

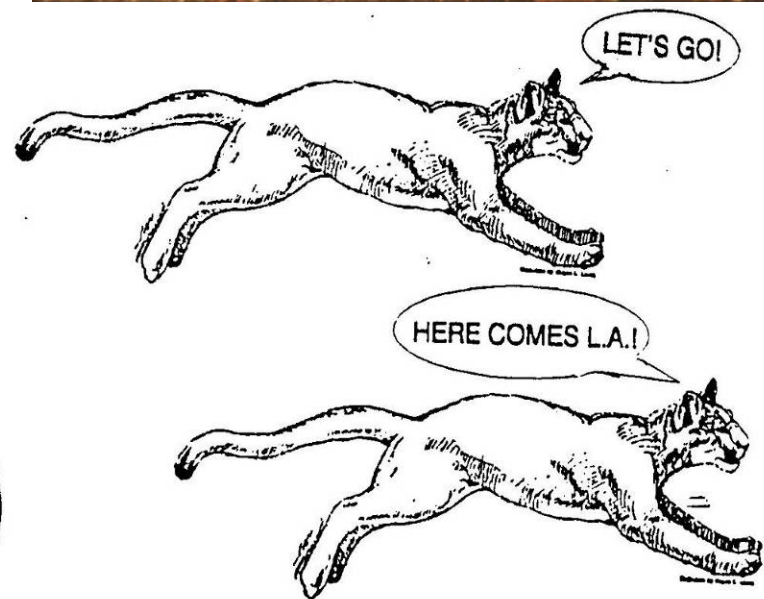
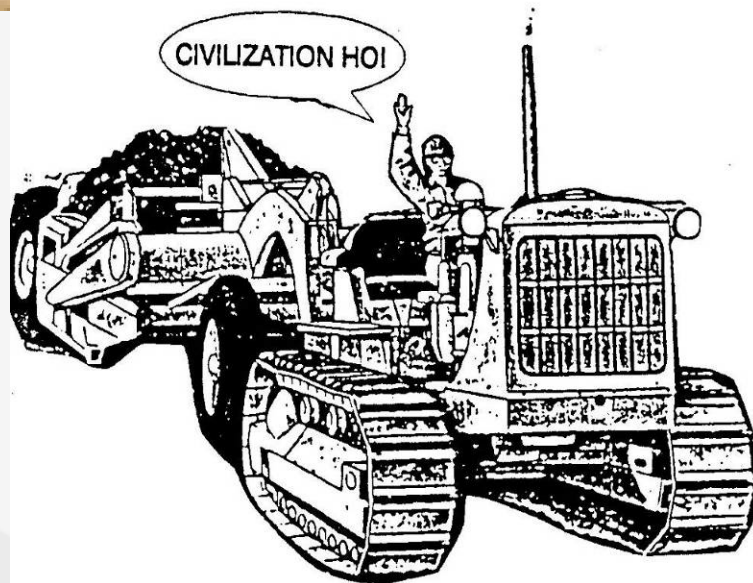
The Big Picture

Paul Beier
Dan Majka
Jeff Jenness

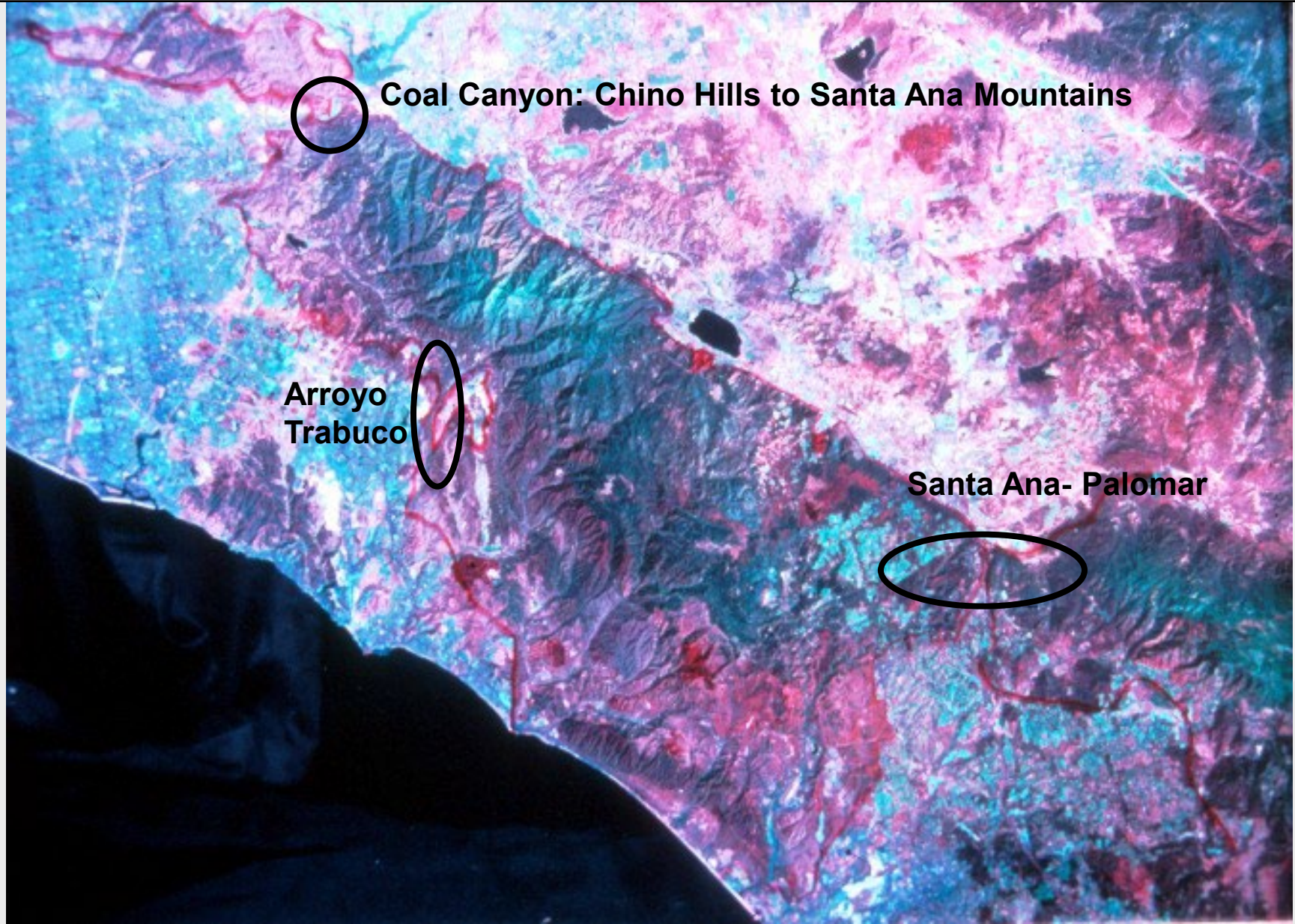
1988 – *California mountain lion study*



Population doomed without immigration



Dispersers used all 3 corridors



These 'corridors' were simply areas developers hadn't got to yet. Imagine how cougars would use well-designed corridors...





South Coast Regional Report – Spring 1999

A *positive* vision...

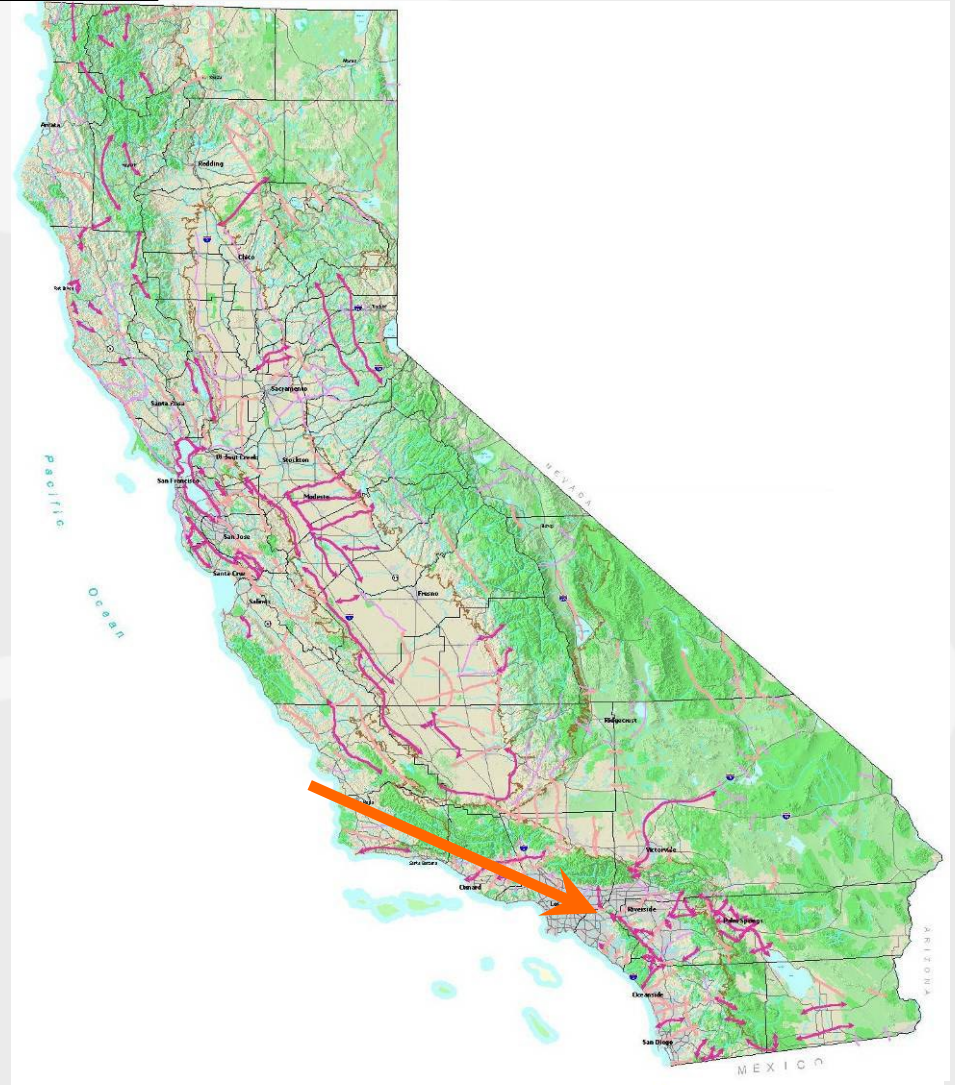
... with two problems:

1. The linkages were too vague for NGOs or planners to implement!

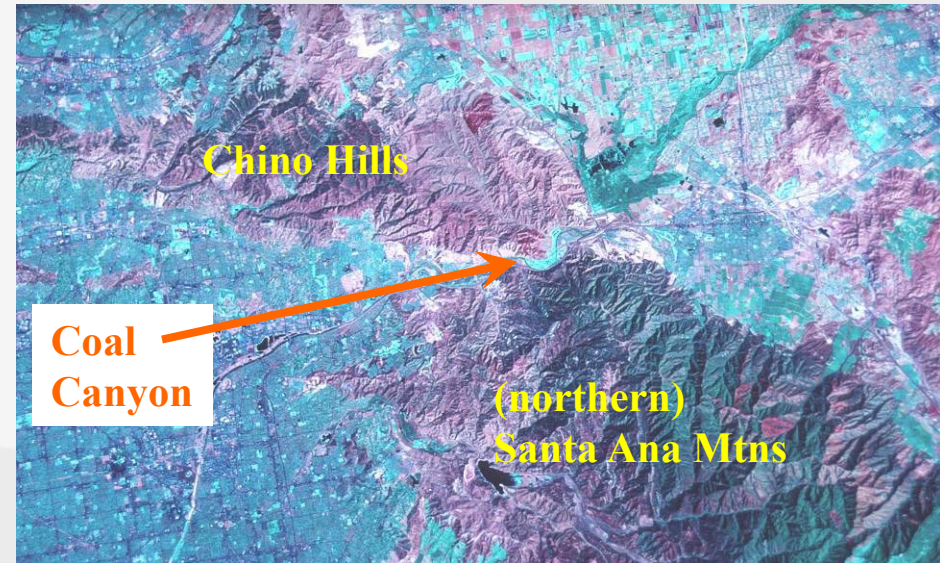
2. It was the vision of one group proclaiming “*Conservationists of California, unite under us!*”



Missing Linkages:
Restoring Connectivity to California landscapes
November 2, 2000
San Diego Zoo



Victory at Coal Canyon



The last parcel is bought.



1st interchange in U.S. to be removed for conservation.

Publication of the *Missing Linkages* report – 7 August 2001

A partner in each linkage area gave the media a local story.

Los Angeles Times

On The Internet: WWW.LATIMES.COM TUESDAY, AUGUST 7, 2001 COPYRIGHT 2001/CC/90 PAGES 50¢ Designated Areas Higher

Press-Telegram

Long Beach, California TUESDAY, AUGUST 7, 2001 25¢ (plus tax)

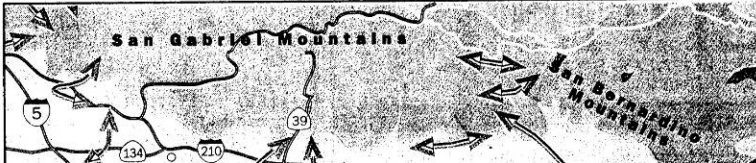
PASADENA STAR-NEWS

Tuesday, August 7, 2001 ♦ www.pasadenastarnews.com 50¢ plus tax

Development threatens Valley wildlife corridors

By Rodney Tanaka and Becky Oskln
STAFF WRITERS

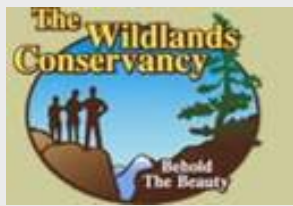
Development severely threatens 59 percent of California's wildlife corridors, the natural pathways traveled by the state's native species, a study released Monday found.



The map shows the San Gabriel Mountains and San Bernardino Mountains. It highlights several wildlife corridors with arrows. Major highways shown include I-5, I-39, I-134, and I-210. The map illustrates the impact of development on these natural pathways.

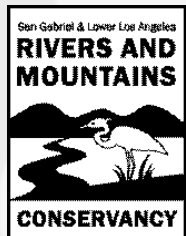
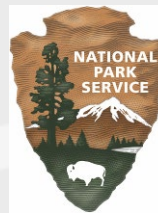
How do we turn all the other “arrows on the map” into protected linkages? ... 17 August 2001 *South Coast Missing Linkages* is born...





With a staff of 2½, we are dwarfed by many, much larger partners.

Leadership is *not* “getting others to follow you!”



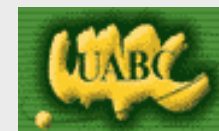
Santa Monica Mountains Conservancy



Environment
Now



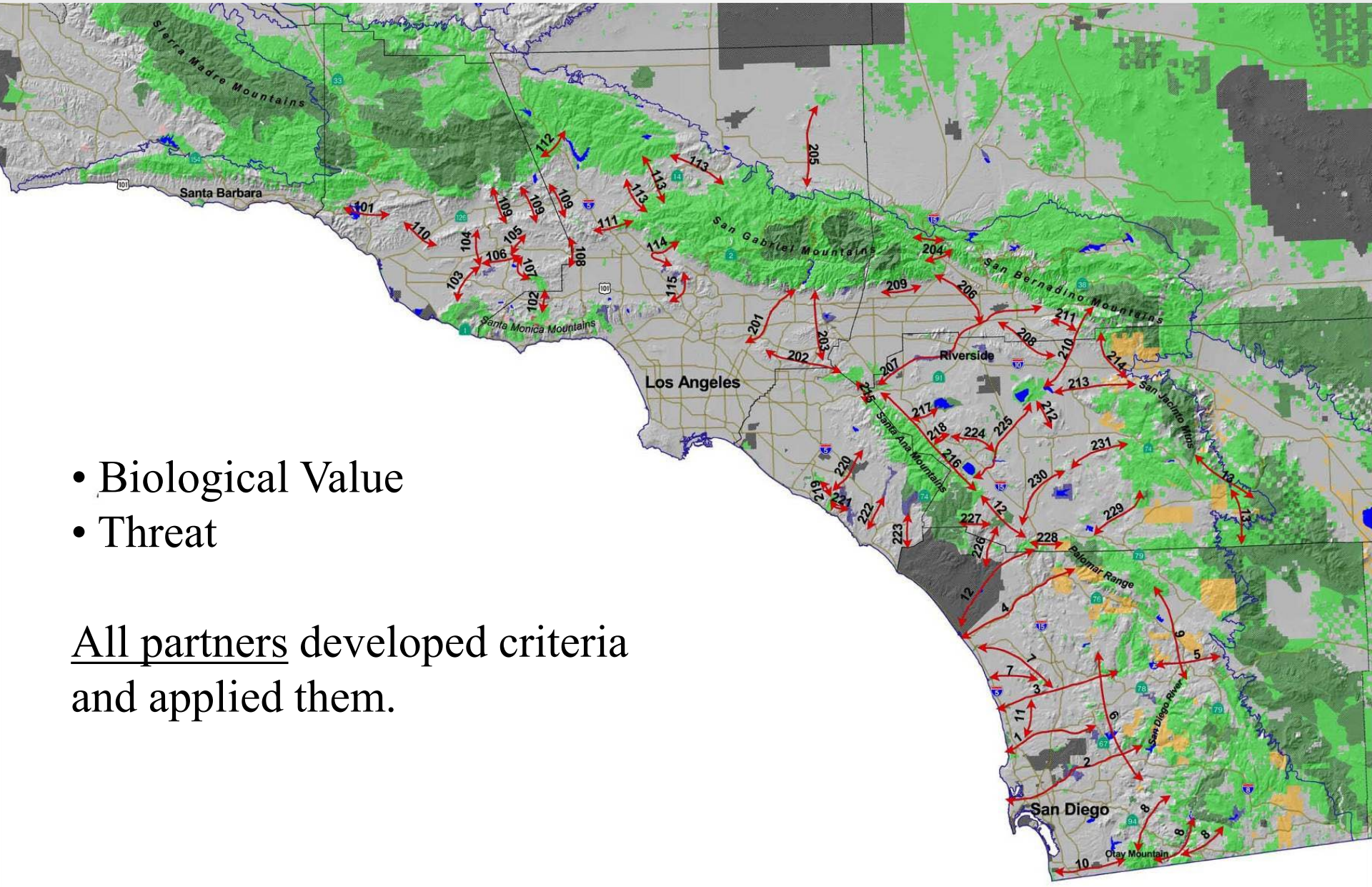
Conabio



First we prioritized 15 of the 69 potential linkages for detailed plans.

- Biological Value
- Threat

All partners developed criteria and applied them.



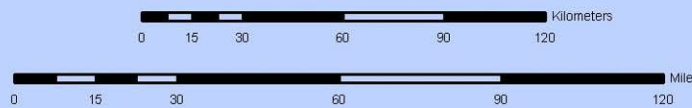


- Project Linkages
- South Coast Ecoregion
- Protected Lands

Land Cover

- Open Space
- Agriculture
- Urban
- Water
- WindWolves

Scale 1 : 2,000,000



For each priority linkage, we recruited local experts to identify 8-30 *focal species*.



Why so many focal species?

Why invite *everybody* to identify focal species?



Types of focal species



Area-sensitive: the first to go when corridors are lost



Habitat specialists: species that most need continuous swaths of each vegtype or topographic element.



Barrier-sensitive: the species hardest to get across the road, canal, fence or other barrier in the area

Why so many focal species?

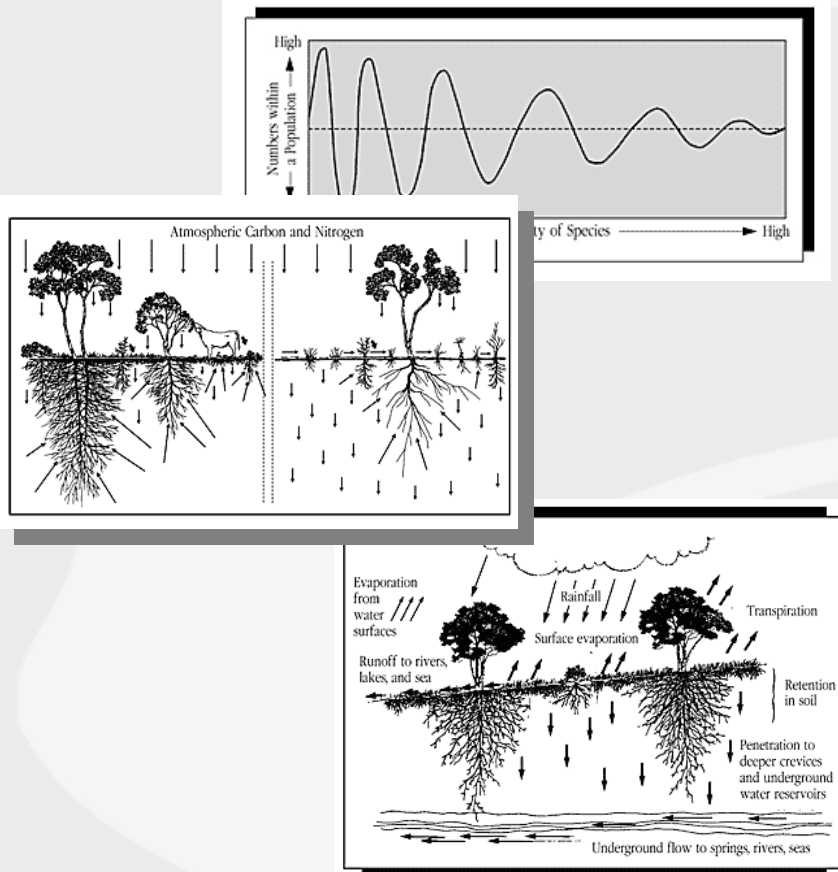
Why invite *everybody* to identify focal species?

(small groups)



More types of focal species

Someday we'll learn how to conserve ecosystem processes directly.



Represent ecosystem processes: predation, competition, disturbance, evolutionary forces

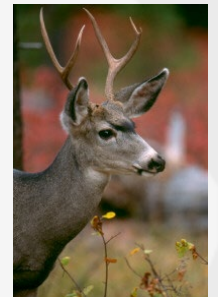
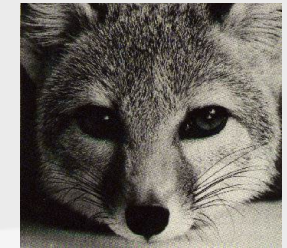
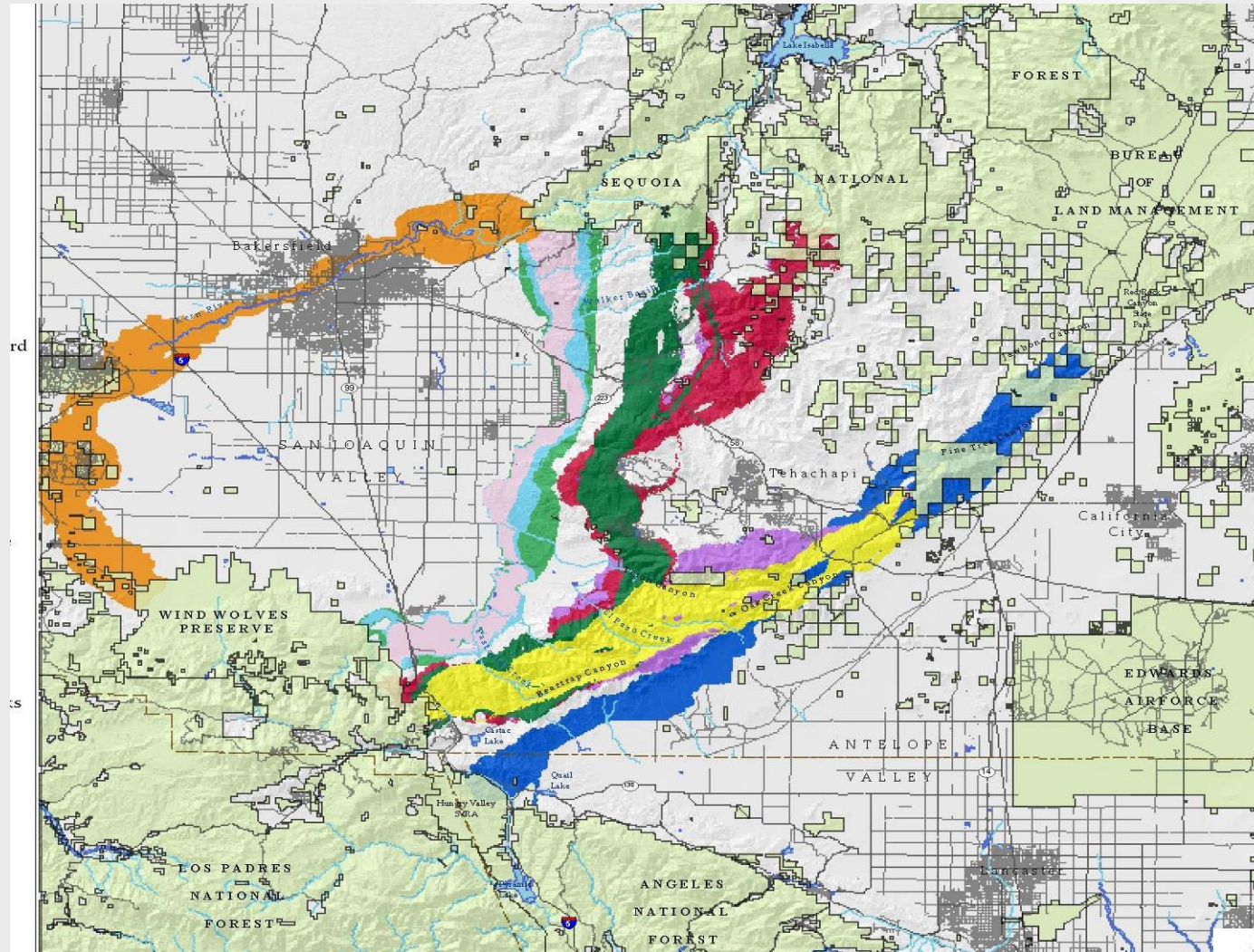
Why not just large carnivores?

After implementing a 'jaguar corridor, investors will be *less* receptive to the 'leopard lizard' corridor.

Carnivores are a great flagship if used as part of a suite of focal species.

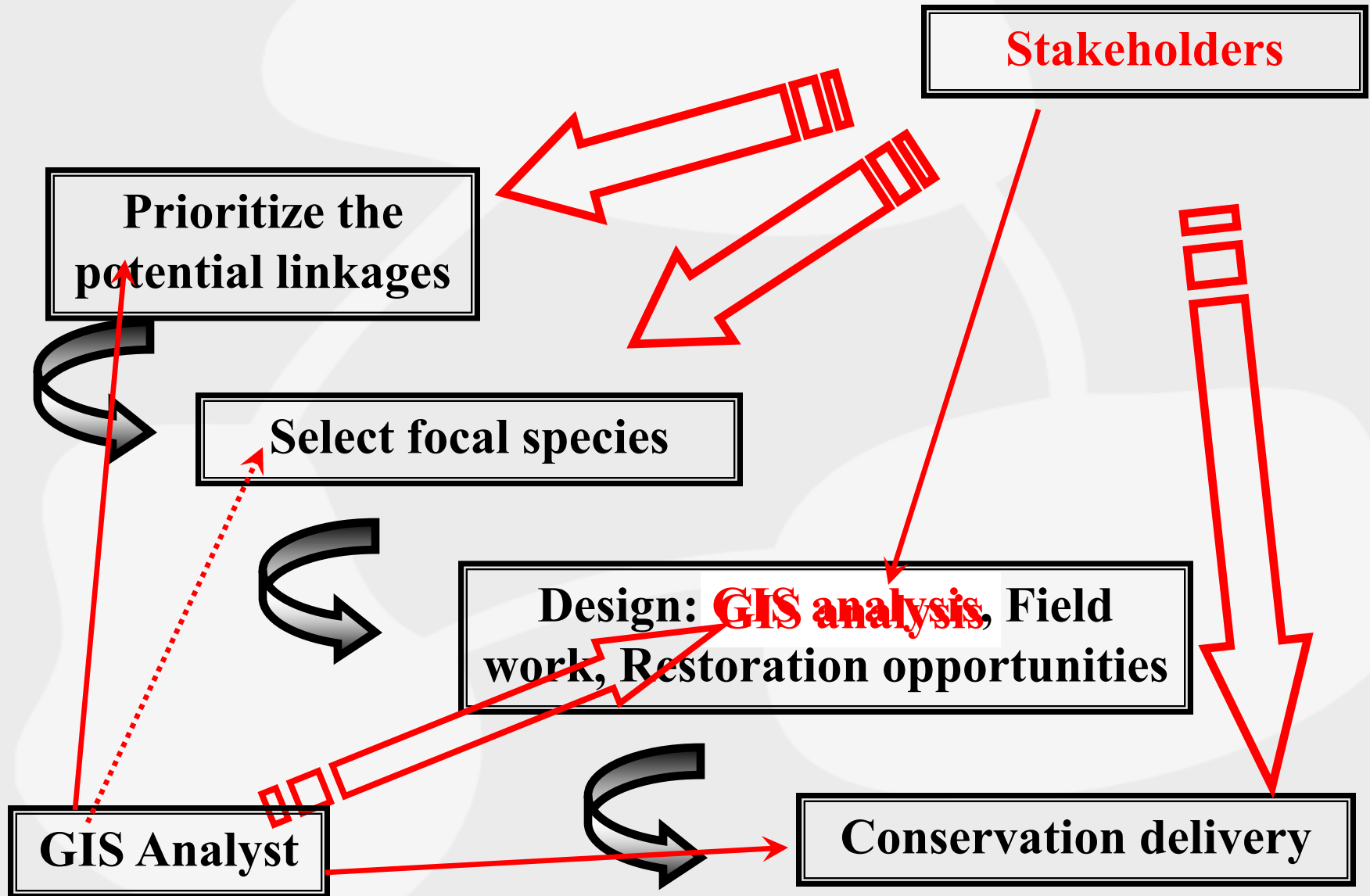


No species left behind



“*corridor*” (1 species);
“*linkage*” (several focal species)

Linkage Design



Comprehensive plans – *not just “getting animals across the road”*

- Locations & types of highway crossing structures
- Zoning
- Lighting, fencing, invasive species
- Priorities for easements & acquisitions
- Engage landowners as stewards





Field assessment



We don't just recommend *mitigation* – we seek ways to *improve* connectivity across barriers.



Implementation!

Santa Ana-Palomar Linkage Design

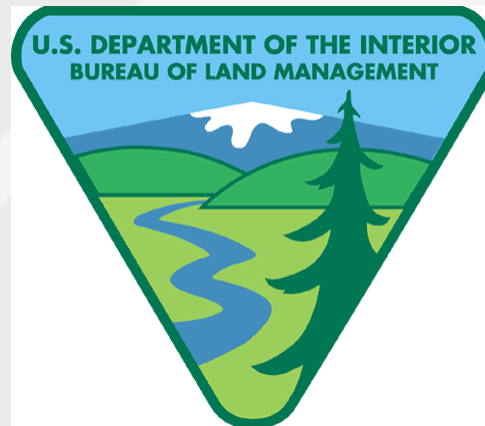


- “Compatible Use Buffer” program at Camp Pendleton may conserve most of the linkage.
- In San Diego County, 92% of Linkage Design is targeted for conservation under Northern San Diego County Multiple-Species Habitat Conservation Plan.
- Linkage design is helping justify acquisitions by **five** conservation agencies.
- **News Flash!:** Southern California Association of Governments will target transportation mitigations in 11 linkage design areas.

ARIZONA'S MISSING LINKAGES WORKSHOP

Biodiversity at the Crossroads

April 13th and 14th, 2004



U.S. Department
of Transportation

**Federal Highway
Administration**



WILDLANDS PROJECT



**NORTHERN
ARIZONA
UNIVERSITY**

School of Forestry

Thinking Like a Mountain

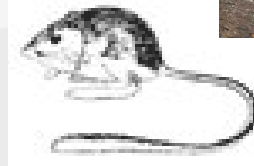
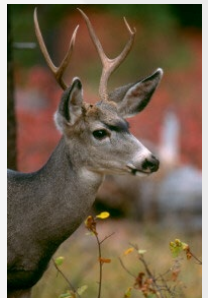
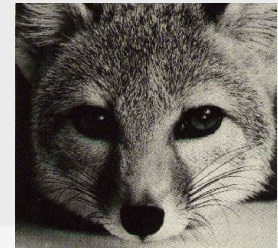
Positive: work **for** positive vision, not **against** bad ones.

Collaborative: None of us are as smart as all of us. Partner on *everything* – even *science* issues. Lead by serving.

Comprehensive: No species left behind

More Comprehensive: roads *and* land conservation *and* management practices

Beyond mitigation: make the landscape *more permeable* than it is today!

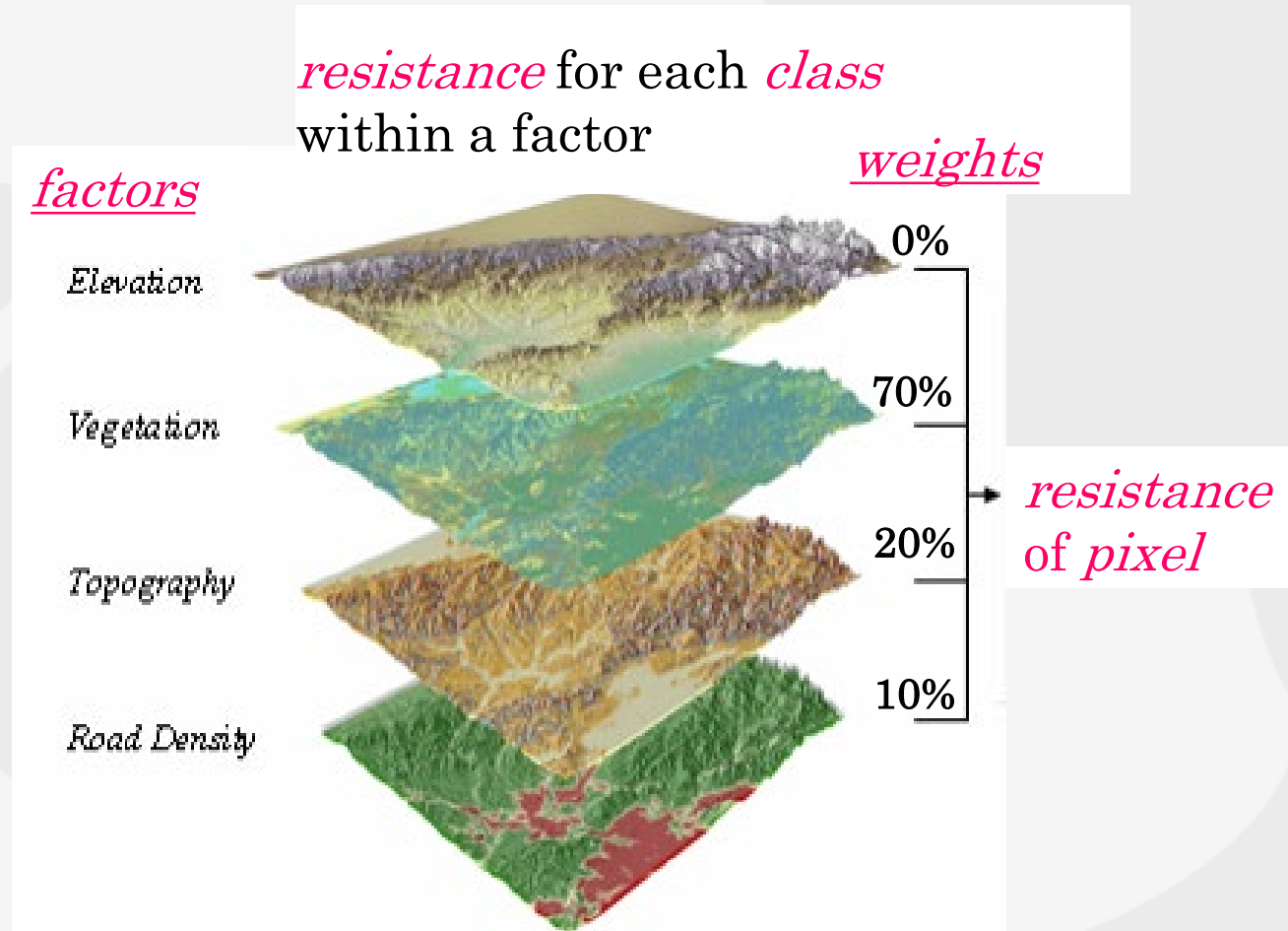


The Big Picture, part III: Issues to resolve before you start using CorridorDesigner

1. Alternatives to least-cost models
2. Prioritizing potential linkages
3. Defining wildland blocks, planning area
4. Selecting focal species
5. Deciding which focal species get a corridor model



1. *least-cost models*— the only way to go?



Identify the area with lowest resistance (cumulative travel cost) for the focal species between wildland blocks.

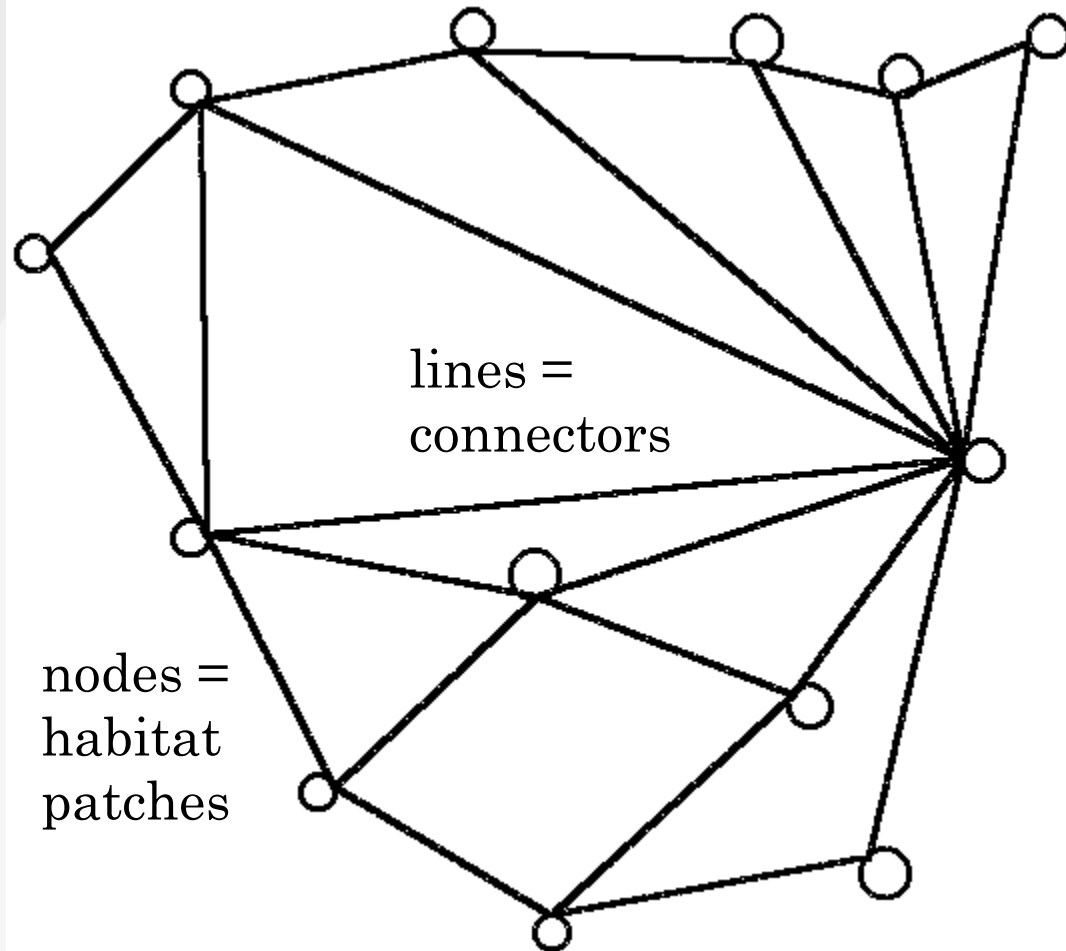


Least-cost models – the only way to go?

graph theory

circuit theory (McRae)

Both use cost-weighting to calculate effective length of line segments.



Used to
DESCRIBE
- not
DESIGN
linkages.



Least-cost models – the only way to go?

Simulated annealing – MARXAN, PATCH

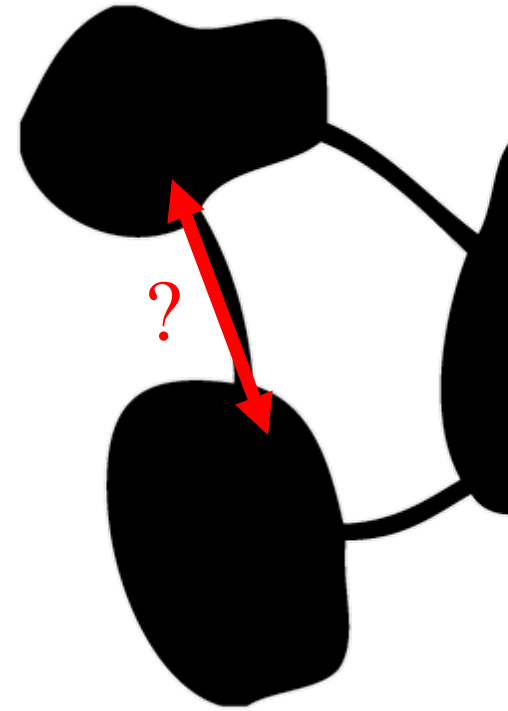
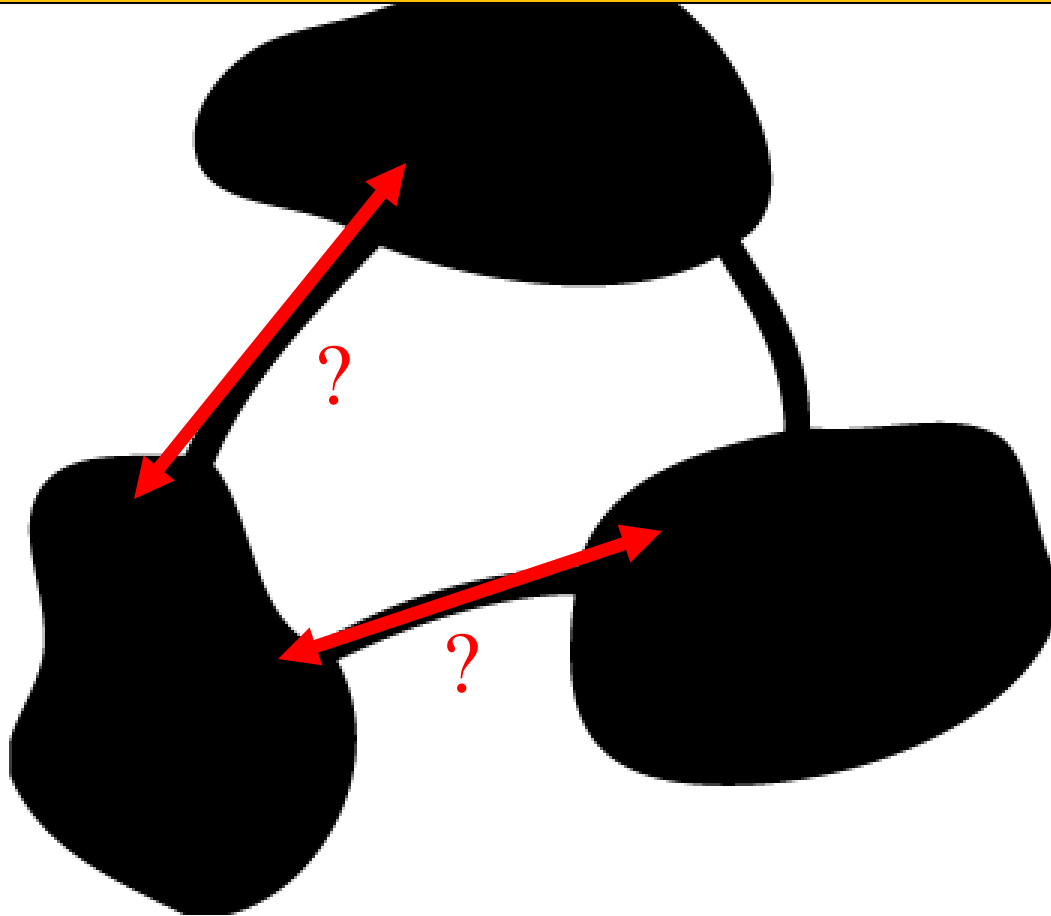
Designs wildland blocks and corridors simultaneously.

PATCH requires estimates of how much each polygon contributes to population viability – can't be run for most focal species.

Annealing algorithms can achieve goals (representation or species viability) by enlarging wildland blocks – with no corridor at all!

In many landscapes, the wildland blocks are fixed. LCM efficiently designs corridors between fixed blocks.

2. Prioritizing: which potential linkages need detailed plans?

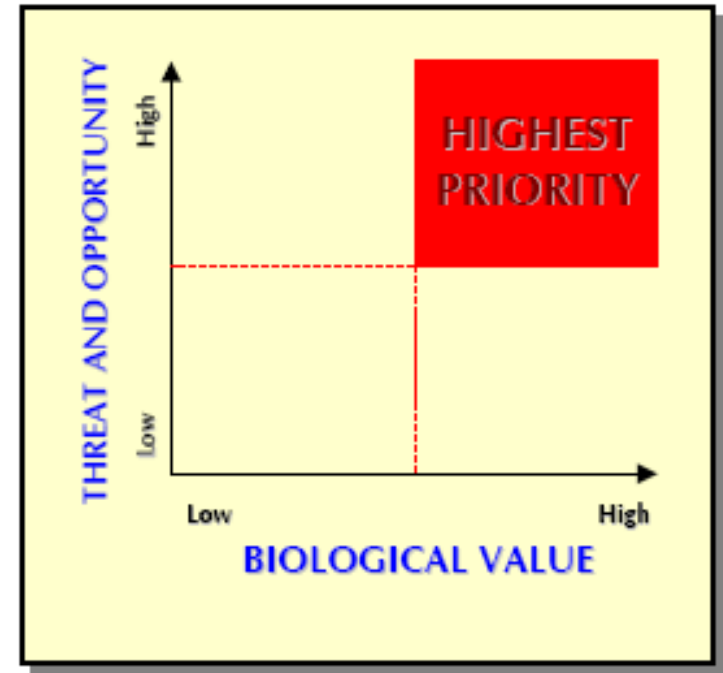


* An issue where stakeholders are more important than the GIS analyst, but both work together.

Prioritizing: which potential linkages need detailed plans?

Biological importance

- size of the wildlands connected
- habitat quality in smaller wildland
- restorable habitat quality in the potential linkage



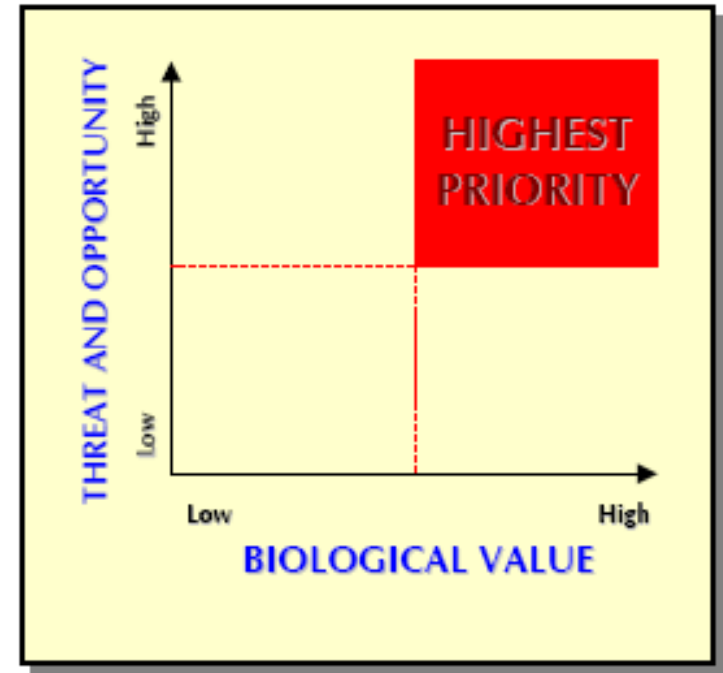
Prioritizing: which potential linkages need detailed plans?

Biological importance

- * size of the wildlands connected
- * habitat quality in smaller wildland
- * habitat quality in the potential linkage

Threat and opportunity

- Risk that roads or urbanization will sever the linkage if we do not act now.
- active conservation effort



Prioritizing: which potential linkages need detailed plans?

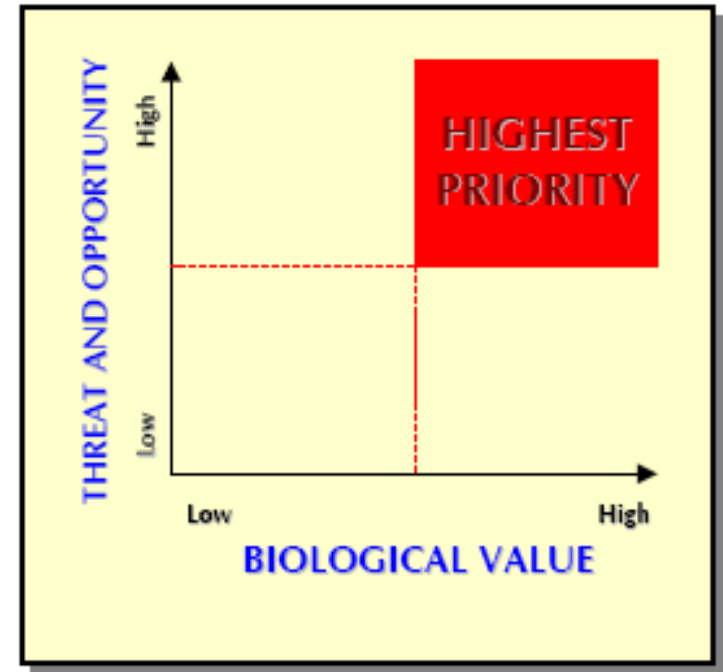
Biological importance

- * size of the wildlands connected
- * habitat quality in smaller wildland
- * habitat quality in the potential linkage

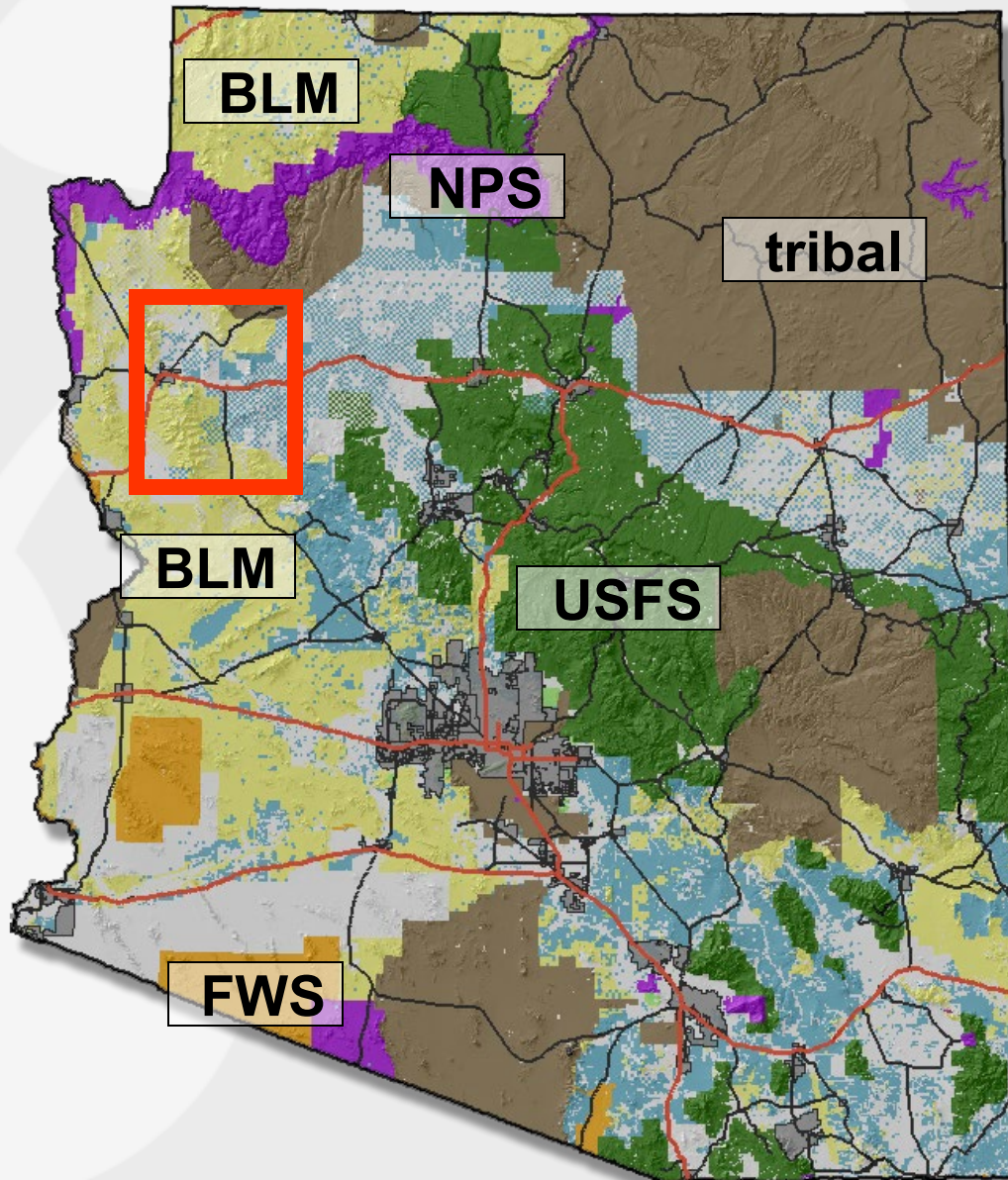
Threat and opportunity

- * risk that roads or urbanization will sever linkage
- * active conservation effort

The identity & weighting of the criteria is less important than stakeholder involvement in selecting & weighting them.



3. What to connect?

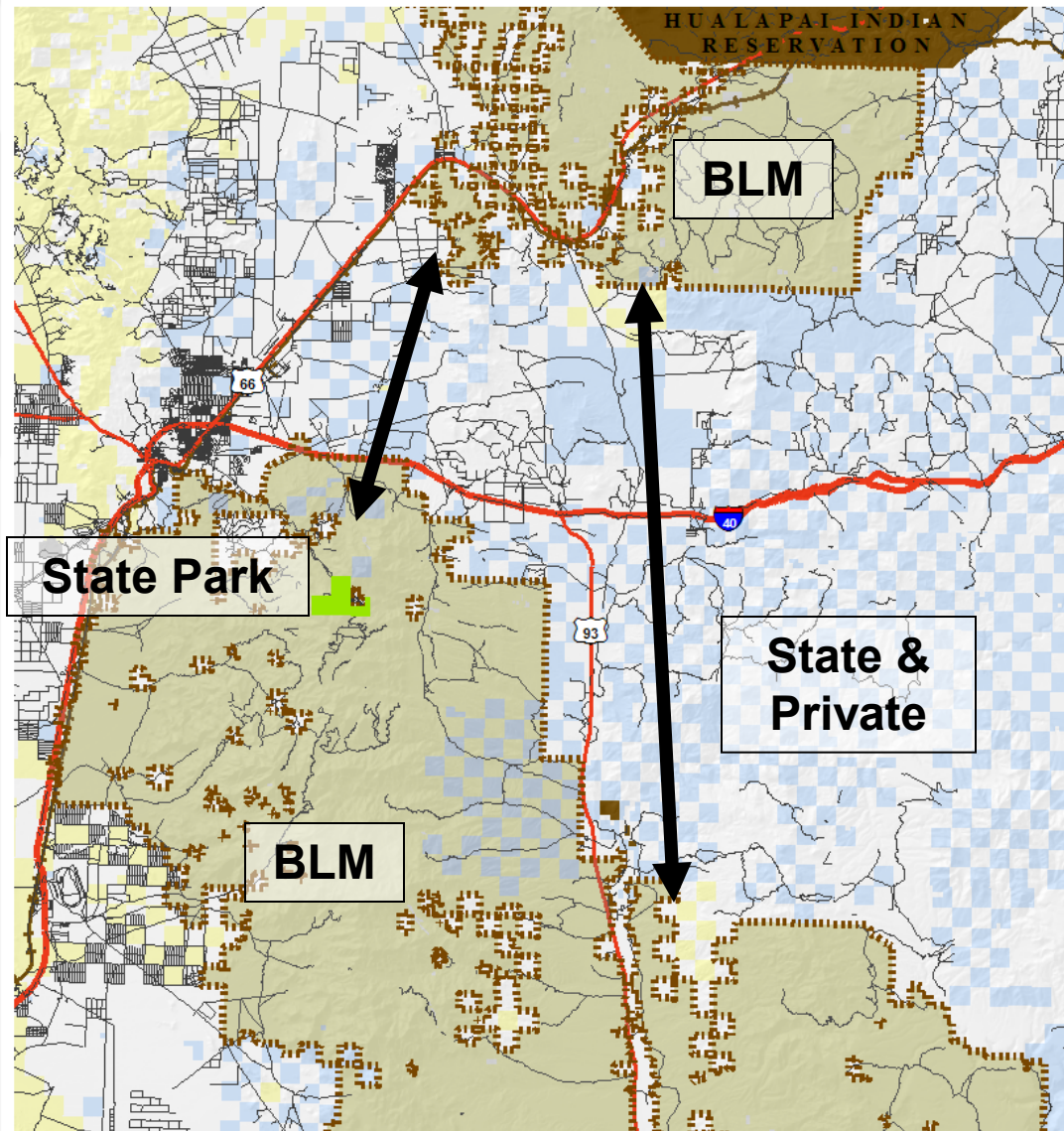


What to connect?

**wildland
block*

**planning
area*

**matrix*



Another issue where stakeholders are most important.

4. Who to connect? Selecting focal species

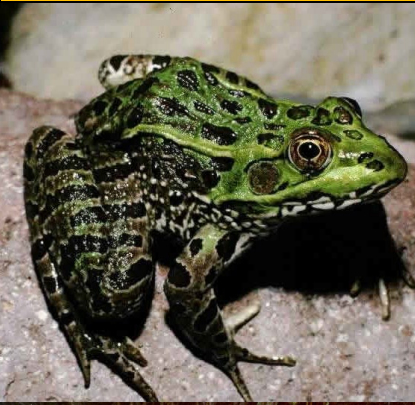


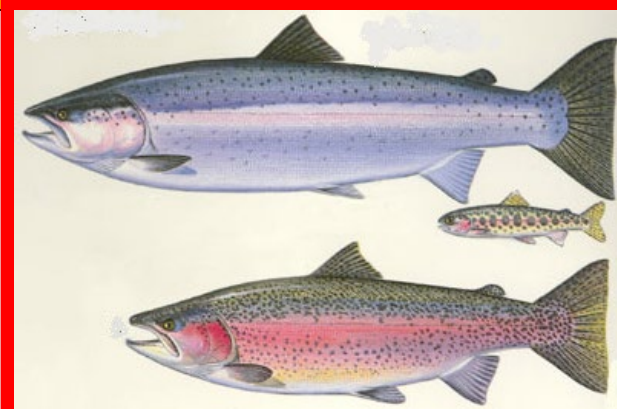
Photo credits: Robert Shantz, Jim Rorabaugh

5. Which species get a corridor model?



Photo credits: Robert Shantz, Jim Rorabaugh

1. can't model movement as fx of GIS layers, or
2. occur in matrix, but not in wildland blocks



These species are NOT “dropped”!!
GIS analysis may include habitat modeling
(wind-dispersed plants, insects), or buffered
perennial waters (fish).

Two kinds of corridor users

- ‘corridor dwellers’ need more than one generation to move their genes between wildland blocks.
- ‘passage species’ can move between block in a single movement event of a few hours.
- The distinction is not a species trait, but depends on the organism and the landscape.