California Essential Habitat Connectivity Project

Multidisciplinary Team Meeting Four

February 10, 2010

Welcome and Introductions

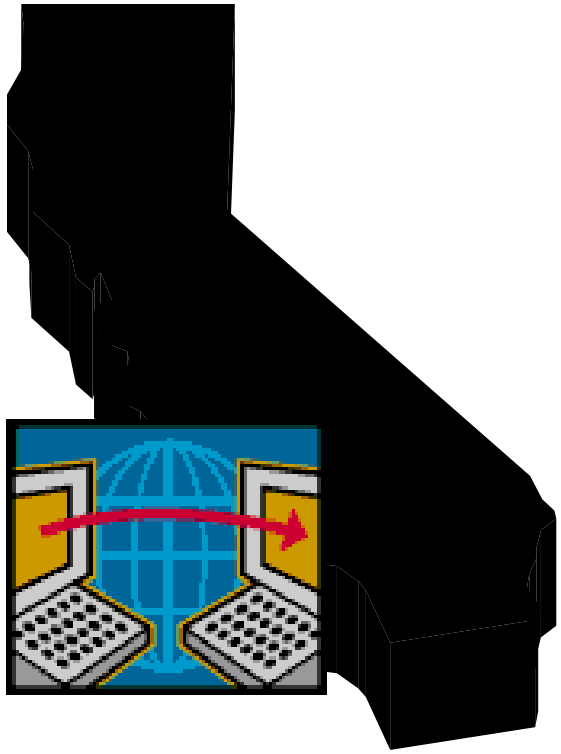
Partnerships and Implementation

Sharon Scherzinger, CA Dept. of Transportation, Chief, Division of Transportation Planning

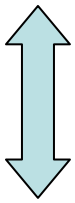
- Integrated Regional Blueprint Idea and Background
- Integration with Transportation Planning
- Framework for Considering Roads

Integrated Regional Blueprint Idea and Background

- How do these data compare to other inputs that are used or will be used in the Statewide Integrated Regional Blueprint
- Integrated Statewide Land Use Transportation Model
- More compact growth patterns that alleviate pressure on natural resources



Integration with Transportation Planning



Framework for Considering Roads

Partnerships and Implementation

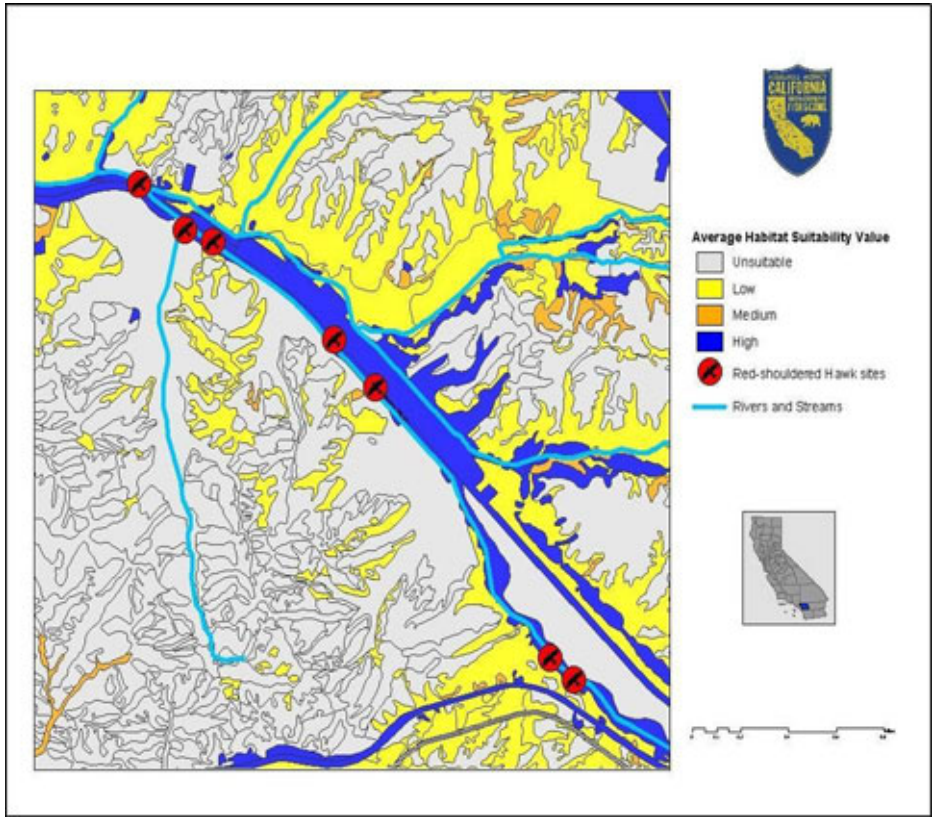
Kevin Hunting, CA Dept. of Fish & Game, Chief Deputy Director

- Legislation
- Statewide Planning for Wildlife Conservation
- Conserving Connectivity Beyond California's Borders

Legislation

AB 2785 (2008) amends Sections 1930 and 1932 of the Fish and Game Code, requiring CDFG to map essential wildlife corridors and habitat linkages.

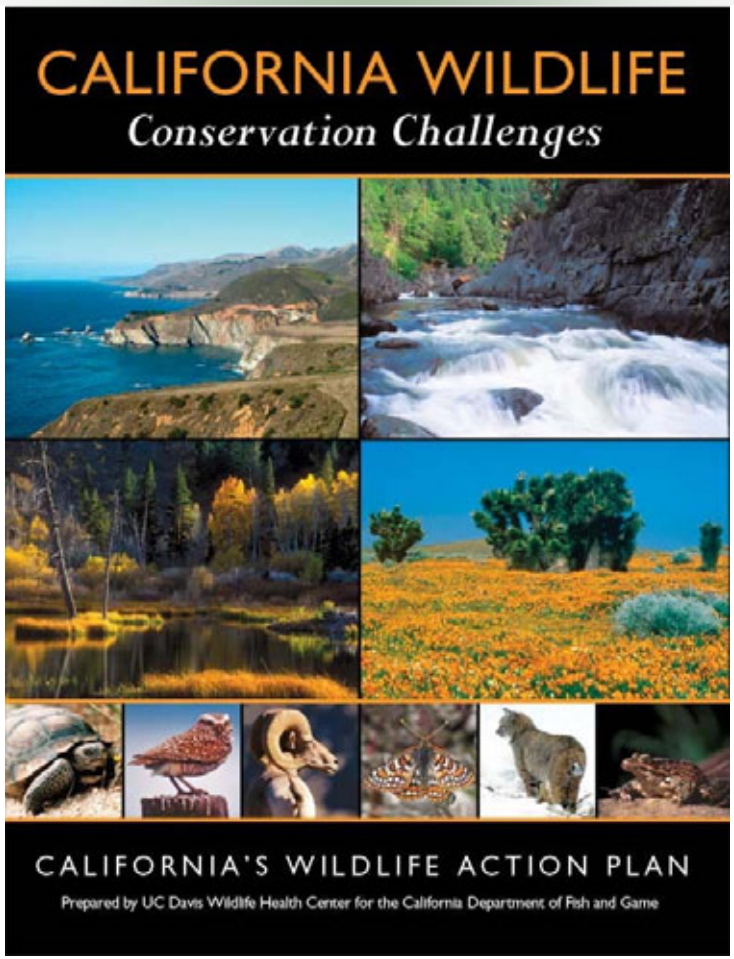
Legislation



Sample of Using Fine-Scale Vegetation
Data to Model Habitat Suitability for a Single Species

- SB 85 (2007) requires CDFG to develop vegetation mapping standards and report on wildlife corridors in the state.
- The Essential Habitat Connectivity data will be used together with CDFG's standardized and fine-scale vegetation data to plan for connectivity.

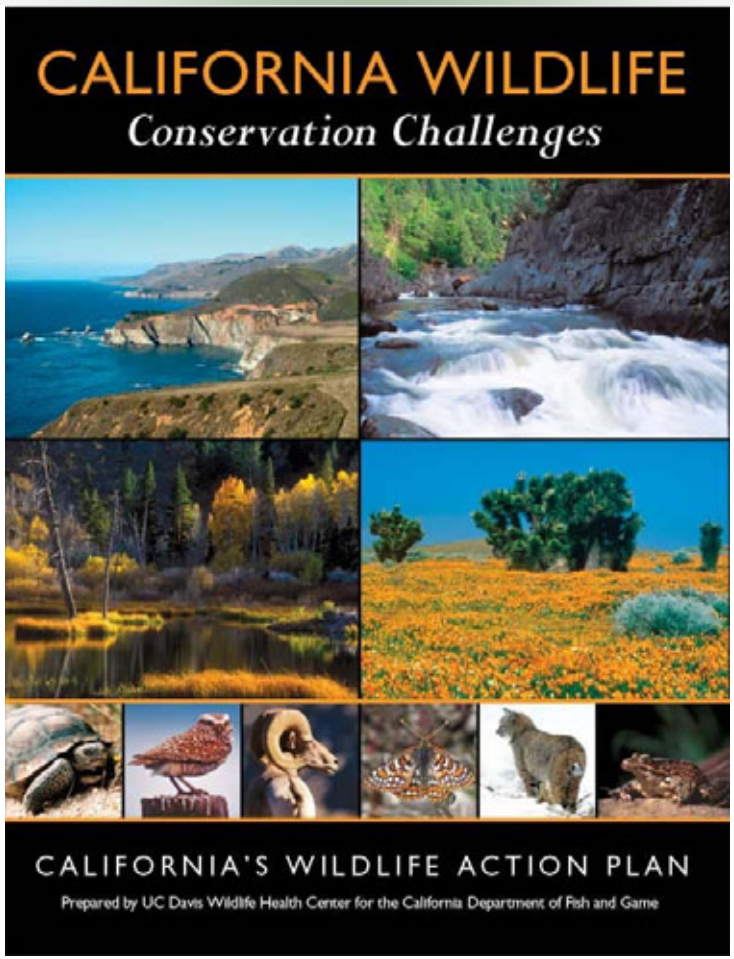
Statewide Planning for Wildlife Conservation



Three primary questions:

- What are the species and habitats of greatest conservation need?
- What are the major stressors affecting California's native wildlife and habitats?
- What are the actions needed to restore and conserve California's wildlife?

Statewide Planning for Wildlife Conservation

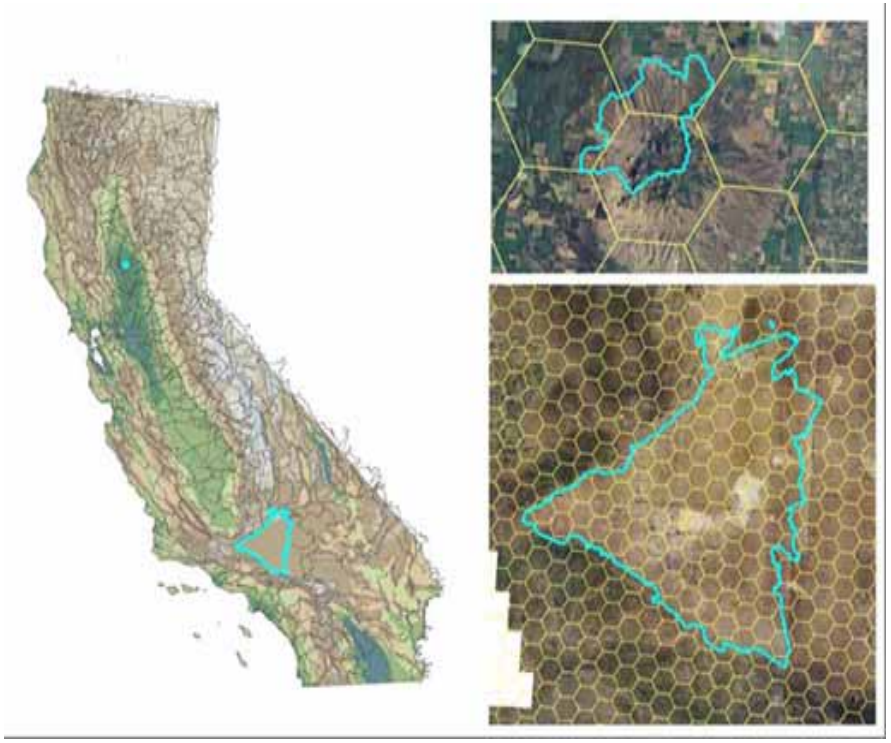


Fragmentation is identified as a major stressor.

- Connectivity conservation is identified as a key action both statewide and in four of eight terrestrial ecoregions.
- No map accompanied the initial plan.
- The California Essential Connectivity Project provides data for identifying and prioritizing these linkages.

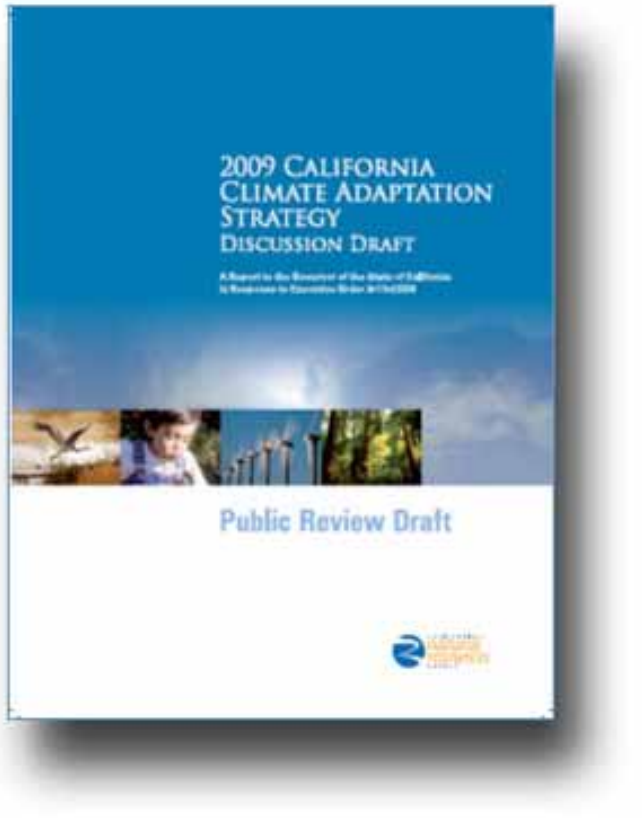
Statewide Planning for Wildlife Conservation

Areas of Conservation Emphasis (ACE) II



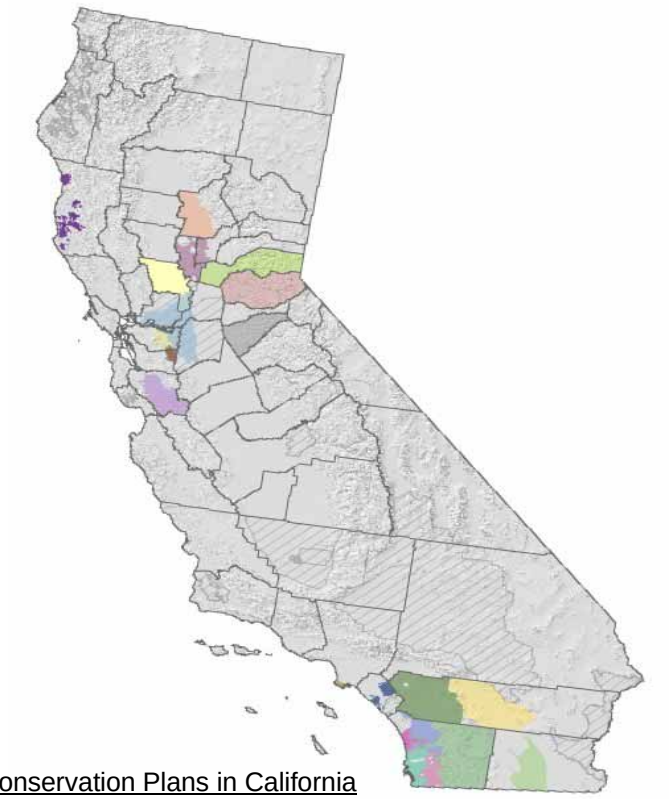
- Prioritization of lands supporting high biological and recreational value.
- Decision support system still being designed. One option adds the relative weights of a number of data layers all in a standard format, such as a hexagon grid.
- Essential Habitat Connectivity data will be an input layer.

Statewide Planning for Wildlife Conservation



- Calls for creating a large-scale, well-connected, sustainable system of protected areas across the state.
- Follows an assumption that climate change will cause shifts in the ranges and distributions of individual species.
- Those species that can respond will require movement corridors.
- Essential Habitat Connectivity map identifies natural landscape corridors least resistant to movement by organisms.

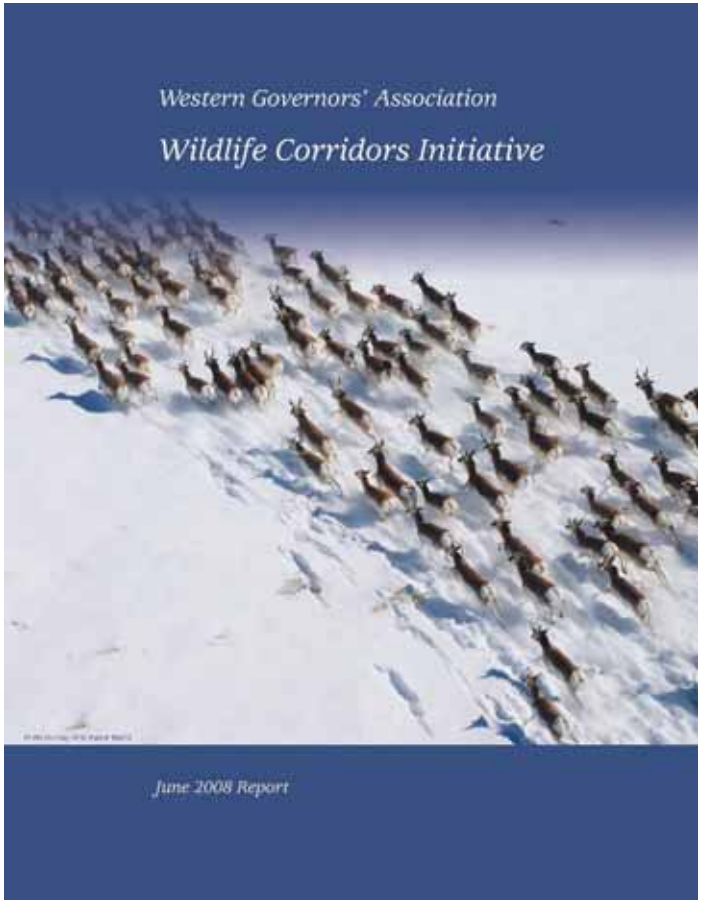
Statewide Planning for Wildlife Conservation



Regional Conservation Plans in California
Natural Community Conservation Plans (NCCPs)
Habitat Conservation Plans (HCPs)
Large Coordinated Resource Management Plans (CRMPs)

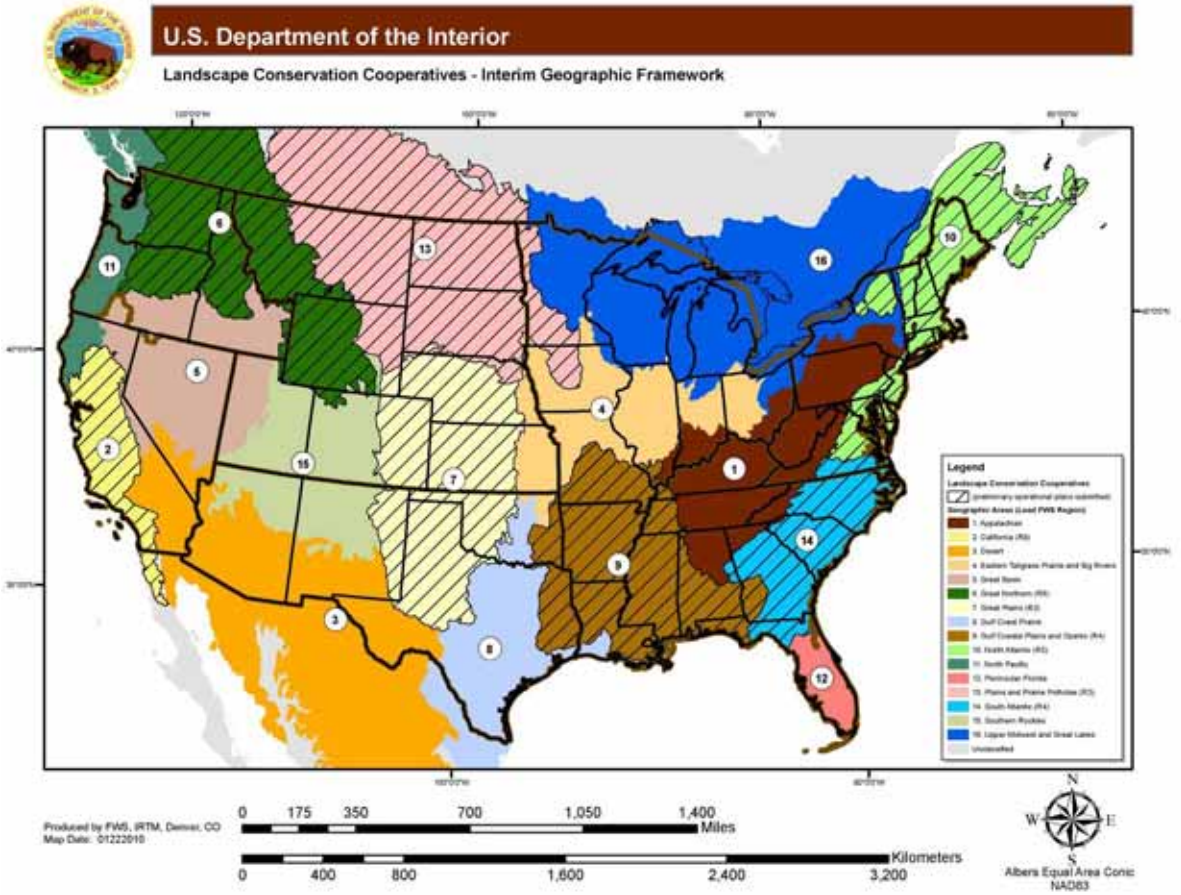
- 24 active NCCPs, covering over 9 million acres in California.
- 8 are approved and permitted; 16 are in the planning phase.
- NCCP Act of 2003 requires every plan to establish linkages to adjacent habitat areas beyond its planning boundary.
- Essential Habitat Connectivity map can support planning across boundaries.

Conserving Connectivity Beyond California's Borders



- In 2008, the Western Governors' Association established the Western Governors' Wildlife Council, a group of representatives from 19 western states.
- Mission is to identify key wildlife corridors and crucial wildlife habitat in the west and coordinate policies and tools for preserving those landscapes.
- California is actively participating to help standardize data collection and modeling approaches so connectivity conservation can be achieved across state boundaries.

Conserving Connectivity Beyond California's Borders



- Landscape Conservation Cooperatives were Initiated by the U.S. Fish and Wildlife Service to emphasize strategic, science-based conservation on a landscape scale across multiple agencies and organizations.
- The Essential Habitat Connectivity Map will be a key data source used by each of the four Landscape Conservation Cooperatives that cover California.

Project Goals

- Produce a statewide assessment of essential habitat connectivity to
  - Comply with Section 6001 of SAFETEA-LU
  - Help meet requirements set forth in AB2785 and SB85
  - Incorporate natural resources considerations into transportation & land use planning efforts
  - Increase the efficiency and cost-effectiveness of transportation & land use planning
  - Help sustain California's unique natural heritage
  - Provide framework for detailed regional studies

Engage Multidisciplinary Team
- evaluate habitat connectivity and prioritization methods
- reach consensus

Team Meeting #1
Introduce Project & Approach

Develop Work Plan with Multidisciplinary Team

Team Meeting #2
Criteria Development, Prioritization, and Consensus Building

Statewide Connectivity Map
- Compare with existing Conservation Plans

18 Month Project
completion anticipated February 2010

Biological Characteristics Analysis

Develop Strategy
- guide future regional connectivity analysis, planning, and implementation

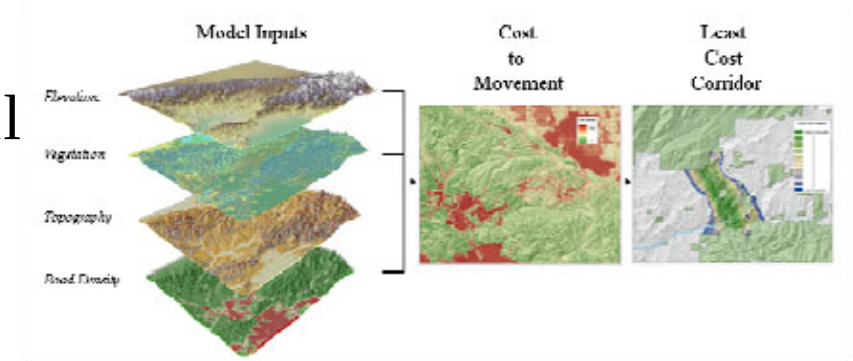
Team Meeting #3
Review Draft Maps/Strategic Plan

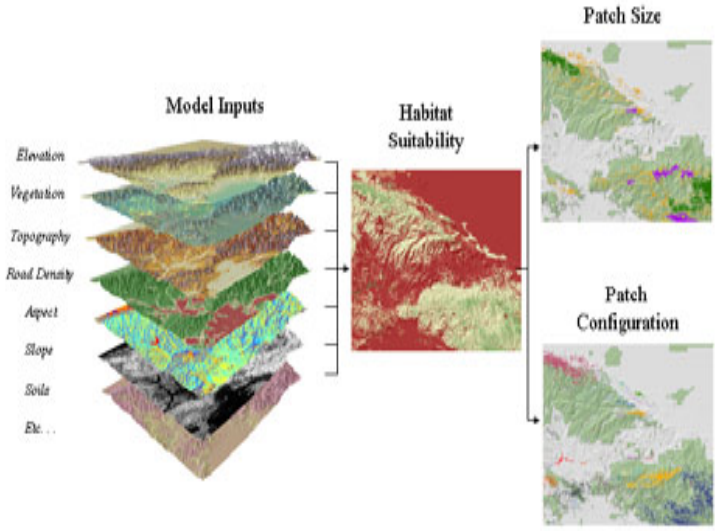
Team Meeting #4
Review Final Maps/Strategic Plan

Collaboration

Technical Approach

- Reach consensus on analytical approach for statewide connectivity analysis & prioritization
- Develop transparent, scientifically-defensible, and repeatable procedure





Products

- Statewide Essential Habitat Connectivity Map & Model
- Biological Characteristics Analysis
- Strategy that
  - outlines the steps to complete regional and local scale connectivity analyses
  - helps end users interpret results

Major Steps

1. Define Analysis Area (California + ?)
2. Define Areas to Connect (Natural Landscape Blocks)
3. Define Linkage Polygons (Essential Connectivity Areas)
4. Characterize and describe the resulting Essential Connectivity Network
5. Compare to Other Conservation Maps
6. Provide Recommendations for Future Planning:
   - Regional connectivity plans
   - Local Linkage Designs
   - Improving road-crossings
   - Implementing and institutionalizing connectivity plans

Step 1. Define Analysis Area

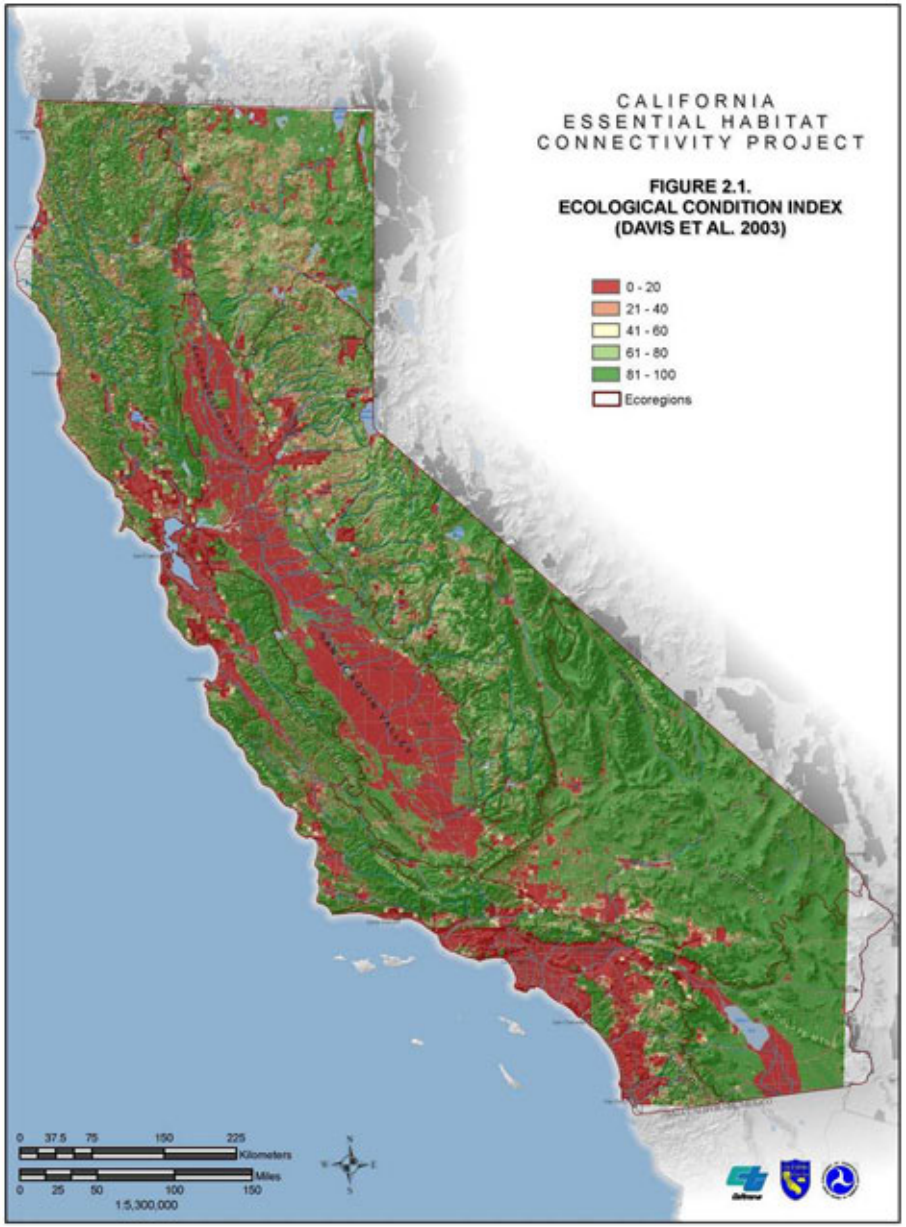
- The State of California
- Plus protected areas and designated critical habitat in adjoining states
  - We did not model beyond California boundaries
  - We drew placeholder “sticks” for future analysis with neighboring states

Step 2. Define Areas to Connect

- Areas to connect = “Natural Landscape Blocks” (NLBs)
- NLBs are large areas that tend to be:
  - Mostly natural and ecologically intact
  - Relatively well conserved
  - High in biological resource values

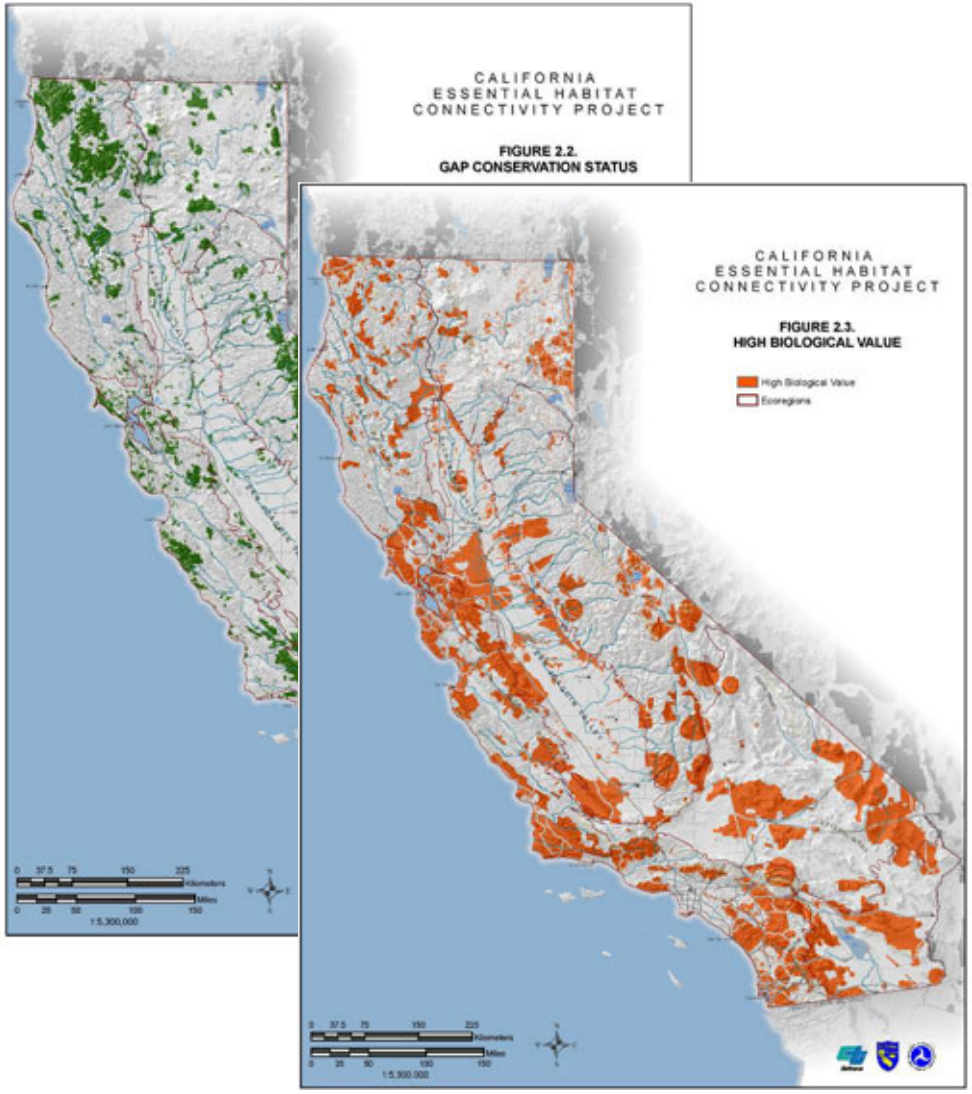
Delineating Natural Landscape Blocks #1

- Primary Input = Ecological Condition Index (Davis et al. 2003, 2006) derived using:
  - Land conversion status
  - Residential housing impacts
  - Road effects
  - Forest structure (in forested areas)



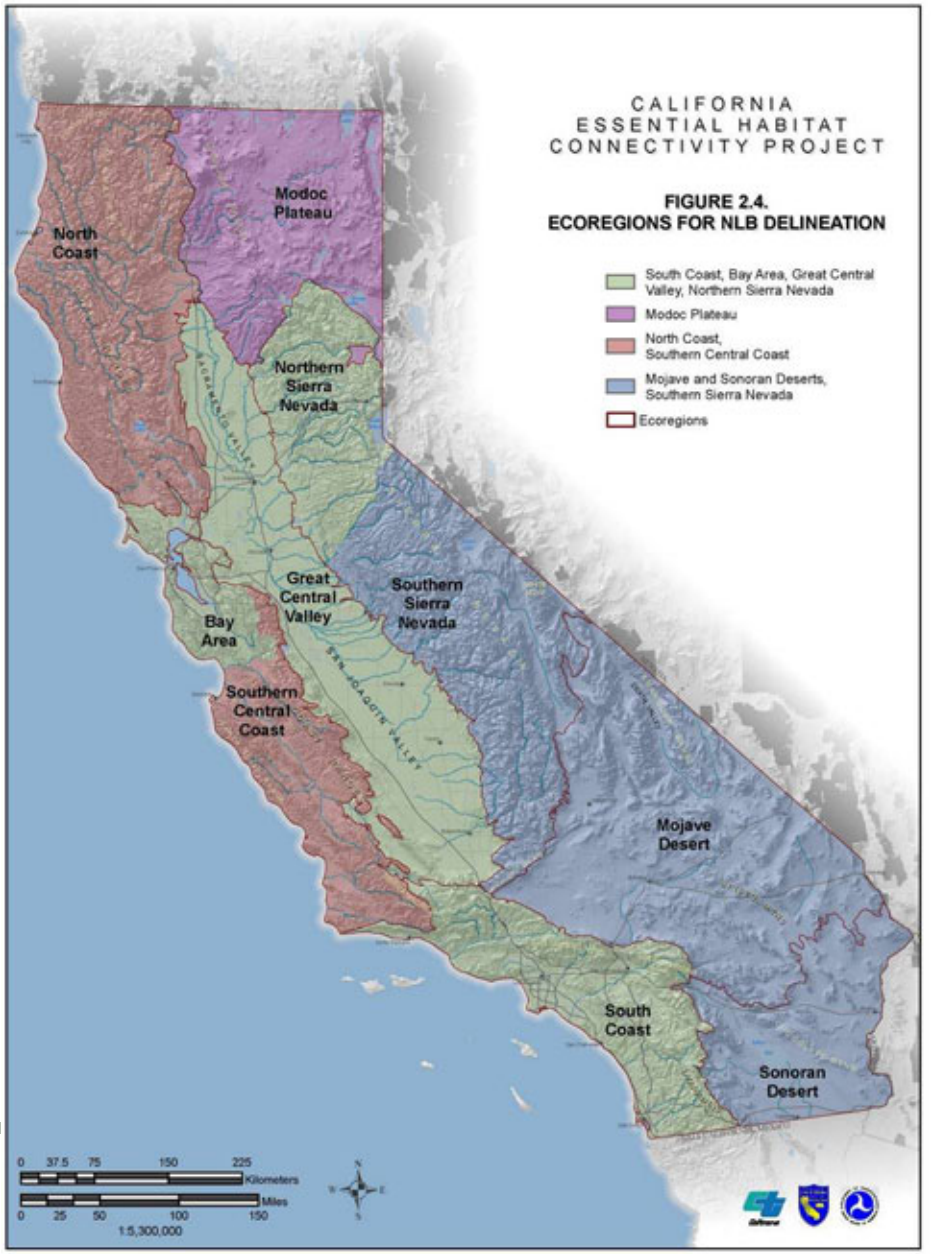
Delineating Natural Landscape Blocks #2

- Modifiers to Ecological Condition Index Map:
  - Protection Status (GAP1 and GAP2 lands automatically qualify)
  - Areas of known High Biological Value get a "bonus":
    - Critical Habitat
    - Essential habitat
    - Wetlands and vernal pools
    - Endemism hotspots
    - BLM Areas of Critical Environmental Concern



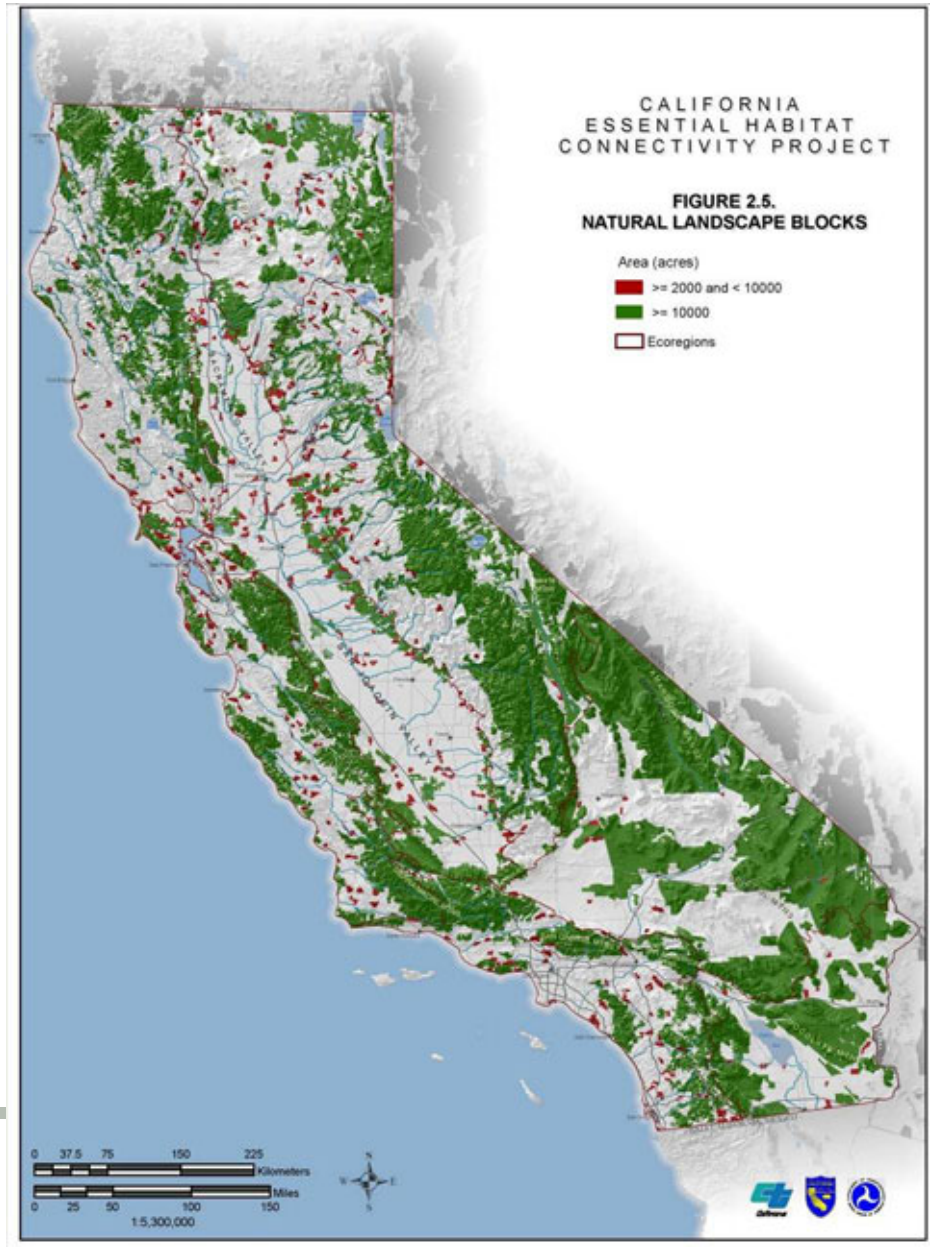
Delineating Natural Landscape Blocks #3

- Apply Ecoregion-specific rules:
  - *South Coast, Bay Area, Great Central Valley, Northern Sierra Nevada:*
    - ECI > 70 *OR*
    - ECI > 51 AND High Biological Value
  - *Modoc Plateau:*
    - ECI > 95 OR
    - ECI > 71 AND High Biological Value
  - *North Coast, Southern Central Coast:*
    - ECI > 95
  - *Mojave and Sonoran Deserts and Southern Sierra Nevada:*
    - ECI > 95 AND High Biological Value



Delineating Natural Landscape Blocks #4

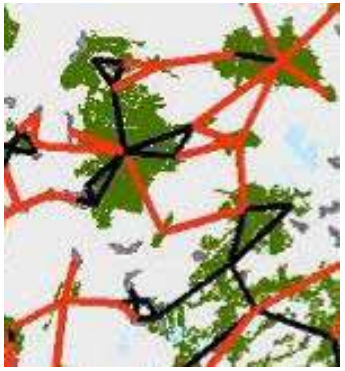
- Final Refinements:
  - Blocks split by major and secondary roads (50-m buffer)
  - Eliminate small and edge-effected blocks:
    - Blocks < 2,000 acres
    - Blocks < 2 km across
  - Apply size thresholds for blocks to serve as termini for connectivity models:
    - Blocks >10,000 acres used throughout the state
    - Blocks 2,000 – 10,000 used in more altered ecoregions (South Coast, Bay Area, Great Central Valley, Northern Sierra Nevada)



Step 3. Define Linkage Polygons

- Decide which NLBs should be linked:
  - Rules for drawing *sticks*
  - Rules for consolidating and prioritizing sticks
- Different treatments for different stick *types*:
  - Least-cost corridors (*Essential Connectivity Areas*)
  - Road mitigation / enhancement links
  - Inter-state links

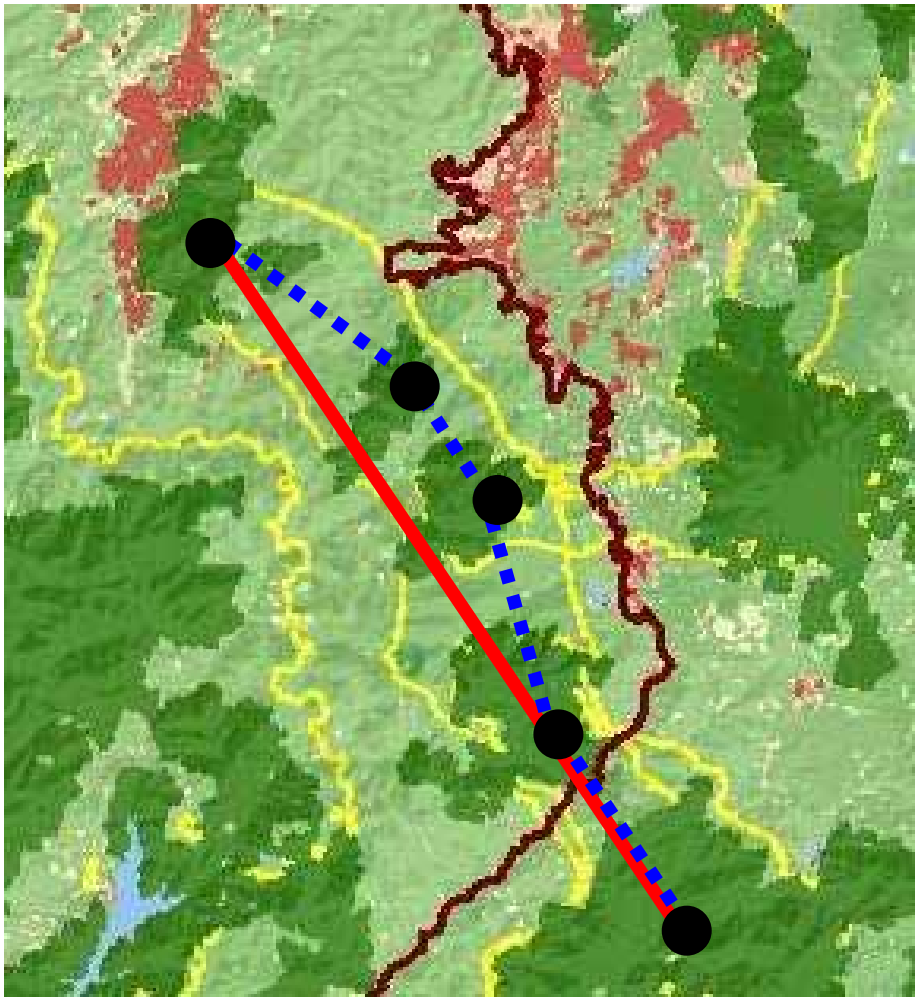
Rules for Drawing Sticks



- Sticks represent the *need* for a linkage, not the actual linkage or corridor
- Sticks connect *centroids* of neighboring NLBs
- Connect each NLB to 2 nearest neighbors:
  - Neighbors must be <15 km apart
  - Linkages can not cross >1 km open water
  - Linkages can not cross >1.5 km urbanized land
- Connect each *constellation* to its nearest neighbor, if not already connected

Rules for Consolidating & Eliminating Sticks

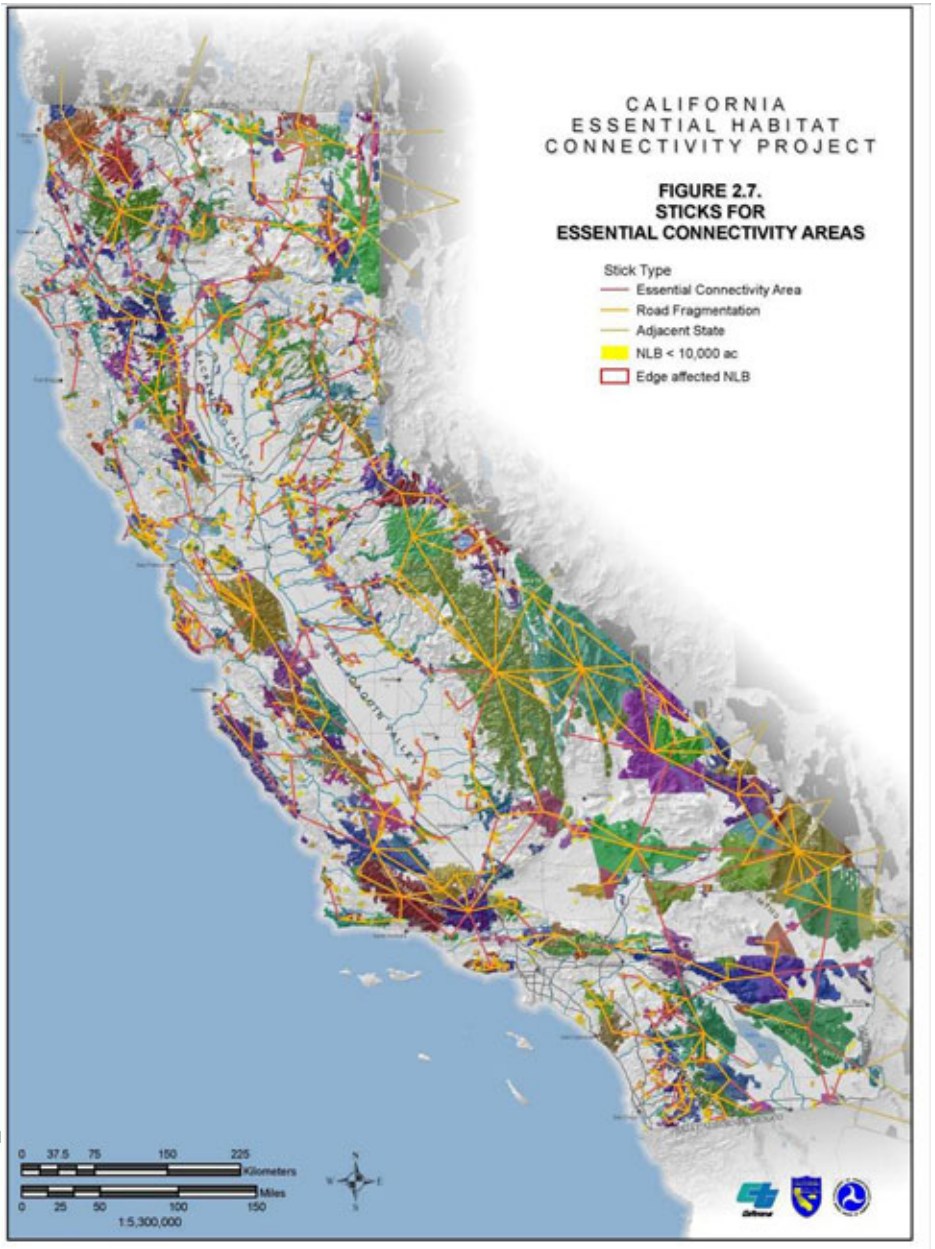
- Original rules yielded too many sticks!
- Therefore, prioritize and simplify connections:
  - To remove markedly inferior and redundant sticks
  - To consolidate *chains* of sticks using one spanning stick



One spanning stick (—) replaces 4 "substicks" (····) between 5 NLBs.

Final Network of NLBs and "Sticks"

- 192 links to be modeled as least-cost corridors
- 552 links across roads
- 31 links into other states



Available modeling approaches for delineating, prioritizing, or evaluating connectivity areas

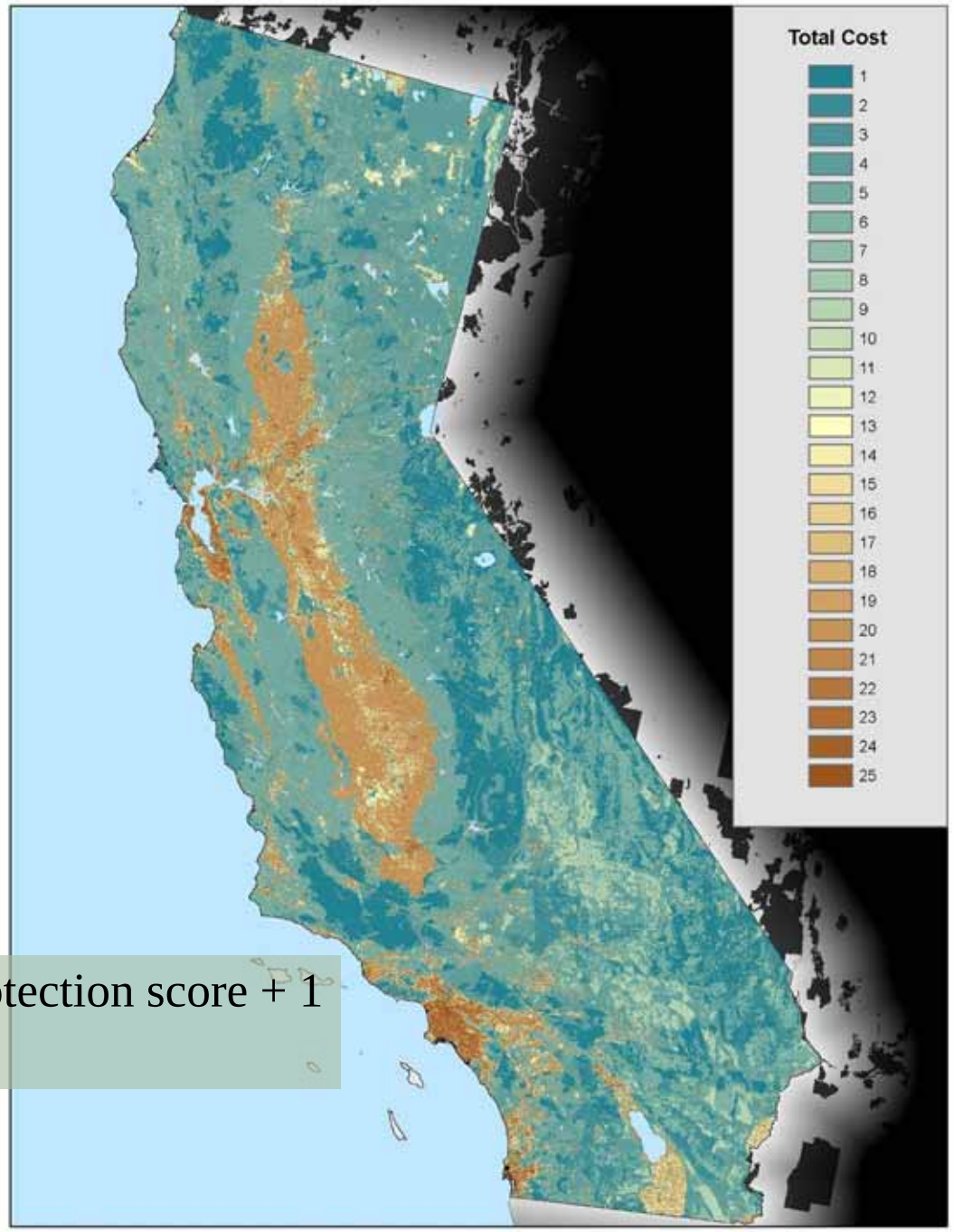
Approach	Regional map	Prioritize	Design linkages	Compare alts
Least-cost modeling	☺⚑		☺⚑	☺
Graph theory		☺⚑		
Circuit theory		☺↑		☺
Individual-based movement model	😐↑		☺↑	
Spatially explicit population model				☺
Network flow	😐		😐	

Least-cost Corridor Modeling

- Cost Raster (Resistance) Factors:
  - Land-cover score:
    - from 0 (natural land covers)
    - to 20 (completely developed)
  - Gap protection status scores:
    - GAP 1 = 0
    - GAP 2 = 1
    - GAP 3 = 3
    - GAP 4 = 4

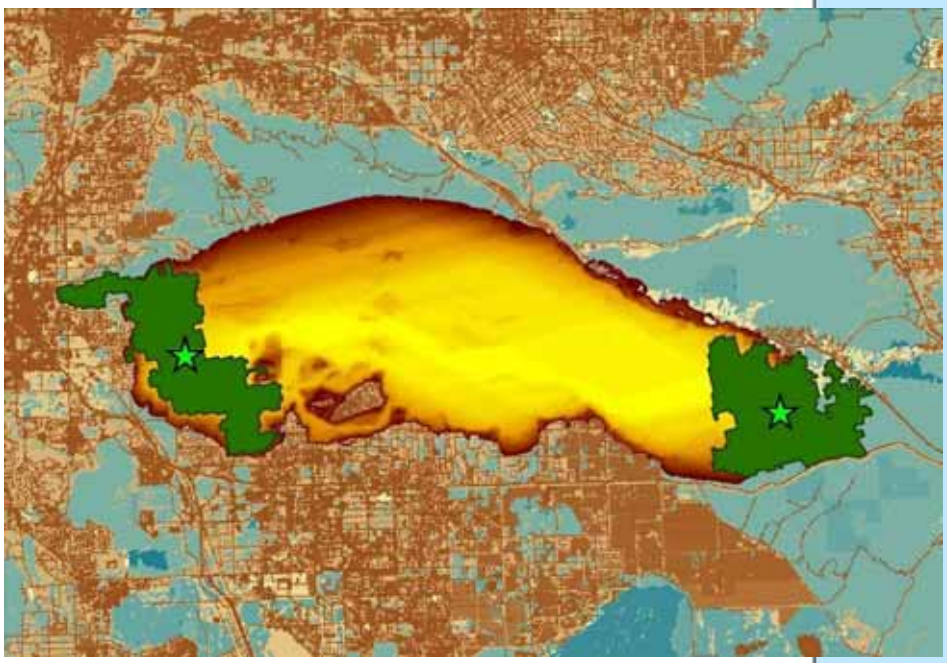
Resistance = land cover score + protection score + 1

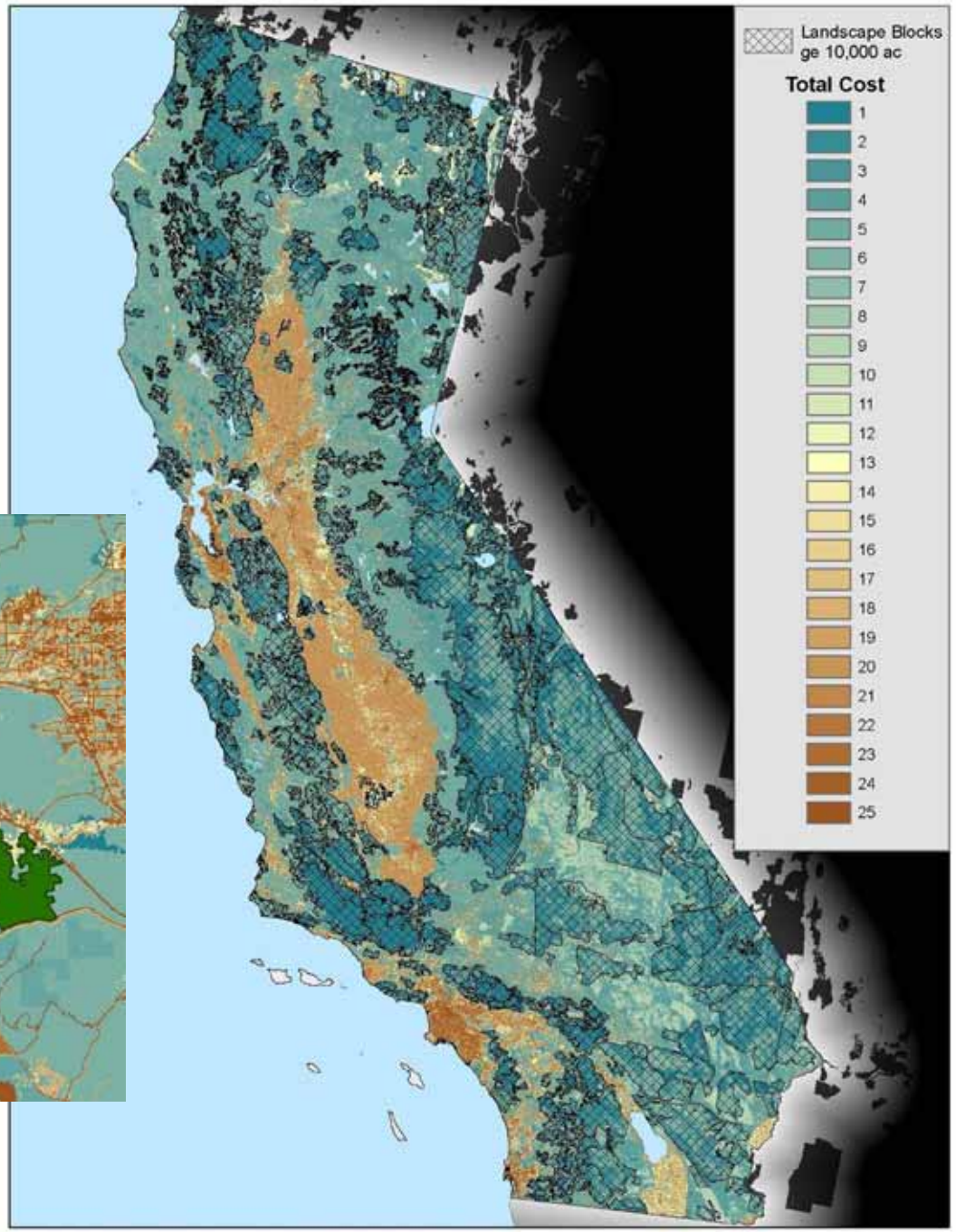
Values range from 1 to 25



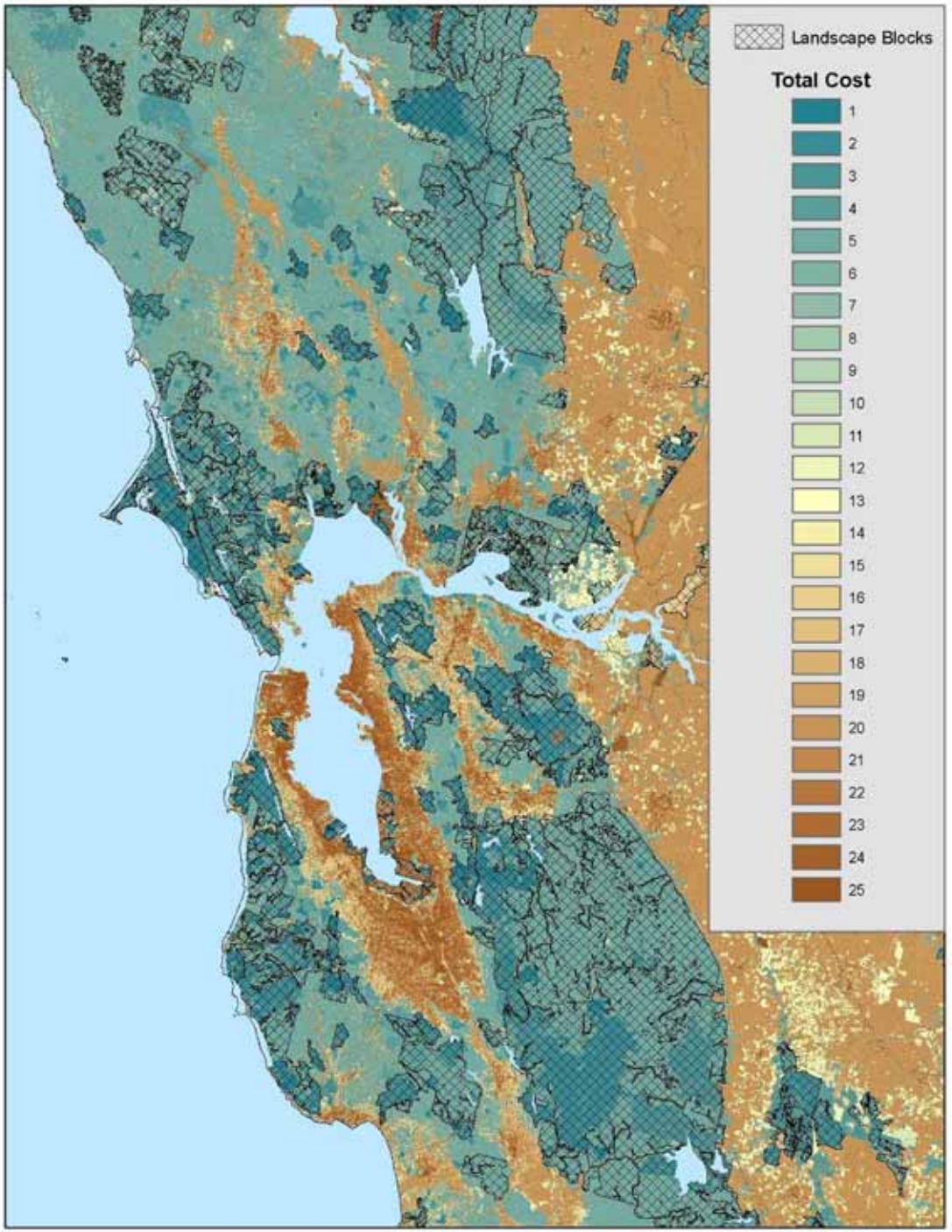
Cost raster with NLBs

- Example least-cost corridor output between centroids of 2 Natural Landscape Blocks



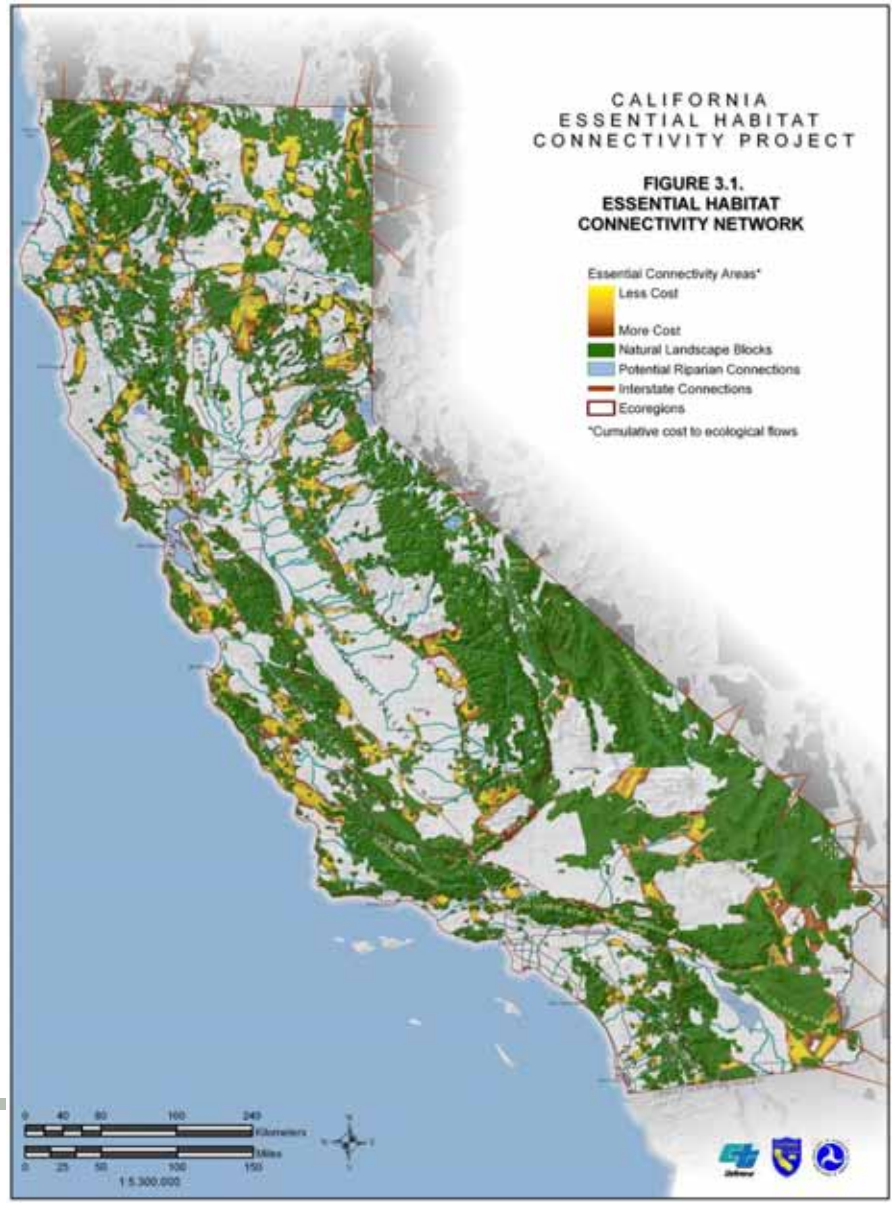


Regional Example



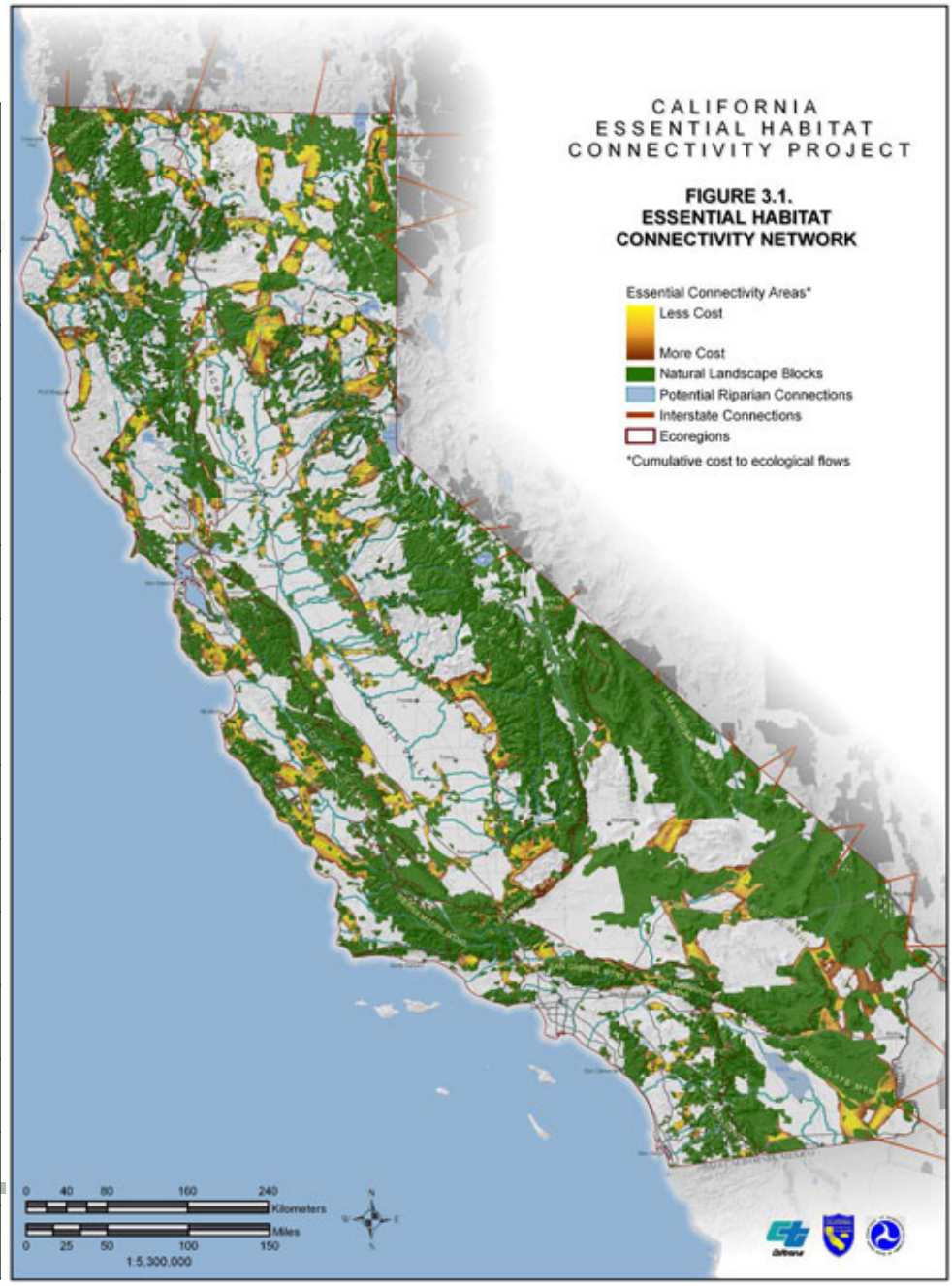
Results – California Essential Habitat Connectivity Network

- Overview
  - Coarse map to serve as decision support
  - Depicts
    - 850 Natural Landscape Blocks
    - 192 Essential Connectivity Areas
    - 552 cross-road connections
    - 31 connections to neighboring states
    - Riparian corridors also essential to connectivity
  - Has some important omissions



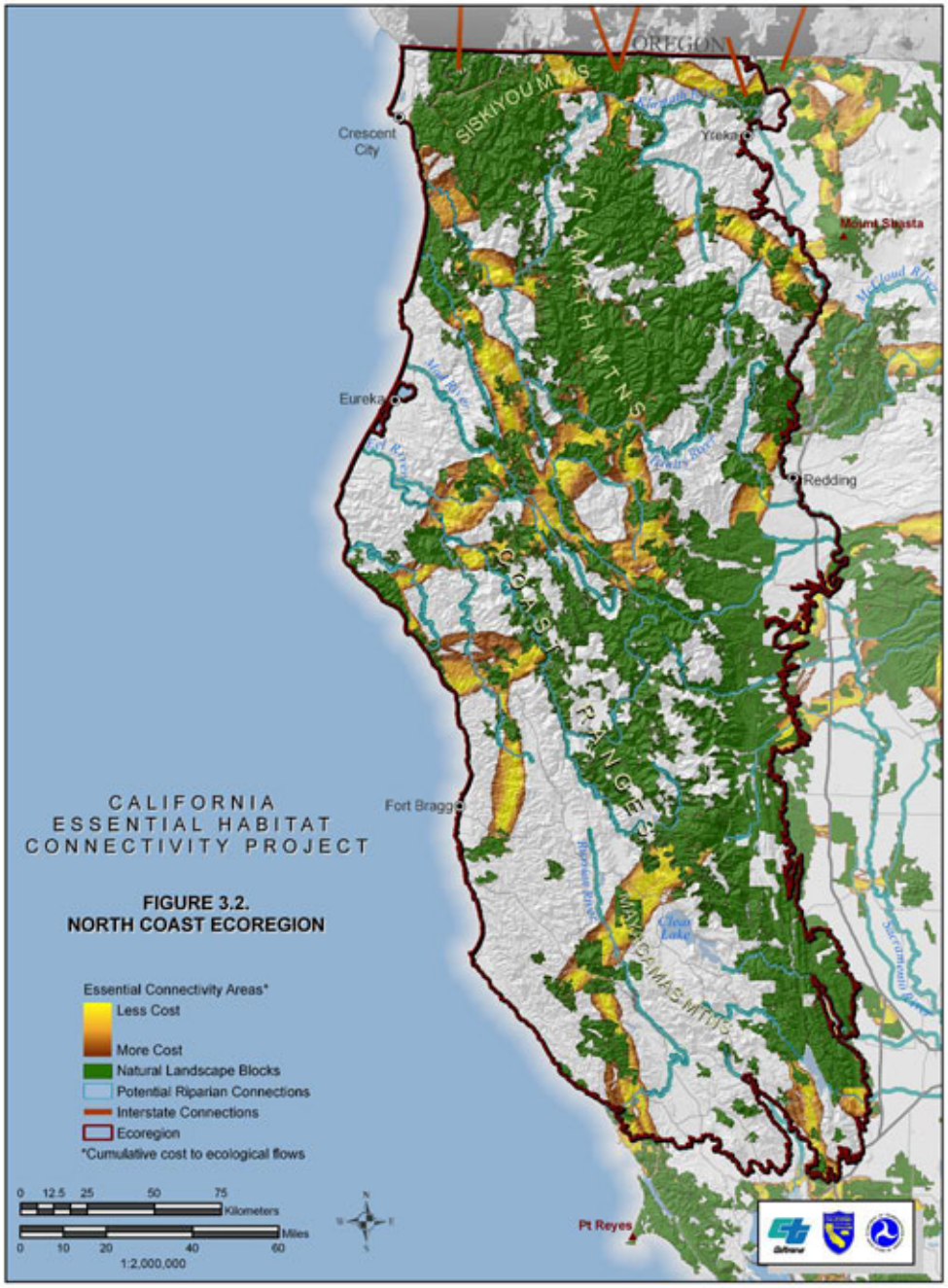
Results - Statewide

Descriptor	Mean for 850 NLBs	Mean for 192 ECAs
Ecological Condition Index	75	53
Area (acres)	51,000	97,500
Length (km)	NA	21
% public or easements	60	39
% highly protected	44	13
% private, unprotected	40	61
No. CNDDB special plants	6	13
No. CNDDB special animals	6	13
% in rarity hotspots	11	7
% in Critical Habitat	16	12
% in essential habitat	23	13
% natural landcover	93	85
% developed	2	5
% agriculture	5	10



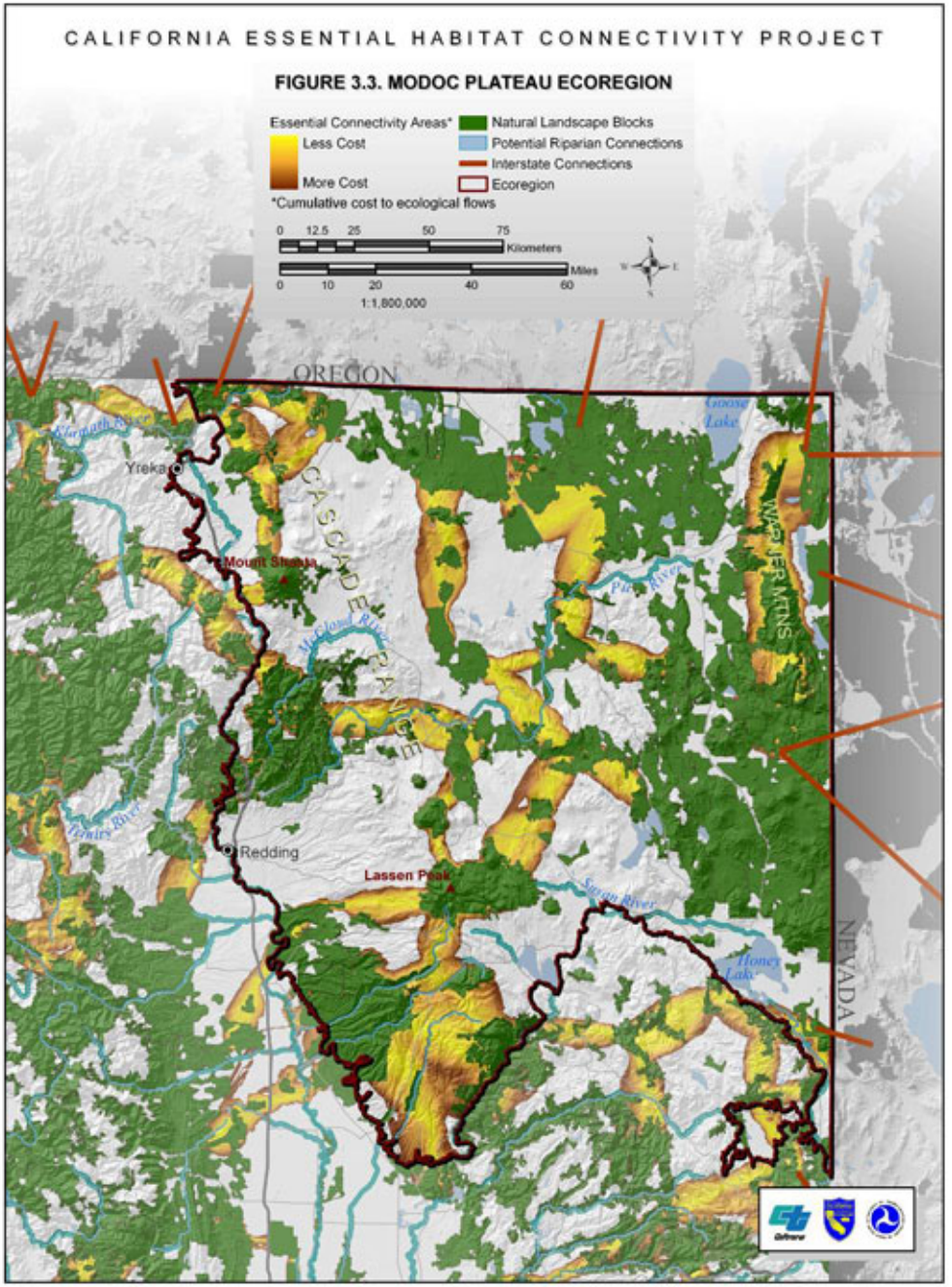
North Coast

Descriptor	Mean for 96 NLBs	Mean for 24 ECAs
Ecological Condition Index	82	64
Area (acres)	41,700	87,400
Length (km)	NA	17
% public or easements	66	44
% highly protected	48	8
% private, unprotected	34	56
% in rarity hotspots	4	1
% in Critical Habitat	21	20
% natural landcover	99	96
% developed	1	4
% agriculture	0	0



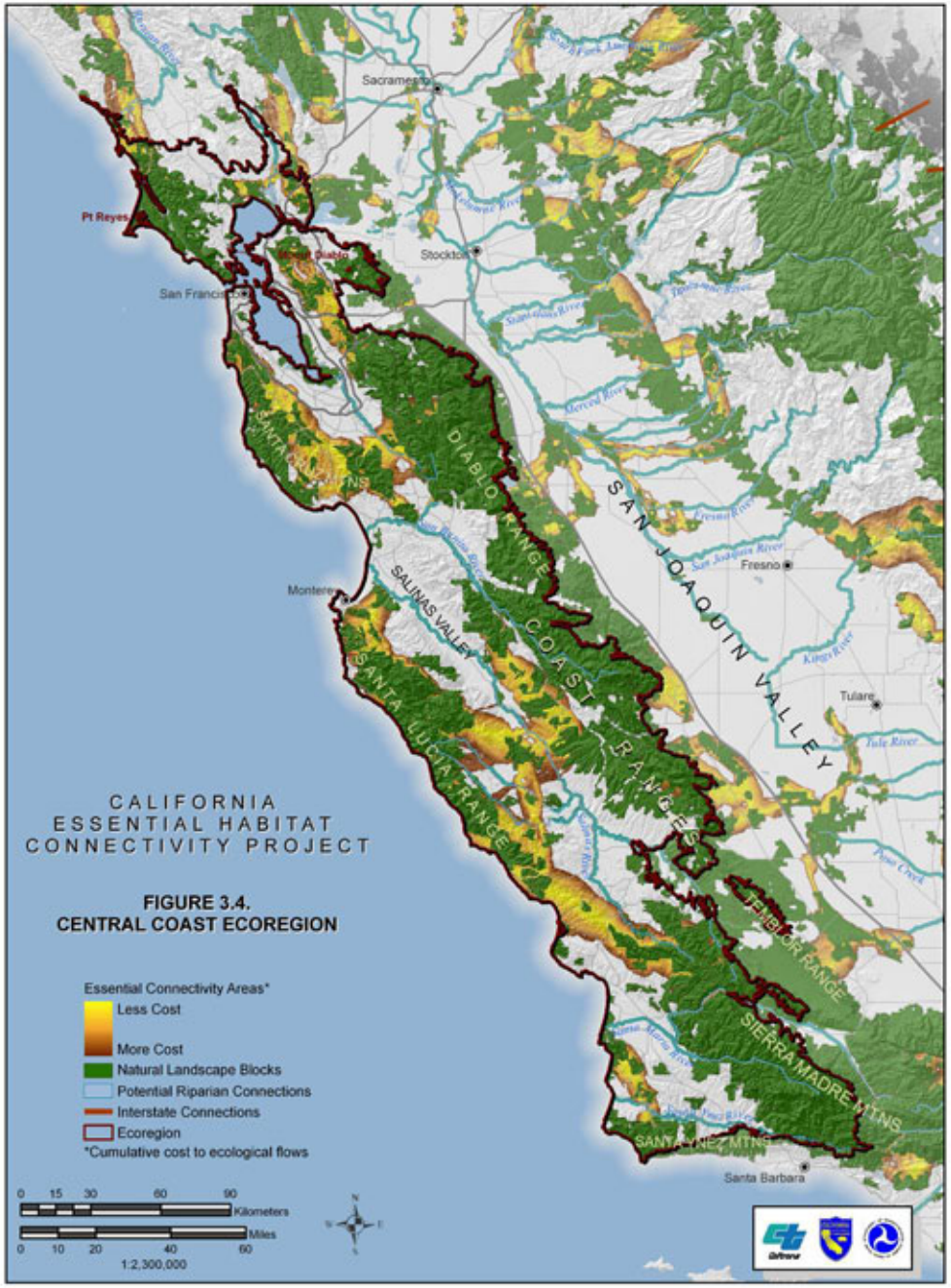
Modoc Plateau

Descriptor	Mean for 100 NLBs	Mean for 19 ECAs
Ecological Condition Index	88	60
Area (acres)	34,800	100,200
Length (km)	NA	24
% public or easements	67	61
% highly protected	29	9
% private, unprotected	33	39
% rarity hotspot	0	0
% in Critical Habitat	4	4
% in essential habitat	5	2
% natural landcover	91	95
% developed	>0	1
% agriculture	8	3



Central Coast

Descriptor	Mean for 103 NLBs	Mean for 12 ECAs
Ecological Condition Index	61	44
Area (acres)	15,900	123,000
Length (km)	NA	28
% public or easements	59	23
% highly protected	53	15
% in private, unprotected	41	77
% in rarity hotspots	33	7
% in Critical Habitat	17	12
% in essential habitat	48	30
% natural landcovers	95	83
% developed	4	11
% agriculture	1	6

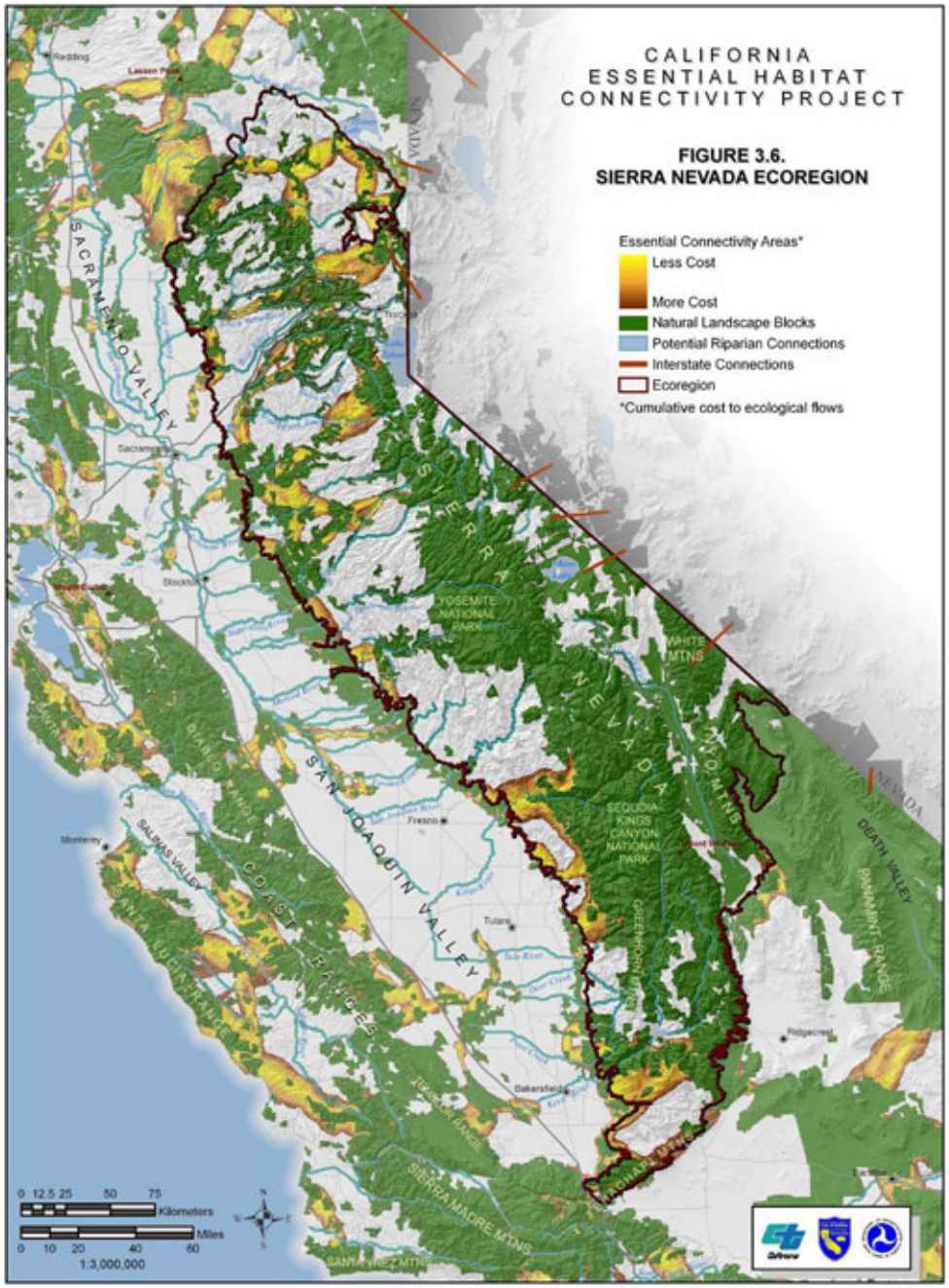


Central Valley

Descriptor	Mean for 114 NLBs	Mean for 29 ECAs
Ecological Condition Index	68	35
Area (acres)	8,900	22,600
Length (km)	NA	13
% public or easements	41	20
% highly protected	37	12
% private, unprotected	59	80
% in rarity hotspots	5	3
% in Critical Habitat	25	17
% in essential habitat	32	16
% natural landcover	71	48
% developed	3	5
% agriculture	25	46

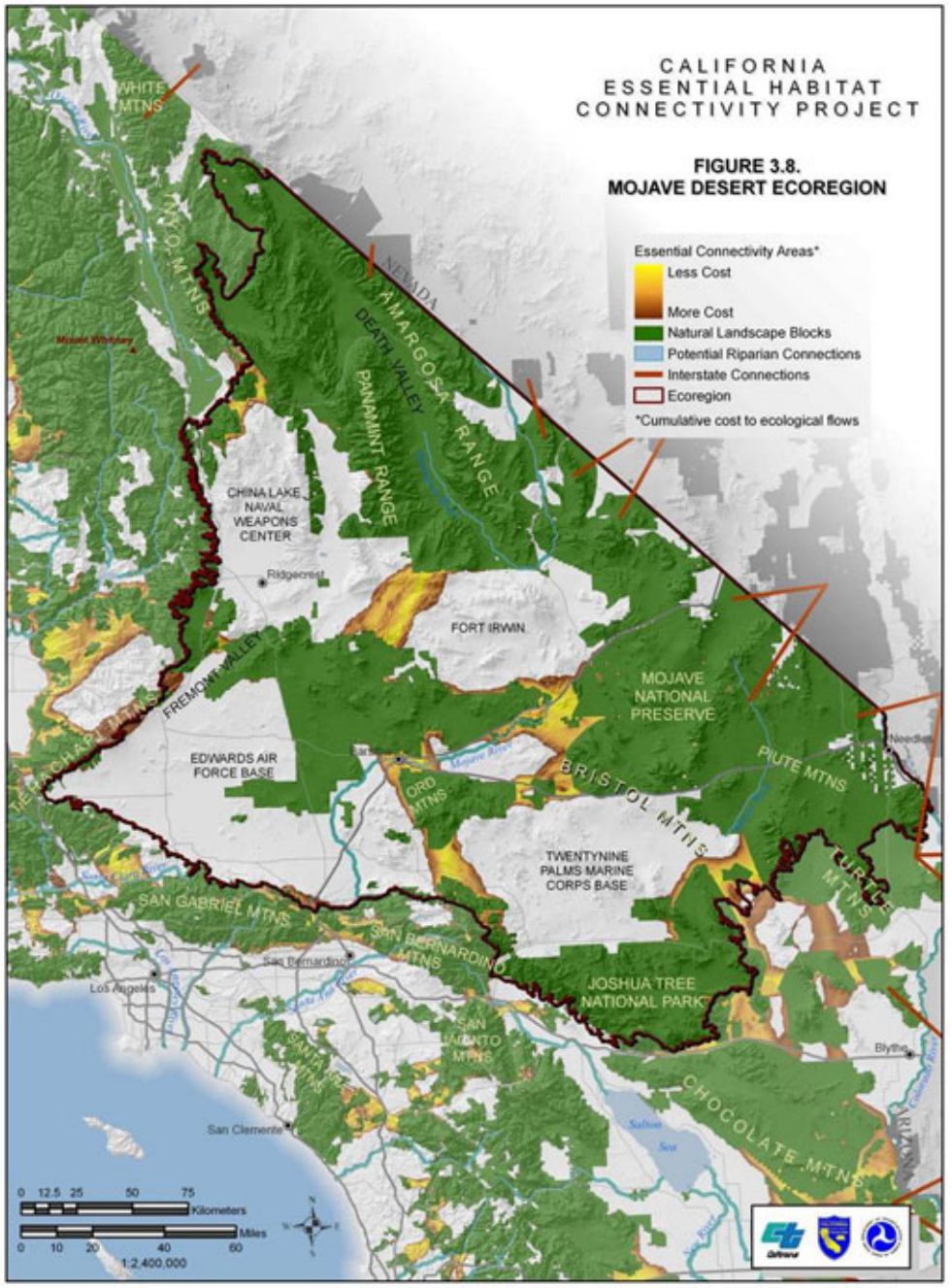
Sierra Nevada

Descriptor	Mean for 118 NLBs	Mean for 16 ECAs
Ecological Condition Index	75	51
Area (acres)	33,800	73,000
Length (km)	NA	21
% public or easements	57	41
% highly protected	32	3
% in private, unprotected	43	59
% in rarity hotspots	7	0
% in Critical Habitat	1	0
% in essential habitat	21	27
% natural landcovers	100	96
% developed	0	3
% agriculture	0	1



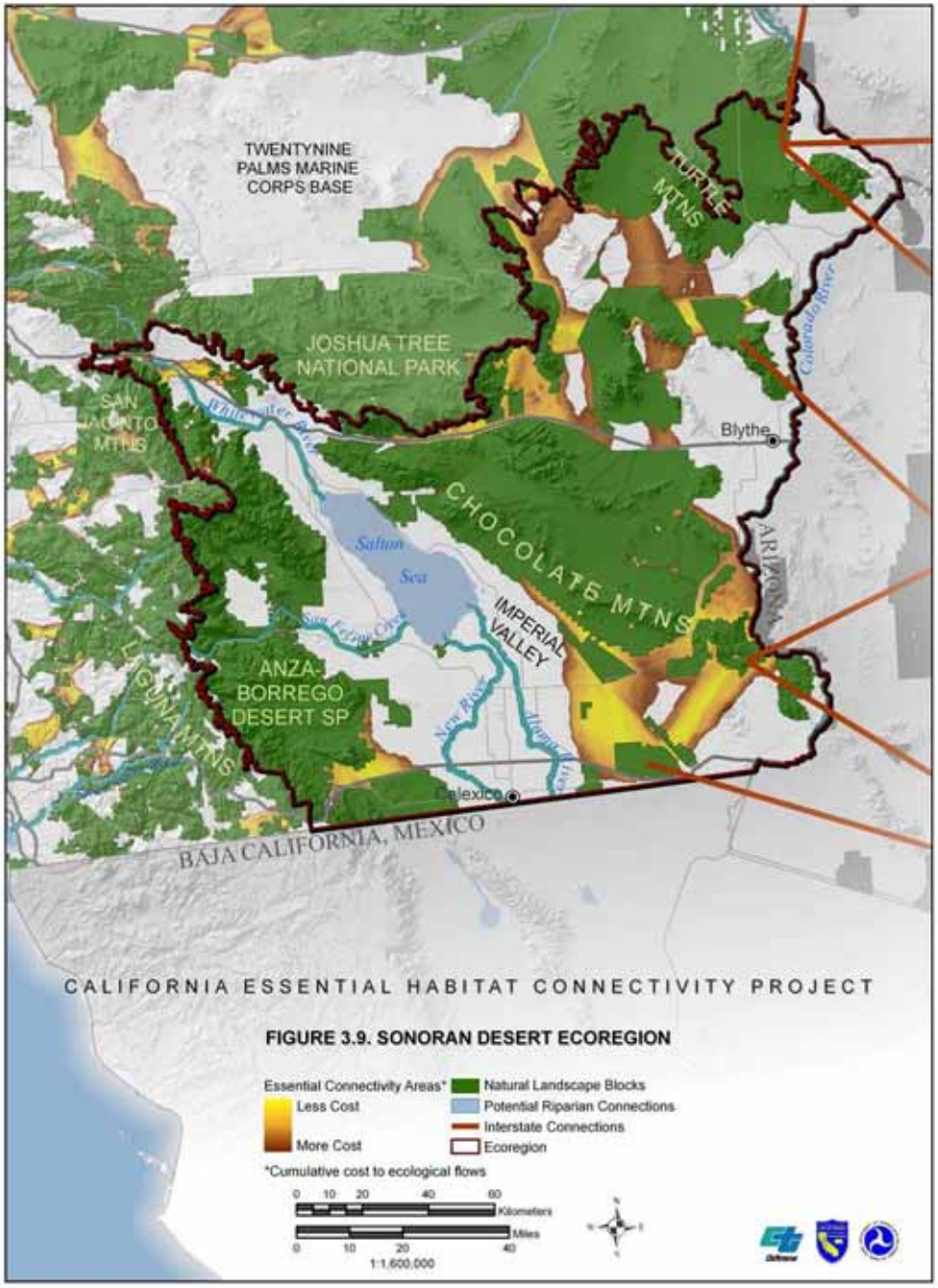
Mojave Desert

Descriptor	Mean for 52 NLBs	Mean for 7 ECAs
Ecological Condition Index	89	80
Area (acres)	135,400	312,100
Length (km)	NA	38
% public or easements	99	87
% highly protected	94	45
% in private, unprotected	1	13
% in rarity hotspots	10	1
% in Critical Habitat	33	11
% in essential habitat	0	0
% natural landcover	99	97
% developed	>0	3
% agriculture	0	0

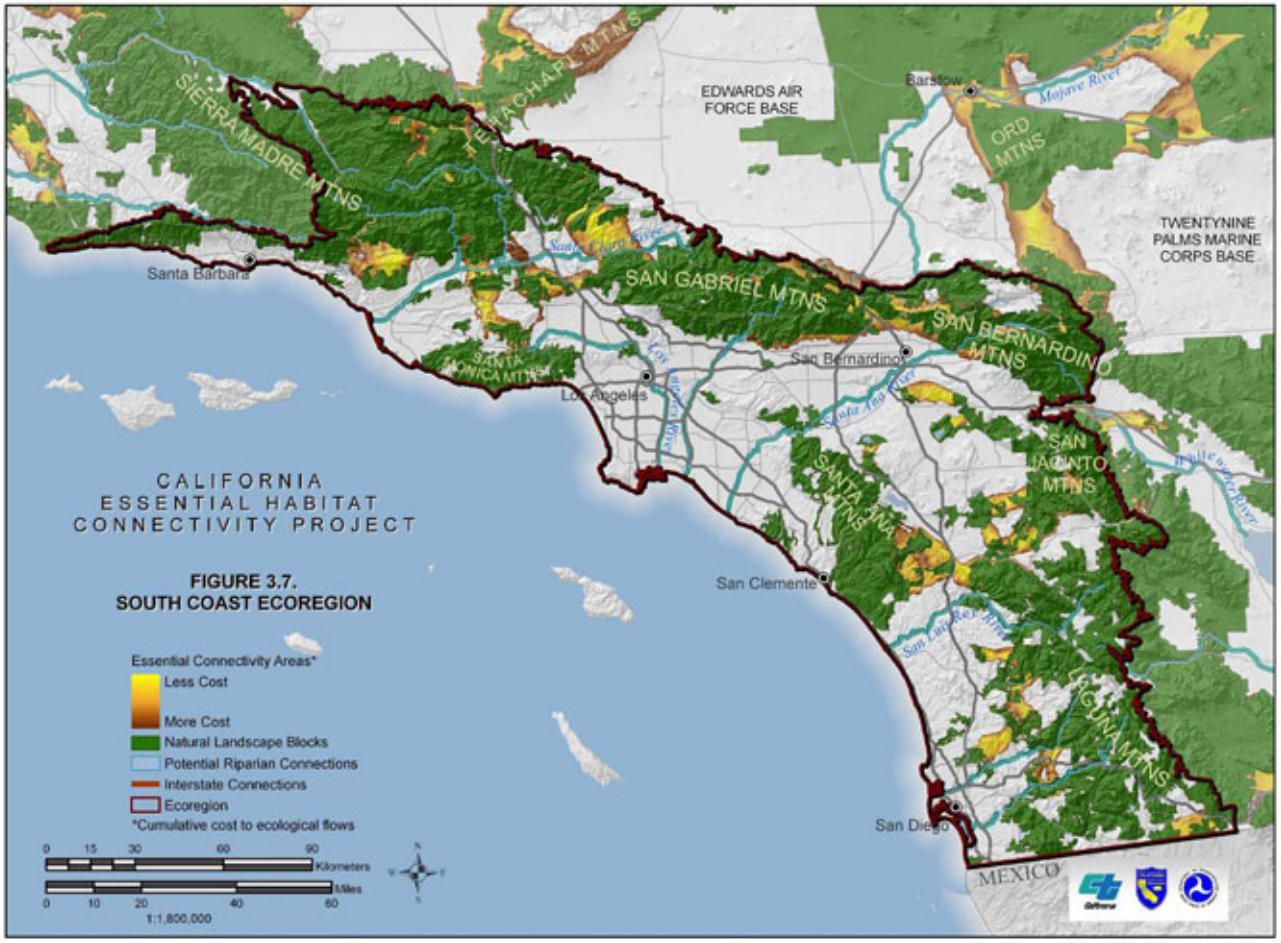


Sonoran Desert

Descriptor	Mean for 25 NLBs	Mean for 5 ECAs
Ecological Condition Index	84	93
Area (acres)	87,400	119,000
Length (km)	NA	15
% public or easements	97	94
% highly protected	79	15
% in private, unprotected	3	6
% in rarity hotspots	1	0
% in Critical Habitat	31	6
% in essential habitat	4	1
% natural landcover	98	99
% developed	0	1
% agriculture	2	0



South Coast



Descriptor	Mean for 90 NLBs	Mean for 17 ECAs
Ecological Condition Index	52	26
Area (acres)	23,400	34,000
Length (km)	NA	13
% public or easements	70	28
% highly protected	51	10
% in private, unprotected	30	72
% in rarity hotspots	33	44
% in Critical Habitat	15	19
% in essential habitat	33	20
% natural landcover	93	82
% developed	6	12
% agriculture	1	6

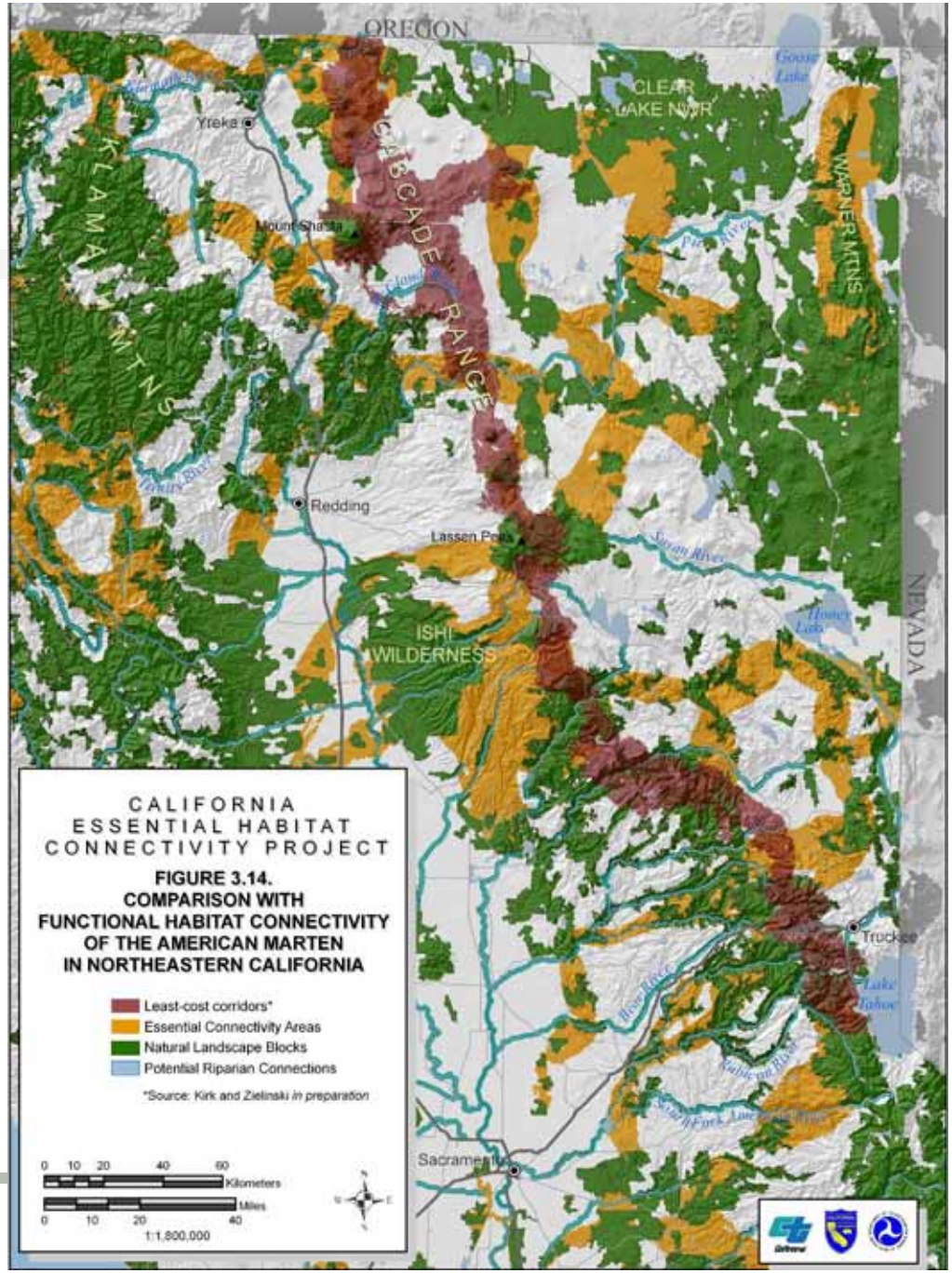
Step 4. Comparisons with other conservation maps

- Comparison to prior focal species analyses
- Comparisons with other conservation maps
  - Statewide Missing Linkages
  - Critical & Essential Habitat
  - Protected Lands
  - TNC Ecoregional Plans
  - NCCP and MSCP
  - CA Rangeland Conservation Coalition Focus Areas

American marten

Kirk and Zielinski (in prep)

- LCC modeling between 7 core areas
- Used top 25%
- 53% captured
  - All Core Areas
  - 50% or greater in 4 out of 6 LCCs



Central Coast

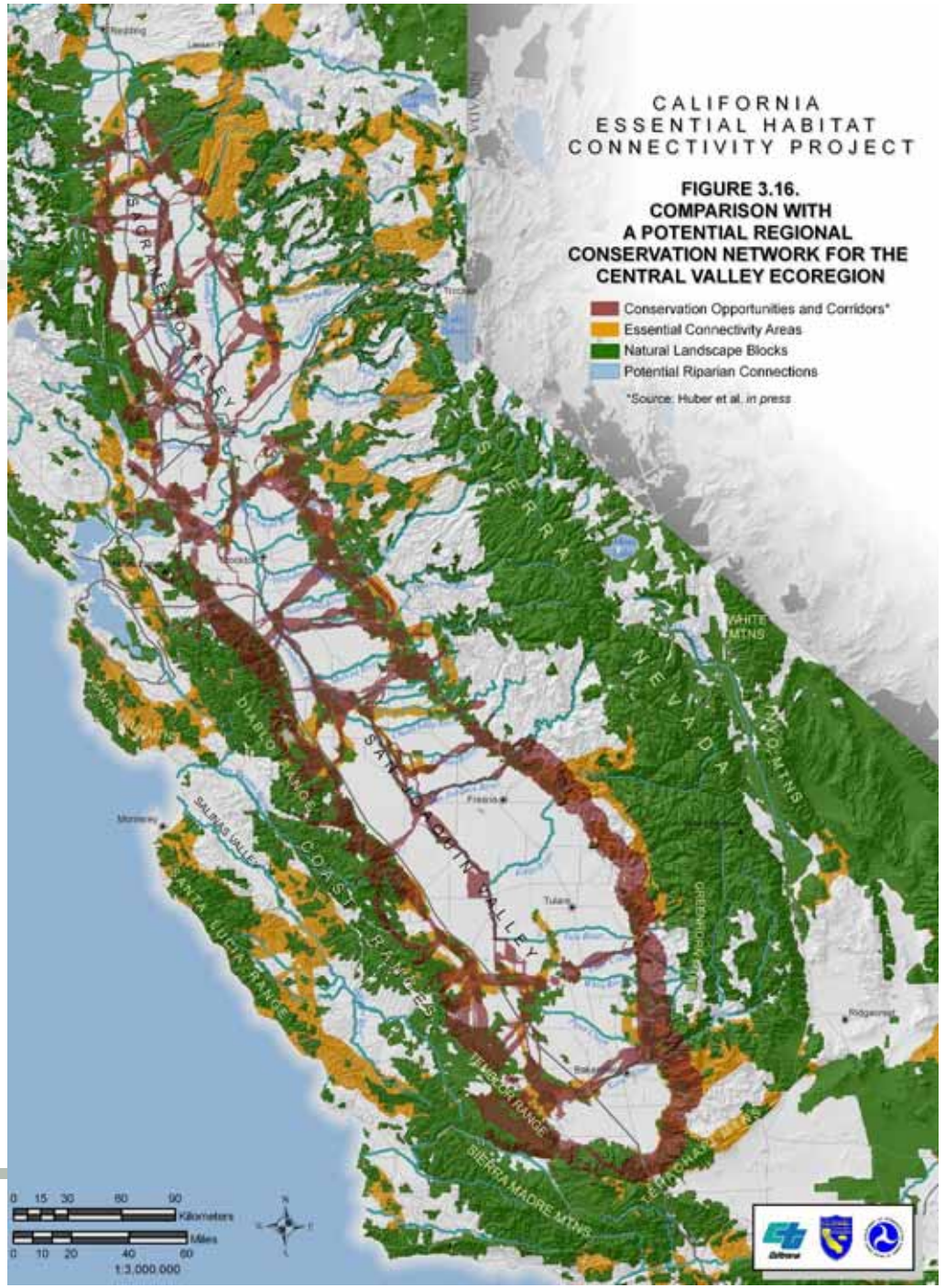
Thorne et al. 2002

- 3 Mammals 1 Fish
  - Mountain lion
  - SJ kit fox
  - Pronghorn antelope
  - Steelhead trout
- 84% captured
  - 70% in NLBs
  - 14% in ECAs

Central Valley

Huber et al. 2010

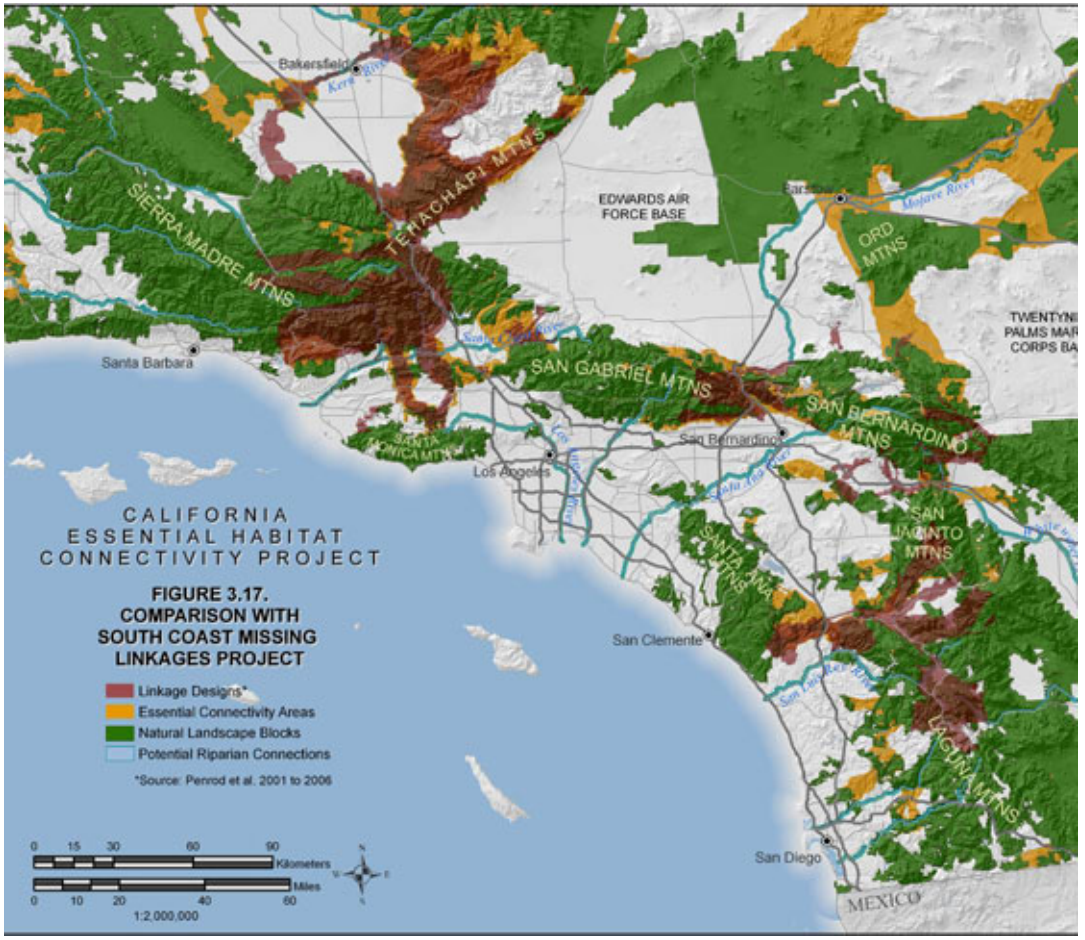
- 7 focal species & 1 community
- LCC for 5 mobile terrestrial species
- 63% captured
  - 46% in NLBs
  - 17% in ECAs



South Coast Missing Linkages

www.scwildlands.org/reports

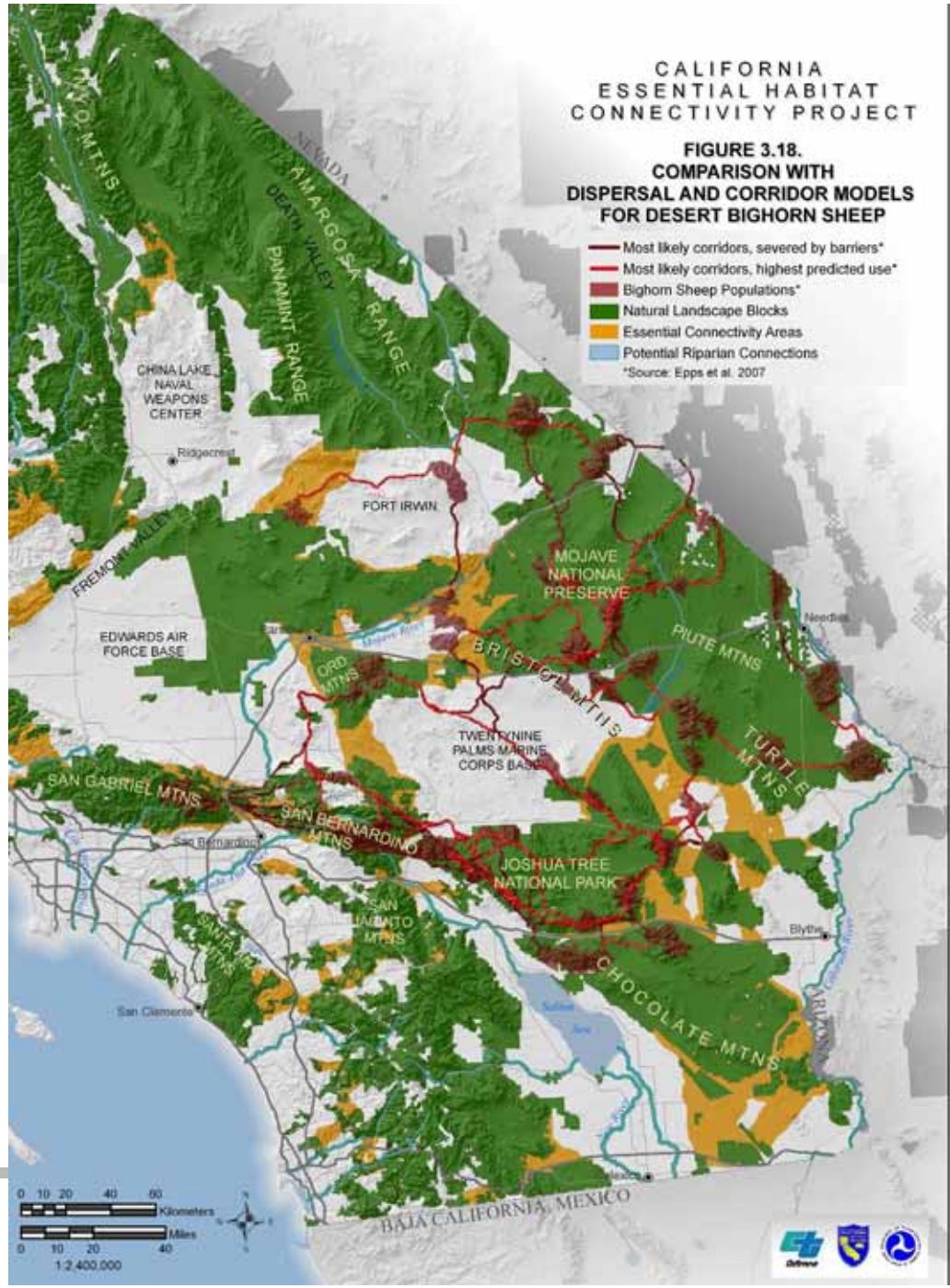
- 11 Linkage Designs
- 14 to 34 Species
- 81% captured
  - 55% in NLBs
  - 26% in ECAs



Bighorn sheep

Epps et al. 2007

- LCPs among 26 Bighorn populations
- 86% of population polygons captured
- 86% LCPs highest predicted use
- 85% LCPs severed by barriers

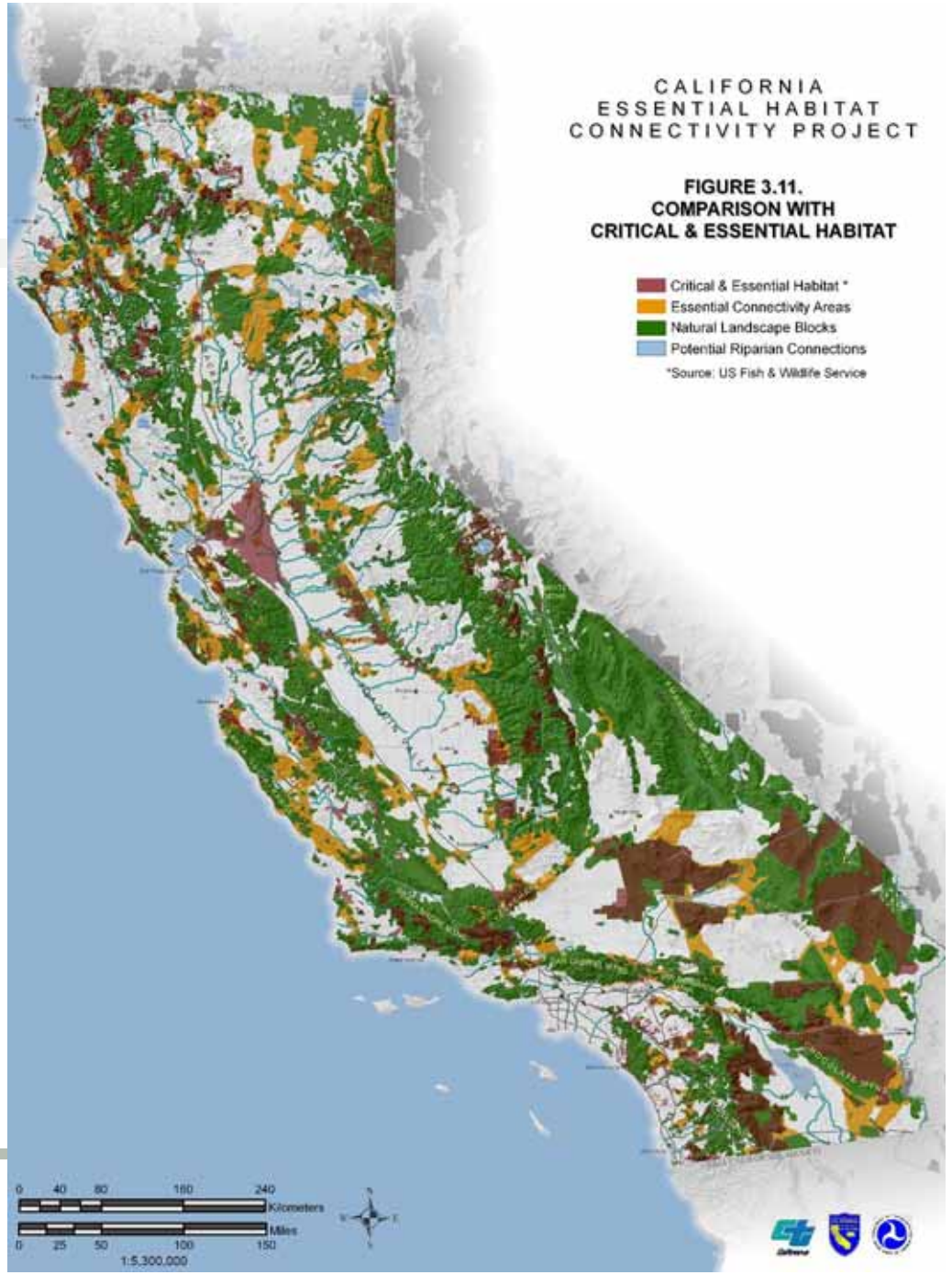


NCCP/HCP

- 39 HCPs throughout state, covering 28 mil ac
- Network captured 41%of total area

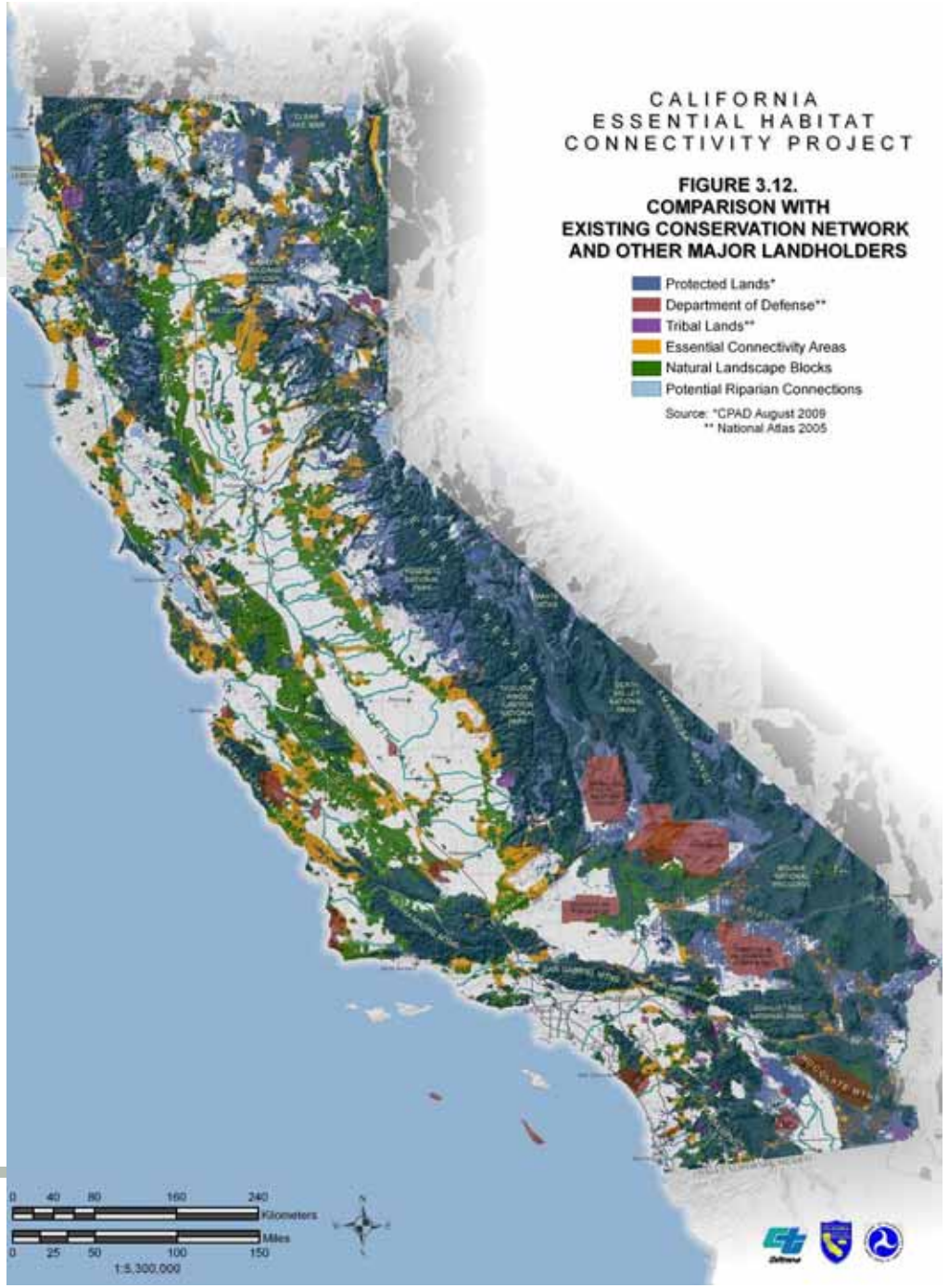
Critical / Essential Habitat

- 100 species with Critical / essential
- 13.5 mil ac Critical
- 1 mil ac essential
- 80% captured
  - 72% NLB
  - 9% ECA



Existing Conservation Network

- CPAD 48.7 mil ac
  - 76% captured
- DoD 4.1 mil ac
  - 31% captured
- Tribal 0.7 mil ac
  - 34% captured



Chapter 4: Framework for Regional Analysis

1. Why bother with regional analysis?
2. Some overarching considerations
3. What's in a regional analysis?
4. Examples of regional analyses

Why do a Regional Analysis?

1. To recognize Natural Landscape blocks < 2,000 acres
2. To map connectivity areas missed in this report
3. To delete connectivity areas erroneously mapped in the statewide report

If these are not big issues, and you have resources to develop fine-scale designs for each linkage in your region… you don't need no stinkin' regional analysis!

4. *If your planning resources are limited*: To identify a priority set of linkages for detailed linkage designs

Can Regional Analysis delay real conservation?

If a proposed project might adversely impact an ECA, a Linkage Design should be conducted – even if no Regional Analysis has been completed.

The lack of Regional Analysis should not be used as an excuse to avoid or delay local-scale analysis.

Overarching considerations for Regional (and Fine-scale) Analysis

Collaborative – including stakeholders, end-users, implementers, and scientific experts.

Engage end-users early.

Transparent, repeatable procedures that can be revised as new information becomes available.

Analyze based on existing conditions (or on restorable habitat) – not on potential future build-out scenarios.

What's in a Regional Analysis?

1. A map of natural landscape blocks & connectivity areas, including connections beyond the region.
2. Documentation, descriptions, and strategies related to the map (as in this report).
3. A prioritization scheme to select which connectivity areas are most crucial to ecological integrity of the region.
4. A fine-scale, implementable linkage design for each of the connectivity areas most crucial to ecological integrity of the region.

Can I use the CEHC Report as a template for #1 and #2?

1. A map of natural landscape blocks & connectivity areas, including connections beyond the region.
2. Documentation, descriptions, and strategies related to the map (as in this report).

Can I use the CEHC Report as a template for #1 and #2?

Please do. The Report provides some lessons from our experience, such as:

- Use data layers and criteria that can be applied across the entire region.
- Use a quantitative procedure (not expert opinion) to create each attribute layer. You probably will use expert opinion and user values to attach weights to the data, but the underlying data should be objectively defined.

Prioritization: which connectivity areas are first to get a Linkage Design?

3. A prioritization scheme to select which connectivity areas are most crucial to ecological integrity of the region.

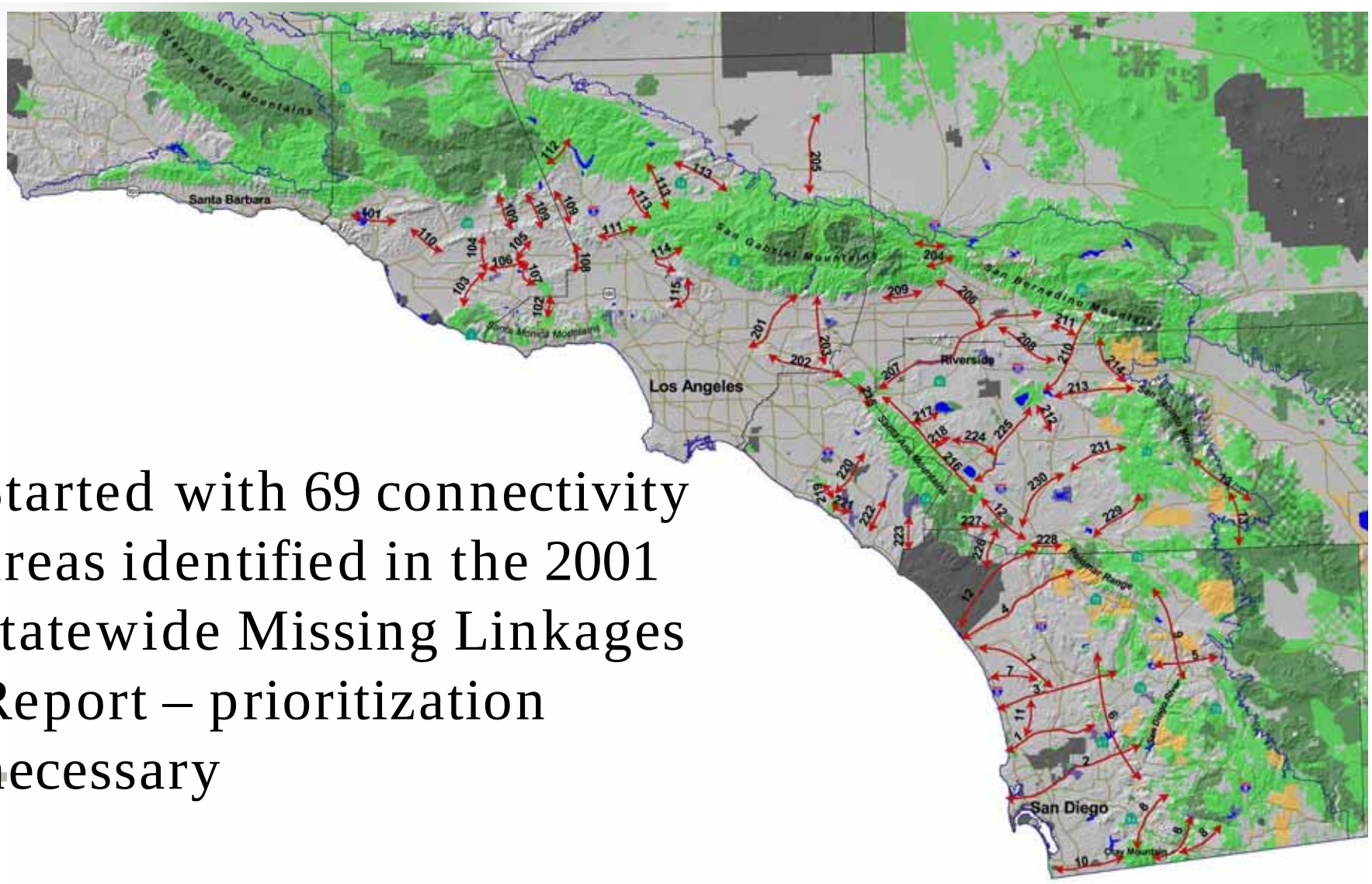
Prioritization is contentious. The only reason to prioritize is to get to work on #4.

4. A fine-scale, implementable linkage design for each of the connectivity areas most crucial to ecological integrity of the region.

How to prioritize

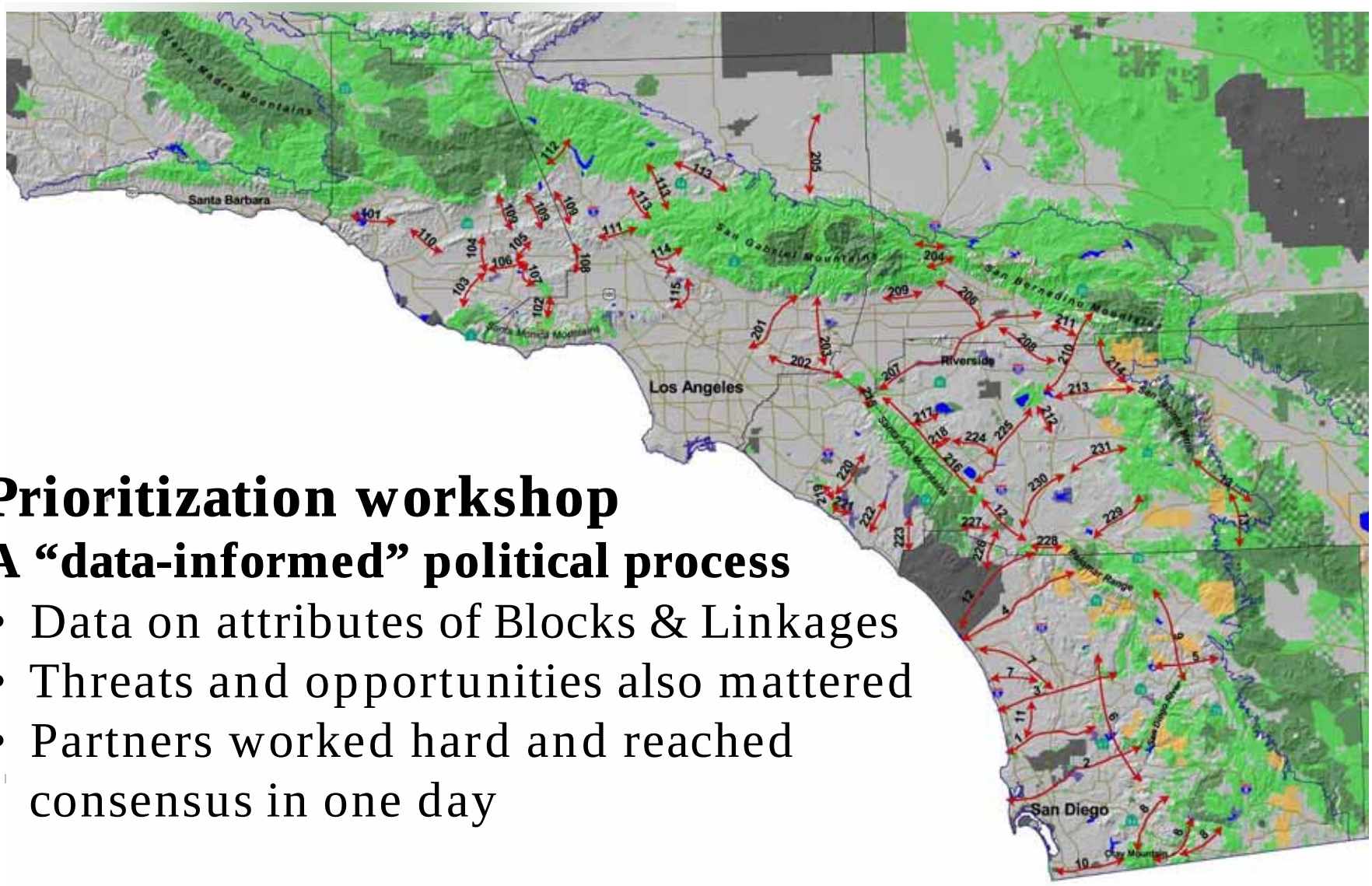
- Provide data on Natural Landscape Blocks and Essential Connectivity Areas to the stakeholders.
- Don’t try to invent a single metric to describe linkage importance. It won’t work. It invites the conclusion that low-scoring linkages are “not important.”
- The objective is to come up with a set of Connectivity Areas that most stakeholders agree will best connect the major Natural Landscape Blocks.
- There is so much conservation need that almost any set of priorities is a good set.

Example Regional Analysis: South Coast Missing Linkages



Started with 69 connectivity areas identified in the 2001 statewide Missing Linkages Report – prioritization necessary

Example Regional Analysis: South Coast Missing Linkages



Prioritization workshop

A "data-informed" political process

- Data on attributes of Blocks & Linkages
- Threats and opportunities also mattered
- Partners worked hard and reached consensus in one day

Example: South Coast Missing Linkages

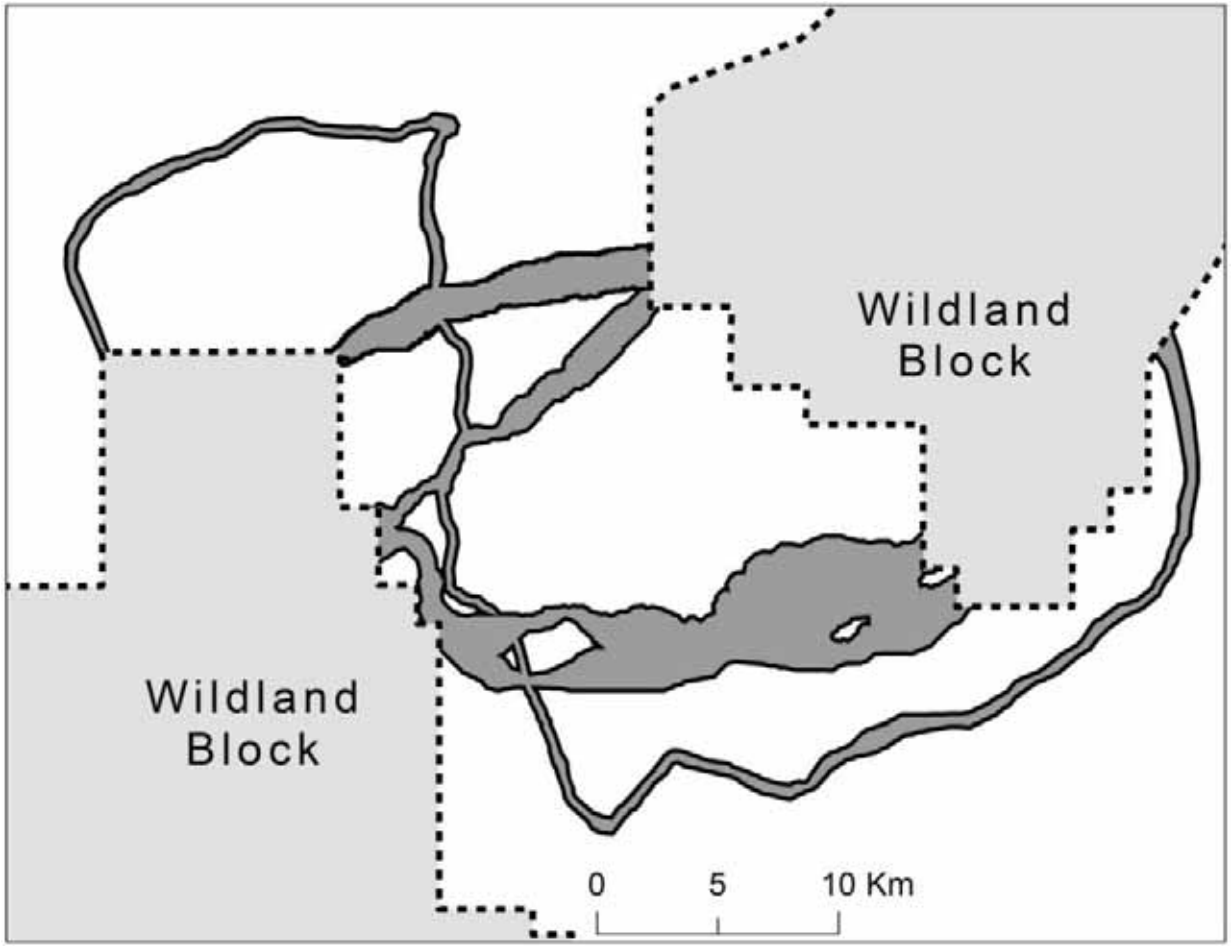
- Consensus on 15 “no regret” linkages.
- The other 54 were not ranked – none labeled “unimportant.”
- Included links beyond region.

Example: South Coast Missing Linkages

- Placeholder arrows replaced with detailed linkage designs.
- Designs are being actively implemented.

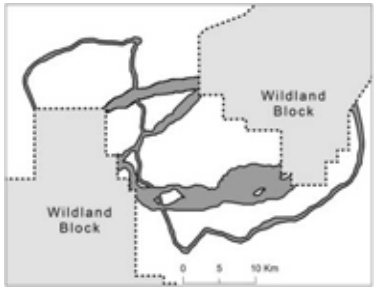
Chapter 5: Framework for Linkage Designs

Goal:
Replace ECA (placeholder polygon) with an implementable linkage design



Linkage Design: not just a map

Specify actions needed to maintain or restore connectivity



Examples:

- Crossing structures
- Livestock practices
- Logging
- Fencing
- Lighting
- Land use

When should a Linkage Design be developed?

1. As part of a Regional Analysis
2. When a proposed project may negatively impact a connectivity area
3. A transportation improvement project creates an opportunity to make a road more permeable
4. A Habitat Conservation Plan, Natural Community Conservation Plan, or Blueprint Plan is being prepared

Steps in Linkage Design

1. Select focal species.
2. Map corridors for focal species.
3. Map corridors for climate change.
4. Merge these corridors into a multi-stranded linkage design. Impose minimum width.
5. Assess in the field to document barriers & identify restoration opportunities.
6. Develop a detailed action plan to conserve or restore the linkage.

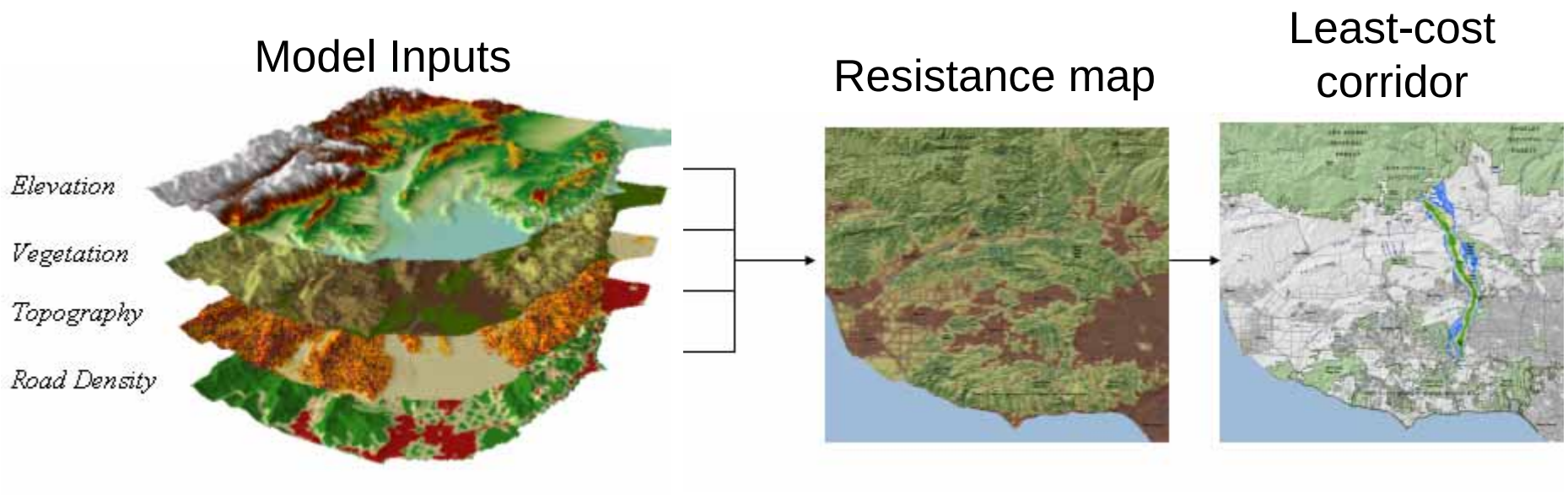
Linkage Design 1: Select focal species

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

Habitat specialists: species that most need continuous swaths of <u>each</u> type of vegetation or topography.

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

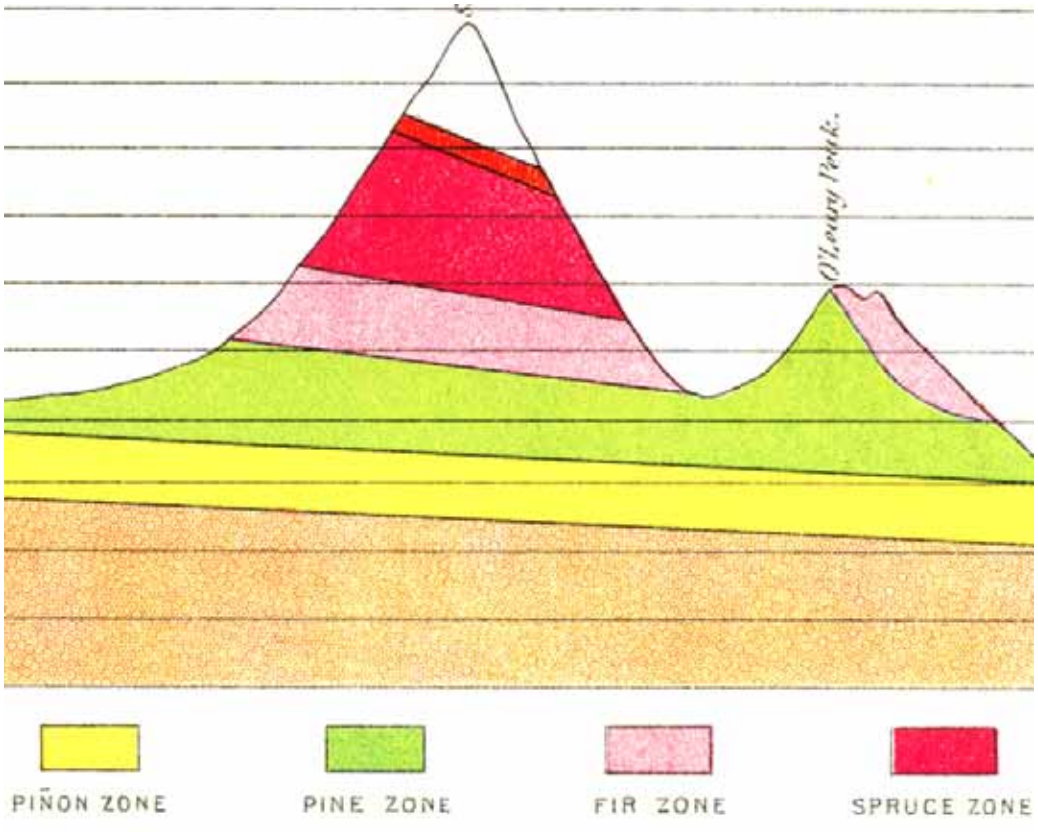
Linkage Design 2: map a corridor for each focal species



The Report provides a cookbook for least-cost modeling for focal species

Linkage Design 3: map corridors for climate change

The Report provides a cookbook for corridors of *land facets* (recurring polygons of uniform topography and soil)

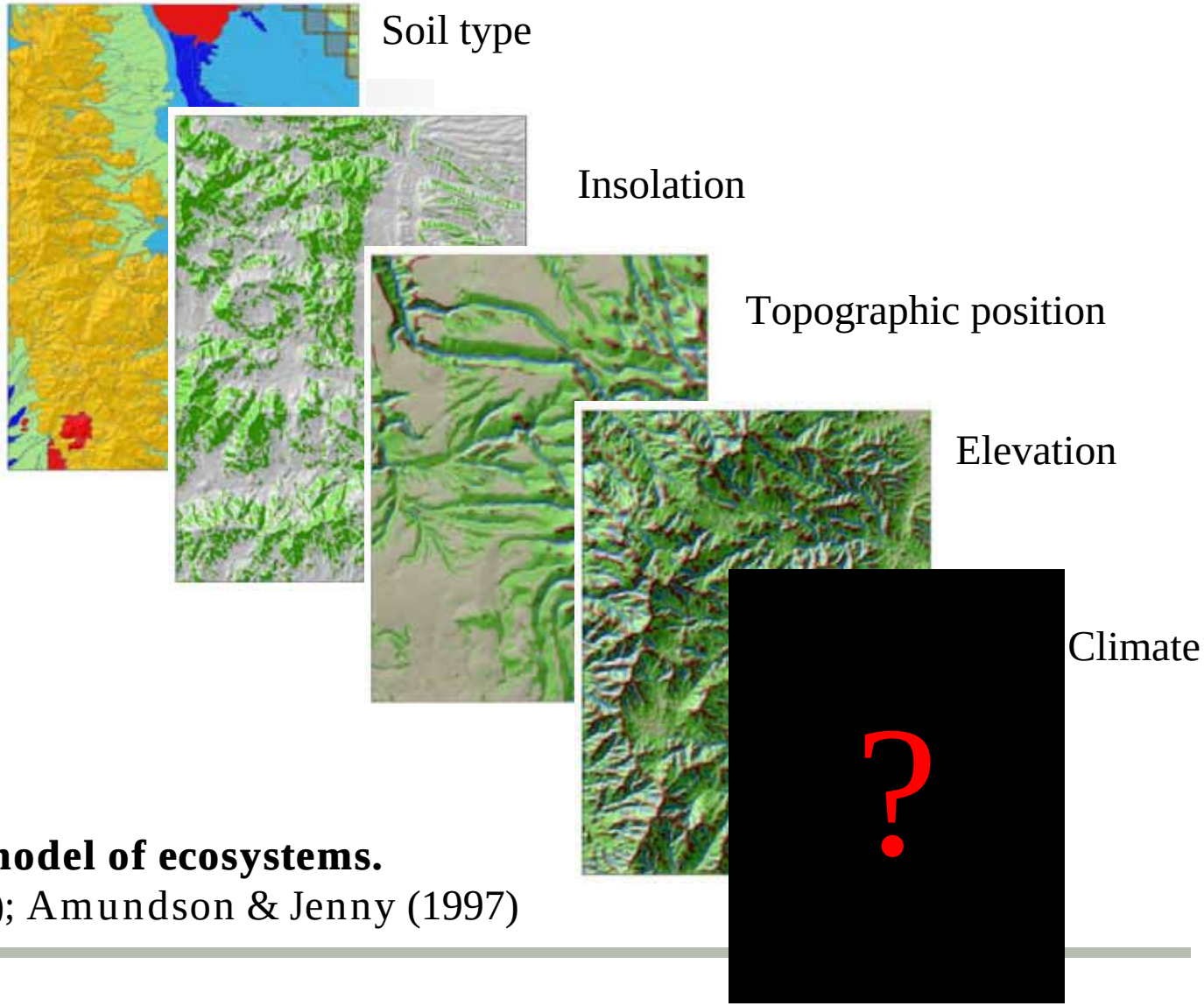


C. Hart Merriam, 1890:

Life Zones (elevation & aspect)

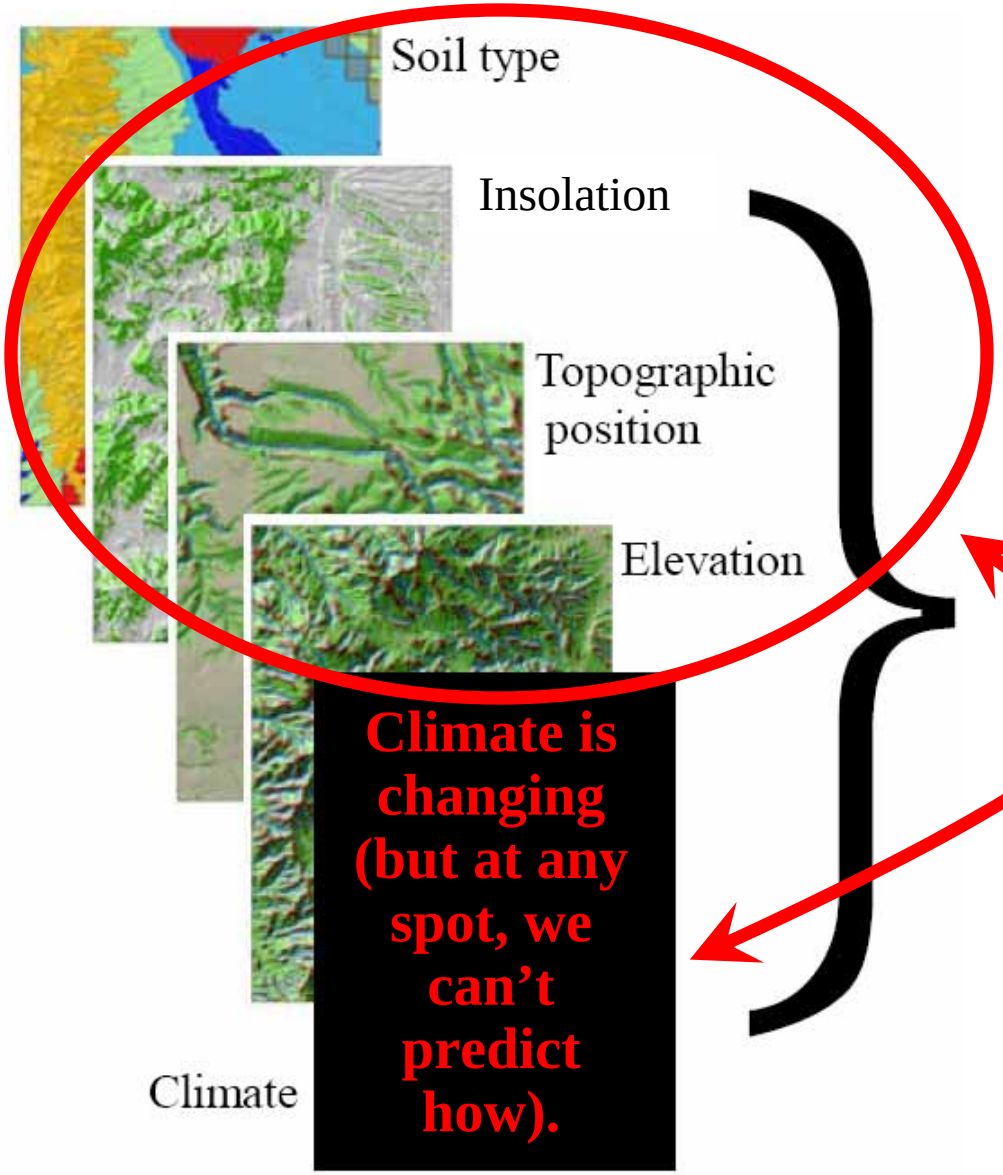
Land facets as drivers of biodiversity

Plants & animals are (and will be) a function of:



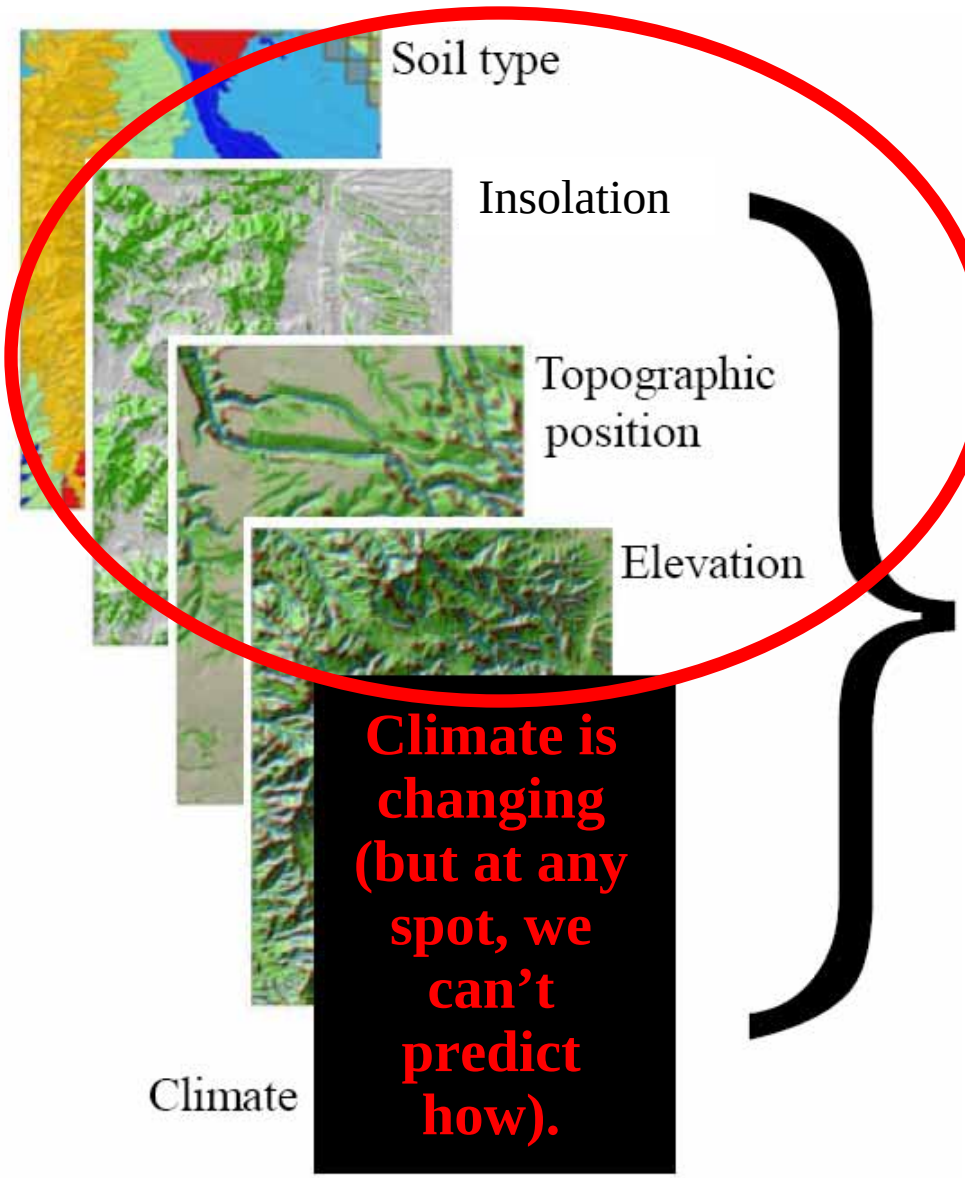
The state-factor model of ecosystems.
Hans Jenny (1941); Amundson & Jenny (1997)

These variables are stable.



They define land facets. Land facets will interact with future climate to support new assemblages of plants and animals.

Distribution of plants & animals



Our approach identifies a continuous strand of each land facet, and a strand with high diversity of facets.

These will help plants & animals shift their ranges as climate changes.

Linkage Design 4: Join corridors

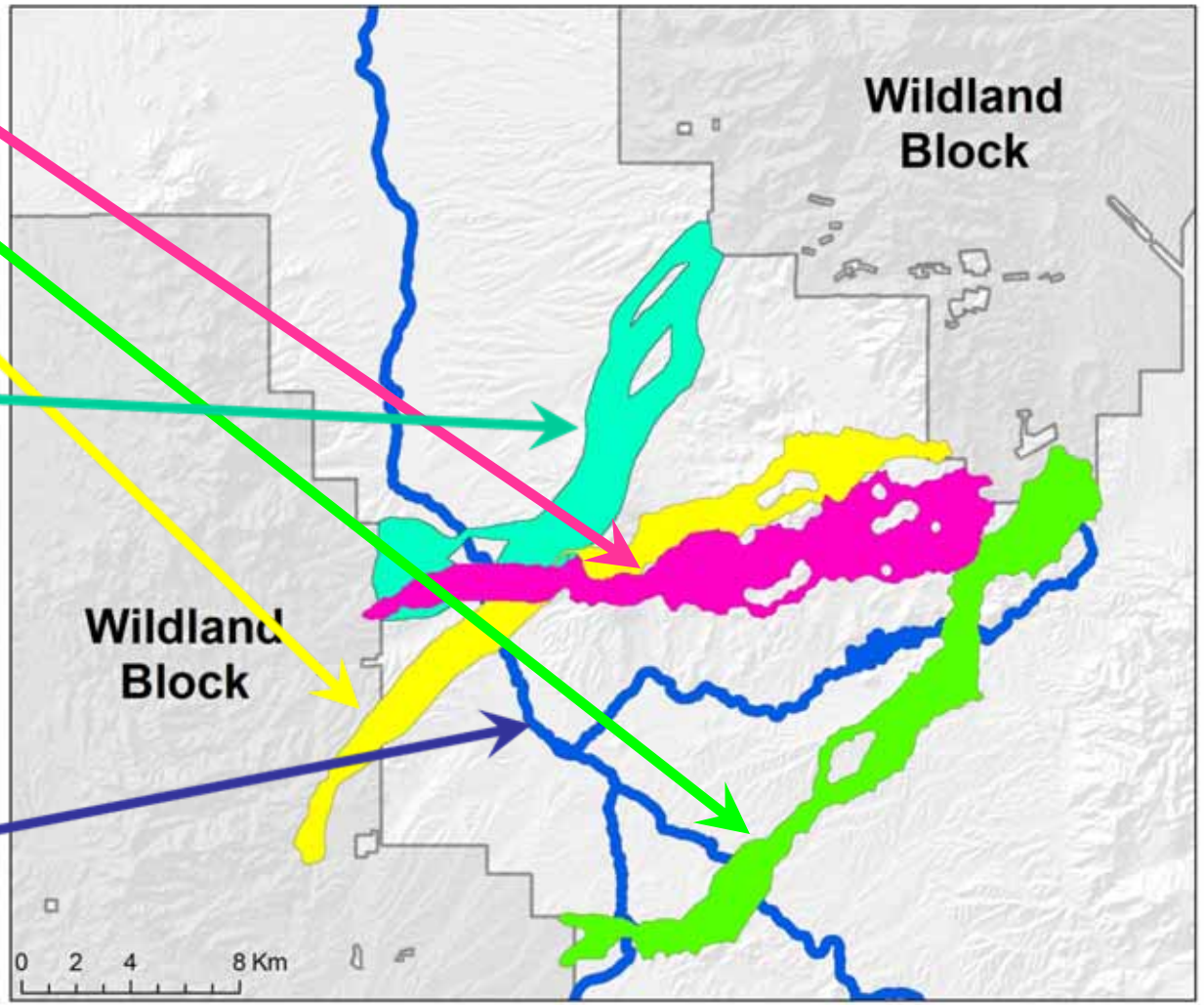
Species A Corridor

Species B Corridor

Facet D Corridor

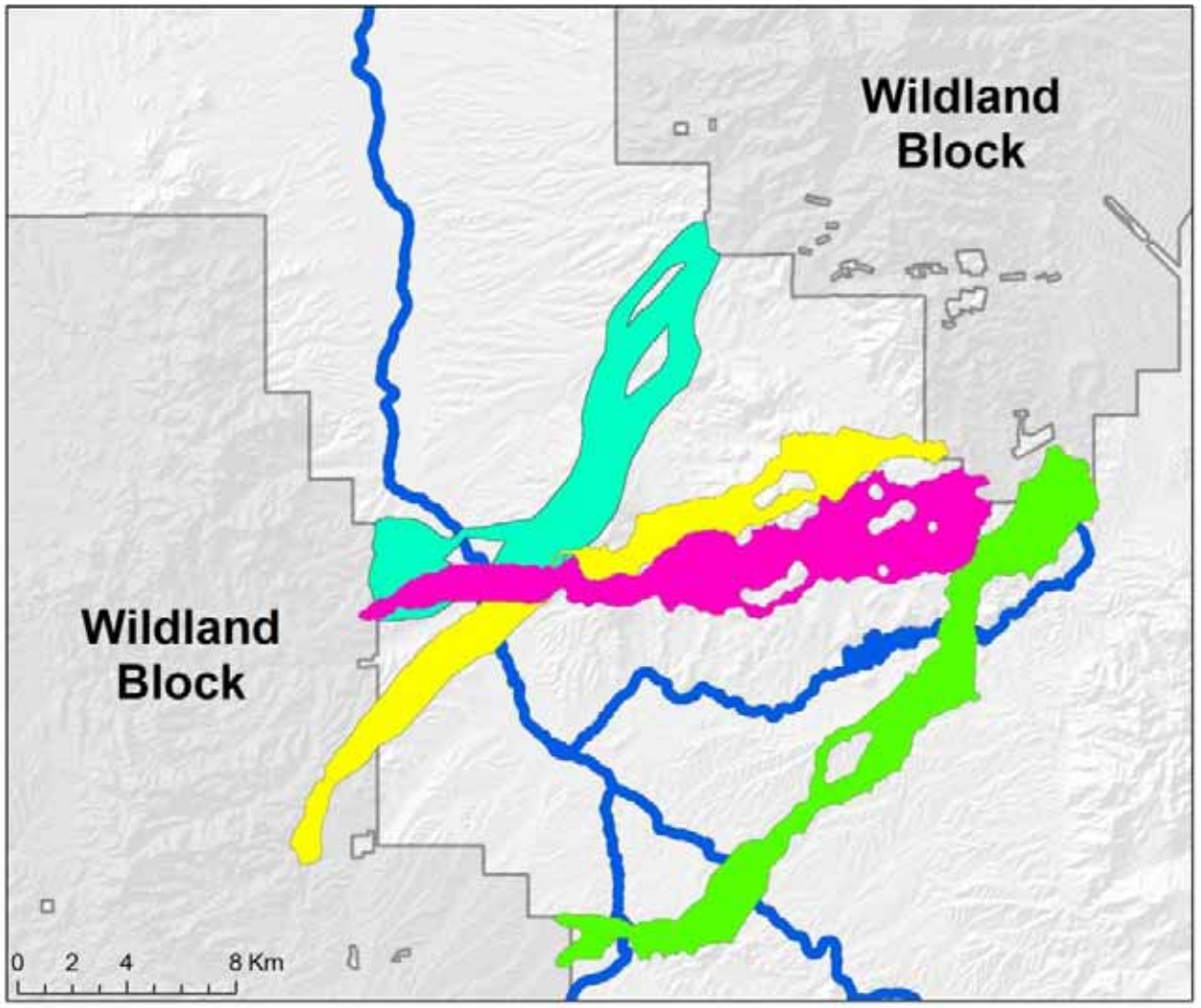
Corridor with interspersed facets

Riparian Corridor



Linkage Design 4: Join corridors

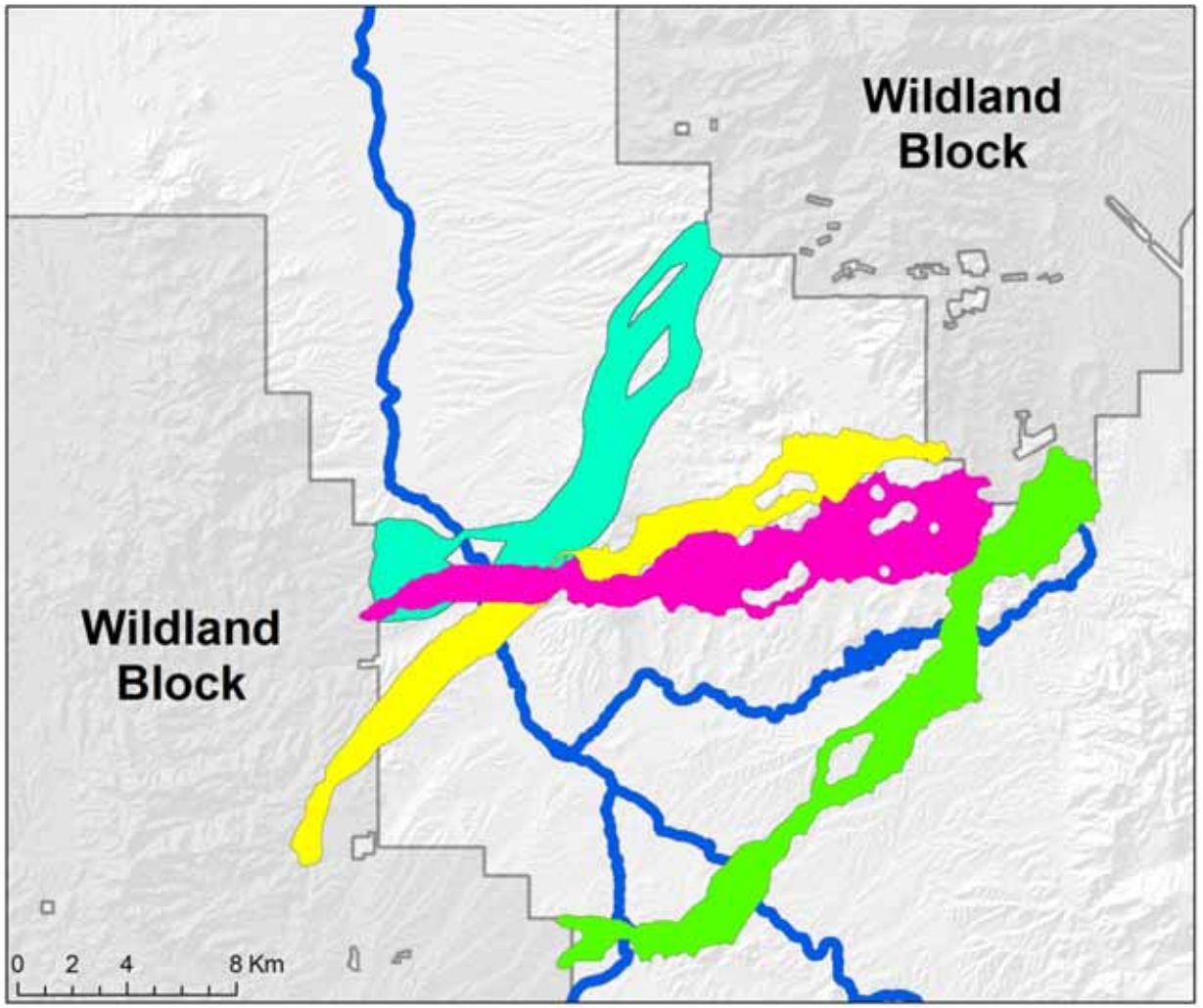
Typically >10 focal species and >10 land facets



Linkage Design 4: Join corridors

No species left behind

No land facet left behind



Linkage Design 5-6: Specify actions to restore connectivity

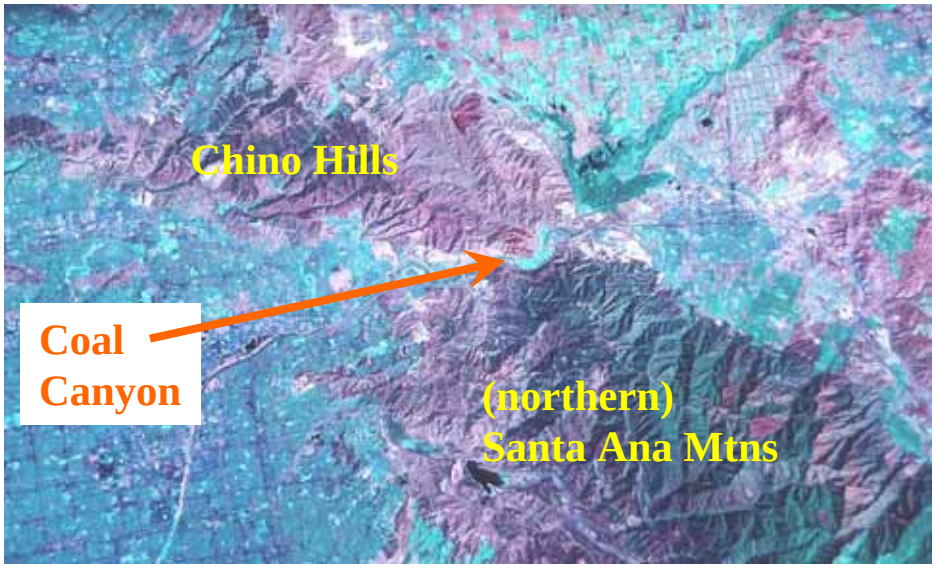
Land use plans

Restoration

Road crossings

Linkage Design 7: Implementation

Linkage Design 7: Implementation



Fall 2000: last parcel bought

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

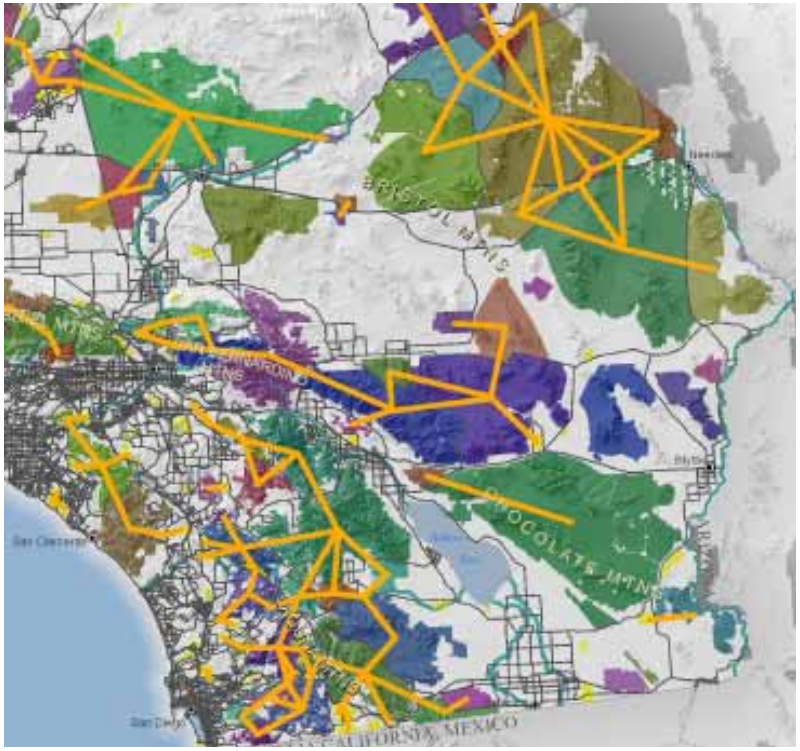
Linkage Design 7: Implementation

Asphalt-breaking ceremony:
10 Dec 2002

Chapter 6: Framework for Considering Roads

Highways occur in 96% of Essential Connectivity Areas.

In 552 ECAs, Natural Landscapes are separated only by a highway.



Road Mitigation Sticks

Highways in connectivity areas

Project Location	Protection Status	
	Protected	**Not Protected**
In Natural Landscape Block	Mitigate to highest standards. When modifying existing roads, seek opportunities to *enhance* wildlife movement.	Impact analysis should consider NLB designation.
In Essential Connectivity Area	Conduct fine-scale analysis to replace ECA with a Linkage Design.	
In Linkage Design	Mitigate to standards specified by the Linkage Design in specified locations. When modifying existing roads, seek opportunities to *enhance* wildlife movement.	

Standards for Road Mitigation

Wildlife Crossings Guidance Manual

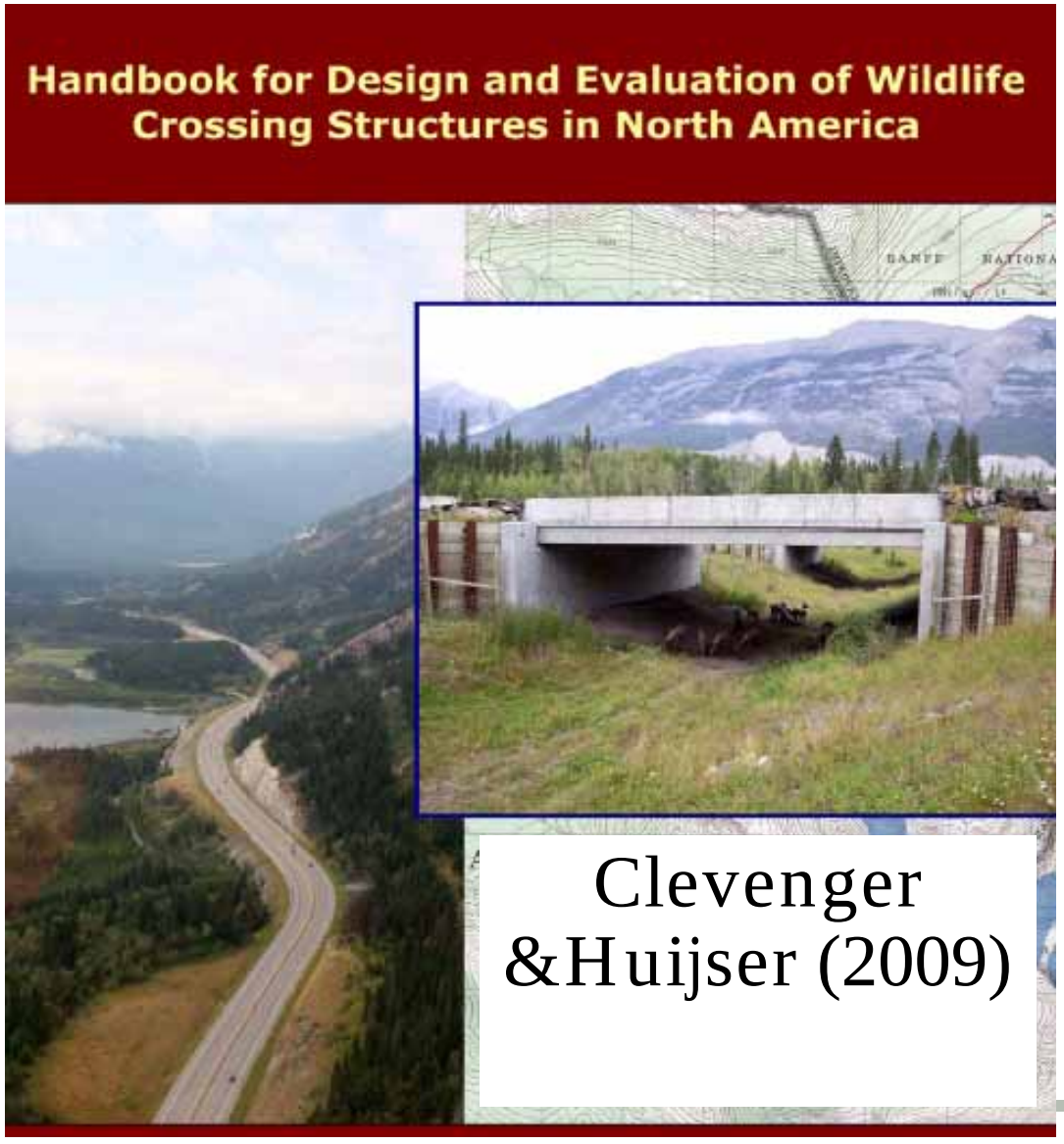
California Department of Transportation

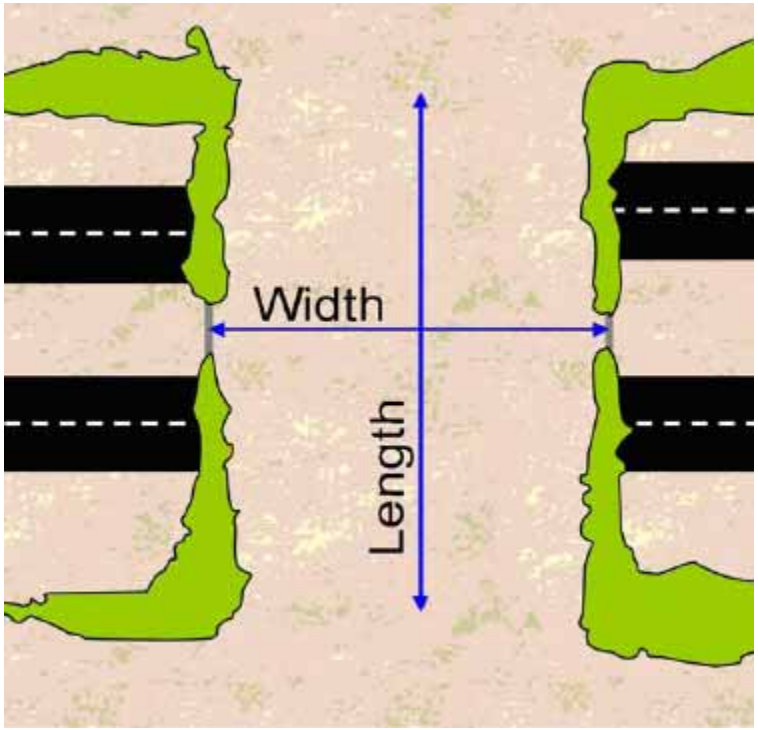
Caltrans

Meese et al. (2009)

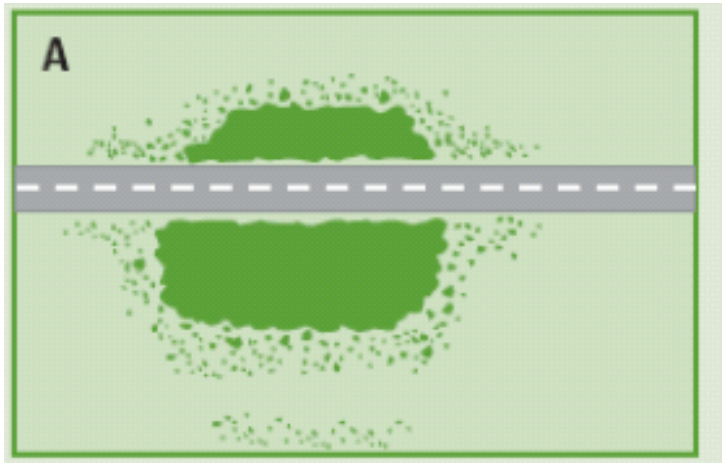
Fencing must guide animals to the structure

Standards for Road Mitigation

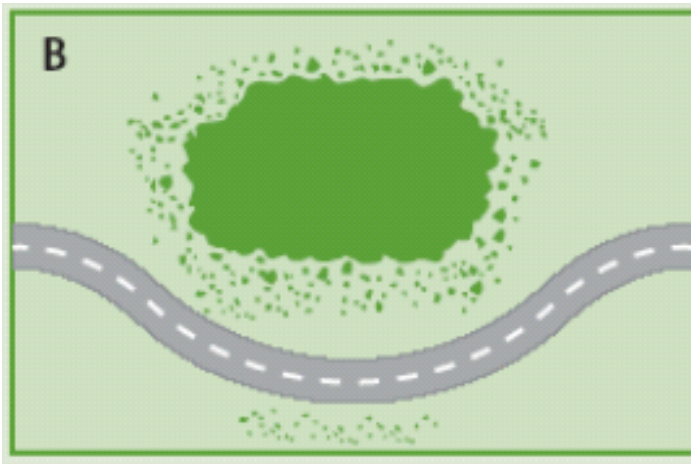




Avoidance is more effective than mitigation

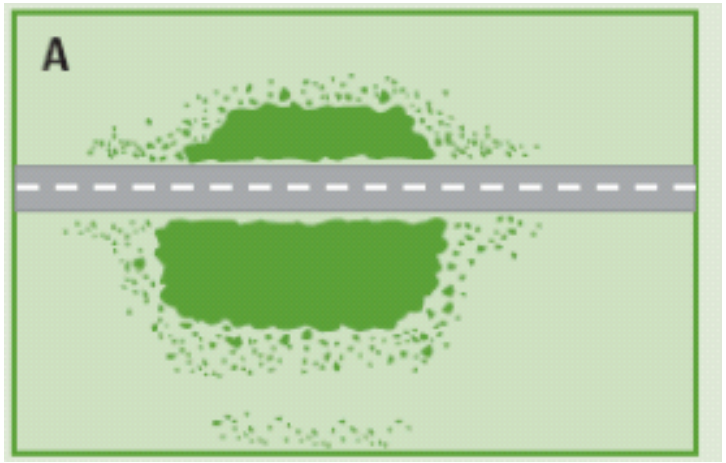


Initial concept

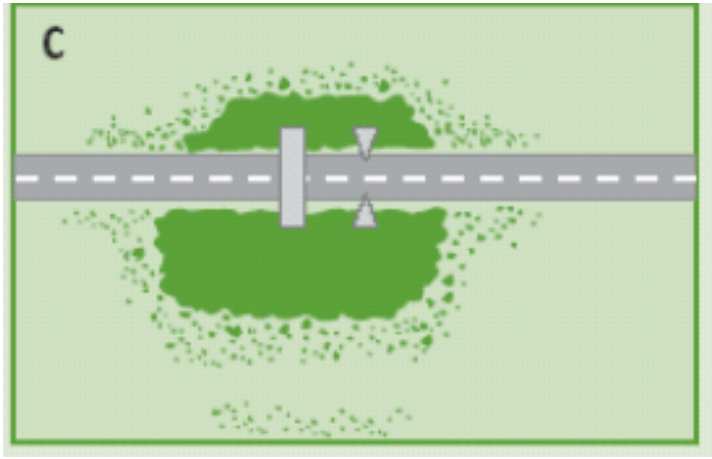


Avoidance

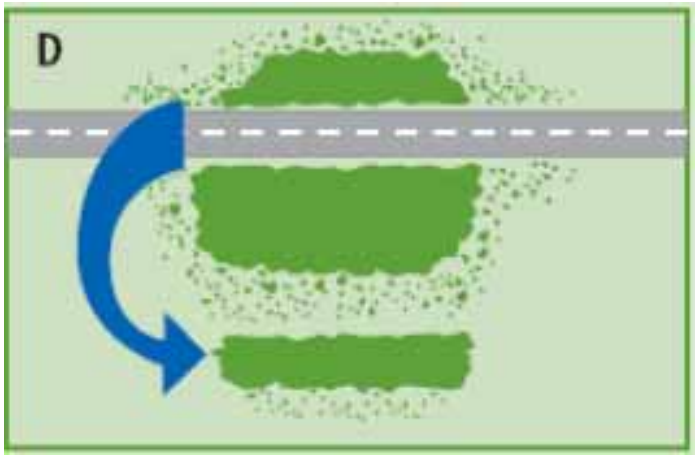
Types of mitigation



Initial concept



Crossing structures



Habitat replacement

Variety of crossing structure types is crucial

Good for elk & mule deer

Good for pronghorn

Good for small mammals & amphibians

Spacing of crossing structures is also crucial

One per mile

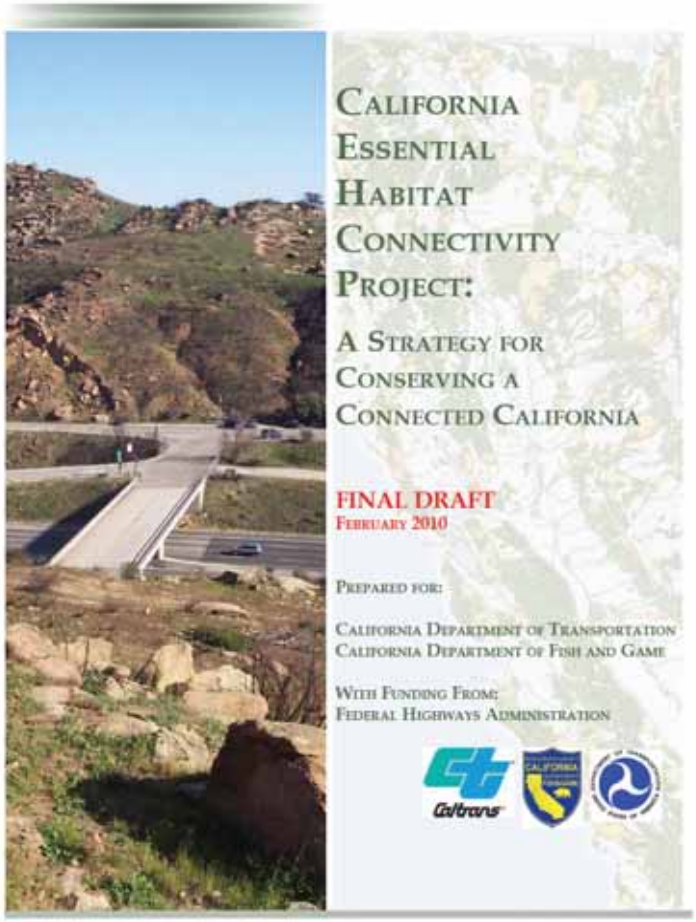
One per quarter mile

Essential Habitat Connectivity Project Data Distribution / Roll-out

- **Public Release Target: Mid-March 2010**
- **Essential Habitat Connectivity Report & Maps** (PDF)
- **DFG's GIS-lite Map and Data Viewer and Repository** - Biogeographic Information and Observation System (BIOS) - http://bios.dfg.ca.gov
- **Other Map Viewer/Conservation Tools/Hosts will follow** – Example: DataBasin.org (Others might include CERES, Western Regional Partnership, etc.)
- **GIS Data Access** – Data Download via ArcGIS Online (linked from BIOS and other sites)

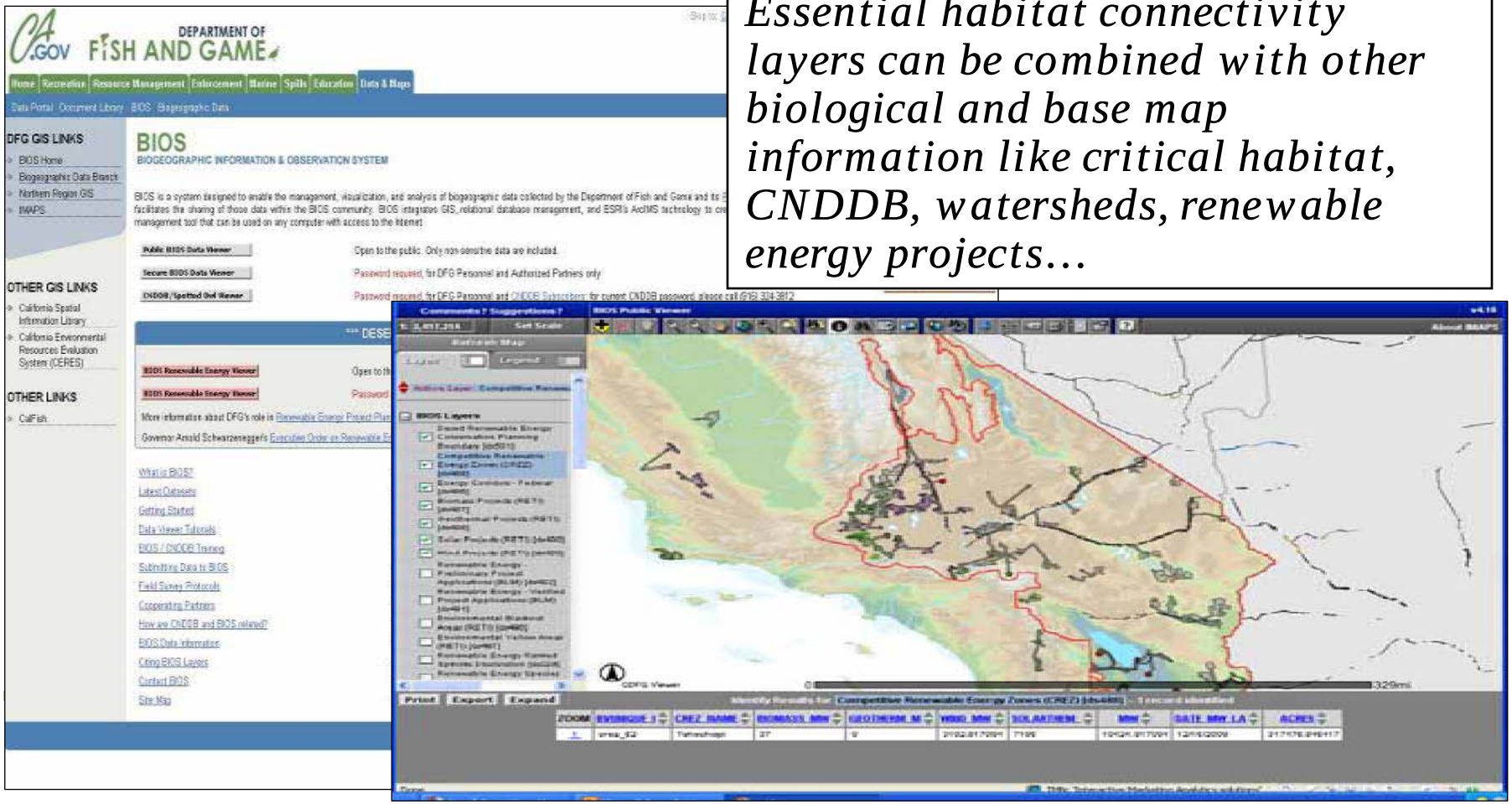
Data Distribution / Roll-out

- Essential Habitat Connectivity Report (PDF) – Accessible from DFG and Caltrans Websites
- Announcement sent to MDT when final information posted



Data Distribution / Roll-out

- DFG Map Viewer - Biogeographic Information and Observation System (BIOS) - http://bios.dfg.ca.gov



Essential habitat connectivity layers can be combined with other biological and base map information like critical habitat, CNDDB, watersheds, renewable energy projects…

Data Distribution / Roll-out

Other Map Viewers / Conservation Tools – e.g., Data Basin (now in beta; release in early May 2010) - http://databasin.org

From CBI, ESRI and Partners

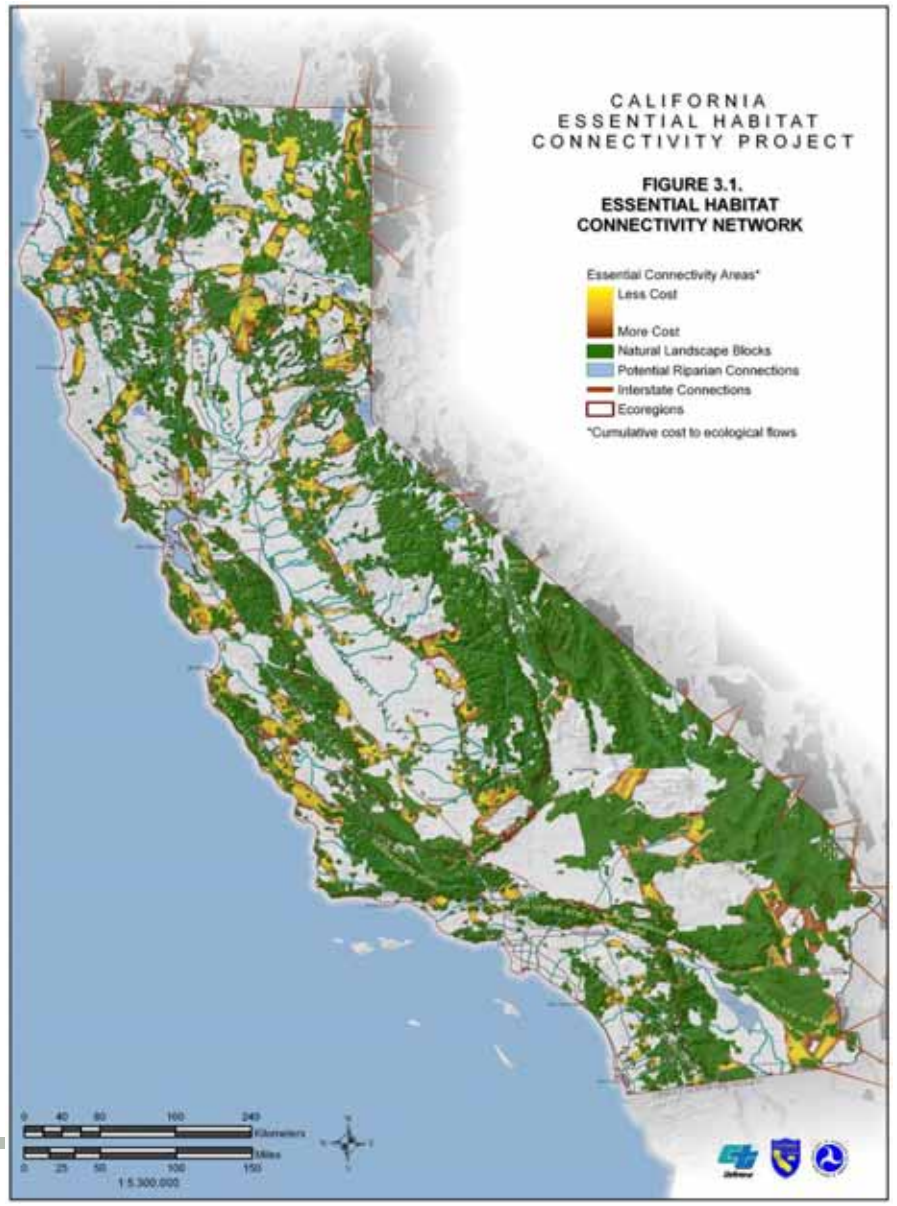
Data Distribution / Roll-out

- GIS / Geospatial Data Layers – Download Access from BIOS via ArcGIS Online (Layer Packets, including metadata):

Data Layer Name	Description File	File Format
NLB_gen	General **Natural Landscape Blocks** (used to generate comparison statistics)	Shapefile
NLB_ dissect	**Natural Landscape Blocks dissected by major and secondary roads** (used as termini in least-cost corridor modeling)	Shapefile
Sticks	**Diagrammatic linear linkage between centroids of Natural Landscape Blocks**	Shapefile
ECAs	**Unsplit version of the Essential Connectivity Areas** (n=168)	Raster and Shapefile
ECAs_split	**Split version of the Essential Connectivity Areas** (n=192)	Shapefile
Least_ Cost_Paths	**Least-cost path results for all Essential Connectivity Areas** (n=168)	Shapefile
Cost Surface	**Statewide resistance surface generated for least-cost path models**	Raster

Input

- Outreach Methods
- Important Audiences
- Availability of Materials
- Other Ideas



Final Comments / Questions





Please send any final comments to:

kwinters@dangermond.com

Thank you for participating!