Quantifying vulnerability of quaking aspen & associated bird communities to global climate change

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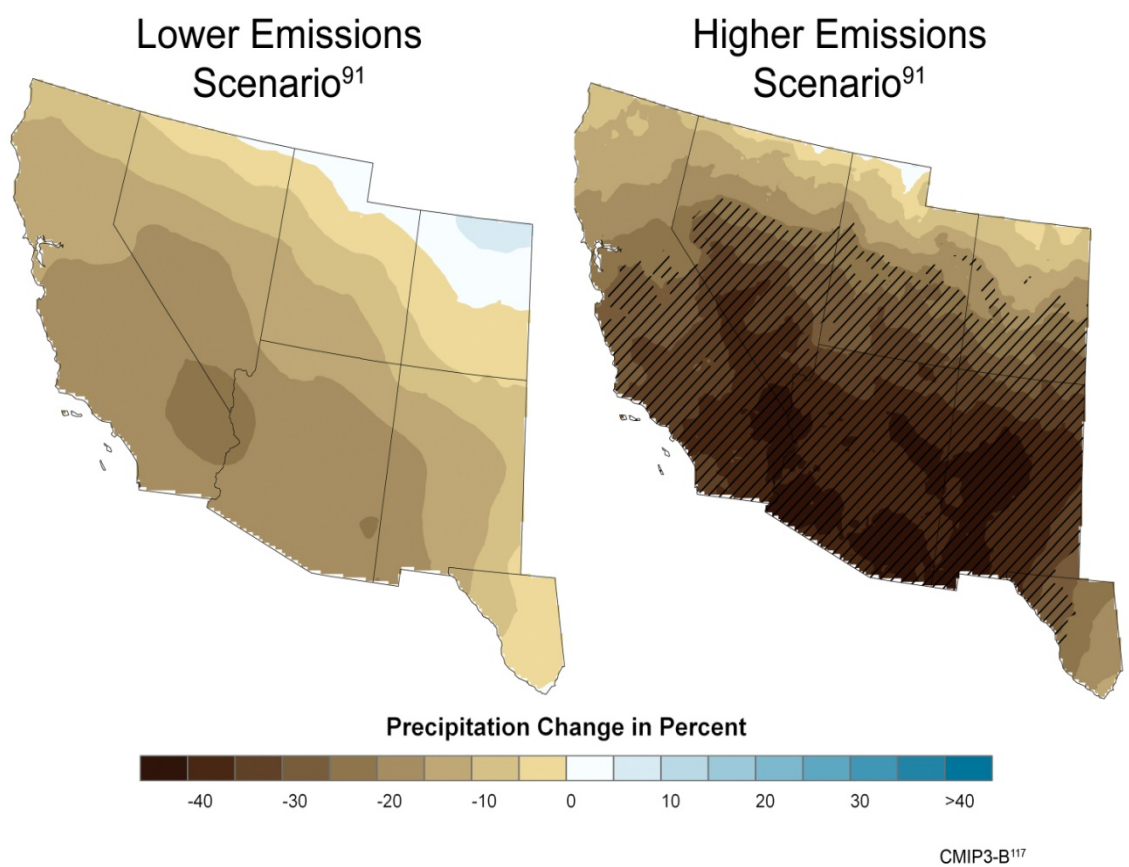
science for a changing world

Aspen in the Great Basin

- Importance in Great Basin
  - Deciduous tree habitat
  - Isolated, small patches
  - Species-rich; avian communities
  - Not well-studied
- Concerns about aspen decline
- Climate change



Percentage change in March-April-May precipitation for 2080-2099 compared to 1961-1979 for a lower emissions scenario[91] (left) and a higher emissions scenario91 (right). Confidence in the projected changes is highest in the hatched areas.

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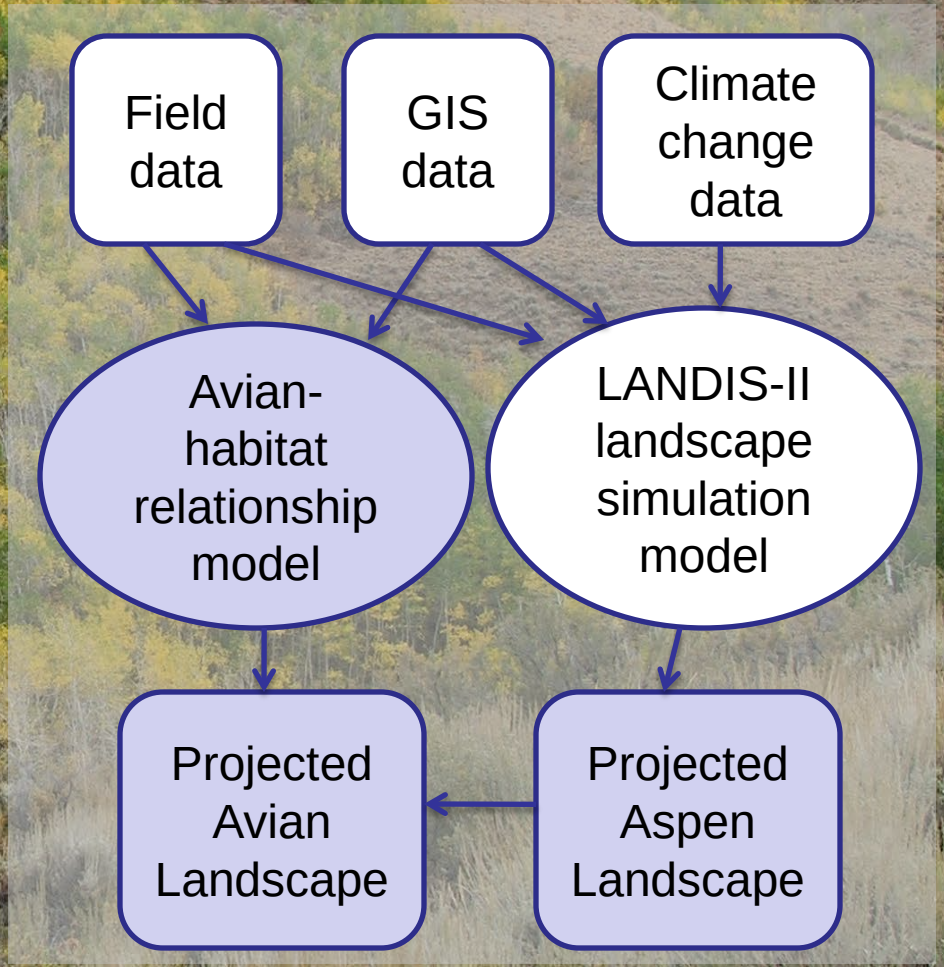
U.S. Global Change Research Program . 2009.

Questions & Approach

1. What is the current structural and spatial distribution of aspen on the landscape, and how does it affect avian abundance and distribution?

2. How is global climate change likely to affect aspen stand structure and distribution, and thus avian abundance and distribution?



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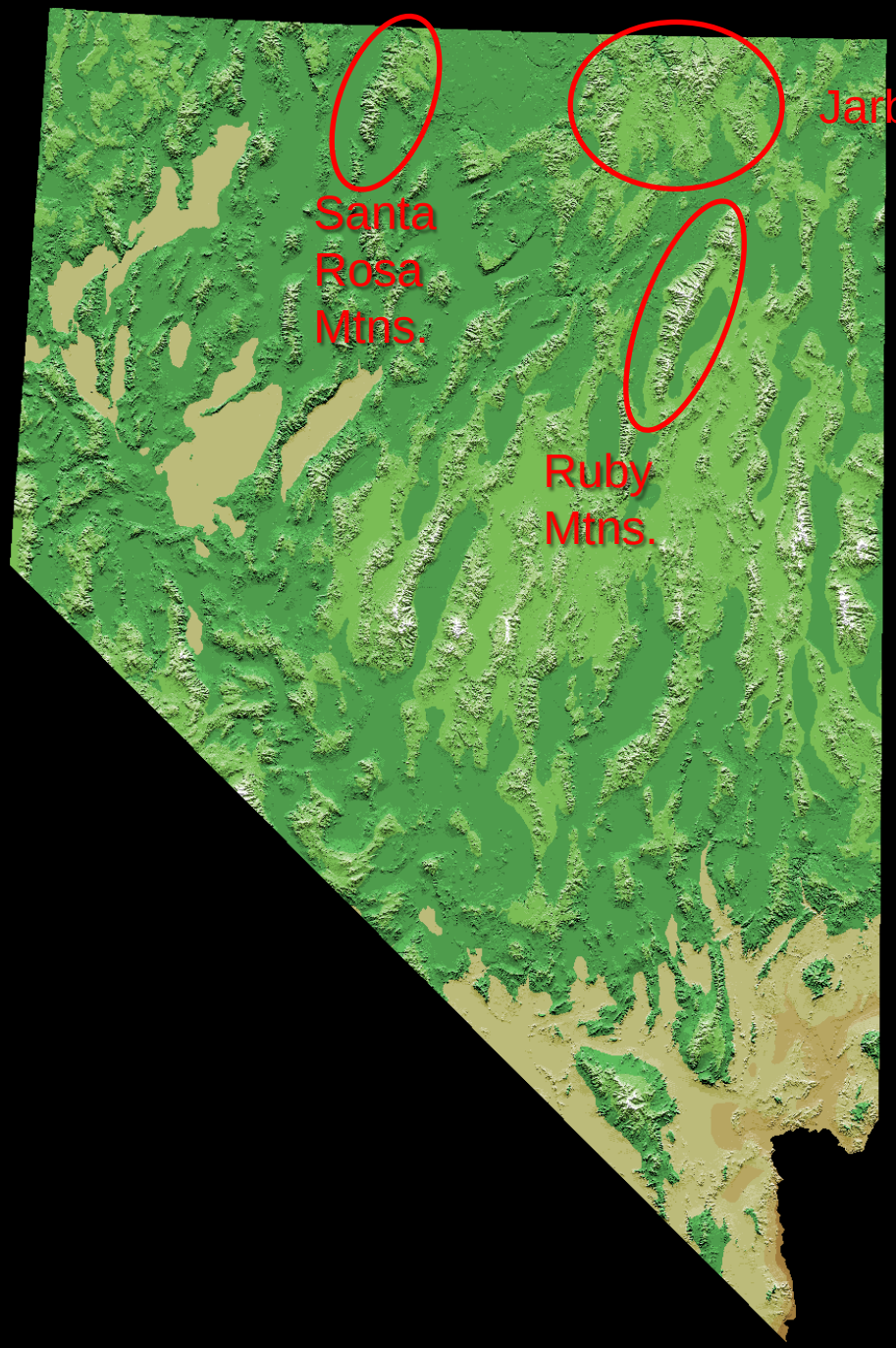

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Sampling Plan

ASPEN STAND SELECTION

- Stands derived from USFS cover type map
- Systematic stand selection, across mountain ranges, with stand edge 150m of road or trail

WITHIN STAND SAMPLING

- GIS grid
- Selected random interior cell for 100-m radius point count circle in each stand as starting point
- Then located adjacent cells: up to 6 interior & 2 edge point count circles per stand, subset with 2 points outside aspen

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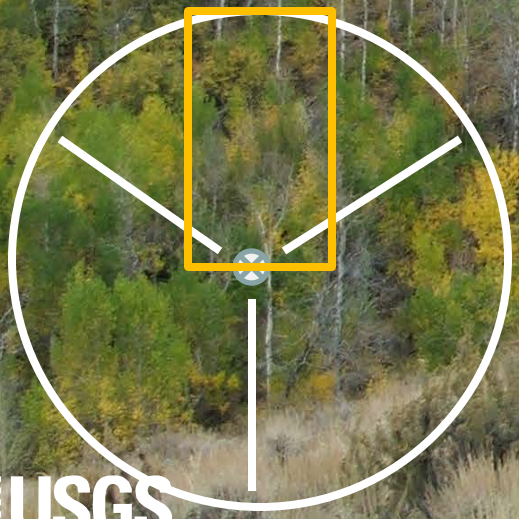
Field Data Collection

AVIAN SURVEYS

- 100-m fixed-radius point count; 10 minutes
- Each surveyed twice during breeding season (either 2010 or 2011)



STAND STRUCTURE & PLANT COMMUNTIES

- Collected on subsample of avian survey points
- Three 30-m transect lines in each point count circle
  - Aspen & other tree stem density
  - % cover shrubs, grasses/forbs
- Plot placed on center-point, random orientation: tree age (disturbance, structural)

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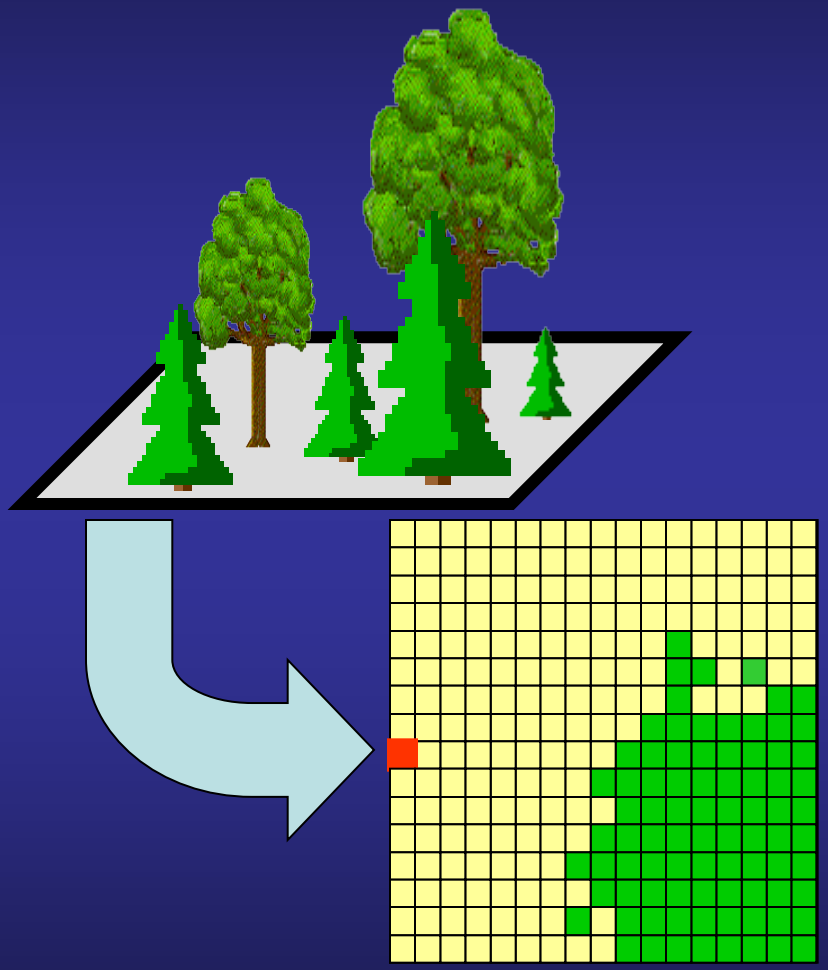
Modeling with LANDIS-II

- Spatially-explicit, stochastic forest landscape simulation model (FLSM)
  - Dispersal, succession, disturbance, & interactions
- Projects forest species age-cohorts, biomass, disturbance events over time
- Compare effects of
  - Management scenarios
  - Disturbance scenarios
  - Climate scenarios



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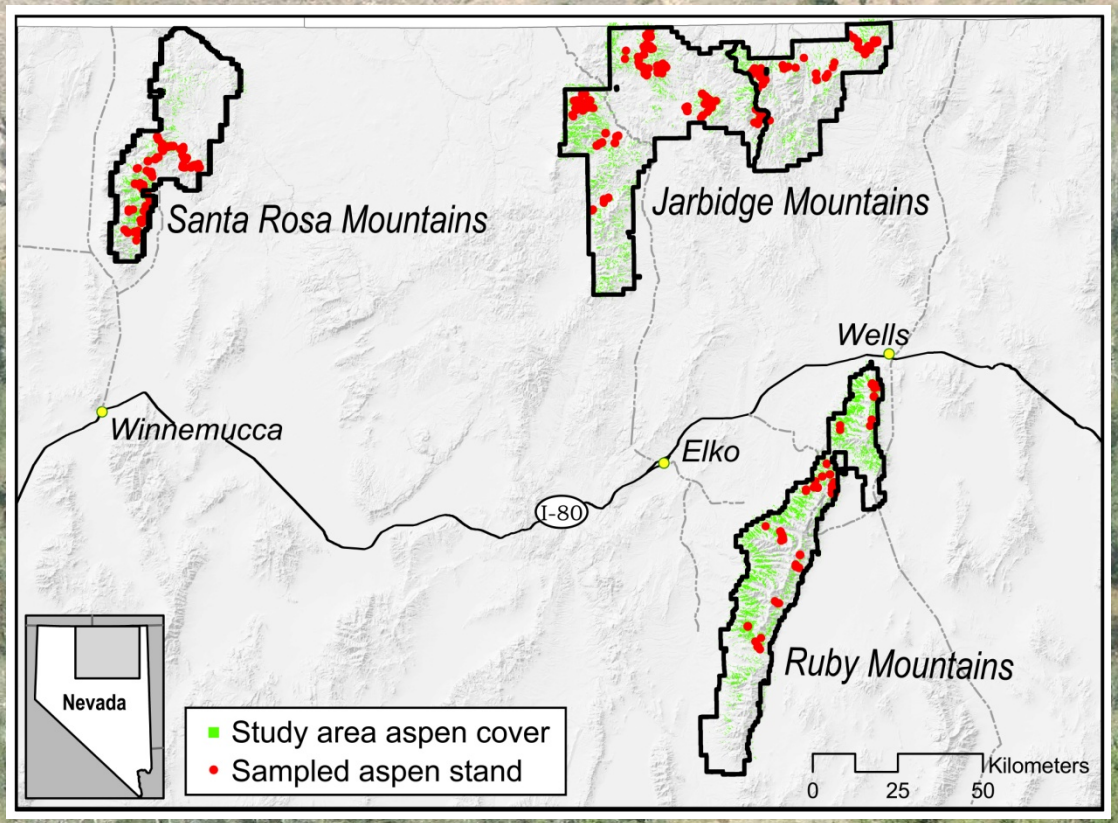
Scheller et al. 2007.

Field Data (2010 & 2011)



Number of 100-m point count circles (and stands) sampled			
Range	**Avian Data**	**Stand Structure**	**Age Structure**
Jarbidge	486 (148)	183 (111)	(40)
Ruby	191 (59)	83 (48)	(30)
Santa Rosa	224 (73)	66 (48)	(31)
Total	**901 (280)**	**332 (207)**	**(101)**

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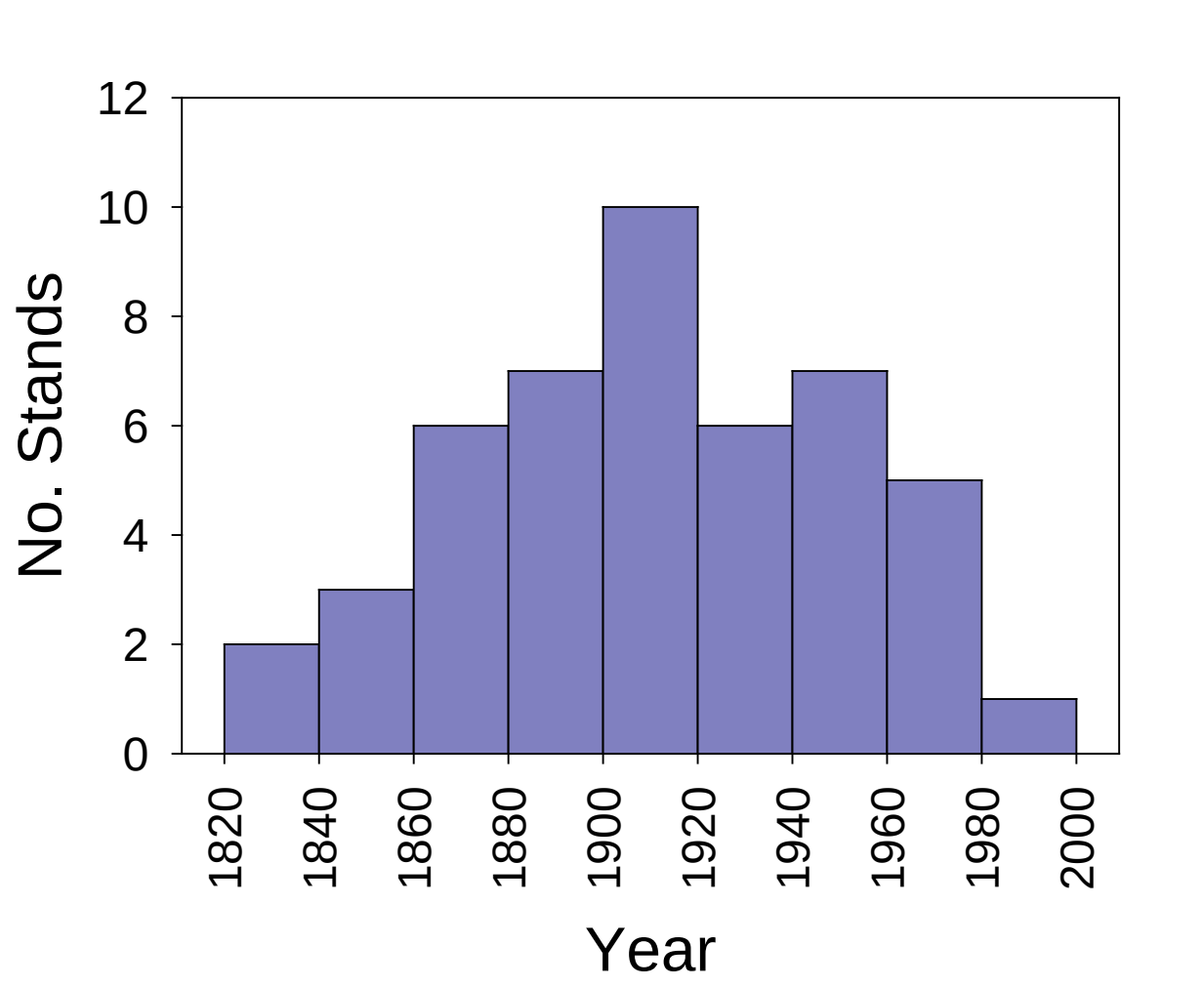
Stand Age Distribution



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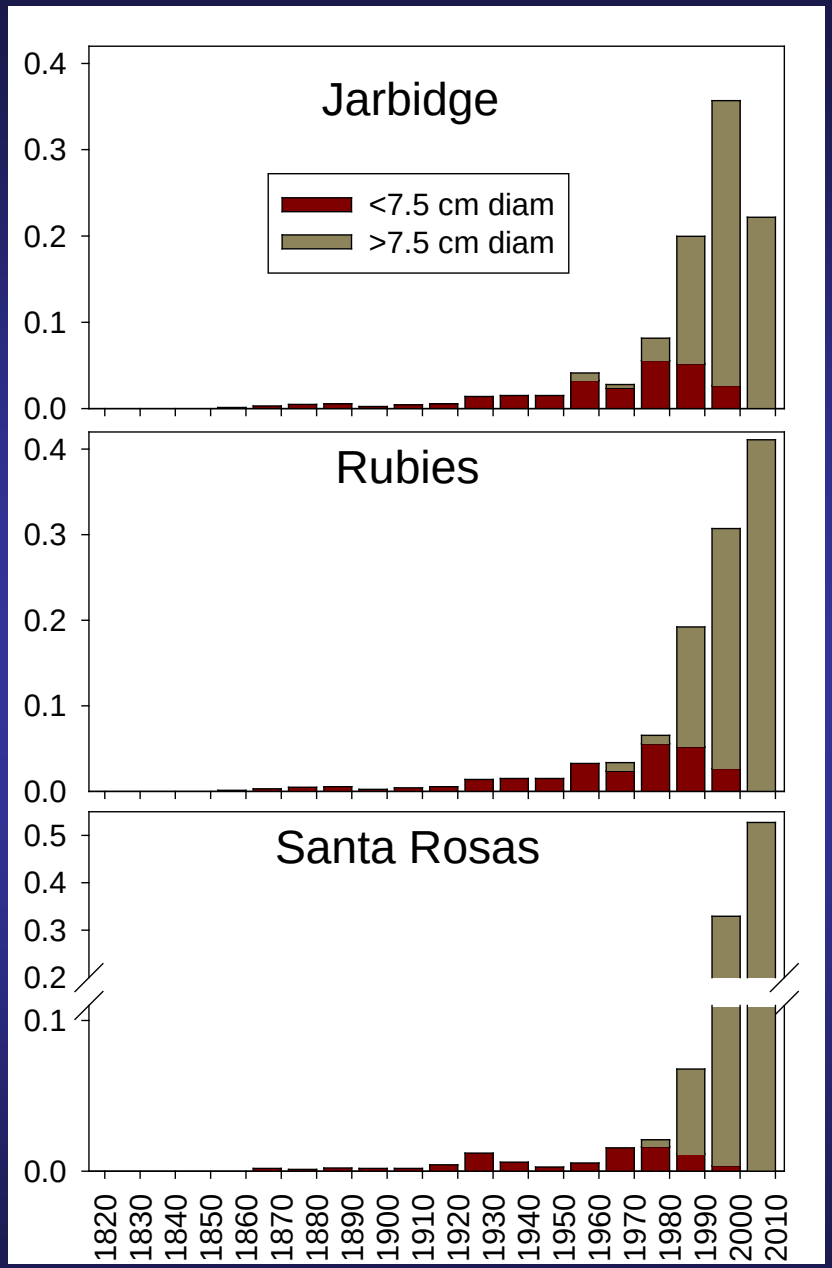
Composite Stand Age Structure



n = 46 stands (101 stands by end of study)

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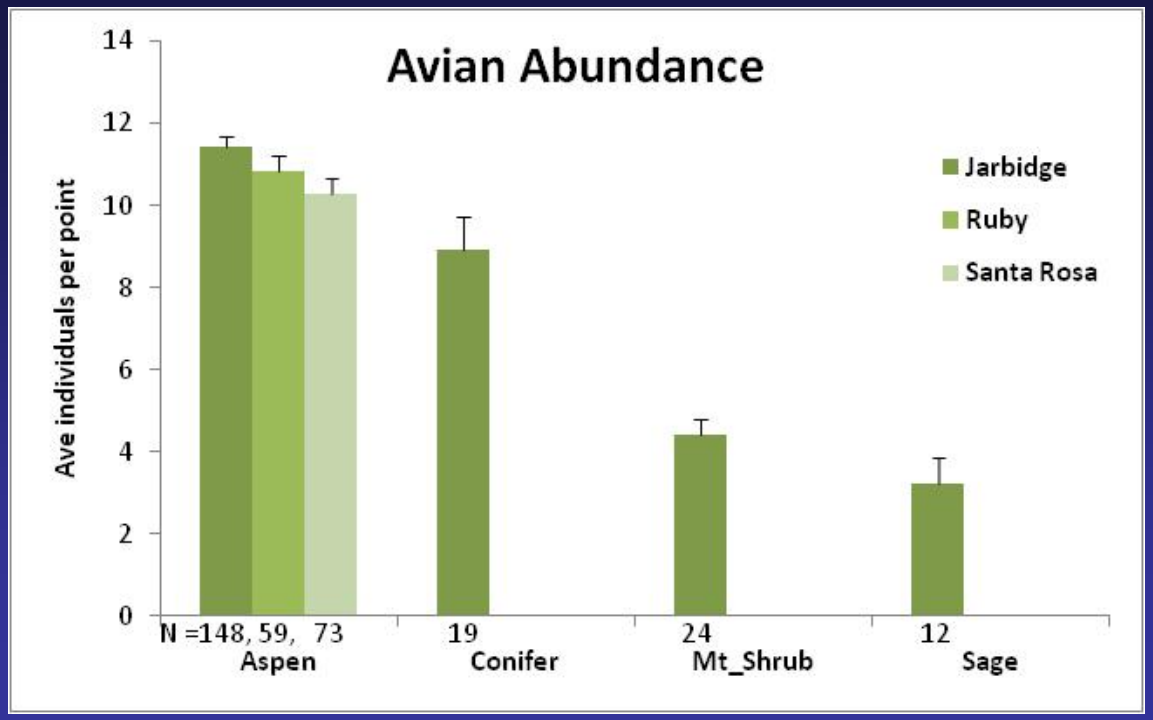
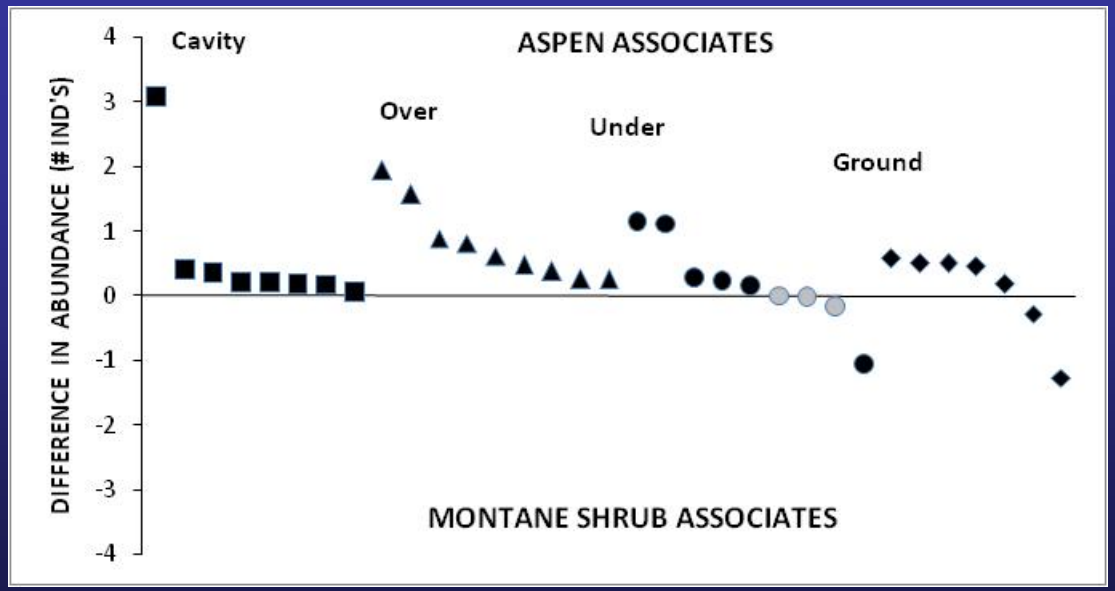

Avian Abundance
Ave individuals per point
14
12
10
8
6
4
2
0
Jarbidge
Ruby
Santa Rosa
N =148, 59, 73
Aspen
19
Conifer
24
Mt_Shrub
12
Sage

NPS


ASPEN ASSOCIATES
Cavity
Over
Under
Ground
DIFFERENCE IN ABUNDANCE (# IND'S)
4
3
2
1
0
-1
-2
-3
-4
MONTANE SHRUB ASSOCIATES

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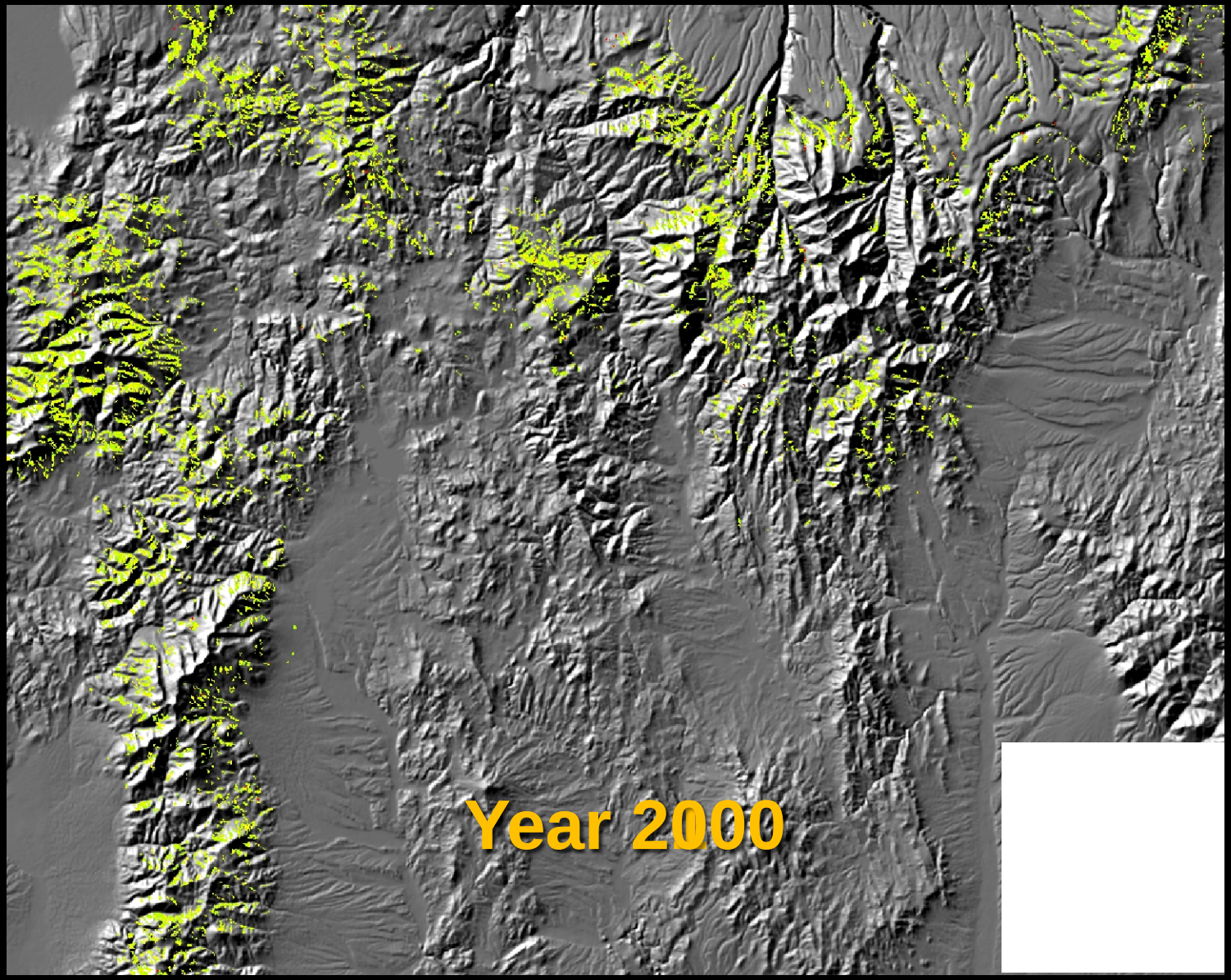
LANDIS-II Model Output



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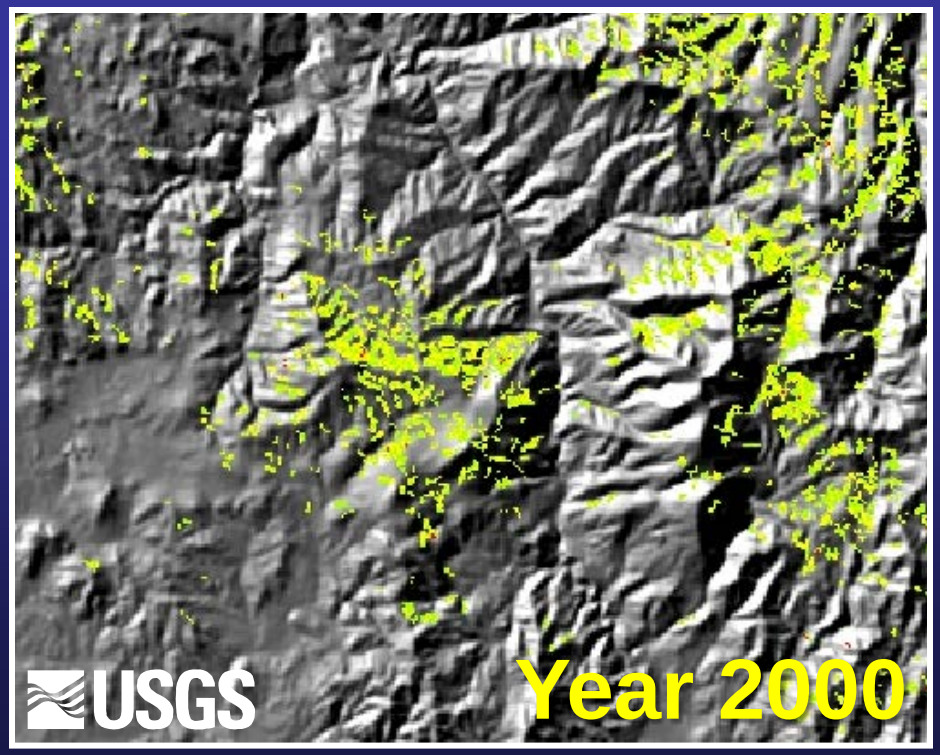
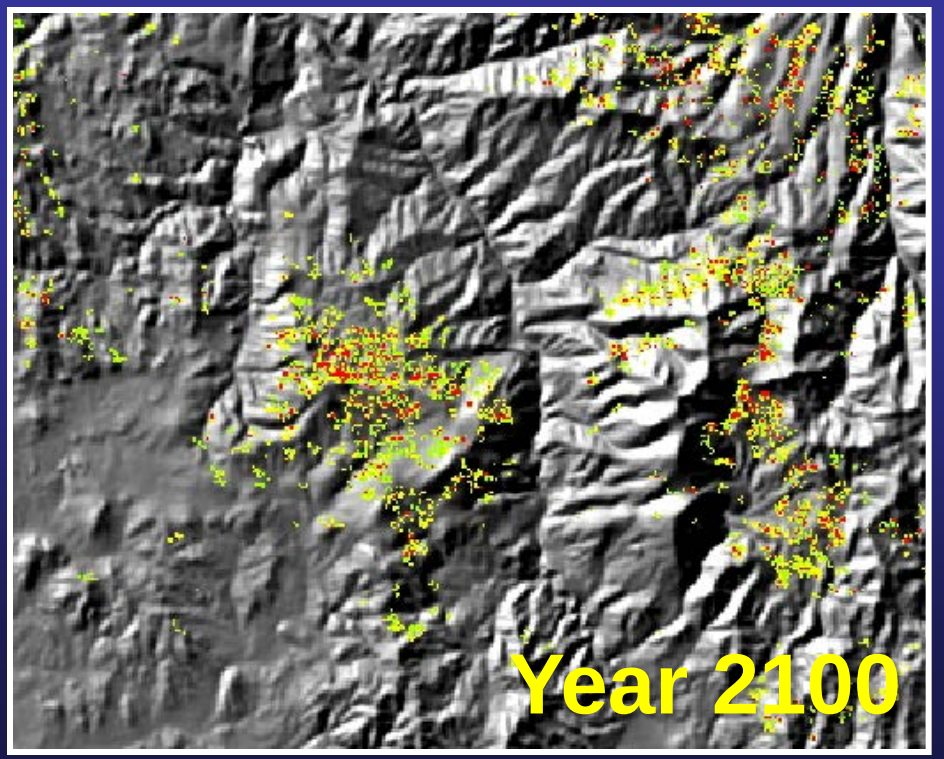
RNSA = b_1 elev^2 + b_2 PctAspen + b_3 LgTrees





Questions?

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- Great Basin LCC

Partners & Supporters:
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