MANAGING FOR RESILIENCE IN MATURE FORESTS: FOREST MANAGEMENT GOALS AND LESSONS FROM THE PAST

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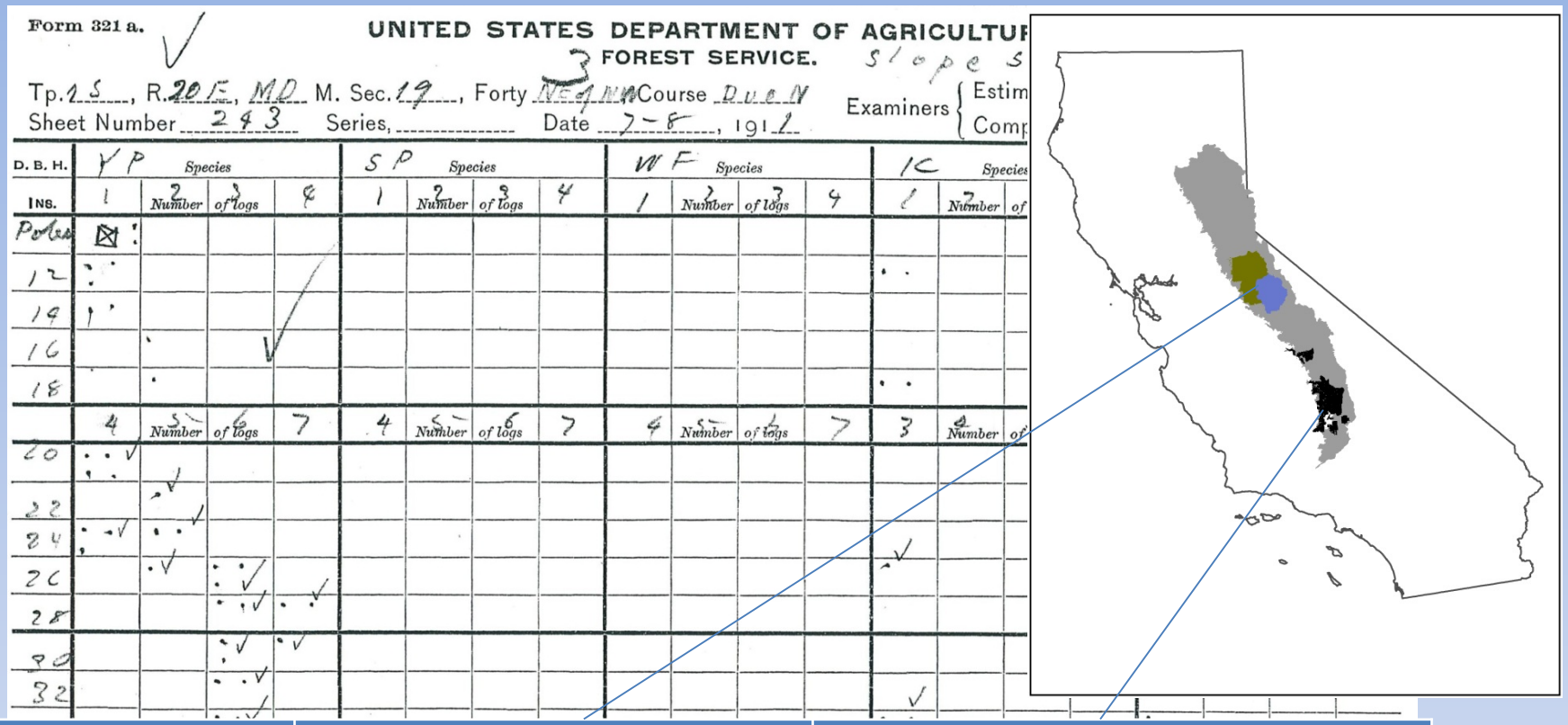
Talk Outline

Forest structure before suppression and harvesting
  - Early forest inventories in 1911
  - Information of what forests once were

Recent managed wildfires
  - In frequent fire regimes forests in YOSE, SEKI

Forest restoration and fire hazard treatments
  - Multiple treatments over 15 years
  - Effects on tree resilience

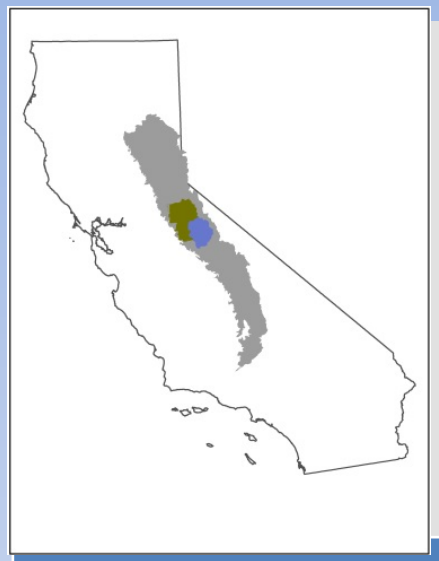
First early forest inventory from USFS



Total count	Stanislaus NF & Yosemite NP	Sequoia (Kern) NF Greenhorn Mts.
Transects	294	378
Trees	20,700	18,052
Survey area (ac)*	41,496	28,405

*no prior timber harvesting, ~3% sample of total area

STF-YOSE – forest structure and composition



Vegetation group	No. (transects)	CHFO (% cover)	Shrub (% cover)	Total BA ($ft^2\ ac^{-1}$)	Trees > 6" (ac^{-1})	Canopy cov. (%)
Shrub	27	2	84	0	0	0
Low BA, high shrub	48	25	54	35	10	9
Low BA, high small trees	31	32	22	43	20	12
PIPO, low BA, high CHFO	44	80	11	60	15	16
PIPO, high BA, mod CHFO	41	55	21	94	29	24
PIPO-CADE, low CHFO	60	18	17	73	19	17
Mixed-con., high lg. trees	24	43	25	132	29	28
PSME-PILA	16	26	36	82	18	20
AB sp., high large trees	3	0	22	129	32	20

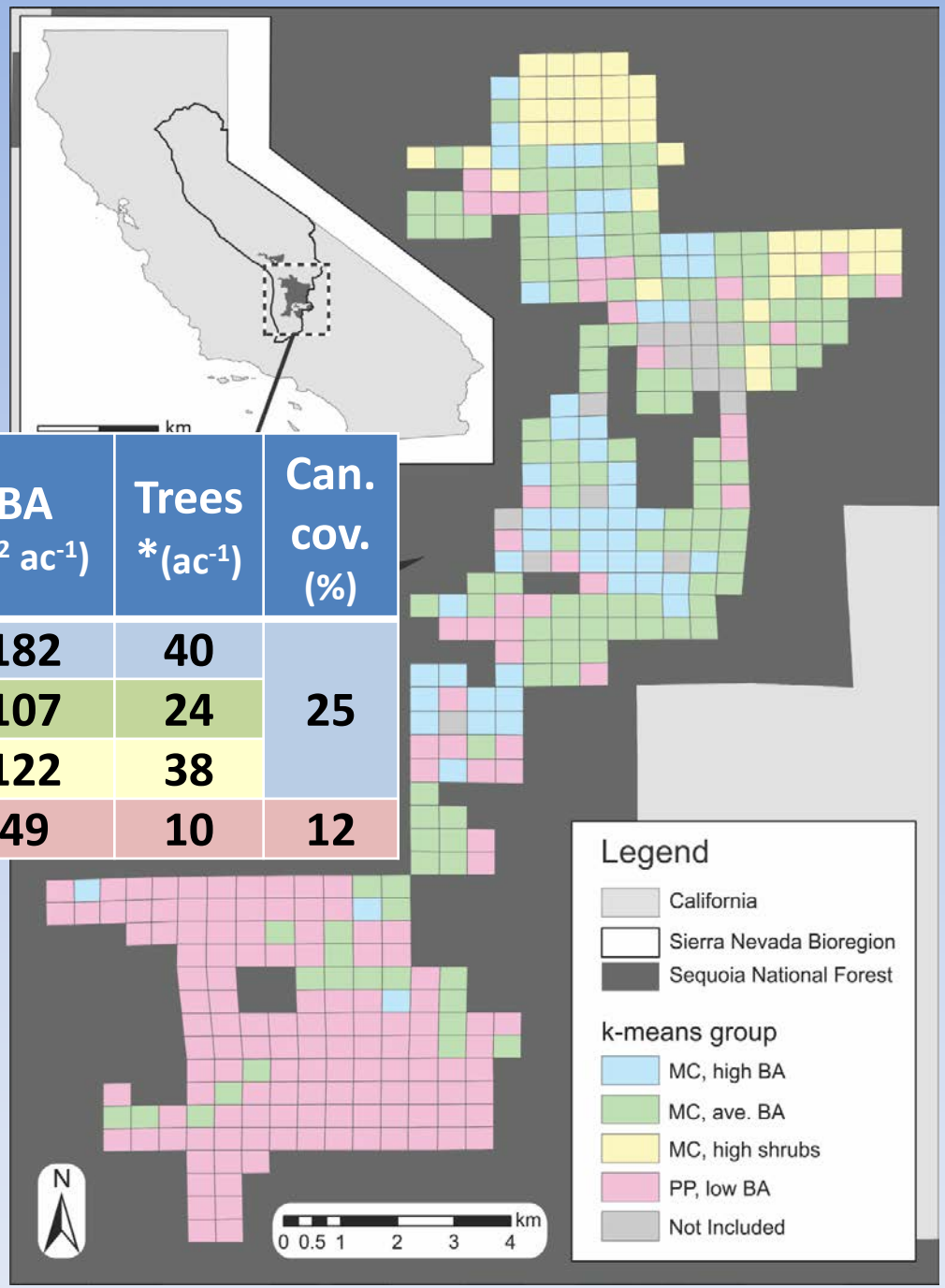
Collins et al 2015, *Ecol. Appl.*

STF-YOSE Historical vs. current:
re-measurement of 1911 timber surveys

Year	Basal area ($ft^2\ ac^{-1}$)	Tree density (ac^{-1})		Pine proportion
		> 6 in.	>36 in.	
1911	87	22	5	0.56
2013	173	101	5	0.45

Kern – forest structure and composition:

Vegetation group	No. (trans.)	CHFO (% cover)	Shrub (% cover)	BA ($ft^2\ ac^{-1}$)	Trees *(ac^{-1})	Can. cov. (%)
MC, high BA	55	0	20	182	40	25
MC, ave. BA	127	5	26	107	24	
MC, shrubs	39	62	76	122	38	
PP, low BA	157	1	14	49	10	12



Stephens et al. 2015, *Ecosphere*

Jeffrey pine-Mixed Conifer in Yosemite

Area burned 3 times by managed wildfire since 1974

Characterizing vegetation structure/composition

Identify distinct vegetation groups in YOSE and SEKI

K-means cluster analysis-fire

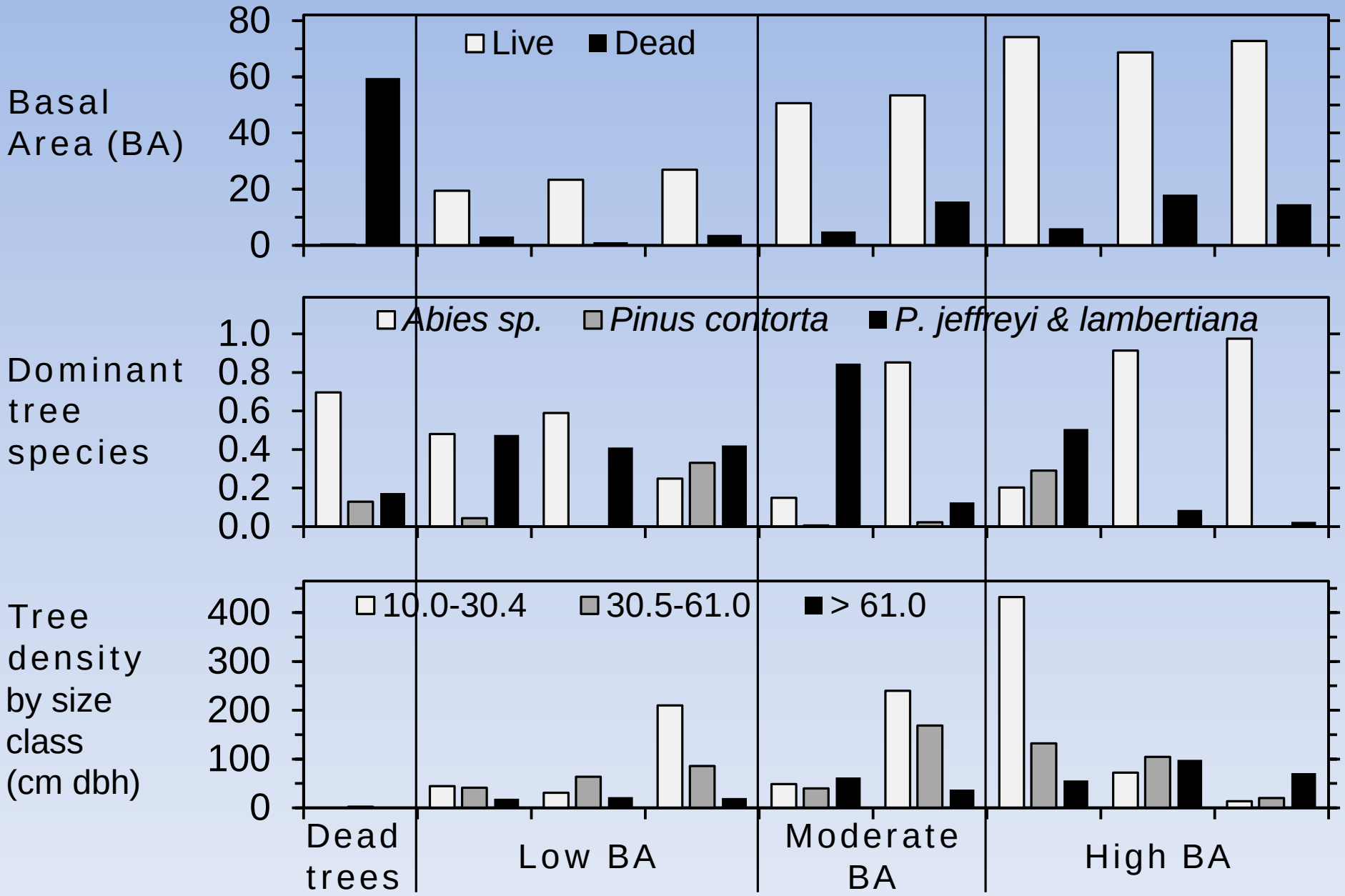
- Based on Euclidian distances between transects (n=117)
- Input variables:

  Basal area (BA) by species, live and dead BA, tree density by size class, shrub cover

Collins et al. 2016 For. Ecol. Management

Characterizing vegetation structure/comp.

Vegetation groups identified from cluster analysis



Forest Structure Summary

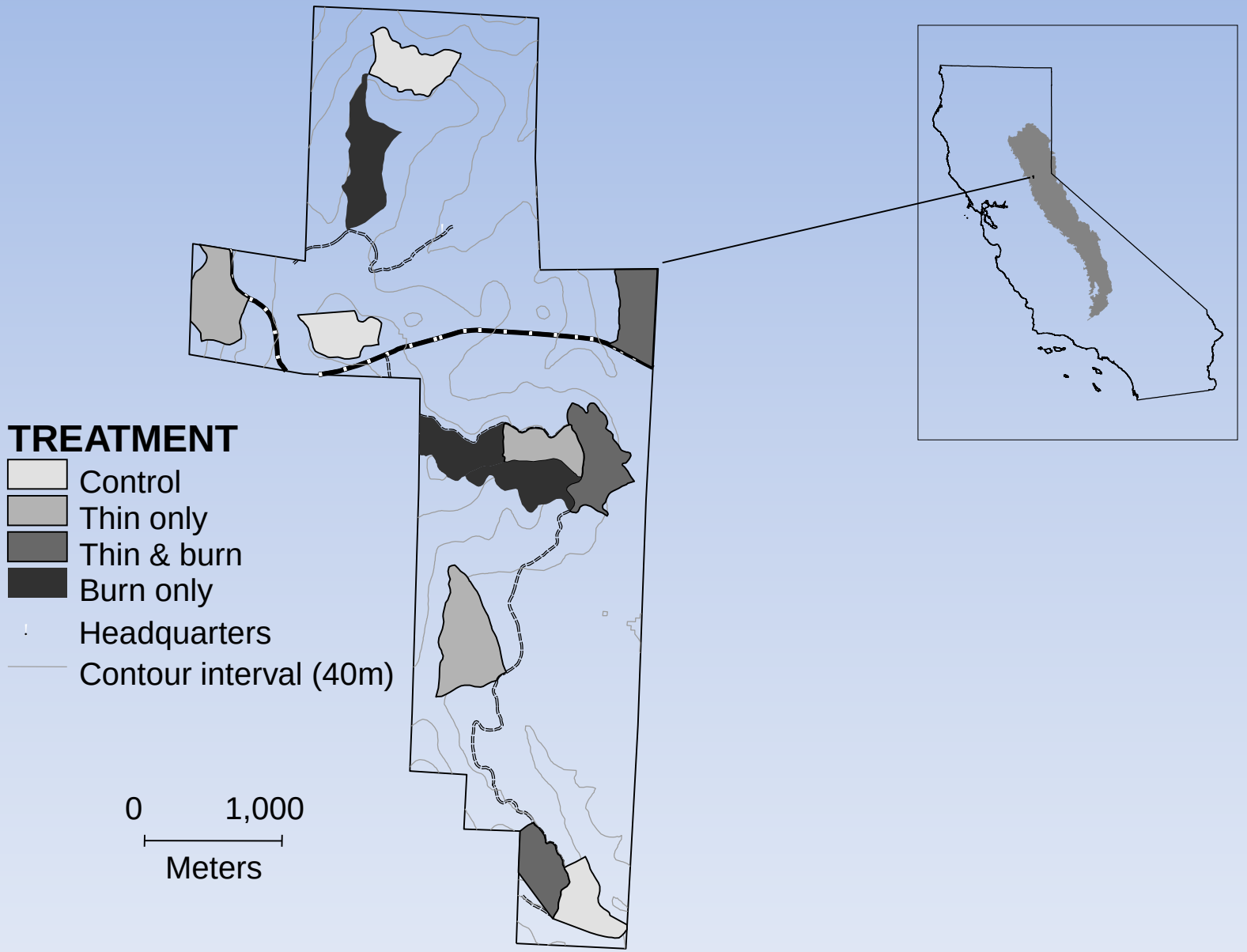
1911 Inventories and Managed Wildfires in Yosemite and Kings Canyon National Parks

Mixed conifer and upper elevation mixed conifer forests (both forest types together)

- Approximate proportions in different forest structural classes:
  - 50–70% low density, open;
  - 15–20% high density, closed canopy;
  - 5–10% early seral in small patches (median < 10 acres)

  – Proportions could be a starting point from which to apply and monitor different landscape restoration strategies.

Northern Sierra Nevada site (Blodgett Forest) – National Fire and Fire Surrogate Study



No treatment vs. thinning: Blodgett Forest

Pre

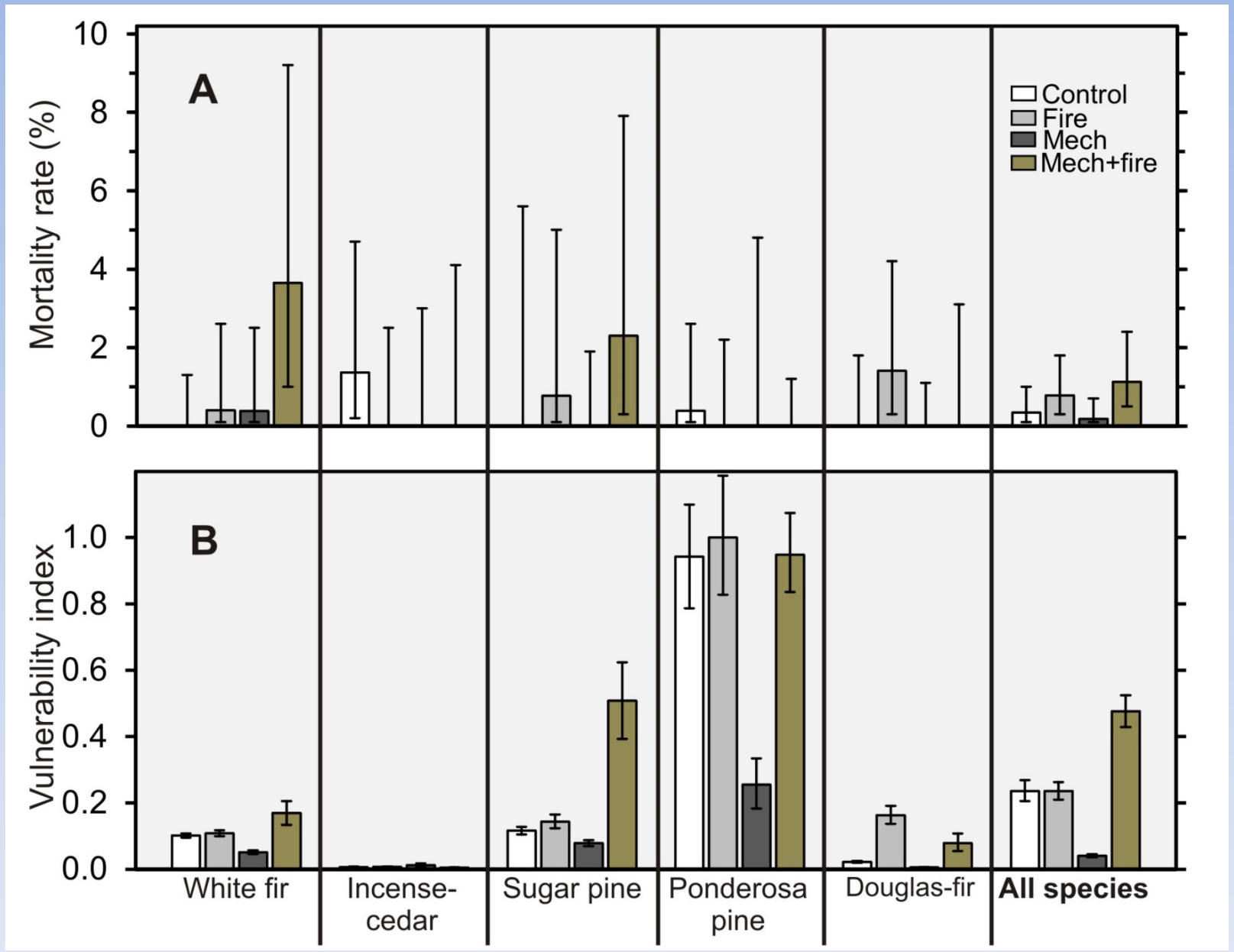
Post

Fire alone vs. thinning + fire: Blodgett Forest

Pre

Post

Tree vigor differences among treatments



Collins et al., 2014, *Ecol. Appl.*

Conclusion

We have some good information on resilient old mixed conifer forests

- Managed fire and restoration treatments can achieve desired outcomes
- Mechanical treatments need more heterogeneity when used

Need increased fuel reduction treatments and managed wildfire for resource benefit, 10x current treatment area/yr.

Frequent fire forests – critical

US Forest Service management plans being revised
Best chance in decades to change trajectory

Next 1-3 decades absolutely critical

Leave options available for future managers, optimistic

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