

Logs, snags, and trees: woody habitat structures in Colorado forests

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INTRODUCTION

Raptors, cavity nesting birds, and mammals utilize woody habitat structures (WHS) in the form of **snags, wildlife logs, and living trees with decay and deformities**¹. Features such as cavities, lightning scars, brooming, and broken tops enhance WHS for a variety of wildlife activities. In the Colorado Rocky Mountain region, there is little understanding of the distribution and quality of WHS. Understanding the prevalence of WHS in **fire-suppressed untreated forests** is important to gaining a baseline understanding of habitat availability before forest treatments are implemented that may impact **wildlife of concern**. Consequently, we asked the following questions in three Colorado forest types:

- What is the **abundance** of WHS across forest types? Does abundance differ significantly between forest type?
- How prevalent are features that enhance the **quality** of WHS? Does quality differ significantly between forest types?

	Food source	Denning or nesting	Cover from predators	Scanning or hunting platform	Increased access to heartwood	Drumming tower
Cavities		X	X		X	
Hollows		X	X		X	X
Broken tops		X	X	X	X	
Dead tops		X		X	X	X
Conks					X	
Fire/lightning scars					X	
Witches' brooming		X	X			
Mistletoe shoots	X					

METHODS

Field sites were selected in stands with no history of forest management *and* no moderate to high severity fire in the last 30 years. 65 sites were established: 26 in **mixed conifer**, 31 in **ponderosa-pine dominant**, and 8 in **pinyon pine-dominant** forest.

Per site, logs, snags, and living trees were measured and assessed for the presence of wildlife features². Logs were measured in a 1/100th ac plot from the site's center. Overstory measurements were recorded using 10 BAF prism variable radius plots (22 sites) and fixed 1/10th ac plots (43 sites).



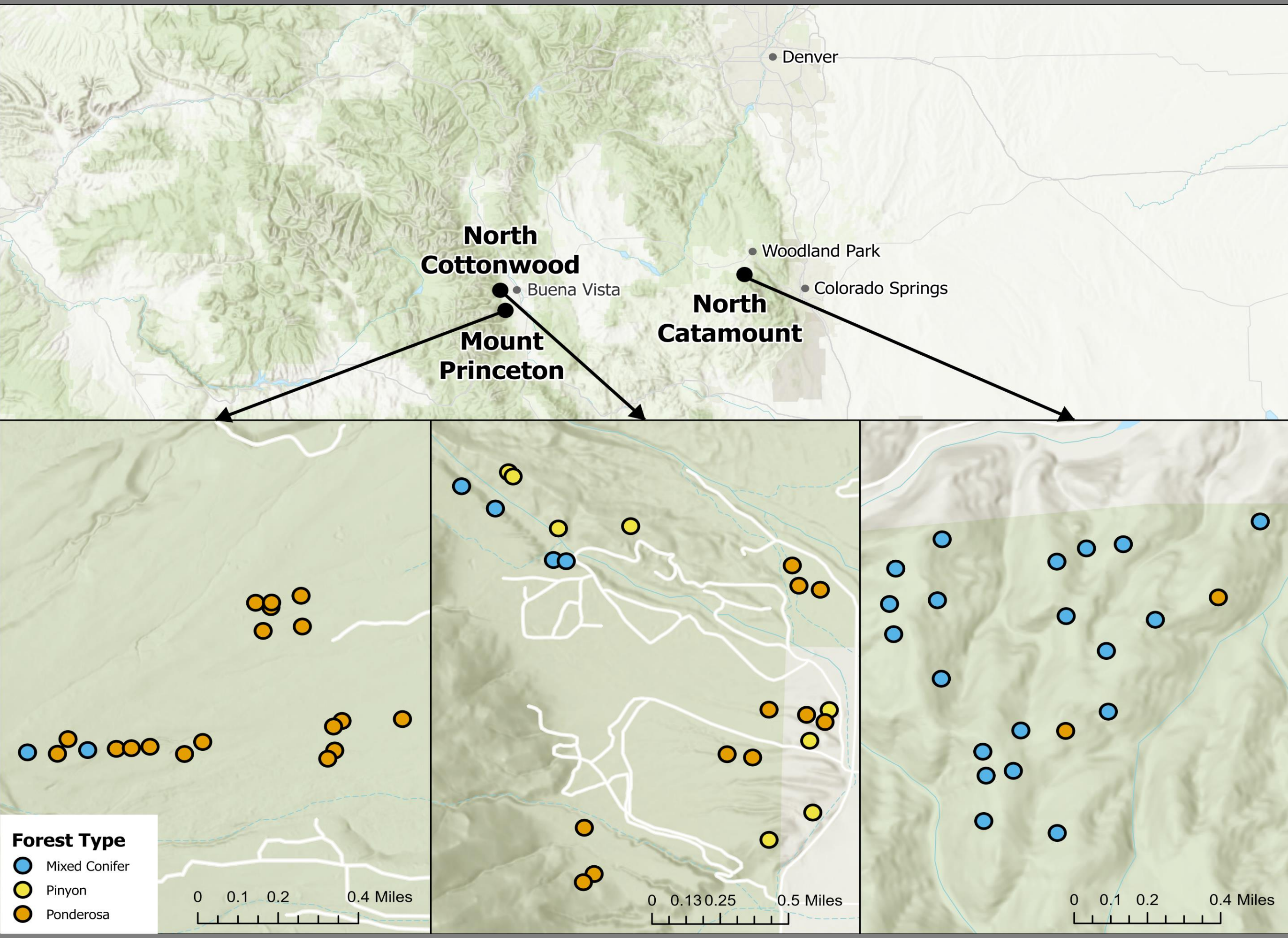
Abundance		Mixed Conifer (MC) Forest Type			Ponderosa Pine (PIPO) Forest Type			Pinyon Pine (PIEN) Forest Type		
		Mean	SD	N	Mean	SD	N	Mean	SD	N
Wildlife Tree	Density	37.2 ^b	43.1	26	101 ^a	86.4	31	5 ^b	10.7	8
Wildlife Tree	Relative Abundance	.17	-	-	.52	-	-	.02	-	-
Snag	Density	35.3 ^a	45.8	26	7.5	12	31	0 ^b	0	8
Wildlife Log	Density	150 ^a	127	26	109.7	185	31	0 ^b	0	8
Wildlife Log	Volume	7.3	13.9	20	3.8	4.9	13	-	-	-

Table 3. The unit for density is *the woody structure/acre*; the unit for volume is in *cubic feet*. Relative abundance is the ratio of wildlife tree density out of total tree density. Superscripts denote statistically significant differences between forest types.

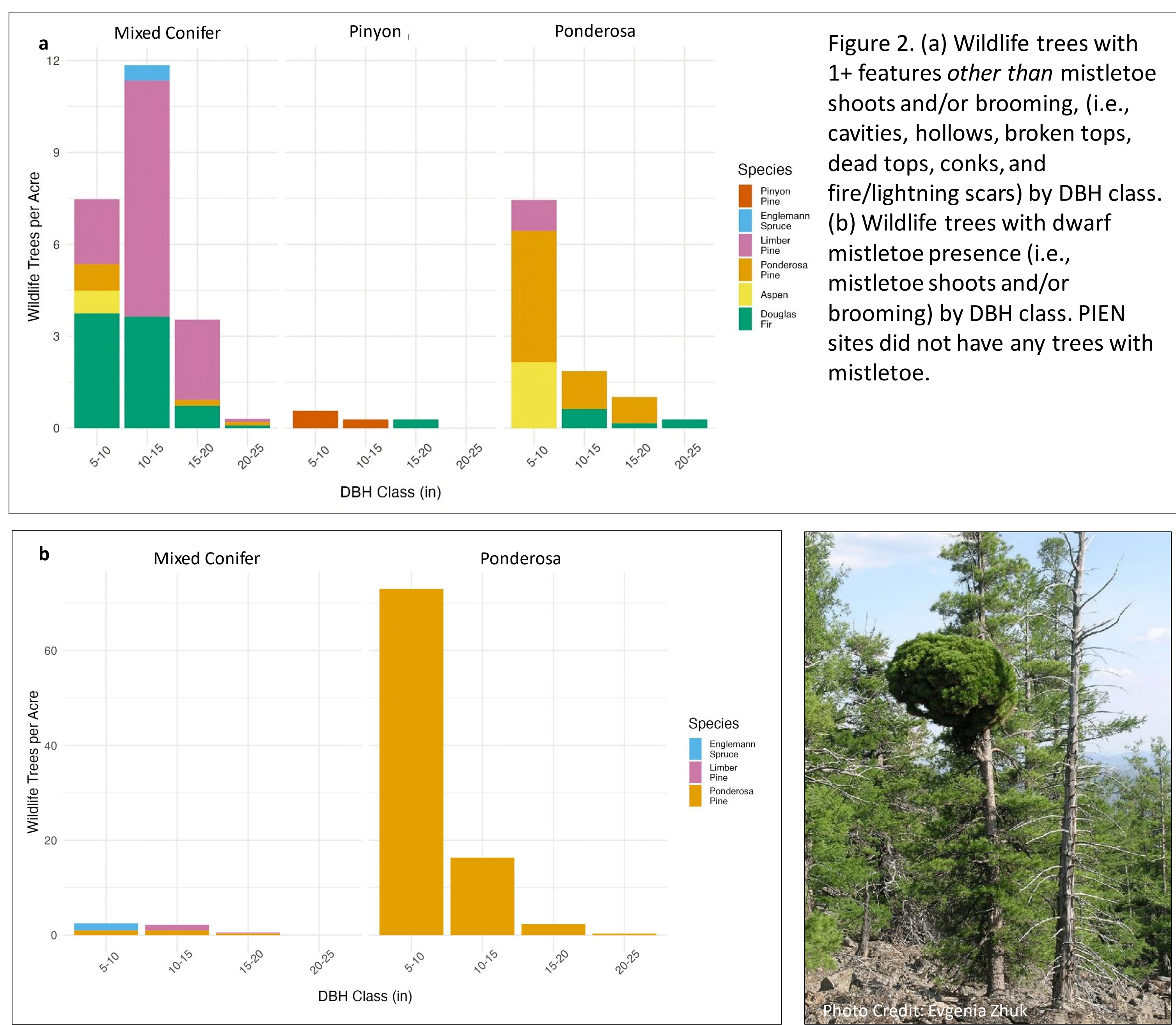
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REFERENCES

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WILDLIFE TREES: $\geq 4.5'$ tall; $\geq 5''$ DBH; 1+ feature indicative of decay or deformity



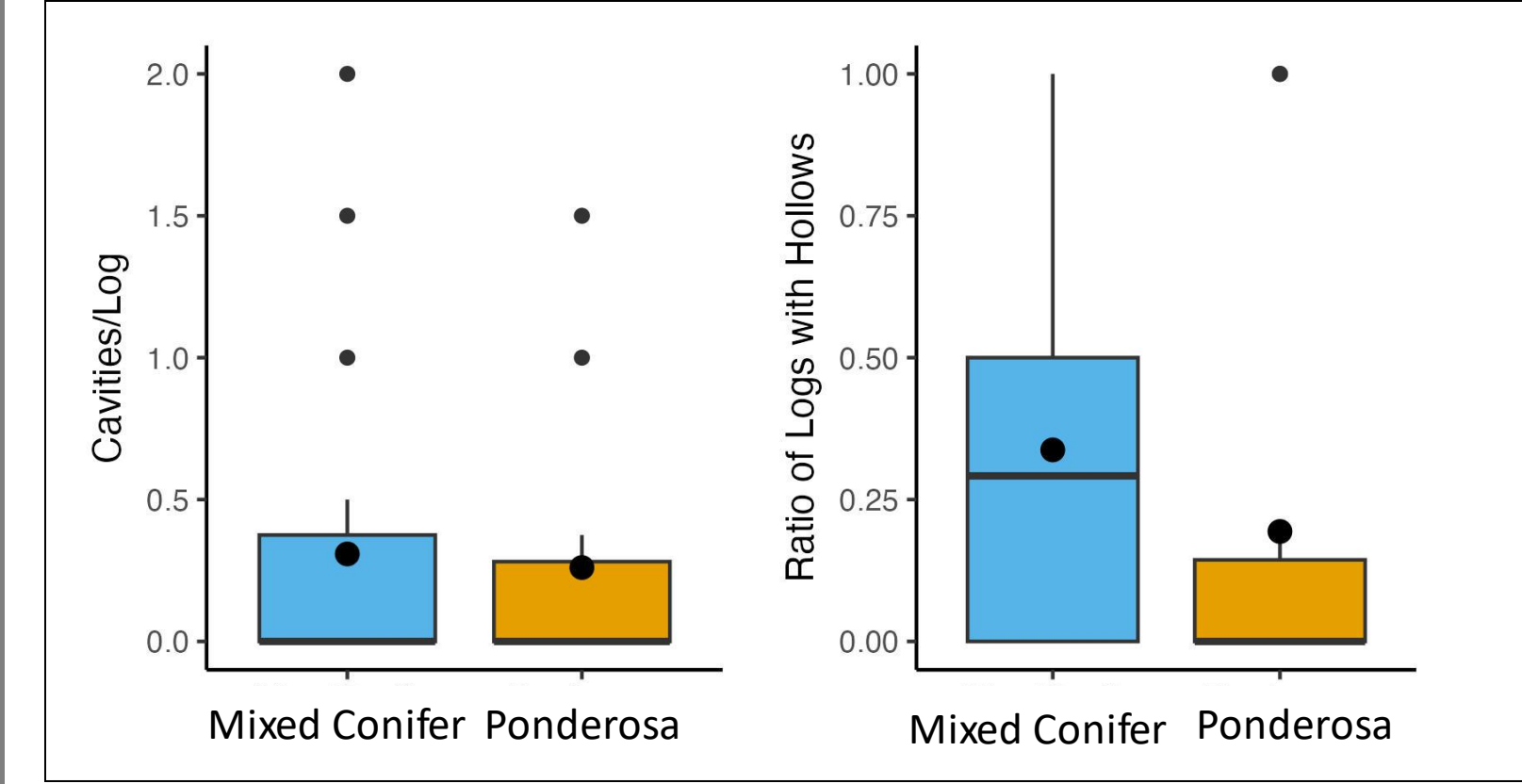
Abundance Results

- PIPO sites had the highest density and relative abundance of wildlife trees, which was driven by high prevalence of trees with mistletoe shoots and brooming.
- Wildlife tree density was followed by MC, then PIEN sites.

Quality Results

- PIPO sites had statistically more trees with broken and dead tops, mistletoe shoots, and brooming than other forest types.
- MC sites had statistically more trees with fire and lightning scars than other forest types.
- Trees in PIEN sites had low rates of occurrence for almost all features.
- Amongst all forest types, there was a low occurrence of conks, hollows, and cavities. These features are associated with wood decay, perhaps shortening a tree's lifespan and amount of time before it is classified as a "snag".

WILDLIFE LOGS: $\geq 6.56'$ long; $\geq 3''$ diameter³



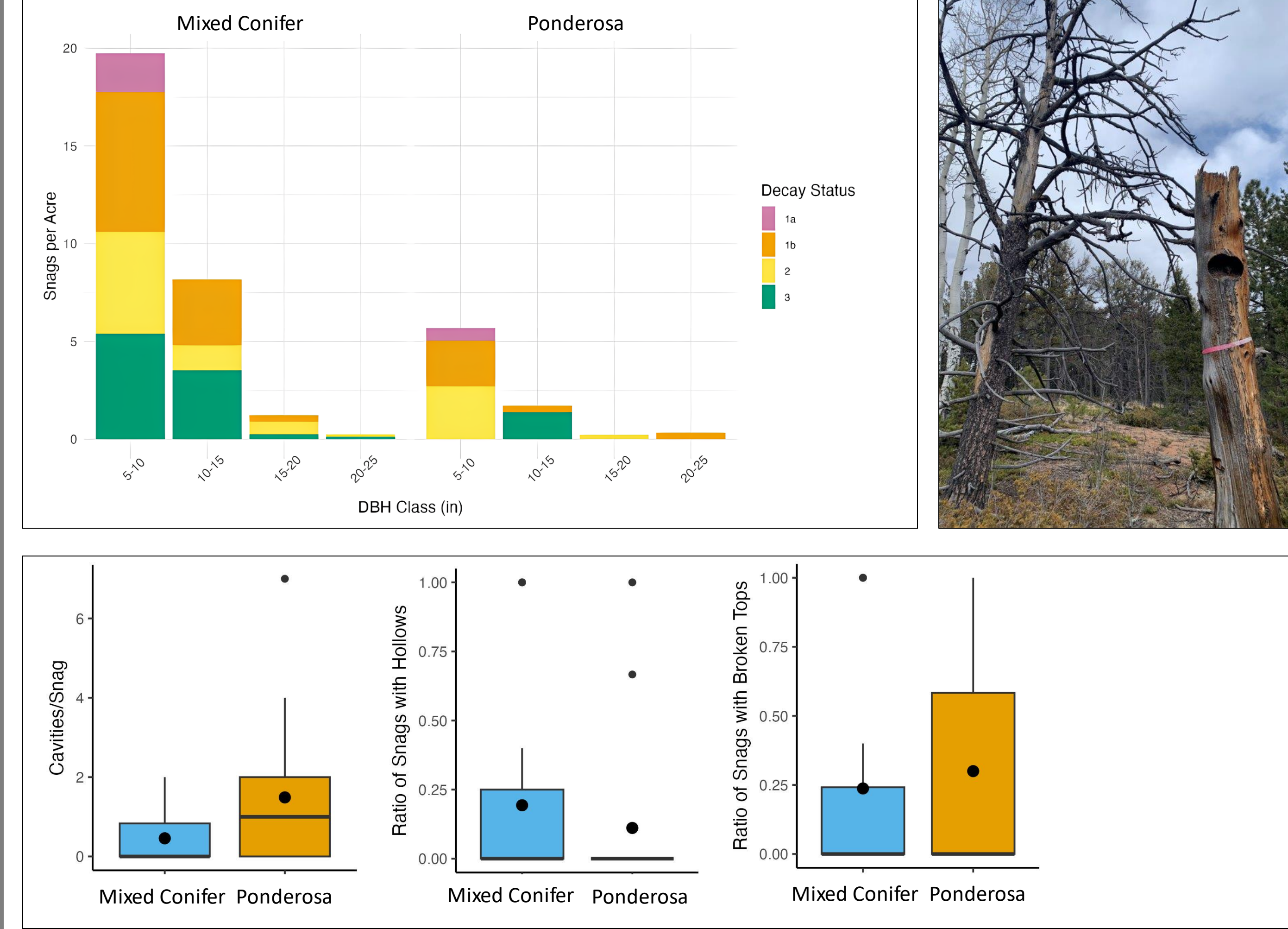
Abundance Results

- No wildlife logs were recorded at PIEN sites. While not significant, wildlife logs at MC sites were both more abundant and larger than at PIPO sites.

Quality Results

- While not significant, logs had more cavities and hollows at MC than PIPO sites.

SNAGS: *dead standing tree; $\geq 4.5'$ tall; $\geq 5''$ DBH*



Abundance Results

- No snags were recorded at PIEN sites. Density was higher at MC than PIPO sites.
- Both forest types had similar DBH distributions, but class 3 snags were more abundant in MC forests across more size classes.

Quality Results

- While a higher ratio of snags were hollow at MC sites, snags at PIPO sites had more cavities and were more likely to have broken tops.

DISCUSSION:

- Low abundance of WHS in PIEN** forest type partly due to the lower number of sites, but also indicates need to actively manage for WHS in PIEN, and to consider **smaller size thresholds** for wildlife logs due to smaller pinyon pine tree sizes.
- Larger diameter** snags (>15" DBH)⁴ and wildlife trees (>20" DBH)¹ are highly valuable habitat. Larger size classes remain scarce across study and should be actively promoted.
- Given **high mistletoe presence** in PIPO stands, managers should consider diminishing rates of return for wildlife against increased risk of stand mortality, high fuels loading, and reduced seed production in PIPO.
- Cavities are a very valuable feature provided by WHS. Cavities/snag were greater than cavities/wildlife tree. Wildlife trees were also more abundant on the landscape and tend to have a longer lifespan, thus increasing the time that cavities can be used and re-used. This underlines the importance of **protecting wildlife trees with cavities**.
- Recommended: **follow-up study** post treatment to assess how abundance and quality of WHS is affected through management actions aimed at wildfire risk reduction