

Change over time in privately-managed residential vegetation: Resident actions promote dynamic plant communities

Megan M. Wheeler¹, Kelli L. Larson², Elizabeth M. Cook³, Sharon J. Hall¹

¹School of Life Sciences, Arizona State University; ²School of Geographical Science & Urban Planning, Arizona State University; ³Department of Environmental Science, Barnard College



Background

- Residential areas are ~40% of urban land and are individually-managed, with decisions informed by personal and structural factors.
- Managed plant communities provide services, support conservation goals.
- Poor understanding of how managed urban plant communities beyond trees change over time and with management – what happens after conversion to urban land use occurs?

To what extent are residential yard plant communities static or dynamic over time?

H1: Management for spatial and temporal homogeneity, following lawn management literature (e.g. Robbins 2007; Burr et al. 2018), legacy effects (e.g. Larson et al. 2017; Roman et al. 2018)

→ Prediction: Low turnover over time

H2: Ongoing small and large-scale changes, “press” disturbances, leading to match with preferences (e.g. Larsen & Harlan 2006; Kendal et al. 2012)

→ Prediction: Moderate to high turnover over time

H3: Stasis punctuated by major change, “pulse” disturbances, as with landscape conversion (e.g. Pincetl et al. 2019)

→ Prediction: Bimodal, low and high turnover

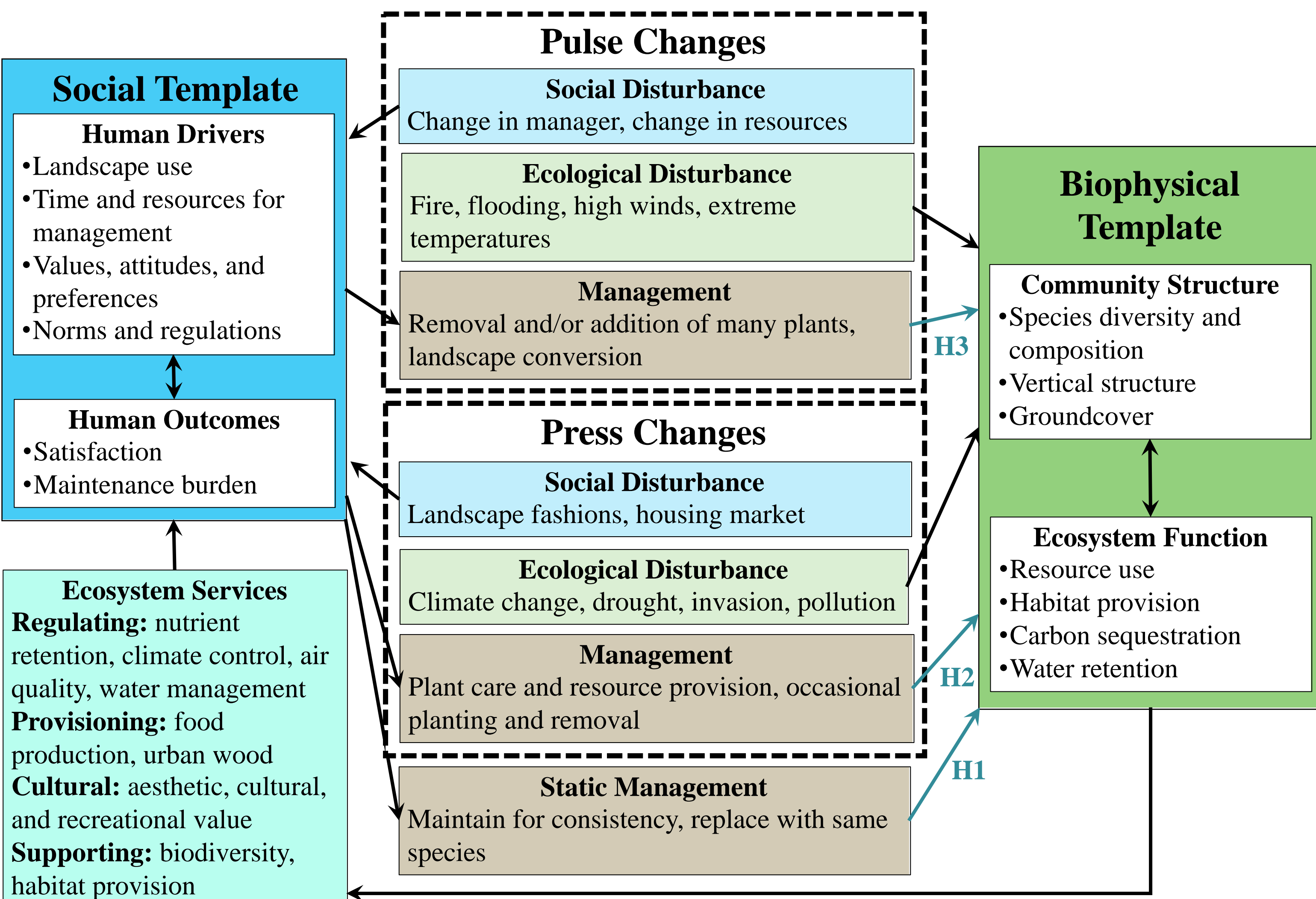


Figure 1. Press-Pulse Disturbance framework for residential yard plant communities. Adapted from Collins et al. 2011 and Cook et al. 2012. H1, H2, and H3 map hypotheses onto the framework.

Data Collection

- Residential front yards in Phoenix, AZ
 - 416 in 2008 and 2018
 - 100 in 2018 and 2019 (returned 2018 social survey)
- Inventory of woody plant species, to genus
 - Bray-Curtis dissimilarity for each yard with itself over time
- Comparison with Ecological Survey of Central Arizona (ESCA)
 - 2000, 2005, 2010, and 2015 perennial plant surveys
 - Primarily urban and primarily desert plots

Urban and residential yard plant community turnover is high compared to desert plant communities.

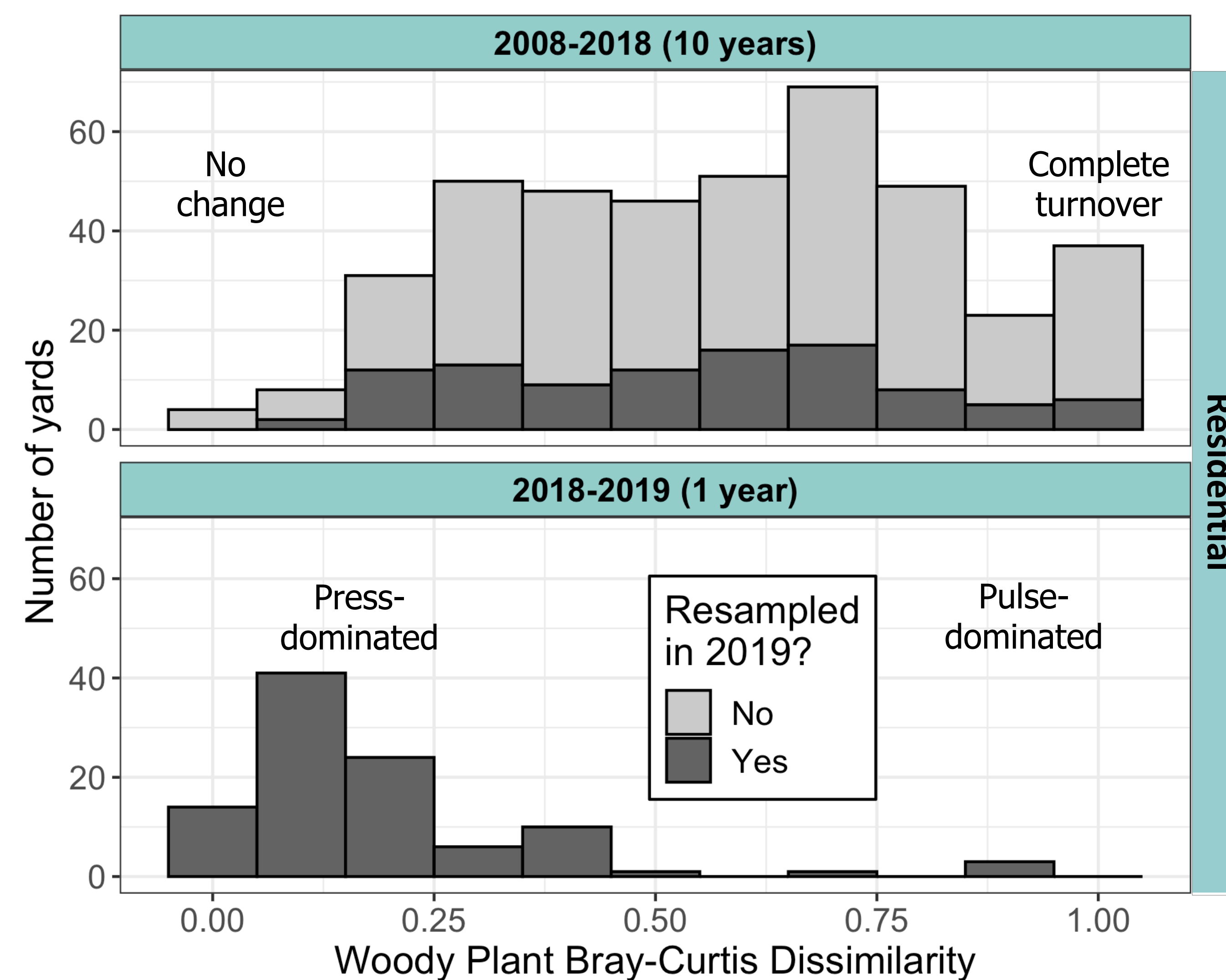


Figure 2. Dissimilarity of woody plant communities at the genus level in Phoenix front yards from 2008 to 2018 and from 2018 to 2019. Turnover is high overall, and 1-year change shows many yards with small and a few with large turnover, supporting the importance of both “press” and “pulse”-type changes.

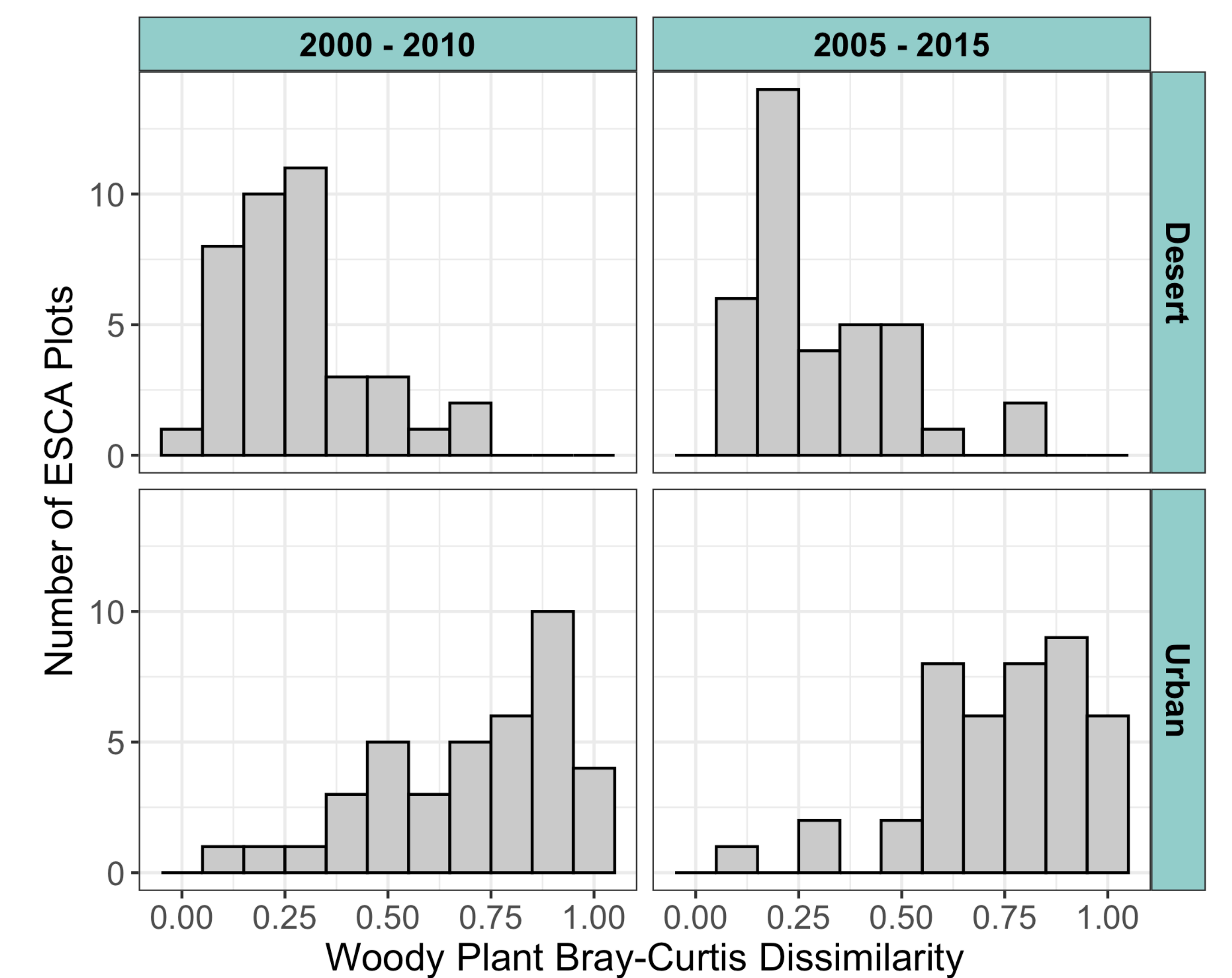


Figure 3. Dissimilarity of woody plant communities at the genus level from four ESCA surveys. Panels show 10-year contrasts for plots that were primarily desert or urban in both years. Turnover is higher in urban areas than in deserts and is similarly high in this smaller more general urban sample compared to the larger residential sample.

Turnover is a result of both “press” and “pulse” changes.

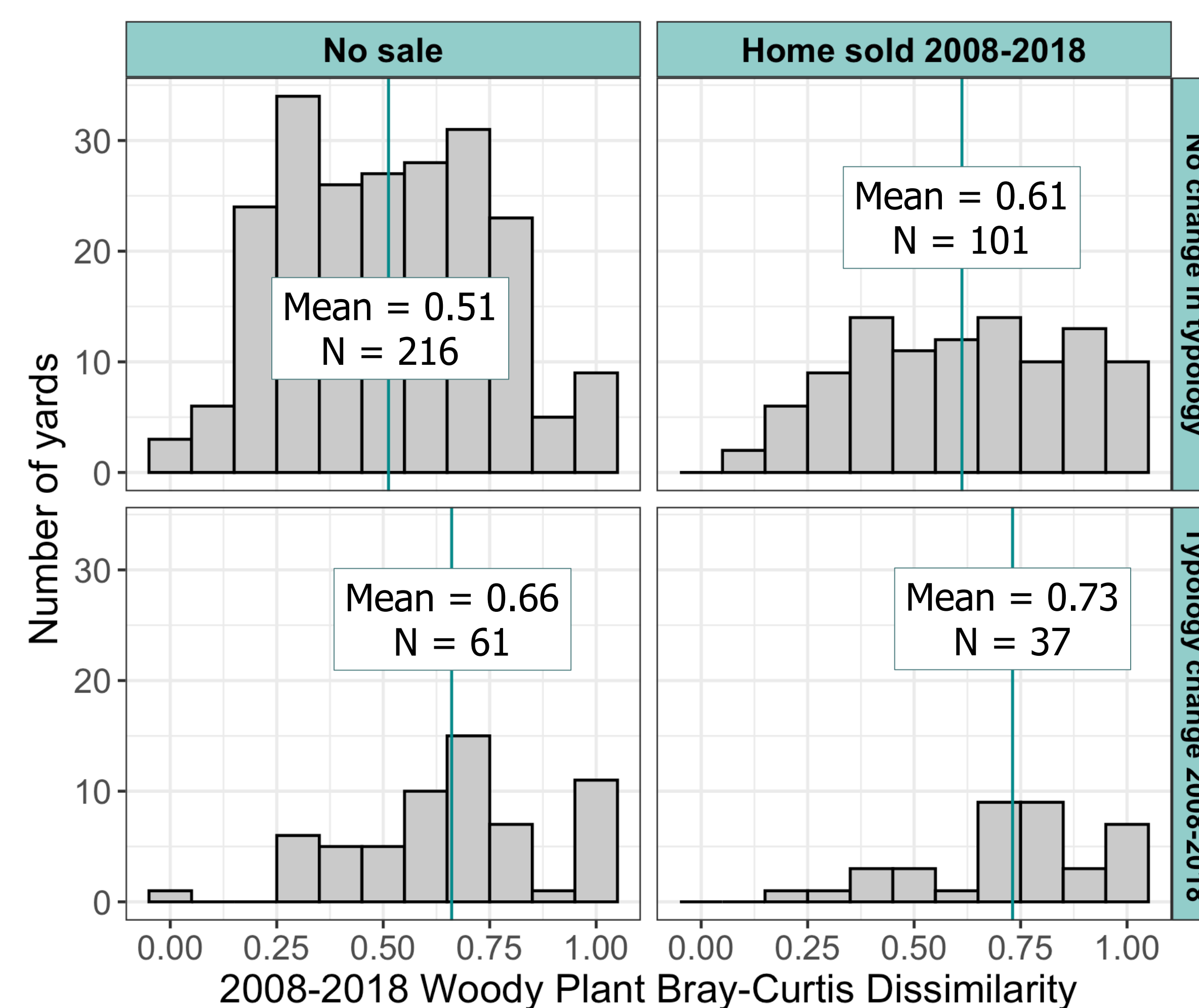


Figure 4. Dissimilarity for yards that have changed typology (mesic, oasis, xeric, or bare ground cover types, from vegetation surveys) or have changed ownership (most recent sale date from Maricopa County Tax Assessor). Typology change and ownership change are two examples of “pulse” changes: a management pulse, and a social pulse that may lead to a management pulse due to changes caused in the social template.

Managed urban plant communities are NOT static!

Change occurs as both accumulated small changes and larger discrete events.

Opportunity to harness change for conservation – promote positive choices where vegetation is already changing.

- Why is turnover so high?
- How do people choose what to change?
- Are poor plant health and maintenance practices leading to high turnover?
- How do these dynamics change with context?



Acknowledgements & References

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