A History of Heavy Harvesting:
Logging through the Decades and the Effects on Riparian Forests

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Background

- Riparian zones are the areas between rivers and land that contain many diverse habitats

- Due to heavy logging, <10% of the forests on the Olympic Peninsula are old-growth

- Many harvests until recently did not have environmental protections regarding riparian zones

- T3 Watershed Experiment studies how various post-harvest treatments effect local ecology

Research Question

How has historical logging affected the makeup of forest stands in riparian zones within the T3 Experimental Watersheds?

Internship and Methods

- Interned at the WA Department of Natural Resources

- Digitized harvests from 1950 and 1967 imagery *(Fig. 2)*

- Utilized various historical and modern resources to create a GIS layer on historical logging events *(Fig. 1)*

- Conducted a literature review of variables that affect health of forest stands and methods to mitigate damage

- Collected and analyzed data on riparian forests

Figure 1. 6 of the 16 T3 experimental watersheds where various post-harvesting treatments are being applied to study the long-term effects. Aa, Ap, Az, Ba, Cp, and Cz with estimated harvest years and old growth, as well as 9 of the 22 riparian reaches that were studied for tree and understory health. Harvests are predominantly between 1970 and 1989 in these watersheds.
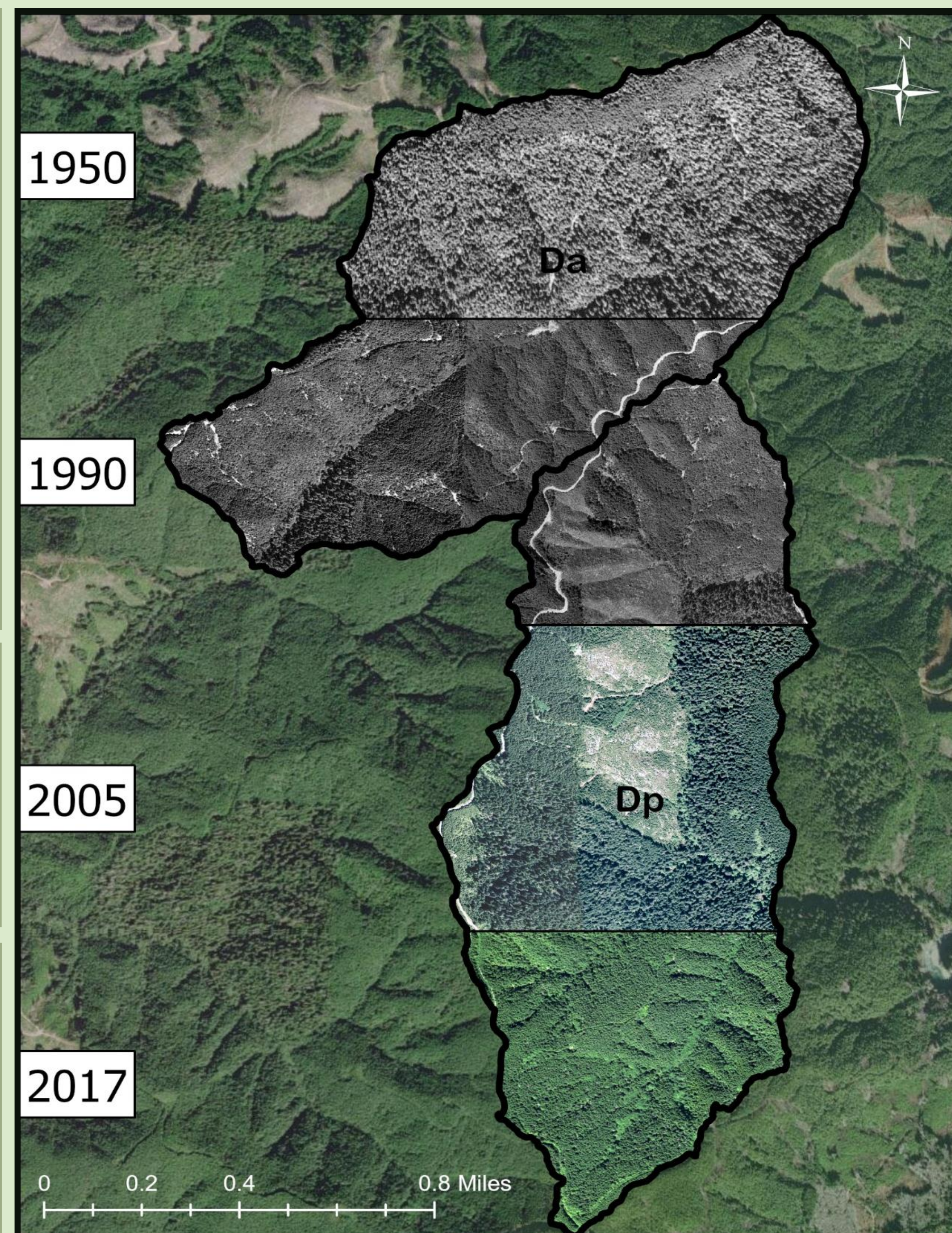

Figure 2. Experimental watersheds Da (top) and Dp (bottom) with aerial imagery from 1950, 1990, 2005, and 2017, showing land changes over time. The background is ArcGIS Pro's World Imagery. Imagery from 1950 has ben georeferenced to 1967 imagery (not shown), 1990, and ArcGIS Pro's World Imagery.

Results

- There is no significant relationship between the calculated Diversity Index and most recent year of harvest *(Fig. 3)*

- There is no significant relationship between the average DBH and the most recent year of harvest, though old growth stands are outliers *(Fig. 4)*

- There are signs that despite harvests leaving an immediate impact on the environment, forest stands are continuing to show traditional cyclical forest cycles (pioneer species followed by climax species) *(Fig. 4)*
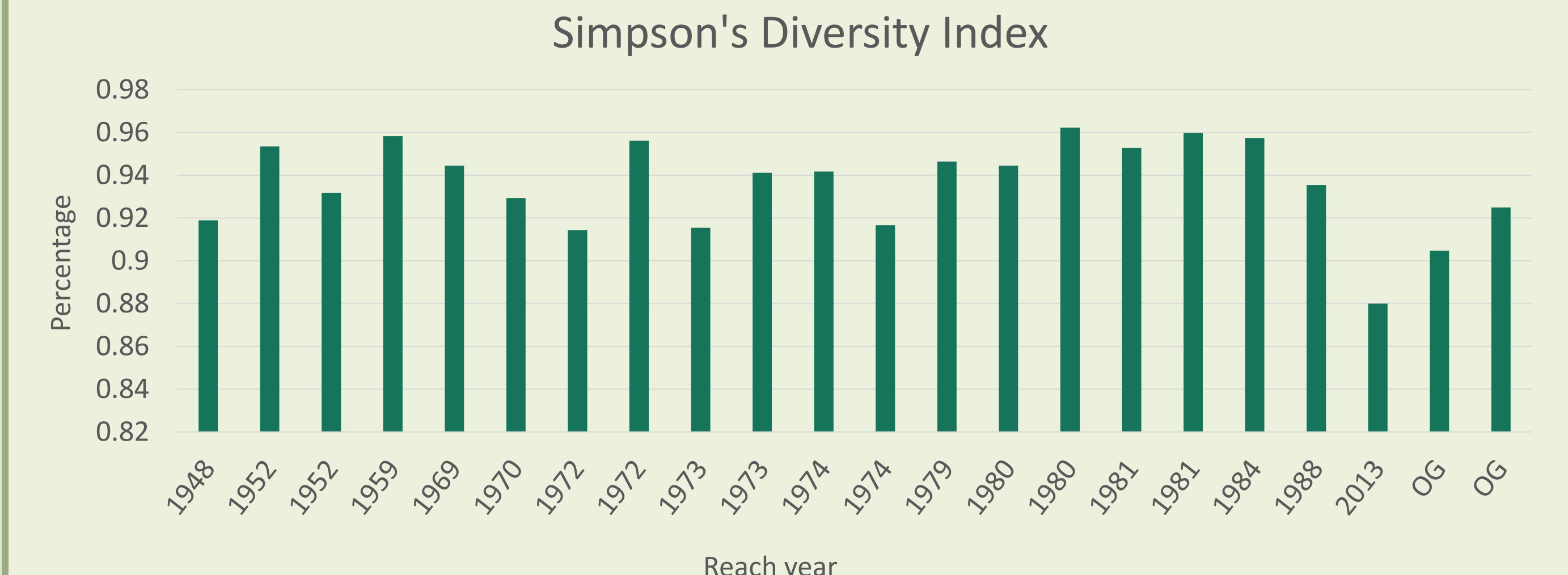

Figure 3. Simpson's Diversity Index for each reach by year. This calculates the estimated population diversity, with 0 being the least diverse and 1 being the most.
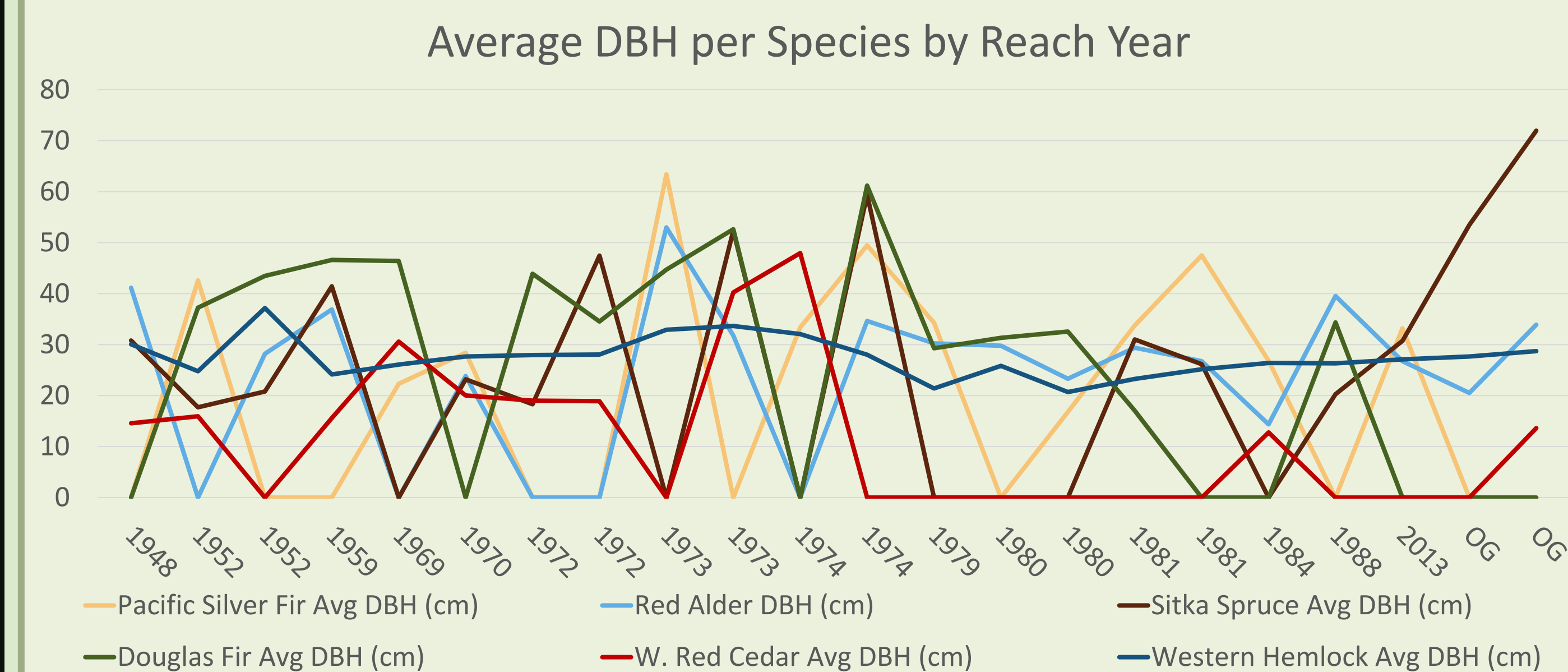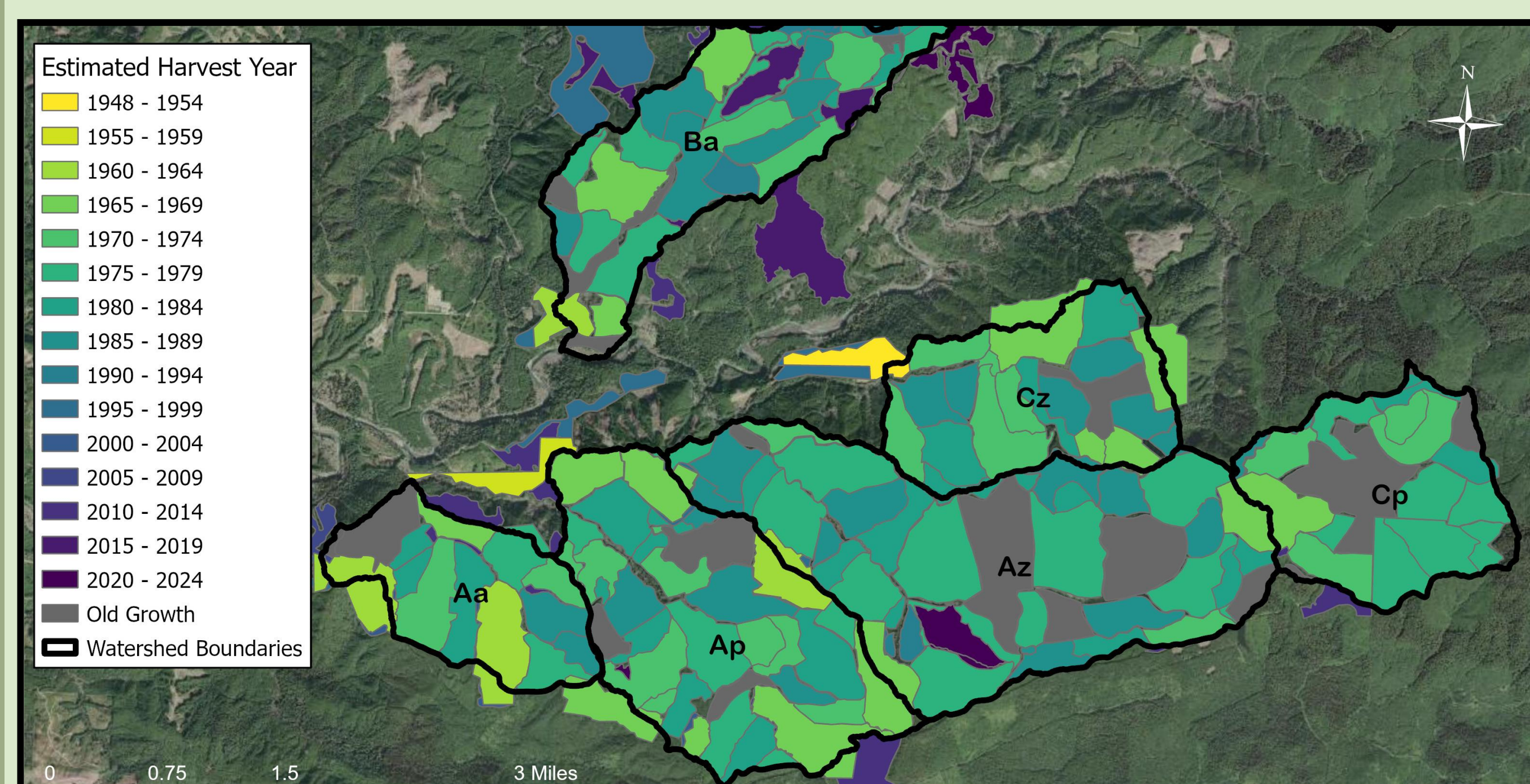

Figure 4. Average Diameter at Breast Height (DBH) for each species in each reach by year. This is the size of the tree at 1.35m from the ground and can be used to tell how trees are growing. As shown, Douglas Firs show large avg. DBH's from 1948 to 1974 where it lowers, and Red Alders are the largest from 1973 on.

Significance

- Despite consistent disturbances, riparian zones and forests show they are resilient and able to regenerate to some levels comparable to old growth

- Modern logging methods are more sustainable, but they still can cause significant short-term harm

- Caution should be taken when comparing designated harvest lands to old growth, as the types of forests serve separate purposes

- More research should be done to examine other variables associate with riparian health with a larger sample size