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Large woody debris protects woody plants from browsing in restoration following Elwha dam removal.

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Log clusters facilitate Elwha River revegetation



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Objective

Examined how presence and orientation of large woody debris (LWD) affects browse of ungulates (deer and elk) on early successional riparian tree species. Results are important for increasing effectiveness of future revegetation and restoration projects.

Dam Removal and Restoration

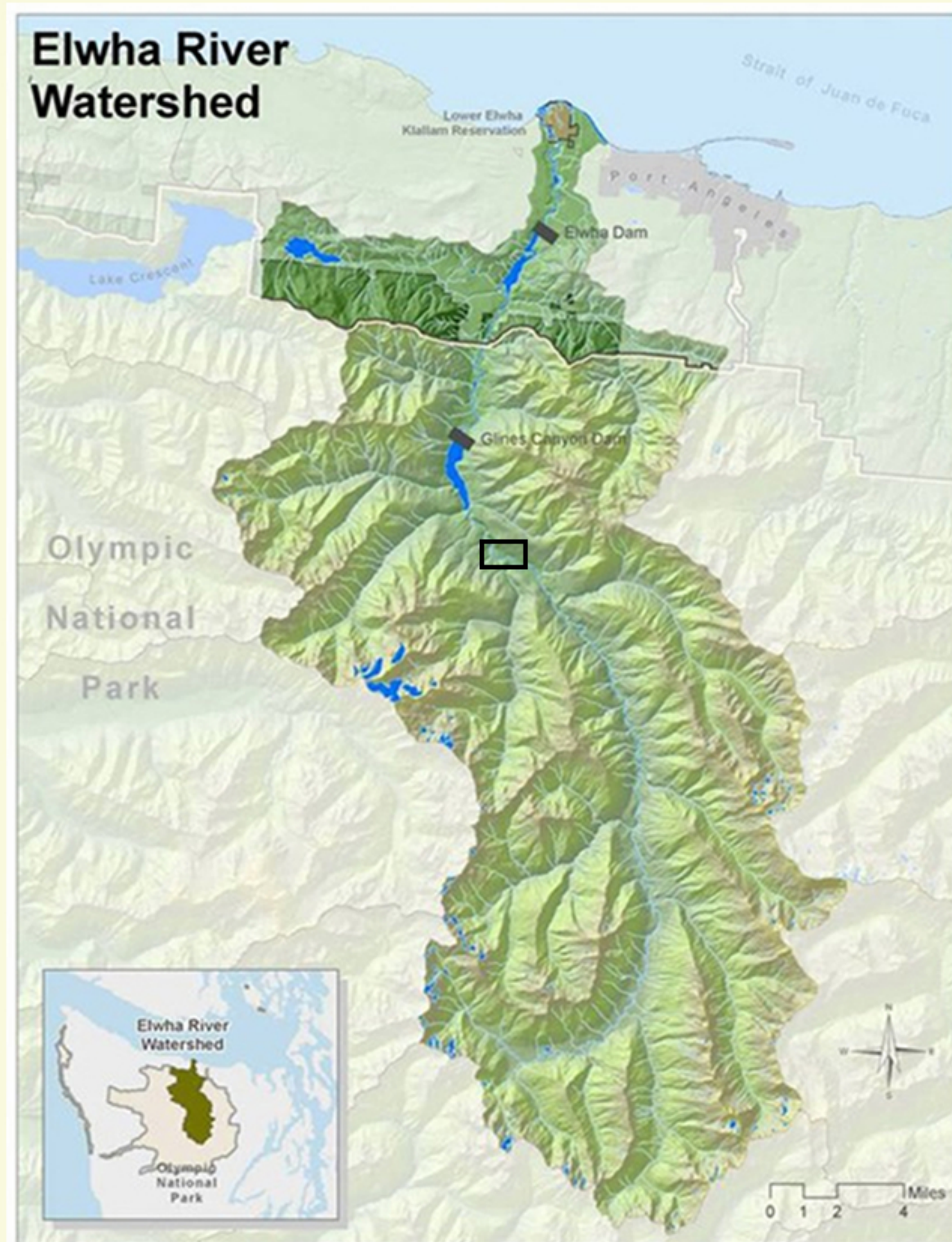


Figure 1. Elwha River watershed. Rectangle outlines Geyser Valley, our study area. Map from National Park Service.

Largest dam removal project in world.
Goal to restore forest to reservoir beds.
Our work informs future dam removals.
Geyser Valley as model for revegetation.



Figure 2. Deer browsing on Douglas fir in study area.

Methods

- Stratified random sampling
- Each site included:
 - Open area
 - Single log
 - Double logs
 - Log cluster
- Collected in 5 m² plots:
 - Browse intensity
 - Plant species
 - Log height

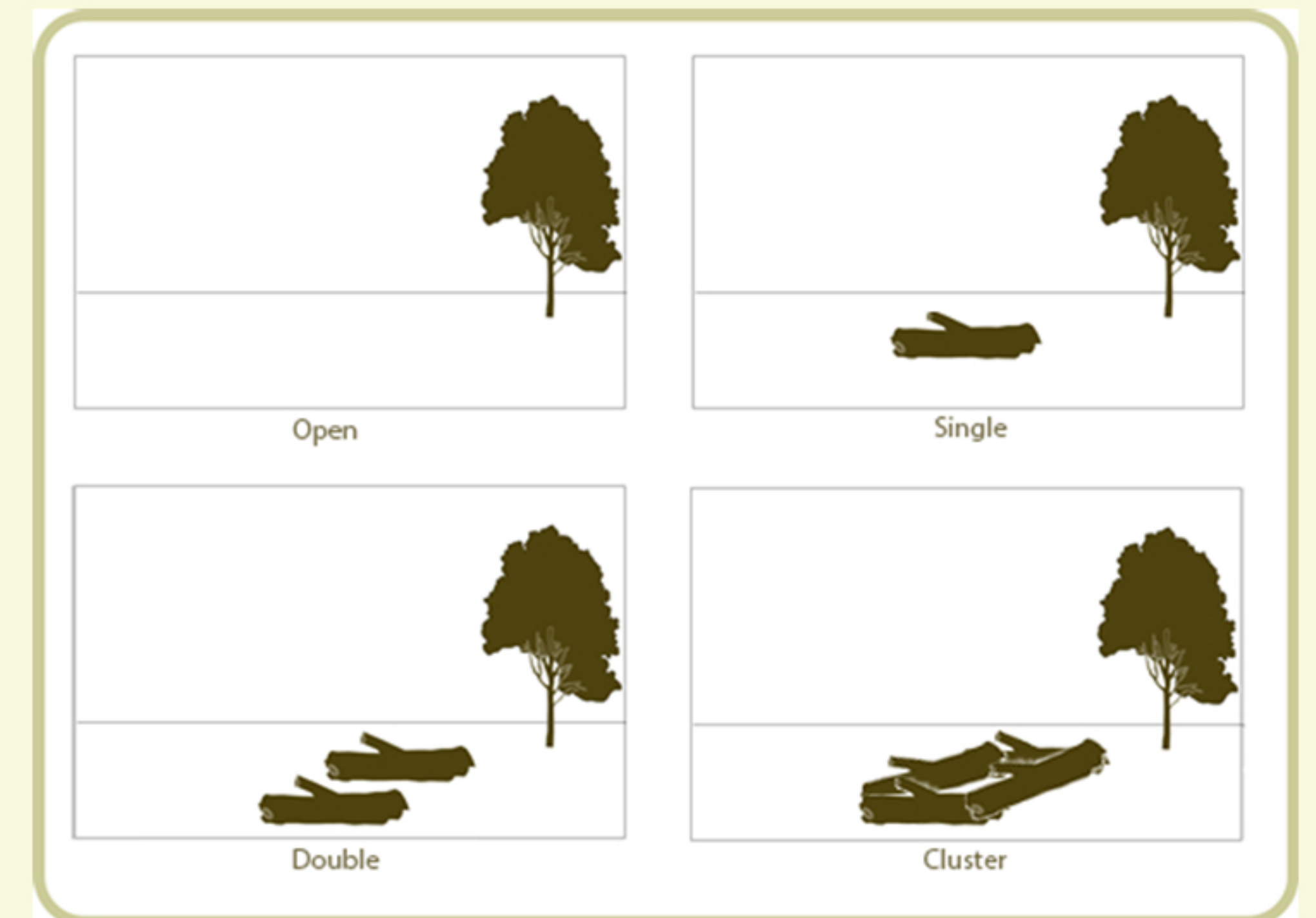


Figure 3. The four LWD configurations.

Results

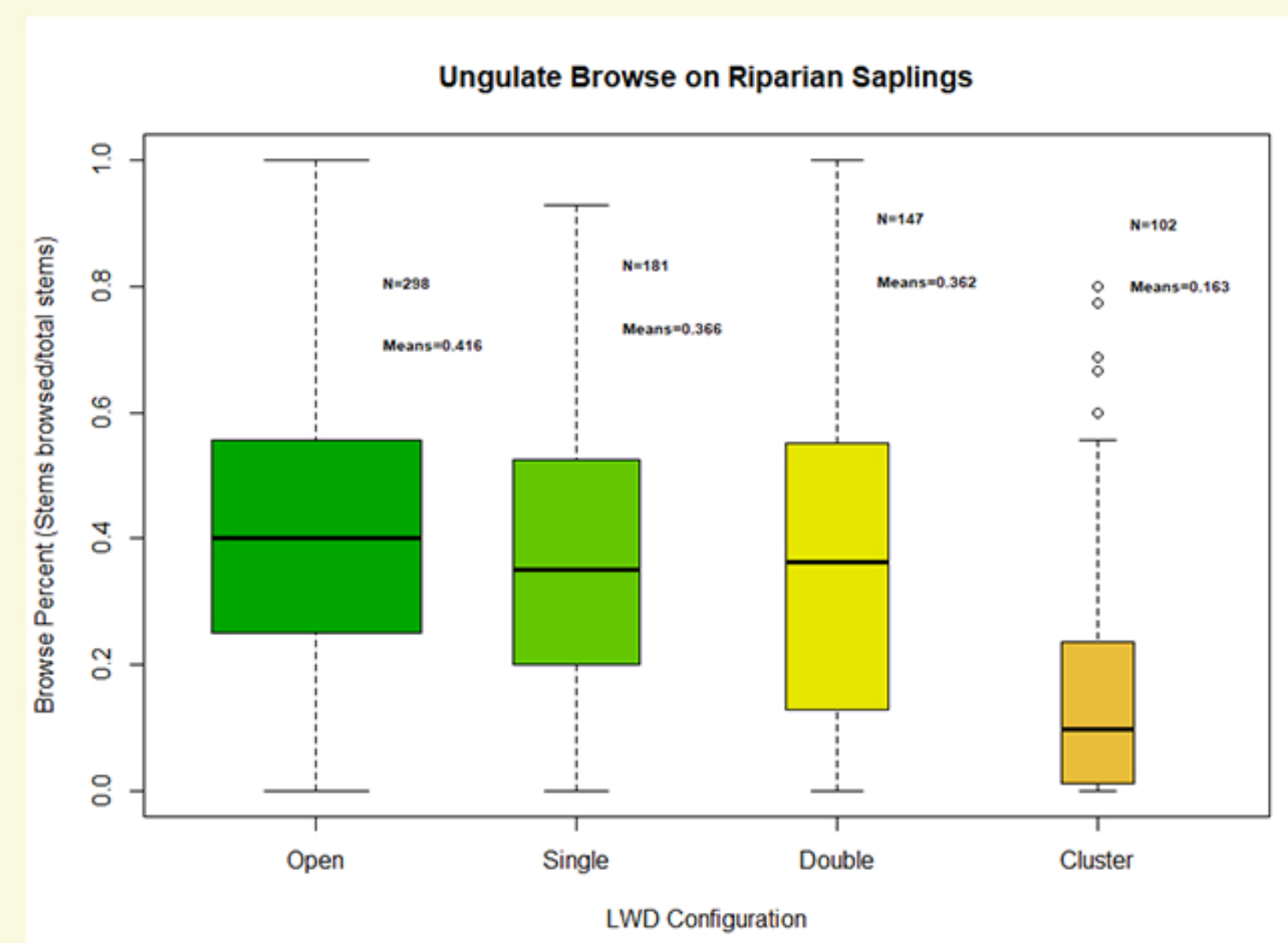


Figure 4. Browse intensity (number of stems browsed in proportion to total number of stems) in each LWD type.

High browse intensity except in clusters.
Clusters decrease browse intensity 250%.

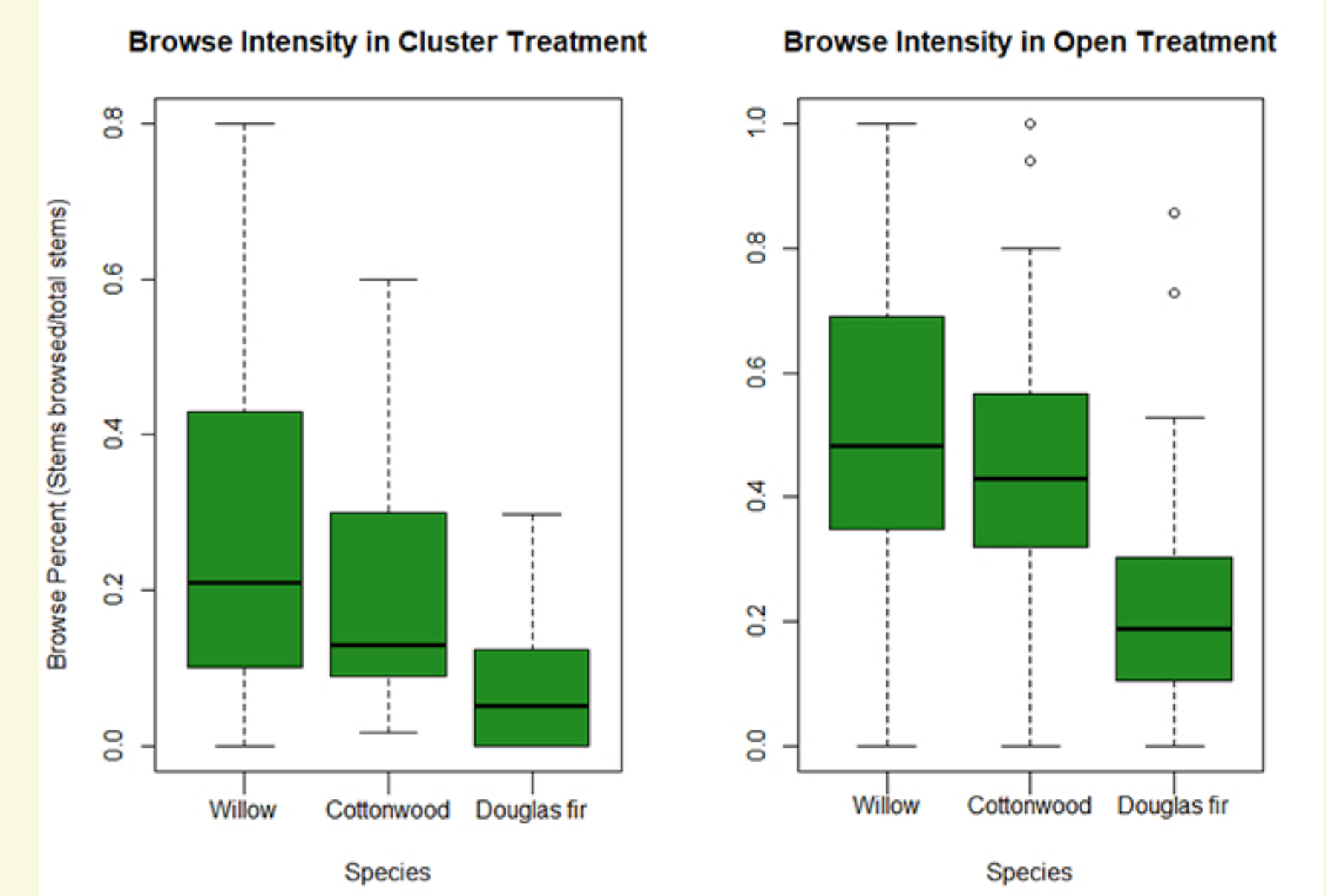


Figure 5. Average percent browse of the three most common species in the enclosing cluster (left) and open (right) treatments. Sample sizes for cluster 30, 16, and 26, for open 96, 133, and 51 respectively.

Clusters reduced browse most effectively for preferred species.

Implications

- Browse impedes revegetation success.
- Log clusters reduce browser access.
- Previous efforts used individual logs to shade saplings. This provided little protection from browse.
- Future restoration should place logs in clusters to allow saplings to reach maturity.
- Log clusters may be essential to revegetation success.



Figure 6. Juxtaposition of a heavily browsed sapling (right) and a sapling with less browse (left).