Pebble Beach Reserve
2026 Baseline Survey

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## Territorial acknowledgement

We would like to acknowledge that the research for this project was conducted within the "shared, asserted, unceded and traditional territories of the Hul'qumi'num-speaking First Nations Peoples and those who hold traditional rights, responsibilities, and Indigenous rights and title in and around what is now known as Galiano Island" (Galiano Conservancy Association, n.d.). Galiano Island, home of the Coast Salish Peoples, is a deeply cared for place. It is a place stewarded by generations living, learning and working with this landscape. Through this project we hope to further this labour of care and compassion into the future within the area of the Pebble Beach Reserve.

## Acknowledgement

We would like to thank Eric Higgs, Adam Huggins, Millie Kuyer and Jeanine Rhemtulla for their assistance in this project.

## Summary

This report provides updated baseline data on the site characteristics of the Pebble Beach Reserve forest (District Lot 63) on Galiano Island. Historically, the site was clearcut in two phases, first in 1967 and then in 1978 (Scholz *et al.*, 2004) and replanted with a dense monocrop of Douglas-fir trees (*Pseudotsuga menziesii*). The reserve was later acquired by the Galiano Conservancy Association at which point restoration began, with restoration efforts and monitoring continuing to this day (Erickson, 1998; Scholz *et al.*, 2004; Hohendorf, 2015).

The forest mensuration data were gathered from four newly established permanent plots in an area previously used as the control for thinning treatments. These data were collected according to guidelines laid out in the 2025 protocol on wildfire fuel treatment efficacy established by Daniels *et al.*

Key findings identify site characteristics within the Pebble Beach Reserve forest which may help to better inform site selection for future thinning treatments. Thereby improving the impact and effectiveness of restoration efforts conducted by the Galiano Conservancy Association. Supporting their goals in increasing forest complexity, habitat for species of concern and capacity for carbon sequestration over time (Gaylor *et al.,* 2002).

## Introduction

Forest ecosystems provide vital habitat for myriad species. In a time of rapid land-use change and climate change, forest management is increasingly of concern. Deforestation is the second-largest contributor to land-use change worldwide. In total, land-use change accounts for approximately 17% of global greenhouse gas emissions (Earles *et al.*, 2012).

Carbon storage is a key ecosystem service that trees provide (Ung *et al.,* 2008). The amount of storage forests provide depends on their stand age, composition and management. However, it is a commonly-held myth that intensive short-rotation forest plantations can maximize carbon storage. While juvenile forests have a greater *rate* of carbon uptake, the long-term accumulation and storage of carbon is a quality best represented by older forests (Pojar, 2019). By protecting and restoring forests the potential for carbon sequestration in forest ecosystems can be maintained or improved, thereby helping to mitigate greenhouse gas emissions. Carbon sequestration is but one of many characteristics which must be considered in forest management.

Composed primarily of long-lived species, forest ecosystems are made more difficult to manage or restore due to the longevity of the planning required (Golladay *et al.*, 2016; Hamann and Wang, 2006). Developing old-growth forest characteristics is key for ecological function within forest ecosystems. Most young plantation forests will eventually develop old-growth characteristics. However, the objective of forest restoration can be to facilitate and accelerate these desired natural processes (Parks Canada Agencies NPD, 2008).

The study site for this project was a 61.5 hectare forest-zoned lot (District Lot 63) which underwent industrial logging, clear-cutting the mature forest stands in 1967 and 1978 (Scholz *et al.*, 2004). Following each of these rounds of logging, the area was replanted with Douglas-fir tree seedlings. The site was then acquired in 1998 by the Galiano Conservancy Association (GCA), followed by restorative thinning from 2003 to 2006 (Scholz *et al.*, 2004). Prior to beginning the thinning efforts, the GCA collected extensive baseline data for the site and selected control plots that did not experience restoration treatments.

In 2015 a University of Victoria master's thesis by Hohendorf evaluated the effectiveness of the initial treatments done by the GCA. Based on these findings, Hohendorf recommended that to improve the structural diversity of the Pebble Beach Reserve forest, treatment continuation should occur. The GCA currently wishes to investigate site suitability using updated baseline data, to potentially expand these restoration treatments within the Pebble Beach Reserve forest into the areas previously used as controls.

## Site description

The Pebble Beach Reserve forest is located on the traditional territories of the Coast Salish peoples, on the north-central coast of Galiano Island. As one of the southern Gulf Islands of British Columbia, Galiano is part of the Coastal Douglas-fir biogeoclimatic zone, a region characterized by temperate wet winters and warm dry Mediterranean summers (Nuszdorfer *et al.,* 1991).

Though restoration treatments by the Galiano Conservancy Association began at the Pebble Beach Reserve over 20 years ago (Scholz *et al.*, 2004), much of the site remains densely wooded and dominated by even-aged Douglas-fir trees. The crown cover overhead is closed, with little light reaching the forest floor; this was observed at all four plots across our study site (see Figure 1). Coupled with heavy deer browsing, the result is a reduced understory and a lack of natural regeneration of saplings observed on the site. Various introduced plant species of concern were also observed across the plots (see Appendix 2).

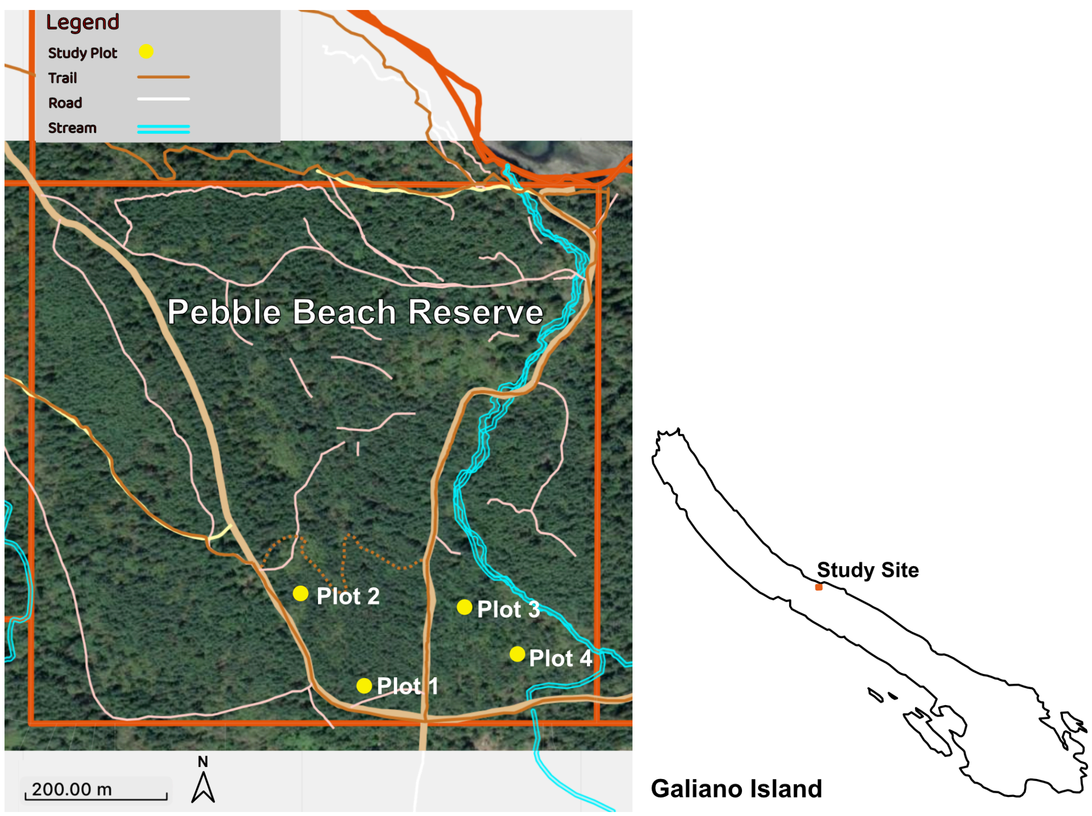



**Figure 1.** Study area map of Pebble Beach Reserve on Galiano Island including four plot locations. Data retrieved from GCA's ArcGIS Field Maps Database.

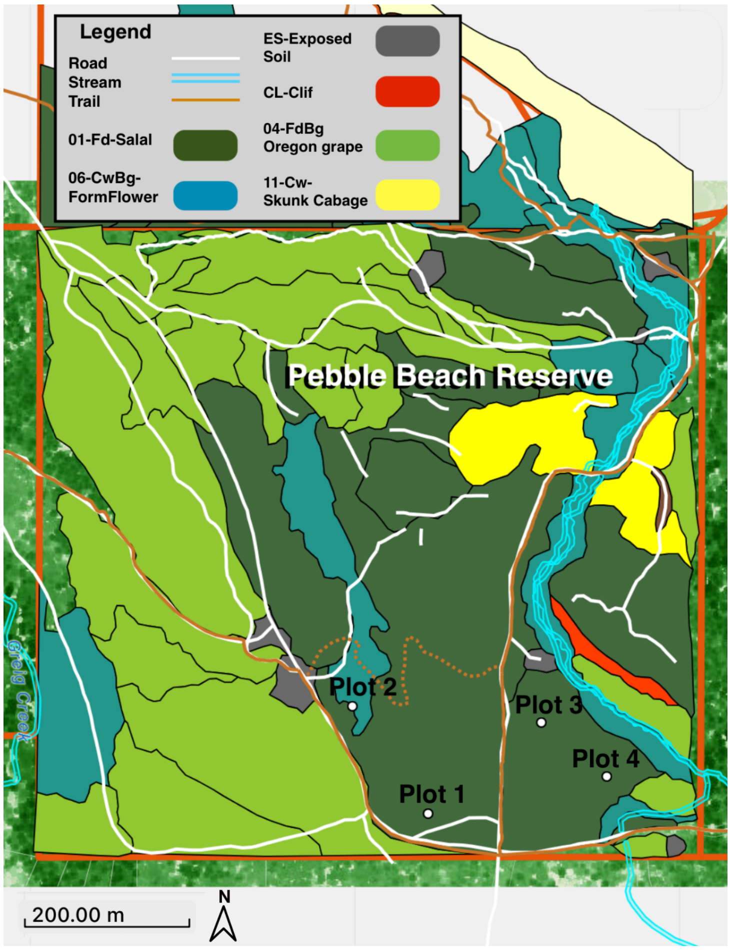



**Figure 2.** Map of ecological communities at Pebble Beach Reserve. Data retrieved from GCA's ArcGIS Field Maps Database.

Figure 2 shows that Plots 1, 3, and 4 were located within the 01 Douglas-fir–salal (Fd–Salal) site series, while Plot 2 was located within the 06 western redcedar–grand fir–foamflower (CwBg–Foamflower) site series.

## Goals

To collect and analyze baseline forest data within the Pebble Beach Reserve. Conducted with the goal of informing treatment design, management decisions and future monitoring for restoration activities on the site. Thereby supporting the broader goals of the GCA to accelerate successional processes, and to promote forest health, diversity and resilience. This will hopefully create a more complex forest which can better protect species of concern and increase carbon sequestration within the PBR.

## Objectives

The data collected will help to support the goals identified above by allowing for the analysis of site-specific characteristics. By better understanding the current state of the forest, a more informed site selection can be conducted, allowing for the appropriate allocation of time and resources and maximizing the positive effect experienced through future restoration efforts.

- Identify four long-term baseline assessment plots and record the physical and ecological attributes of each plot.
- Conduct detailed forest mensuration and identify site-specific conditions that may inform the selection and design of future thinning treatments.
- Quantify and compare stand density, basal area, species composition, canopy cover, tree height, diameter distribution, live-crown length, and live-crown ratio among plots.
- Estimate above-ground biomass and carbon stocks by tree species, and standardize plot-level estimates per hectare.
- Provide baseline values against which future changes in tree growth, regeneration, understory composition, habitat structure, and above-ground carbon stocks can be evaluated.

## Methods

### Plots

Four permanent forest plots were established in order to collect the necessary baseline data. Plots were selected according to the wildfire fuel treatment efficacy protocol established in 2025 by Daniels *et al.* The four sample locations were chosen in the untreated control polygon on the southwest side of the reserve (see Figure 1). They were selected in areas not yet covered within previously established plots. These new plots were selected to be accurately representative of the untreated area within the Pebble Beach Reserve forest. The plots were chosen by dropping four different pins randomly on the ArcGIS field map provided by the GCA. In accordance with the protocol followed, the centres of the four plots were at least 20 m away from hazards such as roads or cliffs. Following the selection of plot locations, plot attributes were recorded. These included aspect, slope, elevation, understory and other notable characteristics. Understanding these key site characteristics is important when comparing data between sites. These features may later play a role in deciding where restoration treatments should occur.

The plot radius used varied depending on tree size and tree density (see Figure 3). According to the Daniels *et al.* protocol (2025) the trees were sorted into three different size classes: large

(DBH ≥12.5 cm), small (12.5 cm≥DBH ≥5 cm) and saplings (height >130 cm and DBH < 5 cm) (there were no saplings or small trees found in any of the four plots). The density of the plots was visually assessed and either determined to be high or low. Large trees in high density plots (1,2, and 4) were measured in a 7.98 m radius. For plot 3, which was less dense, an 11.28 m radius was used.

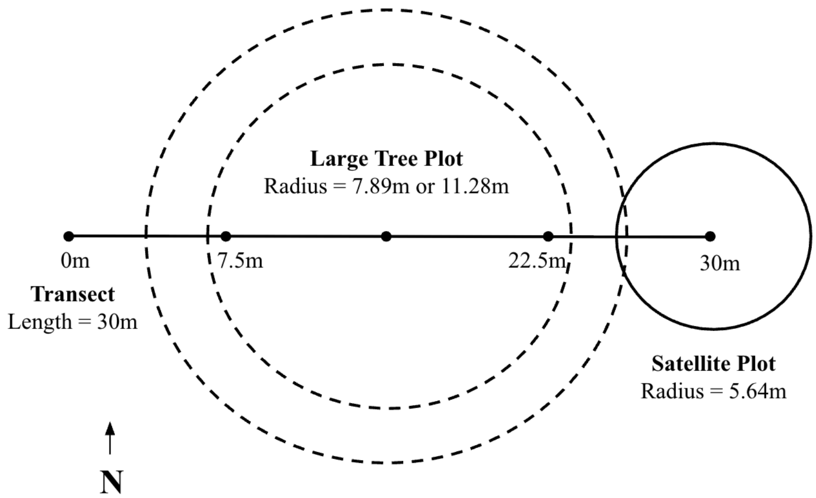



**Figure 3.** General plot layout (adapted from Daniels *et al.* 2025).

**Tree size and canopy cover**

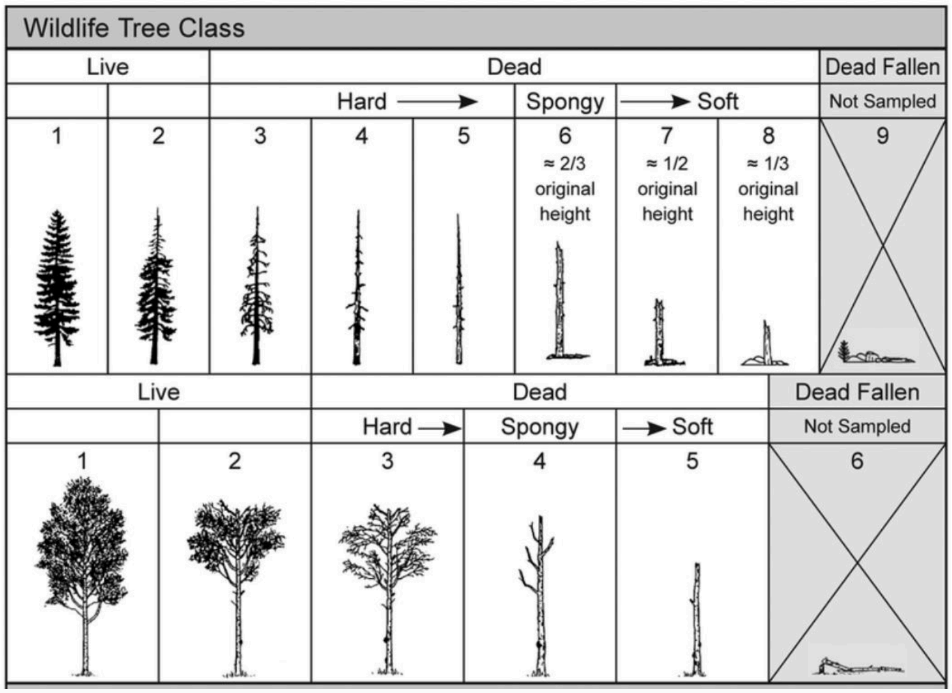
Within the plots, trees were measured clockwise, beginning from due north. For each tree, the tree ID number, species (identified according to Pojar and MacKinnon, 1994), whether it had a broken top, tree or snag class (see Table 1), height, live crown base height, and dead crown base height were measured.

According to guidance provided by the GCA we did not look at Part 3: Surface Fuels from the Daniels *et al.* 2025 protocol. The measurement of coarse woody debris (CWD) was not deemed within the scope of our report at this time.

Canopy cover was calculated along a transect, running 30 m from east to west (see Figure 3). A spherical crown densiometer was used to calculate the crown density every 2 m along the transect beginning from 0 m. These values were then averaged to produce a percentage of canopy cover for each plot. A satellite plot was then established at the end of the transect with a 5.64 m radius (100 $m^2$). The substrate, exposed mineral soil, and five most abundant understory plants were visually estimated in percent cover for each plot.

A total of 112 trees were measured across all four plots; the data were then entered into the GCA's database for forestry restoration surveys and used to calculate the average proportion of canopy to tree height per plot, tree height vs DBH and the species composition breakdown for each plot.

**Table 1.** Live tree and dead snag decay classification system (adapted from Daniels *et al.* 2025).




**Carbon sequestration**

Our biomass and above-ground carbon sequestration values were calculated using allometric equations from Ung *et al.* (2008). Allometric equations are used to describe the proportional relationship between the size of a part of an organism to its whole. In forestry, for example, allometry can be used to describe the relationship between a tree's diameter and its above-ground biomass.

The parameter estimates which the equations used were based upon come from an updated national data set (Ung *et al.,* 2008). This Canadian data set was updated to include tree mass data from British Columbia. Given the bioregion of concern at the Pebble Beach Reserve, such an update allows for more accurate biomass calculations. Formulas, shown in Table 2, were used to calculate tree biomass and above-ground carbon sequestration. Trees identified as being dead or decaying were included in the overall calculations for average carbon per plot.

**Table 2.** Formulas used to calculate tree biomass, above-ground carbon sequestration for trees sampled in each plot.

| Calculation | Formula | Variables |
|---|---|---|
| Tree biomass<br>(Dry wood) | **AGB = 0.0204(DBH)^2.6974**<br>for Douglas-fir<br>**AGB = 0.0111(DBH)^2.8027**<br>for western redcedar<br>**AGB = 0.0864(DBH)^2.3715**<br>for Hardwoods | **AGB** = above-ground biomass (kg)<br>**DBH** = diameter at breast height (cm) |
| Tree above-ground carbon sequestration | **AGC = AGB*0.47** | **AGC** = above-ground carbon sequestration<br>**AGB** = above-ground biomass (kg) |

## Results

### Plot description

Plot 1 has a gentle 7% slope and represents a dense, closed, largely single-layer canopy dominated by Douglas-fir (89%) and red alder (11%) (*Alnus rubra*). Habitat features are limited, although some snags are present. It has the highest stand density at 1,350 stems/ha, a mean DBH of 22.9 cm, and a low mean live-crown ratio of approximately 17.5% (see Table 3).

Plot 2 is located on a 25% northeast-facing slope and consists of Douglas-fir (52%) and red alder (48%), with habitat features that include standing red alder snags and some moss-covered CWD. Of the 13 Douglas-firs recorded in Plot 2, one was classified as a snag. Five of the 12 red alders were also classified as snags, representing approximately 42% of the red alder cohort.

Plot 3 has the highest species diversity of all four plots, contains the tallest trees, has a mean DBH of 26.0 cm, and a mixture of small and large diameter classes, including three trees over 40 cm DBH. It has a canopy composed of approximately 53.5% bigleaf maple *(Acer macrophyllum)* followed by Douglas-fir at 41.9%, with scattered black cottonwood (*Populus trichocarpa*) and bitter cherry (*Prunus emarginata*) also present. Some habitat features are present, including snags, a few downed trees, and moss-covered CWD.

Plot 4 is situated on a gentle 3% northeast-facing slope near a seasonal creek and has a number of larger trees and more widespread understory vegetation. The stand is dominated by Douglas-fir (76%) and red alder (17.6%), with western redcedar (*Thuja plicata*) also present, and supports a more established understory. The introduced, fast-growing wild clematis (*Clematis* *virginiana)* is smothering several trees, while habitat features include snags, medium-sized downed trees, and other CWD.

**Table 3.** Summary statistics based on the raw data presented in Appendix 1

| | Density | Mean DBH | Basal Area | Mean Height | Live Crown Base Height | Mean Live Crown Ratio | Mean Canopy Cover | Mean Carbon Sequestration |
|---|---|---|---|---|---|---|---|---|
| plot # | stems/ha | cm | $m^2$/ha | m | m | % | % | t/ha |
| 1 | 1350 | 22.856 | 58.248 | 22.952 | 20.460 | 17.45 | 87.589 | 69.057 |
| 2 | 1250 | 22.948 | 58.767 | 19.21 | 16.908 | 17.35 | 87.381 | 78.244 |
| 3 | 1075 | 26.016 | 63.926 | 23.563 | 21.344 | 16.51 | 86.549 | 100.569 |
| 4 | 850 | 30.565 | 66.536 | 19.394 | 14.700 | 20.27 | 88.699 | 98.361 |

Mean Canopy cover shows that there is minimal difference in canopy cover across the different plots. However, plot 4 has the highest percent canopy cover at 88.7% followed by plot 1 at 87.6%, next is plot 2 at 87.4% and finally plot 3 has the lowest percent canopy cover at 86.5%. Canopy cover varies by only 2.2 percentage points among the plots, indicating that all four plots retain highly closed canopies.

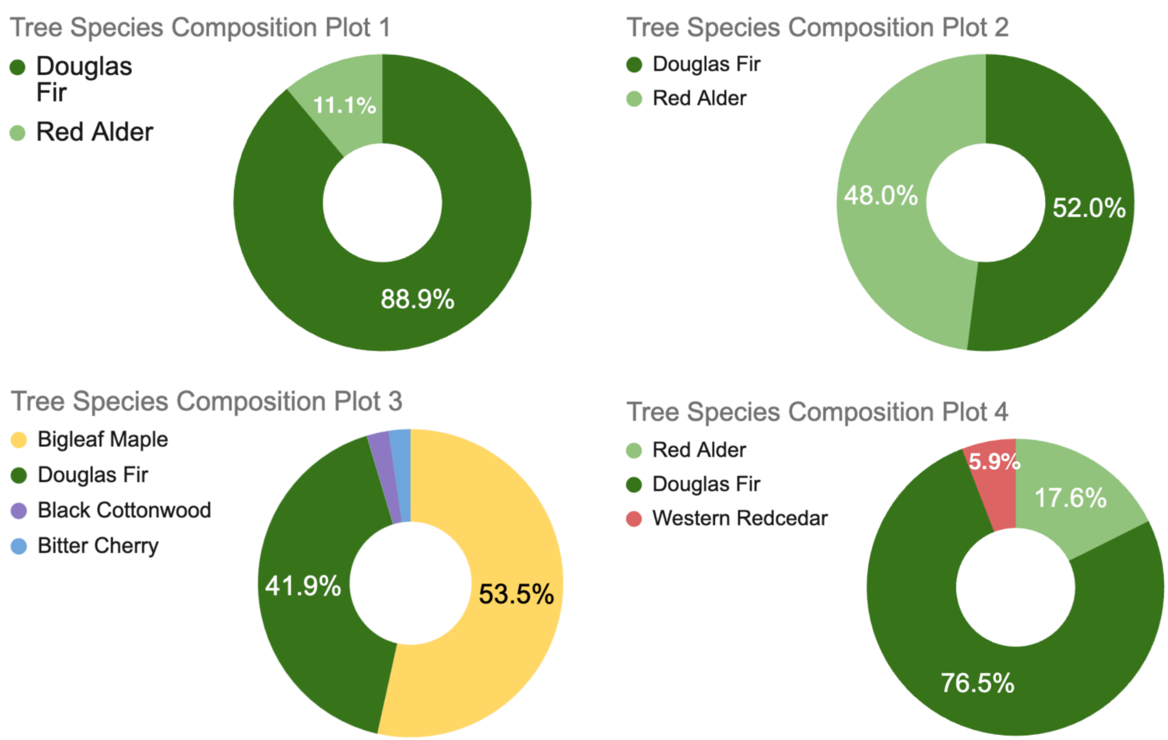



**Figure 4.** Tree species composition across the four plots where measurements were collected. Raw data is provided in Appendix 1.

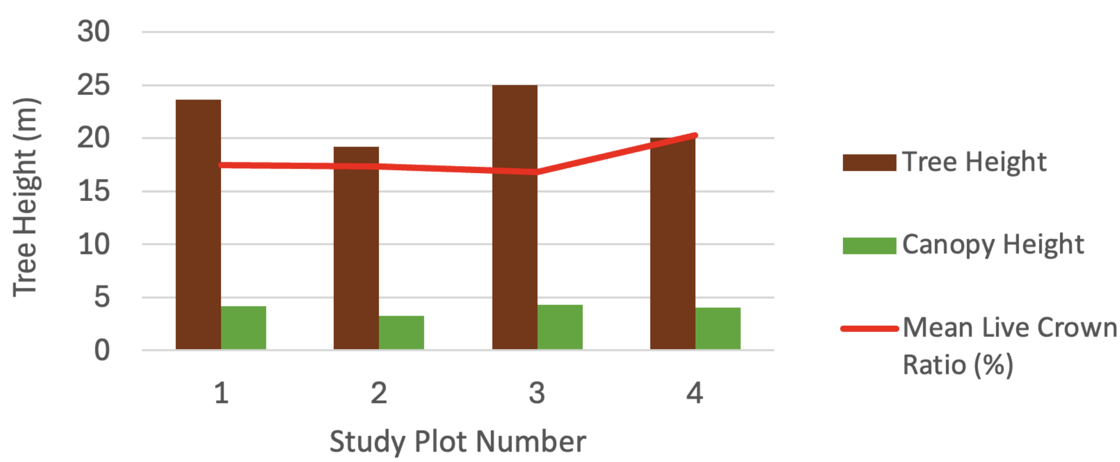



**Figure 5.** Average proportion of tree to canopy height per plot of trees. Raw data in Appendix 1.

The mean live crown ratio was similar in Plots 1–3 (16.5–17.5% of tree height), and mean live crown length across the plots was less than 4.3 m. These relatively short crowns suggest that high stand density and competition may be restricting crown development. Plot 4 had a higher mean live crown ratio (20.3%) and the lowest stand density (850 stems/ha), compared with 1,075–1,350 stems/ha in Plots 1–3.


**Figure 6.** Tree height and DBH of all trees sampled within the 4 plots. Raw data in Appendix 1.

There is a trend seen in Figure 6 of tree height increasing with diameter. This was not the case for every measurement taken but is as seen overall across all measurements. The tallest tree measured was 33.6 m with a diameter at breast height (DBH) of 43.9 cm. The largest DBH recorded at any of the plots was 44.3 cm with the tree having a height of 20.1 m.

## Discussion

Forest mensuration data provide a useful baseline for assessing forest composition, structure, identifying where thinning could reduce competition, and informing management intended to enhance long-term above-ground carbon storage. High tree density, high canopy closure, limited crown development, and minimal regeneration, particularly in Plots 1–3, suggest conditions that may restrict the development of the multilayered canopy, varied tree sizes, and structural diversity, characteristics which are associated with an old-growth trajectory.

As shown in Table 3 and Figure 5, Plot 4 had the lowest tree density, and a higher mean live crown ratio than Plots 1-3. The lower density may have reduced competition for light and growing space and may explain its higher mean live crown ratio, although differences in species composition and site conditions may also have influenced crown development. Because the plots represented only two of the four site series within the reserve, differences among plots cannot be clearly attributed to ecological-community type rather than plot-specific conditions.

The relatively high proportion of red alder snags in Plot 2, five of twelve stems, or approximately 42% (Appendix 1), may reflect the decline of this pioneer cohort. However, repeated surveys are needed to determine whether this represents an ongoing trend. The standing snags provide important wildlife habitat, and could create canopy openings as they fall, eventually contributing to downed wood on the forest floor. Retaining these habitat features while supporting the regeneration of other conifers and native broadleaf species could facilitate natural succession and increase stand diversity.

### Limitations

The study focused on a particular untreated portion of the Pebble Beach Reserve rather than the reserve as a whole. Within this area, plots were selected in locations considered representative rather than through a systematic or randomized sampling design, which may have introduced selection bias. In addition, canopy cover was measured along a single transect at each plot, while understory vegetation was assessed in one satellite plot; therefore, these measurements may not have fully captured within-plot spatial variability.

Habitat features and species of concern were only partially assessed through snag classification, canopy measurements, and understory vegetation surveys. Although downed wood was observed, its dimensions, volume, and decay classes were not measured. Other data gaps include assessments of wildlife trees, cavity availability, CWD, and the percentage cover and distribution of species of concern.

Present data are insufficient to support recommendations concerning forest fire resilience because surface fuel loads, ladder fuels and CWD, were not measured. Also opening the canopy may increase sunlight and wind exposure, further drying understory and increase fuel loads while thinned materials may temporarily add surface fuels. These effects should be evaluated before thinning treatment occurs. Expected benefits of reducing tree density should also be evaluated, particularly in Plots 3 and 4, which already have lower stand densities.

While the plots in this study were established to analyse present conditions, they provide only a snapshot in space and time of the Pebble Beach Reserve forest. In order to identify the rate of carbon sequestration, the natural regeneration or the potential future carbon sequestration capacity of the forest, the repeat measurement of established forest plots within the section of interest is necessary. Additionally, the carbon estimates in this work quantify only the above-ground standing tree carbon stocks; they do not account for the role of carbon storage which downed wood plays on the forest floor. Overall these estimates do not account for below-ground tree carbon storage or for the total ecosystem carbon currently stored.

## Conclusion

The four plots analysed in this study were done so to help characterize baseline forest conditions and inform future thinning decisions within the PBR; they were not designated as proposed thinning units. Accordingly, these recommendations apply to areas with conditions similar to those recorded in the plots. Based on the observed conditions, we recommend site-specific selective thinning supported by introduced-species management and post-treatment monitoring.

Areas within the reserve which resemble Plots 1 and 2 warrant priority consideration for thinning. These plots had the highest stem densities (1,350 and 1,250 stems/ha, respectively), relatively small mean DBH, and limited structural diversity. Areas resembling Plot 1 may benefit from thinning that reduces Douglas-fir dominance and lessens competitive pressures for selectively retained trees. In areas resembling Plot 2, thinning should maintain the relatively balanced Douglas-fir–red alder canopy and focus on selected suppressed, damaged, closely spaced, or poorly formed trees. Because a large initial reduction in density could increase windthrow, canopy drying, invasive plant establishment, and short-term carbon loss, thinning should be gradual and accompanied by monitoring of regeneration, understory development, fuel loads, and introduced species of concern. Scotch broom (*Cytisus scoparius*) should be controlled where present and monitored following canopy opening.

Areas resembling Plot 3 warrant a more conservative approach because this plot had high canopy-species diversity, tall trees, and the highest estimated live-tree carbon density. Thinning should be limited to localized groups of closely spaced or damaged trees while retaining large, healthy trees and less abundant native species. Areas resembling Plot 4 may require less thinning because this plot had the lowest stem density and greatest mean DBH. Management in these areas should prioritize monitoring and controlling introduced wild clematis to protect healthy trees and native understory vegetation.

Overall, selective thinning and the creation of small gaps may help accelerate structural diversification. This should further support the long-term increase of carbon sequestration within the Pebble Beach Reserve forest. However, we recommend that treatment retain existing habitat features and be adapted to the ecological conditions of each site series rather than applied uniformly.

**Future monitoring**

Moving forward at the Pebble Beach Reserve forest, additional monitoring could be done to better understand the existing forest conditions and more accurately inform management decisions. One example of further monitoring could be to repeat the control plots that were created by the GCA. Repeating these plots would allow for a better understanding of what successional processes are naturally occurring in these planted stands over time. This could potentially provide a more in-depth site history and help to advise management choices. Another interesting opportunity for learning on this site would be to investigate the factors which facilitate the more complex forest structures seen in Plots 3 and 4. If the aim in management is to increase forest diversity and resilience, future monitoring should also include tree regeneration and browsing, wildlife trees and cavities, snag decay stages, downed wood dimensions and volume, and the quantity and distribution of surface and ladder fuels.

The Pebble Beach Reserve forest also provides an opportunity for an investigation into the economic models for small-scale forestry. Due to the time constraints of this project, it was not possible to investigate forestry models for this location. However, as thinning is recommended, it could be an opportunity for the GCA or future students to investigate this possibility. This seems like a prime opportunity to support sustainable forestry projects.

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# Appendices

**Appendix 1.** Forest Mensuration Raw Data

| Plot | Treatment | Date | Plot Size | Tree | Decay Class | Species | DBH | Broken Top | Basal Area | LCR | Height | Live Crown | Biomass | Carbon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| # | | sampled | $m^2$ | # | | | cm | | $m^2$ | % | m | m | kg | kg |
| 1 | None | 7-Jul-26 | 200 | 1 | 1 | Fd | 36.2 | No | 0.10292 | 30.14% | 28.2 | 19.7 | 326.66 | 153.53 |
| 1 | None | 7-Jul-26 | 200 | 2 | 1 | Fd | 22.8 | No | 0.04083 | 13.88% | 24.5 | 21.1 | 93.87 | 44.12 |
| 1 | None | 7-Jul-26 | 200 | 3 | 1 | Fd | 22.6 | No | 0.04011 | 7.51% | 21.3 | 19.7 | 91.66 | 43.08 |
| 1 | None | 7-Jul-26 | 200 | 4 | 1 | Fd | 25.1 | No | 0.04948 | 7.63% | 24.9 | 23 | 121.65 | 57.18 |
| 1 | None | 7-Jul-26 | 200 | 5 | 1 | Fd | 21 | No | 0.03464 | 12.96% | 21.6 | 18.8 | 75.19 | 35.34 |
| 1 | None | 7-Jul-26 | 200 | 6 | 5 | Fd | 19.2 | Yes | 0.02895 | N/A | 13.8 | N/A | 59.05 | 27.75 |
| 1 | None | 7-Jul-26 | 200 | 7 | 1 | Fd | 27.8 | No | 0.06070 | 22.04% | 24.5 | 19.1 | 160.25 | 75.32 |
| 1 | None | 7-Jul-26 | 200 | 8 | 1 | Fd | 25 | No | 0.04909 | 14.10% | 23.4 | 20.1 | 120.35 | 56.56 |
| 1 | None | 7-Jul-26 | 200 | 9 | 1 | Fd | 20 | No | 0.03142 | 27.03% | 22.2 | 16.2 | 65.92 | 30.98 |
| 1 | None | 7-Jul-26 | 200 | 10 | 1 | Fd | 26.9 | No | 0.05683 | 17.93% | 25.1 | 20.6 | 146.64 | 68.92 |
| 1 | None | 7-Jul-26 | 200 | 11 | 1 | Dr | 16.5 | No | 0.02138 | 49.21% | 19.1 | 9.7 | 66.65 | 31.32 |
| 1 | None | 7-Jul-26 | 200 | 12 | 1 | Fd | 27.2 | No | 0.05811 | 11.90% | 25.2 | 22.2 | 151.09 | 71.01 |
| 1 | None | 7-Jul-26 | 200 | 13 | 1 | Fd | 20.7 | No | 0.03365 | 14.62% | 21.2 | 18.1 | 72.33 | 34.00 |
| 1 | None | 7-Jul-26 | 200 | 14 | 1 | Fd | 26.5 | No | 0.05515 | 18.15% | 24.8 | 20.3 | 140.83 | 66.19 |
| 1 | None | 7-Jul-26 | 200 | 15 | 1 | Dr | 19.2 | No | 0.02895 | 51.50% | 26.6 | 12.9 | 95.47 | 44.87 |
| 1 | None | 7-Jul-26 | 200 | 16 | 1 | Fd | 27.6 | No | 0.05983 | 9.58% | 24 | 21.7 | 157.16 | 73.86 |
| 1 | None | 7-Jul-26 | 200 | 17 | 1 | Fd | 21.7 | No | 0.03698 | 9.39% | 24.5 | 22.2 | 82.15 | 38.61 |
| 1 | None | 7-Jul-26 | 200 | 18 | 2 | Fd | 13.5 | No | 0.01431 | 11.16% | 24.2 | 21.5 | 22.83 | 10.73 |
| 1 | None | 7-Jul-26 | 200 | 19 | 1 | Fd | 25 | No | 0.04909 | 12.71% | 23.6 | 20.6 | 120.35 | 56.56 |
| 1 | None | 7-Jul-26 | 200 | 20 | 1 | Fd | 19.3 | No | 0.02926 | 8.45% | 21.3 | 19.5 | 59.88 | 28.14 |
| 1 | None | 7-Jul-26 | 200 | 21 | 1 | Fd | 15 | No | 0.01767 | 11.65% | 20.6 | 18.2 | 30.34 | 14.26 |
| 1 | None | 7-Jul-26 | 200 | 22 | 1 | Fd | 19.6 | No | 0.03017 | 15.81% | 23.4 | 19.7 | 62.43 | 29.34 |
| 1 | None | 7-Jul-26 | 200 | 23 | 1 | Fd | 25.9 | No | 0.05269 | 22.22% | 26.1 | 20.3 | 132.39 | 62.22 |
| 1 | None | 7-Jul-26 | 200 | 24 | 1 | Fd | 29.1 | No | 0.06651 | 13.22% | 24.2 | 21 | 181.27 | 85.20 |
| 1 | None | 7-Jul-26 | 200 | 25 | 4 | Dr | 13.7 | Yes | 0.01474 | N/A | 14.5 | N/A | 42.88 | 20.15 |
| 1 | None | 7-Jul-26 | 200 | 26 | 1 | Fd | 29.6 | No | 0.06881 | 17.98% | 26.7 | 21.9 | 189.80 | 89.21 |
| 1 | None | 7-Jul-26 | 200 | 27 | 1 | Fd | 20.4 | No | 0.03269 | 5.45% | 20.2 | 19.1 | 69.54 | 32.68 |
| 2 | None | 8-Jul-26 | 200 | 1 | 1 | Fd | 22.5 | No | 0.03976 | 9.91% | 21.2 | 19.1 | 90.57 | 42.57 |
| 2 | None | 8-Jul-26 | 200 | 2 | 4 | Fd | 16.9 | No | 0.02243 | N/A | 15.2 | N/A | 41.85 | 19.67 |
| 2 | None | 8-Jul-26 | 200 | 3 | 1 | Fd | 32.5 | No | 0.08296 | 5.63% | 21.3 | 20.1 | 244.22 | 114.78 |
| 2 | None | 8-Jul-26 | 200 | 4 | 1 | Fd | 30.9 | No | 0.07499 | 22.35% | 25.5 | 19.8 | 213.13 | 100.17 |
| 2 | None | 8-Jul-26 | 200 | 5 | 1 | Fd | 17.8 | No | 0.02488 | 20.79% | 17.8 | 14.1 | 48.14 | 22.63 |
| 2 | None | 8-Jul-26 | 200 | 6 | 1 | Fd | 29.9 | No | 0.07022 | 20.79% | 20.2 | 16 | 195.03 | 91.66 |

| Plot | Treatment | Date | Plot Size | Tree | Decay Class | Species | DBH | Broken Top | Basal Area | LCR | Height | Live Crown | Biomass | Carbon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | None | 8-Jul-26 | 200 | 7 | 1 | Dr | 19.9 | No | 0.03110 | 15.64% | 21.1 | 17.8 | 103.93 | 48.85 |
| 2 | None | 8-Jul-26 | 200 | 8 | 1 | Dr | 19.7 | No | 0.03048 | 29.44% | 18 | 12.7 | 101.47 | 47.69 |
| 2 | None | 8-Jul-26 | 200 | 9 | 1 | Fd | 37.3 | No | 0.10927 | 9.41% | 20.2 | 18.3 | 354.13 | 166.44 |
| 2 | None | 8-Jul-26 | 200 | 10 | 1 | Dr | 20.3 | No | 0.03237 | 14.49% | 21.4 | 18.3 | 108.95 | 51.21 |
| 2 | None | 8-Jul-26 | 200 | 11 | 5 | Dr | 12.7 | Yes | 0.01267 | N/A | 3.8 | N/A | 35.82 | 16.84 |
| 2 | None | 8-Jul-26 | 200 | 12 | 1 | Fd | 28.3 | No | 0.06290 | 5.42% | 20.3 | 19.2 | 168.14 | 79.03 |
| 2 | None | 8-Jul-26 | 200 | 13 | 1 | Dr | 18.2 | No | 0.02602 | 5.84% | 13.7 | 12.9 | 84.10 | 39.52 |
| 2 | None | 8-Jul-26 | 200 | 14 | 1 | Fd | 32.3 | No | 0.08194 | 3.41% | 17.6 | 17 | 240.19 | 112.89 |
| 2 | None | 8-Jul-26 | 200 | 15 | 1 | Fd | 24.5 | No | 0.04714 | 25.95% | 18.5 | 13.7 | 113.96 | 53.56 |
| 2 | None | 8-Jul-26 | 200 | 16 | 5 | Dr | 18.5 | Yes | 0.02688 | N/A | 13.3 | N/A | 87.42 | 41.09 |
| 2 | None | 8-Jul-26 | 200 | 17 | 2 | Dr | 16.9 | No | 0.02243 | 28.21% | 15.6 | 11.2 | 70.54 | 33.15 |
| 2 | None | 8-Jul-26 | 200 | 18 | 1 | Dr | 17.2 | No | 0.02324 | 42.38% | 15.1 | 8.7 | 73.55 | 34.57 |
| 2 | None | 8-Jul-26 | 200 | 19 | 4 | Dr | 12.7 | No | 0.01267 | N/A | 13 | N/A | 35.82 | 16.84 |
| 2 | None | 8-Jul-26 | 200 | 20 | 1 | Fd | 30.9 | No | 0.07499 | 27.04% | 15.9 | 11.6 | 213.13 | 100.17 |
| 2 | None | 8-Jul-26 | 200 | 21 | 1 | Fd | 34.3 | No | 0.09240 | 13.74% | 21.1 | 18.2 | 282.44 | 132.75 |
| 2 | None | 8-Jul-26 | 200 | 22 | 1 | Fd | 31.9 | No | 0.07992 | 4.93% | 20.3 | 19.3 | 232.25 | 109.16 |
| 2 | None | 8-Jul-26 | 200 | 23 | 2 | Dr | 19.6 | No | 0.03017 | 24.26% | 20.2 | 15.3 | 100.25 | 47.12 |
| 2 | None | 8-Jul-26 | 200 | 24 | 4 | Dr | 14.5 | Yes | 0.01651 | N/A | 6.4 | N/A | 49.06 | 23.06 |
| 2 | None | 8-Jul-26 | 200 | 25 | 5 | Dr | 13.5 | Yes | 0.01431 | N/A | 6 | N/A | 41.41 | 19.46 |
| 3 | None | 9-Jul-26 | 400 | 1 | 2 | Mb | 16.7 | No | 0.02190 | 4.98% | 20.1 | 19.1 | 68.58 | 32.23 |
| 3 | None | 9-Jul-26 | 400 | 2 | 1 | Fd | 27.2 | No | 0.05811 | 16.93% | 25.4 | 21.1 | 151.09 | 71.01 |
| 3 | None | 9-Jul-26 | 400 | 3 | 1 | Fd | 32.4 | No | 0.08245 | 7.00% | 25.7 | 23.9 | 242.20 | 113.83 |
| 3 | None | 9-Jul-26 | 400 | 4 | 1 | Mb | 19 | No | 0.02835 | 21.20% | 25 | 19.7 | 93.13 | 43.77 |
| 3 | None | 9-Jul-26 | 400 | 5 | 1 | Mb | 24.8 | No | 0.04831 | 18.73% | 26.7 | 21.7 | 175.17 | 82.33 |
| 3 | None | 9-Jul-26 | 400 | 6 | 1 | Mb | 13.7 | No | 0.01474 | 18.64% | 23.6 | 19.2 | 42.88 | 20.15 |
| 3 | None | 9-Jul-26 | 400 | 7 | 1 | Mb | 22.8 | No | 0.04083 | 23.83% | 27.7 | 21.1 | 143.50 | 67.45 |
| 3 | None | 9-Jul-26 | 400 | 8 | 1 | Fd | 31.3 | No | 0.07694 | 21.58% | 32.9 | 25.8 | 220.65 | 103.71 |
| 3 | None | 9-Jul-26 | 400 | 9 | 1 | Fd | 22.9 | No | 0.04119 | 5.09% | 21.6 | 20.5 | 94.98 | 44.64 |
| 3 | None | 9-Jul-26 | 400 | 10 | 5 | Fd | 13.7 | Yes | 0.01474 | N/A | 4.8 | N/A | 23.76 | 11.17 |
| 3 | None | 9-Jul-26 | 400 | 11 | 1 | Fd | 31.2 | No | 0.07645 | 19.44% | 28.8 | 23.2 | 218.76 | 102.82 |
| 3 | None | 9-Jul-26 | 400 | 12 | 1 | Fd | 25.5 | No | 0.05107 | 14.23% | 26 | 22.3 | 126.95 | 59.67 |
| 3 | None | 9-Jul-26 | 400 | 13 | 1 | Fd | 32.2 | No | 0.08143 | 9.32% | 27.9 | 25.3 | 238.19 | 111.95 |
| 3 | None | 9-Jul-26 | 400 | 14 | 1 | Fd | 35.6 | No | 0.09954 | 10.84% | 28.6 | 25.5 | 312.26 | 146.76 |
| 3 | None | 9-Jul-26 | 400 | 15 | 1 | Fd | 35.6 | No | 0.09954 | 14.67% | 30 | 25.6 | 312.26 | 146.76 |
| 3 | None | 9-Jul-26 | 400 | 16 | 1 | Act | 43.5 | No | 0.14862 | 25.57% | 30.5 | 22.7 | 664.04 | 312.10 |
| 3 | None | 9-Jul-26 | 400 | 17 | 1 | Mb | 18.9 | No | 0.02806 | 22.17% | 21.2 | 16.5 | 91.97 | 43.23 |
| 3 | None | 9-Jul-26 | 400 | 18 | 1 | Mb | 18.6 | No | 0.02717 | 27.02% | 24.8 | 18.1 | 88.54 | 41.62 |

| Plot | Treatment | Date | Plot Size | Tree | Decay Class | Species | DBH | Broken Top | Basal Area | LCR | Height | Live Crown | Biomass | Carbon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | None | 9-Jul-26 | 400 | 19 | 1 | Fd | 43.9 | No | 0.15136 | 31.25% | 33.6 | 23.1 | 549.56 | 258.29 |
| 3 | None | 9-Jul-26 | 400 | 20 | 1 | Mb | 16.7 | No | 0.02190 | 2.31% | 17.3 | 16.9 | 68.58 | 32.23 |
| 3 | None | 9-Jul-26 | 400 | 21 | 1 | Fd | 38 | No | 0.11341 | 17.87% | 26.3 | 21.6 | 372.34 | 175.00 |
| 3 | None | 9-Jul-26 | 400 | 22 | 3 | Fd | 17.1 | Yes | 0.02297 | N/A | 18.4 | N/A | 43.20 | 20.31 |
| 3 | None | 9-Jul-26 | 400 | 23 | 1 | Fd | 42.5 | No | 0.14186 | 1.97% | 25.4 | 24.9 | 503.55 | 236.67 |
| 3 | None | 9-Jul-26 | 400 | 24 | 3 | Mb | 23.2 | No | 0.04227 | N/A | 15.8 | N/A | 149.54 | 70.29 |
| 3 | None | 9-Jul-26 | 400 | 25 | 1 | Mb | 35.5 | No | 0.09898 | 24.40% | 25 | 18.9 | 410.09 | 192.74 |
| 3 | None | 9-Jul-26 | 400 | 26 | 1 | Mb | 35.2 | No | 0.09731 | 12.87% | 27.2 | 23.7 | 401.92 | 188.90 |
| 3 | None | 9-Jul-26 | 400 | 27 | 1 | Mb | 18.4 | No | 0.02659 | 6.44% | 20.2 | 18.9 | 86.30 | 40.56 |
| 3 | None | 9-Jul-26 | 400 | 28 | 3 | Mb | 24.9 | No | 0.04870 | N/A | 20.4 | N/A | 176.85 | 83.12 |
| 3 | None | 9-Jul-26 | 400 | 29 | 1 | Mb | 17.6 | No | 0.02433 | 7.49% | 18.7 | 17.3 | 77.67 | 36.50 |
| 3 | None | 9-Jul-26 | 400 | 30 | 1 | Mb | 30.9 | No | 0.07499 | 9.09% | 24.2 | 22 | 295.09 | 138.69 |
| 3 | None | 9-Jul-26 | 400 | 31 | 4 | Vb | 30.1 | Yes | 0.07116 | N/A | 4.6 | N/A | 277.29 | 130.33 |
| 3 | None | 9-Jul-26 | 400 | 32 | 1 | Fd | 35.9 | No | 0.10122 | 20.14% | 28.8 | 23 | 319.41 | 150.12 |
| 3 | None | 9-Jul-26 | 400 | 33 | 1 | Mb | 13.8 | No | 0.01496 | 5.59% | 17.9 | 16.9 | 43.63 | 20.50 |
| 3 | None | 9-Jul-26 | 400 | 34 | 1 | Mb | 18.5 | No | 0.02688 | 19.51% | 24.6 | 19.8 | 87.42 | 41.09 |
| 3 | None | 9-Jul-26 | 400 | 35 | 1 | Mb | 16.9 | No | 0.02243 | 27.14% | 21 | 15.3 | 70.54 | 33.15 |
| 3 | None | 9-Jul-26 | 400 | 36 | 1 | Mb | 12.6 | No | 0.01247 | 9.13% | 20.8 | 18.9 | 35.16 | 16.52 |
| 3 | None | 9-Jul-26 | 400 | 37 | 2 | Mb | 16.4 | No | 0.02112 | 1.75% | 17.1 | 16.8 | 65.69 | 30.88 |
| 3 | None | 9-Jul-26 | 400 | 38 | 1 | Mb | 26.5 | No | 0.05515 | 25.34% | 29.2 | 21.8 | 204.99 | 96.35 |
| 3 | None | 9-Jul-26 | 400 | 39 | 1 | Fd | 36.4 | No | 0.10406 | 24.66% | 29.6 | 22.3 | 331.55 | 155.83 |
| 3 | None | 9-Jul-26 | 400 | 40 | 1 | Fd | 32 | No | 0.08042 | 30.43% | 25.3 | 17.6 | 234.22 | 110.08 |
| 3 | None | 9-Jul-26 | 400 | 41 | 1 | Fd | 34.4 | No | 0.09294 | 14.98% | 26.7 | 22.7 | 284.67 | 133.80 |
| 3 | None | 9-Jul-26 | 400 | 42 | 1 | Mb | 17.2 | No | 0.02324 | 21.56% | 21.8 | 17.1 | 73.55 | 34.57 |
| 3 | None | 9-Jul-26 | 400 | 43 | 1 | Mb | 18.5 | No | 0.02688 | 32.27% | 22 | 14.9 | 87.42 | 41.09 |
| 4 | None | 9-Jul-26 | 200 | 1 | 1 | Dr | 22.3 | No | 0.03906 | 27.23% | 20.2 | 14.7 | 136.15 | 63.99 |
| 4 | None | 9-Jul-26 | 200 | 2 | 3 | Dr | 15.1 | Yes | 0.01791 | N/A | 13.1 | N/A | 54.01 | 25.38 |
| 4 | None | 9-Jul-26 | 200 | 3 | 1 | Fd | 29.8 | No | 0.06975 | 14.03% | 22.1 | 19 | 193.28 | 90.84 |
| 4 | None | 9-Jul-26 | 200 | 4 | 1 | Fd | 44.3 | No | 0.15413 | 21.89% | 20.1 | 15.7 | 563.17 | 264.69 |
| 4 | None | 9-Jul-26 | 200 | 5 | 1 | Fd | 37.8 | No | 0.11222 | 23.66% | 18.6 | 14.2 | 367.08 | 172.53 |
| 4 | None | 9-Jul-26 | 200 | 6 | 1 | Fd | 19.6 | No | 0.03017 | 16.03% | 15.6 | 13.1 | 62.43 | 29.34 |
| 4 | None | 9-Jul-26 | 200 | 7 | 1 | Fd | 40 | No | 0.12566 | 18.57% | 21 | 17.1 | 427.59 | 200.97 |
| 4 | None | 9-Jul-26 | 200 | 8 | 1 | Fd | 35.3 | No | 0.09787 | 15.86% | 22.7 | 19.1 | 305.21 | 143.45 |
| 4 | None | 9-Jul-26 | 200 | 9 | 1 | Cw | 20.4 | No | 0.03269 | 14.49% | 13.8 | 11.8 | 51.98 | 24.43 |
| 4 | None | 9-Jul-26 | 200 | 10 | 1 | Fd | 30 | No | 0.07069 | 33.16% | 18.7 | 12.5 | 196.80 | 92.49 |
| 4 | None | 9-Jul-26 | 200 | 11 | 1 | Fd | 37.2 | No | 0.10869 | 18.25% | 25.2 | 20.6 | 351.57 | 165.24 |
| 4 | None | 9-Jul-26 | 200 | 12 | 2 | Fd | 37.4 | Yes | 0.10986 | N/A | 15.7 | N/A | 356.69 | 167.65 |

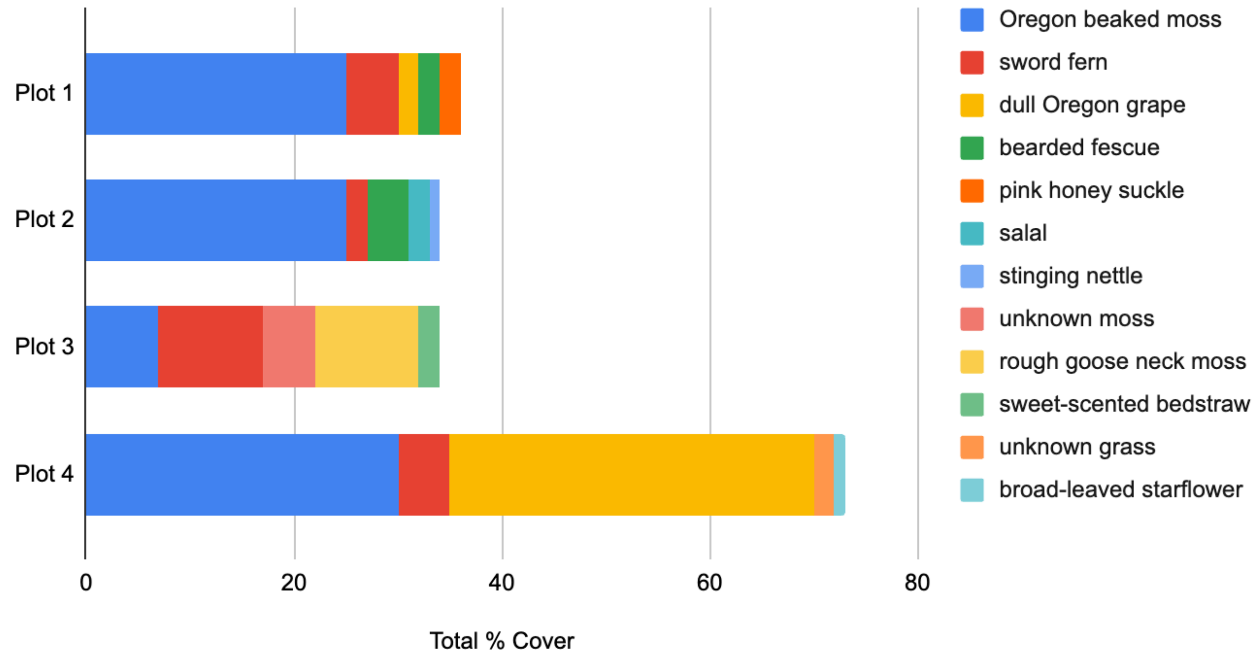
| Plot | Treatment | Date | Plot Size | Tree | Decay Class | Species | DBH | Broken Top | Basal Area | LCR | Height | Live Crown | Biomass | Carbon |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | None | 9-Jul-26 | 200 | 13 | 1 | Fd | 34.9 | No | 0.09566 | 23.04% | 21.7 | 16.7 | 295.97 | 139.11 |
| 4 | None | 9-Jul-26 | 200 | 14 | 1 | Fd | 27.4 | No | 0.05896 | 20.70% | 22.7 | 18 | 154.11 | 72.43 |
| 4 | None | 9-Jul-26 | 200 | 15 | 1 | Dr | 32 | No | 0.08042 | 14.04% | 17.1 | 14.7 | 320.61 | 150.69 |
| 4 | None | 9-Jul-26 | 200 | 16 | 1 | Fd | 32.7 | No | 0.08398 | 15.18% | 22.4 | 19 | 248.30 | 116.70 |
| 4 | None | 9-Jul-26 | 200 | 17 | 1 | Fd | 23.4 | No | 0.04301 | 27.89% | 19 | 13.7 | 100.68 | 47.32 |

**Appendix 2.** Tree species list, understory species composition and introduced species observed.

| Plot | Canopy layer species | Canopy layer % Cover | Understory species | Understory % Cover | Introduced species of concern |
|---|---|---|---|---|---|
| 1 | Douglas-fir *(Pseudotsuga menziesii)* | 88.9 | Oregon beaked-moss *(Kindbergia oregana)* | 25 | English holly *(Ilex aquifolium)* |
| 1 | red alder *(Alnus rubra)* | 11.1 | sword fern *(Polystichum munitum)* | 5 | Scotch broom *(Cytisus scoparius)* |
| 1 | | | dull Oregon-grape *(Mahonia nervosa)* | 2 | |
| 1 | | | bearded fescue *(Festuca subulata)* | 2 | |
| 1 | | | pink honeysuckle *(Lonicera hispidula)* | 2 | |
| 2 | Douglas-fir *(Pseudotsuga menziesii)* | 52 | Oregon beaked-moss *(Kindbergia oregana)* | 25 | English holly *(Ilex aquifolium)* |
| 2 | red alder *(Alnus rubra)* | 48 | bearded fescue *(Festuca subulata)* | 4 | Scotch broom *(Cytisus scoparius)* |
| 2 | | | sword fern *(Polystichum munitum)* | 2 | |
| 2 | | | salal *(Gaultheria shallon)* | 2 | |
| 2 | | | stinging nettle *(Urtica dioica)* | 1 | |

| Plot | Canopy layer species | Canopy layer % Cover | Understory species | Understory % Cover | Introduced species of concern |
|---|---|---|---|---|---|
| 3 | bigleaf maple *(Acer macrophyllum)* | 53.5 | sword fern *(Polystichum munitum)* | 10 | broad-leaved helleborine (*Epipactis helleborine*) |
| 3 | Douglas-fir *(Pseudotsuga menziesii)* | 41.9 | rough goose neck moss *(Hylocomiadelphus triquetrus)* | 10 | |
| 3 | black cottonwood *(Populus trichocarpa)* | 2.3 | Oregon beaked-moss *(Kindbergia oregana)* | 7 | |
| 3 | bitter cherry *(Prunus emarginata)* | 2.3 | unknown moss *Plagiomnium sp.* | 5 | |
| 3 | | | sweet-scented bedstraw *(Galium triflorum)* | 2 | |
| 4 | Douglas-fir *(Pseudotsuga menziesii)* | 76.5 | dull Oregon-grape *(Mahonia nervosa)* | 35 | broad-leaved helleborine (*Epipactis helleborine*) |
| 4 | red alder *(Alnus rubra)* | 17.6 | Oregon beaked-moss *(Kindbergia oregana)* | 30 | oxeye daisy (*Leucanthemum vulgare*) |
| 4 | western redcedar *(Thuja plicata)* | 5.9 | sword fern *(Polystichum munitum)* | 5 | Scotch broom *(Cytisus scoparius)* |
| 4 | | | unknown grass *(Festuca sp.)* | 2 | wild clematis (*Clematis virginiana*) |
| 4 | | | broad-leaved starflower *(Trientalis latifolia)* | 1 | |

**Appendix 3.** Vegetation species composition (% cover) by satellite plot




**Appendix 4.** Forest Canopy Cover Survey Raw Data

| Plot | Measurement # | Raw % Open | Corrected % Open | % Canopy Cover |
|---:|---:|---:|---:|---:|
| 1 | 1 | 15 | 15.6 | 84.4 |
| 1 | 2 | 13 | 13.52 | 86.48 |
| 1 | 3 | 12 | 12.48 | 87.52 |
| 1 | 4 | 9 | 9.36 | 90.64 |
| 1 | 5 | 10 | 10.4 | 89.6 |
| 1 | 6 | 17 | 17.68 | 82.32 |
| 1 | 7 | 16 | 16.64 | 83.36 |
| 1 | 8 | 14 | 14.56 | 85.44 |
| 1 | 9 | 12 | 12.48 | 87.52 |
| 1 | 10 | 14 | 14.56 | 85.44 |
| 1 | 11 | 10 | 10.4 | 89.6 |
| 1 | 12 | 7 | 7.28 | 92.72 |
| 1 | 13 | 9 | 9.36 | 90.64 |
| 1 | 14 | 9 | 9.36 | 90.64 |
| 1 | 15 | 12 | 12.48 | 87.52 |

| Plot | Measurement # | Raw % Open | Corrected % Open | % Canopy Cover |
|---|---|---|---|---|
| 2 | 1 | 13 | 13.52 | 86.48 |
| 2 | 2 | 15 | 15.6 | 84.4 |
| 2 | 3 | 14 | 14.56 | 85.44 |
| 2 | 4 | 14 | 14.56 | 85.44 |
| 2 | 5 | 11 | 11.44 | 88.56 |
| 2 | 6 | 8 | 8.32 | 91.68 |
| 2 | 7 | 8 | 8.32 | 91.68 |
| 2 | 8 | 14 | 14.56 | 85.44 |
| 2 | 9 | 10 | 10.4 | 89.6 |
| 2 | 10 | 16 | 16.64 | 83.36 |
| 2 | 11 | 13 | 13.52 | 86.48 |
| 2 | 12 | 12 | 12.48 | 87.52 |
| 2 | 13 | 10 | 10.4 | 89.6 |
| 2 | 14 | 8 | 8.32 | 91.68 |
| 2 | 15 | 16 | 16.64 | 83.36 |
| 3 | 1 | 14 | 14.56 | 85.44 |
| 3 | 2 | 11 | 11.44 | 88.56 |
| 3 | 3 | 13 | 13.52 | 86.48 |
| 3 | 4 | 17 | 17.68 | 82.32 |
| 3 | 5 | 14 | 14.56 | 85.44 |
| 3 | 6 | 14 | 14.56 | 85.44 |
| 3 | 7 | 11 | 11.44 | 88.56 |
| 3 | 8 | 11 | 11.44 | 88.56 |
| 3 | 9 | 19 | 19.76 | 80.24 |
| 3 | 10 | 12 | 12.48 | 87.52 |
| 3 | 11 | 15 | 15.6 | 84.4 |
| 3 | 12 | 13 | 13.52 | 86.48 |
| 3 | 13 | 11 | 11.44 | 88.56 |
| 3 | 14 | 10 | 10.4 | 89.6 |
| 3 | 15 | 9 | 9.36 | 90.64 |
| 4 | 1 | 12 | 12.48 | 87.52 |

| Plot | Measurement # | Raw % Open | Corrected % Open | % Canopy Cover |
|---:|---:|---:|---:|---:|
| 4 | 2 | 10 | 10.4 | 89.6 |
| 4 | 3 | 11 | 11.44 | 88.56 |
| 4 | 4 | 4 | 4.16 | 95.84 |
| 4 | 5 | 4 | 4.16 | 95.84 |
| 4 | 6 | 7 | 7.28 | 92.72 |
| 4 | 7 | 9 | 9.36 | 90.64 |
| 4 | 8 | 9 | 9.36 | 90.64 |
| 4 | 9 | 8 | 8.32 | 91.68 |
| 4 | 10 | 10 | 10.4 | 89.6 |
| 4 | 11 | 14 | 14.56 | 85.44 |
| 4 | 12 | 18 | 18.72 | 81.28 |
| 4 | 13 | 17 | 17.68 | 82.32 |
| 4 | 14 | 18 | 18.72 | 81.28 |
| 4 | 15 | 12 | 12.48 | 87.52 |

**AI Use Statement:** Generative AI was used solely to assist with spelling and proofreading.