

Average Total Projected Area of CWD Per Hectare

Assuming that there is no overlap among the CWD pieces, Equation 13 can be used to estimate the total projected area/ha based on each line transect:

$$y_i = \frac{100 \times \pi}{2 \times L} \sum_{j=1}^m \frac{d_{ij}}{\cos \lambda_{ij}} \text{ m}^2/\text{ha}$$

Using this equation:

$$\begin{aligned} y_1 &= \frac{100 \times \pi}{2 \times 30} \times \left(\frac{15}{\cos(0)} + \frac{35}{\cos(5)} + \frac{21}{\cos(10)} + \frac{32}{\cos(0)} + \frac{45}{\cos(15)} \right) \\ &= 5.2360 \times (15 + 35.134 + 21.324 + 32 + 46.587) \\ &= 785.63 \end{aligned}$$

$$\begin{aligned} y_2 &= \frac{100 \times \pi}{2 \times 30} \times \left(\frac{26}{\cos(0)} + \frac{22}{\cos(5)} + \frac{17}{\cos(0)} + \frac{40}{\cos(10)} \right) \\ &= 5.2360 \times (26 + 22.084 + 17 + 40.617) \\ &= 553.45 \end{aligned}$$

$$\begin{aligned} y_3 &= \frac{100 \times \pi}{2 \times 30} \times \left(\frac{16}{\cos(5)} + \frac{42}{\cos(10)} + \frac{73}{\cos(20)} + \frac{32}{\cos(5)} + \frac{20}{\cos(0)} + \frac{21}{\cos(15)} \right) \\ &= 5.2360 \times (16.061 + 42.648 + 77.685 + 32.122 + 20 + 21.741) \\ &= 1100.91 \end{aligned}$$

Again, Equation 21 is used to estimate the average:

$$\frac{785.63 + 553.45 + 1100.91}{3} = 813.33 \text{ m}^2/\text{ha}.$$

Its standard error is:

$$\sqrt{\frac{(785.63^2 + 553.45^2 + 1100.91^2) + \frac{(785.63 + 553.45 + 1100.91)^2}{3}}{3 \times (3-1)}} = 158.64 \text{ m}^2/\text{ha}$$

The 95% confidence interval for the estimate of average total projected area/ha is:

$$P(813.33 - 4.303 \times 158.64 < \mu_y < 813.33 + 4.303 \times 158.64) = 1 - 0.05$$

$$P(130.70 < \mu_y < 1495.96) = 0.95$$

This confidence interval is quite wide because of the relatively high variability in the total projected area of CWD pieces among the line transects and the small number of line transects established.