

AN EXAMINATION OF STAND ATTRIBUTES
AND THE PRESENCE
OF ENGLISH HOLLY
IN A PACIFIC NORTHWEST FOREST,
GRAYS HARBOR COUNTY, WASH.

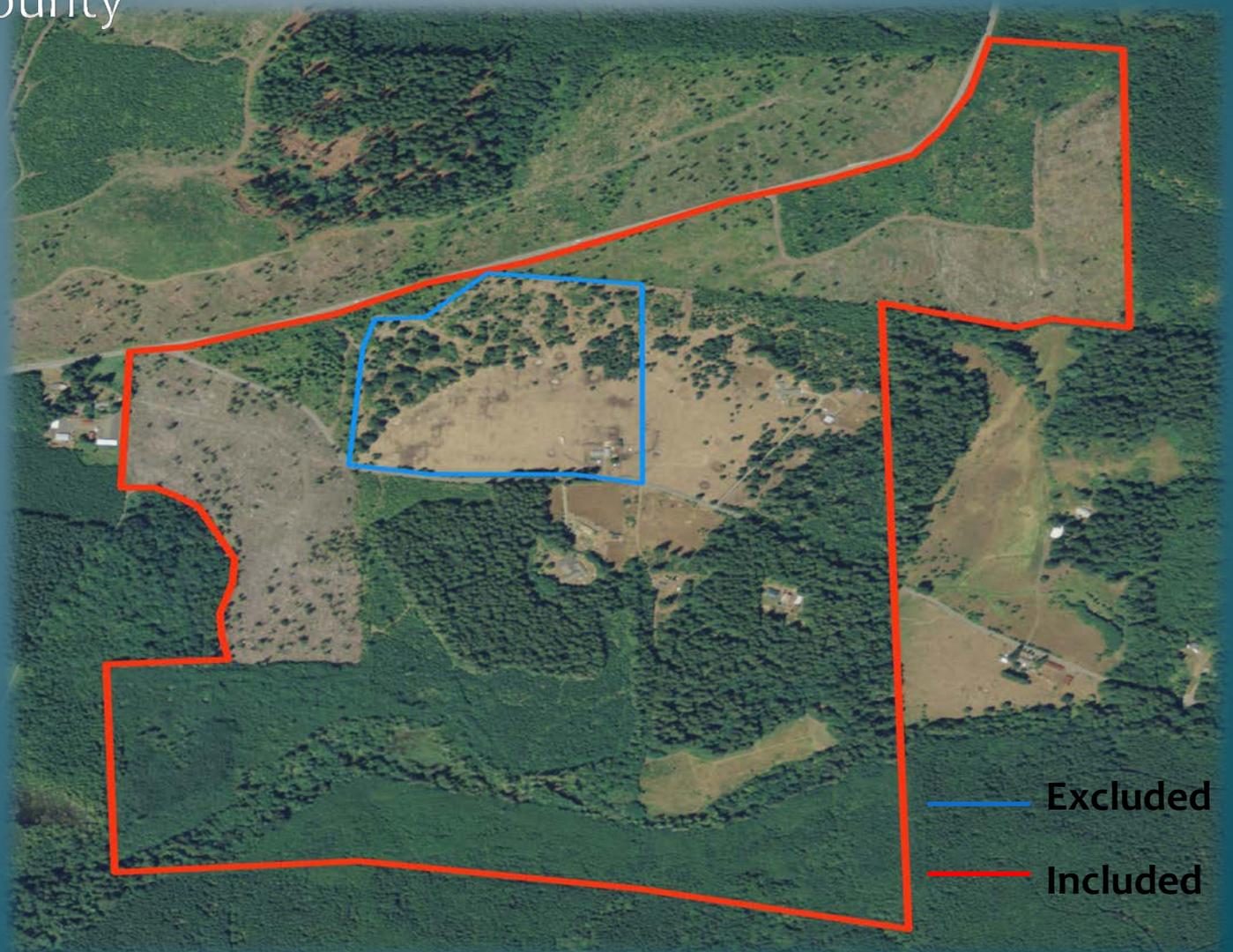
By Andrea Watts

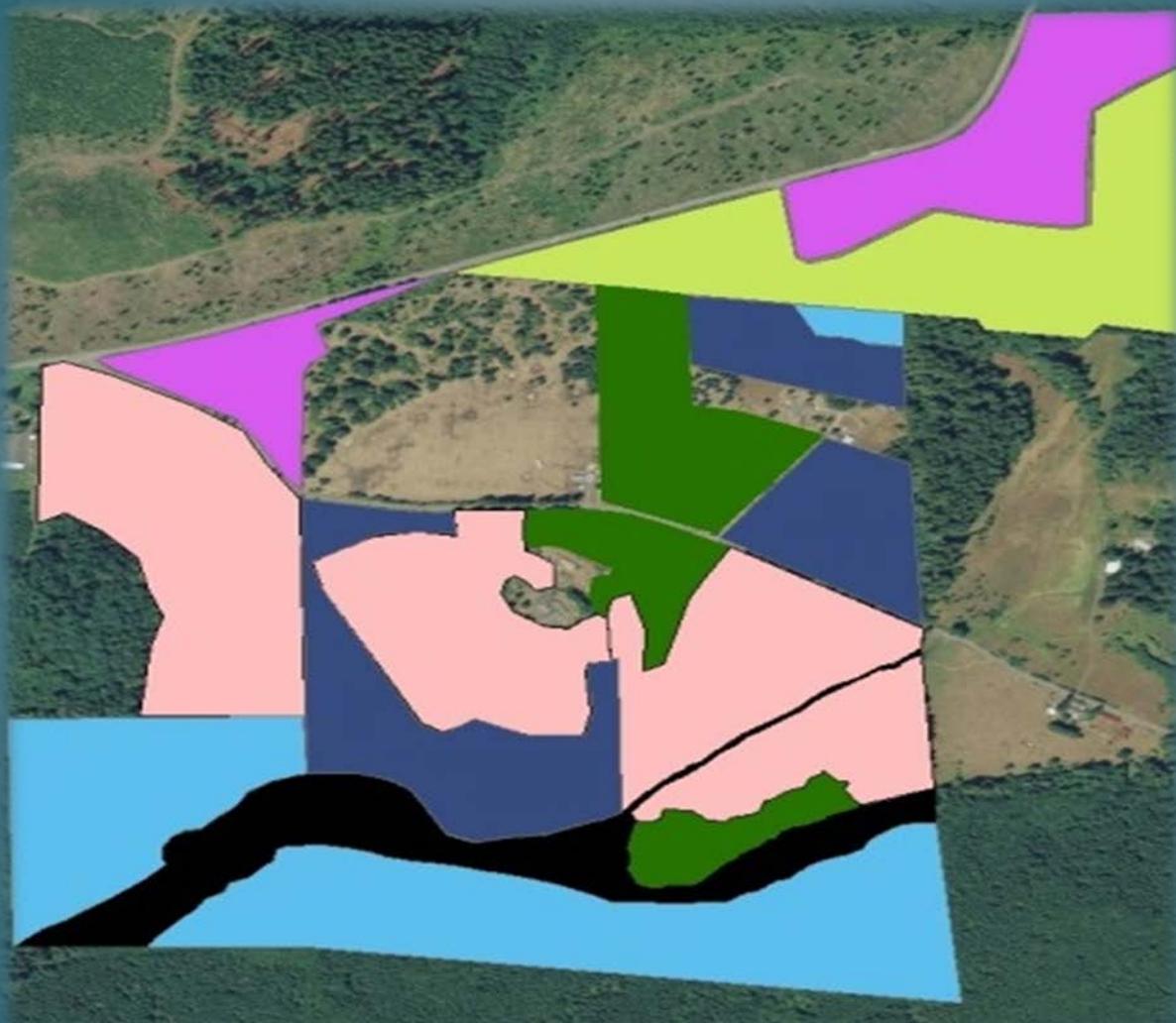
An abridged version of my master's thesis defense presented March 2013

University of Washington School of Environmental and Forest Sciences

RESEARCH AREA

344 acres –
Grays Harbor County





Location of Stand Stages in Research Area

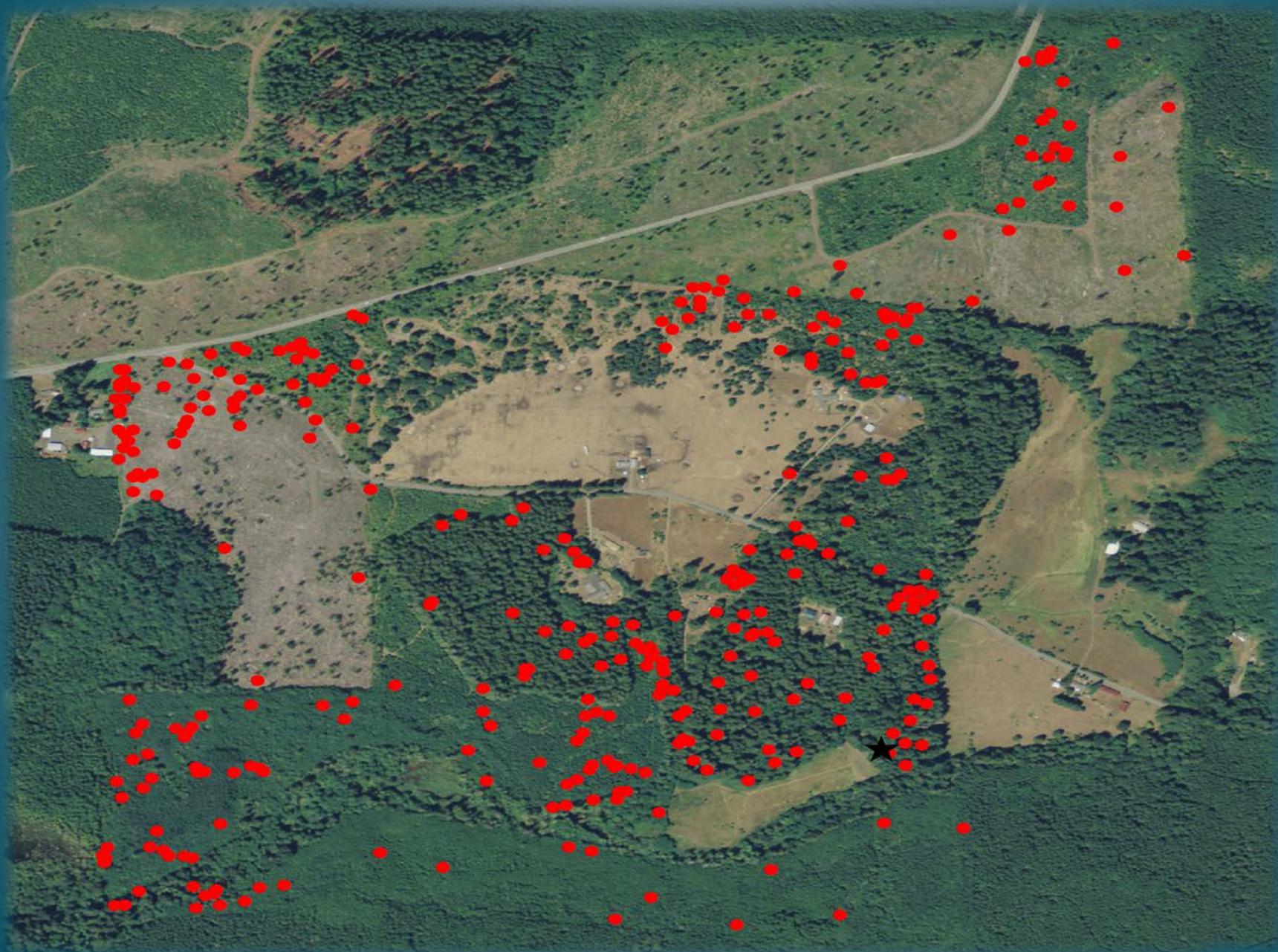
Stand_Stages

-  Grassland
-  Seedling/Grass
-  Sapling/Shrub
-  Late Initiation
-  Stem Exclusion
-  Understory Re-initiation
-  Riparian



0 145 290 580 Meters

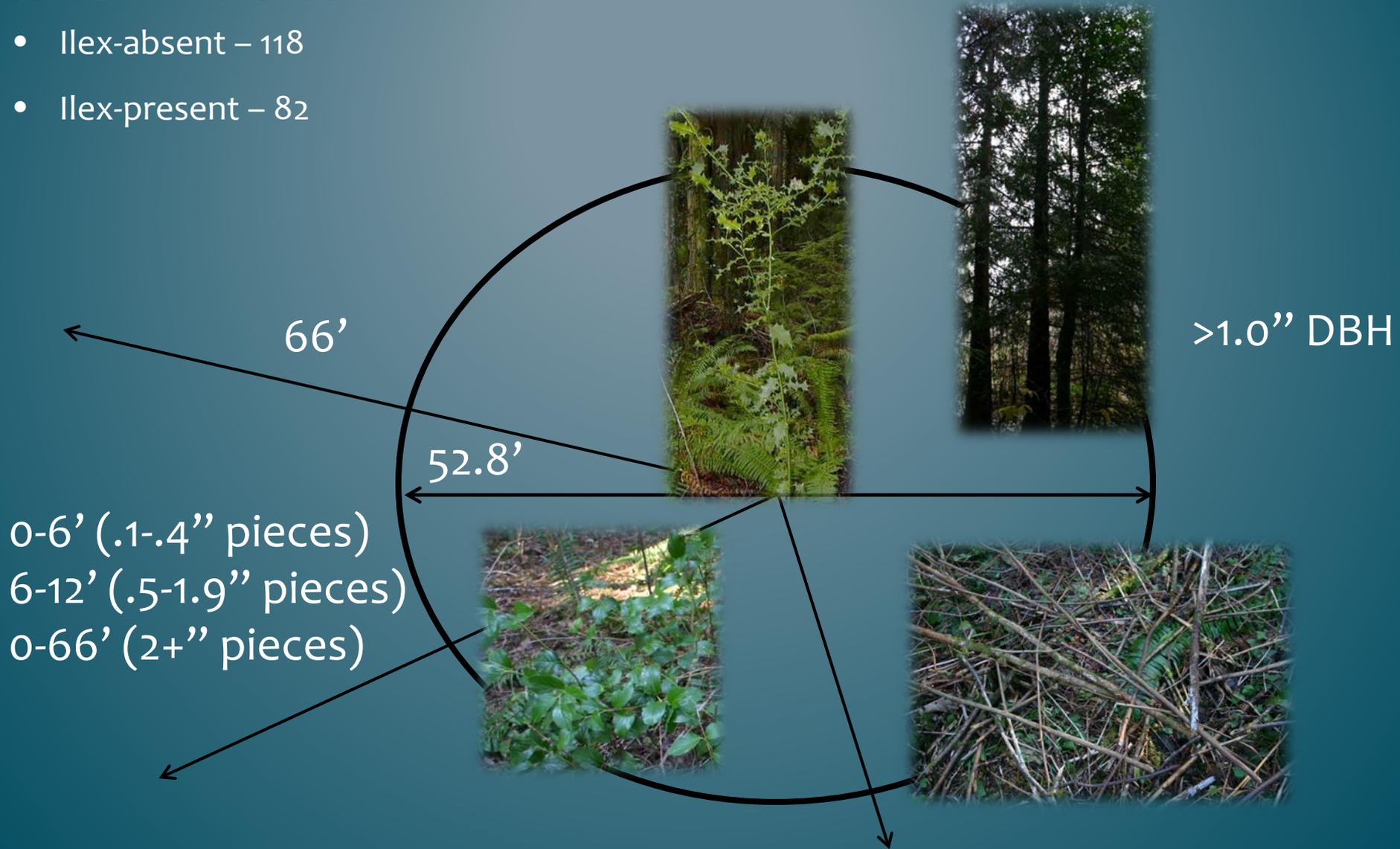


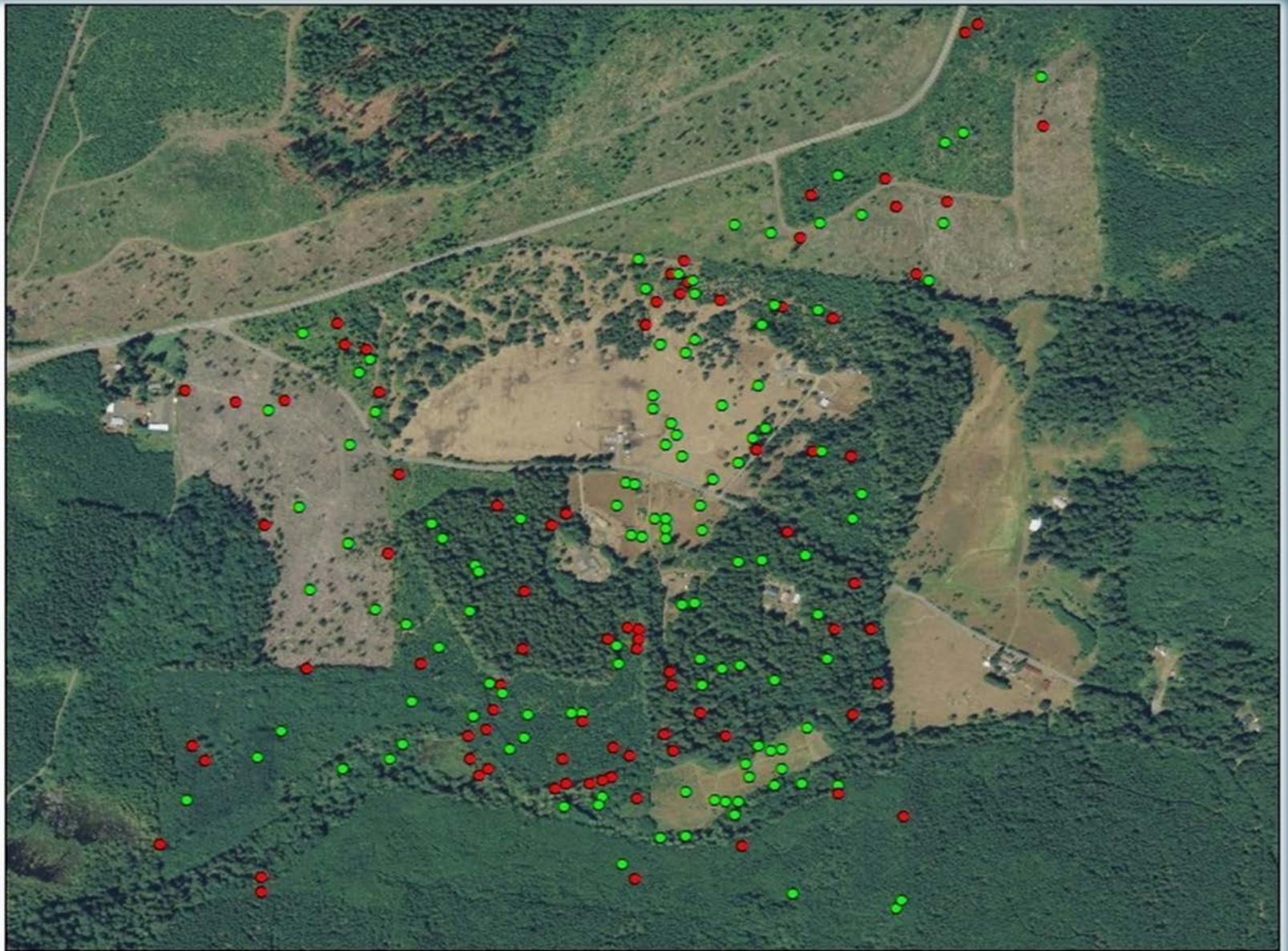


DATA COLLECTION

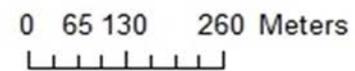
200 (1/20 acre) plots placed throughout the landscape
June 2011 – November 2012

- Ilex-absent – 118
- Ilex-present – 82





- *Ilex*-absent plot
- *Ilex*-present plot



Open Grassland

32.89 acres

Plots: 42 *Ilex*-absent , 6 *Ilex*-present

Species Composition: Douglas-fir and western red cedar

Age < 30 (50+)

Average Trees per acre (TPA) - 28 (SD - 55)

Average Basal Area ft² per Acre - 23 (SD - 68)



Seedling Grass

43.2 acres

Plots: 6 *Ilex*-absent, 6 *Ilex*-present

Species Composition: Douglas-fir, red alder

Age < 11

Average TPA - 300 (SD - 113)

Average Basal Area ft² per Acre - 5 (SD - 2)



Sapling Shrub

31.22 acres

Plots: 8 *Ilex*-absent, 8 *Ilex*-present

Species Composition: Douglas-fir, western red cedar, and western hemlock

Age < 15 (69+)

Average TPA - 595 (SD - 380)

Average Basal Area ft² per Acre - 69 (SD - 38)



Late Initiation

45.51 acres

Plots: 19 *Ilex*-absent, 19 *Ilex*-present

Species Composition: Douglas-fir, western red cedar, and western hemlock

Age < 20 (82+)

Average TPA - 879 (SD - 647)

Average Basal Area ft² per Acre - 113 (SD - 115)



Stem Exclusion

65.30 acres

Plots: 7 *Ilex*-absent, 7 *Ilex*-present

Species Composition: cascara, red alder, Douglas-fir

Age < 20

Average TPA - 1780 (SD - 813)

Average Basal Area ft² per Acre - 140 (SD - 64)



Understory Reinitiation

98.01 acres

Plots: 21 *Ilex*-absent, 21 *Ilex*-present

Species Composition: Douglas-fir and western red cedar

Age < 125

Average TPA - 191 (SD - 131)

Average Basal Area ft² per Acre - 416 (SD - 263)



Riparian

26.89 acres

Plots: 30 *Ilex*-absent, 30 *Ilex*-present

Species Composition: cascara, red alder, and western red cedar

Age < 79+

Average TPA - 453 (SD - 537)

Average Basal Area ft² per Acre - 255 (SD - 251)

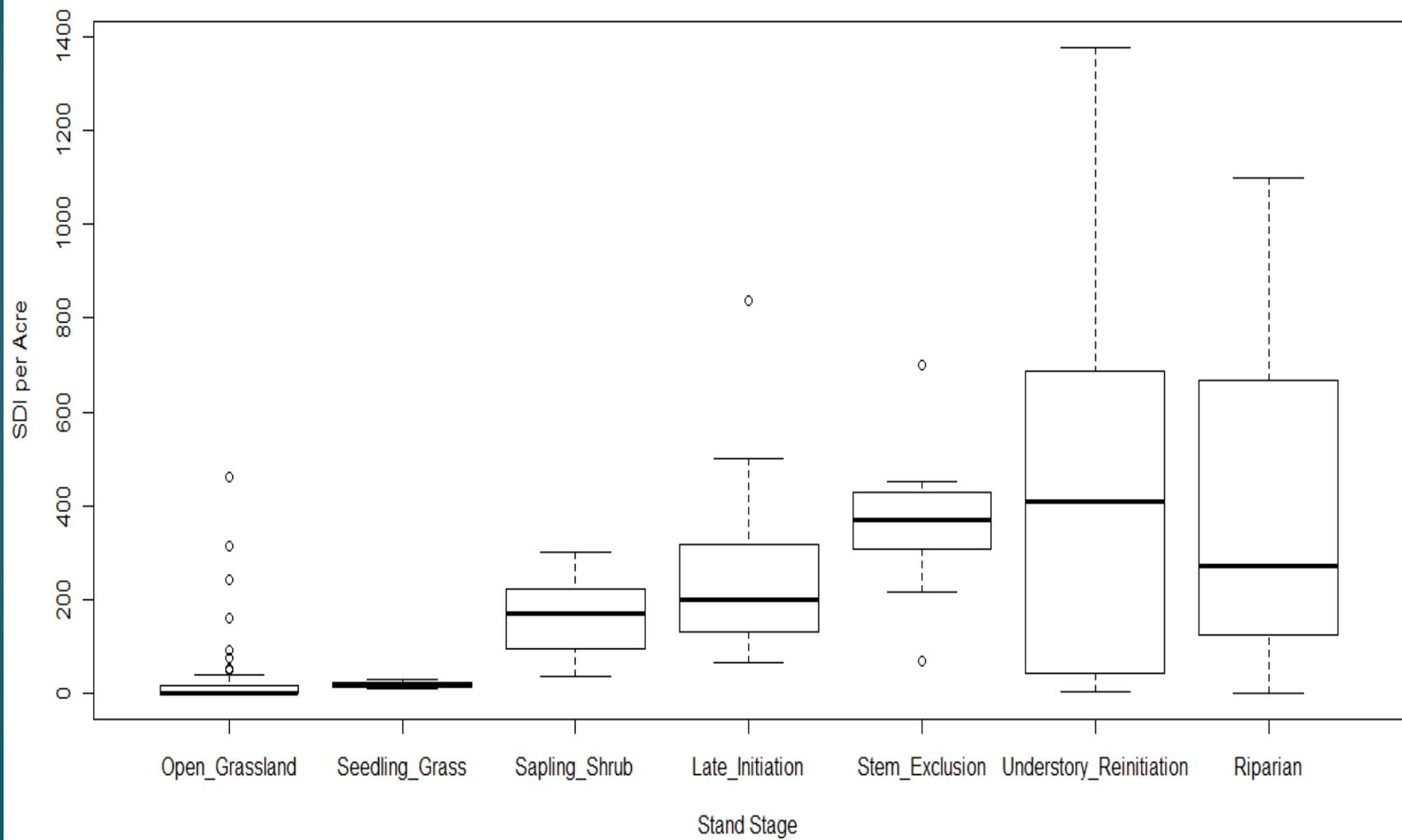


DATA ANALYSIS

- Analysis of Deviance (Type II) ANOVA generalized linear model binomial (logit)
 - P-value <.10 significance
- Plots coded as absence or presence
- Variables that were factors, such stand stage and *Ilex* growth type were made ordered factors
 - Stand summary variables calculated to a per acre
 - Basal Area per acre, Relative Density, Stand Density Index (SDI), TPA, and Volume,

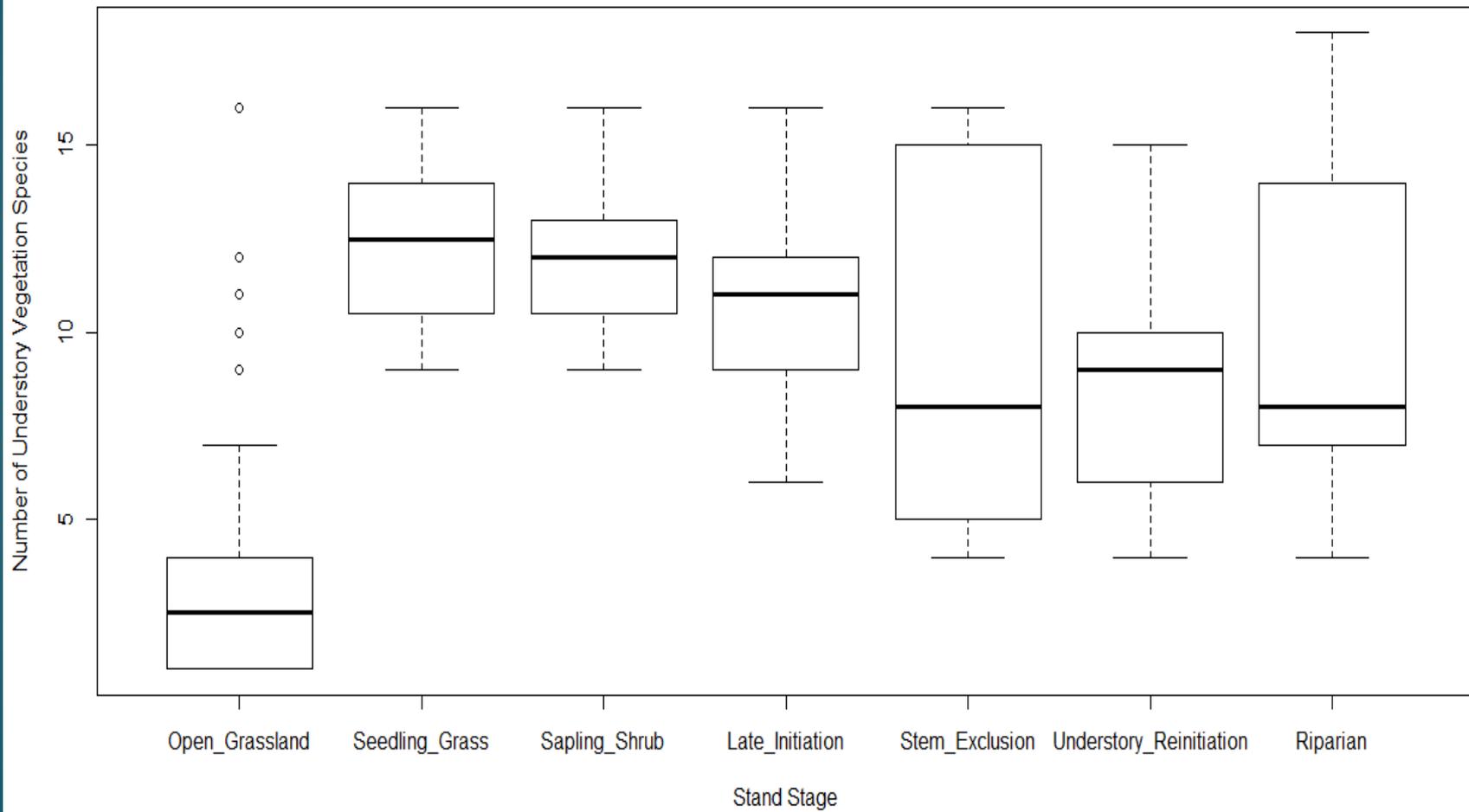
SINGLE-FACTOR MODEL – STAND DENSITY AND STAND STAGE VARIABLES

- Stand Stage - < 0.0005549
 - also resulted in lowest residual deviance of these variables
- Relative Density - < 0.003086
- Trees per Acre - < 0.0003927
- Volume – < 0.0002038
- Basal Area – $< 4.676e-05$
- Stand Density Index - $< 2.536e-05$



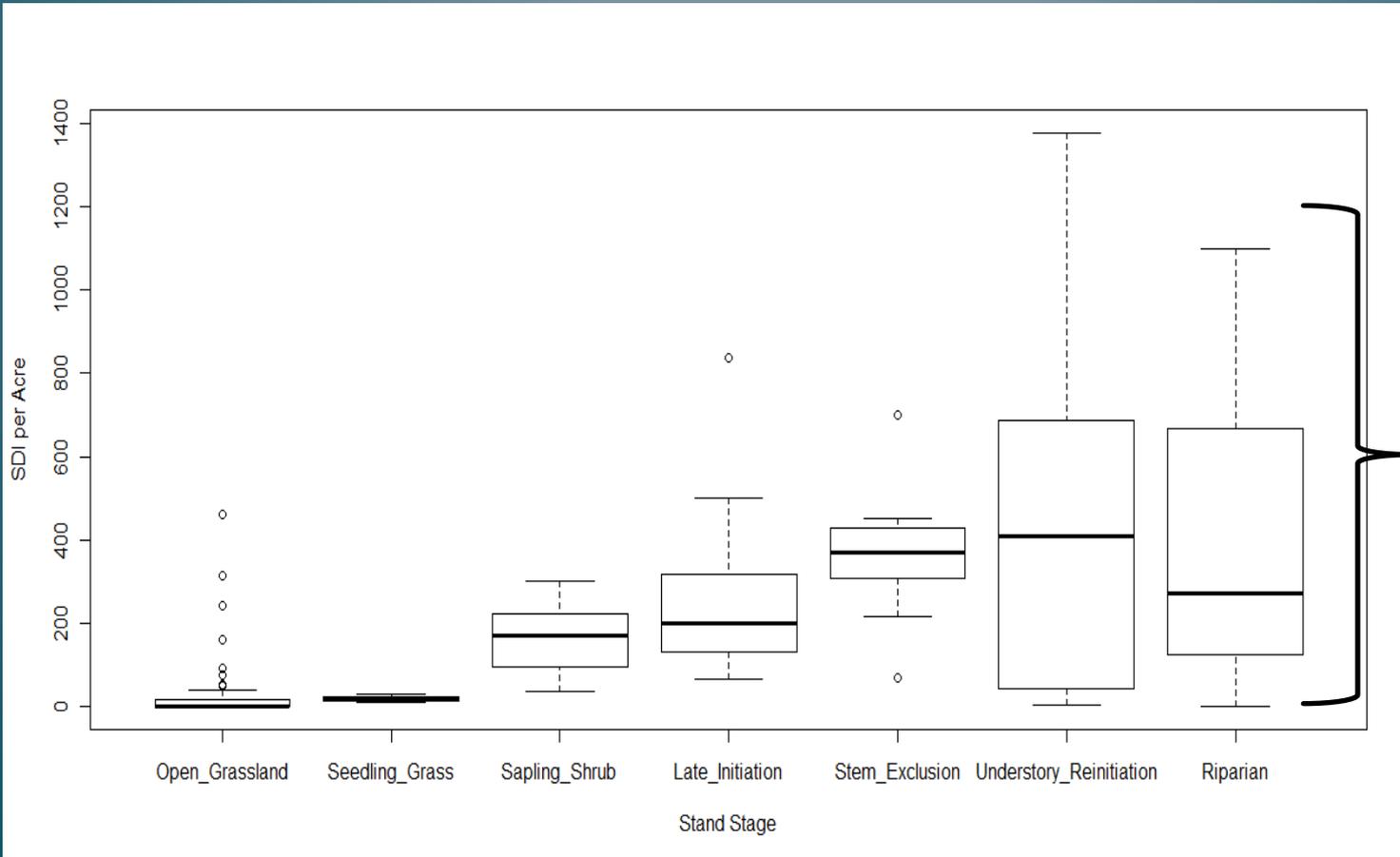
SINGLE-FACTOR MODEL – UNDERSTORY AND OVERSTORY SPECIES

- Number of understory vegetation species $p < 1.169e-08$
 - Lowest residual deviance
 - reed canary grass, browsed grass, and native grass found to be significant but are disassociated with *Ilex*
 - evergreen blackberry $p > 0.6135$
- Species that could serve as habitat indicators
 - Sword fern $p < 4.581e-05$
 - Cascara $p < 5.187e-05$
 - hazelnut $p < 0.004091$
 - Douglas-fir $p < 0.001816$
 - Western red cedar $p < 0.001968$



DISCUSSION

- While *Ilex* is commonly associated with stands of increasing density, the plant can adapt to a variety of stand conditions.



- Any forest management activities – thinning or leaving alone – will create conditions for *Ilex* to germinate.
- An increase in the amount of understory vegetation species indicates wildlife habitat but also a habitat suitable for *Ilex*.
- Since it takes three years for *Ilex* to germinate, areas have to be swept repeatedly to ensure an *Ilex* does not become established.

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PORT BLAKELY
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