



ACCELERATING FOREST DIVERSITY IN SEATTLE'S FORESTED PARKLANDS

GREEN SEATTLE
PARTNERSHIP



Summary

Creating canopy gaps in some hardwood-dominated forests, in combination with other GSP restoration practices, can promote

site conditions conducive to successful conifer establishment and increased native forest diversity.

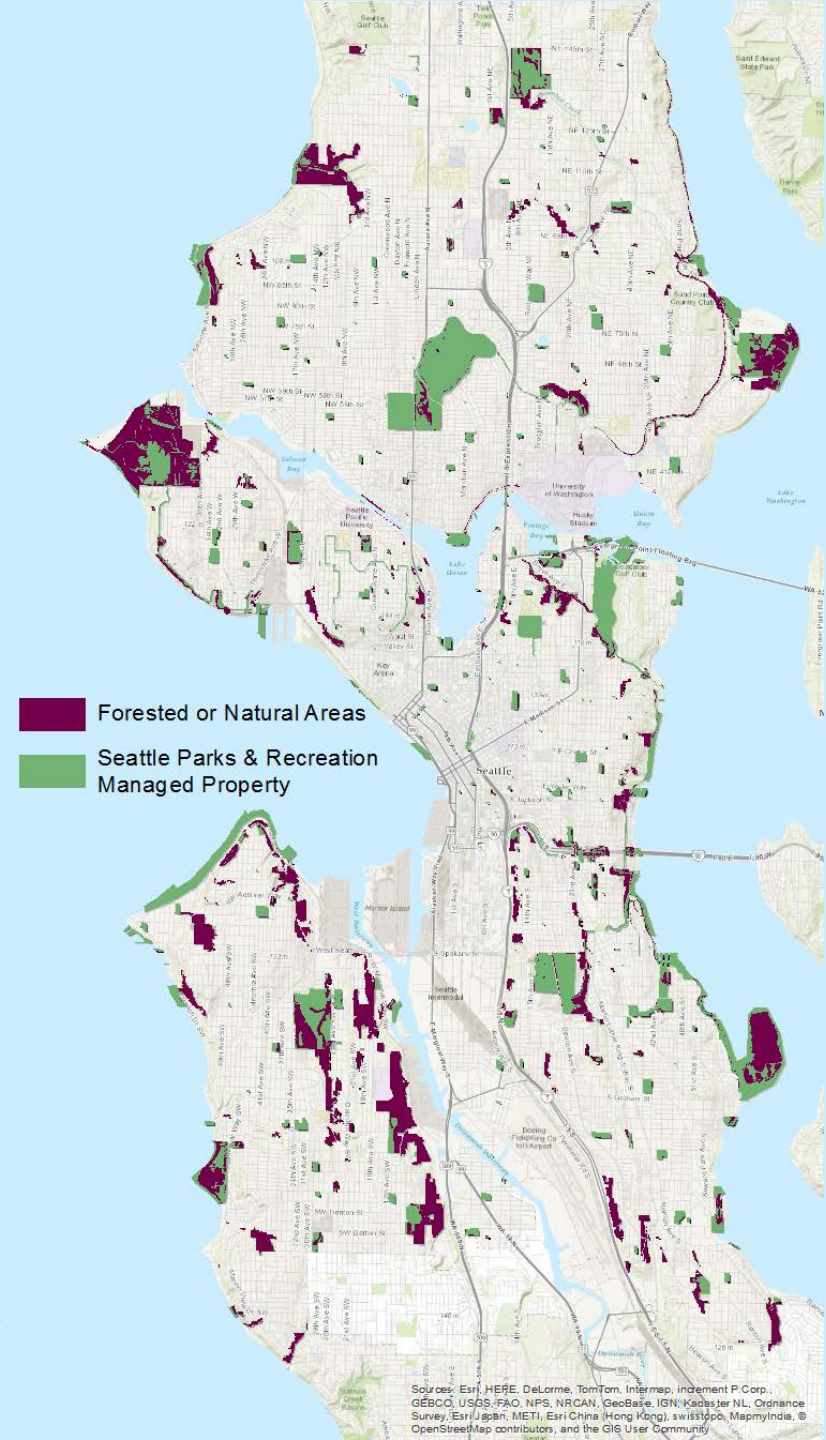
These conditions will help

slope stability, increase wildlife habitat, reduce the effects of stormwater runoff, and promote stewardship practices common on forestlands managed both for timber production and species diversity.



Where are the forested parks?

GSP is active in 80+ parks



Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

If urban forests are Not Restored



PRESENT

Seattle's forested parklands are dominated by deciduous big-leaf maples and alders nearing the end of their life span. After decades of neglect, non-native invasive plants such as English ivy and Clematis cover the ground and grow up into the tree canopy.

IN 20 YEARS

Invasive plants out-compete and cover existing native vegetation, leaving little light for young plants to establish. English ivy thrives in the tree canopy, making trees top heavy and susceptible to wind. Eventually trees die or fall over.

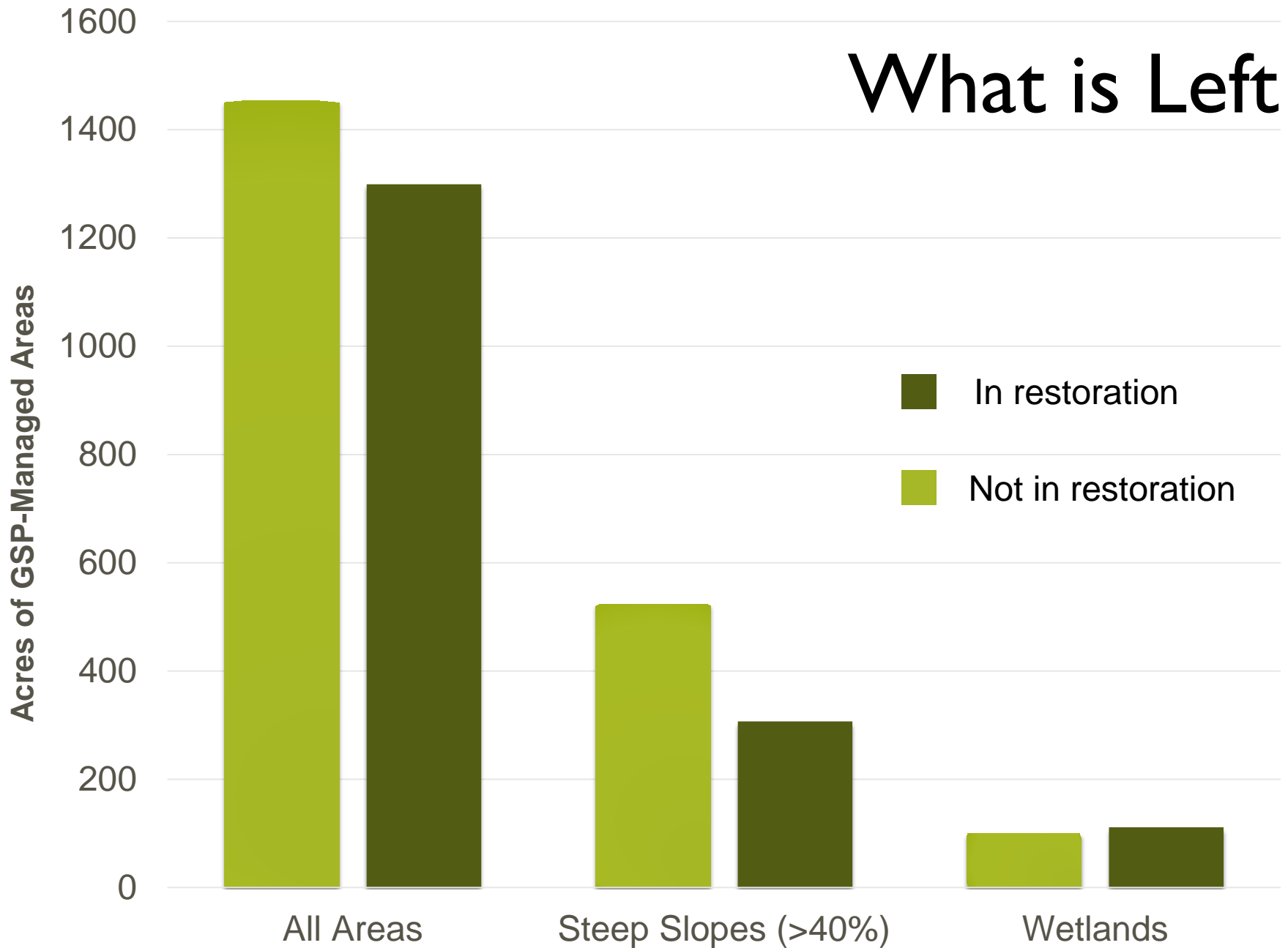
IN 50 YEARS

The trees are gone. Only a few native shrubs struggle to survive the stress of competing invasive plants.

IN 100 YEARS

The forest is destroyed. Natural native forest regeneration is lost. The landscape is a dense "ivy desert." Few plant species can live. All forest biodiversity is gone. Conditions provide homes for rats and little habitat for more desirable urban wildlife.

What is Left



Target Ecosystem Thresholds

Target System ID #	Target System Name	NatureServe ID #	Regeneration Threshold (TPA)	Regeneration Diversity Threshold (# Species)	Understory Cover Threshold	Understory Diversity Threshold (#Species)	Invasive Regeneration Maximum (%)
1	Conifer Broadleaf Evergreen Mixed Forest	CES204.845	125	3	110%	10	10
2	Dry-Mesic Conifer and Conifer Deciduous Forest	CES204.001	125	3	70%	10	10
3	Mesic-Moist Conifer and Conifer Deciduous Mixed Forest	CES204.001	200	4	50%	14	10
4	Oak Woodland	CES204.852	50	3	60%	12	10
5	Riparian Forest and Shrubland	CES204.869	125	2	150%	14	10
6	Scrub Shrub Wetland	CES204.865	25	2	120%	11	10
7	Bog & Fen	CES204.063	50	2	125%	13	10



Timeline

2008, “Maduzia Gap” (understory treatment only)

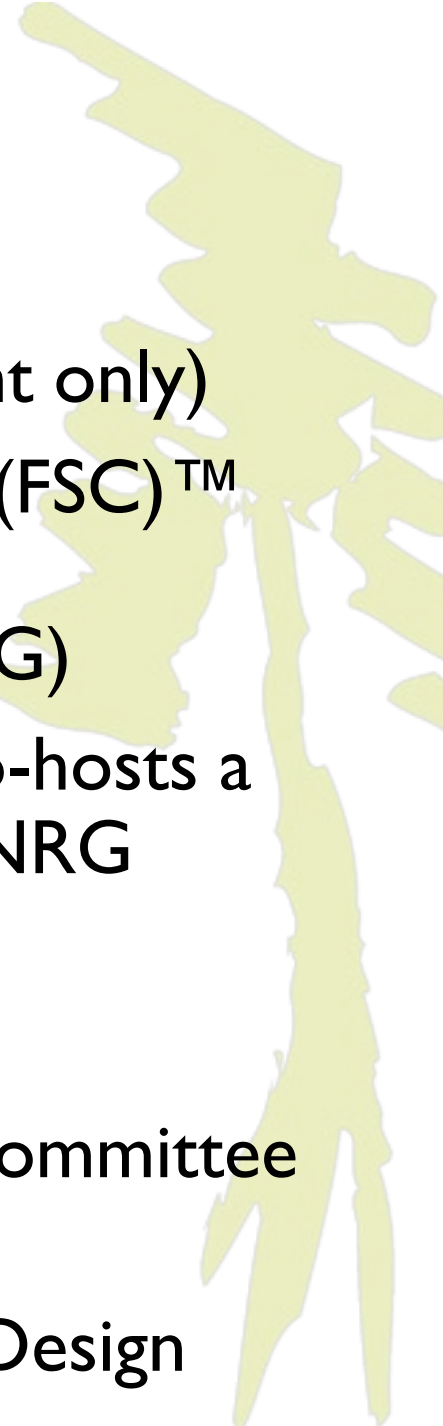
August 2012, Forest Stewardship Council (FSC)TM certifies Seattle’s forested parkland via with Northwest Natural Resource Group (NNRG)

November 2012, Parks Urban Forestry co-hosts a Forest Ecosystem Services Seminar with NNRG

June 2014, Parks Urban Forestry received recommendations from NNRG

August 2014, Initial review by GSP Field Committee and some Park’s staff

March 2015, Proview Feedback on Draft Design



NNRG's Objective

Provide a series of prescriptions for successfully establishing a conifer cohort beneath hardwood canopies at Carkeek Park and the West Duwamish Greenbelt



Red alder dynamics

Shade intolerant, **early successional** species

Colonizes sites at high initial densities, **few conifers**

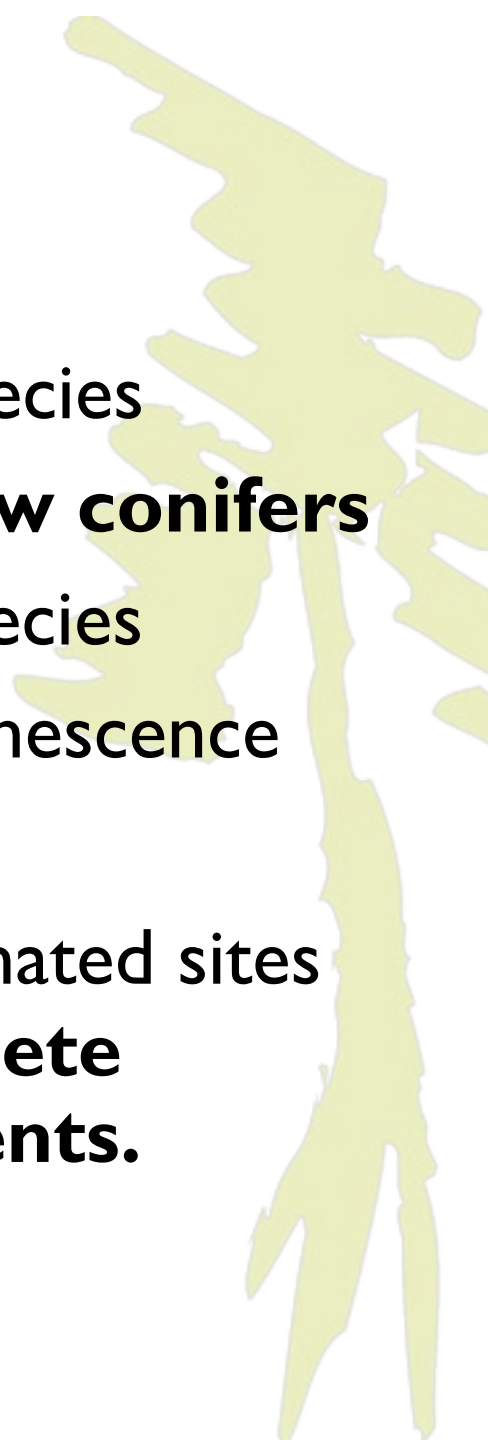
Early growth outcompetes all other species

Maximum height in **~40 years**, begins senescence

High degree of “**plasticity**”

Alder stands often turn into brush-dominated sites

- Alder and salmonberry can **out-compete conifers for light, water and nutrients.**



Conifer regeneration

Presence & abundance is based on light availability

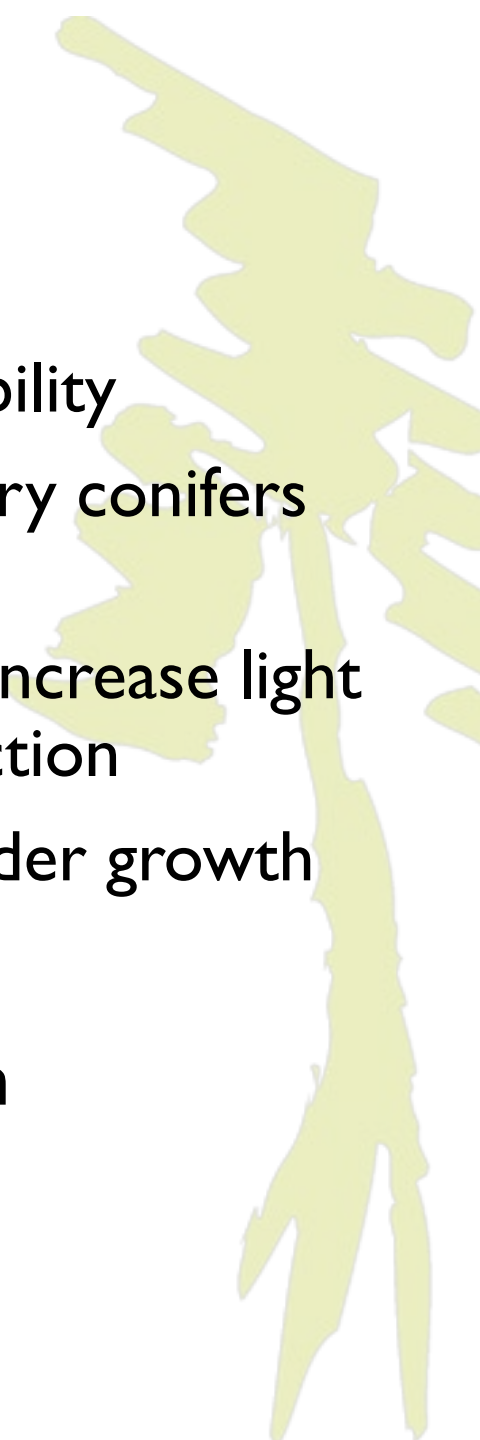
Variable canopy density can support understory conifers thru canopy succession

Gaps of $\frac{1}{4}$ acre and at least 20 feet wide can increase light availability by 30% and support conifer production

At age 25-40, conifer growth intersects red alder growth

Take-aways:

- Canopy transparency
- Control competing vegetation
- Conifer stocking
- Prevent animal damage









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Google earth



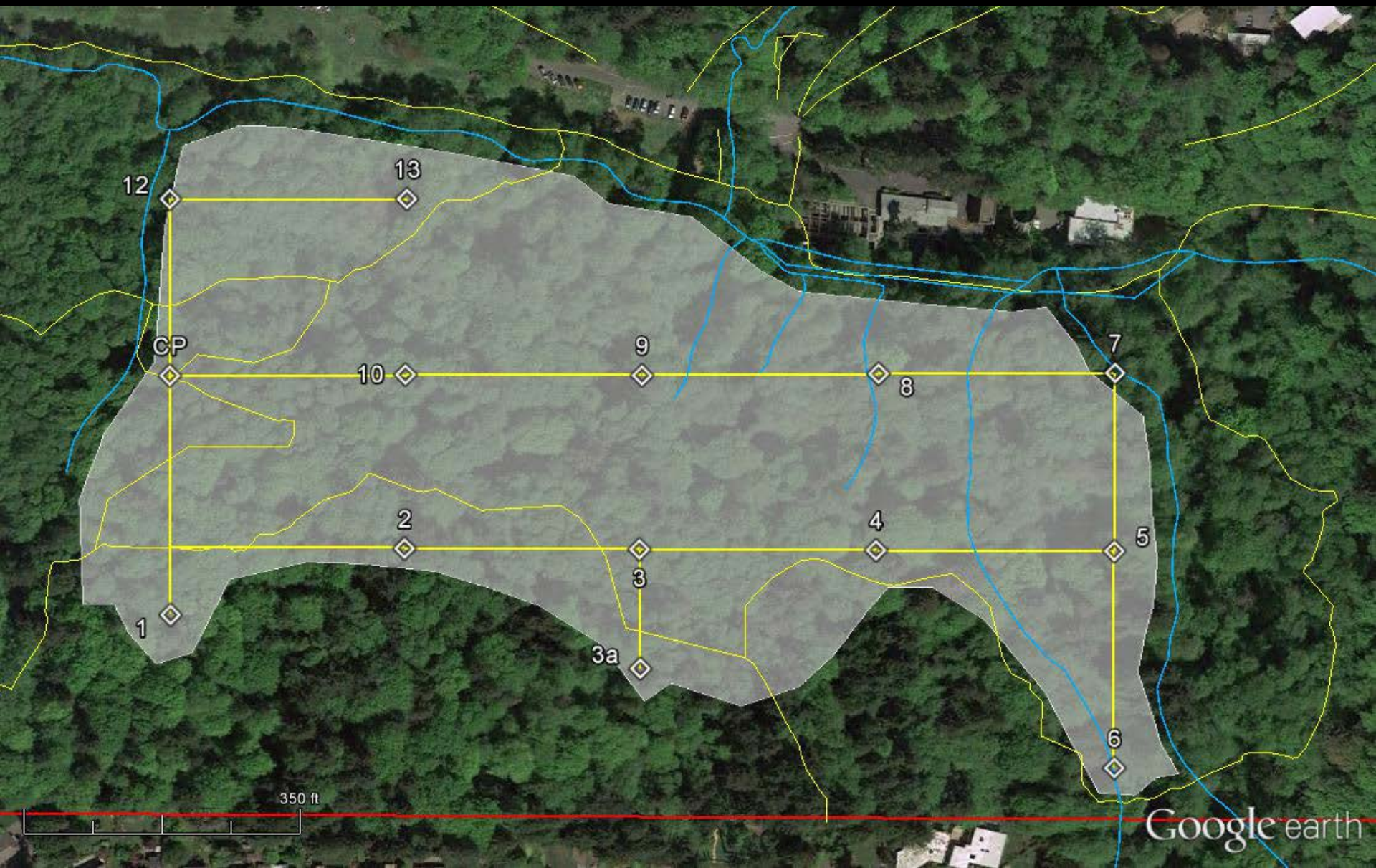




237 ft



Go



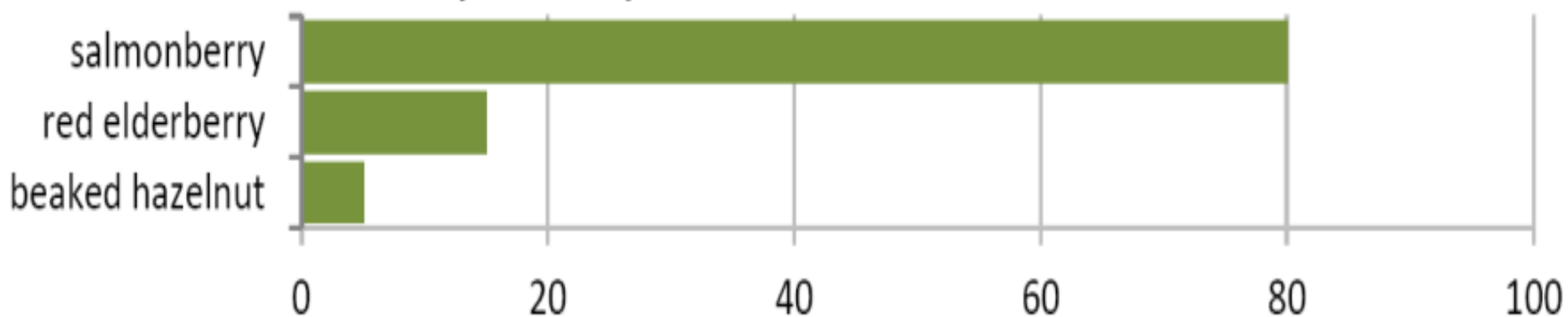
Dominant Species	TPA	Average DBH	Average Height	Average LCR	Average Volume Per Acre	Average BA	Average HDR
Red alder Big leaf maple	60	20"	120'	30%	33 MBF	142 sq. ft.	78

Carkeek

Dominant Species	TPA	Average DBH	Average Height	Average LCR	Average Volume Per Acre	Average BA	Average HDR
Red alder Big leaf maple	76	20"	82'	35%	25 MBF	188 sq. ft.	51

Maduzia Gap

Shrubs (Cover %)



Carkeek Park



Method Alternatives

(A) Understory treatment (UT) only

Remove or treat weeds, plant natives, erosion control

(B) 30% Thin & Understory Treatment

UT + girdle, inject or cut native trees

(C) 30% Thin Gap Creation/Enhancement Understory Treatment

UT + girdle, inject or cut native trees

(D) Commercially thin alder & maple, gap creation/enhancement, understory treatment

UT + girdle, inject or cut native trees +
road building and hauling logs off the site





Understory treatment only

Method Alternatives

(A) 30% Thin & Understory Treatment:

UT + girdle, inject or cut native trees

(B) 30% Thin Gap Creation/Enhancement: Understory Treatment

UT + girdle, inject or cut native trees

GSP will not be pursuing the following alternatives at this time:

(C) **Commercially thin alder & maple, gap creation/enhancement, understory treatment:** UT + girdle, inject or cut native trees + road building and hauling logs off the site

(D) **Understory treatment (UT) only:** Remove or treat weeds, plant natives, erosion control





West Duwamish Greenbelt pre- and post-treatment. Green = existing gaps, yellow = lighter stocked areas, orange = new gaps.

**30% Thin Gap Creation/Enhancement
Understory Treatment**



**Carkeek Park pre- and post-treatment. Green = existing gaps,
yellow = lighter stocked areas, orange = new gaps.**

**30% Thin Gap Creation/Enhancement
Understory Treatment**