Targeting Grazing of English ivy (*Hedera spp.*)

H. helix or H. hibernica

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Outline:

1) Targeted Grazing defined

2) Targeted Grazing with goats as a tool for noxious plant control

3) Why English ivy?

4) English ivy research results

Targeted Grazing is

Application of a specific kind of livestock at a

▶ determined season

▶ determined duration

▶ intensity (animals/area)
 ...to achieve defined vegetation or landscape goals

Targeted Grazing is not a Grazing System but is a *management tool*

Different from livestock production

- Focus is on vegetation & landscape enhancement rather than production goals

- Manager must have clear vision of desired plant community (objectives for the site)

Requires knowledge of:

1) Vegetation
2) Landscape dynamics
3) Livestock husbandry & behavior

Successful prescription should:

1) cause significant change to target plant,

      eradication is a term we seldom use

2) limit damage to other vegetation

3) be integrated with other control methods (chemical or biological)

      IPM = Integrated Pest Management

Components:

- time target plant is susceptible to damage and

- when plant is most palatable to animals toxicities (secondary plant compounds) must be considered

Selecting Species

▶ *Grazers*, cattle and horses, primarily consume grasses

▶ Cattle have large mouths and sweep vegetation with tongue before biting

▶ Horses have upper & lower incisors and nip plants

▶ used to control Johnsongrass in AZ

Johnsongrass,
Patagonia-Sonoita Creek Preserve
Southeastern, AZ

Sheep are intermediate feeders

- Narrow muzzle

- Graze close to the ground

- Also select leaves & buds

- Eat lots of forbs, when available

- Large rumen relative to body mass

- to control leafy spurge, spotted knapweed, yellow starthistle, other thistles, tansy ragwort

Yellow starthistle

Tansy ragwort

Goats are browsers

▶ Narrow strong tongue

▶ Rough texture inside mouth

▶ Large liver (relative to body mass) allows for detoxification of secondary plant compounds (chemical avoidance mechanisms)

Goats browse English ivy
Memorial Park,
Wilsonville, Or Aug. 2006

Invasive Plant Control with Targeted Grazing

Site assessment:
1) Species present:
   density or % cover
2) Soil characteristics
3) Topography

Biology & ecology of target:
1) Species phenology & demography
2) Where is meristematic tissue?
… Choose *season* of vulnerability
3) Secondary plant compounds?

Match herbivore to target plant:
1) Species & palatability
2) Intensity: animals/area
3) Frequency

Post-treatment assessment:
1) Trend in cover, density
2) Other methods? think IPM
3) Cost: benefit analysis
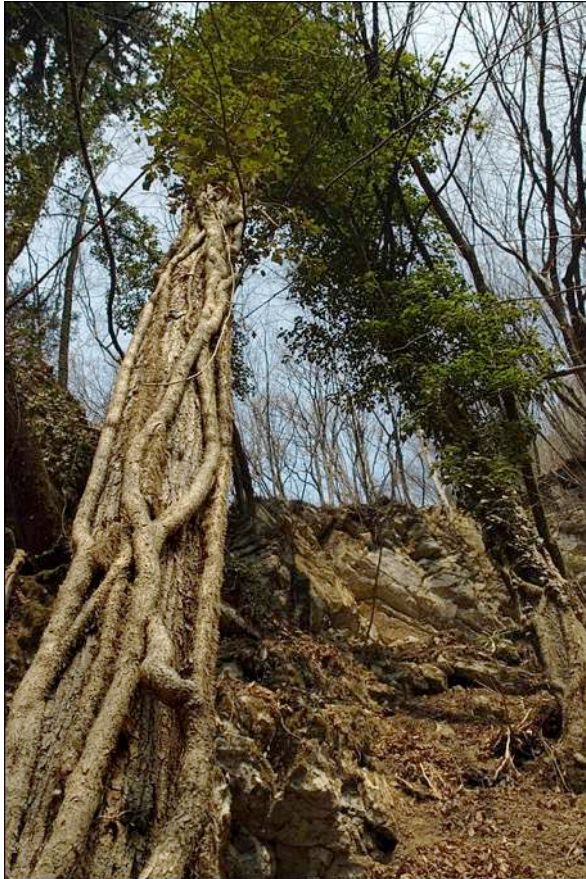
What is your view of English ivy?

Why English ivy (*Hedera helix*) ?

- ▶ Introduced to North America as ground cover

- ▶ Invasive in Mid-Atlantic States & Northwest

- ▶ Dominates forests by displacing native vegetation & becoming intertwined with shrubs

- ▶ Illegal to sell in Oregon, Noxious B list species

English ivy

in Slovenia

98% of emergent seedlings survive to 6 months, 96% of those survive to 1 year

Stoloniferous growth

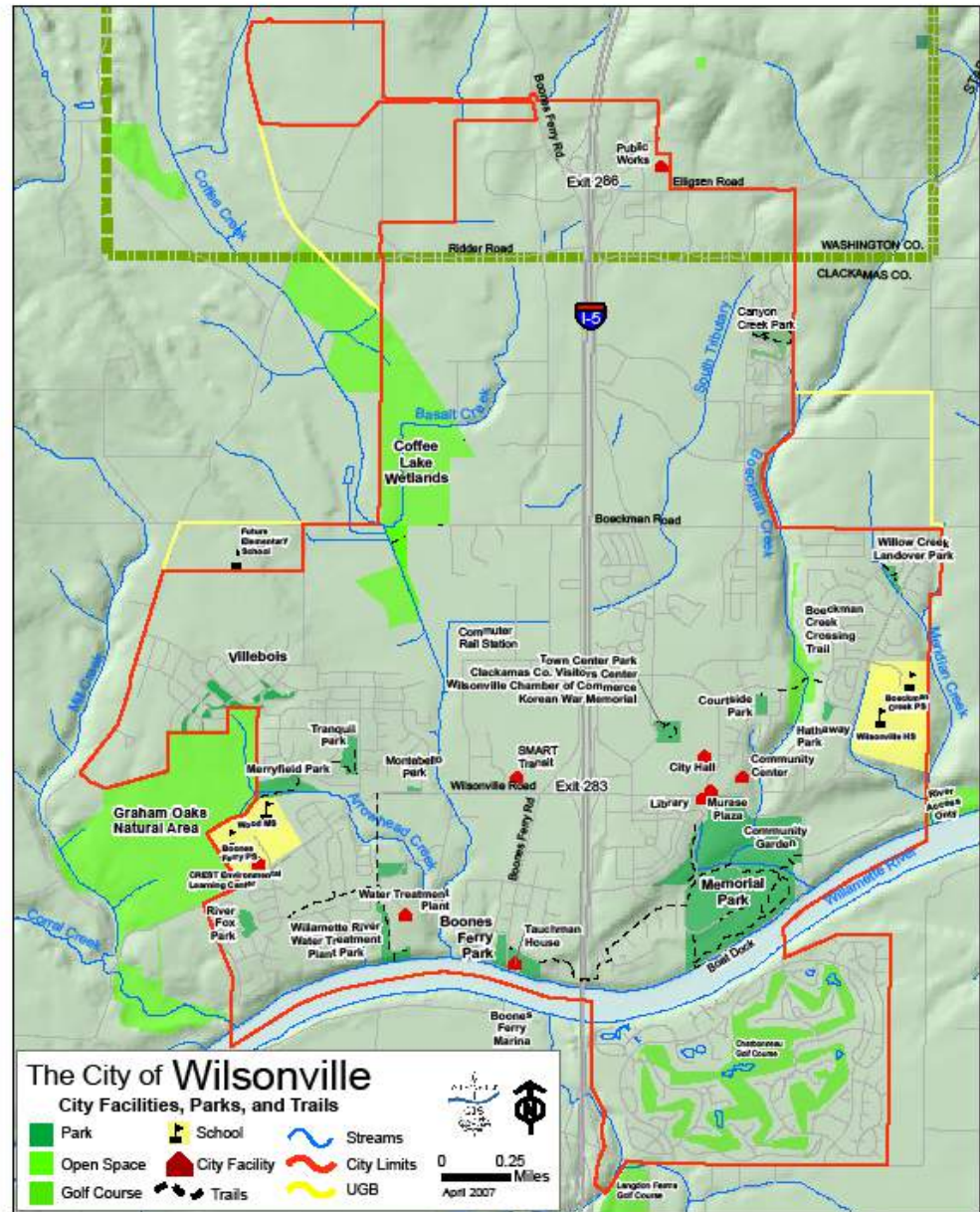Internodes: 12.5 cm/wk - 13.5 cm/wk

Leaves: 1-2/wk

Dominant eigenvalue, finite rate of increase, 1.28
 (calculated from Laskurain et. al., 2004)

Drought and shade tolerant

English Ivy (*Hedera* spp., Araliaceae) Response to Goat Browsing

- Site within 47 forested acres of 126 acre Memorial Park

- Willamette River forms southern boundary

- Chehalis silt loam soil

- Old field site (Egler, 1954) vegetation logged & cleared for agricultural uses

The City of Wilsonville
City Facilities, Parks, and Trails

- Park
- Open Space
- Golf Course
- School
- City Facility
- Trails
- Streams
- City Limits
- UGB

0   0.25
Miles

April 2007

English ivy *(Hedera helix*)

Herbaceous:
waterleaf (*Hydrophyllum tenuipes)*
western trillium *(Trillium ovatum*)
stinging nettle *(Urtica dioica)*

Shrubs are all Family Rosaceae:
Himalayan blackberry (*R. armeniacus*)
thimbleberry (*Rubus parviflorus)*
trailing blackberry *(Rubus ursinus*)

Treatment Description

▶ August 2006 & 2007

▶ Browsing by experienced doe-kid pairs for one day

▶ Stocking rate: 100 goats/1,000 m2 (400 goats/ac)

▶ Goats herded into research area in the morning & removed when most of the English ivy defoliated & the goats satiated

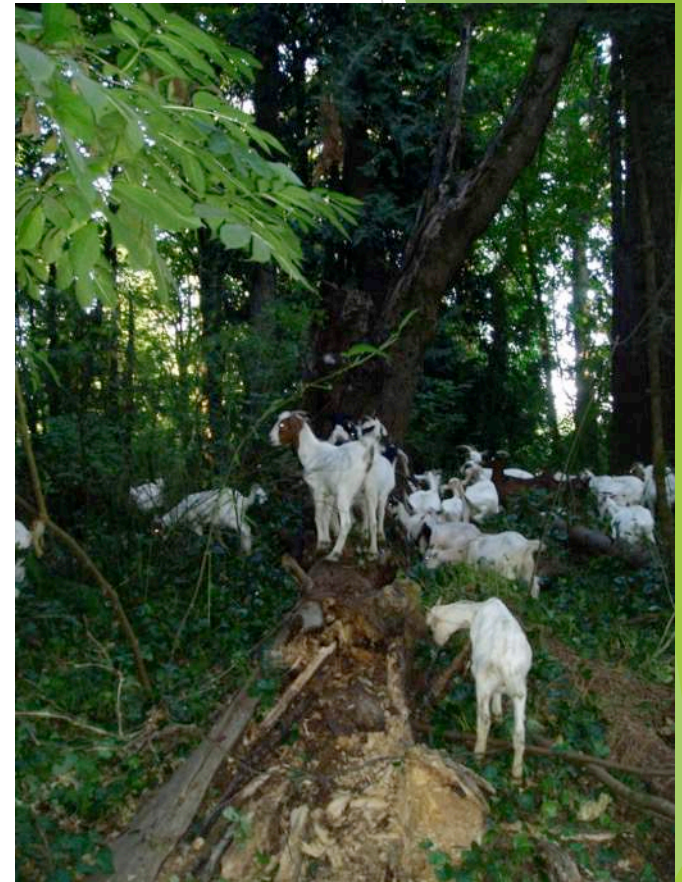▶ Behavioral indicators of satiety; animals laying down to ruminate, walking within the enclosure without browsing

exclosures & plots

Goats on the plots

Herd with guard dog
Research plots with exclosures in background

Kids browsing

Not Browsed, Browsed x 1 & Browsed x 2

Treatment Levels

Level	Procedure
0	Not browsed
1	Browsed in 2007
2	Browsed in two years, 2006 & 2007

$Y_{ij} = ц + α_i + βx_{ij} + ε_{ij}$

- Y_{ij} = % change in English ivy cover from 2006 to 2008 for *ith* treatment, *jth* plot
- $ц$ = grand mean of % change in English ivy from 2006 to 2008
- $α_i$ = effect of treatment group i
- $β$ = relationship between baseline % cover of English ivy and treatment
- x_{ij} = over-all mean of *H. helix* cover in 2006 prior to start of study
- $ε_{ij}$ = error term ~ normal $(0, σ^2)$

Results

Mean English Ivy % Cover Before and After Browsing Treatments
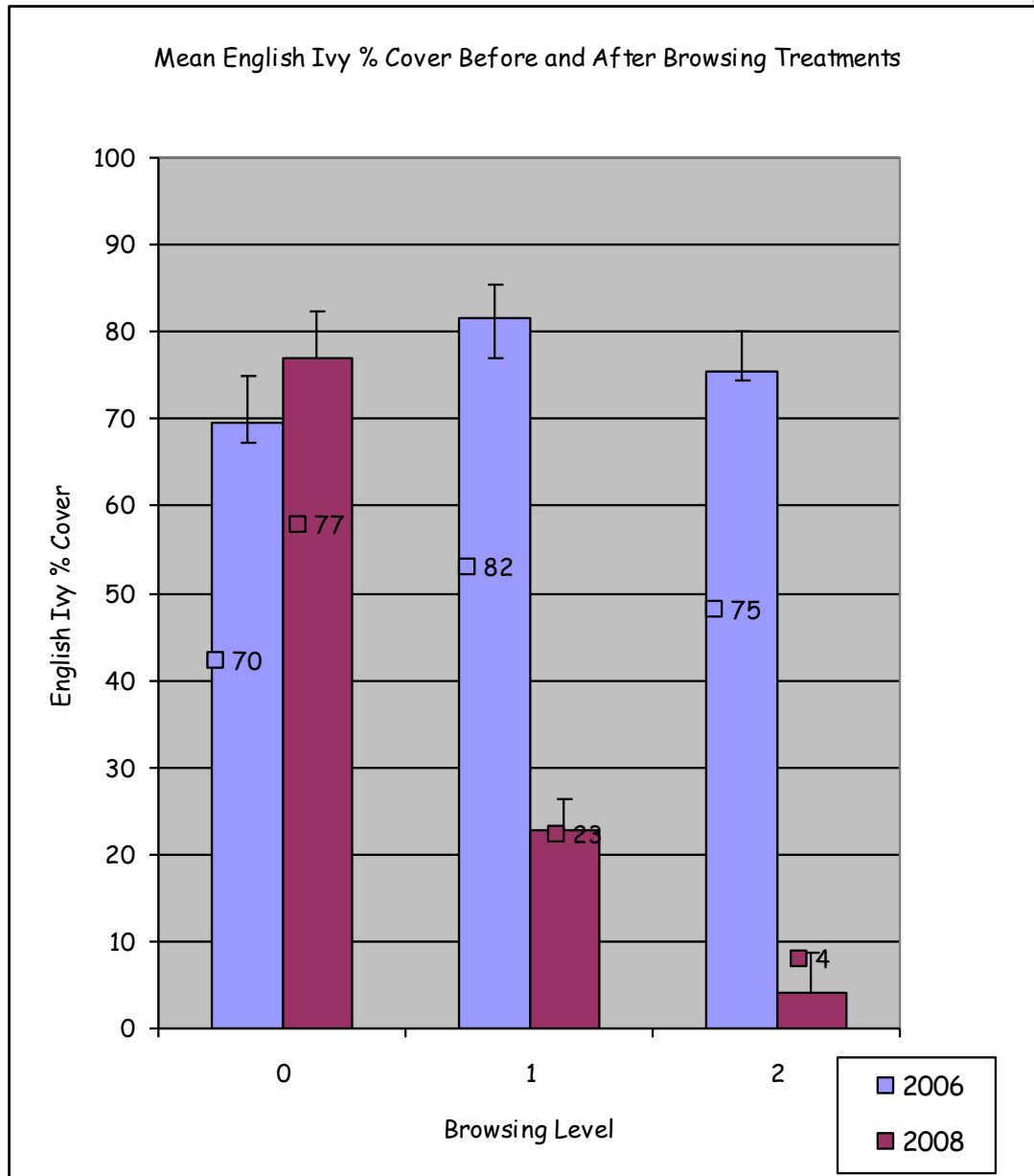
Browsing Level Comparisons and Associated Confidence Levels

Levels Compared	Difference between Means	Upper limit	Lower limit	Confidence Level
1 & 0	-0.89	-1.16	-0.63	0.01
1 & 2	0.22	0.02	0.42	0.05
2 & 0	-1.12	-1.38	-0.85	0.01

Summary

- Goat browsing applied @ correct intensity & duration is effective for English ivy   control

- Regeneration from seed bank of desirable species not likely due to shade, active restoration needed

- Continued monitoring and IPM action needed to continue to suppress ivy

Can we predict vegetation response to targeted grazing?

- ▶ Yes, if we apply the control method @ time when plant is vulnerable & @ intensity that matches the plant's ability to regenerate

- ▶ Requires knowledge of target species biology and ecology

- ▶ Choice of herbivore is critical & herd experience is important for less palatable plants

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English Ivy (*Hedera* spp., Araliaceae) Response to Goat Browsing

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TARGETED GRAZING-
6 video segments on YouTube

https://www.youtube.com/playlist?list=PL2-JjtPZCj2v2A2smeP0aLzgJhk9sPec0

Got Himalaya blackberry?   A different story for control

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Targeted Grazing video segments:

https://www.youtube.com/watch?v=4cwU1WSk2sg&list=PL2-JjtPZCj2v2A2smeP0aLzgJhk9sPec0

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