Distribution and abundance of invasive plants in Pacific Northwest forests

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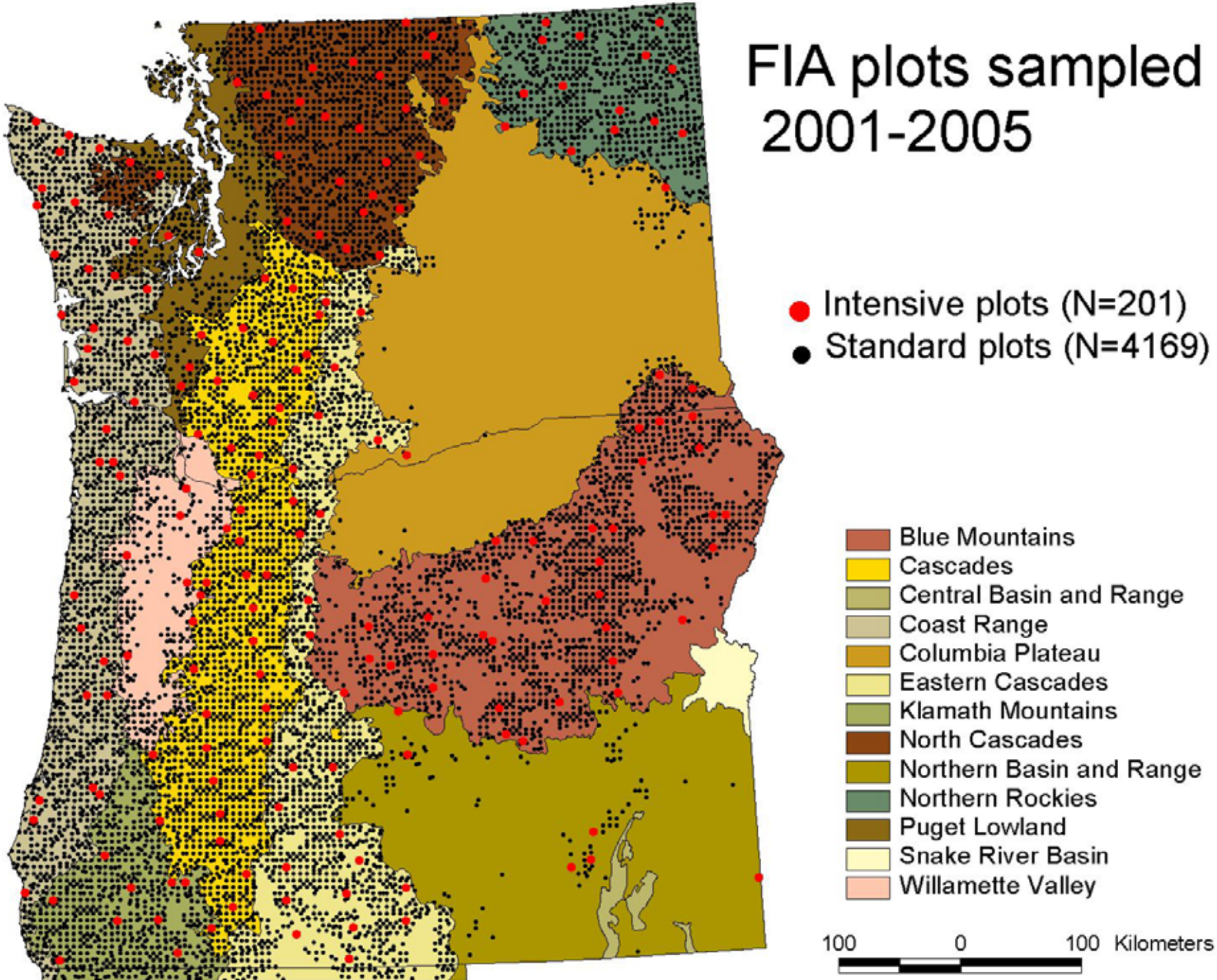
- **Problem:**
  - Nonnative invasive plants cost the U.S. at least $35 billion/yr in lost land use and weed control *
  - Comprehensive information about the abundance and impact of invasive plants is not available:
    - How much land area is affected? (C+I, Heinz Ctr)
    - Which species are most abundant?
- **Approach:**
  - Evaluate invasive plant impacts on a statistically-based sample of forest lands

* Source: Pimentel et al. 2005. *Ecological Economics* 52: 273-288
based primarily on ag and pasture land, not range, forest, wetland

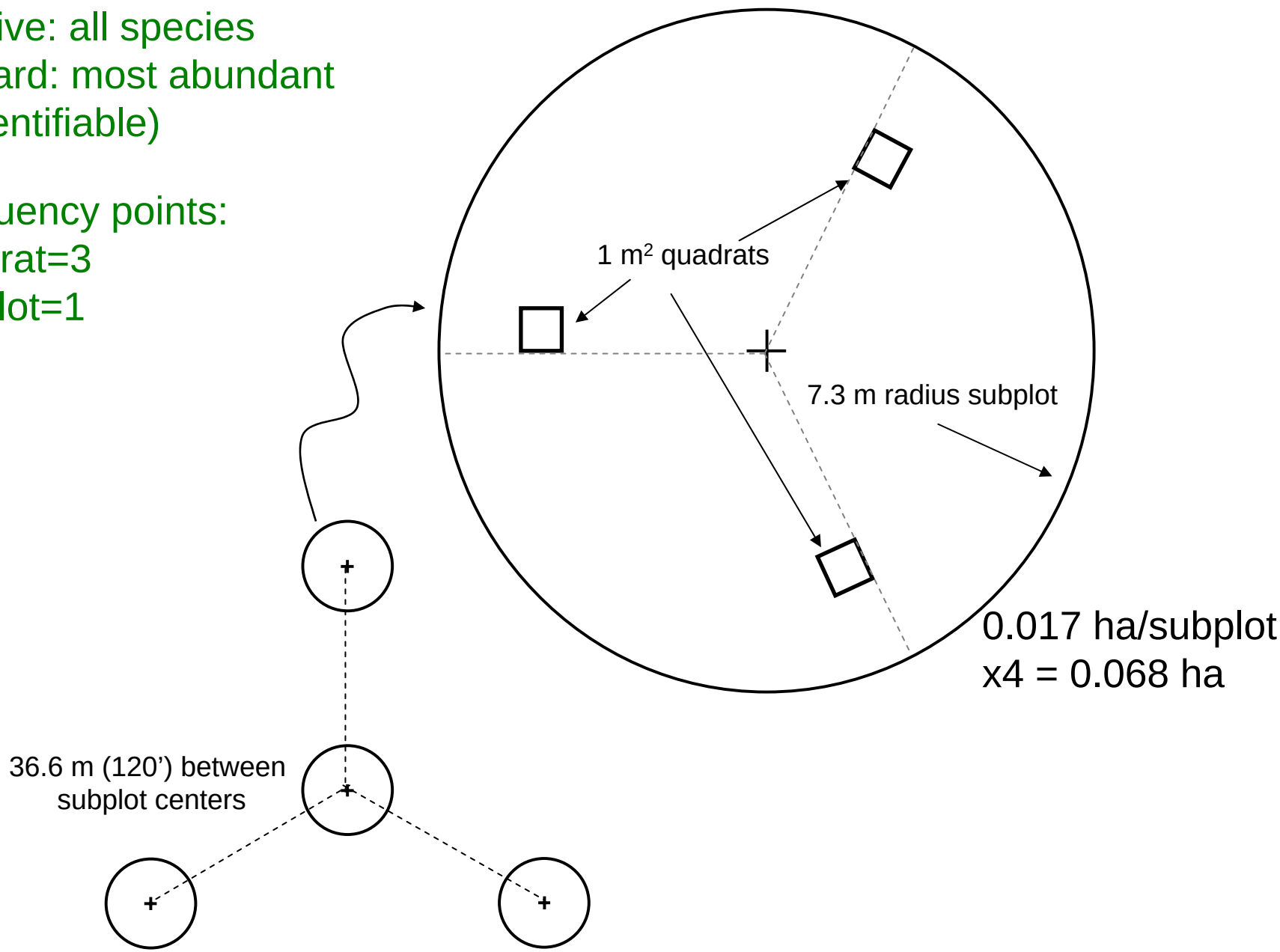

FIA plots sampled
2001-2005
Intensive plots (N=201)
Standard plots (N=4169)
Blue Mountains
Cascades
Central Basin and Range
Coast Range
Columbia Plateau
Eastern Cascades
Klamath Mountains
North Cascades
Northern Basin and Range
Northern Rockies
Puget Lowland
Snake River Basin
Willamette Valley
100 0 100 Kilometers

FIA plot (standard, with intensive plot quadrats)

Intensive: all species

Standard: most abundant
(+ identifiable)

Frequency points:
quadrat=3
subplot=1



Constraints for FIA sampling of understory plants



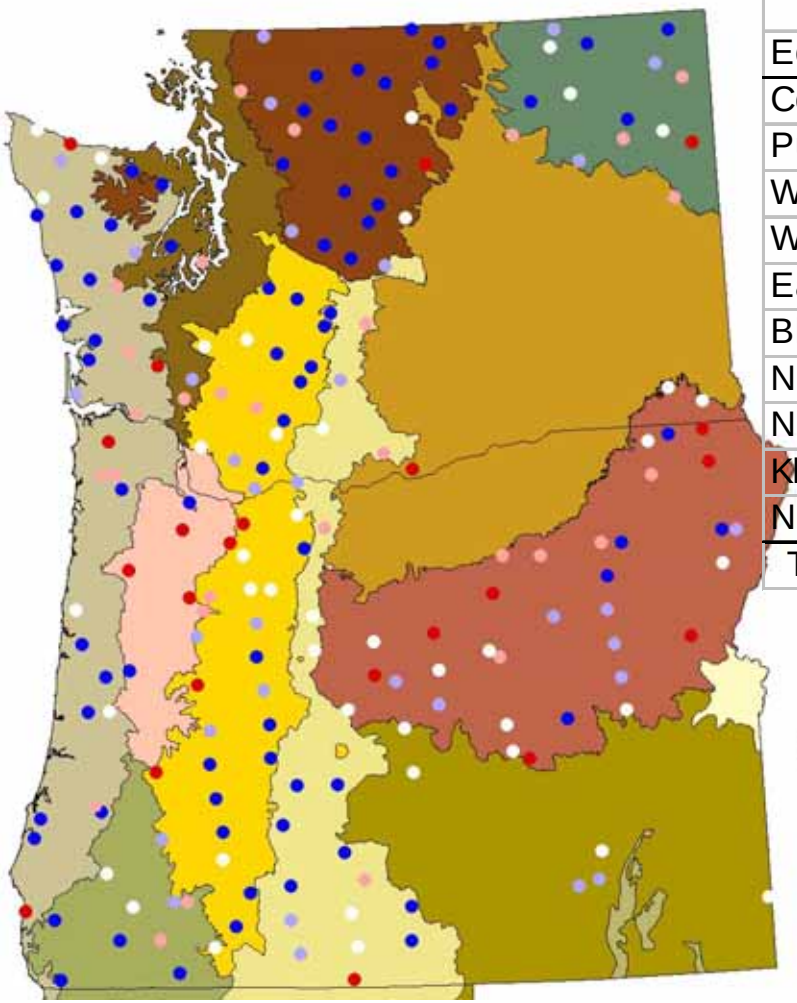



- Identifying all those plants requires expertise (3,400 vascular species in OR alone)
- You have to get there when the plants are identifiable (summer)






Nonnative importance across OR+WA

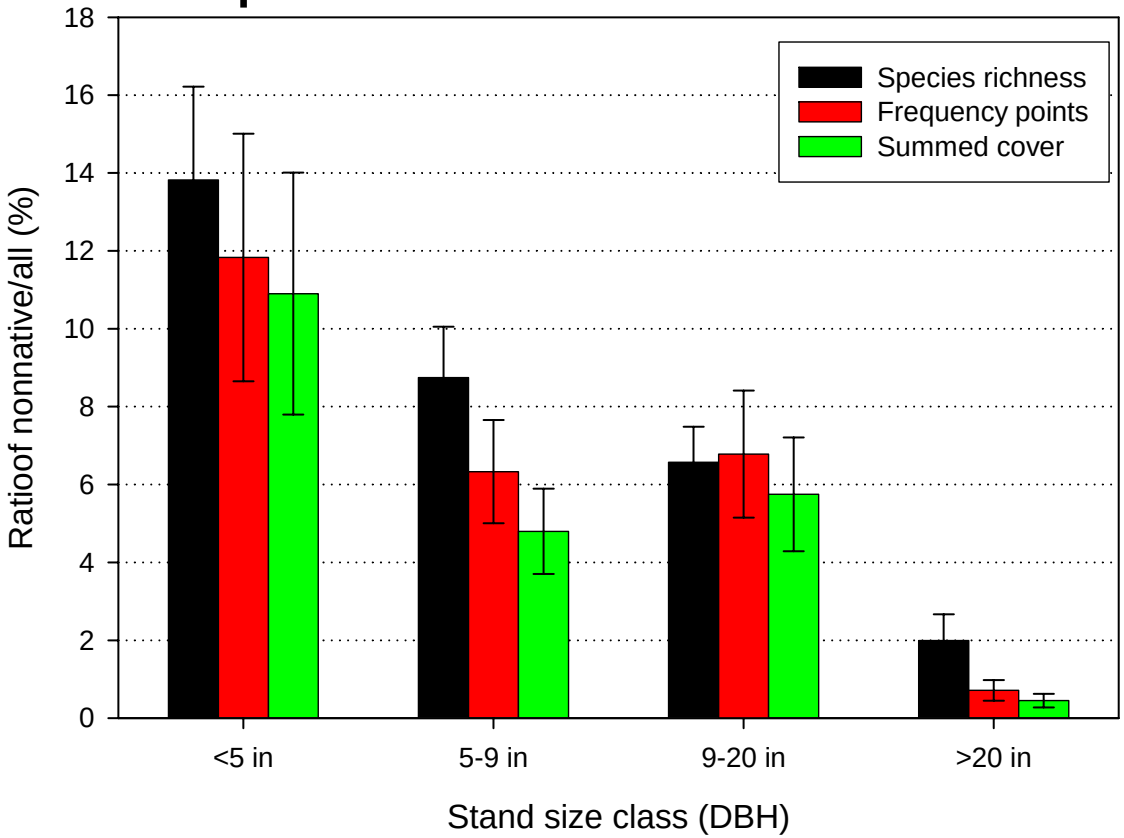


	Plots with nonnatives		Nonnative proportions	
Ecoregion	N sampled	% nonnat	% species	% cover
Coast Range	35	51.4	7.5	4.2
Puget Lowland	5	60.0	6.4	6.5
Willamette Valley	5	80.0	25.3	25.4
Western Cascades	41	61.0	6.1	3.8
Eastern Cascades	24	62.5	7.2	6.6
Blue Mountains	34	85.3	10.7	7.3
Northern Rockies	15	73.3	7.6	6.8
North Cascades	27	33.3	2.7	2.8
Klamath Mountains	9	55.6	5.2	0.7
N. Basin and Range	6	100.0	6.7	3.5
Total	201	63.2	7.4	5.4

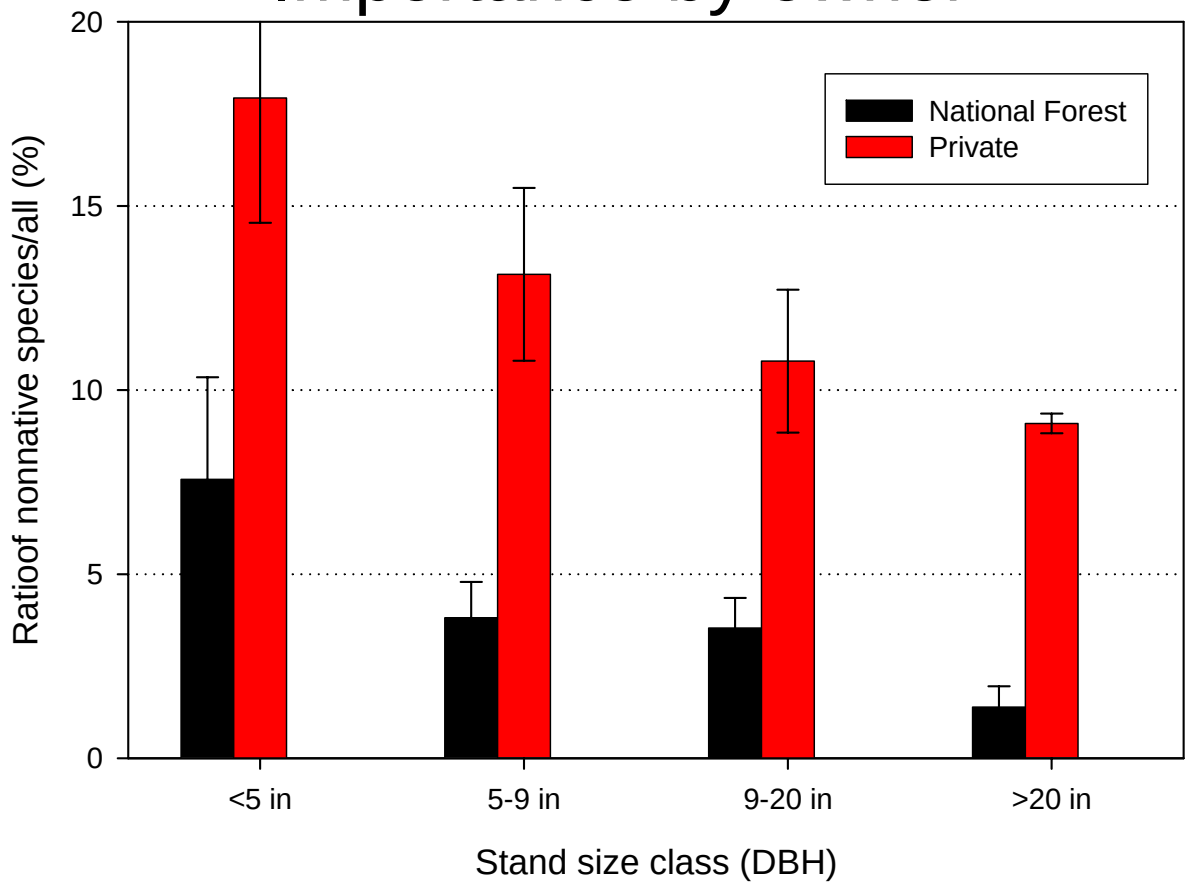
Area covered by nonnatives:

Forestland (ha):	21,284,400
Mean cover (%):	5.42
Area covered (ha):	1,153,000
	±185,552

Importance of nonnatives

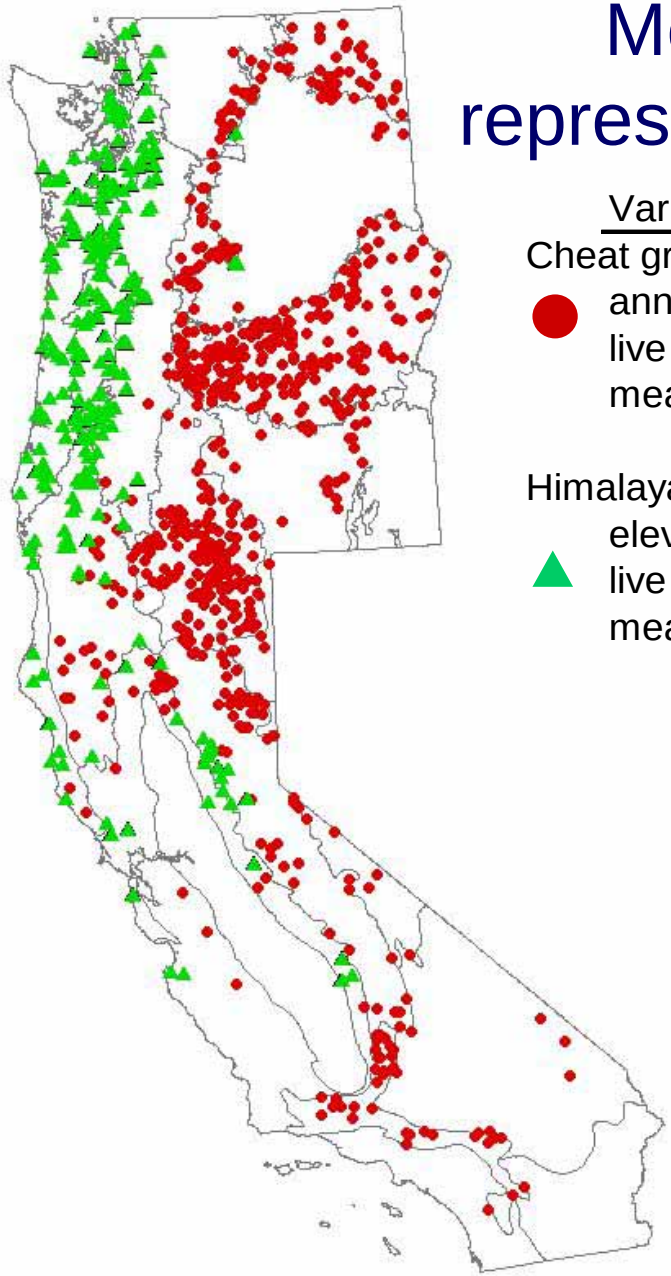


Importance by owner



Top 15 nonnatives

Scientific name	Common name	Frequency points	Frequency N plots	Mean Charac. Cover	Number of Inv. Lists (8)
Bromus tectorum	cheatgrass	688	40	7.11	4
Mycelis muralis	wall-lettuce	220	27	1.17	0
Tragopogon dubius	yellow salsify	100	24	0.43	1
Hypericum perforatum	common St. Johnswort	156	21	1.73	6
Digitalis purpurea	purple foxglove	124	20	1.89	3
Cirsium vulgare	bull thistle	120	19	2.31	6
Dactylis glomerata	orchardgrass	102	18	1.55	2
Rumex acetosella	common sheep sorrel	95	18	0.43	1
Hypochaeris radicata	hairy catsear	139	17	3.18	3
Rubus laciniatus	cutleaf blackberry	135	17	2.90	0
Senecio jacobaea	stinking willie	86	16	1.09	7
Holcus lanatus	common velvetgrass	199	15	17.02	2
Rubus discolor	Himalayan blackberry	165	15	7.21	6
Leucanthemum vulgare	oxeye daisy	96	14	0.88	4
Lactuca serriola	prickly lettuce	88	14	0.25	2

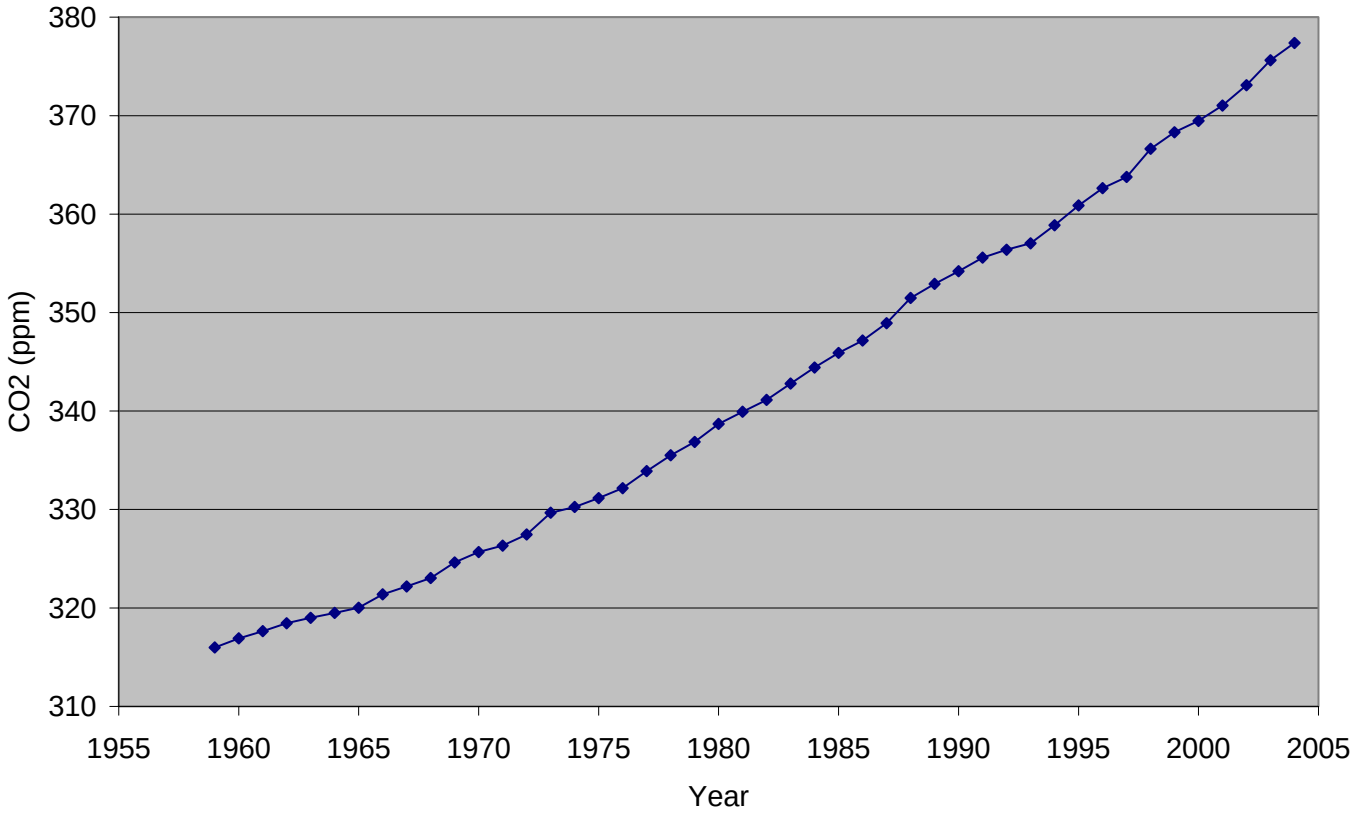


Modeling distribution of well-represented species on standard grid

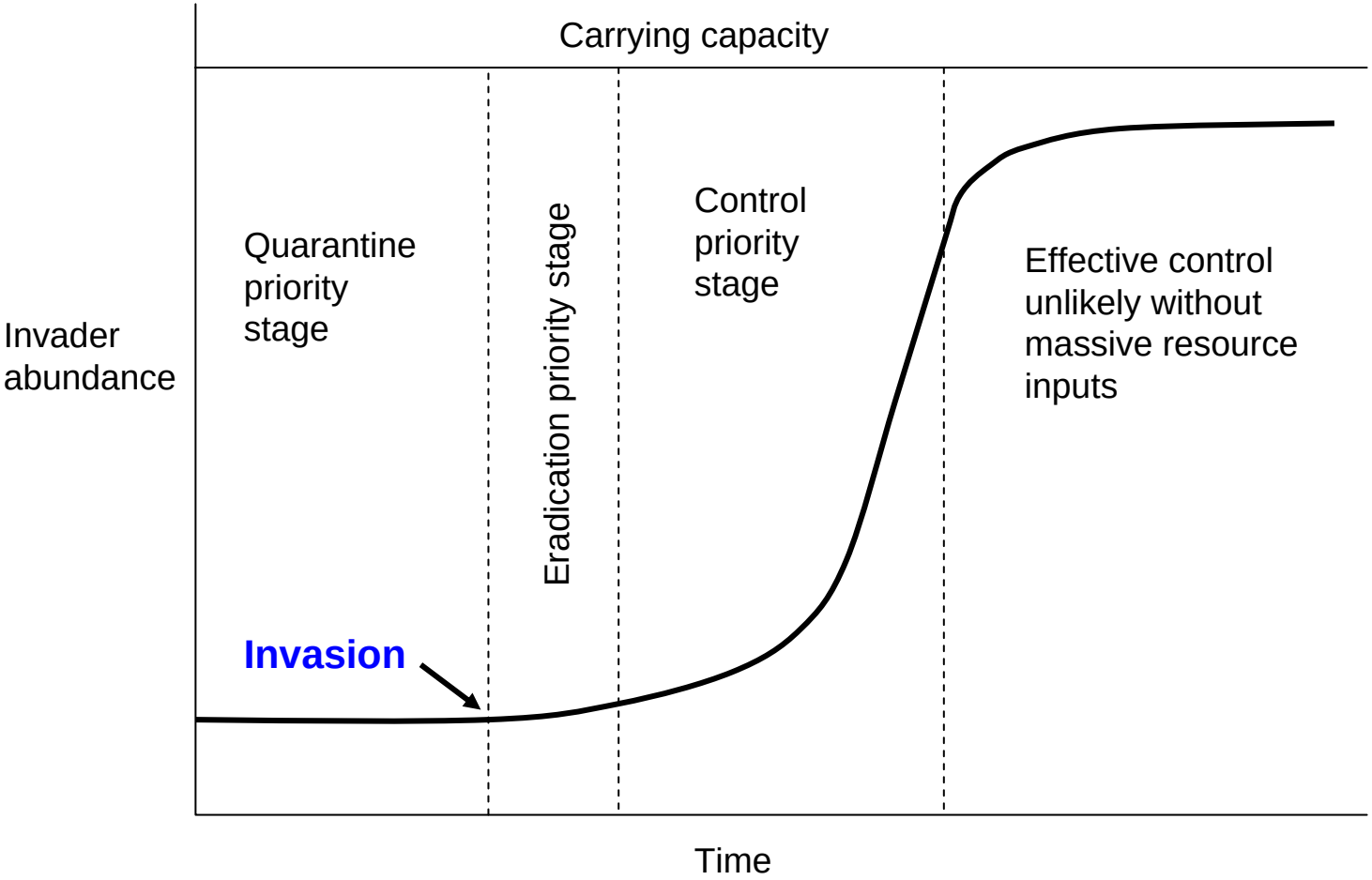
Variables	Estimate	F(1,7505)
Cheat grass (*Bromus tectorum* , N=676)		
annual precipitation	-1.6969	960.7
live tree basal area	-0.0143	707.1
mean minimum temperature, December	-0.0533	55.5
Himalaya blackberry (*Rubus discolor* , N=257)		
elevation above sea level	-0.0043	3355.3
live tree basal area	-0.0081	531.4
mean temperature, May-Sept	-0.0446	19.8

Simple data can tell a big story

Atmospheric carbon dioxide record, Mauna Loa



Fit the monitoring to the question



Conclusions 1

- Nonnative species are already well-established in PNW forests, and are currently most abundant in early seral, non-federal lands.
- What about non-forest? NRI samples ag lands; “Range pilot” in 2007 with NRI and FIA to refine design and protocols: invasives and full-species composition are key elements.

Conclusions 2

- Statistically-based samples of all species provide estimates of invasive plant impacts that represent the entire population.
- List-based sampling on standard plots could provide detailed information on selected species.
- Precise estimates of invasive plant impacts could motivate policies and actions.

WANTED

(Dead, Not Alive)

SPOTTED KNAPWEED

A.k.a. Centaurea maculosa & their similar kin - Russian, diffuse, and Squarrose Knapweed

Last Seen Growing In This Vicinity

Distinguishing Features

- reaches almost 3 feet in height
- maintains a flowering stalk as it matures
- dark spots visible on flower buds and heads
- flowers are pink to purple, sometimes white
- leaves are short, narrow and covered with fine hair; small and divided at the base of the plant in small clusters close to the ground during its first year

Crimes Committed:

- choking & the deliberate takeover of native plants
- stealing land, homes, & food from wildlife
- corrupting & invading open lands, roadsides, & recreation areas
- costing a bundle for taxpayers to control
- wreaking havoc & mayhem on innocent, unsuspecting ecosystems

Join the Invasive-Weed Patrol

- help stop the spread of this weedy, seedy, desperado
- report any sightings to local land managers or rangers
- remove all weed seeds from clothing, shoes, pets, camping gear, & tire treads

Reward

Healthy Ecosystems on Your Public Lands

American Hiking Society

Local contact: _____ Phone: _____