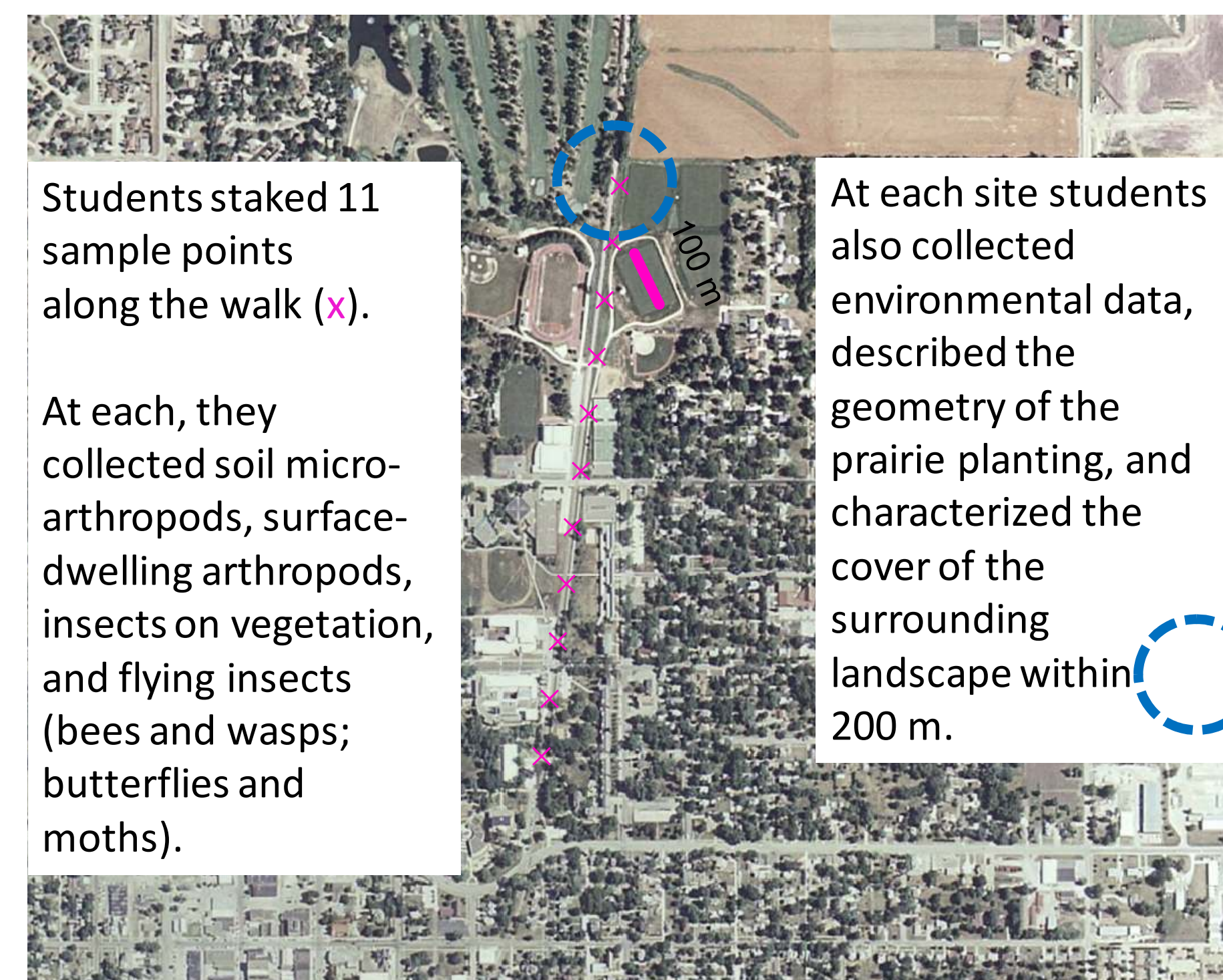


Ecology class assesses native-plant landscaping effects on arthropod diversity

Vince Eckhart & the 2008 BIO 368 class (Hart Ford-Hodges, Michelle Fournier, Ben Iberle, Anu Kramer, Cara Krieg, Tashi Langton, Curtis McCoy, Brian Perbix, Margaret Smith, Neal Wepking, Hannah Yourd, Ellen Zaander), Dept. of Biology, Grinnell College, Grinnell, IA 50112, USA

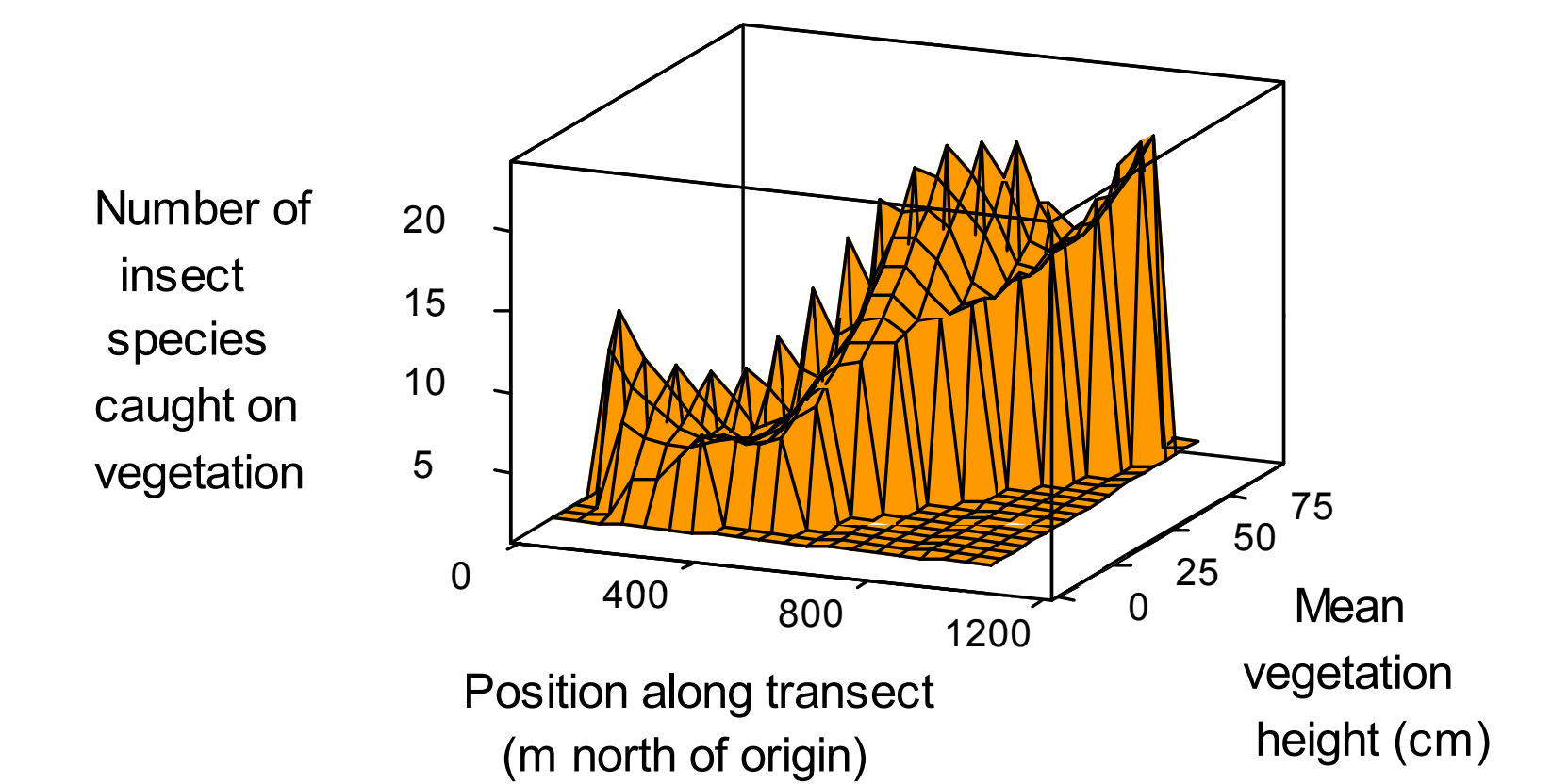
Grinnell College's "Prairie Walk" (and nearby "Prairie Borders" in the soccer/softball/football practice complex) came from lobbying for sustainable, place-appropriate landscaping. It was a small, but official, part of the year 2000 Campus Master Plan.



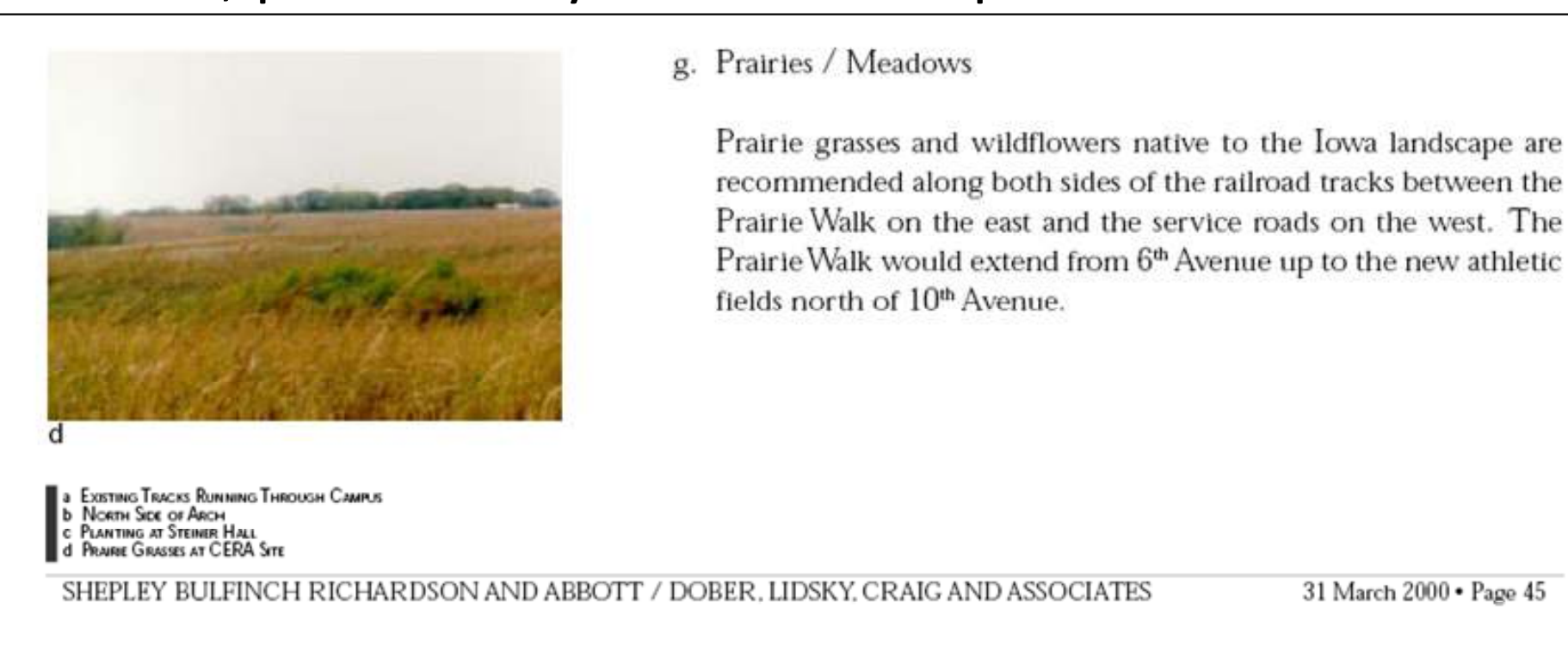
All students collaborated to score site and landscape variables.

Site variables	Landscape variables
"prairie" width	transect position
distance to pavement	proportion cover within 200 m of:
mean vegetation height	- herbaceous perennial plantings
% soil moisture	- pavement
% soil organic matter	- buildings
soil resistance to penetration	(sum = impervious surfaces)
density of	- open lawn
- all inflorescences	- tree-shaded lawn
- <i>Oligoneuron rigidum</i> racemes	- cropland
- <i>Aster novae-angliae</i> heads	
- <i>Heliopsis helianthoides</i> heads	
- <i>Daucus carota</i> umbels	
- <i>Ratibida pinnata</i> heads	
disturbance severity (none, high mowing, low mowing)	

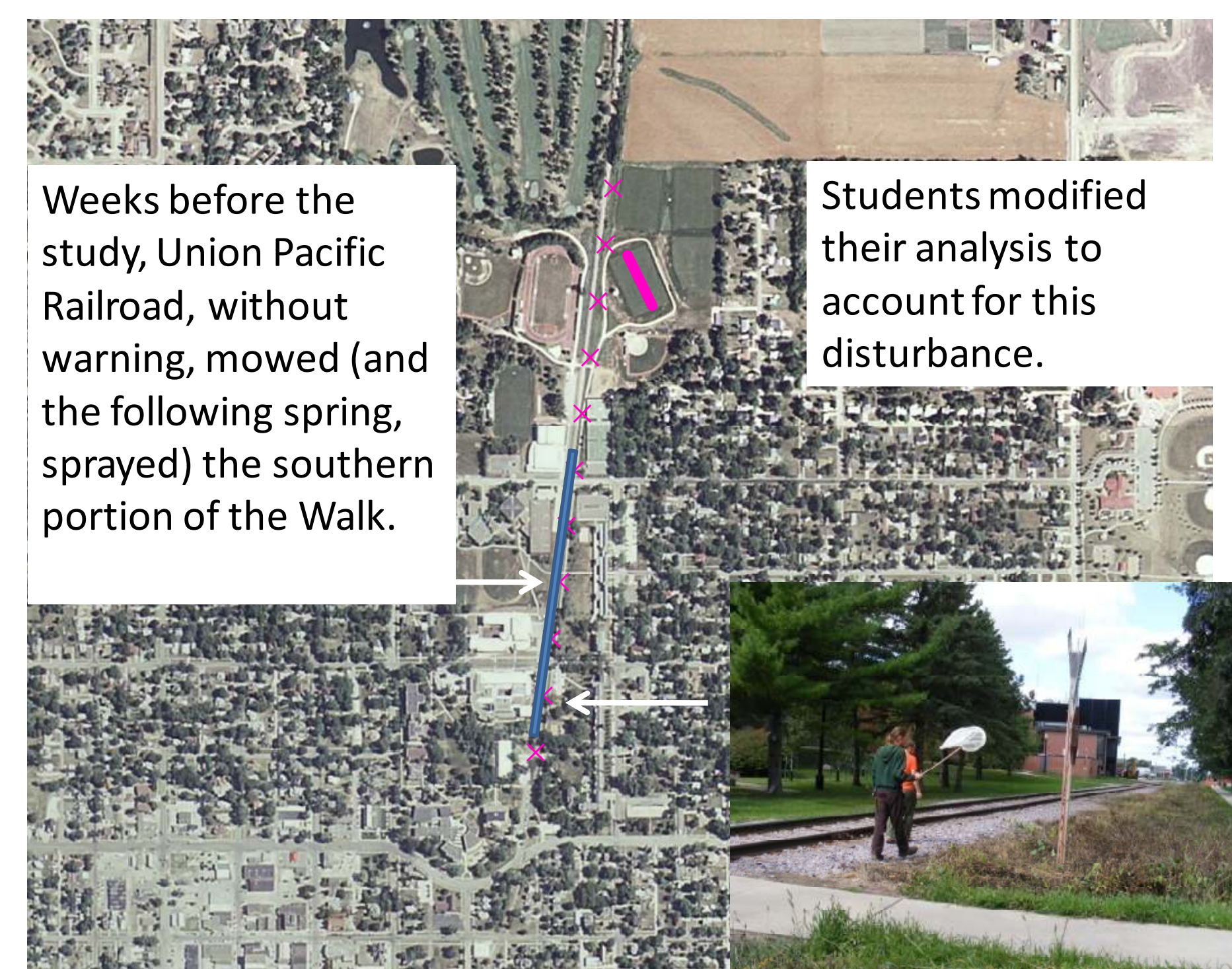
Example findings (from the "insects-on-vegetation" group)



Three-dimensional wireframe plot of insects species caught by sweep-netting vegetation versus transect position and vegetation height. Species diversity increased significantly with vegetation height ($r = 0.88$, $P < 0.001$), which itself correlated positively with transect position ($r = 0.90$, $P < 0.001$)

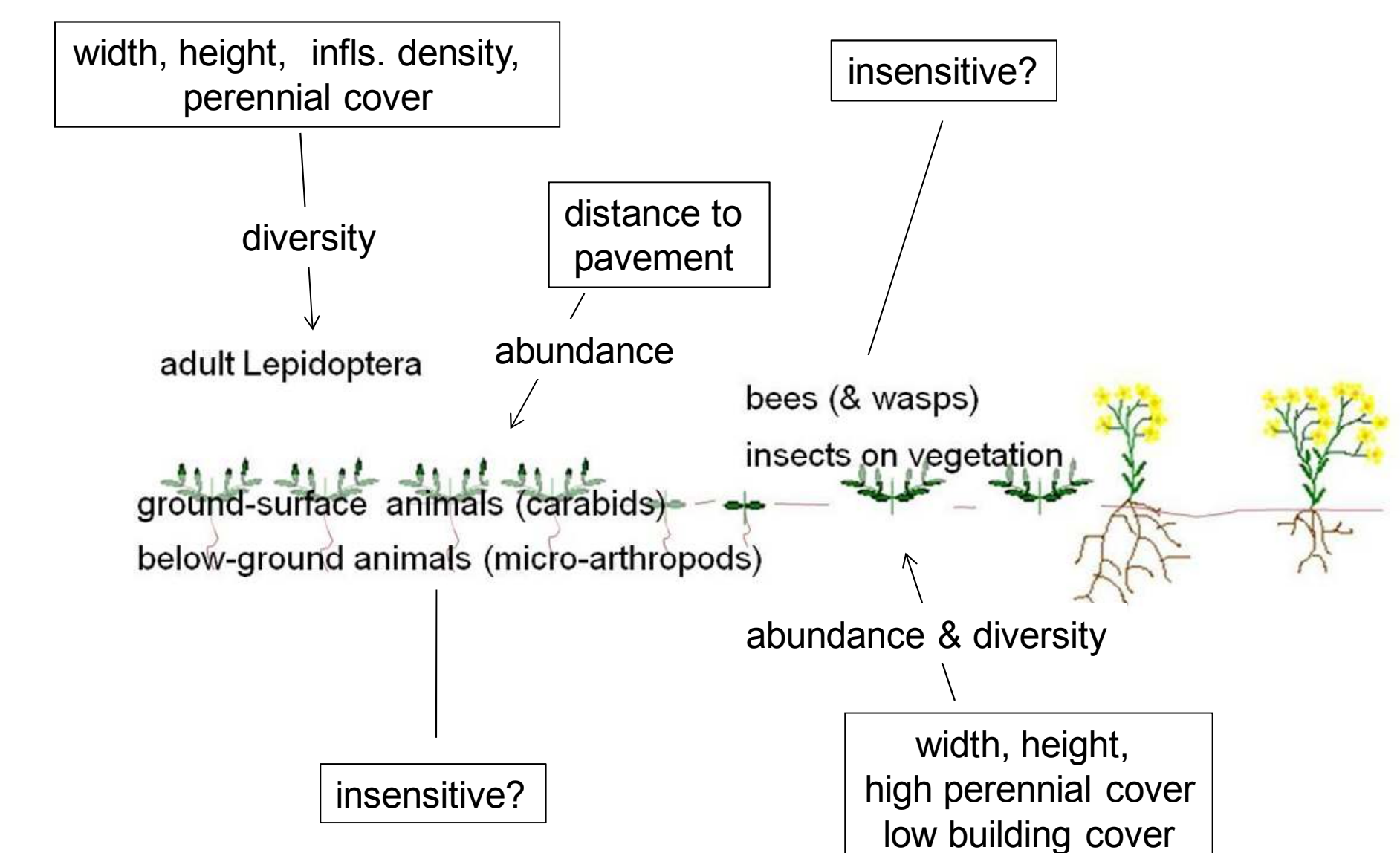


(Hypothesis: the consultants' referring to prairies as "meadows" reflects their New England origins.)



Michelle Fournier and Anu Kramer estimate inflorescence density.

Summary of controls on arthropod abundance and diversity:



Lessons

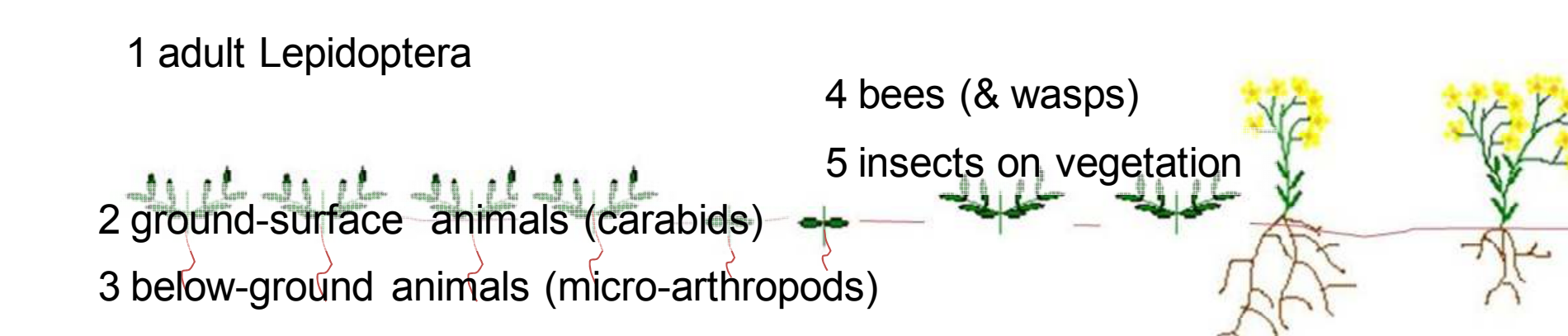
Findings matched, in part, students' landscape sensitivity expectations.

Might highly vagile species (e.g., bees) be sensitive to landscape structure at larger scales than 200 m?

To increase diversity of flower- and leaf-foraging insects on campus:

- increase patch size and coverage of native vegetation plantings.
- find places for these plantings less sensitive to the whims of the Union Pacific, whose attitude changed a few years after Grinnell created the Prairie Walk.

Pairs or trios of students focused on arthropod diversity and abundance, stratified by taxon and/or location.



Expected vagility:

Lepidoptera ~ bees > vegetation-dwellers > surface dwellers > subsurface dwellers

Predictions:

Sensitivity to landscape variables should correlate with vagility.

Sensitivity to site variables should vary by group (depending on their specific habits, foraging requirements, etc.).



Curtis McCoy, Tashi Langton, and Margaret Smith return to lab after retrieving pitfall traps (inset at right). Yes, they are breaking the law by walking on the tracks. I told them so.

Biology 368 – Ecology – Fall Semester 2008

Landscape context and ecological patterns:

Arthropod communities along the campus Prairie Walk

Ecologists increasingly recognize that landscape configuration (e.g., the shape of habitat patches and the land cover composition of the "matrix" in which patches occur) affects ecological patterns (e.g., biodiversity).

In Fall, 2008, BIO 368 (Ecology) students investigated how arthropod (mainly insect) diversity varies along the College's Prairie Walk. This 1.1 km strip of native vegetation extends from South Campus to the athletic fields along the railroad tracks, providing an ecological "transect" that samples diverse landscapes.

Various arthropod groups might be expected to respond to landscape variation in different ways, depending on where they reside and how mobile they are.