Seed Banks in Pastures and Hayfields of the University of New Hampshire Organic Dairy

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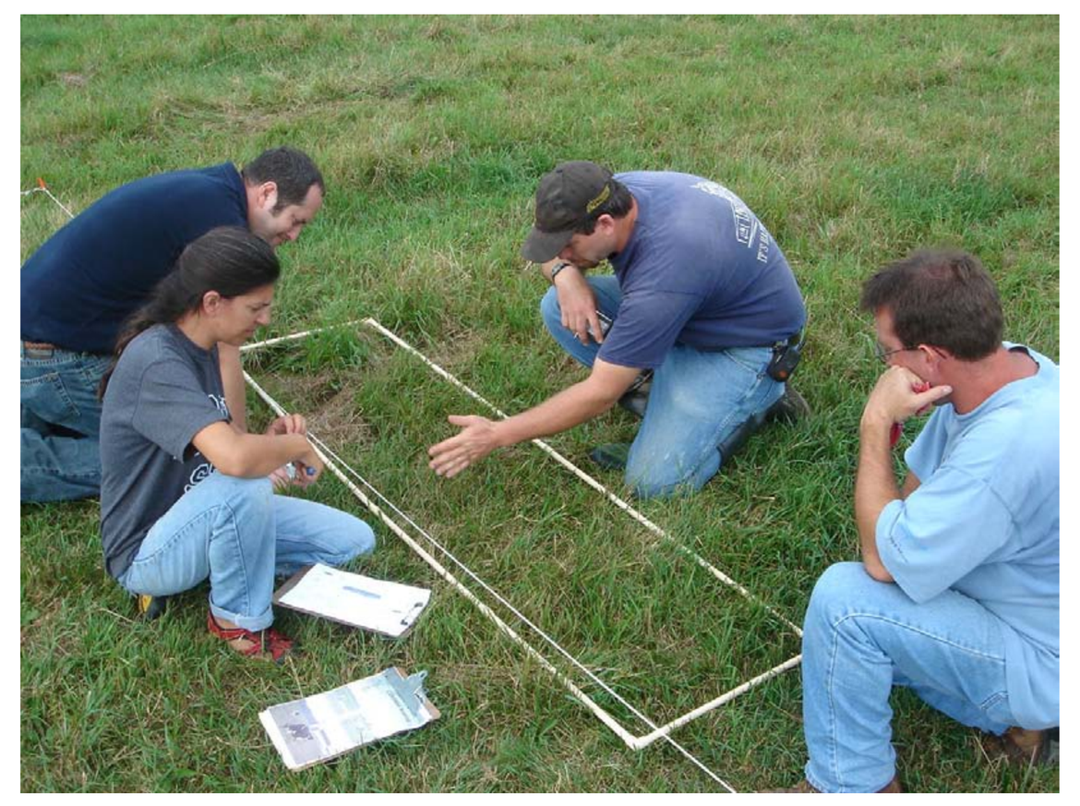
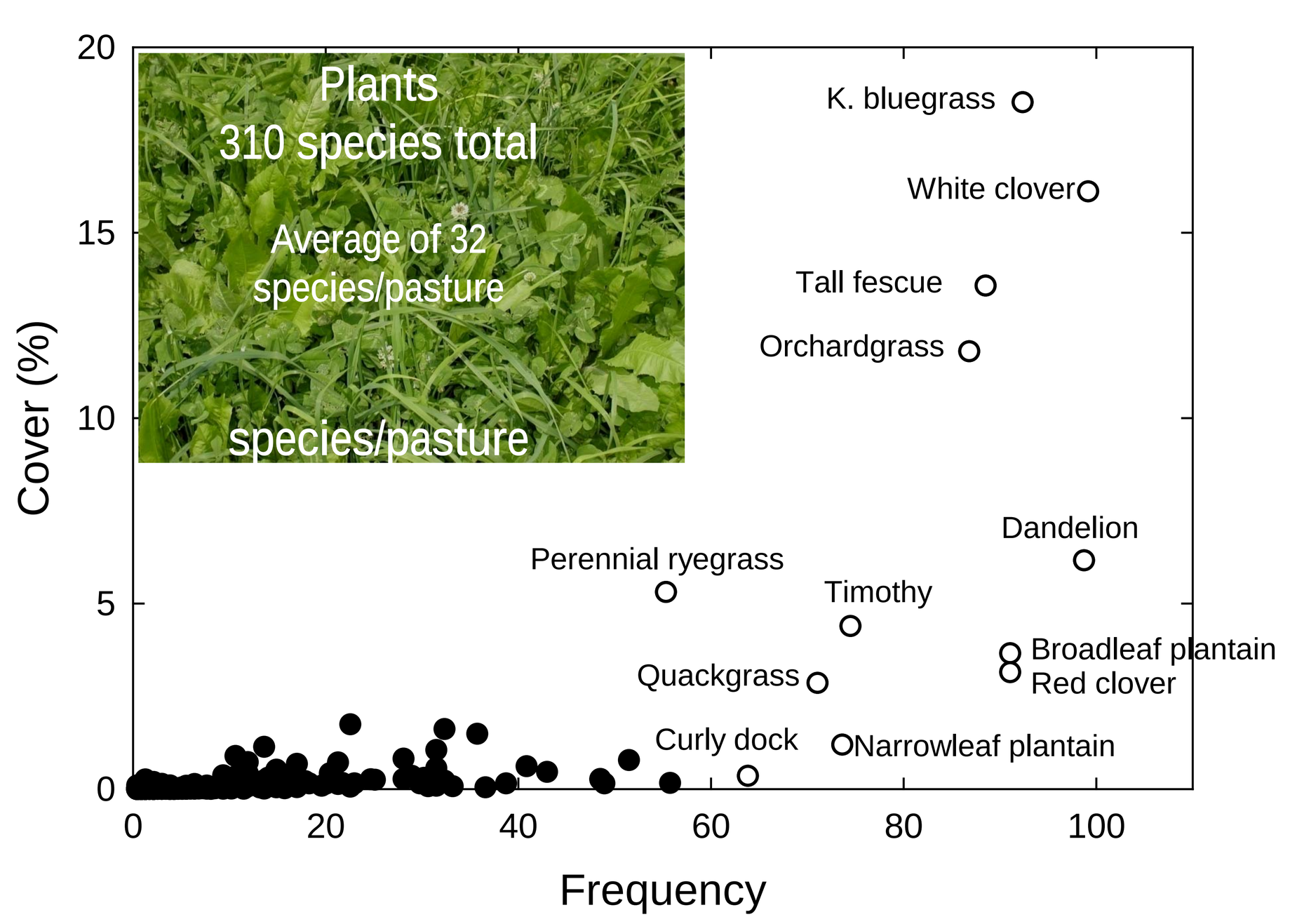
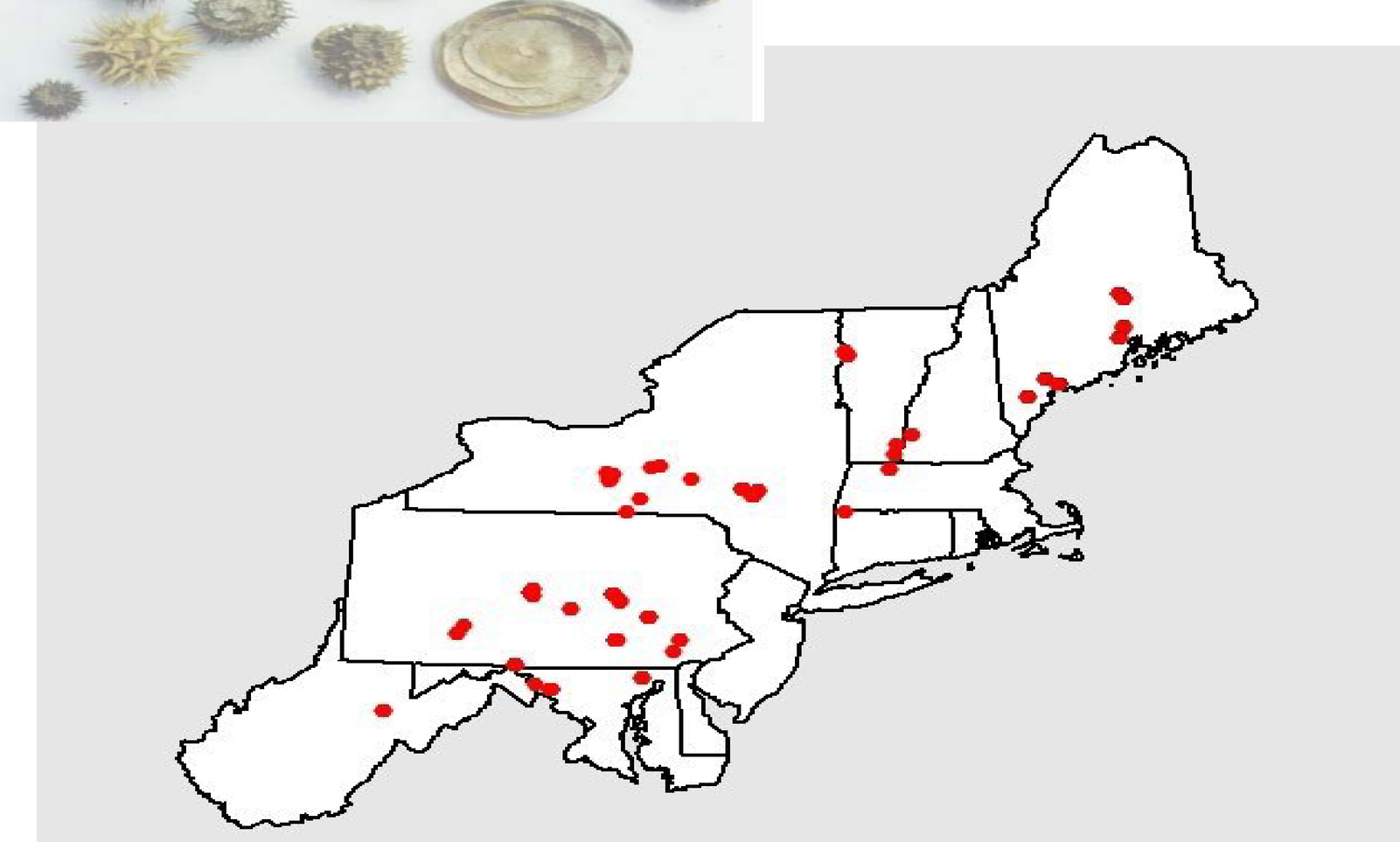
Buried seed in pasture soils are often reservoirs of weedy plants. Knowledge of how land use history affects the seed bank in pastures would be useful in anticipating potential weed management needs.

We characterized the seed bank in pastures and hayfields with different management histories at the University of New Hampshire Organic Research Dairy.

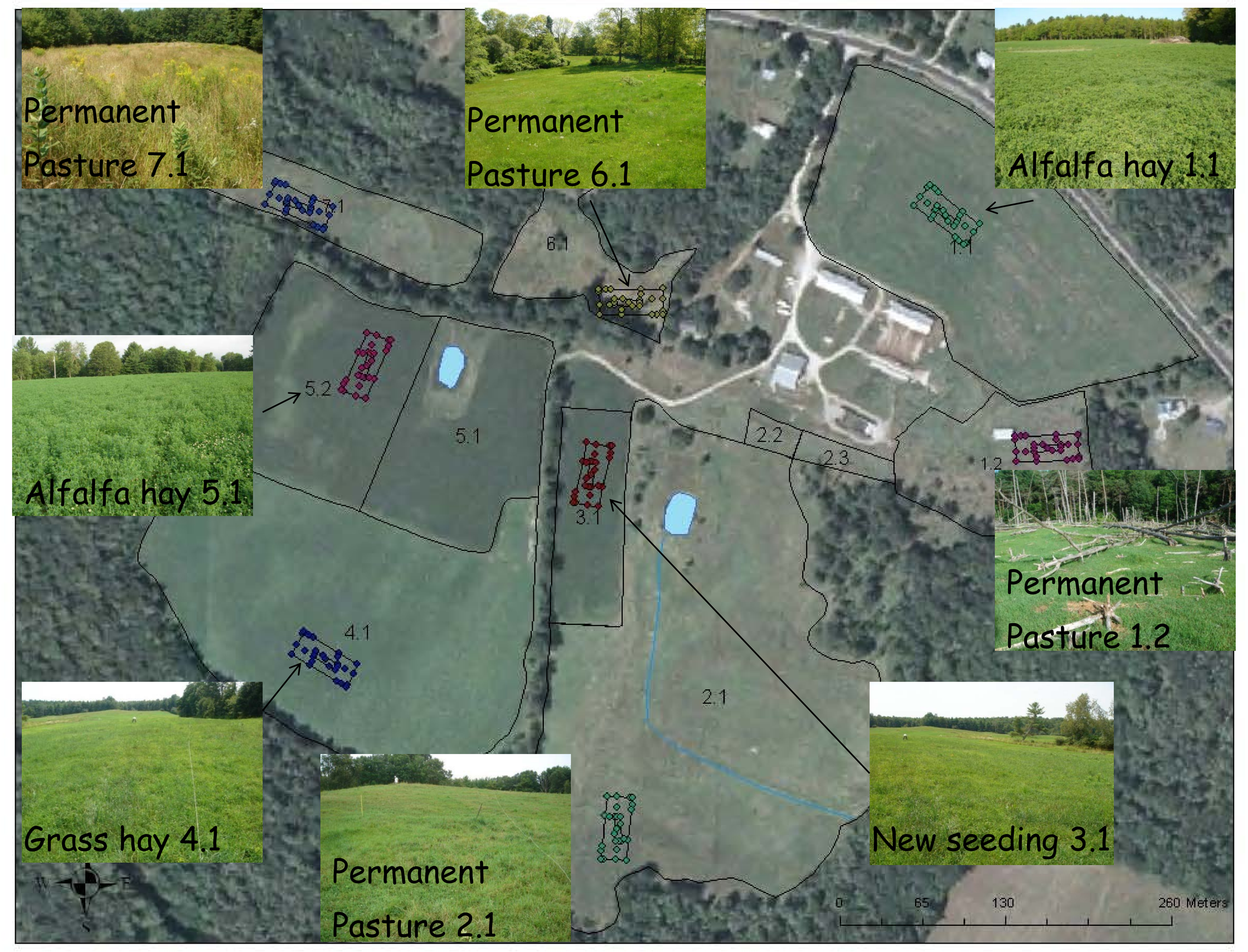


Our previous research on plant diversity in northeastern U.S. pastures identified many plant species; however, most pastures are dominated by a few grasses and legumes.

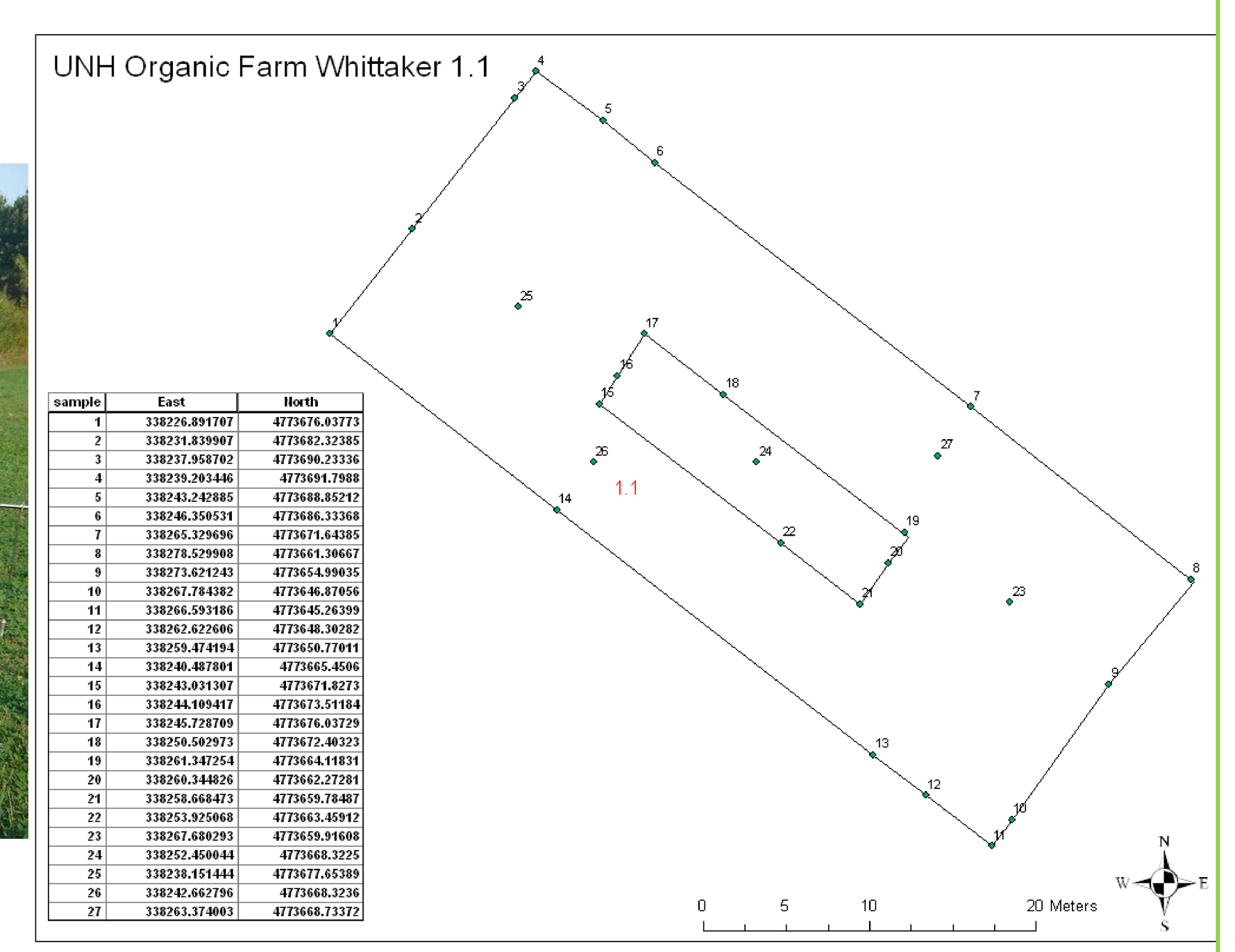




Three hayfields (two of alfalfa and one grass) and five pastures of 3 to 50 years were sampled in August 2007.

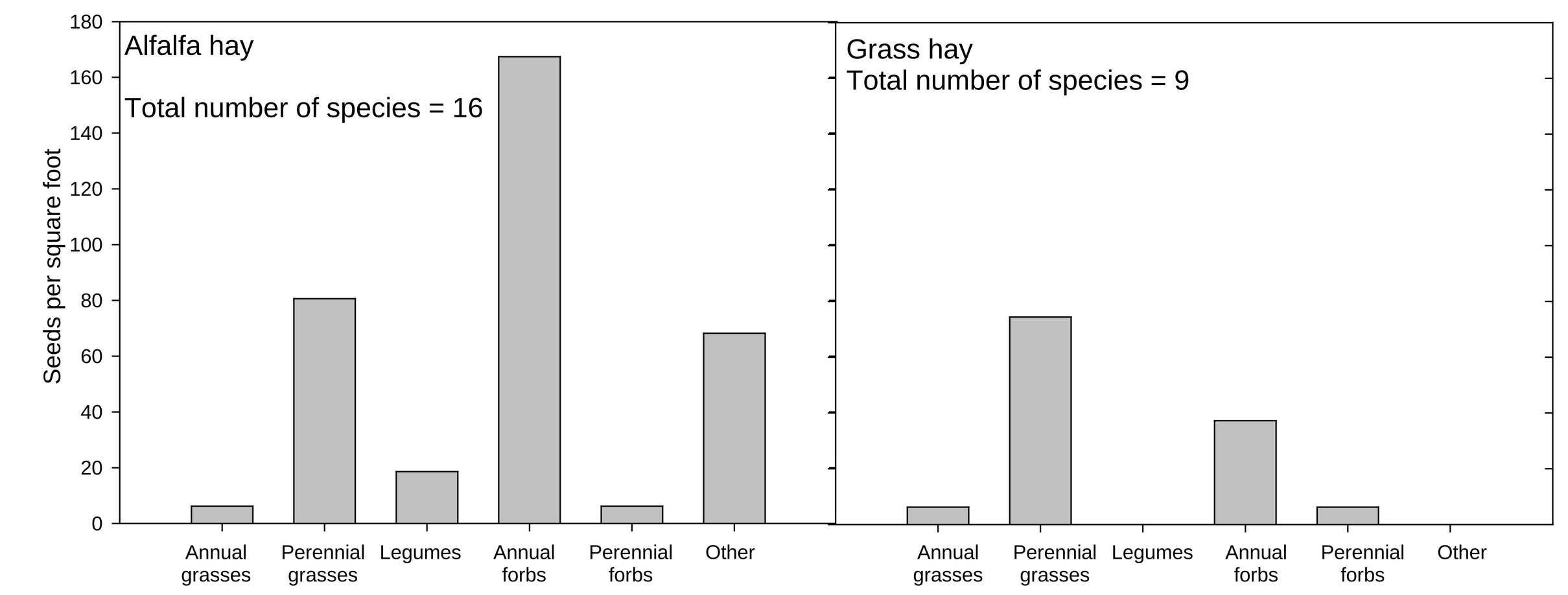


In each field or pasture, two soil cores (0.75 inches diameter by 2 inches deep) were taken at 27 georeferenced points within a modified Whitaker plot. The pairs of soil cores were bulked for each sample point within a plot.

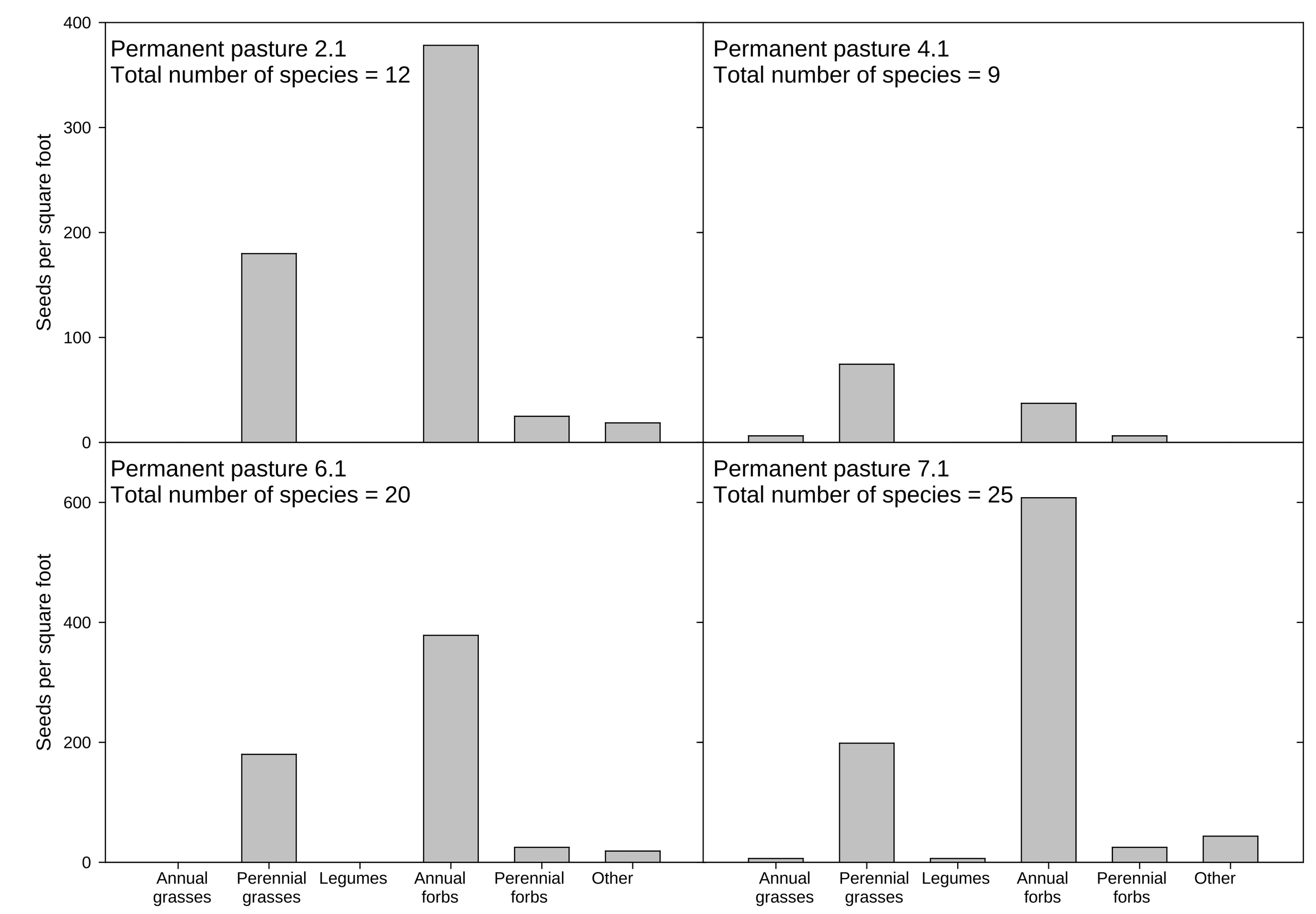


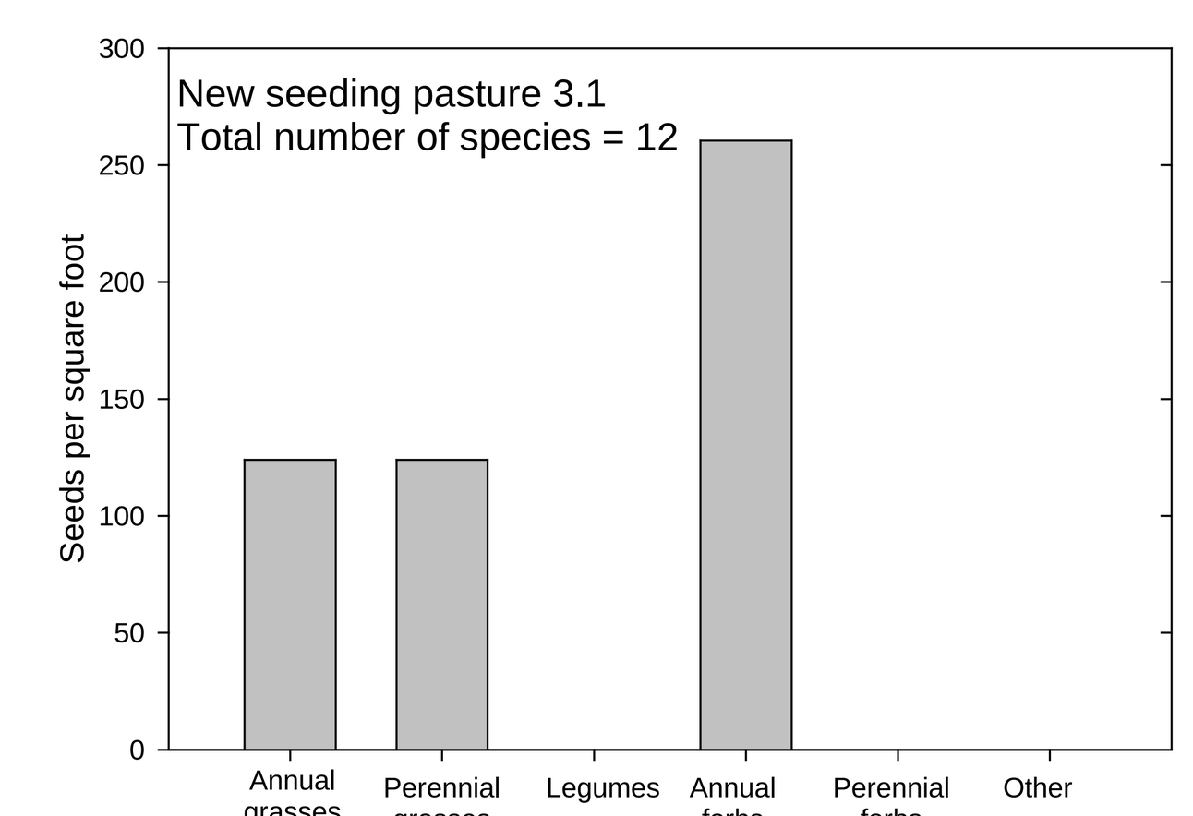
Soil samples were placed in a greenhouse under natural light and controlled temperature for 5 months and germinated seedlings identified and counted.

Soil from the hayfields had the fewest number of seed (8 to 83 seeds per plot sample) and plant species (2 to 14 species per plot sample) compared with pastures. Ragweed and slender rush predominated in the seed bank from the alfalfa fields.



Old permanent pastures had 98 to 277 seeds per plot sample and 12 to 25 plant species. Nearly 42% of the soil samples from the hay fields had no germinable seeds, whereas only 7% of soil samples from the pastures had no germinable seeds.





Generally, there was little correlation between plant species presence and abundance in the above ground vegetation and the seed bank.

Dominant plant species (top 5)			
Vegetation	% cover	Seed bank	Seeds/ft^2
Alfalfa hay 1.1			
Alfalfa	39	Juncus spp.	68
White clover	17	Shepherd's purse	56
Red root pigweed	8	Red root pigweed	43
Quackgrass	7	Red fescue	43
Large crabgrass	3	White clover	19
Alfalfa hay 5.2			
Alfalfa	67	Red fescue	31
Timothy	1	Common ragweed	19
Red root pigweed	1		
Quackgrass	1		
White clover	1		
Grass hay 4.1			
Orchardgrass	40	Red fescue	62
Dandelion	24	Lobelia	12
Meadow foxtail	16	Bluegrass	12
Bluegrass	10	Persian speedwell	12
White clover	8	Shepherd's purse	6
New seeding 3.1			
Perennial ryegrass	48	Red fescue	118
Timothy	20	Common lambsquarters	105
White clover	14	Smooth crabgrass	68
Large crabgrass	12	Stitchwort	62
Bluegrass	3	Green foxtail	62

The exception was permanent pasture 6.1 where the seed bank mirrored above ground vegetation.

Dominant plant species (top 5)			
Vegetation	% cover	Seed bank	Seeds/ft^2
Permanent pasture 1.2			
Quackgrass	39	Red fescue	831
Bluegrass	21	Carpet weed	167
Canada goldenrod	2	Agrostis	161
Red fescue	1	Common fleabane	155
Common fleabane	1	Juncus spp.	87
Permanent pasture 2.1			
Bluegrass	24	Stitchwort	260
Quackgrass	17	Red fescue	124
White clover	15	Bluegrass	56
Red fescue	13	Persian speedwell	50
Dandelion	10	Common speedwell	31
Permanent pasture 6.1			
Agrostis	27	Agrostis	484
Bluegrass	20	Bluegrass	285
Red fescue	18	Red fescue	149
White clover	7	Stitchwort	81
Stitchwort	5	Red clover	43
Permanent pasture 7.1			
Orchardgrass	15	Oxeye daisy	192
Timothy	13	Common fleabane	155
Meadow fescue	12	Stitchwort	118
Meadow foxtail	11	Red fescue	105
White clover	10	Bluegrass	50