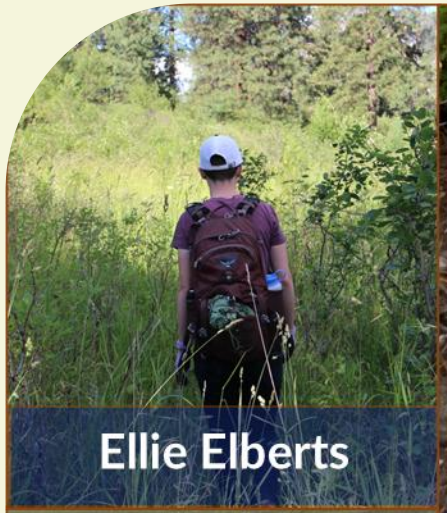
Plants as Archaeological Witnesses:

A Multispecies Approach to Detecting Burials in Montana

John S. Harris · Harris Anthropological Research LLC

Acknowledgements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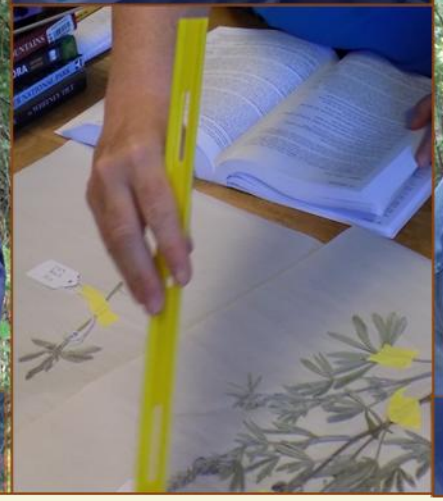
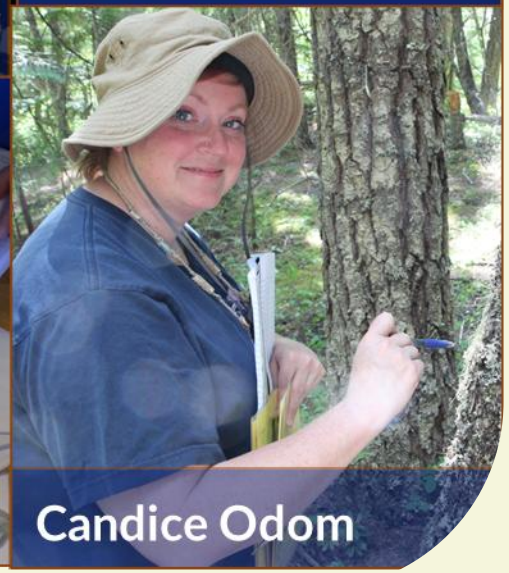
Church Universal & Triumphant
MT SHPO
MT FWP
Spring Creek Cemetery Association
University of Montana Herbarium


Dr. William Schroeder


Cody Riley

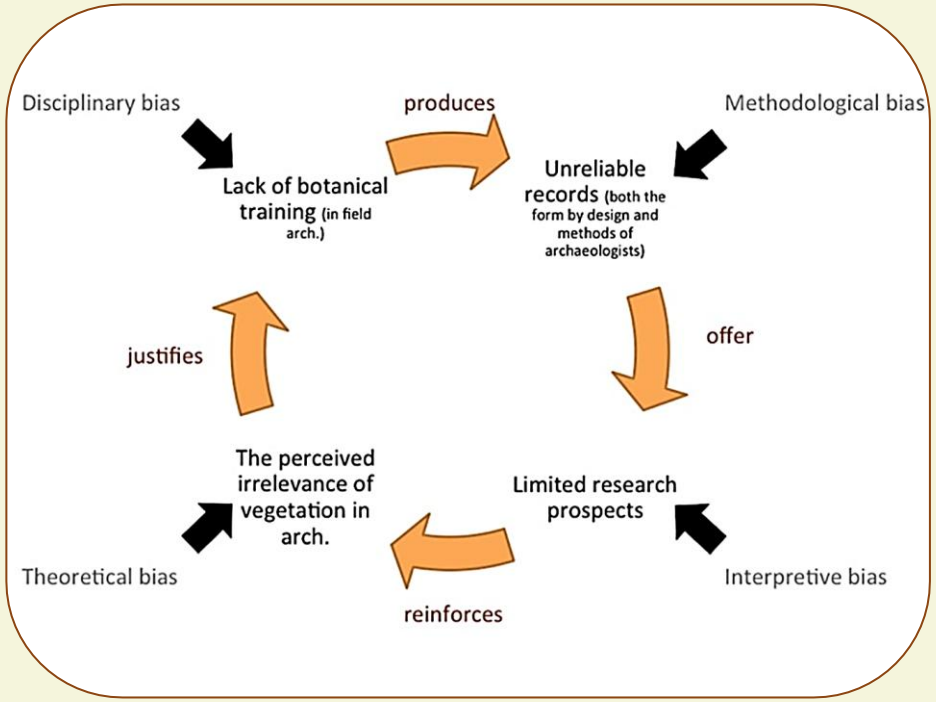



Candice Odom

The Recognition Gap

The Problem:

- Unfortunately, 'Conifer forest.' 'Sagebrush.' 'Various grasses.' have functioned more as placeholders, not evidence or other data potential.
- Every surveyor notices vegetation. Almost none records it rigorously.



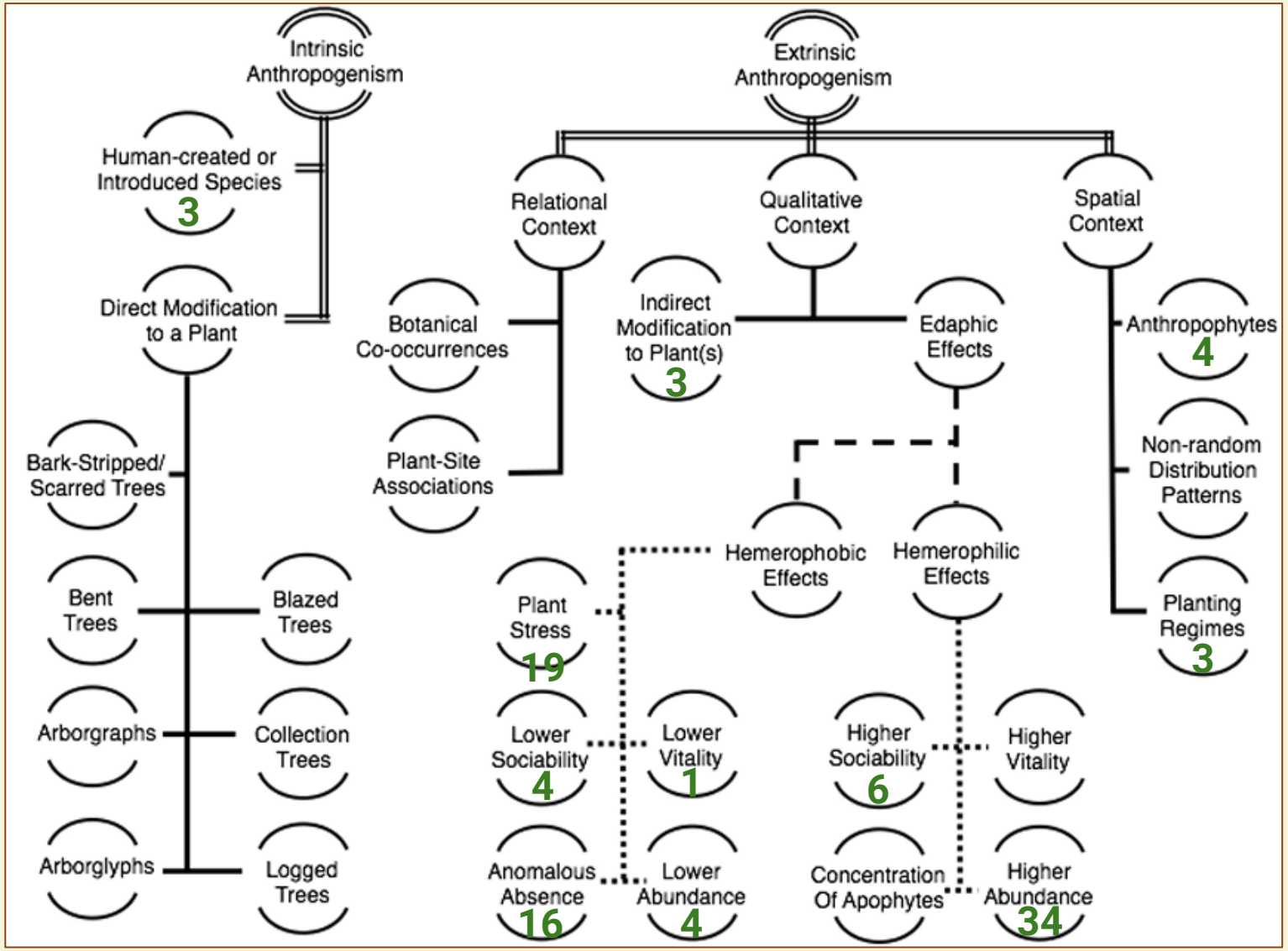
- **The goal:** discover which plants to look for, what they mean, what (and how) to document.

Study Context

- **Sites:** distinct ecological settings, 19th-century industrial and settler communities.
  - 24BE1535
  - Aldridge Cemetery
  - Nevada City Cemetery
  - Spring Creek
- **Sampling**: Paired 4 × 4 m blocks: Feature on grave or structural element, Control on adjacent undisturbed ground with matched slope and exposure.
- **Five metrics**: frequency, cover, sociability, vitality, stress.
- **Signal Classification**: Feature-exclusive → Feature-leaning → Generalist → Control-leaning → Control-exclusive
- **Analysis**: Qualitative indicator classification is from the Specificity and Fidelity components of Dufrêne and Legendre's Indicator Value Method

Results

- All four cemeteries show distinct Feature and Control vegetation signatures despite widely different regional species pools.
- Spring Creek and Nevada City: strongest Feature-exclusive patterns.
- Three consistent categories: positive indicators, intentional ornamentals, negative indicators.
- The differentiation is reproducible across ecologically distinct sites.
- 91 unique species show anthropogenic vegetation indicator potential for graves, with 112 indicators total.



Results

Meaningful as Cultivars and Spatially Dislocated Reasons

- There were 7 plants meaningful for their associations were direct human interventions through planting/seeding, or inadvertent human activity spreading mechanisms.

Cultivars

sweetclover

Melilotus officinalis

common lilac

Syringa vulgaris

Harrison's yellow rose

Rosa × harisonii

hoary alyssum

Berteroa incana

Rocky Mountain iris

Iris missouriensis

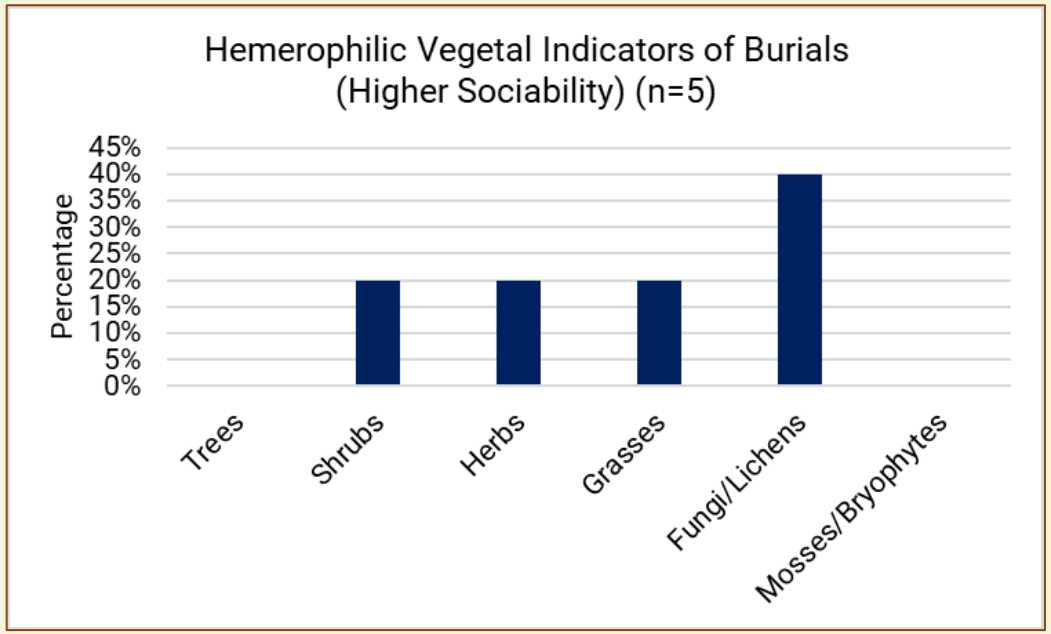
pale yellow iris

Iris flavescens

Results

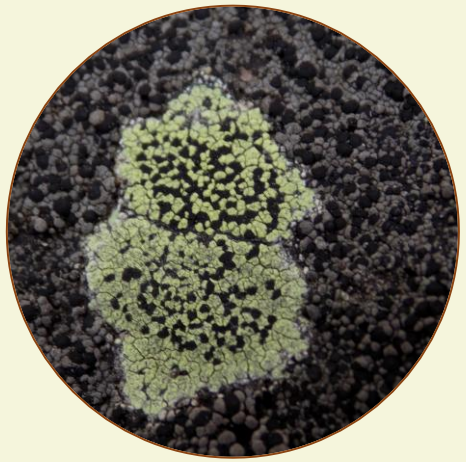
The Positive Indicators: What Gathers Around Graves

- 5 species showed **higher sociability** in burials than control



common yarrow

Achillea millefolium



Large spore map lichen

Rhizocarpon macrosporum

Idaho fescue

Festuca idahoensis

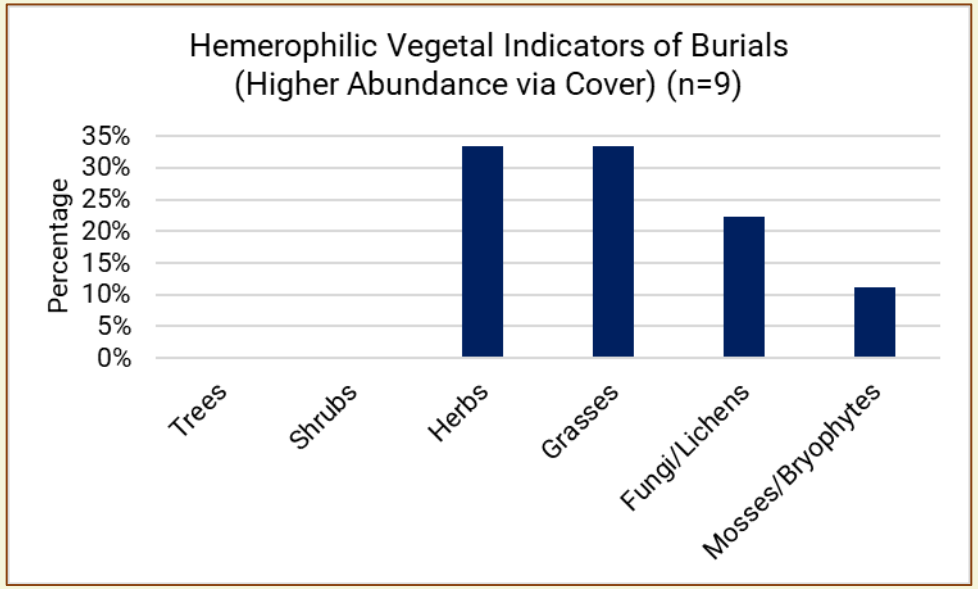
common freckle pelt

Peltigera Aphthosa

Results

The Positive Indicators: What Gathers Around Graves

- 9 species showed **higher abundance** (via their Cover metric) in burials than control
- 1 species showed **higher vitality** in burials than control



cutleaf anemone

Anemone multifida

trumpet lichen

Cladonia fimbriata

silvery lupine

Lupinus argenteus

hillside arnica

Arnica fulgens

copper-wire moss

Pohlia nutans

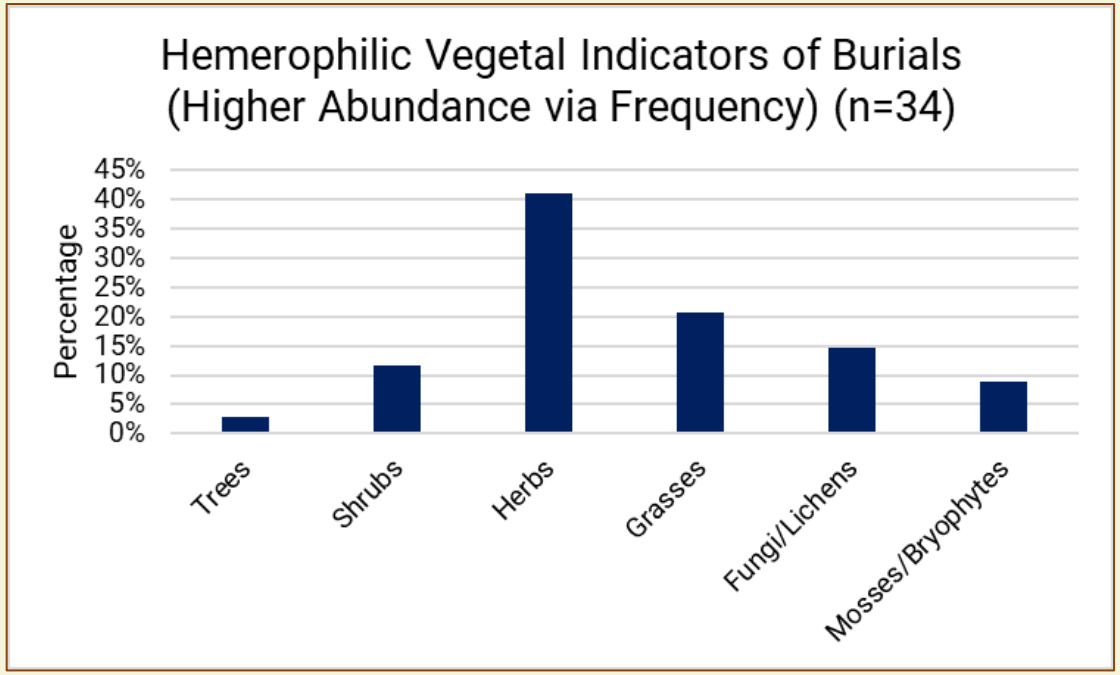
common freckle pelt

Peltigera Aphthosa

Results

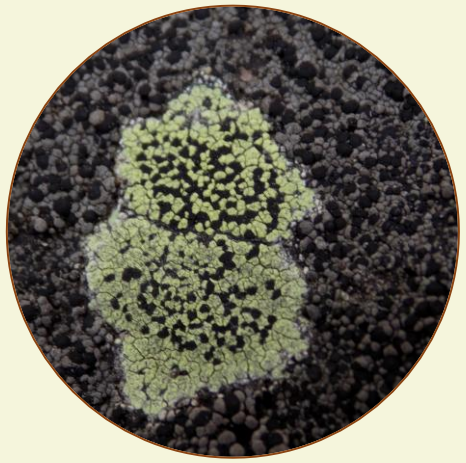
The Positive Indicators: What Gathers Around Graves

- 34 species showed **higher abundance** (via their Frequency metric) in burials than control
- A combination of mosses/bryophytes, fungi/lichens, and grasses showed multiple hemerophilic manifestations at the same time



trumpet lichen

Cladonia fimbriata



Large spore map lichen

Rhizocarpon macrosporum

copper-wire moss

Pohlia nutans

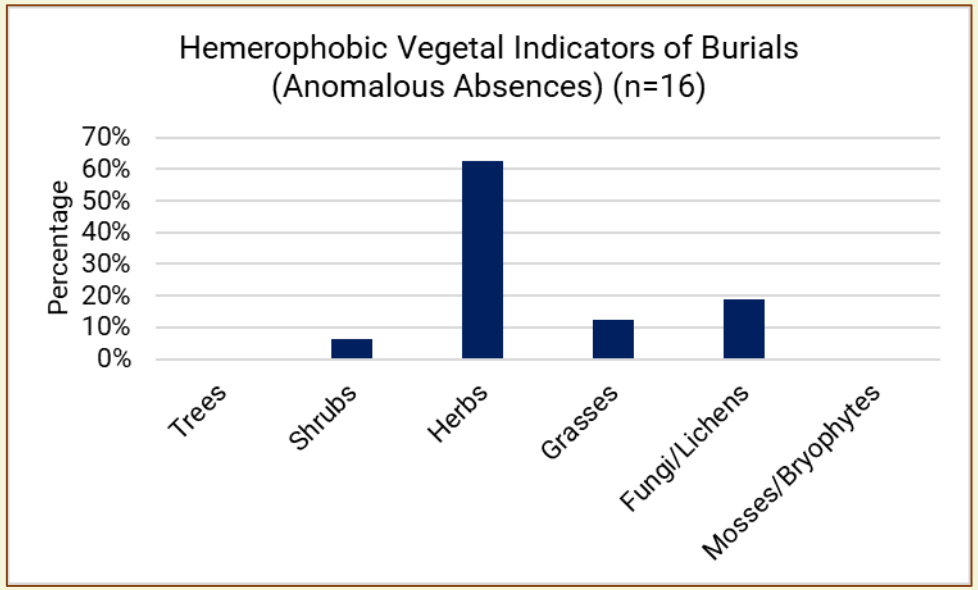
common freckle pelt

Peltigera Aphthosa

Results

The Negative Indicators: What Avoids Graves

- There were eco-zone-specific anomalous **absences** in graves
  - 7 in Dry Intermontane Sagebrush Valleys
  - 3 in Montane Grassland-Sage Steppe
  - 4 in the edge of Montane Coniferous Forests
  - 2 in substrate=depend cryptograms across ecoregions
- 4 species showed **lower abundance** (via their cover metric) in burials than control
- 4 species showed **lower sociability** in burials than control



green needlegrass

Nassella viridula

big sagebrush

Artemisia tridentata ssp. tridentata

prairie junegrass

Koeleria macrantha

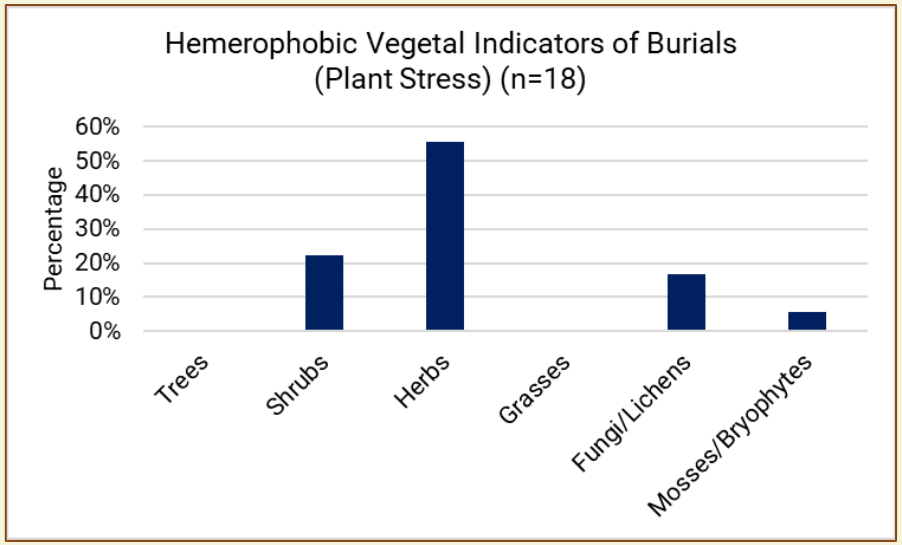
rosy pussytoes

Antennaria rosea

Results

The Negative Indicators: What Avoids Graves

- 18 species showed **plant stress** in burials than control



common freckle pelt

Peltigera Aphthosa

Torrey's sedge

Carex torreyi

big sagebrush

Artemisia tridentata ssp. tridentata

dotted blazingstar

Liatris punctata

great blanketflower

Gaillardia aristata

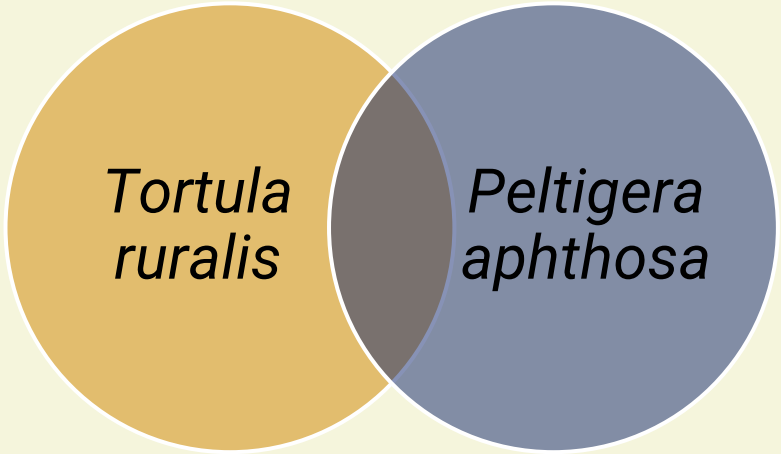
Meadow deathcamas

Toxicoscordion venenosum

Results

Botanical Co-Occurrence

- Graves create an unusual micro-niche where plants with opposite needs can co-exist, even when the surrounding is hostile environments to either. They tend to suffer plant stress, but survive even in large colonies. So this represents four categories of anthropogenic vegetation:
  - Relationally
  - Spatially out-of-place
  - Abundance
  - Plant Stress



Prefers arid, sunny settings

Prefers moist, shaded, cooler settings

star moss

Tortula ruralis

common freckle pelt

Peltigera Aphthosa

Results

The Disturbance Generalists of Graves

- Ruderals and disturbance-tolerant grasses are attracted to the disturbance of the pathways, roads, and grave shafts

- Compaction and nitrogen-enhanced substrates too attract a disturbance-tolerant grasses

sweetclover

Melilotus officinalis

Common dandelion

Taraxacum officinale

yellow salsify

Tragopogon dubius

common pepperweed

Lepidium densiflorum

quackgrass

Elymus repens

cheatgrass

Bromus tectorum

Kentucky bluegrass

Poa pratensis

Sandberg bluegrass

Poa secunda

Results

- **The Indirect Modification to Plant:**
- Frugivorous bird-dispersed species distribution patterns are important as the consequence from seed rain from wood structure perches (e.g., fences, headstones, etc.) can outlast the fencing itself.
- Attention is needed among these genera:
  - Rosa
  - Rubus
  - Fragaria
  - Vitis
  - Prunus
  - Sorbus
  - Malus
  - Poaceae
  - Vicia
  - Lathyrus
  - Plantago
  - Rumex

whitestem gooseberry

Ribes inerme

Virginia strawberry

Fragaria virginiana

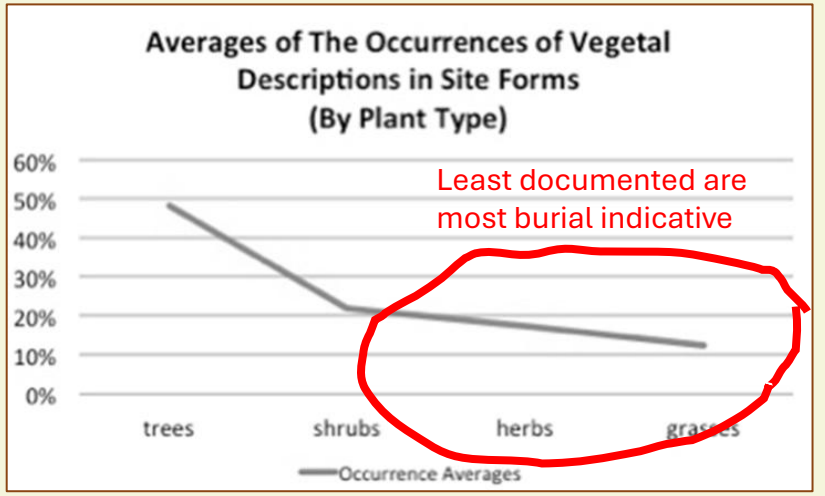
prairie rose

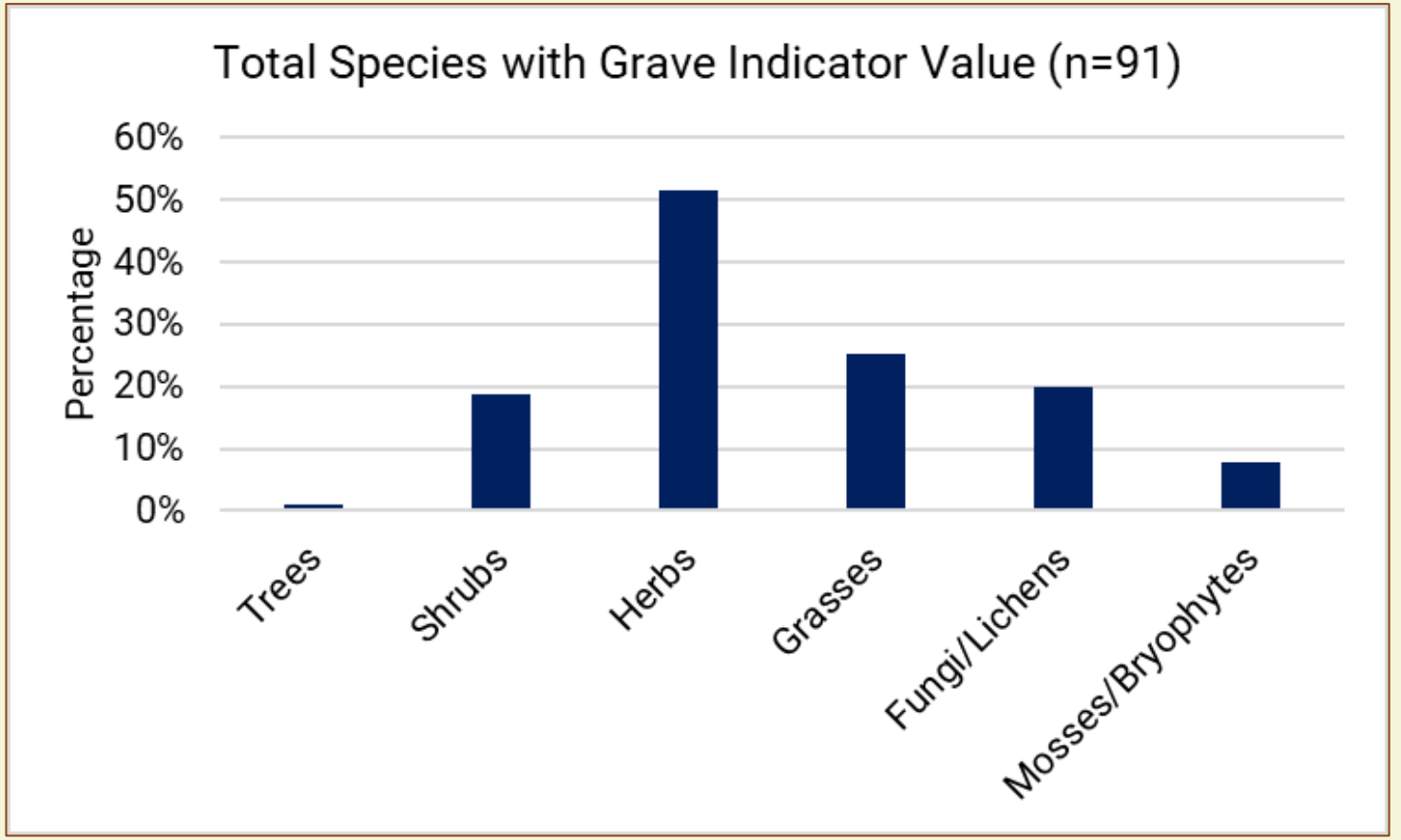
Rosa arkansana

Field Recommendations

Challenged Assumptions

- The study's results of the indicative value of vegetation mirrors the distribution of biodiversity by growth habit, not the popular conventions of recording larger growth habit plants over smaller growth habit plants.
- Smaller growth habit plants have even more indicative value than trees.

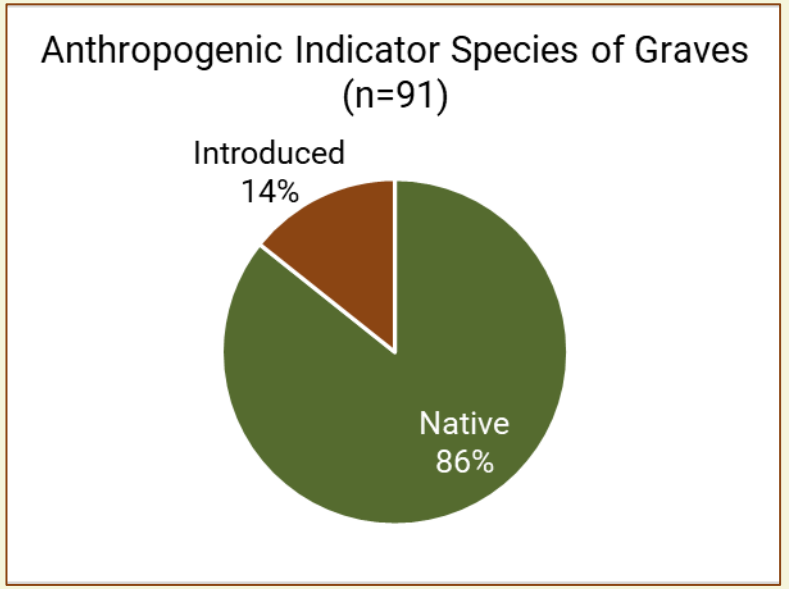




Field Recommendations

Challenged Assumptions

- Using one nativity status over another should no longer be used for site prospection or NRHP integrity eligibility.
    - Habitat setting is more important than nativity when it comes to integrity proxy usage.
- Do not assume that native plants at sites are mere “noise,” they hold good potential for site prospection
- It’s not all about cultivars and ornamentals
- Be aware that native versions of Euro-American culturally significant species may be adapted locally (e.g., *iris missouriensis*) at cultural features and sites
- Pure plant inventory of species present is of little data value
- Do not rely solely on generalized eco-zone descriptions, without ground-truthed descriptions is difficult to know whether vegetation is out-of-place



Field Recommendations

What to Add to Your Site Forms

- Use the categories of anthropogenic vegetation to see and note if there are observable differences in:
  - Are there physical modifications to the plants (e.g., peeling/scars, cuts, impressions in bark, paint, bends)?
    - List species, treat at named/numbered and spatially referenced cultural features
  - Are there repeated asymmetries in the tree canopy branches exhibiting phototropism?
    - List species, include pattern on site sketch map, along with measurements of area formerly left open canopy
  - A different combination of plants present than typical for the surrounding?
    - List species, post-field analysis edaphic settings favors by these species to see patterns in their preferred settings
  - A pattern of plant stress among a species not shared by the same species in the broader area?
    - List the species name and characterize the type of stress, note their preferred settings

Field Recommendations

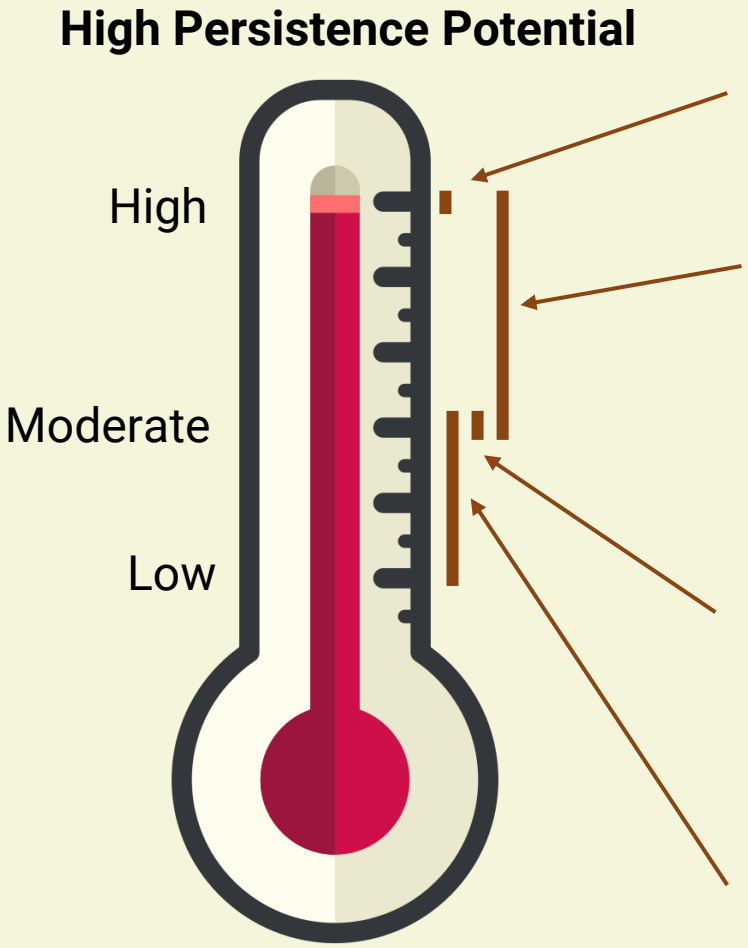
What to Add to Your Site Forms

- Use the categories of anthropogenic vegetation to see and note if there are observable differences in:
  - Are there anomalies in higher or lower than expected colonization of a particular species? Are there non-random geometric patterns of its distribution?
    - List the species, rate it on the sociability scale, include it on the site sketch map
  - Are there geometric patterns of distribution of bird-dispersed species
    - List the species, rate it on the sociability scale, include it on the site sketch map
  - Are there geometric patterns of distribution of fur/hoof-dispersed species
    - List the species, rate it on the sociability scale, include it on the site sketch map
  - Are these species present which are spatially dislocated/out-of-place and likely to need human intervention for their dispersal?
    - List the species, rate it on the sociability scale, include it on the site sketch map

Closing: The Archive is Already There

Beyond Cemeteries: Potential Persistent Plants at Historic Sites

- Continue education into the recognition of:
  - Historically introduced species
  - Culturally significant species to Indigenous peoples
  - Bird-dispersed genera
  - Fur/Hoof-Dispersed genera (*Galium, Bidens, Arctium*)
  - Disturbance-loving generalists



oat/ common oat; turnip; garden strawberry; barley; apple; alfalfa; poplars; cottonwoods; roses; currants; gooseberries; red raspberries; buffaloberry; wheat;

winter squash; pumpkin; green ash; chokecherry; radishes; blackberries; potato; common lilac

common hackberry; cherries; plums; boysenberry; American elm

melon; cucumber; garden pea; tomato

Learn More

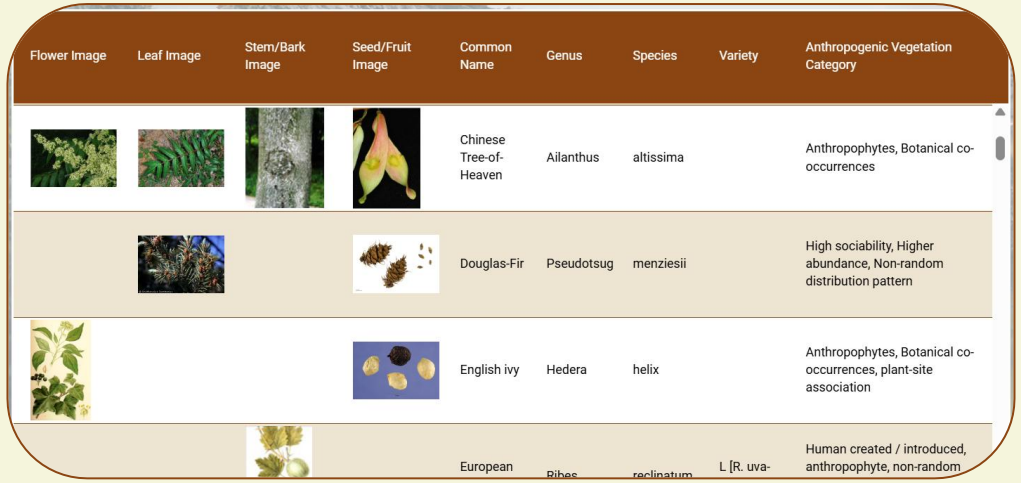
- **More** in forthcoming chapter of SHA's

Material Culture of Ethnic Diversity in the Industrial West: Cultural Convergence in Mining, Lumber, and Railroad Communities

  - See tables of what plants were historically introduced and whether they are likely to persist today
  - See the full array of anthropogenic indicators at this cemeteries in this study

- **Connect** with John at:
  - harrisanthropologicalresearch@pm.me

- **See** a working field guide for anthropogenic vegetation
  - https://www.harrisanthroresearch.com/deep-time-commons



Flower Image	Leaf Image	Stem/Bark Image	Seed/Fruit Image	Common Name	Genus	Species	Variety	Anthropogenic Vegetation Category
				Chinese Tree-of-Heaven	Ailanthus	altissima		Anthropophytes, Botanical co-occurrences
				Douglas-Fir	Pseudotsug	menziesii		High sociability, Higher abundance, Non-random distribution pattern
				English ivy	Hedera	helix		Anthropophytes, Botanical co-occurrences, plant-site association
				European	Ribes	reclinatum	L [R. uva-	Human created / introduced, anthropophyte, non-random