

Habitat Restoration Goal:

To transform the irreversibly altered land and hydrologic conditions to a mosaic of biodiverse landscapes, including forest, prairie, and ephemeral wetland, native to Milwaukee County and ecologically appropriate for new conditions. To provide measurable sustainable trajectories, within 3 to 8 years, to [long-term] target habitat goals. To incorporate, from day one, environmental literacy learning through participatory restoration and science. To provide the experience of wildness. To engender community support as measured through safe use of trails and meaningful UEC program participation.

Objectives:

Ecological Function

To enable and foster successional trajectories toward biotic goals -- thwarting invasive exotic species; facilitating the establishment of target biodiversity including conservative species; providing good land management

To maintain the integrity of the cap in perpetuity

To have working ecosystem services -- rainfall infiltration; biomass and decomposition; root development, soil structure, and soil biotics; pollinators; food chain support; viable reproduction

To support fauna habitat -- patch size; appropriate spatial and topographic arrangement; physical characteristics, enabling existing and arriving species of special concern or needed function

To be manageable -- with phasing and techniques that match resources; capable of not crashing - i.e. no big setbacks if management fails

Examples of LRP responses include: range of C values and families in seedings; effective cover crops; manageable phases; furrows and microtopographic variation to minimize runoff; species that quickly make root networks; suggest planting over seeding in flashy zones; matching species to microhabitat; providing soil composition/structure guidance; provide perches for birds, woody debris for cover, dead wood both horizontal and vertical; provide migrating bird food quickly - insect nectar spring, fruits fall; sizing and adjacency of habitat types; provide phasing options and easy "holding pattern" phases.

Examples of Land Manager responses include: promote working toward prescribed fire; continual management; adaptive management; erosion monitoring; following ecotype guidelines; establish vegetation monitoring...

Learning

Provide opportunity from beginning for deep environmental education, universally inclusive, engaging all senses

Enable participatory restoration

Become outdoor laboratory for science

Examples of LRP responses include: access to varied habitats of different phases; sufficient patch size to perceive / understand; expression of multiple successional times; look for ecorevelatory opportunities; consider plant texture, scent, sound/wind, edible; growing, planning, seeding, planting opportunities that could be manual; multi-year and multi-season restoration activities; habitat zones that facilitate monitoring.

Examples of Land Manager responses include: planning for participatory restoration; encourage monitoring plans and baselines.

Intrinsic Value of Nature

Express sense of place

Maximize biodiversity at both habitat and species level

Make examples of rare ecosystems

Examples of LRP responses include: plan locally native habitats whose transitions are ecologically coherent; allow human movement on trails to experience a variety of habitats, and varied patterns within; incorporate sensible variants of habitats, e.g. dry forest and mesic forest, dry prairie to mesic prairie; ensure resources allocated to high species diversity in seed and plants; propose oak savanna and potentially oak barrens as rarer ecosystems that could be incorporated.

Wildness

Enable individual discovery (discovery always better than being told) -- less sense of having been “designed”; landscapes that provide clues to understanding them and make sense; provide for heightened awareness

Provide mystery and promote curiosity -- multiple layers of variety and diversity; full sensory experiences

Being in a space that you want to explore

Offering isolation and the ability to linger; watching, listening and waiting to be taught by this place

Examples of LRP responses include: partially obscured other trails; local variability in species that makes ecological sense; use of patterns of species that make ecological sense; use of “visual essence” species; partially obscure views; incorporate artifacts and natural debris; make variability in provision for five senses (e.g. large seeded vs. small seeded,

minty-scented vs. soapy-scented); provide plant density variability (tied to soil types and habitat types); provide strong seasonal changes and seasonal identity.

Examples of Land Manager responses include: monitoring for opportunities to enhance wildness character.

Delight

Convey an intentional, functional, progressing, healthy restoration process -- the place looks loved; that this is nobody's front yard lets it define its own aesthetic :)

Tangible connection to home

Intuitively appreciated landscapes

Examples of LRP responses include: initially clear restoration zones and phases that fade over time; attention to species at trail edges; incorporation of pioneer species for early response; support magical views to community and surroundings; integrate community gardens; use of marker trees to develop over time; use of characteristic species; use of patterns of species that are characteristic and legible; attention to incorporating species that are seasonally characteristic for habitat.

Examples of Land Manager responses include: match management resources to phasing plan; manage for magical views; attention to plant cover and to weeds/invasives that considers both ecology and perception. This should include implementation of details that demonstrate this place is (well loved) cared for.

Habitat Character and Habitat Objectives expressed for proposed habitat types:

Riparian Forest:

Due to conditions of flashiness, siltation, and substantial weed vectors, achievable floristic quality is probably low. Examples of managed floodplain forests in protected lands in urban areas indicate a target FQI goal in the low- to mid-20s may be reasonable.

Hawthorn Glen's inventory has an FQI = 40 (n=88).

Emphasis on control of exotic species and selective planting. See LRP Part One p. 15.

Northern Mesic Forest (relict):

Here is an opportunity in support of habitat diversity goals, where conditions permit, to plant for a more northern forest. Characteristic target tree species in addition to our southern mesic species would include *Tsuga canadensis* (Hemlock) and *Betula allegheniensis* (Yellow Birch). Characteristic herbaceous species may be longest wait of any habitat here for conditions to develop. FQI goal to be determined.

Shrubland components in restoration trajectory may include *Corylus cornuta* (Beaked Hazelnut), *Diervilla lonicera* (Northern Bush Honeysuckle), *Sambucus canadensis* (Elderberry), *Viburnum lentago* (Nannyberry), *Viburnum acerfolium* (Mapleleaf Viburnum), *Cornus rugosa* (Roundleaved Dogwood), *Vaccinium angustifolium* (Low Blueberry).

Southern Mesic Forest:

Locally familiar. Characteristic target tree species for us include *Acer saccharum* (Sugar Maple), *Tilia Americana* (Basswood), *Quercus rubra* (Red Oak), *Carya cordiformis* (Bitternut Hickory), *Ostrya virginiana* (Ironwood). There are a number of characteristic herbaceous species that have a broader ecological amplitude and can be established a bit earlier than those reliant on full development of soil; these include *Geranium maculatum* (Wild Geranium), *Hydrophyllum virginianum* (Virginia Waterleaf), *Podophyllum peltatum* (Mayapple), etc. Long-term target FQI goal of 40, perhaps.

Seminary Woods (Barloga) FQI = 48 (n=98).

Homestead Woods inventory FQI = 42 (n=81).

Woods N. of Eastbrook (Barloga, includes spring-fed wetland in mesic forest) FQI = 45 (n=89).

Shrubland components in restoration trajectory may include our *Ribes* spp (Gooseberries), *Corylus americana* (American Hazelnut), *Viburnum lentago* (Nannyberry), *Viburnum prunifolium* (Blackhaw), *Viburnum rafinesquianum* (Downy Arrowwood), *Cornus racemosa* (Gray Dogwood).

For all forested types, the herbaceous cover mix to precede shrub planting is under development. It is a novel mix, to gracefully accompany the shrubs, and that will fade with eventual shade, that includes grassland perennials (e.g. *Elymus*, *Danthonia*) and annuals (e.g. *Chamaecrista fasciculata*) as well as open woods species.

Southern Dry Forest:

Oaks dominate. The southern dry forest zones will skew to the upper slopes and those with more sun exposure. This habitat is important to provide the logical transition from prairie and savanna to forest in the landscape. In addition to *Quercus alba* (White Oak), *Quercus velutina* (Black Oak), *Quercus macrocarpa* (Bur Oak), *Quercus rubra* (Red Oak), *Quercus muhlenbergii* (Chinquapin Oak), characteristic target trees include *Prunus serotina* (Black Cherry), *Carya ovata* (Shagbark Hickory), *Ulmus americana* (American Elm). Target FQI goal lower than Southern Mesic.

Shrubland components in restoration trajectory may include the brambles, *Rubus* spp, *Cornus racemosa* (Gray Dogwood), *Corylus americana* (American Hazelnut), *Ceanothus americana* (New Jersey Tea), *Rhus glabra* (Smooth Sumac). It is characteristic of this forest type that the shrub layer can be well-developed, but from fewer species. That is the kind of characteristic pattern we build upon in this restoration.

Oak Opening (Oak Savanna):

Herbaceous seeding differs from prairies in two particular ways: more forbs, and some distinctively savanna species. Seed mix to include approximately equal proportions by weight of non-conservative (C value 2-4), somewhat conservative (C value 5-7), and conservative (C value 8-10) native species.

Wisconsin savanna indicator species have been developed (UW Arboretum, etc.) -- primarily for the identification of remnant savannas, but useful in restoration. They tend to be species that prefer or even rely on the partial canopy/light conditions of savannas -- and may reach their greatest importance in these communities. They make savannas different at the ground level from prairies. In addition, if an oak opening is a bit more closed in (approaching 50% canopy cover), brambles are an important characteristic component.

An informal survey a few years ago of one local Milwaukee-area native seed nursery included availability of 180 species on UW Arboretum's savanna species reference.

Long-term target FQI goal of 50 (our proposed savanna site is 3 acres).

Genessee Depot Oak Opening (White) FQI = 65 (n=110).
[Pleasant Valley Conservancy, driftless zone, Brock) FQI = 91 (n=319)].

Dry/Mesic Prairie:

Seed mix to include 1/3 poaceae, 1/3 asteraceae, 1/6 fabaceae, and 1/6 all other families. Approximately equal proportions by weight of non-conservative (C value 2-4), somewhat conservative (C value 5-7), and conservative (C value 8-10) native species. June seeding preferable. (Fall seeding favors graminoids, and to get the desired balance, seeding costs increase). Target FQI goal to be determined.

Messenger Dry Prairie (Meyer, partial #1) FQI=32 (n=27)
Messenger Dry Prairie (Meyer, partial #2) FQI=31 (n=25)

Mesic Prairie:

Seed mix to include 1/3 poaceae, 1/3 asteraceae, 1/6 fabaceae, and 1/6 all other families. Approximately equal proportions by weight of non-conservative (C value 2-4), somewhat conservative (C value 5-7), and conservative (C value 8-10) native species. June seeding preferable. (Fall seeding favors graminoids, and to get the desired balance, seeding costs increase). Target FQI goal to be determined.

Low Prairie/Fresh Wet Meadow Complex / Prairie Swale / Shrubswamp / Prairie Stormwater Swale:

These habitats form a matrix of transitional grassland habitat to manage stormwater flow, to support the possibility of ephemeral wetlands, to have interaction with river flows as well as some degree of groundwater connection at lowest elevations. To provide this function, and to cope with flashiness, siltation, and significant weed seed vector along the river corridor, will require somewhat novel communities that reflect natural communities in part but not in whole. Target FQI is relatively low, due to the novel conditions as well as the likely perpetual weed competition.

For example, at the lowest elevations, although the community could bear some resemblance to sedge meadow, a gentled slope leading to riprap will not likely support *Carex stricta* (Tussock Sedge), a dominant of that natural community. However, other *Carex* species, *Glyceria*, *Calamagrostis*, *Spartina*, as well as non-graminoids, can be part of a successful mix.

In the upper stormwater swales, *Juncus dudleyi* (Dudley's Rush), *Eupatorium perfoliatum* (Boneset), and *Solidago ridellii* (Riddell's Goldenrod) are characteristic in the mix.

We recommend planting rather than seeding these areas, because they are impacted by floodwaters and stormwater, and also because a number of these species are not available by seed. When revised cost estimate is developed, if budget does not permit planting the full area, priority will go to the Low Prairie and 100-year zone and to the Shrubswamp / Prairie Stormwater Swale (the high and the low zones).