



Sundew Consultants

Plants • People • Places

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Leddy Park August 2022 Draft Ecosystem Health Assessment

I. Overview:

Leddy Park is one of the most visited parks in Burlington owing to its popular beach, ice-skating rink, ball-courts, and playing fields. With the natural ecosystems dissected by these roads and buildings it would be easy to assume Leddy Park is ecologically insignificant. In fact, as we have discovered, Leddy Park serves to conserve a rare natural forest community and some of Burlington's oldest and grandest trees.

In August 2022, we surveyed the Leddy Park on foot, visiting all sectors. To date we have conducted five hours of field work and spent five hours of time researching and documenting our findings. The following synopsis provides our sense of the ecological health of Leddy Park and our suggested action plan to maintain and improve it into the future.

II. Findings:

Leddy Park is situated on river delta sands deposited by the Winooski River into the Champlain Sea 9,000 thousand years ago. These flat and well-drained 'sand-plain' soils are common along the Winooski in Chittenden County; however, because they are highly sought after for development, they have rarely been preserved as intact natural ecosystems. Of the estimated 15,000 acres of sandplain forest originally found in pre-settlement Chittenden County, only 6.7% remain as intact forest. As such, Leddy Park conserves a rare natural community in Vermont. Leddy Park also conserves significant stands of large trees, upwards of 200 years old. These stands of mature trees are awe-inspiring and unique in the Burlington area. These tree stands could serve as a point of attraction if Leddy Park were programmed as a destination for the appreciation of nature.

III. Factors Influencing Highest Priority Conservation Areas:

1. Land-use History

Land-use history is the most important driver of forest health and conservation priorities in Leddy Park. This history is not uniform, and changes made over a century ago persist today. A 1937 aerial photograph shows that the south-western portion of the Leddy Park was covered by mature oak and pine forests (Fig. 1A). Our field surveys confirm they are still there and thriving. These stately, mature trees with full canopies presiding over diverse shrub and

herbaceous understories comprise one of the largest stands of full-size trees in the city of Burlington. These areas currently occupy about 33 acres, or one-half of the total park space; they should be of the highest conservation priority. The same 1937 photograph show that the north-eastern portions of the park were cleared for pasture. These previously cleared areas are either now used as playing fields, or they have been replanted with white and red pines, or they have naturally reverted to younger, successional forests (Fig. 1B). These areas currently occupy about 33 acres, or one-half of the total park area. Successional forests are important, they will eventually become rich ecosystems themselves, but parks serve the needs of many stakeholders, and as such we designate these portions of Leddy Park with a lower conservation priority (Fig. 1C,D).

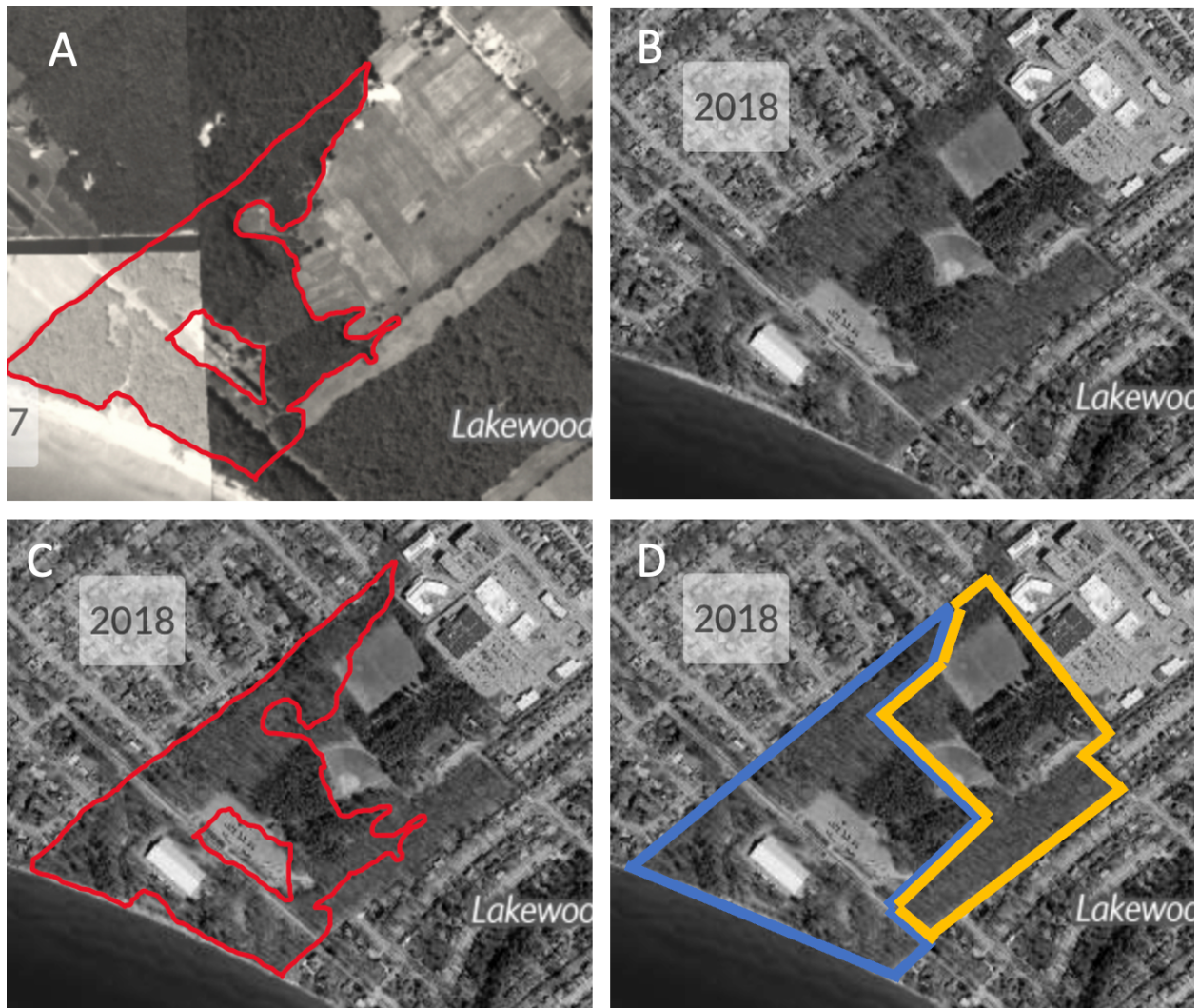


Figure 1. Leddy Park Then and Now A-D. A) Aerial photograph taken 1937 with forested areas outlined in red. B) Aerial photograph taken 2018. C) Aerial photograph taken 2018 with 1937 forested areas overlain. D) Designated conservation priorities; blue areas are of highest priority; yellow areas are lower priority.

2. Hydrology:

After land-use history, water is the factor that most influences the diversity and composition of forests in Leddy Park. Most of the forest in Leddy Park are moderately moist and are designated as a “Mesic Pine-Oak Sandplain Forest” (Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont, 2019).* These forests are characterized by prominent white pine, red oak, black oak, red maple, and hemlock trees, with maple-leaf viburnum common in the shrub layer (Fig. 2A). The large full-grown oaks include red oak, black oak, white oak, and scarlet oak. Oaks support more biodiversity than any other tree type in our region; a single full-grown individual can support upwards of 500 species of caterpillars, which are critical food sources for our native songbirds. Oaks are also particularly good at carbon sequestration and at putting carbon into soils. The uncommon stature of these oaks is awe-inspiring and are a treasure for the city of Burlington. They have great potential as a point of attraction if Leddy Park were activated with nature-appreciation in mind.

Terrain also influences the movement of water, and although Leddy Park is generally flat, it gradually slopes towards the southwest. The water table at the base of these slopes is higher and support a higher diversity of tree species e.g. Yellow and Black birch, and a lush herbaceous understory including many wetland plants e.g. Cinnamon fern, and Skunk-cabbage. The composition of species in these species approaches the natural community designation of a “Sand Over Clay Forest”, a rare natural community statewide (Fig. 2A). We also found large populations of Pokeweed in the understory here. Pokeweed is at the northern edge of its range in Vermont, and an example of a species expanding its range northwards with climate change. Its presence here is a welcome addition to the native flora of the park as an understory species that is successfully adapting its range to a warmer climate.

Nestled in the center of Leddy Park is a mature stand of white pine (Fig. 2B). These trees were mature in the 1937 aerial photograph, and we infer that the original sandplain forests of this area were felled and then regenerated with white pine by 1937. These large and mature trees support an unusually rich understory of plants uncommon in the Champlain lowlands e.g. hobblebush and blue-bead Lilly. Although younger than the nearby oaks, these massive pines are equally impressive in size, and could also serve as a point of attraction if Leddy Park were activated with nature-appreciation in mind.

Leddy Park abuts Lake Champlain along its southwestern edge. Here, at the water’s edge, the sandplain forests grade into Lakeside bluff plant communities characterized by native grasses and sedges, and a shrub layer of heaths, e.g. blueberry and huckleberry (Fig. 2C). These sandy bluffs are delicate and easily eroded. Pleasure trails are abundant where visitors stake out sites for picnics and other activities with a view of the lake in mind.

The southwestern edge of the park is also where ground-water movement is most prevalent. Two seeps emerge along the western sides of the bike path (Fig. 2D), which was originally built as the railway bed for the Vermont Railway in 1849. Ground water seeps are common and natural features, but perhaps owing the disturbance of both the railway and a former rendering plant (now the site of the ice arena) and more intense rainfall events due to climate change, the northern of the two seep-fed streams is rapidly eroding its banks. The more southern seep is controlled with a culvert. Sand is easily eroded, and although the total amount of water is low, the northern seep has cut through the ~20 feet down to a layer of clay beneath

the alluvial sands. Trees are being taken by the rapidly eroding banks, and invasive species are colonizing the open slopes. We disagree a previous ecological assessment that characterized these seeps as “important open-water tributaries to the lake used by freshwater

*This natural community was formerly known as White Pine-Red Oak-Black Oak Forest.

mussels and fish.” We find that these seeps are entirely derived from groundwater (as would be evidenced by their 47 degree year around temperature) and are mostly devoid of life when they emerge from the soil. Animals use them as habitat, we saw green frogs and raccoon tracks along the bank, and they are certainly important features of the local ecology. However, previous descriptions may have over-stated their biological diversity.

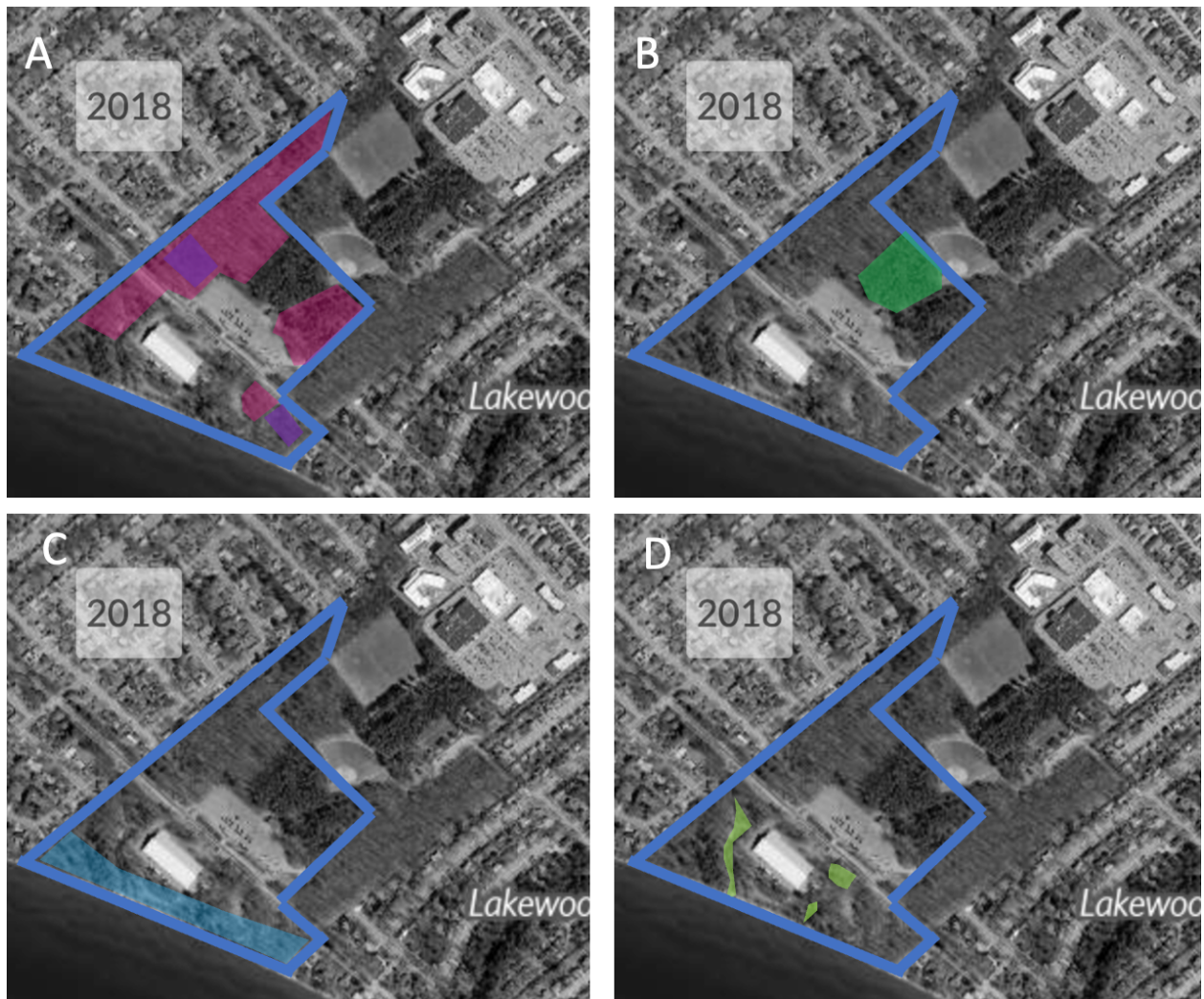


Figure 2. Specific features within the mature forest area of Leddy Park. A) Areas of mature pine-oak sandplain forest; pink designates mesic areas, purple designates moist soils supporting a higher diversity of tree species and wetland herbaceous plants in the understory. B) A mature stand of white pine over 100 yrs old supporting a lush understory. C) Lakeside sandy bluff community. D) Ground water seeps forming lakeside tributaries.

IV. Factors Influencing Lower Priority Conservation Areas

The lower conservation priority areas of Leddy Park are comprised of early successional forests, planted stands of red and white pine, and athletic fields. They cover about 33 acres, about one-half of the total park space. The successional forests differ from the mature sandplain forests by more abundant maples, e.g. sugar maple, red maple, and striped maple. They also have a higher incidence of invasive species e.g. Norway maple, burning bush, climbing bittersweet. Southeastern corner of the park has great oaks along road that show on the 1937 aerial photo. This is the edge of an early successional pasture with landmark oaks filling in with red maple. About four acres of Leddy Park is occupied by a square plot of white pine planted in rows. The understory of poison ivy in this plot is mowed and maintained as open and sits adjacent to the southeast edge of the soccer field. Except for the poison ivy, we find that this plot and an adjacent red pine plot would be most suited ecologically for active forest recreation and trails.

Forest Inventory by Section — *Synopsis of plant communities*

Mesic pine-oak sand plain forest (Fig. 2a). Canopy: Red oak (*Quercus rubra*), black oak (*Quercus marilandica*), , white oak (*Quercus alba*), crimson oak (*Quercus coccinea*), white pine (*Pinus strobus*), eastern hemlock (*Tsuga canadensis*), red maple (*Acer rubra*), black cherry (*Prunus serotina*), black birch (*Betula lenta*), Midstory: striped maple (*Acer pennsylvanica*), pin cherry (*Prunus pennsylvanica*), witch hazel (*Hamamelis virginiana*), alternate-leaved dogwood (*Cornus alternifolia*), beaked hazle-nut (*Corylus cornuta*). Understory: Maple-leaved viburnum (*Viburnum acerifolium*), elderberry (*Sambucus sp.*), false solomon's seal (*Maianthemum racemosum*), red trillium (*Trillium erectum*), jumpseed (*Persicaria virginiana*), canada mayflower (*Maianthemum canadense*), poison-ivy (*Toxicodendron radicans*), sarsaparilla (*Aralia nudicaulis*), ghost pipe (*Monotropa uniflora*), enchanter's nightshade (*Circaea lutetiana*), virginia-creeper (*Parthenocissus virginiana*), wild grape (*Vitis spp.*), raspberries (*Rubus spp.*), bracken fern (*Pteridium aquilinum*), lady fern (*Athyrium angustum*), interrupted fern (*Osmunda claytonii*), new-york fern (*Amauropelta novaboracensis*), pokeweed (*Phytolacca americana*). Wetter areas and seeps: yellow birch (*Betula alleghaniensis*), skunk cabbage (*Symplocarpus foetidus*), jewel weed (*Impatiens capensis*), christmas fern (*Polystichum acrostichoides*), jack-in-the-pulpit (*Arisaema triphyllum*), Cinnamon fern (*Osmundastrum cinnamomeum*), ostrich fern (*Matteuccia struthiopteris*), sensitive fern (*Onoclea sensibilis*), marsh fern (*Thelypteris palustris*). Introduced and invasive species: scotch pine (*Pinus sylvestris*), oriental bittersweet (*Celastrus orbiculatus*), buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Frangula alnus*), black nightshade (*Solanum nigrum*).

Mature white pine forest Fig. 2b). Canopy: white pine. Mid- and understory similar to the mesic pine-oak sand plain forest, but differing by the inclusion of hobblebush (*Viburnum lantanooides*), blue-bead lilly (*Clintonia borealis*), and intermediate wood fern (*Dryopteris intermedia*).

Successional sand-plain forest (Fig. 3a). Canopy: Red maple (*Acer rubra*), black cherry (*Prunus serotina*), black birch (*Betula lenta*), gray birch (*Betula populifolia*), sugar maple (*Acer saccharum*), big-tooth aspen (*Populus grandidentata*). Midstory: striped maple (*Acer pennsylvanica*), pin cherry (*Prunus pennsylvanica*), alternate-leaved dogwood (*Cornus alternifolia*), witch hazel (*Hamamelis virginiana*), beaked hazle-nut (*Corylus cornuta*). Introduced and invasive species: norway maple (*Acer platanoides*), hedge maple (*Acer campestre*), oriental bittersweet (*Celastrus orbiculatus*), burning bush (*Euonymus alatus*), Japanses yew (*Taxus cuspidata*), buckthorn (*Rhamnus cathartica*), garlic mustard (*Alliaria petiolata*), greater celandine (*Chelidonium majus*), black nightshade (*Solanum ptychanthum*), creeping yellow-cress (*Rorripa sylvestris*).

Lakeside sandy bluff community (Fig. 3c). Canopy: eastern cottonwood (*Populus deltoides*), red oak (*Quercus rubra*), white oak (*Quercus alba*), white pine (*Pinus strobus*), red pine (*Pinus rigida*). Mid- and understory: huckleberry (*Gaylussacia baccata*), blue-stem goldenrod (*Solidago caesia*), virginia creeper (*Parthenocissus quinquefolia*), wild grape (*Vitis spp.*), Asters (e.g. *Symphiotrichum spp.*), poison ivy (*Toxicodendron radicans*).

Restoration Areas — *Places requiring intervention to restore health*

Mesic pine-oak sand plain forest. A major threats to this community in Leddy park is the unchecked groundwater seep toward the western side that is rapidly eroding the sandy soils. A plan to slow erosion should be developed.

Successional sand-plain forest would benefit from removal of listed invasive species. In comparison the mature forests, these successional forests are more heavily infested with invasive species. These species are also present in the forest interior, whereas in the mature forests they are largely restricted to the edges. Removing listed invasive species would improve the liklihood of maintaining forest health into the future.

Lakeside bluff community includes robust trees and diverse herbaceous plants. The lakeside sandy bluffs are naturally eroding, but in some portions this is exacerbated by unofficial trails. Some trail maintanance and closure is warranted. The sandy beach itself is also home to many of Lake Champlain’s rare species of plants and invertebrates. Given that Leddy Park beach is a major attraction for visitors, our expectations for conservation and remediation are limited. One suggestion is that the two ends of the beach that are already less visited, be cordoned off, and allowed to revegetate. We suggest that ATVs and other park vehicals refrain from driving on the beach, and that the beach should not be raked.

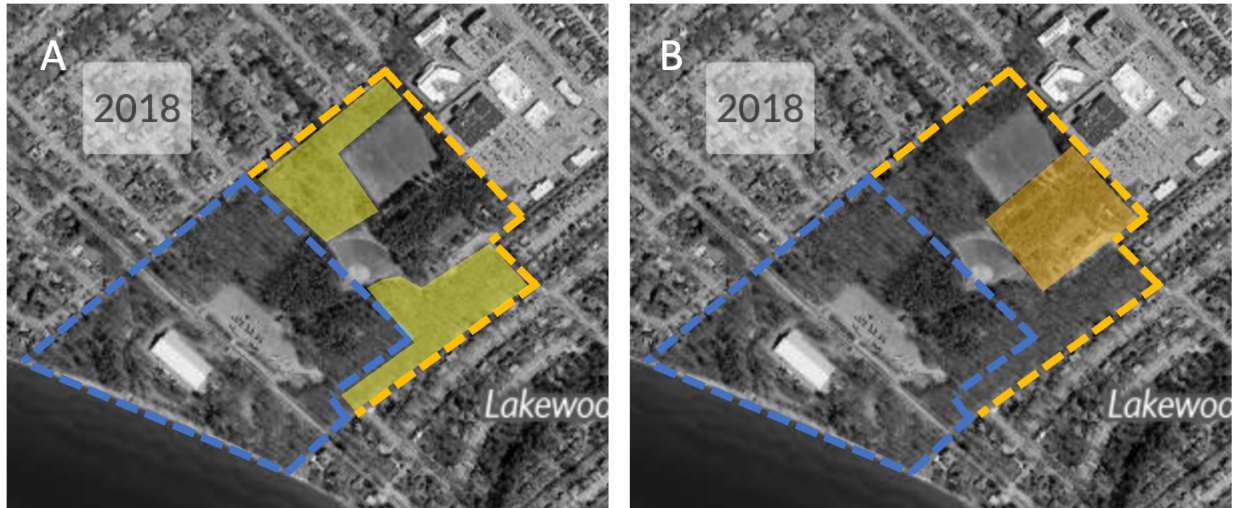


Figure 3. Specific features within the conservation low-priority areas of Leddy Park. A) Successional sand-plain forest. B) Planted stands of white and red pine, and mowed lawns.

Transformation Areas — Places where transformation will restore health

Planted stands of white pine (Fig. 3b). The grounds beneath these mature trees are mowed and maintained as lawns. Instead of restoring this area, we suggest that it be transformed and optimized for mixed use. The shade of the mature trees would facilitate many uses by people. One obstacle is the abundant poison ivy growing at the bases of many trees.

Plants stands of red pine (Fig. 3b). Similar to the larger white pine stands, the grounds beneath these mature red pine trees are mowed and maintained as lawns. Instead of restoring this area, we suggest that it be transformed and optimized for mixed use.

Mowed lawns besides restrooms and parking areas (Fig. 3b). Leddy Park includes mowed ball fields and playing fields which are obviously a main attraction for visitors. Leddy also includes mowed areas that areas do not serve any specific human or ecosystem function, such as the lawns adjacent to the bathrooms and along the parking area. We suggest transforming these lawns into natural meadows. Meadows are heavily used by wildlife and attractive to visitors. Meadows can be made with intention by planting native species, or simply allowed to revegetate themselves. Regeneration happens quickly even without intervention. Mowing can be minimized to maintained paths and sightlines for traffic where needed. Overtime, we expect that this shift away from intensive moving will help lower the operating costs of the park.

Questions for the Parks Planning Team:

- When and why was Leddy Park acquired?
- Do you want us to more finely map areas that would lend themselves to the creation of new habitat for pollinators and other wildlife from existing lawn? Kate Kruesi would be a great one to involve in this effort.
- Is it important to include more cultural history, i.e. information related to the farming and the rendering plant?
- We focused on the terrestrial ecology, but there is an opportunity at Leddy Park to stop raking parts of the beach to allowing new potential habitat to develop for rare sand beach species found further south at Elk's Beach.