Wetlands at Luther Burbank Park: Characterization and Interpretive Signage

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1. Executive Summary

This report aims to characterize the northern wetland at Luther Burbank Park and use the characterization to inform ideas for interpretive signage. Since the wetlands are in a public recreation area, effective restoration depends in part on public respect. Signage could help foster an empathetic relationship between the public and wetland ecosystems, thus increasing respect through individual action and desire to keep funding habitat restoration projects at the park.

The wetlands at Luther Burbank Park are a small fraction of the watershed overall and activities in them are not likely to have a significant impact on it. However, their visibility at the park is an opportunity to increase public support for wetlands overall through education.

2. Why Signage?

With the modern ubiquity of smartphones, there are many digital tools for learning about natural subjects. Plant apps and online resources are abundant both in and out of natural areas. In the classroom, the oft-cited tool *Supermarket Botany* (Burrows and Harper 2019) helps students explore botanical concepts online with grocery-store foods that are familiar to them, making esoteric concepts more accessible. In another classroom study, *Mobile Botany*, some teachers noticed that students engaged more with biology labs when they took pictures with their mobile phones and shared them with each other (Harper et. al. 2015). Out in the parks, some places have experimented with engaging visitors with mobile apps such as Nature Sleuths that guide visitors through natural scavenger hunts (Stream Team 2023).

However, digital experiences or enhancements like apps, social media, and QR codes have two major drawbacks: maintenance and distraction. The latter is a more pressing problem. Many people could recall an experience walking through a natural area, seeing something interesting, and taking out their phone to take a picture. The shutter clicks, and the camera closes, revealing other notifications: a text from a friend or family member, or a live Instagram feed. Out of habit, they click on it. The visitor's head is bent over their phone, now caught in the infinite digital world.

Some studies show just having a phone around can distract from empathetic experiences. It may not even take an alert to be distracted (Heitmayer 2022). A study experimenting with developing new friendships "indicates the mere presence of mobile phones inhibited the development of interpersonal closeness and trust, and reduced the extent to which individuals felt empathy and understanding from their partners" (Pryzbylski 2012). If this can happen with social interactions, some of the most engaging experiences, imagine how it detracts from empathy with plants, which are underappreciated even by biology students (Colon et. al. 2020). The distraction itself can also be quite toxic: The famous data from a Facebook whistleblower found that "Instagram is harmful for a sizable percentage of [young users], most notably teenage girls" (Facebook 2021). The company's information showed use of the social media app even tragically contributed to suicidal ideation.

Distractions from cell phones in natural settings are unfortunate because nature itself is a healing place for many people. As more attention has been given to mental health, the number of studies on nature as a therapeutic tool have increased. A systematic review of studies on the topic found that "[m]ost articles…observed at least one positive association between nature-based recreation and mental health, including improvements in affect, cognition, restoration, and well-being, and decreases in anxiety and depression symptoms" (Lackey 2021). Scientific studies on the benefits of interacting with nature have largely been biased toward "Western societies" in high latitudes (Keniger 2013), but Mercer Island is represented by those qualifiers. Interpretive signs that

encourage in-the-moment engagement with nature, without causing distractions from potentially harmful devices, could increase wellness with visitors at Mercer Island.

Interpretive signage is still an effective tool. Organizations such as the University of Washington Botanic Gardens reap rewards from investing effort in education and interpretive signage. The Union Bay Natural Area and Shoreline Management Guidelines states, “community perception of the site improves during the presence of restoration activity and interpretive signage explaining how projects benefit the environment” (Ewing, 2010).

Lessons in engagement can still be gained from digital tools, however. *Supermarket Botany*, *Mobile Botany*, and plant identification apps show some strategies for creating a successful educational experience: Relate the subject plants or environments to more familiar ones, encourage the students to share with others, and encourage visitors to explore their environment. The goal for this project is to create signage that can accomplish those same things.

The goal to teach facts should not overrule the benefits of mindful engagement in nature. Interpretive signage can accomplish teaching without encouraging smartphone use, which can distract and decrease empathy in the moment. Instead, the signs themselves should be more engaging. The goal for this project is to create signage that goes beyond dry facts by posing interesting questions that relate to the viewer’s life and encouraging the viewer to engage in the moment and share their experience with someone.

3. Wetland Characterization

3.1 Introduction

Luther Burbank Park (LBP) is a public park in the Northeastern area of Mercer Island. It has been significantly altered throughout history, starting in the 1880s with clearing and agriculture (Lund 2012). The hydrology of the LPB wetlands was significantly altered in 1916 when the Chittenden Locks and Montlake Cut lowered Lake Washington by about 10 feet. This major event permanently exposed the existing wetlands to open air, leaving them to die. The current wetlands at LBP would have been underwater 100 years ago, making them a relatively new ecosystem.

After 1916, the park became a joint farm and school, until King County purchased the site in 1969. The county focused on managing the historical buildings in the park, rather than the environment. 30 years later in 2002, the City of Mercer Island officially took charge of the site and began restoring the wetlands and other vegetation, while keeping high emphasis on recreational activities (City of Mercer Island n.d.).

3.2 Methods

The wetland characterization included pre-site online research and one site visit. Online research included gathering information and reference figures from the following sources:

- The US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) Wetlands Mapper (USFWS 2022)
- Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS 2022)
- King County Parcel Viewer (King County 2022)
- Puget Sound Watershed Characterization Project (Ecology 2013)

The field site visit occurred on February 15th, 2022 and assessed vegetation, soil, and hydrology indicators according to US Army Corps of Engineers (USACE) methods. This included filling out Wetland Determination Data Forms (USACE 2010) using the Corps of Engineers Wetland Delineation Manual (USACE 1987) and Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region (USACE 2010).

This study focuses on the North Wetland at LBP. A weir separates the wetland into two units; Unit 1 to the north by the lakeshore, and Unit 2 to the south. Data forms were filled at two sample sites for each wetland unit, and an additional site for an upland area (five sites in total, shown in Figure 1). Vegetation was assessed with a radius of 15 feet for trees, 10 feet for shrubs, and 5 feet for herbs and woody vines. Soil pits were dug to a depth of 18-inches, colored with Munsell Soil-Color Charts (Munsell Color 2015), and assessed for indicators according to Field Indicators of Hydric Soils in the United States (NRCS 2018). Hydrology indicators were assessed visually. After the sample sites were completed, Unit 1 was rated according to the methods of the Washington State Wetland Rating System for Western Washington (Hruby 2014). See the appendix for the completed data and rating forms.

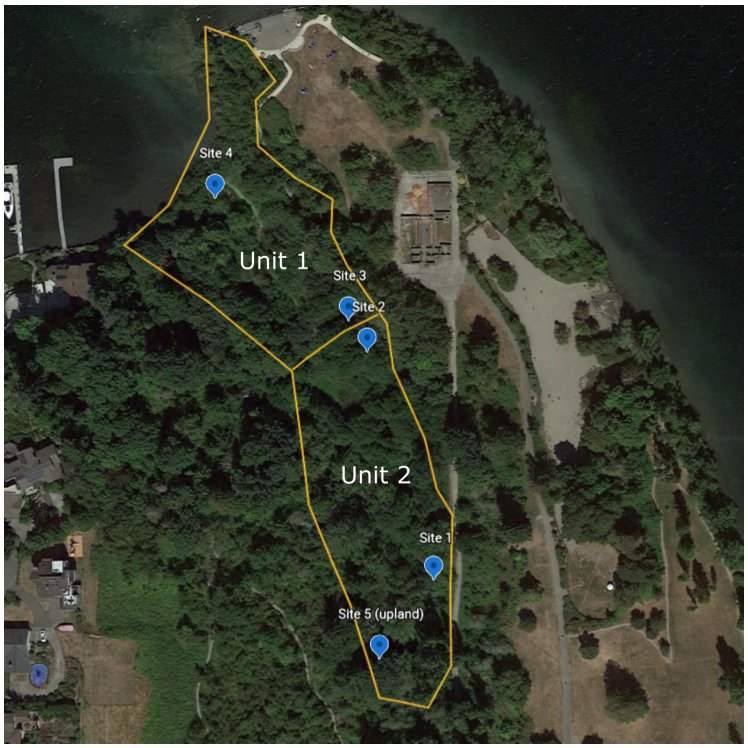


Figure 1: North Wetland at LBP Separated into two units with five sample sites

3.3 Landscape Setting

LBP is on Mercer Island, an isolated body of land in the south end of Lake Washington. The lake was drained into Puget Sound by human activity in 1916, lowering it by 10 feet. Lake Washington is near the bottom of WRIA 8, so improvements on Mercer Island may have little impact on the watershed overall. The area on the island and surrounding the lake are largely developed rather than natural habitat, and many 303d listed waters feed into it.

The *Puget Sound Watershed Characterization Project* places LBP in Assessment Unit 8138 (one of three on Mercer Island). Unit 8138 is rated low overall for restoration and protection in regards to water flow processes and has the lowest importance to fish and wildlife habitats. The characterization recommends protection of sinks for water quality.

3.4 Regulatory Setting

The wetlands at LBP are regulated on a city, county, state, and national level, as wetlands and shoreline. The wetlands are in the City of Mercer Island in King County, Washington. The North Wetland is in parcel 0124049002 and the South Wetland is in parcel 0724059054. (King County 2022).

At a national level, Lake Washington is listed as a Navigable Water of the US by the US Army Corps of Engineers (USACE) Seattle District in Chapter IV of their *Permit Guidebook* (USACE 2008). As the wetlands in Luther Burbank Park are adjacent to Lake Washington, they are also included under the definition (The Navigable Waters Protection Rule 2020) and are thus regulated by the Corps (see Chapter I of the *Permit Guidebook*).

Overall, activity on this site must have/be consistent with:

- a 401 Water Quality Certification (WQC), which can be administered by Ecology, EPA, or approved Tribes.
- Coastal Zone Management Act (CZMA) under Ecology's authority
- Endangered Species Act under National Marine Fisheries Service (NMFS) and US Fish and Wildlife Services (USFWS)
    - The USFWS's iPaC system (USFWS 2022) lists Marbled Murrelet (*Brachyramphus marmoratus*), Streaked Horned Lark (*Eremophila alpestris strigata*), Yellow-billed Cuckoo (*Coccyzus americanus*), Bull Trout (*Salvelinus confluentus*), and Monarch Butterfly (*Danaus plexippus*) as endangered species present in the area.
- National Historic Preservation Act (NHPA)
- Magnuson-Stevens Act/Essential Fish Habitat (EFH) regulated by NOAA
    - The Essential Fish Habitat Mapper (NOAA Fisheries 2021) lists Lake WA as EFH for Groundfish, Chinook Salmon, and Coho Salmon. Salmonscape (WDFW 2022a) additionally maps Puget Sound/Strait of Georgia Chum Salmon and Puget Sound Steelhead in Lake Washington.

On a city level, several sections of Mercer Island City Code apply to the wetlands. Sections 18.24.020 and 8.24.03 define and prohibit "public nuisances" that could disturb wetlands. Section 15.09.040 allows discharges from wetlands to storm and surface water system and ground waters unless they are polluting. Most of the applicable code is in Title 19 (Unified Land Development Code). The full list of Title 19 sections is as follows:

- Chapter 19.02 (Residential)
    - 19.02.020 prohibits designs for future subdivisions that would require modifications to wetlands
- Chapter 19.07 (Environment)
    - Includes several sections that establish review criteria and protection of wetlands
- Chapter 19.10 (Trees)
    - 19.10.050 establishes conditions of tree removal in wetlands
- Chapter 19.13 (Shoreline Master Program)
    - 19.13.010 establishes buffers for wetland categories
    - 19.13.050 establishes detailed development requirements along shorelines, including wetlands
- Chapter 19.16
    - 19.16.010 defines many terms related to wetlands

The wetlands at Luther Burbank Park are also in shoreline jurisdiction. A map created for the City of Mercer Island's Shoreline Master Program labels the shorelines in Luther Burbank Park as "Urban Park Environment," one of the shoreline designations defined in MICC 19.13.030 (City of Mercer Island 2010). The Luther Burbank Park Master Plan also states the "North and south wetlands are the 'bookends' to the Luther Burbank shoreline" (Berger Partnership PS 2006). While the latter could be up for interpretation on whether "bookend" means "included," the map clearly includes the wetlands in the shoreline designation.

3.5 Hydrology

Unit 1 is lacustrine fringe and Unit 2 is depressional. A culvert at the southern end diverts water (likely collected runoff from nearby developed areas) into Unit 2, which may ultimately flow into Unit 1, though there was no notable flow over the weir at the time of the site visit. Unit 1 receives backwater from Lake Washington during high lake levels and high wave action. Both units receive water from surface water runoff, groundwater, and precipitation.

Both units had high surface water, high water table, and saturation. Unit 1 had a distinctly stronger hydrogen sulfide indicator.

3.6 Vegetation

Unit 1 meets the Cowardin classifications of lacustrine emergent and scrub-shrub. Red alder (*Alnus rubra,* FAC), willow (*Salix spp.*, FACW) and reed canary grass (*Phalaris arundinacea*, FACW) were dominant throughout Unit 1. Sedges (*Carex spp.*, FAC) were also dominant near the weir and common duckweed (*Lemna minor*, OBL) was dominant near the lakeshore.

Unit 2 meets the Cowardin classifications of palustrine emergent and scrub-shrub. Red alder, red-osier dogwood (*Cornus sericea*, FACW), and creeping buttercup (*Ranunculus repens*, FAC) were dominant throughout Unit 2. The southern border of the wetland overlaps with restoration areas, where there were plantings of Sitka spruce (*Picea sitchensis*, FAC) and Western Red Cedar (*Thuja plicata*, FAC) in various health conditions. All the dominant species in Units 1 and 2 indicated hydrophytic vegetation.

Big leaf maple (*Acer macrophyllum*, FACU), trailing blackberry (*Rubus ursinus*, FACU), Himalayan blackberry (*Rubus bifrons*, FAC), and sword fern (*Polystichum munitum*, FACU) dominated the upland area. These are not hydrophytic vegetation.

Notably, the National Wetlands Inventory (NWI) maps the entire wetland as PEM1C (Palustrine Emergent), but this did not align with findings at the site. This is possibly due to growth since the

last mapping update, or a target mapping unit that did not capture all the Cowardin wetland types observed in the field.

3.7 Soils

The NRCS Web Soil Survey (NRCS 2022) maps Unit 1 with Puget silty clay loam (Hydric rating 100) and Unit 2 with Kitsap silt loam (Hydric rating 3). All four wetland sample sites met hydric soil indicators. Sites 2, 3, and 4 had organic soils. Tables for Site 1 (Unit 2) and Site 4 (Unit 1) are shown below as examples.

Table 1. Site 1 (Unit 2)

Depth (in. below surface)	Munsell Color	Redox features	Texture	Hydric Indicator of diagnostic layer
0-7	10YR 3/2		Sandy clay	
7-18	10YR 4/1	10YR 5/8	Sandy clay	F3

Table 2. Site 4 (Unit 1)

Depth (in. below surface)	Munsell color	Redox features	Texture	Hydric indicator of diagnostic layer
0-3.5	10YR 4/2	10YR 5/8	organic	A1, A4
3.5-18	10YR 4/2	10YR 5/8	organic	A1, F3, A4

3.8 Wetland rating

The wetland functions were assessed according to the *Washington State Rating System for Western Washington: 2014 Update* (Hruby 2014). The functional assessment in this study is limited to Unit 1, assessed as Lake Fringe because it is adjacent to Lake Washington. According to the field assessment, Unit 1 is Category II. It scored 22 out of 27 points overall, with eight points for Improving Water Quality, seven for Hydrologic Function, and seven for Habitat. It rated higher in Improving Water Quality due to its prevalence and diversity of vegetation and proximity to polluting sources including power boats in Lake Washington, 303d listed waters in the basin, and significant development around the park.

Water Quality Functions

For water quality functions, Unit 1 rates high for site and landscape potential, but medium for value. Site potential is based on the cover of plants along the lakeshore and the wetland overall; vegetative cover in Unit 1 extends farther than 33 feet from the lakeshore and covers between 66%-90% of the wetland, so Unit 1 has high site potential for water quality improvement. Unit 1 also rates high in landscape potential because there are many sources of pollution nearby that it could potentially clean, including power boats and algal blooms in Lake Washington and the residential and recreational areas around the wetland. The unit rates only medium for the value of its water quality improvements because Lake Washington is not on the 303(d) list nor does it have a TMDL, though several 303(d) listed waters do run into the lake.

Hydrologic Functions

For hydrologic functions, Unit 1 rates high in landscape potential and value, but low in site potential. It rates low in site potential because the average width of Scrub-shrub or Forested wetland along the lakeshore is less than 33 feet. It rates high in landscape potential because the fetch on the lake side of the unit is close to five miles (far above the one mile requirement) and there are powerboats with more than ten hp in Lake Washington. It also rates high in value because there are houses along the shore within 25 feet of the wetland.

Habitat Functions

For habitat functions, Unit 1 rates high in site potential and value, but low in landscape potential. It rates high in site potential because it has diverse plants, plant communities, hydroperiods, and habitat features. It rates low in landscape potential because the wetland is part of a recreational facility surrounded by many intensely developed cities, so it is not part of easily accessible continuous habitat for wildlife. However, the City of Mercer Island's Shoreline Master Plan (City of Mercer Island 2010) recognizes the wetlands at LBP as important, so it is considered valuable to society and rates high in that category.

3.9 Conclusion

While their impact to the overall watershed may be low, the wetlands are worth protecting for their diversity of plant communities and hydroperiods, proximity to Lake Washington, and recreational value to society. The City of Mercer Island confirms this in its shoreline master plan, which designates the park as "Urban Park Environment," placing it in shoreline jurisdiction (City of Mercer Island 2010). The *Luther Burbank Park Master Plan* (Berger Partnership 2006) also emphasizes wetland restoration for habitat, erosion control, and recreation.

The City of Mercer Island requires a buffer of 75-110ft for Category II wetlands in MICC 19.07.190(C). Unit 2 would likely be rated lower (as concluded in prior delineations commissioned by the city) and thus require a lower buffer, but it is worth considering the impacts to Unit 1 while planning a project.

4. Signage

Current signage at LBP focuses on shoreline restoration projects, and is absent in the wetland areas beyond reminders to stay on the boardwalk. The shoreline signage includes descriptive diagrams linked to many paragraphs explaining the history of LBP's shorelines and the goals of restoring them, from ecological to human impact. The information is dense, dry, and in some cases out of the way.

New signage will focus on the wetlands and upland buffers at LBP. The new designs focus on themes inspired by the LBP Master Plan (Berger 2006) and are guided by interpretive principles from standard practice and inspiration from more modern digital tools. Currently, the wetlands at LBP are not highlighted; they are easy to walk past without considering their value, despite the boardwalk that runs through them. The goal for the new signage is to go beyond dry facts by posing interesting questions that relate to the viewer's life and encouraging the viewer to engage in the moment and share their experience with each other.

It is conceptual, and there are no plans to install it at the time of this writing.

4.1 Guidance

Guidance for the conceptual interpretive signage comes from the Luther Burbank Master Plan (Berger 2006) and Tilden's Six Principles for interpretation (NPS 2018). The Washington Park Arboretum also has detailed guidelines on how to create signage, including how to present information, color choices, material choices, etc. (Ernst, 2005). The Master Plan states the following guiding principles as "key elements shaping the park into the future":

- Embrace natural systems
- Maintain the character
- Manage vegetation
- Improve park infrastructure
- Improve the arrival

The longer descriptions of these values include desires to maintain the park's serenity and improve the park's aesthetics, cohesiveness, and habitat function (by planting native species and removing invasives).

For this project, guidance from Tilden's Six Principles can be distilled to the following goals:

- Relate the wetland to the personality or experience of the visitor

- Aim not to instruct, but to provoke
- Present the wetland as a whole, rather than a part

Based on work by Jessica Colon (et. al.) addressing plant blindness, the signs are also kept simple. In their experience with undergraduate students, “students disconnect from plants the moment they are overwhelmed with scientific jargon or with too many examples of plant adaptations and features” (Colon 2020). The group also used ethnobotany to increase engagement, similar to how *Supermarket Botany* relates new plants to grocery store foods. Some information regarding plant use has been included in the signs for that reason, but information about use by indigenous peoples has been left out. There was not sufficient time in this project to develop meaningful relationships with relevant Tribes to ensure information was displayed accurately and respectfully. Ideally, this information would be included in a continuation of this project.

Aesthetically, signage should be designed in layers, where a passerby can gain increasing information from a glance to a deep reading.

4.2 Design Process

There are many ways to approach the design process for interpretive signage. In this case, the steps were generally as follows:

1. Observe and characterize site
2. Brainstorm themes and objectives
3. Write word content for chosen themes
4. Sketch placeholder images
5. Layout word blocks and images
6. Collect feedback

Of course, these steps are overly rigid for an artistic process and do not necessarily capture the reality of the timeline. Brainstorming, feedback, or site observations may happen between steps, sketches may be made before word content, or a theme might be scrapped before getting to the final stages. The true process is also iterative, as new information changes the design.

Tools used include pencil and paper, InkScape, PowerPoint, and other various text and image manipulation softwares.

4.3 Product

4.3.1 Themes

Each sign should have a theme that identifies a specific topic around which the words and illustrations are designed. The following are potential themes for various topics:

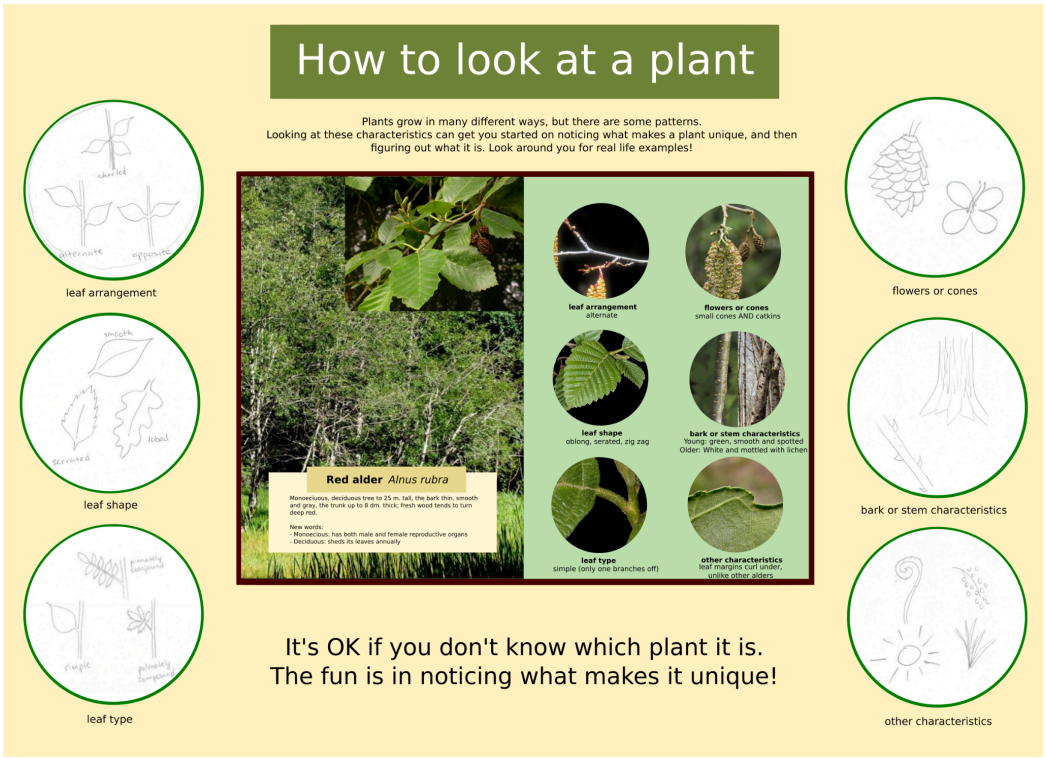
1. Plants are very unique. With some basic skills, anyone can learn how to tell them apart and appreciate their individuality. It's okay if you don't know what the plant is–the fun is in noticing its unique qualities.
2. "Luther Burbank Park is named after the famous horticulturist [Luther Burbank]... He…created the Himalaya[n] blackberry – loved by some for its luscious fruit, despised by others for its invasiveness. Ironically, many of Luther Burbank Park's native vegetation are choked with Himalaya[n] blackberry bushes." (City of Mercer Island Parks and Recreation n.d.)
3. The wetlands at Luther Burbank Park are some of many in a much larger watershed. Wetlands in the watershed provide for us, regulate biogeochemical processes, and are part of our culture.
4. Wetland aesthetics can vary greatly throughout the seasons, from winter twigs to beautiful blooming flowers. They can be both active and serene, noticeable with all the senses.

4.3.2 Signs

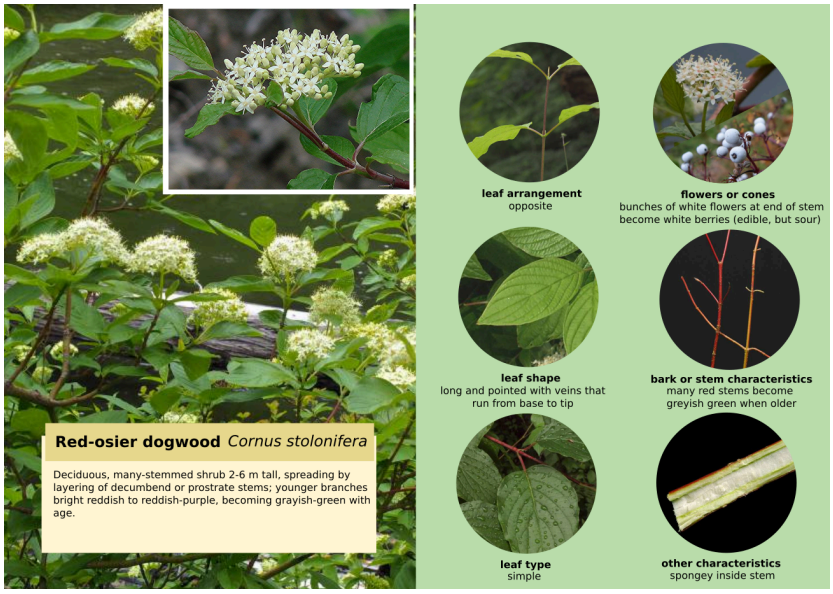
In a professional delivery, these signs would be considered to be in their initial design stage. They are more than sketches, but less than a final product. They would need more rounds of feedback and a professional artist to become installation ready. As they are presented here, they are meant to convey the concept and an idea of how it could be implemented.

Sign 1: How to look at a plant

Image



Main sign



Extra booklet page

Justification

This sign goes beyond just listing examples of plants by teaching some starter plant identification skills. It encourages the viewer to look at specific details on plants in their surroundings. It also has an interactive component, with a flip book of example plants in the center of the sign.

The sketches in this design are stand-ins for a professional artist. The photos in this design are from the Burke Herbarium Image Collection (Burke Museum n.d.) with approval for educational use, but not for public distribution.

Inspiration for flip book (Pannier Graphics 2022)

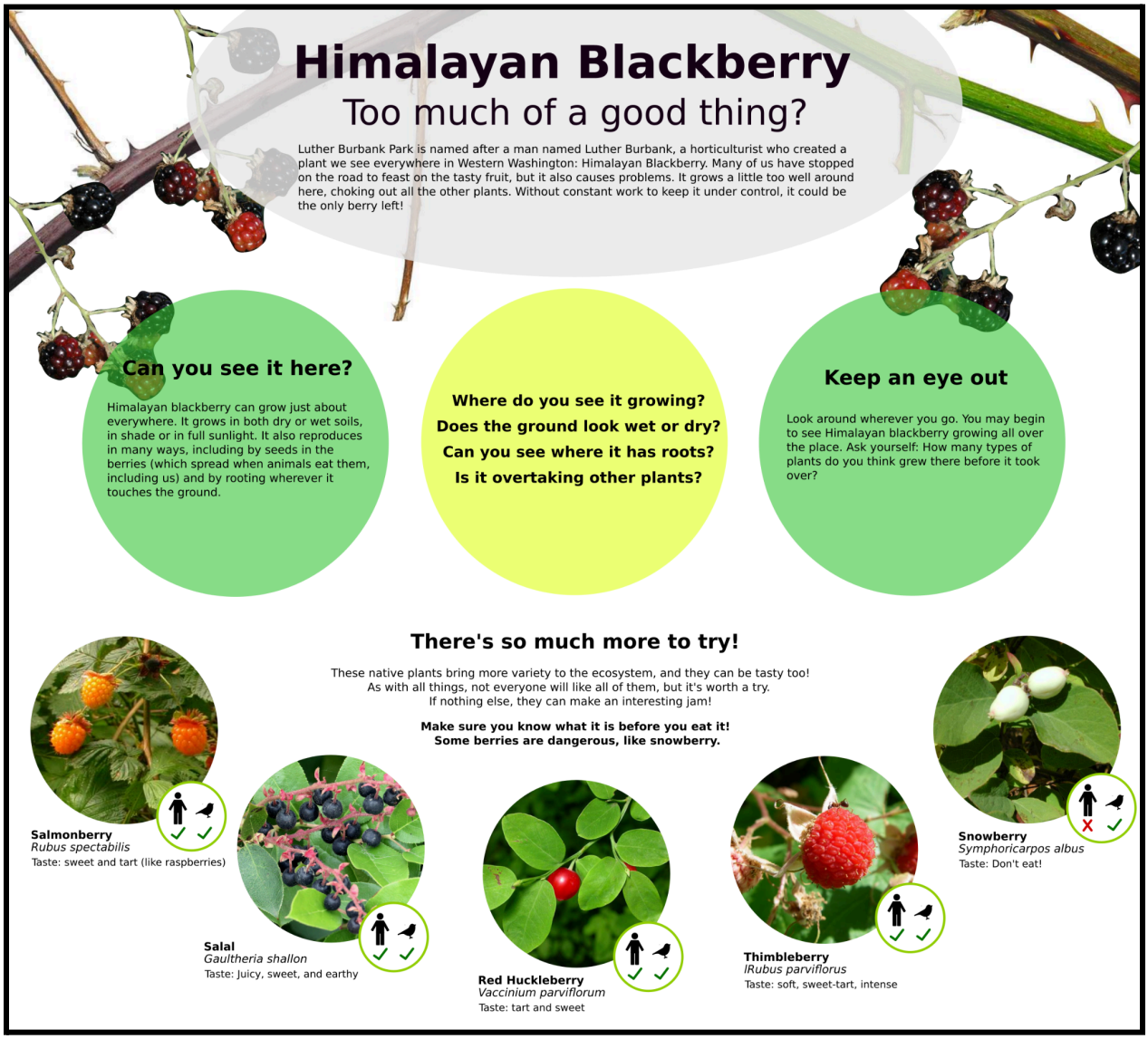
Text

- **Title: How to look at a plant**
- **Subtitle (lower): It's OK if you don't know which plant it is. The fun is in noticing what makes it unique!**
- Theme (not shown on sign): Plants are very unique. With some basic skills, anyone can learn how to tell them apart and appreciate their individuality. It's okay if you don't know what the plant is–the fun is in noticing its unique qualities.
- Paragraphs
    - Plants grow in many different ways, but there are some patterns. Looking at these characteristics can get you started on noticing what makes a plant unique, and then figuring out what it is. Look around you for real life examples!
    - Sections
        - Leaf arrangement
        - Leaf shape

        - Leaf type
        - Flowers or cones
        - Bark or stem characteristics
        - Other characteristics
- Images
    - Sketches of characteristics (not final)
    - Plant photos from Burke Herbarium

Sign 2: Himalayan Blackberry

Image



Justification

This sign is built around the park's values of "manage vegetation" and "embrace natural systems." It informs the public about a common invasive species whose berries they have likely tasted. It asks questions to highlight its invasive properties, so a visitor can understand by specifically looking for where it grows and how it affects other plants. It also addresses biodiversity in an important way, by showing the viewer a variety of other plants that are threatened by Himalayan blackberry, and could be interesting to eat.

The photos in this design are from the Burke Herbarium with approval for educational use, but not for public distribution.

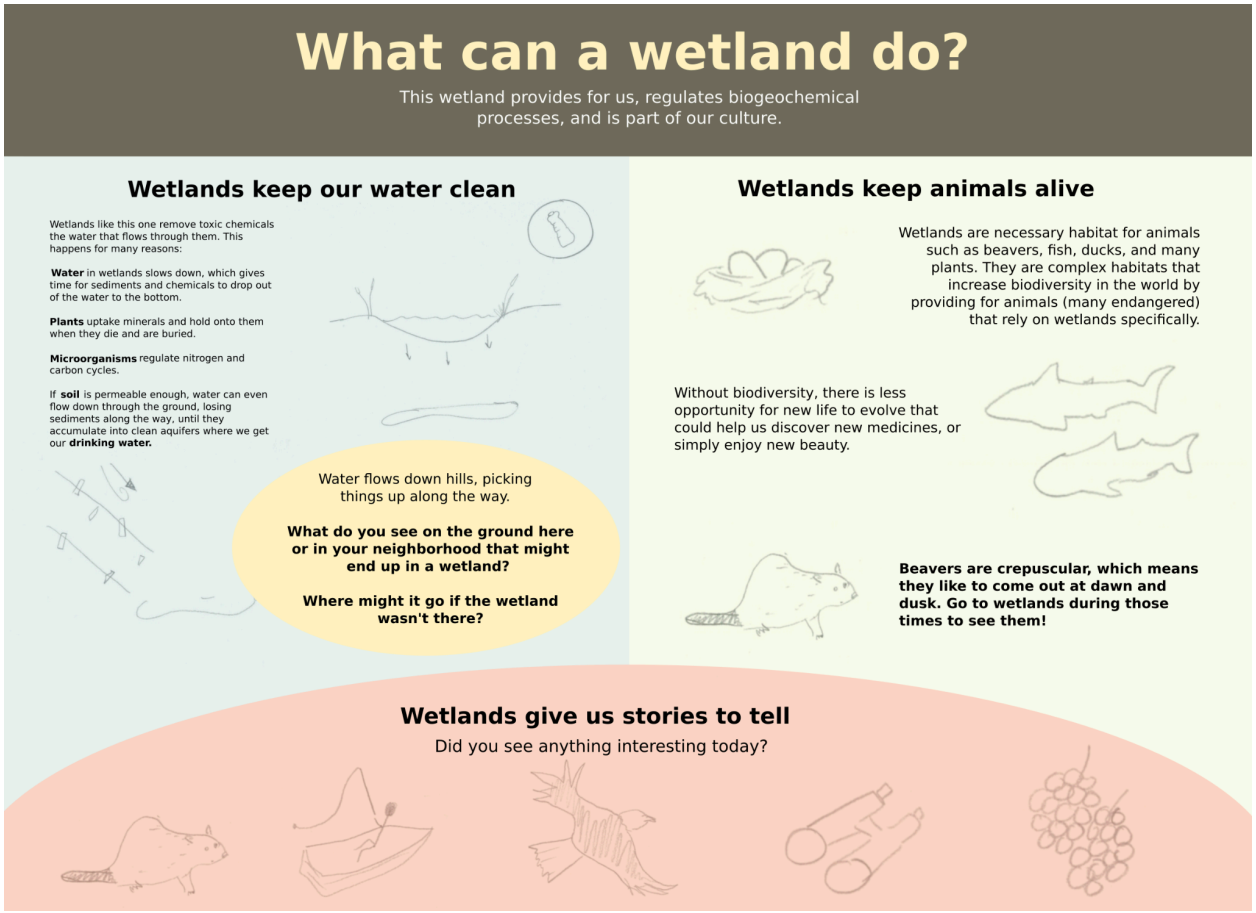
Text

- **Title: Himalayan Blackberry**
- **Subtitle: Too much of a good thing?**
- Theme (not shown on sign): "Luther Burbank Park is named after the famous horticulturalist [Luther Burbank]... He…created the Himalaya[n] blackberry – loved by some for its luscious fruit, despised by others for its invasiveness. Ironically, many of Luther Burbank Park's native vegetation are choked with Himalaya[n] blackberry bushes." (City of Mercer Island Parks and Recreation n.d.)
- Paragraphs
    - **Can you see it here?**
        - Himalayan blackberry can grow just about everywhere. It grows in both dry and wet soils, and in shade or full sunlight. It also reproduces in many ways, including by seeds in the berries (which spread when animals eat them, including us) and by rooting wherever it touches the ground.
    - **Questions**
        - Where do you see it growing?
        - Does the ground look wet or dry?
        - Can you see where it has roots?
        - Is it overtaking other plants?
    - **Keep an eye out**
        - Look around wherever you go. You may begin to see Himalayan blackberry growing all over the place. When you see it, ask yourself: How many types of plants do you think grew there before it took over?
    - **There's so much more to try!**

        - These native plants bring more variety to the ecosystem, and they can be tasty too! As with all things, not everyone will like all of them, but it's worth a try. If nothing else, they can make an interesting jam!
        - **Make sure you know what it is before you eat it! Some berries are dangerous, like snowberry**.
- Images
    - Himalayan Blackberry
    - Salmonberry
    - Salal
    - Red huckleberry
    - Thimbleberry
    - Snowberry

Sign 3: What can a wetland do?

Image



Justification

This sign plainly states valuable things wetlands do for the viewer. At a quick glance, the viewer comes away with three morals: Wetlands keep our water clean, keep animals alive, and give us stories to tell.

The sketches in this design are stand-ins for a professional artist.

Text

- Title: **What can a wetland do?**
- Subtitle: Wetlands provide for us, regulate biogeochemical processes, and are part of our culture.
- Theme (not shown on sign): The wetlands at Luther Burbank Park are some of many in a much larger watershed. Wetlands in the watershed provide for us, regulate biogeochemical processes, and are part of our culture.
- Paragraphs
    - **Wetlands keep our water clean**
        - Wetlands like this one remove toxic chemicals from the water that flows through them. This happens for many reasons:
            - **Water** in wetlands slows down, which gives time for sediments and chemicals to drop out of the water to the bottom
            - **Plants** uptake minerals and hold onto them when they die and are buried
            - **Microorganisms** regulate nitrogen and carbon cycles
            - If **soil** is permeable enough, water can even flow down through the ground, losing sediments along the way, until they accumulate into clean aquifers where we get our **drinking water**
        - Water flows down hills, picking things up along the way
            - **What do you see on the ground here or in your neighborhood that might end up in a wetland?**
            - **Where might it go if the wetland wasn't there?**
    - **Wetlands keep animals alive**
        - Wetlands are necessary habitat for animals such as beavers, fish, ducks, and many plants. They are complex habitats that increase biodiversity in the world by providing for animals (many endangered) that rely on wetlands specifically.

        - Without biodiversity, there is less opportunity for new life to evolve that could help us discover new medicines, or simply enjoy new beauty.
        - **Beavers are crepuscular, which means they like to come out at dawn and dusk. Go to wetlands during those times to see them!**
    - **Wetlands give us stories to tell**
        - Did you see anything interesting today?
- Images
    - Water quality
        - Diagram of wetland aquifer recharge
        - Diagram of stormwater flowing into wetland
    - Habitat
        - Drawings of animals
    - Stories
        - Mural of activities in wetlands

Sign 4: The beauty of a wetland

Image

Justification

This sign is more conceptual. It guides the viewer through using their senses to experience the wetland. It does not convey scientific information, but rather encourages the viewer to think about the wetland on their own.

The background is an image taken in the field. The sign would be much better with a professional drawing of a wetland ecosystem that highlights its beautiful qualities.

Text

- Title: **The beauty of a wetland**
    - Theme (not shown on sign): Wetland aesthetics can vary greatly throughout the seasons, from winter twigs to beautiful blooming flowers. They can be both active and serene, noticeable with all the senses.
    - Steps
        - **Take a deep breath**
            - Did you smell anything? Flowers? Wet mud? Sulfer?
        - **Close your eyes and listen**
            - What did you hear? Birds singing? Animals moving? Water flowing?
        - **Look at something small**
            - Pick a leaf, flower, stick, or bug and study it closely for a little while
        - **Look at the whole scene**
            - This wetland is a complex ecosystem with many types of plants and wet habitats. See what you can notice.
        - **Imagine this place in another season**
            - How would it feel? Would there be different animals? What would the plants look like? Would it smell different?
        - **Find something you like**
            - The smell of a flower, a beaver footprint, anything. Share it with someone.
        - **Thank you**
            - There's a lot to notice in a wetland if you stay for a while. Thank you for taking your time.
    - Images
        - Current: Field photo
        - Future: Professional drawing

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