Ecological design of an urban meadow informed by contemporary approaches to lower-intensity management

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I want to express my gratitude to everyone who helped me with this project: Michael Geffel thank you for your incredible insights into design through maintenance and wildflowers, Land Lab is an incredible source of inspiration for my project. Thank you to my project adviser Rob Ribe, Kory Russel and Mark Eischeid, who incredibly helped me with the literature resources and diagrams, and the script for the project. Thank you, Harper Keeler and Grace Youngblood, for showing me the site of the Urban Farm Riverfront and helping with base maps. Thank you, my cohort, and other students, for your support during the study. And most of all my family that supported me during these years!

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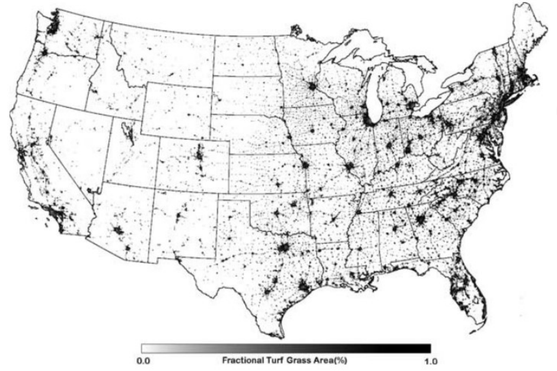
TOPICS THAT INFORM THE PROJECT

Green spaces are an essential part of the urban environment. They should provide multiple benefits, including enhancing people's well-being and affording ecological benefits. Rapidly changing economic conditions often lead to significant shortages of maintenance funding and skilled labor resources (Sutton 2022). This promotes a greatly disturbed urban environment due to neglect and climate change, and a decrease in biodiversity. The design of green spaces in the urban environment becomes more challenging. It was calculated that currently, potentially one hundred sixty-three thousand and eight hundred (163,800 km2 (± 35,850 km2) of land are cultivated with turf grasses in the continental United States, which is three times larger than any irrigated crop (Milesi et al., 2005). "A 2017 projection by the California Air Resources Board cautioned that, beginning in 2020, the most ubiquitous instruments of landscape care—gasoline-powered landscape maintenance equipment, —could generate more ozone pollution than all the cars in the state of California combined"(Sutton, 2022).One of the approaches to these challenges that is gaining more attention is to incorporate into more urban environment ecological planting with low-intensity management (Dunnett and Hitchmough 2004) such as meadow. My project seeks to design a pollinator meadow near the new site of the Urban Farm Riverfront as an alternative land cover type to mown amenities to increase the overall productivity of an ecosystem and create space for activities and exploration.



Distribution of the fractional turf grass area in the conterminous United States
(Milesi and others)

> Potentially 163,800 km2 (± 35,850 km2) of land are cultivated with turf grasses in the continental United States which is three times larger than any irrigated crop.
>
> *(Milesi and others)*

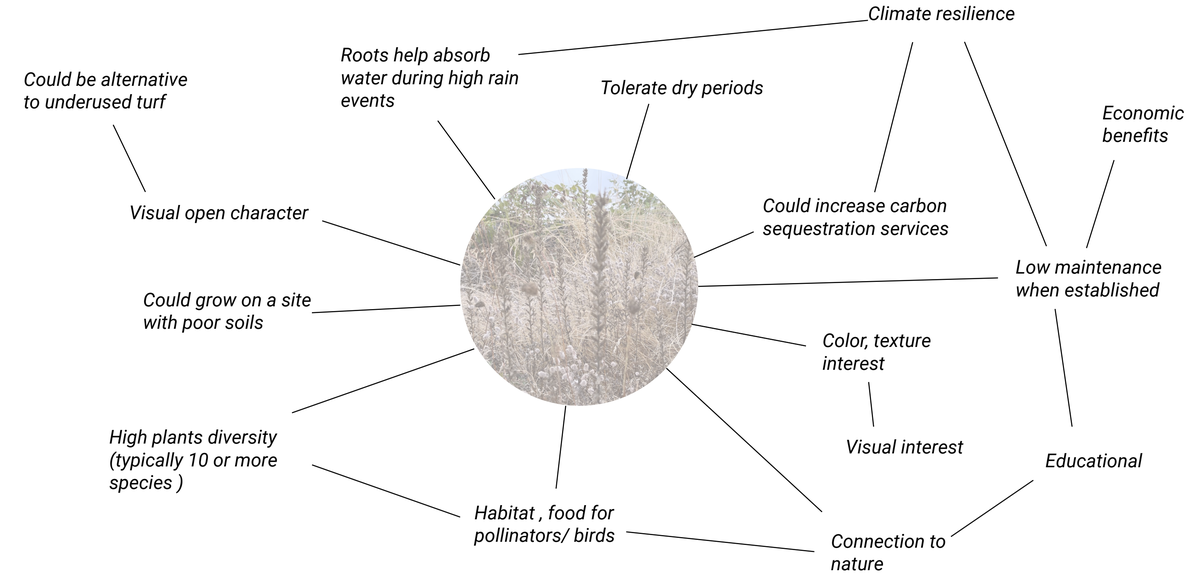
URBAN MEADOW

In a publication “Making Meadows” authors notice that if simplified meadow could be described as a sunny landscape dominated by grasses and wildflowers (Making Meadows: Creating Wildflower Ecosystems West of the Cascade Mountains, n.d.).
For purposes of this project urban meadow defined as lying in between ecological restoration that leans toward native plants, lower human control after establishment and higher dynamic and mowed lawn on the other end that leans toward easy to establish and maintain, high human control and very static.

Urban meadow diagram *(illustration based on sketch of diagram from Rob Ribe)*

POTENTIAL BENEFITS OF URBAN MEADOW

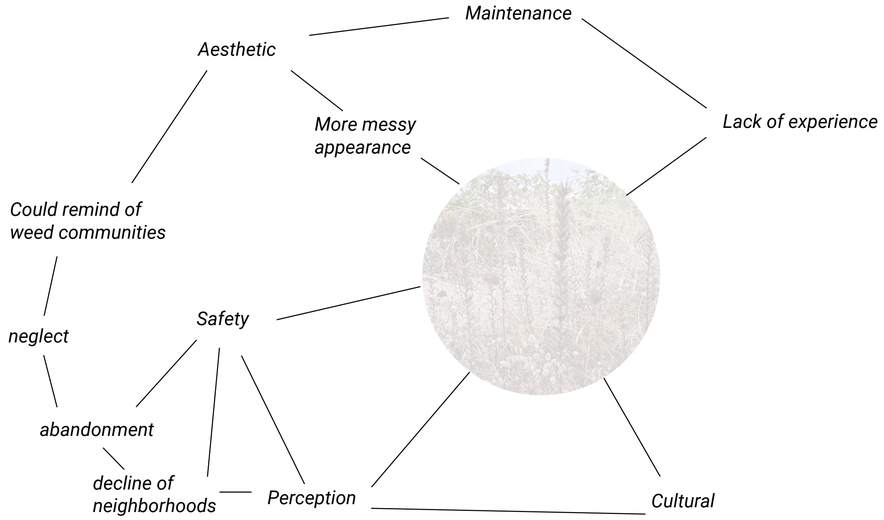
Meadow can have multiple benefits, including a decrease in maintenance costs, pollution, biodiversity, and water use. It could provide visual interest, and connection to nature in urban areas (Making Meadows: Creating Wildflower Ecosystems West of the Cascade Mountains, n.d.). Understanding contemporary concepts relating to this topic and analyzing how contemporary designers incorporate urban meadows into the urban environment is a big goal of my project. This could help create a better framework for the design of urban meadows to replace turf fields. Many cities require mowed turf on vacant lots. More sustainable alternatives are needed.



Urban meadow potential benefits

POTENTIAL CHALLENGES IN URBAN ENVIRONMENT

In an urban environment, however the incorporation of more ecologically based /nature-like vegetation could be challenging, as having a more messy and unorganized appearance, people see low aesthetic value, in unkempt places because they prefer a controlled world. It could be challenging to distinguish well managed meadows from weed communities that can be associated with neglect and abandonment, lack of care, a decline of neighborhoods and safety. But there are also some studies that note that ecological planting, in some cases, can positively affect the perception of the site if well crafted (Southon et al. 2017). So what factors positively influence the perception of ecologically based planting in urban environments?



Urban meadow potential challenges

CUES TO CARE

One of the concepts that address this challenge is to create cues to care that was discovered and advocated by Joan Nassauer. This concept is based on the use of familiar designed elements that would help to recognize the landscape as cared for. Cues to care are “landscape elements that are immediately recognizable as designed, and that signal continuing human presence to care for a landscape” (J. Li & Nassauer, 2020). Although there are some more generic cues, such as paths, mown turf, pruned plants, and fences, cues to care could depend on the context of the landscape. Li and Nassauer in the article “Designing Aesthetic Experiences for the Cultural Sustainability of Ecological Health” provide examples of cues to care that are connected to the local social context of the site. They offer a study in Detroit that aimed to find what cues to care could be implicated to signal that new green infrastructure design on an abandoned lot is safe and cared for. Results were unexpected as residents named as more safe and cared a site with boulders and more flowering plants, but without trees (J. Li & Nassauer, 2021).

“...landscape elements that are immediately recognizable as designed, and that signal continuing human presence to care for a landscape.

Li, J., & Nassauer, J. I. (2020). Cues to care: A systematic analytical review. LandscapeandUrbanPlanning, (201), 1-14.

GENERAL

PATH

MOWED AREAS

PRUNED PLANTS

RECOGNIZABLE PLANTS/ FLOWERING PLANTS

FENCE

Image source: Google Images

SITE SPECIFIC

CONTROL SITE

FLOWERY FORBS AND SHRUBS, WITHOUT BOLLARDS

FLOWERY FORBS AND SHRUBS, WITH BOLLARDS

TREES, WITH BOLLARDS

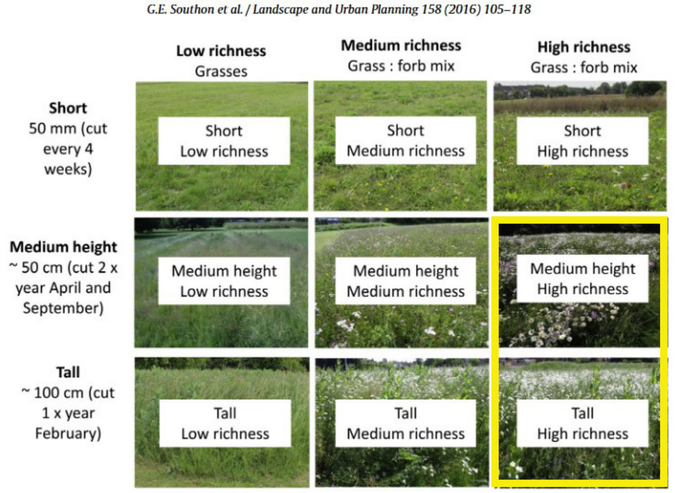
MOWN TURF, WITH BOLLARDS

ENHANCING AESTHETIC THROUGH MANAGEMENT METHODS

Another widely applied approach is to enhance the appearance of ecologically based plantings. This is based on the importance of aesthetics in urban environments. Aesthetic experience is often connected to feeling and imagination as a response to perceptual qualities, form, and meaning. It sometimes could be put in contrast to scientific pursuit based significantly on reasoning and logic (Brady & Prior, 2020). There is an increasing number of studies that aim to understand preferred composition of the ecologically based plantings. For example, Southon et al studied perception of meadows with different compositions of plants (Southon et al., 2017). Kühn suggests different approaches to enhance the aesthetic of spontaneous plantings, such as incorporating flowering plants and prolonged flowering season (Kühn, 2006).

"...common emphasis on the active imagination and the place of feeling or emotion, in contrast to deeply intellectual or scientific pursuits which are often characterized by reasoning and logic.

E.Brady, J.Prior Environmental aesthetics: A synthetic review, 2020



ECOLOGICAL KNOWLEDGE AND VALUE

This approach emphasizes the importance of environmental knowledge (Brady & Prior, 2020). It claims that understanding ecological value and overall greater knowledge of the landscape could positively influence perceptions of messier landscapes. This point of view is supported by some studies. For example, study by E. Southon et al. assessing visitors' response to urban meadows in the England shows that responses were more positive amongst people that had more ecological knowledge, such as an ability to identify plant species, showed more support for conservation (Southon et al., 2017). Research on perceptions of spontaneous plants in Beijing also shows that professionals with higher exposure to nature more appreciated it to lawns and flowering beds (X.-P. Li et al., 2019). People's understanding of ecological functions could influence the aesthetic perception of the landscapes. Multiple studies find that understanding meadows' ecological value due to information about eco-services, overall ecological education, and ability to recognize plants will increase overall acceptance of the meadow (Southon et al., 2017).

Image source: Google Images

DUNE PENINSULA
TACOMA, WA

Maintaining diversity of habitat, visual contrast and active use

I selected case studies in contemporary landscape design projects with urban ecological plantings at different scales to evaluate what design elements were used to incorporate ecological planting into urban contexts.

Park Dune Peninsula is an 11 acre urban park in Tacoma, Washington designed by Site Workshop. It transformed a post-industrial site into new recreation space incorporating local native prairie plantings as urban habitat and low-maintenance public landscape. This case study is an example of the employment of cues to care and incorporation of ecological knowledge. It differs from the often employed approach to the riverfront parks with lawns and ornamental plantings (Dune Peninsula | Projects, n.d.).

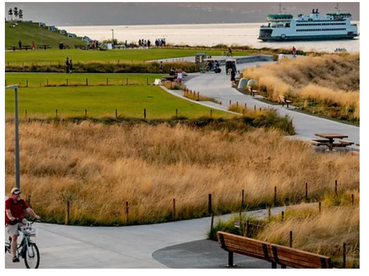
What helped to increase acceptance of the ecological planting of an urban prairie at Park Dune Peninsula?

Elements and strategies that help to increase acceptance:

- Aesthetic: juxtaposition of the natural planting and concrete material, strategic addition of flowering perennials and wildflowers in more visible places, and the contrast of green conifers and herbaceous planting.
- Cues to care: contrast with mowed lawn – showing regular mowing, fence – indicating that this planting is valuable and sensible and helps to protect sensitive vegetation, info-stands – showing that this planting is valuable, highly maintained lawns that also provides space for people's activities.
- Knowledge: info-stands about the ecosystem – help to understand the value of planting, previous use of the site, which was initially brownfield and had a negative value, also could help to increase acceptance of the ecological planting of the prairie as being restorative from the previous pollution and reinforcing the overall post-industrial concept and experience of the site.

Spatial organization: - define space, create units, articulate circulation, suggest movement, develop composition and modulations, reinforce the relationship of circulation to use-space, clear primary circulation helps to feel safe, and secondary paths provide choice to explore.

DUNE PENINSULA
TACOMA, WA



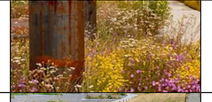
Lawn		Periodic mowing short height
Mixed wild flowers		Low fertility gravely soil
Prairie		

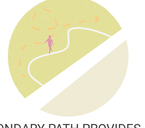
Image source: Google Images

SPACIAL ORGANIZATION

CREATES ENCLOSURE

AS UNIT DEVELOPS COMPOSITION, REINFORCE USE SPACE

REINFORCE CIRCULATION PATH



SECONDARY PATH PROVIDES CHOICE TO EXPLORE

HELPS TO CREATE FOCUS

PARK DES POTERIES
STRASBOURG, FRANCE

Maintaining diversity of habitat, visual contrast and active use

Park des Poteries situated in Strasbourg, France. It was designed by a Danish town planner and completed in 1995 (“Poteries (Strasbourg),” 2021). It is placed within a very formal context of the dense fabric of the city, which also could help to mitigate concerns about safety and tidiness (Dunnett & Hitchmough, 2004). The straight line of the path divides Parc Des Poteries into two parts: the lawn on the left and the meadow on the right side, providing a choice for a different experience.

Elements and strategies that help to increase acceptance:

- Aesthetic: the juxtaposition of the natural planting and of a very formal grid of trees provides structure.
- Cues to care: maintained lawns show regular maintenance and provide space for people’s activities

Spatial organization: - clear primary circulation helps to feel safe, and secondary paths provide a choice to explore. Anna Jorgensen notes that it is important to provide a feeling of safety when incorporating more wild vegetation, which could be achieved by the use of a gradient of planting from more formal to wild or by providing different paths so that people can have a choice whether they want to interact with wild vegetation or not (Dunnett & Hitchmough, 2004).

PARK DES POTERIES
STRASBOURG, FRANCE

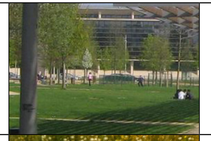
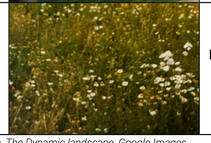
Lawn		Periodic mowing
Wildflower grassland		No mowing during flowering season

Image source: N.Dunnett, J. Hitchmough. The Dynamic landscape, Google Images

SPACIAL ORGANIZATION

REINFORCE CIRCULATION PATH

SECONDARY PATH PROVIDES CHOICE TO EXPLORE

REGENTS PARK
LONDON, ENGLAND

Maintaining diversity of habitat, visual contrast and active use

Regents Park is one of the Royals Park which occupies 410 acres in north-west Inner London. It uses relaxation of the mowing regimes and sowing wildflower mixes, strategically timed cuttings in order to promote structural diversity and pollinator habitat, while also providing visual contrast and public use (2015-The-Regents-Park-And-Primrose-Hill-Conservation-Management-Plan.Pdf, n.d.).

Elements and strategies that could help to increase acceptance:

-Aesthetic: juxtaposition of the formal planting and meadow, visual contrast created through strategic implementation of different maintenance re-gimes that creates mosaic of different grassland habitats (2015-The-Regents-Park-And-Primrose-Hill-Conservation-Management-Plan.Pdf, n.d.).

- Cues to care: contrast with mowed lawn – showing regular mowing, information stands – showing that this planting is valuable.

- Knowledge: specific interpretation including static display/signage, educational visits and interactive maps help visitors understand the value of planting.

- Spatial organization: mosaic of grassland and meadows compose mostly perimeters, areas around different sports facilities and active use fields (2015-The-Regents-Park-And-Primrose-Hill-Conservation-Management-Plan.Pdf, n.d.). Sport fields enclosed with areas of flowering meadow grass and parkland trees. A circuitous path provides a secondary path around the sport fields and immersion in the meadow (Colvin & Moggridge » Re-gent's Park Hub, London, n.d.). Also, there is ruderal vegetation in underused brownfield areas. Mosaic of different grassland habitat provide space for different activities (2015-The-Regents-Park-And-Primrose-Hill-Conservation-Management-Plan.Pdf, n.d.).

REGENTS PARK
LONDON, ENGLAND

Lawn		Periodic mowing short height
Ruderal plant communities		Periodic turning over rubble
Wildflower meadow		No mowing during flowering season, removal of cutting, additional seeding
Grassland		Strategic mowing

Image source: Google Images

SPACIAL ORGANIZATION

CREATES ENCLOSURE

SECONDARY PATH PROVIDES CHOICE TO EXPLORE

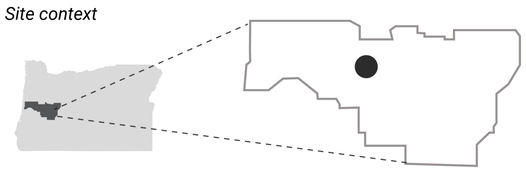
REINFORCE CIRCULATION PATH

ENCLOSED AREA

SITE SELECTION

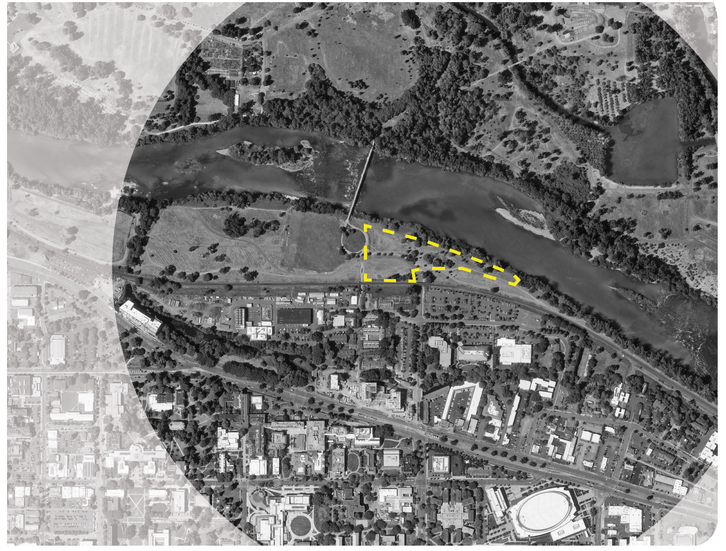
The proposed site is located on the south bank of the Willamette River between the Willamette River and the Railroad. It is close to the future extension of Urban Farm, the Willamette River Natural Area, and Land Lab. Currently, it is an open space within the University of Oregon campus. University of Oregon Urban Farm and Land Lab are important programs that serve as an outdoor classroom for students.
Major considerations for site selection were: underused space, open sunny site, has synergy with nearby land uses, visibility of the site.

Site context



MAJOR CONSIDERATION

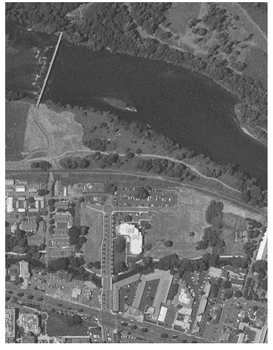
- Underused space
- Open sunny site
- Has synergy with nearby land uses
- Visibility



SITE HISTORY

The site's soil profile and vegetation have been significantly changed over history. In the 1850s, the area of the site was dominated by riparian forest with meandering channels. Beginning in 1900 through the mid-1960s: The Eugene Sand & Gravel Company was located near that area. Industrial land use of the nearby area, significant fill deposits, dams along the river, and compaction significantly changed the character of the site through time. The origin of the fill is thought to consist mainly of construction debris such as mixed soils, concrete, and asphalt (University of Oregon Willamette River Natural Area Landscape Management Plan, Campus Planning and Facilities Management, 2022). Although there is existing grassland vegetation, it consists mostly of non-native grasses and herbaceous plants that have lower ecological value.

1936

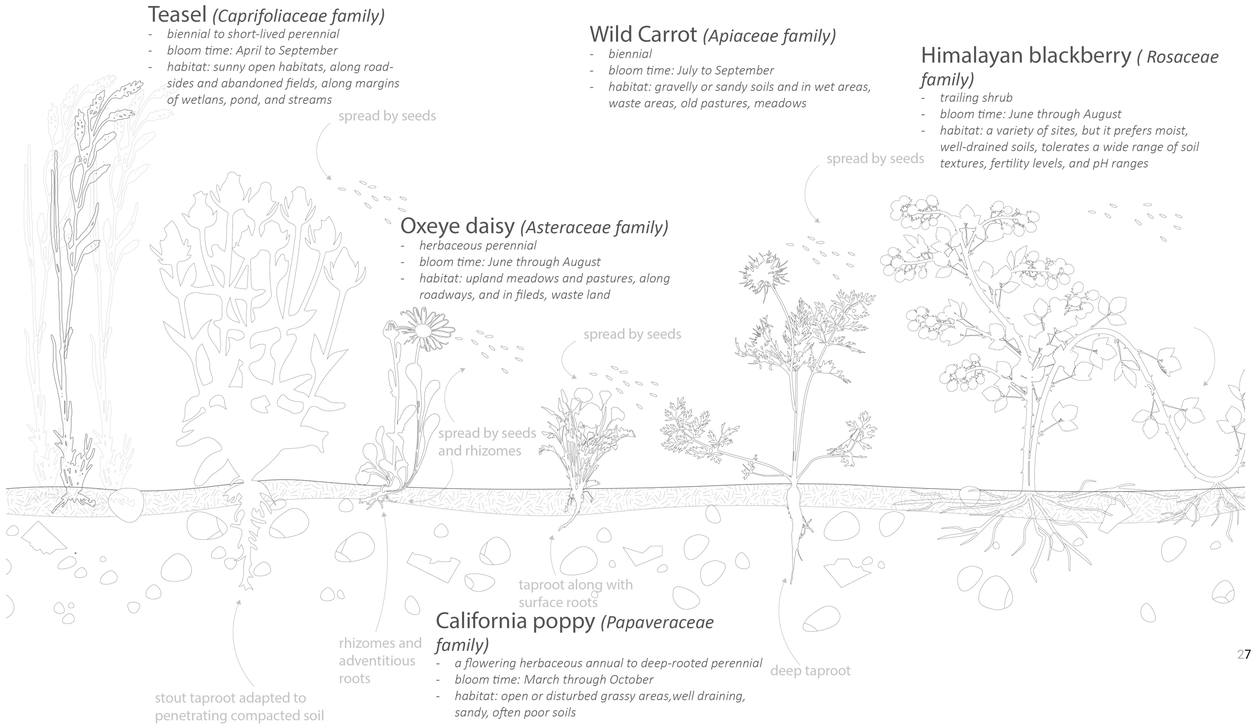


1995

2021

Aerial photographs show a significant change of the site *(1936 Eugene Aerial Photographs Index | UO Libraries), (Google Earth).*

GENERAL SECTION OF EXISTING SITE



MAIN GOALS

- Ecological: pollinator habitat

CREATE A ROBUST URBAN SEED MIX THAT COULD PROVIDE POLLINATOR HABITAT AND BE COMPETITIVE IN WITH GRASSES AND ADAPTED TO SOIL (LONG BLOOM SEASON, POLLINATOR PLANTS, COMPETITIVE ADAPTABLE PLANTS

- Experience

PROVIDE EXPERIENCE, SPACE FOR REST AND EXPLORATION CONSIDER AESTHETIC: LONG BLOOM SEASON, HEIGHT OF PLANTS

- Education

INCORPORATE EDUCATION ELEMENTS: INFO STANDS, OBSERVATION BEE HIVE ETC.

SITE DESIGN

Site design creates a path system that is based on existing routes that are used by visitors now. It seeks to create a clear path system and create meadow areas that provide interest, help to navigate site and create opportunities for learning. Meadow areas balanced with open areas that mowed more often as they provide some more active areas and create fire breaks. Along the path there are points of interest that create opportunity for learning about pollinators and their role in a food system.

SITE PLAN

PLANT PALLET

The plant palette for this project is focused on plants that are suitable for the current condition of the site – plants for dry soil, mostly that have potential to reestablish themselves, that could tolerate wide range of site conditions, including degraded urban soils. Seed mix designed based on the general condition of the site – well drained, dry soils, full sun. High diversity of plants was included because it is often difficult to predict what species would thrive exactly, so at least some species could establish (Making Meadows: Creating Wildflower Ecosystems West of the Cascade Mountains, n.d.). Multiples wildflowers that bloom in different seasons were selected to create a longer bloom time and food for pollinators.

NATIVE PLANT PALLET

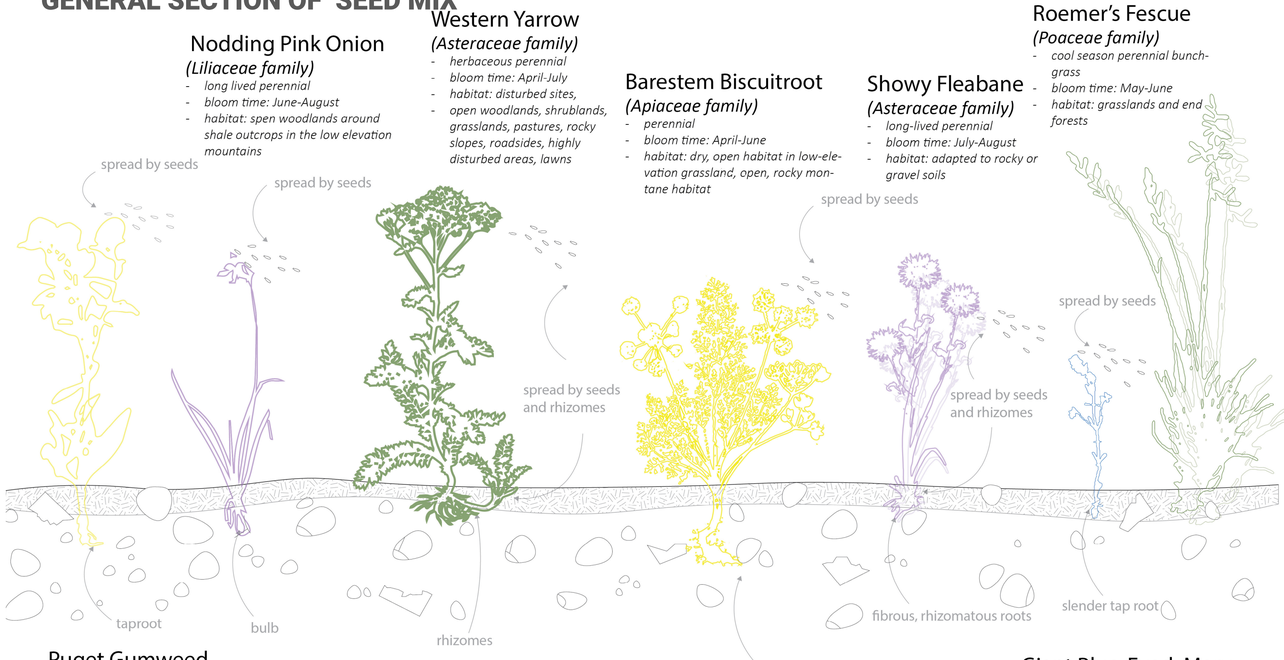
Large Blue-Eyed Mary (Collinsia grandiflora)	W,D	A	spring	12″	adaptable low growing, some partial shade tolerance
Farewell to Spring (Clarkia amoena)	W,D	A	summer	24″″	good at re-seeding itself, tolerates very dry conditions
Globe Gillia (Gilia capitata)	W,D	A	summer	36″	tolerant of poor soil and heat
Barestem Biscuitroot (Lomatium nudicale)	W,D	P	spring	24″	very good for dry soils, surviving from a deep taproot
Mule's Ears (Wyethia angustifolia)	W,D	P	spring	24″	dry tolerant, slow to establish, but long lived and drought resistant
Oregon Iris (Iris tenax)	D	P	spring	12″	attractive to bumble bees, strong, and persistent once established
Western Yarrow (Achillea millefolium)	W,D	P	summer	24″	very vigorous, can compete with weeds, should be used at lower rate to not out-compete other plants
Nodding Pink Onion (Allium cernuum)	D	P	summer	12″	tolerating dry conditions and rocky soils, ability to grow in tough sites: pure gravel and sand, as well as heavy clay, slow to mature
Showy Fleabane (Erigeron speciosus)	D	P	summer	18″	long summer bloom, tolerate of most upland soil conditions including rocky soils
Pearly Everlasting (Anaphalis margaritacea)	D	P	summer	24″	tolerant of partial shade and compacted/dry soil conditions
Puget Gumweed (Grindelia integrifolia)	W,D	P	fall	36″	adaptable late blooming pollinator plant
Roemer's Fescue (Festuca romeri)	D	P		18″	slow growing, tolerates dry soils, good for inter-planting with wildflowers

Main source: Making Meadows Creating Wildflower Ecosystems West of the Cascade Mountains. Northwest meadowscapes

PLANT PALLET

While preparing planting pallet I thought about species that already exist on a site, as they could be indicators of soil conditions and could have some similar traits (Making Meadows: Creating Wildflower Ecosystems West of the Cascade Mountains, n.d.).
For the planting palette I tried to include multiple species with different size and different root system to maximize areas that plants could occupy and suppress weeds (Mid-Atlantic Native Meadows | Xerces Society, n.d.).

GENERAL SECTION OF SEED MIX



Nodding Pink Onion
(Liliaceae family)
- *long lived perennial*
- *bloom time: June-August*
- *habitat: spen woodlands around shale outcrops in the low elevation mountains*

Western Yarrow
(Asteraceae family)
- *herbaceous perennial*
- *bloom time: April-July*
- *habitat: disturbed sites,*
- *open woodlands, shrublands, grasslands, pastures, rocky slopes, roadsides, highly disturbed areas, lawns*

Barestem Biscuitroot
(Apiaceae family)
- *perennial*
- *bloom time: April-June*
- *habitat: dry, open habitat in low-elevation grassland, open, rocky montane habitat*

Showy Fleabane
(Asteraceae family)
- *long-lived perennial*
- *bloom time: July-August*
- *habitat: adapted to rocky or gravel soils*

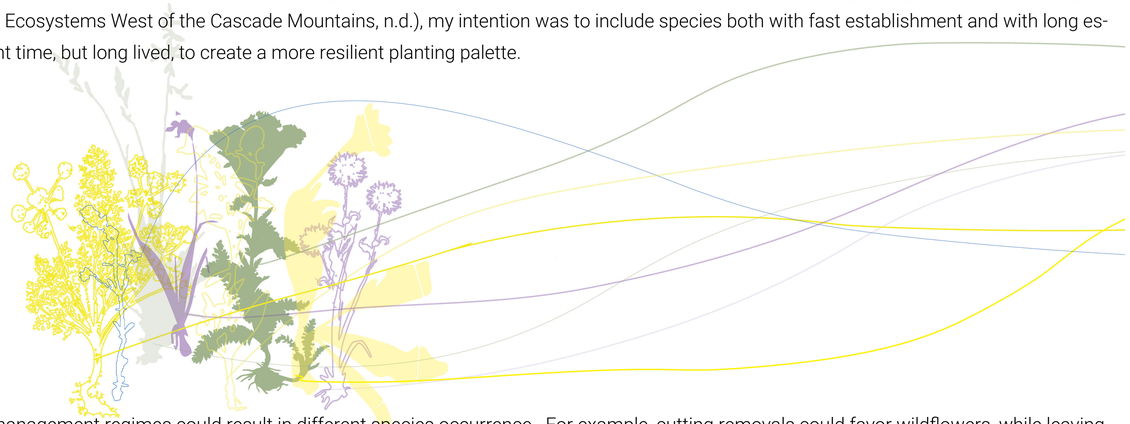
Roemer's Fescue
(Poaceae family)
- *cool season perennial bunchgrass*
- *bloom time: May-June*
- *habitat: grasslands and end forests*

Puget Gumweed
(Asteraceae family)
- *perennial*
- *bloom time: June-Sept*
- *habitat: open, disturbed areas including in wetlands and uplands*

Giant Blue-Eyed Mary
(Plantaginaceae family)
- *annual*
- *bloom time: April-June*
- *habitat: low to mid elevation open areas, moist or dry*

PLANTS DYNAMIC

As inclusion of annual wildflowers, perennials and grasses creates a faster-establishing and longer-lived meadow (Making Meadows: Creating Wildflower Ecosystems West of the Cascade Mountains, n.d.), my intention was to include species both with fast establishment and with long establishment time, but long lived, to create a more resilient planting palette.



Different management regimes could result in different species occurrence. For example, cutting removals could favor wildflowers, while leaving cuttings in place would favor grasses as soil richness would grow (Southon et al., 2017). Cutting once a year or cutting twice a year could also benefit different species. Once meadow is established, there could be implemented rotating management for meadow areas. With some areas cut one year and other next year. That could help to leave habitat for pollinators and visual interest. Removal of cutting could help create favorable soil conditions for wildflowers by maintaining low fertility soil.

LONG TERM MAINTENANCE

BIBLIOGRAPHY

2015-The-Regents-Park-And-Primrose-Hill-Conservation-Management-Plan.pdf. (n.d.). Retrieved May 22, 2023, from https://www.royalparks.org.uk/__data/assets/pdf_file/0009/41769/2015-The-Regents-Park-And-Primrose-Hill-Conservation-Management-Plan.pdf

Brady, E., & Prior, J. (2020). Environmental aesthetics: A synthetic review. People and Nature, 2(2), 254–266. https://doi.org/10.1002/pan3.10089

Colvin & Moggridge » Regent's Park Hub, London. (n.d.). Retrieved May 22, 2023, from https://www.colmog.co.uk/portfolio/regents-park-hub/

Dune Peninsula | Projects. (n.d.). Site Workshop. Retrieved December 9, 2022, from https://www.siteworkshop.net/dune-peninsula-tacoma

Kühn, N. (2006). Intentions for the Unintentional. Jola - Journal on Landscape Architecture, 1, 46–53. https://doi.org/10.1080/18626033.2006.9723372

Li, J., & Nassauer, J. I. (2020). Cues to care: A systematic analytical review. Landscape and Urban Planning, 201, 103821. https://doi.org/10.1016/j.landurbplan.2020.103821

Li, J., & Nassauer, J. I. (2021). Designing Aesthetic Experiences for the Cultural Sustainability of Ecological Health. Landscape Architecture Frontiers, 9(5), 72. https://doi.org/10.15302/J-LAF-1-030029

Li, X.-P., Fan, S.-X., Kühn, N., Dong, L., & Hao, P.-Y. (2019). Residents' ecological and aesthetical perceptions toward spontaneous vegetation in urban parks in China. Urban Forestry & Urban Greening, 44, 126397. https://doi.org/10.1016/j.ufug.2019.126397

Making Meadows: Creating Wildflower Ecosystems West of the Cascade Mountains. (n.d.). Northwest Meadowscapes.

Mid-Atlantic Native Meadows | Xerces Society. (n.d.). Retrieved June 16, 2023, from https://xerces.org/publications/guidelines/mid-atlantic-native-meadows

Milesi, C., Running, S. W., Elvidge, C. D., Dietz, J. B., Tuttle, B. T., & Nemani, R. R. (2005). Mapping and Modeling the Biogeochemical Cycling of Turf Grasses in the United States. Environmental Management, 36(3), 426–438. https://doi.org/10.1007/s00267-004-0316-2

Poteries (Strasbourg). (2021). In Wikipédia. https://fr.wikipedia.org/w/index.php?title=Poteries_(Strasbourg)&oldid=179286289

Southon, G., Jorgensen, A., Dunnett, N., Hoyle, H., & Evans, K. (2017). Biodiverse perennial meadows have aesthetic value and increase residents' perceptions of site quality in urban green-space. Landscape and Urban Planning, 158, 105–118. https://doi.org/10.1016/j.landurbplan.2016.08.003

Sutton, P. (2022). A New Aesthetic of Care. Journal of Architectural Education, 76(2), 137–144. https://doi.org/10.1080/10464883.2022.2097532

University of Oregon Willamette River Natural Area Landscape Management Plan, Campus Planning and Facilities Management. (2022).