

Adam Hershner

Habitat and Biodiversity

Three Areas of Focus



Habitat creation, preservation,
and restoration



Habitat quality



Population and species
richness

Habitat Creation, Preservation, and Recreation

This relates to the presence of ecosystems on the site, either existing, historical, or new. Any site that changes the existing conditions into something green or ecological relates to this goal.

Common tools used for data collection:

- [NRCS Web Soil Survey](#)
- [Integrated Valuation of Ecosystem Services and Tradeoffs \(InVEST\) v 3.3.3](#)
- [ArcGIS](#)

Habitat Quality

This relates to the health, density, and standing of all habitats on the site and their continued survivability. Any impact on ecosystems fits within this category, notably more fragile systems such as wetlands or savannahs.

Common tools used for data collection:

- [Integrated Valuation of Ecosystem Services and Tradeoffs \(InVEST\) v 3.3.3](#)
- [iNaturalist](#)
- [Universal Floristic Quality Assessment Calculator](#)

Population and Species Richness

This relates to the diversity of biomass present on the site, notably flora and fauna. These are often categorizing through a three metric system, using a Species Richness Index, the Shannon Index, and the Simpson Index.

Common tools used for data collection:

- [Global, Americas, and European Biodiversity Metrics](#)
- [Naturalist](#)
- [Universal Floristic Quality Assessment Calculator](#)
- [eBird](#) (and [Merlin Bird ID](#))
- Active species surveys

Overall Goal Limitations



Many species are difficult to spot or confirm presences of, making biodiversity numbers impossible to prove beyond a reasonable doubt



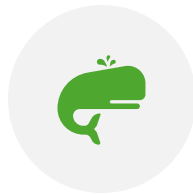
Some biodiversity indexes skew for native species, others do not



Certain indexes (Shannon) take into account both species richness and species abundance, which calculates future uncertainty or stability



Habitats are difficult to modulate and recreate, with some requiring many years before reaching their "proper" habitat form; often post-construction site surveying doesn't extend to the full length of required time



Any pre-design metrics can only be predicted for potential increased species unless actively introduced



Crosswinds Marsh Wetland Interpretive Preserve



- 
- Designed by SmithGroup
 - 27600 Haggerty Road
New Boston, Michigan 48164
 - 1,050 acres
 - \$18.5 million
 - Completion date in 1995



Fast Facts

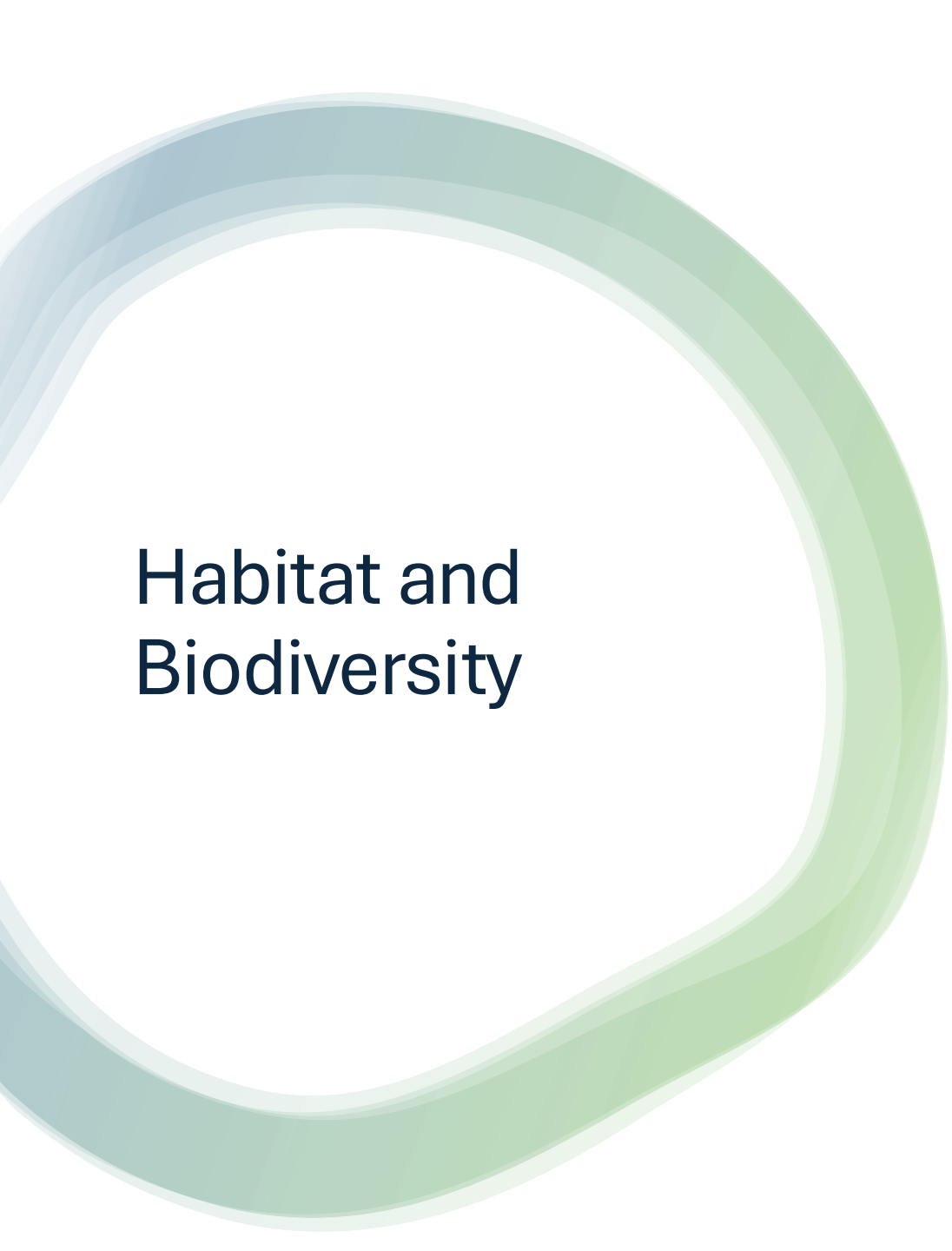
This project was designed to counteract the construction required for the DTW airport, who had an expansion on top of existing wetlands. This was designed to vastly overcompensate for the construction and restore historical wetlands from its agricultural present.

Goals:

- Recreate existing wetlands to a greater amount than the new airport runway
- Counteract the historical agricultural damage to site
- Recreate habitats for previous species and endangered animals, particularly the Bald Eagle







Habitat and Biodiversity

Habitat creation, preservation, and restoration

- Restored over 100 acres of historical wetland habitat that had been drained for agriculture and residential use.
- A diversity of wetland habitat types including forested, wet meadow, emergent, submergent, and deep water areas were created on the site.

Habitat quality

- By carefully grading and sculpting the land to follow site hydrology, no pumps, dykes, or artificial methods are required to maintain the natural systems.

Population and species richness

- Over 300,000 native aquatic plants, 10,000 seedlings, and 300 acres of wetland seed were added to the site to create self-sustaining wetland communities.
- Sensitive planning created and limited human access to habitat for several threatened species. These include bald eagle nesting sites and 20 acres set aside for the propagation and reestablishment of three rare plant species relocated from the airport.
- Created a variety of habitat types for over 200 species of birds, 170 species of plants, 20 fish, 30 mammals, 21 reptiles and amphibians, and 70 species of butterflies and dragonflies.

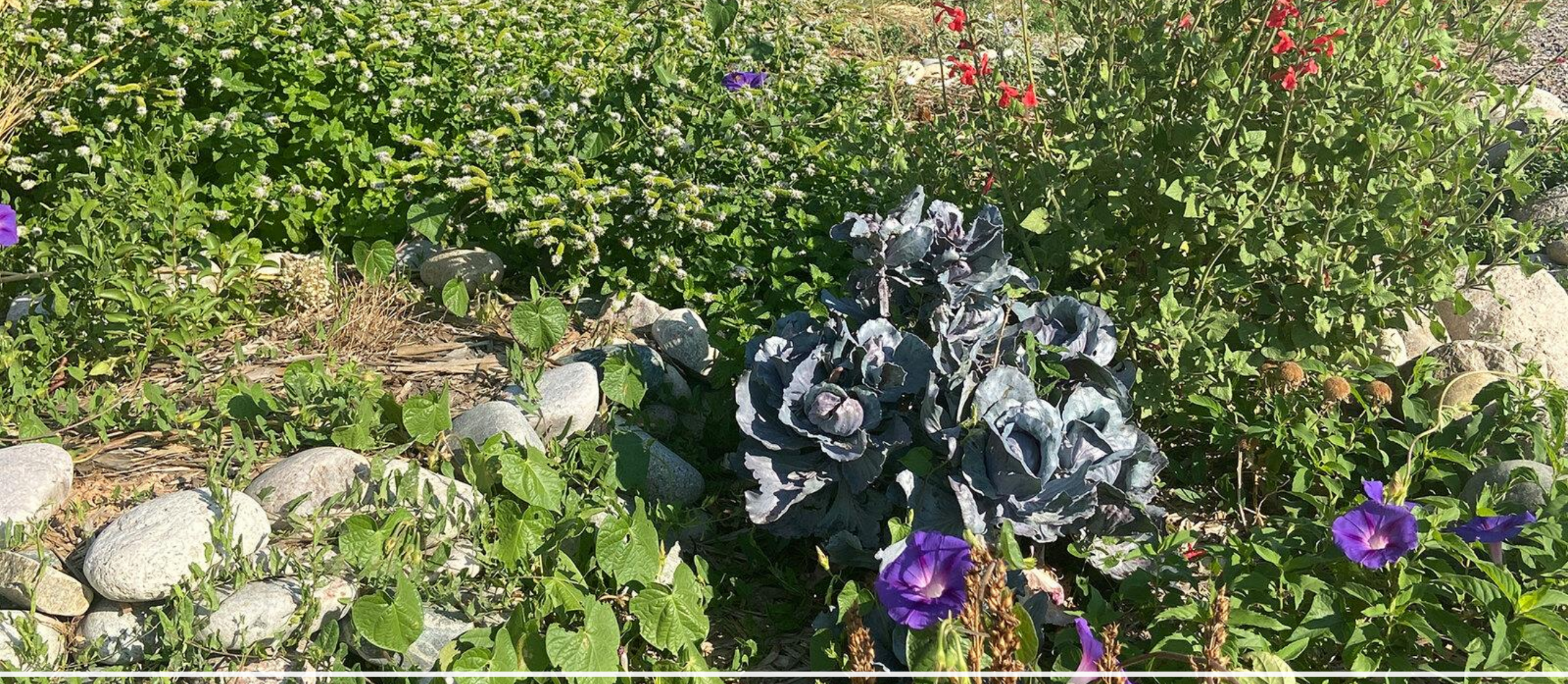
Key Methods of Testing



Five years of post-construction monitoring and evaluation in partnership with Wayne County,



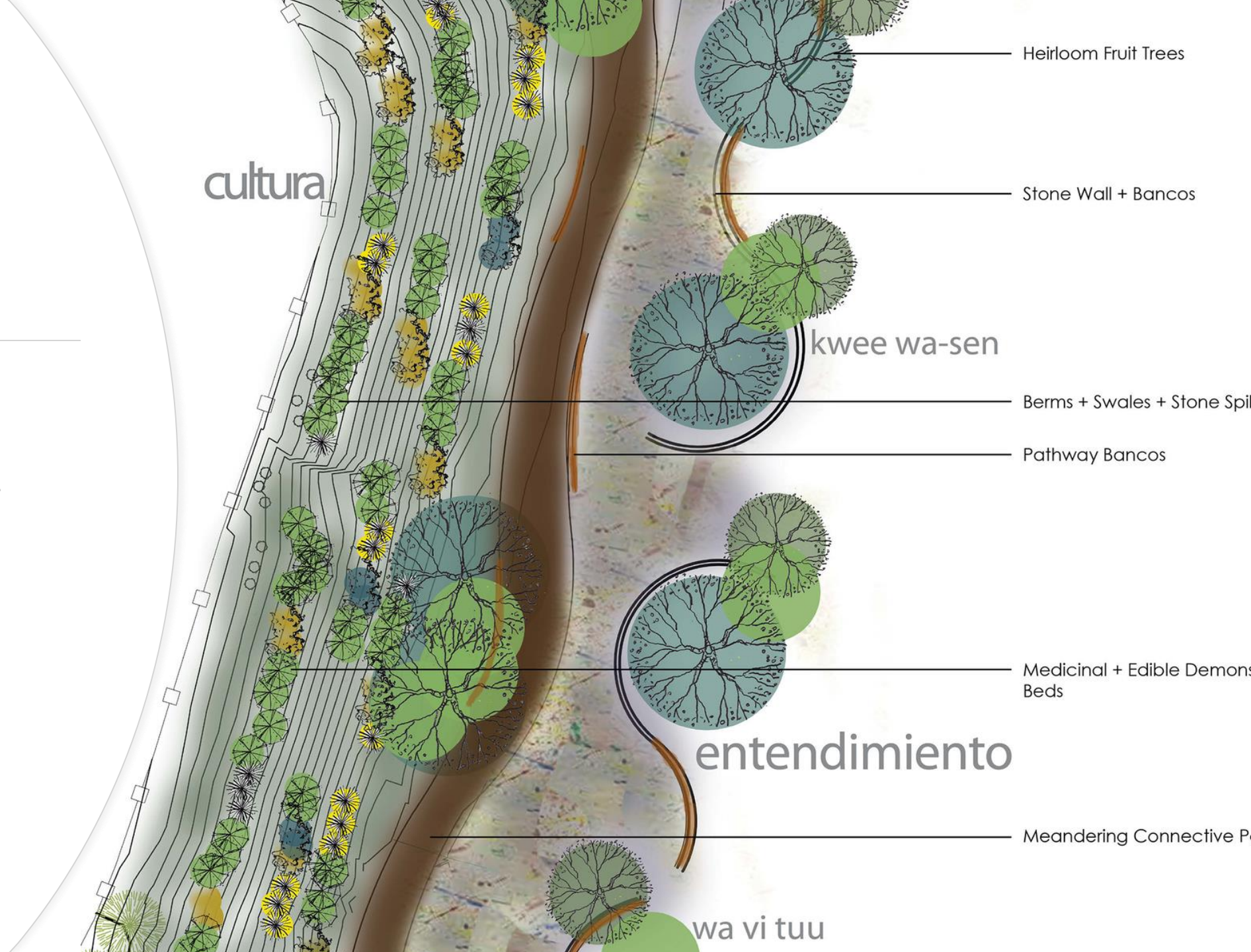
Hydrologic analysis to assess water changes, using standard USDA and U.S. Army Corps of Engineers modeling software.



Española Healing Foods Oasis



- Designed by Radicle
- 313 N Paseo De Oñate
Española, New Mexico 87532
- 1 acre
- \$500,000
- Completion date in 2018



Fast Facts

An ethno-botanic public demonstration garden, restoring the city's only public park. Due to its difficult position on a sheer slope with high pollution levels, this site showcases how small sites can be used for great effect, as well as community enrichment alongside ecological.

Goals:

- Regenerate the heavily-degraded slope
- Test out mycoremediation
- Cultivate a biodiverse ecosystem, with a focus on culturally significant plants, pollinators, historical dye plants, and edible plants
- Manage stormwater flow and high-drought predictions for the area that led to its previous decay



Reference Site

City Hall

Española Healing Foods Oasis

Española Library
+ Lucero Recreation Center

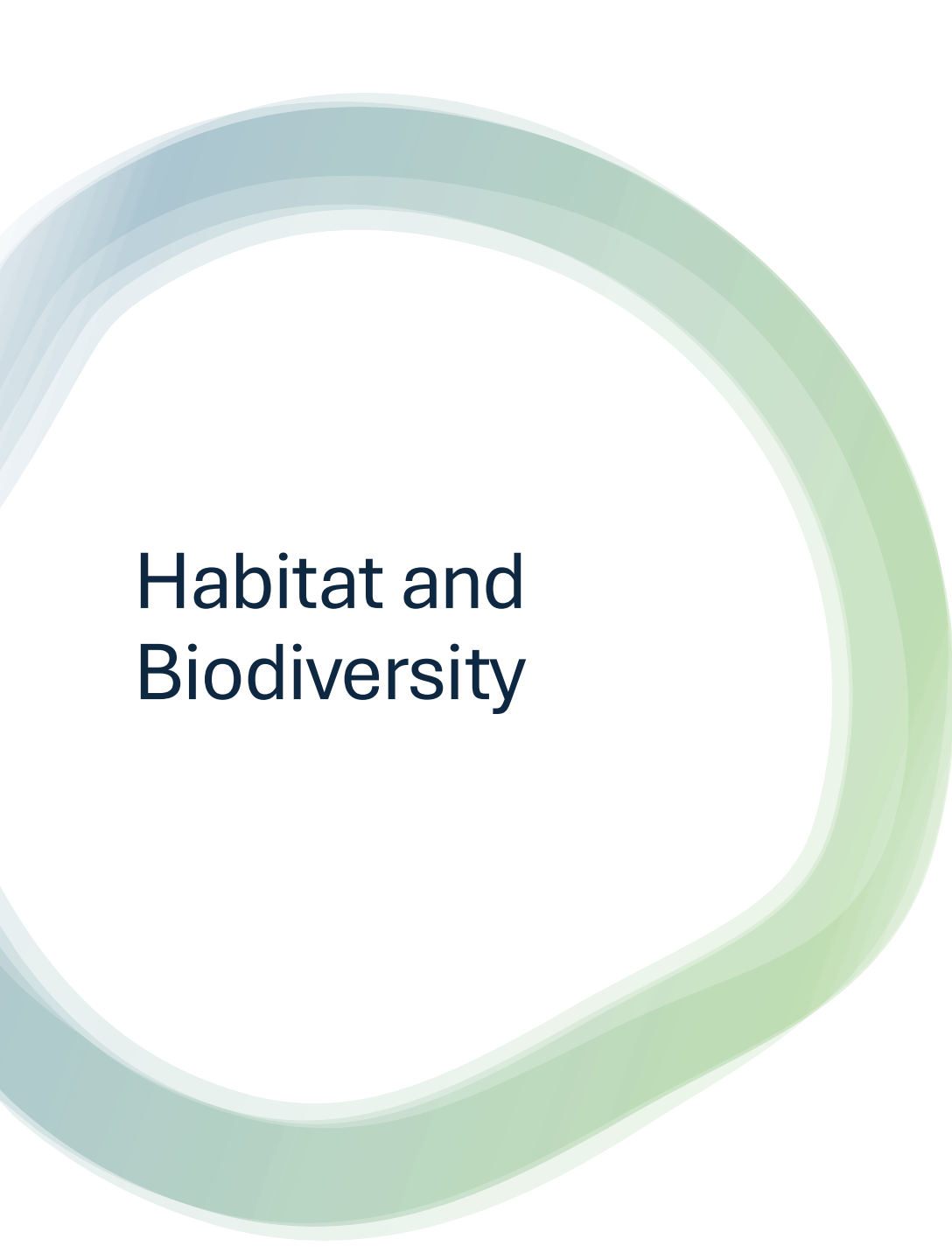
Valdez Park

N Paseo De Oñate

Vietnam Veterans Memorial Park Road







Habitat and Biodiversity

Habitat creation, preservation, and restoration

- More than doubles soil microbial biomass carbon and supports a more fungaldominated microbial community in intensively cultivated garden zones, compared to adjacent degraded soils.

Habitat quality

- Planting techniques demonstrate traditional, regenerative Indigenous practices designed to maximize water efficiency and soil health in arid environments. Dryland farming methods, which conserve soil moisture and maximize limited rainfall, include terrace farming, rock mulching, and ollas. Terrace farming slows runoff and reduces erosion, rock mulching retains moisture and regulates soil temperature, and ollas—sub-surface clay vessels—gradually release water at the root zone.
- As a mycoremediation pilot project, the uppermost swale which receives the first flush of runoff from the parking lot was inoculated with nearly 40 mycelium bricks/ceremonial mushroom pillows.

Population and species richness

- The garden incorporates over 200 plant species featuring edible, ceremonial/medicinal, fiber, and dye plants that are native or regionally adapted and significant to local Indigenous, Hispanic, and Anglo cultures.
- Increases plant species diversity nearly 4 times compared to the adjacent reference site, as measured by the Simpson's Diversity Index (0.919 vs. 0.237).
- Increases total plant species richness over 17 times compared to the adjacent reference site, from 4 identified species to 71 species in the garden.
- Improves habitat quality for native pollinators by introducing 55 native plant species to the site that provide nectar, pollen, and larval host resources.

Key Methods of Testing



Soil test built from and confirming
NRCS Web Soil Survey



Xerces Society's Streamlined Bee
Monitoring Protocol



Complete florist diversity study,
utilizing Species Richness
Biodiversity Metric and Simpson's
Diversity Index (1-D)



Continued project maintenance
and development



Crissy Field

- Designed by Hargreaves Associates
- 1199 East Beach
San Francisco, California 94129
- 100 acres
- \$25 million
- Completion date in 2001



Fast Facts

This site was previously used as a military base point, excavating the existing dune network. In 1994, the base was decommissioned and given back to the National Park System, with this plan making it into the largest public park of San Francisco, notably focusing on both restoration and public use.

Goals:

- Remove existing rubble and military base
- Recreate historical dunes and sand ecology
- Reintroduce pedestrian water access, including sailboarding and kayaking
- Create habitats for endangered or threatened species





WILDLIFE PROTECTION AREA

This area is subject to the Environmental
Endangered Species Act.

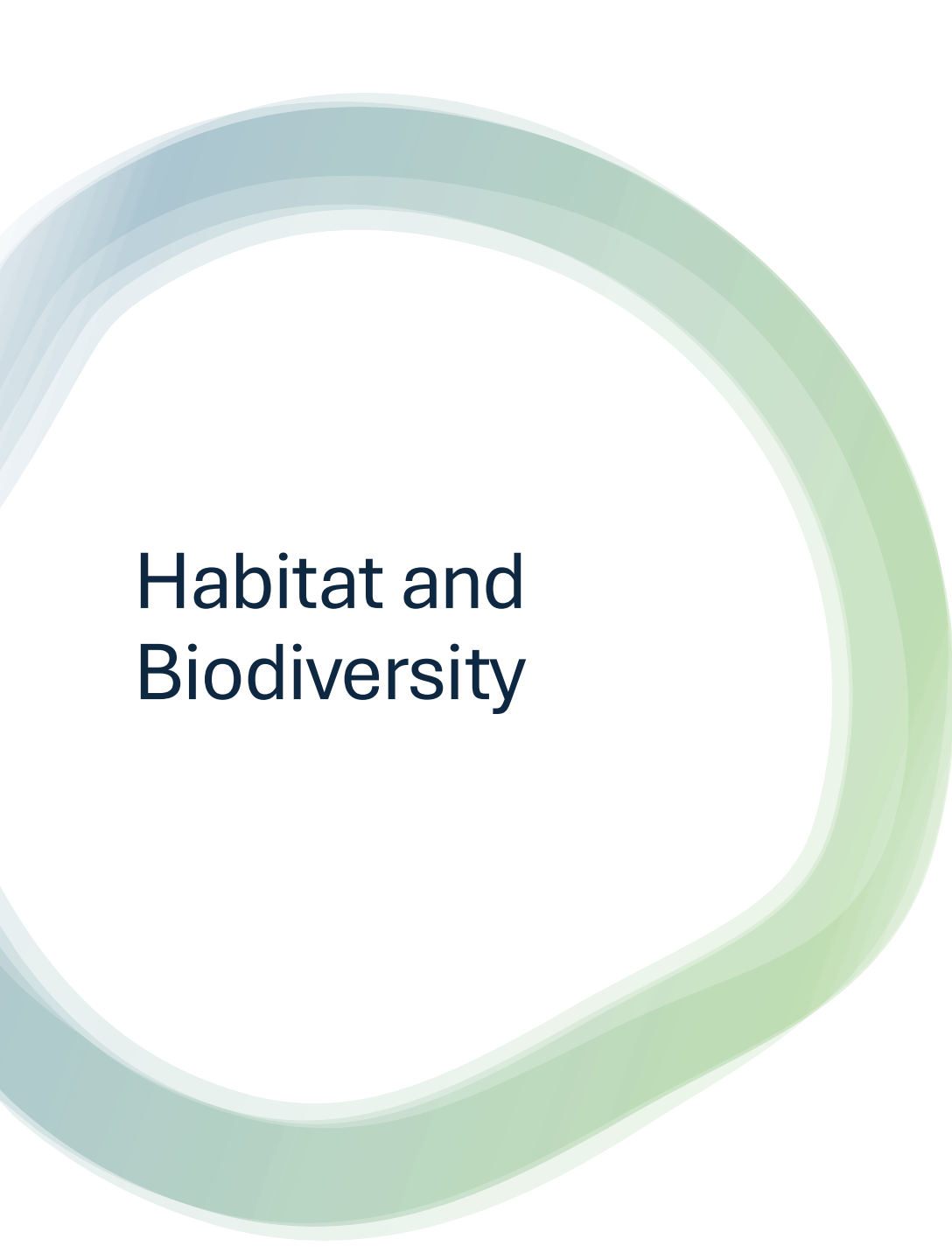
Restrictions: These fences and signs
are posted where game animals
are known to occur. They are the
property of the State of California.

FOLLOW PARK REGULATIONS

Help protect the habitat
of your visitor
May 15 - July 1

The red fence, trash bins,
signage, or other facilities
are not to be used.

For more information
call 415-774-2800



Habitat and Biodiversity

Habitat creation, preservation, and restoration

- Remediated approximately 38,000 cu yds of contaminated soil on-site through low temperature thermal desorption
- Restored 40 acres of habitat consisting of 22 acres of vegetated dune and dune swale habitat and 18 acres of tidal marsh, allowing fresh and salt water to merge at Crissy Field for the first time in 100 years.

Habitat quality

- Interaction points without interference, such as boardwalks and grass separators.

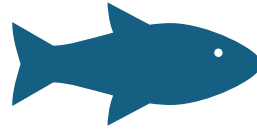
Population and species richness

- Supports ongoing native species establishment, as evidenced by an increase in Native Species Richness from 4.2 to 5.2 in the high elevation marsh habitat between 2002 and 2004.
- Provides habitat for 145 observed bird species representing 36 families, including 9 listed as endangered species or species of concern at a federal and/or state level, as observed from 2000 to 2004.
- Provides habitat for at least 19 species of fish representing 12 families and at least 13 macrocrustacean species as observed in Crissy Marsh from 2000 to 2004.
- The restoration of dune and marsh habitats reintroduced nearly 100,000 plants to the site, including 110 native species,

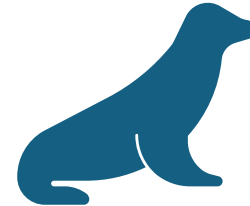
Key Methods of Testing



LTDD soil kilning and historical
NRCS Web Soil Survey



On-site species identification
surveys



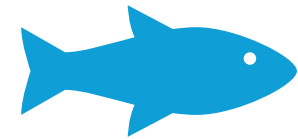
Catch-and-release aquatic
species surveys



Habitat creation,
preservation, and restoration



Habitat quality



Population and species
richness