Rose Prairie Restoration Plan

The Rose Prairie tract is a 170-acre property located in Franklin Township, Story County, Iowa. The property lies to the west of Ada Hayden Heritage Park, and delivers ground and surface water to Ada Hayden Lake, which serves as the emergency drinking water supply for the City of Ames.

Rose Prairie is underlain by loamy morainal soils and was historically dominated by upland, mesic, and loamy-mesic tallgrass prairie, marsh, and sedge meadow plant associations. Today, approximately 85% (143.0 acres) of the property is row-cropped in a corn-soybean alternation, with non-cropped areas dominated by cool-season grass waterways and terraces (23.0 acres), and mixed deciduous woodland along the creek (4.0 acres). An unnamed tributary to Ada Hayden Lake flows through the property from NE to SE, with several small drainageways entering the creek from the west. The creek, which drains both agricultural and developed areas, suffers from downcutting and incision. Left as is, this cycle could cause increased sediment and nutrient delivery to Ada Hayden Lake, further impairing it. Groundwater investigations in the last 15 years identified nutrient migration towards the lake and both surface and ground water nutrient inputs into Ada Hayden Lake have been identified as a threat to water quality.

An ecosystem-based approach was employed in the development of a property-wide restoration plan for the Rose Prairie tract (see Figure 1). The primary goal of the restoration plan is to balance the development of cost-effective ecosystem services provisioning (improving water quality, increasing biodiverse habitat, enhancing ecosystem resiliency) with recreational opportunities (low-impact trails, natural history exploration, research, and citizen science).

Rose Prairie's restoration plan will support three principal outcomes:

1. Maintain and improve water quality of surface and groundwater flowing into Ada Hayden Lake
2. Expand habitat for biodiversity in an exurban setting
3. Increase recreational opportunities for community members and visitors

Riparian areas

Removal of trees and shrubs along stream restoration site (4.0 acres, $13,000)

After avian and bat use surveys are conducted, removal of some trees and shrubs along the unnamed creek will facilitate the restoration of grass and sedge-dominated wet meadow community in the riparian area. Limited grading of deeply incised areas along the creek may be necessary after full survey of the creek. Ongoing management of trees and shrubs along the creek should be conducted on an annual basis.

Installation of Earthen dam and Beaver Dam Analog structures ($22,000)

Small earthen dam structures (3-4 foot high) and Beaver Dam Analogs (BDA) will be installed along the creek and its small tributaries. These structures are designed to mimic the function of natural beaver dams, and can accelerate recovery of incised streams and riparian and wet meadow habitats by reducing water velocities, increasing sediment deposition and aggradation, enhancing floodplain connectivity, raising groundwater recharge, and increasing habitat complexity. These structures are low-

cost alternatives to installation of highly engineered treatment wetlands, and can accomplish the same goals (Figure 2). The four small earthen dams are placed at strategic locations to facilitate trail crossings, and are more cost-effective than bridge installation.

Reconstruction and management of marsh and sedge meadow habitat (31.0 acres, $78,000)
Immediately following tree removal and installation of structures along the creek and tributaries, the cool season grasslands and former woodland areas will be converted to marsh and sedge meadow habitat using best practices, local ecotype seeds, and live-plant plugs of native plant species. Ongoing management will include mowing, prescribed fire, and invasive species management.

Upland areas
Reconstruction and management of upland tallgrass prairie habitat (138.0 acres, $242,000)
All current row-crop acres will be converted from an annual cropping system to a perennial tallgrass prairie using best practices and local ecotype seeds of native plant species. Ongoing management will include mowing, prescribed fire, and invasive species management.

Development of parking area and multi-use trails (2.1 miles, $450,000-$500,000)
The former house site on the property will be transitioned to a parking area with access from Hyde Avenue, allowing for visitors to access the multi-use trail system. The trail system will consist of a hard-surface 1.1 miles northern loop trail, and a crushed-rock 1.0 mile southern loop trail. Ongoing trail management will include annual mowing and infrequent surface improvements.

Attachments
Figure 1—Map of Rose Prairie Restoration Plan
Figure 2—Beaver Dam Analog Fact Sheet

References
Bentrup, G. 2008. Conservation Buffers: Design Guidelines for Buffers, Corridors, and Greenways Gen. Tech. Rep. SRS-109. U.S. Department of Agriculture, Forest Service, Southern Research Station, Asheville, NC. http://www.unl.edu/nac/bufferguidelines/ docs/conservation_buffers.pdf

Iowa DNR. 2006. How to Control Streambank Erosion. Iowa Department of Natural Resources, Des Moines, IA, & Natural Resources Conservation Service, Washington, DC. http://www.ctre.iastate.edu/erosion/manuals/streambank_erosion.pdf

Pollock, M., Beechie, T., Wheaton, J., Jordan, C., Bouwes, N., Weber, N., Volk, C. 2014. Using Beaver Dams to Restore Incised Stream Ecosystems. BioScience xx(4):1-12. https://academic.oup.com/bioscience/article/64/4/279/2754168

Wheaton J.M., Bennett S.N., Bouwes, N., Maestas J.D. and Shahverdian S.M. (Editors). 2019. Low-Tech Process-Based Restoration of Riverscapes: Design Manual. Version 1.0. Utah State University Restoration Consortium. Logan, UT. http://lowtechpbr.restoration.usu.edu/manual

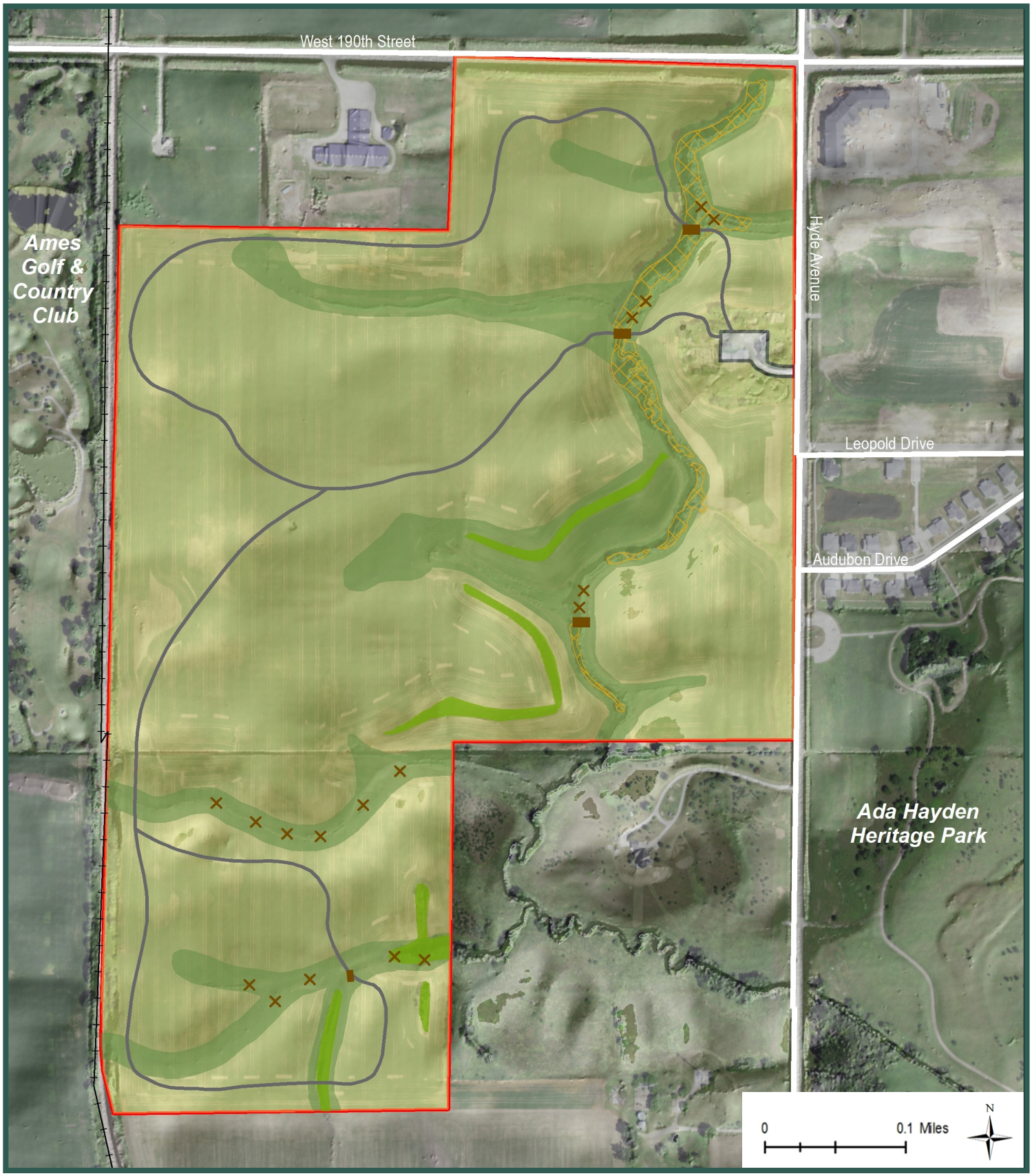

Figure 1: Rose Prairie Restoration

- Project Area
- Prairie Reconstruction
- Swale Reconstruction
- Tree Removal/Streambank Restoration
- Trails
- Parking Lot
- Existing Terrace/Waterway
- Beaver Dam Analog
- Earthen Dam

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Figure 2: Beaver Dam Analogs

Beaver Dam Analogs (BDAs) are channel-spanning, permeable structures, with a uniform crest elevation, constructed using woody debris and fill material, to form a pond and mimic natural beaver dams. In general, the design and installation of BDA complexes is a simple, cost-effective, non-intrusive approach to stream restoration that can influence a suite of hydraulic, geomorphic and hydrologic processes in order to achieve a range of common restoration goals.

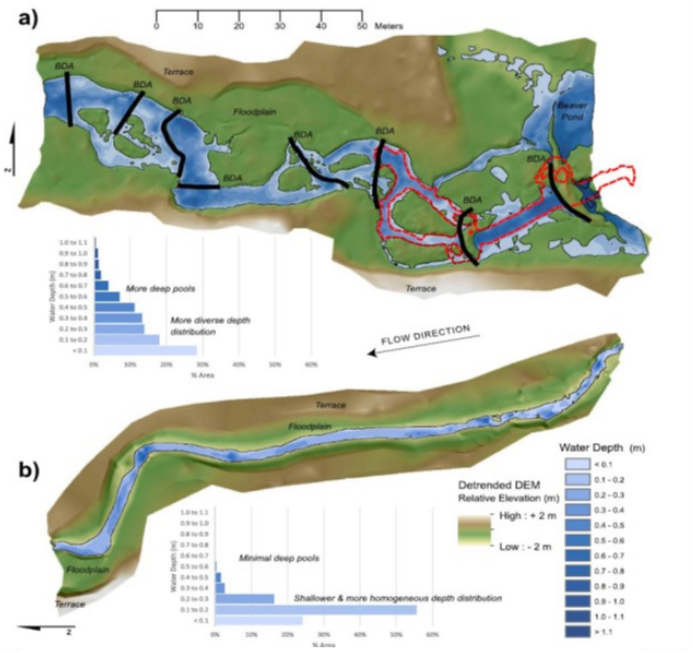

Figure 1. Digital elevation models (DEMs) and water depth distributions for a) typical reach with beaver dam analogues (BDAs) (i.e., successfully mimicking and promoting beaver dam activity) and b) without BDAs (i.e., structurally-starved control) from Bouwes et al. (2016b). Treatment area with BDAs has more channels and greater water depth variability than the control area without BDAs.

Figure 2. Installation of BDAs can take many forms, as different structures shapes, sizes and locations can be designed to promote specific outcomes at the structure scale. Building a diversity of structure types accommodates variability and uncertainty in stream flows and is more likely to encourage the recovery of degraded processes (e.g., erosion, deposition, overbank flow) that are crucial to meeting restoration

Figure 3. BDAs installed on along central Iowa stream, photos from "Restoring Rare Habitats for Wildlife and Water Quality – Beaver Habitat" Presentation given by Darrick Weisenfluh, Fish and Wildlife Biologist - Private Lands , U.S. Fish & Wildlife Service.

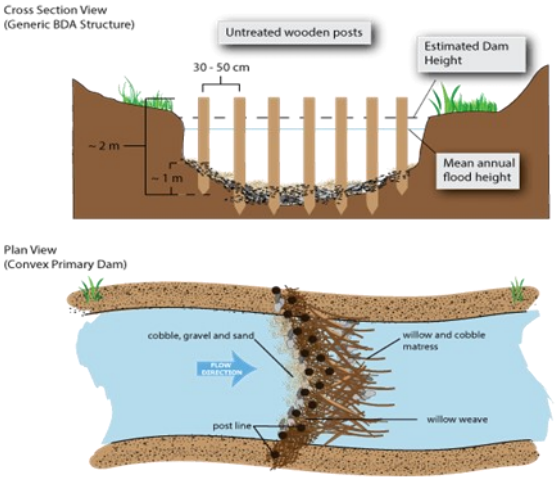

Figure 4. Conceptual illustration of BDAs incorporating a downstream "mattress" and double post line. In practice BDAs can be built with or without posts and using a range of natural materials.

References:
Figures 1, 2, 4 and text from Wheaton J.M., Bennett S.N., Bouwes, N., Maestas J.D. and Shahverdian S.M. (Editors). 2019. Low-Tech Process-Based Restoration of Riverscapes: Design Manual. Version 1.0. Utah State University Restoration Consortium. Logan, UT. 286 pp. DOI: 10.13140/RG.2.2.19590.63049/2.
Figure 3 from Weisenfluh, D. 2020, August 4. Restoring Rare Habitats for Wildlife and Water Quality – Beaver Habitat. USFWS. Practical Farmers of Iowa Webinar Series. https://practicalfarmers.org/events/field-days/restoring-rare-habitats-for-wildlife-and-water-quality-beaver-habitat/

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