STILLWATER CREEK WETLAND DEMONSTRATION PROJECT

A "How-to" Report on Restoring an Urban Wetland and Demonstrating its Importance for Floodplain Management

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INTRODUCTION

Teal Ridge Wetland is a 23-acre urban restoration project within the Stillwater Creek floodplain. The City of Stillwater is located in Payne County in north central Oklahoma. Stillwater Creek, a major tributary in the area, transects the western and southern portion of the city limits as it flows in a southeasterly direction toward the Cimarron River. Due to the productive soils, most of the floodplain vegetation was cleared and converted to various agricultural uses during early settlement times. In most areas along the creek, a narrow riparian zone composed of native hardwoods represents the only vegetative component of the floodplain that has not been substantially altered. Construction of upstream reservoirs, road construction, and various field drainage improvements to enhance farming capabilities has all contributed to changes in the creek's floodplain hydrology. Nevertheless, much of the floodplain within the city limits still remains subject to seasonal over-bank flooding and frequently inundates roads and agricultural lands on a temporary basis.

Over the past 10-15 years, the southwest portion of the city has seen a steady increase in residential development bordering the 100-year floodplain of Stillwater Creek. Recently, a limited amount of commercial development has also occurred within higher portions of the floodplain zone. Due to city ordinances, all developments within the city limits are now required to comply with stormwater retention criteria and account for increased runoff levels through the construction of retention structures or other similar storage systems. Many of these urban stormwater retention systems presented opportunities during the planning process to integrate wetland values with floodplain management objectives. Potential benefits include improvements to water quality from urban runoff, reduced siltation, recreational and educational opportunities and enhancement or restoration of wildlife habitat.

The Teal Ridge Wetland was planned for restoration under the Wetland Reserve Program (WRP), administered by the Natural Resources Conservation Service, and the approved project was restored and protected under a perpetual conservation easement. The property is located in the southwest section of the city near both existing and planned residential developments. The Conservation Commission, with funding from EPA and cooperation with several other partners, worked to develop accessibility and educational features for the wetland.

The project presented several opportunities to promote various aspects of wetland conservation through onsite demonstration. The City of Stillwater approved a stormwater retention design for the adjacent residential development, which was incorporated into the wetland restoration project. Also, promotion of this aspect of the project included the education of nearby residents on the importance of reducing pollutants from urban development runoff and the importance of wetlands in an urban landscape for reducing flood flows and filtering some sediments and pollutants from runoff waters.

Restoration of the wetland provided quality wetland habitat for a variety of wetland-dependent wildlife species. Development of a reliable water source further enhanced the project to allow flexibility in managing water levels and manipulating vegetation. Doing so also provided year-round viewing for visitors and created attractive breeding habitat important for many resident bird species. The demonstration project is also in a favorable location to attract several types of

migratory birds including waterfowl, shorebirds, and wading birds. Seasonal inventory surveys will document how migratory, wintering, and breeding birds respond to restoration/enhancement efforts.

This demonstration project also has provided educational opportunities. Located in close proximity to a growing urban area, several public schools, and a major university, the project has served a variety of audiences. Development of interpretive signs, boardwalks, and an outdoor classroom gazebo has allowed users to access and more effectively view wetland activities as well as increase their understanding of wetland functions and values. These features have also enhanced planned on-site training workshops targeting local educators to demonstrate suggested activities for the purpose of incorporating curriculums, field techniques and equipment into a wetland outdoor classroom.

TEAL RIDGE WETLAND PLANNING COMMITTEE

The Oklahoma Department of Wildlife Conservation and the Oklahoma Conservation Commission submitted the original grant proposal for the Teal Ridge Wetland project in the fall of 1997. The grant was awarded in the fall of 1998 and the Teal Ridge Wetland planning committee was developed. Members of the planning committee represented numerous agencies and organizations with an interest in wetland conservation. They included the following:

- USDA - Natural Resources Conservation Service
- Oklahoma Department of Wildlife Conservation
- Oklahoma Conservation Commission
- Payne County Conservation District
- The City of Stillwater
- Blaylock Construction
- Payne County Audubon Society
- OSU Student Chapter of The Wildlife Society

The planning committee began meeting in the summer of 1999 to design the layout and implementation of interpretive and educational features at Teal Ridge Wetland. These features were designed so that the project could be completed in phases. A promotional packet was produced in order to solicit additional partners and sponsors for the project. See attached for a copy of the promotional packet and a schedule of the phases of development.

Once construction of the wetland units was completed, work began on the interpretive and educational features at the site. Members of the planning committee began a series of workdays at the Teal Ridge Wetland in the spring of 2000. Most of the construction and installation of interpretive and educational features at the site was completed by members of the planning committee.

Members of the planning committee also designed interpretive and educational materials such as informational brochures, wildlife checklists, and bookmarks. These publications were placed at the trailhead kiosk at the Teal Ridge Wetland for distribution to visitors.

EDUCATIONAL AND INTREPRETIVE FEATURES

The goal of the Teal Ridge Wetland project was to develop a demonstration site that provides recreational and educational opportunities, quality wildlife habitat and floodplain management. Funding from EPA was used to develop educational and interpretive features at the site. These include a system of trails, an observation blind, a covered shelter, wildlife habitat structures and interpretive signage. Descriptions of these features may be seen in the provided attachment.

The first feature that visitors encounter at Teal Ridge Wetland is the entrance sign. The sign includes original artwork by the landowner and lists the partners involved in the project. Next, is the gravel parking area. Concrete parking bumpers are located around the perimeter of the parking area providing space for 17 vehicles or a school bus. A handicapped parking pad is also available. A wooden entrance ramp leads from the parking area to the top of the wetland dike. A welcome sign is located at the beginning of the entrance ramp. The center platform of the entrance ramp surrounds a Trailhead Kiosk. The design of the kiosk incorporates the first of several wildlife habitat structures seen at the site, a Chimney Swift Tower. The kiosk itself is 4-sided with each side bearing an information and/or interpretive panel. One side contains a map of the site, an informational brochure about Teal Ridge Wetland, a wildlife checklist and a children's checklist. The other panels include an introduction to wetlands, information on Chimney Swifts and a description of the management of Teal Ridge Wetland. A series of interactive interpretive panels entitled "Wetland Metaphors" is mounted on the handrail along one side of the entrance ramp between the kiosk and the end of the ramp. This display was adapted from an activity in the Project WILD curriculum and explains the functions and values of wetlands.

Once visitors reach the top of the wetland dike, they can view two separate wetland units. The center dike divides the wetland area into two distinct pools. A concrete sidewalk leads visitors from the entrance ramp to the Wetland Gazebo located in the center of this dike. The sidewalk also serves as an interpretive feature; animal tracks are located in the concrete in several places along the sidewalk. Each set of tracks tells a tale of something that happened in the wetland. Visitors are encouraged to investigate the animal tracks and determine what happened and who was involved. A bookmark with all of the tracks identified is available at the Trailhead Kiosk. At the Wetland Gazebo, visitors can sit and enjoy the wonders of the wetlands. They can also observe and identify several species of wetland birds. Silhouettes of several species of birds including waterfowl, wading birds and shorebirds are located inside the Wetland Gazebo. A series of interactive interpretive signs entitled "The Beauty of Mud" is also mounted on the handrail of the gazebo. This series of signs describes the importance of wetland mud in the food web of a wetland.

Visitors can continue their journey around the east wetland unit on the Wetland Loop Trail. This trail begins at the Wetland Gazebo and circles the perimeter of the east unit ending back at the entrance ramp. The portion of the trail on the south side of the wetland unit is a wooden boardwalk. The remainder of the trail is natural surface. Several benches are located along the length of this trail.

Another major interpretive feature at the Teal Ridge Wetland is the Observation Blind. This structure is located on the west side of the property. The blind is enclosed with several viewing windows facing the west wetland unit. Interpretive signs inside the blind include a Wetland Bird Identification sign and a chalkboard for visitors to record their observations. Access to the observation blind is provided by the Quiet Trail that leads from the parking area to the west end of the wetland units. A series of interpretive signs illustrating the importance of being quiet when viewing wildlife is located along the quiet trail. Visitors are discouraged from using the top of the dike surrounding the west wetland unit by a length of split rail fence.

Additional habitat structures located at Teal Ridge Wetland include Bat houses, Wood duck nest boxes and Purple Martin nest gourds. These structures are located in various places within the wetland units.

Several of the interpretive features at Teal Ridge Wetland were sponsored or donated by project partners or other parties interested in the project. Signs acknowledging these sponsorships or donations are located on the feature or in close proximity.

SEDIMENT AND POLLUTION CONTROL STRATEGIES

In order to reduce the amount of sediment and other pollutants entering the wetland units, several sediment and pollution control practices were implemented at Teal Ridge Wetland and the adjacent housing subdivision. Blaylock Construction installed the first of several practices in order to comply with codes and ordinances for the City of Stillwater. These practices included a stormwater detention structure located on the southeast corner of what would become the east pool of Teal Ridge Wetland and silt fencing along the northern boundary of the subdivision. These actions prevented sediment from construction activities from entering nearby Stillwater Creek.

As construction of the wetland dikes progressed, the original stormwater detention structure was incorporated into the east pool of Teal Ridge Wetland. Stormwater runoff from the residential streets within the subdivision entered the wetland via a concrete flume. During storm events in early 2000, the soil surrounding the terminal end of the concrete flume began eroding because of the high velocities of the water entering the wetland. In order to minimize this erosion, straw bales were installed as a temporary measure to protect the banks and slow the water. Eventually, riprap was installed around the flume and has worked successfully to reduce the erosive forces of the stormwater and stabilize the bank near the flume.

When construction of the wetland dikes was completed, native vegetation was installed on the dikes in order to stabilize the soil. The native vegetation buffalograss, *Buchloe dactyloides*, was used because of its low maintenance requirements and ability to hold soil.

In addition to physical sediment and pollution control practices implemented at the wetland site, the City of Stillwater agreed to mark curbs in the adjacent subdivision indicating not to dump anything in the street because stormwater will carry it into the wetland. Informational brochures were also be distributed to residents detailing the importance of controlling nonpoint source

pollution including soil particles, oil, antifreeze, animal waste, paint, fertilizers, pesticides and other urban wastes that enter water sources during storm events.

WILDLIFE INVENTORIES

Members of the planning committee, the OSU Student Chapter of the Wildlife Society, and the Payne County Audubon Society have conducted several wildlife inventories at the Teal Ridge Wetland. Species observed included 6 amphibians, 9 reptiles, 61 birds and 5 mammals.

TYPE	COMMON NAME	SCIENTIFIC NAME
Amphibian	Blanchard's Cricket Frog	*Acris crepitans blanchardi*
	Toad	*Bufo spp.*
	Gray Tree Frog	*Hyla chrysoscelis or versicolor*
	Chorus Frog	*Pseudacris spp.*
	Bullfrog	*Rana catesbiana*
	Southern Leopard Frog	*Rana utricularia*
Reptile	Snapping Turtle	*Chelydra serpentina*
	Skink	*Eumeces spp.*
	Speckled Kingsnake	*Lampropeltis getula holbrooki*
	Blotched Water Snake	*Nerodia erthrogaster transversa*
	Diamondback Water Snake	*Nerodia rhombifer rhombifer*
	Texas Brown Snake	*Storeria dekayi texana*
	Western Ribbon Snake	*Thamnophis proximus proximus*
	Three-toed Box Turtle	*Terrapene carolina triunguis*
	Red-eared Slider	*Trachemys scripta elegans*

Bird	Pied-billed Grebe	*Podilymbus podiceps*
	Great Blue Heron	*Ardea herodias*
	Great Egret	*Casmerodius albus*
	Snowy Egret	*Egretta thula*
	Little Blue Heron	*Egretta caerulea*
	Green Heron	*Butorides striatus*
	Canada Goose	*Branta Canadensis*
	Green-winged Teal	*Anas crecca*
	Mallard	*Anas platyrhynchos*
	Northern Pintail	*Anas acuta*
	Blue-winged Teal	*Anas discors*
	Northern Shoveler	*Anas clypeata*
	Gadwall	*Anas strepera*
	Turkey Vulture	*Cathartes aura*
	Mississippi Kite	*Ictinia mississippiensis*
	Northern Harrier	*Circus cyaneus*
	Red-shouldered Hawk	*Buteo lineatus*
	Red-tailed Hawk	*Buteo jamaicensis*
	American Kestrel	*Falco sparverius*
	Merlin	*Falco columbarius*
	American Coot	*Fulica Americana*
	Killdeer	*Charadrius vociferous*

	Greater Yellowlegs	*Tringa melanoleuca*
	Lesser Yellowlegs	*Tringa flavipes*
	Western Sandpiper	*Calidris mauri*
	Least Sandpiper	*Calidris minutilla*
	Baird's Sandpiper	*Calidris bairdii*
	Long-billed Dowitcher	*Limnodromus scolopaceus*
	Wilson's Phalarope	*Phalaropus tricolor*
	Mourning Dove	*Zenaida macroura*
	Common Nighthawk	*Chordeiles minor*
	Chimney Swift	*Chaetura pelagica*
	Belted Kingfisher	*Ceryle alcyon*
	Eastern Phoebe	*Sayornis phoebe*
	Western Kingbird	*Tyrannus verticalis*
	Eastern Kingbird	*Tyrannus tyrannus*
	Scissor-tailed Flycatcher	*Tyrannus forficatus*
	Horned Lark	*Eremophila alpestris*
	Barn Swallow	*Hirundo rustica*
	American Crow	*Corvus brachyrhynchos*
	Marsh Wren	*Cistothorus palustris*
	Eastern Bluebird	*Sialia sialis*
	American Robin	*Turdus migratorius*
	Northern Mockingbird	*Mimus polyglottos*

	Northern Cardinal	*Cardinalis cardinalis*
	Dickcissel	*Spiza Americana*
	Field Sparrow	*Spizella pusilla*
	Vesper Sparrow	*Pooecetes gramineus*
	Savannah Sparrow	*Passerculus sandwichensis*
	Grasshopper Sparrow	*Ammodramus savannarum*
	Song Sparrow	*Melospiza melodia*
	Lincoln's Sparrow	*Melospiza lincolnii*
	White-throated Sparrow	*Zonotrichia albicollis*
	White-crowned Sparrow	*Zonotrichia leucophrys*
	Dark-eyed Junco	*Junco hyemalis*
	Red-winged Blackbird	*Agelaius phoeniceus*
	Eastern Meadowlark	*Sturnella magna*
	Great-tailed Grackle	*Quiscalus mexicanus*
	Common Grackle	*Quiscalus quiscula*
	Brown-headed Cowbird	*Molothrus ater*
	American Goldfinch	*Carduelis tristis*
Mammal	Field Mouse	
	Muskrat	*Ondatra zibethicus*
	Raccoon	*Procyon lotor*
	White-tailed Deer	*Odocoileus virginianus*
	Coyote	

CONCLUSION

The Teal Ridge Wetland Construction and Educational Enhancement have been successful efforts. The wetland construction allows for improvements to water quality from urban runoff, reduced siltation, recreational and educational opportunities, and enhancement or restoration of wildlife habitat. These systems are critical to water quality protection in such rapidly expanding urban settings.

The location of the wetland in proximity to a major university and the City of Stillwater offered an excellent opportunity for educational enhancement and effectively, doubled the utility of the wetland. Not only is it successfully reducing impacts to water quality and providing critical habitat for wetland fauna, but it is also serving an important educational role. The wetland offers lessons for people of all ages and knowledge bases to learn about wetlands importance and role in the greater ecosystem. Groups from the Wildlife Society, the Audubon Society, and the University are already using the wetland. It is likely that the remaining members of the planning committee will also use the wetland in the future, along with many other local groups.