

**APPENDIX A**  
**Baker Wetlands History**

# **Baker University Wetlands History Since 1968**

By Dr. Roger L. Boyd  
Biology Department – Baker University

## **INTRODUCTION**

In the fall of 1968, Baker University received 573 acres from the Department of Health, Education, and Welfare. The property was received through a “Quit Claim” Deed which required that the property be utilized for the following specific purposes outlined in the university proposal submitted to HEW:

- Education
- Research
- Restoration of the farm ground to native habitat

The University submitted annual progress reports to the U.S. Real Property Office for 30 years. At the end of this period the University received a clear title to the property.

## **SUMMARY**

### **Condition in 1968**

The area was surrounded by a levee on four sides with a drainage canal (Mink Creek) in the center of the eastern half. Mink Creek was designed to drain to the south to the river. There were two virgin wetland meadows of about 15 and 35 acres. The northwest quarter was pasture and the rest of the area had been cultivated at some point in the past and W-ditched for increased surface drainage. There was a subterranean tile system that drained to the river in the western section of the eastern half. For the most part, the area was fairly dry. The drainage systems were not properly maintained and during wet periods the system was easily over-taxed, causing flooding, significant at times, on the inside of the levee system.

### **What was Broken**

The western levee was low and had several breaches in the northern half of the levee. The northern levee had 6 culverts. Five of them were eroded out and no longer held water out, but let significant amounts of water in. The sixth culvert was partly silted shut. Mink Creek had a screw valve structure at the north end, another structure on 35<sup>th</sup> Street and large culverts that exited into the river. The northern structure was silted close, the 35<sup>th</sup> Street structure was dilapidated and non-functional, and the outlet was partially silted shut with the outside flappers all non-functional. There were five surface tile systems that drained into Mink Creek and all five had been severely eroded. The south central location of the area had developed into a large local dump site and contained considerable amounts of refuse along with several pieces of abandoned heavy equipment.

### **What has Changed**

The land that was being cultivated prior to receiving the land was kept in cultivation until it could be planted into native grasses and forbs. A majority of the land was replanted by 1982, the remainder in 1991-2. The dump refuse was bulldozed over the levee, but not into the river, and the heavy equipment was disposed of. The flood canal along Louisiana Street and 31<sup>st</sup> Street were built in 1971. During the same year 35<sup>th</sup> Street was closed. Beginning in 1991 several significant sources of income (mostly USF&W) were acquired. A number of significant projects have been conducted since that time:

- The northern half of the center road was elevated using fill from a borrow ditch created to the east.

- Three water control structures (WCS) were placed under this road.
- The five eroded culverts on the north levee and four of the breaks along Mink Creek were all plugged.
- Two pools of water were created to the south of 35<sup>th</sup> Street using levee construction and Water Control Structures (WCS).
- A southern section of the subterranean tile system was excavated and plugged.
- The northern structure on Mink Creek was plugged, the structure at 35<sup>th</sup> Street was removed (except for the screw posts), and the outlet culverts were plugged. A new WCS was installed on top of the outlet tubes and 3 other WCS were installed.
- 35 wood duck boxes were constructed and erected, as well as 10 bluebird house and a large nest box for barn owls.
- An 850' elevated boardwalk, information kiosk, two nesting islands, and wildlife observation blind were built.
- Long-term studies on biodiversity, specifically birds, small mammals, turtles, snakes, spiders, and plants were all initiated.
- A levee and 2 WCS were installed in the SE section in order to further hydrate this area to increase biodiversity.
- A majority of the scrap metal (barrels, buckets, refrigerators, washing machines, bed springs, car parts, roofing tin, agricultural storage bins, etc.) was removed from the dumpsite.
- A system of 27 observation wells was installed and measured monthly.
- The entire area has become wetter and hydric vegetation has increased phenomenally since 1968.
- The integrity and biodiversity of the native plots has been a priority and the other areas have been converting to similar vegetation types. The exception is the northeastern section. This has become permanently wet without human intervention or control and yet it adds an additional dimension to the habitat on the area.

## DETAILED COMMENTS

### Condition of the Property in 1968 and Subsequent Changes

I will divide the property into four quadrants to discuss the condition of each. This will be a largely qualitative assessment, rather than quantitative. Some data does exist and can be provided, if needed. My personal involvement has been that I was an undergraduate senior at Baker in 1968-69. My father managed the area until his accidental death on the area in March 1982. During this early period I was involved in many of the management aspects with my father. I became a faculty member at Baker in 1976 and became the director/manager of the area upon my father's death in 1982.

### *Northwest Quadrant ~ 155 acres*

- **Pasture:** This area was all fenced for pasture. This was also evident due to the presence of a windmill and concrete water tank on the northern edge. This area had, however, been neglected for some time and substantial areas were dense patches of rough-leaved dogwood with significant numbers of small locust, hedge and elm trees. The herbaceous vegetation was dominated by smooth brome and Kentucky bluegrass. Except for several depressions, the area was fairly dry most of the year.

- **North Levee Breaks:** There were four large breaks in the north levee. Each of these breaks had originally been culverts that were to drain the pasture into the canal along the northern boundary. The culverts originally had flappers on the outside to prevent water from coming back into the area. Over time, the culverts had silted shut and were no longer functional. This allowed craters up to 60 ft. across to erode away. This allowed high water from the canal to flow into the area but it also flowed out again as water receded.
- **Permanent Wetlands on West:** The other significant feature was a permanent wetland that had developed along the west edge. There was a fairly shallow levee that paralleled Louisiana Street much like the levee currently along Haskell Avenue. Portions of this levee had eroded away sometime in the past, perhaps as a result of the 1951 flood, and this had created an avenue for water to enter the pasture. My recollection is that this area consisted of approximately 3-5 acres of open water surrounded by emergent vegetation e.g. cattails, arrowleaf, and buttonbush. To me, this was the only area that I would have categorized as wetlands on the entire site. The current flood canal was not constructed until 1971. Drainage was to the north, as it is along Haskell Avenue, through a fairly shallow ditch. These depressions were slightly lower to the inside of the levee and were not effectively drained by the Louisiana Street ditch.
- **Changes that have occurred:**
  - **Louisiana Flood Canal:** This canal was constructed in 1970-71 by the Wakarusa Watershed District (headquarters in Overbrook) to drain runoff from Naismith Creek directly to the Wakarusa River, thereby avoiding the relatively non-functional northern canal. Baker negotiated that in exchange for the impact of this project on its property, the township road now referred to as 35<sup>th</sup> Street, be closed and the ROW abandoned. In return, 31<sup>st</sup> Street would be constructed along its present route. The large earthen levee along the flood canal was constructed at that time, thus completely eliminating the permanent wetlands mentioned above.
  - **Pasture:** This area was brush-hogged in 1973 and again in 1978. The fence was replaced in 1973 by electric fence and the area was grazed under lease until 1981. It was again brush-hogged in 1992 after the present N-S road was elevated.
  - **Road Elevation:** As a mitigation for the planned wetlands fill by Dunbar, Lawrence Ready Mix, and Snodgrass to the north and east, the north half of the center road was elevated and three water control structures (WCS) were placed in the road in fall 1991. The fill used to elevate the road was obtained by creating a borrow ditch on the east side of the road. The plan was to utilize the road to re-hydrate the northwest quadrangle as well as improving access. In preparation for this re-hydration, base-line biodiversity data were collected on plants, birds, mammals, and reptiles. The vertebrate studies have continued on a periodic annual basis by Dr. Calvin Cink. The vegetation samples were taken by me in 1991, 1996, and again in 2001. The area has significantly increased in hydric vegetation since 1991.
  - **Boardwalk:** In 1992 the initial phase of construction was started. The boardwalk and kiosk were completed by spring 1994. In summer 1999 two swallow pools were constructed near the boardwalk.
  - **Utilities:** The electric line is essentially the same as in 1968. The natural gas pipeline is currently owned by Williams Gas Co. (several changes of ownership since 1968). A line that parallels the center road was replaced in 1989. There was an outbuilding and above-ground valve structure located along this central road, about 250 yards south of the north gate that was removed in 1999.

*Northeast Quadrat ~ 115 acres*

- **North-South Canal:** This quadrat is divided into two parcels by a drainage canal constructed ~1920. The canal drains to the river to the south and has been referred to as “Mink Creek” for the past 10 years. At the north end was a massive screw-valve system with two screw-valves and steel/wooden doors ~56” square. In 1968 these doors were closed and partially silted shut but there was still some leakage through the doors into the northern canal whenever water was present in the N-S canal. There was a similar set of screw-valves on the bridge located on 35<sup>th</sup> street. The doors were present but in disrepair and were missing several boards, thus they were non-functional in closing and holding water.
- **Western Parcel ~ 75 acres:** This area was severely “W-ditched” with the ditches running to the north. There was a single culvert structure in the north levee that had drained the surface water into the northern canal. The culvert was badly eroded and non-functional, similar to the northwest quadrat. In addition, there were two areas on the west side of Mink Creek where there were breeches in a low levee that parallels Mink Creek. This area had been used as a pasture. This was evident due to a concrete watering tank in the northwest corner. This pasture was open in the center, with a broken fence row of hedge, locust and elm along the east side of the N-S center row. There were also scattered cottonwoods, ash, locust, mulberry and hedge along both sides of Mink Creek. This area seemed fairly dry in the early years but most of the herbaceous vegetation was brome and no attempts were made to burn it early in management.
- **Eastern Parcel ~ 40 acres:** This area also includes an additional 20 acres to the north that is owned currently by the Kansas Department of Wildlife and Parks (KDWP) and another 20 acres even further north (adjacent to 31<sup>st</sup> Street) that is owned by the University of Kansas (KU). The northern canal and levee traverses through the KU property and a small sliver of the KDWP property before flowing under the county bridge on County 1055 (Haskell Avenue). In addition, there is a remnant of an old railroad bed running diagonally across the northeastern corner of the KU property. And finally, there is an additional gas line (26”) that runs diagonally from the south central metering site and crossing under Haskell Avenue just north of the bridge. In 1968 the northern canal flowed freely to the east and essentially retained little or no water. I have no recollection of what occurred to the north as it was not part of the Baker Wetlands and it was relatively inaccessible due to the absence of 31<sup>st</sup> Street. To the south of the levee the area had been cultivated in the past. It had been “W-ditched” to drain to the east. This surface water then flowed north and exited through a makeshift culvert created from an old steam engine boiler with a dilapidated wooden flapper on the canal side. The culvert was partially silted in with the flapper open and partially missing. Therefore, during high water this area was subject to flooding from the canal, the same as the other northern parcels already discussed.
- **Changes that have occurred:**
  - **Cultivation/Pasture:** The fence around the western portion of this quadrat was repaired and grazing was begun in 1970. Within several years cultivation was abandoned on most of the eastern portion, as it was not adequately drained any longer. This area was fenced and grazed beginning in 1973.
  - **Hydrology:** In 1991 the north-south road was elevated and the borrow ditch on the east side of the road was created. At the same time the broken culvert on the north levee was plugged as well as the two breeches along Mink Creek. The bridge over Mink Creek was completely removed except for the north retaining wall. The doors on the screw valve structures were removed and steel culverts replaced the old bridge. Also during that year several beavers moved into the area and built separate dams on both ends of the northern canal. This raised the water level and caused a large number of trees to be cut or die from flooding along the length of the levee as well as in the area north of the canal. The beavers also further plugged

the old culvert in KU's portion of the levee. This created the large area of open water in this area. Also in 1991, a subterranean drainage tile system was discovered. This tile started in the northern edge of the west section and ran south, nearly a mile to the river. The tile was excavated near the river in 1992 and 50' was plugged with clay. This went a long ways in increasing the hydrology of the north central area. In 1998 we raised the small levee paralleling Mink Creek and put in two WCS to better regulate water in this area and to better utilize this levee for a trail. In 1999 beavers built a dam on Mink Creek near the southern WCS. They backed water up high enough to make the northern WCS ineffective but at the same time they dramatically increased the hydrology in the entire northern half of the northeastern quadrat. The beavers also began constructing small dams from the ends of several W-ditches and tying them into the levee paralleling Haskell Ave. This further elevated the water levels.

- **Vegetation:** This area was brush- hogged twice in the 1970's for the benefit of grazing and part of it was mowed again in 1992. The east half had ten acres of native grass planted on the southern edge in 1978. This area has been periodically burned since 1979. The rest of it was determined to be too wet for the grass mix we were using. None of the west half was ever planted to native species but as it became wetter since 1990 native species of sedges, spikerush and grasses have re-established in this area. This portion was first burned in 1983 and periodically since. Prior to rehydration both of these areas became very brushy but increased hydrology has killed much of this woody vegetation.
- **Utilities:** The electric utilities are essentially the same as 1968. There is a cut-off valve along the major gas line that was replaced in the mid-1980's. From aerial photographs it appears that this gas line was replaced in the mid-1950's. The RWD #4 obtained an easement for locating a water line parallel to Haskell Avenue in 1975 and the City of Baldwin did the same in 1979. The County rebuilt the bridge along Haskell Ave in 1982 and rerouted a significant portion of the levee and shoulder.

### ***Southeast Quadrant ~ 148 acres***

- ***North-South Canal:*** This quadrat is divided into two parcels by the same drainage canal as the northeast quadrat. The canal drains to the river to the south and is about 20 feet deep where it goes through the river bank levee. There were three culverts, each 52" in diameter that went through the levee and each had a very heavy steel flapper valve on the outside of the levee. In 1968 these culverts were partly silted shut, one of the flappers was missing, and the other were silted into an open position. In 1968 most of this area was cultivated except for 15 acres of virgin wetland prairie in the northeast corner. All of this was fairly dry but the farmer still had trouble working the ground at just the right time or being able to harvest the crop if it was a wet fall.
- ***Western Parcel ~ 77 acres:*** This area was "W-ditched" with the ditches running to the north and emptying into a big ditch. From there the water ran to the east and emptied into Mink Creek. There is a levee on the west side of Mink Creek which was created with the spoil from digging the canal. This levee had two large clay tile culverts that had originally gone through the levee in order to drain the surface water from the west field. Both of these had been eroded out of the levee and the tile sections were scattered in the canal and in the large erosion holes. In 1968 there was an old beaver dam just down stream from the southernmost culvert. This dam still retained water but was not high enough to prevent the fields from draining.
- ***Eastern Parcel ~ 71 acres:*** This area contains the 15 acre virgin wetland prairie tract at the north end. To the south were two 20 acre fields. The northern field was "W-ditched" and drained to the east. From there it drained north into a ditch and then back west into Mink Creek. The southern field was lightly "W-ditched" and drained north to a shallow ditch that drained west into

Mink Creek. The concrete retaining walls for this culvert had collapsed and the culvert was nearly silted shut but it still functioned except during extremely heavy run-off. All three of these areas were fairly dry in the early periods except for a shallow depression in the center of the southern field. The two fields were fairly consistently planted and harvested but in wet years this central depression was avoided.

- **Changes that have occurred:**
  - **Cultivation:** None of this ground was cultivated after 1981.
  - **Hydrology:** In 1992 both ditches on the north edge were converted to WCS to regulate flow into Mink Creek. There was a nesting island created in the western parcel and the two culvert washouts were plugged and the levee reconstructed. Also there was a diagonal levee built that paralleled the gas line in the west. Also in 1992 the subterranean tile system in the western parcel was excavated and plugged. In 1994 there was a large WCS constructed on top of the old culverts at the south end of Mink Creek. The old culverts were plugged on the north end. This has not been a permanent plug and repairs will be made on the structure during 2002. On the eastern half there was a levee constructed on the south edge of the native meadow in 1995 and five depressions were excavated from several of the W-ditches. There was a WCS placed at the east end of this levee and the collapsed culvert in the southern field was replaced with another WCS.
  - **Vegetation:** The western portion of this quadrat was cultivated until 1982. At that time it was left fallow. Ten acres on the south end were planted to grass and forbs in 1988 and the remaining acreage was mowed and over-seeded in 1992. In 1982 about 15 of the southeastern 20 acre field was planted to native grasses and a few forb seeds. An extensive line of cottonwoods has come in along the southern boundary of the hydric soils and a portion of the southeastern field was grown up in dogwoods and other secondary growth.
  - **Other:** There was a wildlife observation blind constructed in 1998 along the levee south of 35<sup>th</sup> Street and just east of the diagonal levee.

#### **Southwest Quadrat ~ 155 acres**

- **Virgin Wetland Meadow:** There was about 37 acres of meadow in the northwest corner of this quadrat. It apparently had been mowed annually for hay prior to our receiving the land. There was a low levee on the west that paralleled Louisiana Street. The meadow drained to the east along the levee that paralleled 35<sup>th</sup> street.
- **Cultivated Fields ~ 110 acres:** This area was lightly “W-ditched” with the ditches running to the north. The water then drained to the east, eventually entering Mink Creek. It was later discovered that a single 6” lateral traversed the northeastern portion and connected with the subterranean tile to the east. This area was fairly effectively drained except along the northern edge.
- **Southern Dump Site:** In 1968 there was an old broken down bulldozer and steam shovel sitting in the field at the southern end of the central road. In addition there was a large extent of refuse that had been dumped on both sides of the river levee. This trash extended approximately 200+ feet north of the levee. The road to this site was well traveled and unsecured. It had become a dump for local residences as well as Haskell and required large gates and a period of transition before trash was no longer left along the road or the entrance gate. Even after 35<sup>th</sup> street had been closed in 1971, people continued to periodically dump their trash at the east gate. On the river side of the levee there were large amounts of concrete and brick debris for about 130 yards to the east and about 70 yards to the west.

- **Gas Meter Houses:** There were a series of metal sheds that were just north of the dump site which contained meter gages for the gas pipeline. I recall perhaps 6 such structures.
- **Changes that have occurred:**
  - **Cultivation:** This area was planted into several pure stands of prairie grass for harvesting the seed in order to plant other areas. Ten acres of switchgrass was planted in 1970. More grass strips of switchgrass, indiangrass, and big bluestem were planted in 1971 and 1972. A ten acre strip of mixed grass was planted in 1977 and another in 1986. The remaining 60 acres was planted with native grass and forbs in 1991.
  - **Vegetation:** The native area was mowed for hay every year until 1982. Since then it has been periodically burned. The northern half of the cultivated area has developed into significant wetland vegetation. The southern portion is mostly non-hydric soils and consists of 7-10 ft. tall native grass species which are burned every other year.
  - **Utilities:** In 1989 Williams Gas Company replaced two of the gas lines on the west side of the central road. One line continued north to the meter valve house and connected to the line that diagonals to the northwest. The second line originally went from the meter houses and diagonalled across the native prairie. They replaced it by going north to the E-W center road and then down the center of the road to the west.
  - **Hydrology:** In 1970-71 the flood canal was constructed along Louisiana Street. The newly constructed levee was planted to native grasses but approximately 5 acres of the virgin prairie tract was lost to the canal and levee. In 1992 there was a N-S levee constructed to the west of the new gas lines with a WCS in the north end of it. Also within this area was constructed a nesting island. Once the subterranean tile was plugged this area became much wetter.
  - **Dump site:** Early in the fall of 1968 the bulldozer and steam shovel were sold as scrap metal and the refuse was bulldozed over the levee. This was the era before plastic so a majority of the material was paper, wood, glass, tin or steel and most has long since decomposed. In the past 5 years 12 large dumpsters of scrap metal has been recycled. Most of these materials were barrels, 5 gallon buckets, roofing tin, fencing, refrigerators, washing machines, bed springs, and car parts. There is very little glass and hardly any material other than metal and concrete/brick rubble that remains in the dump.