

PREFACE

Background Information:

Butler is a small town located in west central Missouri between the South Grand River and the Upper Osage/Maris de Cygnes Rivers. Like many parts of the country, the town of Butler started as a very rural community surrounded by small family farms and ranches. Fields of corn, milo, soybeans, and wheat were common and cattle operations, hog producers, and dairies prospered in close proximity to the stockyard of Kansas City. Over the years Butler grew at a slow and steady rate until the 1980's when the urban sprawl from the Kansas City Metro Area began to move south, followed by many changes.

With the Kansas City urban sprawl, a much more rapid growth is being experienced. Butler and the surrounding communities became "bedroom communities", which prompted an increase in the area's growth and subsequent requirements for expanded services and new industries. The area is still growing at an extremely fast rate. Along with the increase in population came an increase in demand for a safe water supply.

During the same period of time, the "Clean Water Act" was passed in Congress and has remained in effect. The purpose of the "Clean Water Act" is to ensure a safe drinking water supply and water resources for the citizens of the county. The act outlines requirements for the health of public watersheds, and allows time for the cities, municipalities and water distributors to come into compliance.

Water can only be clean if pollutants are kept out of the supplying source. Larger populations increase the need for larger, more cost effective sewage control and water supplies. With continually dropping farm revenues and subsequent drive to produce more on agricultural land, producers have necessitated heavier use of herbicides and fertilizers to maximize production. Heavier grazing of cattle has also added increased potential to pollute Butler Municipal Reservoir and tributaries. This pattern, occurring nationally, has prompted various State and Federal agencies to monitor water bodies and surrounding watersheds, in addition to regulating water distributors.

In January of 1995, the Bates County SWCD initiated a resource assessment and watershed-planning project in the Miami Creek/Drexel Lake watersheds. The Project was initiated in response to a news article that appeared in the local paper about Atrazine in the Public Water Supply. The article pointed to the Agricultural Community and the lack of Conservation on the land as the main source of the problem. Through the Watershed Planning Process the Planning committee identified the need for a major information and education effort in the watershed.

In November of 1996, the SWCD, with assistance from the Osage Valley RC&D applied and received "EPA-319" funding to implement an Information/Education and Demonstration project in the Miami Creek/Drexel Lake watersheds. This project has received a positive response from the Steering Committee as well as the Agricultural Community. Further planning in the watershed identified the need for additional Technical and Cost-Share assistance. This assistance will aid in the application and planning of Critically needed Agricultural Best Management Practices (BMPs) to protect the Areas Water Resources.

In March of 1997, a public meeting was held in the watershed to further define the public's concerns. A list of concerns were identified and prioritized. The resource concerns are listed in Table 1.

TABLE 1
Resource Concerns Identified in the Miami Creek /Butler City Lake/Drexel Lake Watershed:

1. Animal Waste	12. Get water into Creek instead of along side
2. Adequate water supply for residents	13. Need to have places and information about where to dump trash (closet landfill)
3. Add Amsterdam(Bates Co. PWSD#2) to project with Butler and Drexel's PWSD's	14. Animal Waste Management-feedlots, confinement areas, etc.
4. Voluntary basis versus environmental pressure (DNR Support)	15. Trash thrown in Creek
5. Chemical contamination	16. Concern for more water
6. Lack of sewage systems in towns	17. Concern for "pure" water
7. Junk yards next to streams	18. DNR approval for dry(not Lagoon) manure handling
8. Soil erosion	19. Agricultural chemicals in water
9. Flood Control. Keep drifts/trash out of waterway	20. Dam on Miami Creek (desired for recreation and public water)
10. Junk that floats down	21. CRP contracts that go back to cropland
11. Government restrictions	

The development of the Miami Creek /Drexel Lake Watershed Pilot Agriculture Non-Point Source Special Area Land Treatment (AgNPS S.A.L.T.) Watershed project has been a locally led initiative since the early planning stages in 1996. The Bates County Soil and Water Conservation District incorporated the idea of watershed-based planning into its successful application for a EPA "319" Info/Ed and Demonstration Project. The AgNPS S.A.L.T. project has taken the suggestions and comments of its stakeholders and partners and incorporated them into the planning of this project. A steering committee consisting of farmers (grain and livestock producers), elected officials, teachers, water treatment plant operators, water district board members and stakeholders of the community was organized early in the planning process.

With these efforts in place, the Miami Creek Environmental Quality Incentive Program (EQIP) Priority Area was a locally led initiative that received funding in November of 2000 for voluntary participation to implement BMPs to assist in the effort to protect and restore water quality in the watershed.

In April of 2001, a group of concerned citizens, municipal employees, and elected officials formed the Butler Lake Watershed Management Committee (BLWMC) with assistance from the Missouri Department of Natural Resources. The objective of this organization is to help the area citizens become more aware of healthy watershed management. The BLWMC is continually recruiting new members who want to promote watershed stewardship and education for the benefit of the communities within the surrounding Butler Lake watershed.

INTRODUCTION

Watershed Overview:

The Butler Municipal Lake watershed encompasses 1,957.3 acres of land within Bates County, Missouri. Bates County is located in the Cherokee Prairie major land resource area. The watershed area lies within 10290102120004 fourteen digit hydrological of the Upper Osage/Maris de Cygenes Watersheds. The Upper Osage/Maris de Cygenes River Basin carries a ranking of 7th on Missouri's Nonpoint Source Watershed list. It is basin number 37U.

The water resource within the watershed area is the Butler Municipal Reservoir. This reservoir supplies drinking water to the cities of Butler and four public rural water supply districts serving approximately 9,800 Bates County residents. This reservoir is also used for recreation activities, such as fishing. The Missouri Department of Conservation has been managing the Butler City Lake's fish habitat since 1993. With encroachment from the Kansas City Metropolitan area increasing, so is the demand for safe usable water in the area.

The City of Butler uses three water sources to provide water to their customers. The most used source is the Butler Municipal Lake. Historically the lake is used 45-50 percent of the time. In dry periods they will use an intake located on the Maris de Cygenes River 30-35 percent of the time and the Miami Creek intake is used the remaining 15-20 percent of the time.

IMPOUNDMENT HISTORY AND CONDITIONS

Reservoir Statistics:

The Butler City reservoir serves as a water supply to the City of Butler, Missouri. The reservoir was originally constructed prior to 1936 with an approximate normal pool surface area of 56.9 acres. In 1991 modifications were made to the dam of the reservoir. The dam crest was raised eight feet and the normal pool was raised five feet. The present storage capacity of the reservoir is approximately 222 million gallons (681.4 acre feet), an increase of approximately 81 million gallons over the original reservoir storage capacity. The surface acres today is approximately 63 acres. The total watershed area draining into the Butler City reservoir is 3.02 square miles. (1,957.3 acres)

The capacity of the reservoir to supply water during drought conditions is defined as “firm capacity.” Firm capacity is defined as the maximum demand rate that can be sustained through a statistical 50-year drought. Alternatively, this can be defined as the maximum continuous draft rate that can be sustained with a 2 percent risk deficiency. In determining the firm capacity of the Butler City reservoir, it is assumed the total usable volume of the reservoir will be used. To achieve the firm capacity, therefore, it would be necessary to pump the reservoir almost completely dry during a statistical 50-year drought.

WATERSHED SETTING

Landuse & Cover:

The project area consists of approximately 50 landusers. These landusers are primarily farmers engaging in row crop production, livestock production, and dairying. The watershed consists of an estimated 22 percent cropland, 19 percent Conservation Reserve Program (CRP), 52 percent grassland, and 4 percent forestland. Refer to Table 2. Intensively cropped farmland is scattered throughout the watershed. These acres lack sufficient conservation measures to ensure that pesticides and nutrients are not flowing into the water supply. Pasture lands are not being managed in a way that keeps livestock from having free access to streams, rivers and tributaries.

TABLE 2
Current Landuse Data

Landuse	Acres	Percent of Project Area
Cropland	422.8	21.6
CRP*	379.6	19.4
Grassland	1014.1	51.81
Forestland	83.8	4.28
Water	56.9	2.91
Totals	1,957.3	100

Source: Local SWCD/NRCS Data. *Conservation Reserve Program (CRP)

As a result of land users not using proper management techniques and poor household waste management, the water quality in the watershed is poor. This is causing health risks to the public, reduced recreational benefits, and increased water treatment costs. Presently, the Osage Valley Resource Conservation and Development (RC&D) Council, the Bates County SWCD, and the City of Butler, along with several other partners, are working to address the concerns with the “319” Watershed Protection Project funds earmarked for Info/Ed. The AgNPS S.A.L.T. project and the Miami Creek EQIP Priority Area funds earmarked for implementation of Best Management Practices for Agricultural water quality issues. The Bates County State Cost-Share Program, which provides financial assistance for erosion control measures. These projects focus on informing, educating and demonstrating to producers the use of BMPs throughout the watershed. In addition to allowing others voluntarily implement BMPs. With these projects available, the hope by all is that producers will learn more about how these practices work and will adopt them.

Topography & Soils Information:

The major soil associations in the Butler Lake watershed are as follows:

The soils of the watershed are primarily made up of two associations. The major upland soil association is the Kenoma-Bates-Summit association. This association is very deep, nearly level to gently sloping, moderately well drained and somewhat poorly drained soils that formed in material weathered from shale. This association makes up nearly 90 percent of the watershed. The soils found in the flood plains and upland foot slopes are a Okemah-Verdigris Association. These soils are very deep, nearly level, somewhat poorly drained and moderately drained soils that formed in alluvium. This association makes up approximately 10 percent of the watershed.

The slope of the land within the watershed ranges from 0% - 5%.

Climatic Conditions:

The climate conditions of the watershed are very similar to other West Central Missouri locations. The winters are cold and summers are hot and long. Heavy rains occur mainly in the spring and early summer. The total annual precipitation is about 38 inches. Of this, 29 inches, or about 75 percent falls between April and September. The average seasonal snowfall is about 12 inches. The rainfall – runoff relationship by storm frequency, is illustrated in the following table:

TABLE 3

STORM FREQUENCY (YRS)	1	2	5	10	25	50	100
24 HR RAINFALL (IN)	3.1	3.6	4.8	5.5	6.5	7.2	8.0
RUNOFF (IN)	1.3	1.7	2.7	3.3	4.2	4.9	5.6

Runoff from the smaller storm events (1 – 10 years) ranges from 40 – 60% of total rainfall/storm. Runoff from the larger events (25 – 100 years) ranges from 60 – 70% of total rainfall/storm.

Upper Osage/Maris de Cygenes Features:

The basin is a system of tributaries and streams that flow into the Maris de Cygenes River and eventually into Truman Lake. It flows in a southeastern direction across the county.

Woodland Resources:

Forest or woodland resources within the watershed are primarily confined to small woodlots, 5 acres or less, and areas along either side of creeks and streams.

Most woodlands in the watershed are a mixture of plant species that have succeeded over the last 100 years. A variety of oaks, hickory, elm, ash, locust, hedge, pecan, and walnut are the most commonly found species. Before the land of the watershed was divided into small parcels and developed or framed, it was primarily open rangeland. Vegetation on this natural prairie consisted of native grasses with woody species along creeks and streams. As development and farming proceeded, the native grasslands disappeared, as did much of the woodland resources. There are very few native, virgin trees remaining in this area due to widespread harvest for lumber, firewood, and other uses as development progressed. Over time, some expansion of the woodland areas has occurred as a result of certain land uses and conservation planning. Due to state and federal programs some native grasslands have made resurgence in some of these areas.

Wildlife Resources:

Wildlife species in the watershed are common and varied. Many species, both game and non-game, particularly exist where habitats have been protected from development and intensive farming. Some game species have increased under the protection of future management concerns. As the city limits expand, Canada geese and White-tailed deer populations will become increasingly difficult to control with no natural predators.

Other wildlife species in the watershed are known to occur in reasonable numbers, dependent upon the particular species and its population trend. Quail populations have been low in recent years

following a statewide trend. This can be explained due to increased predator populations, specific habitat loss (mainly fencerows / hedge rows), and wet spring nesting season. Beaver and raccoon populations have increased with the decrease in demand for harvested fur and limited natural predators. Disease is the main population control mechanism, which prohibits numbers from reaching all time highs. Prairie chicken numbers are increasing due to native habitat being encouraged through federal, state, and local programs.

Many areas in the watershed which have a variety of seed and berry producing vegetation, mixed cool and warm season grasses, woody species, annual weeds, and fallow areas, demonstrate a plentiful supply and wide range of wildlife species.

Wetland Resources:

Wetland resources within the watershed are primarily confined to upstream areas found on the main tributary feeding the lake and the Butler Lake itself. These areas are subject to periodic lake fluctuations and are thus not managed in a fashion ideal for a variety of waterfowl species. There are no known wetlands within the watershed managed primarily as moist soil management units, i.e. promoting wetland plant species growth through water level manipulation.

The wetland resource on the Butler Municipal Reservoir is significant to a variety of wetland birds and wildlife species, which can be witnessed every fall and spring as the migrant ducks and geese make Butler Lake a resting-place on their journey north or south. The reservoir attracts and holds many birds each fall. The condition of shoreline vegetation and adjacent crop fields determines the length of stay of many of the waterfowl species. Normally, crop residues are ample and the birds find plenty of food to eat and ample water to drink, as long as the reservoir does not completely freeze over. As soon as complete freeze up occurs, most of the waterfowl migrate elsewhere in search of water to inhabit.

The development of intensively managed resources with water level manipulation capabilities would provide a more desirable habitat for many waterfowl species. This prime, shallow water habitat does not currently exist on the reservoir nor in the watershed, but is created when the water level rises two or three feet above normal pool level. Conversely, as the water level falls back to normal or slightly below normal, shallow, vegetated habitat is lost. Water level fluctuation on the reservoir is a key creating prime waterfowl habitat for fall and spring migrations.

Recreation Resources:

Recreation resources are varied, as managed by the City of Butler Department of Parks. The lake offers recreational opportunities such as fishing, picnicking, and sightseeing. The City of Butler maintains the facilities.

Butler Lake has always been an extremely popular “day use” lake. A high percentage of the visiting public come out for the day to engage in recreational activities. This type of use inherently induces more stress on the shoreline and water resources. The bank fisherman leave trash behind posing environmental risks. Restroom facilities receive intense use by day visitors.

The Butler Lake Park areas are designed with ample facilities to meet the majority of demand placed upon it. As the popularity increases, systems will need to be upgraded to meet current and future demands in an attempt to protect those valuable resources of land, water, and wildlife.

Economics:

The Butler Municipal Reservoir Watershed generates a minimal amount of gross receipts from grain and livestock sales. The elimination or reduction of corn acres to reduce the use of certain herbicides would not have a negative effect on the economy of Bates County since the watershed area only makes up about 0.3% of the county and there is only 422 acres in crop production today. Minimal consideration should also be given to the affect upon individual production operations. Furthermore, the potential increase in soybean acres would exact a grim environmental and economic toll due to increased erosion, sedimentation, pollution, reduced yields, and infrastructure maintenance.

Most of the farmers/ranchers in the watershed get their drinking water from the Butler Lake and realize the need to protect water resources. Many have adopted some form of water resource protection while still trying to sustain farm income. Any alternatives considered for protecting Butler Lake should account for both the general economy and the individual farm operation.

Government Programs:

Over the past 30 years, the bulk of government programs affecting the water quality of the Butler Municipal Reservoir have been cost share programs administered by the USDA and the Bates County Soil and Water Conservation District Boards. These funds – and the needed technical assistance – were utilized to assist producers with the installation of traditional soil erosion control practices including terraces, waterways, and structures. More recently, these agencies have expended funding on projects directly related to water quality, such as: EPA 319 grant, Agriculture Non-Point Source Special Area Land Treatment Project (AgNPS S.A.L.T.), Wildlife Habitat Improvement Program (WHIP) and Environmental Quality Incentive Program (EQIP), in addition to certain Conservation Reserve Programs (CRP). The funds of these programs have been used to provide incentives to implement BMPs on cropland, pastureland, and hayland to reduce pollutants into the watershed.

Since 1986, the USDA Conservation Reserve Program (CRP) has paid landowners to convert cropland to a permanent vegetation cover for a period of 10 to 15 years. Approximately 380 acres in the watershed are enrolled in CRP programs. As mentioned above, several CRP practices (including Filter Strips and Riparian Buffers), have value for improving water quality and pay landowners an extra 20% over the regular CRP rental rates.

At this time, current programs available to producers include: EPA “319” Grant, AgNPS S.A.L.T., EQIP, Cost-Share, Loan Interest Share, Wetland Reserve, and WHIP. The challenge involving government programs is that monetary and staff resources are usually limited making it hard to make an impact and see an immediate improvement. All programs are voluntary.

Miami Creek/Drexel Lake 319 Water Quality Protection and Restoration Project:

The Bates County Soil and Water Conservation District and the Osage Valley Resource Conservation and Development Council, Inc. co-sponsor the Miami Creek/Drexel Reservoir Watershed Protection and Restoration Demonstration Project. The project demonstrates animal waste management systems, restoration of riparian zones, streambank stabilization, protection/restoration of natural wetlands, prescribed grazing system, and controlling chemical and nutrient runoff on a watershed basis utilizing Best Management Practices.

The overall goal of the Miami Creek/Drexel Reservoir Protection and Restoration Demonstration Project is to protect the quality of water throughout the watershed. This will be accomplished by achieving four primary objectives: (1) inform, educate, and demonstrate controlling chemical runoff by adopting Best Management Practices, (2) inform, educate, and demonstrate controlling animal waste runoff by adopting Best Management Practices, (3) inform, educate, and demonstrate controlling sheet and rill erosion by adopting Best Management Practices, and (4) to educate and inform the landusers, using education and information activities, on proper techniques in protecting the water quality of the upper 80,000 acres of the Miami Creek and Drexel Reservoir watersheds.

Miami Creek/Drexel Lake BMPs Being Demonstrated In The Watershed

Pasture and Hayland Management	Pest Management
Riparian Forest Buffer-Livestock Exclusion	Nutrient Management
Woodland Protection-Livestock Exclusion	Filter Strip
Upland Wildlife Habitat Management	Planned Grazing System
Prescribed Burning	Grade Stabilization Structure
Wetland Enhancement	Tree Establishment
Wetland Wildlife Habitat Management	Integrated Crop Management – Record Keeping
Conservation Crop Rotation with Grasses and Legumes	Residue Management – Mulch Till & No-Till
Conservation Cover	

AgNPS Pilot S.A.L.T. Project:

The Soil and Water Conservation Programs (SWCP) AgNPS S.A.L.T. Project will provide incentive payments to encourage the adoption of Best Management Practices (BMPs) and the application of Resource Management Systems (RMSs). Agricultural producers in the county have had high participation rates in previous Conservation Programs such as ACP, EQIP, CRP, and the Missouri Soil and Water Conservation Cost-Share Program. Based on past participation, 40 percent of the agricultural producers in the Watershed are expected to request financial and educational assistance if sufficient funding is available in the project area. These producers will, in turn, influence additional producers in the watershed to adopt economically and environmentally sound conservation practices on their farms. Below is a list of the key incentive and cost-share practices, which are be utilized to help meet the AgNPS S.A.L.T. Committee’s Primary Water Quality Goal.

The AgNPS S.A.L.T. project incentive payments and cost-share will be used as a means to encourage the adoption of BMPs and the application of Resource Management Systems. This program concentrates its efforts to the upper 80,000 acres of the Miami Creek watershed.

AgNPS S.A.L.T. Best Management Practices Offered for Implementation

Conservation Tillage System-No Till	Nutrient Management
Residue Management, Seasonal	Stream and Water Body Protection
Filter Strip	Pasture and Hayland Management
Conservation Crop Rotation	Field Borders
Pest Management	Planned Grazing System
Cover and Green Manure Crop	Waste Treatment Facility

Miami Creek EQIP Priority Area:

Objectives of the Miami EQIP Priority Area are to implement Resource Management System (RMS) plans utilizing BMPs that provide incentives to landusers in the use and proper disposal of fertilizers, pesticides, and conservation systems on cropland/grazinglands. Provide incentives/cost assistance to landusers in pasture and hayland improvement systems. Provide incentive/cost assistance to livestock producers for installation of comprehensive nutrient management plans (CNMP) and provide incentives to landusers to manage/improve riparian corridors and wildlife habitat.

Natural Resource Concerns and Goals.

- a. Primary natural resource concerns:
Water Quality Nutrient and Pesticide Management

- b. Secondary natural resource concerns:
Soil Health
Animal Wastes/Nutrient Management
Erosion on Stream Corridors

Miami Creek EQIP Best Management Practices Offered for Implementation

Residue Management, No-Till & Strip Till	Nutrient Management
Pasture and Hayland Planting	Prescribed Burning
Filter Strip	Riparian Forest Buffer
Conservation Cover	Manure Transfer
Conservation Crop Rotation with Grasses & Legumes	Field Borders
Pest Management	Prescribed Grazing System
Cover and Green Manure Crop	Waste Management System
Structure for Water Control	Terraces
Use Exclusion	Waste Utilization
Well Decommissioning	Wildlife Wetland Habitat Management
Woody Root Pruning	

The Missouri Soil and Water Conservation Cost-Share Program:

The state-funded cost-share program is intended to provide financial incentives to landowners to install erosion control projects and practices they would not otherwise install. “Tate-funded” means that public dollars are to be made available to soil and water conservation district boards of supervisors to buy reduced erosion.

The locally elected supervisors are given the authority to decide which landowners receive how much money for which practices. The idea behind this program is: Who better to run the program than local landowners giving their time and talents, working towards a goal in which they believe?

State Cost-Share Practices Offered for Implementation In Bates County

Pasture and Hayland Planting	Grassed Waterway
Pasture Enhancement	Critical Area Treatment
Woodland Protection-Livestock Exclusion	Filter Strip
Diversions	Planned Grazing System
Sediment Retention Reservoirs	Ponds
Terraces/UGO Terraces	Grade Stabilization Structure
Waterways	

These practices are offered to individuals at a cost-share rate of 75% of the county average cost. The Missouri’s Soil and Water Districts Commission offers a Loan Interest-Share Program. This Program refunds a portion of the interest expense on loans used either to reduce erosion or to reduce the potential for erosion.

Conservation Reserve Program:

The Food Security Act of 1985, as amended, authorizes the CRP, which is implemented through the Commodity Credit Corporation (CCC).

The CRP is a voluntary program that offers annual rental payments, incentive payments for certain activities, and cost-share assistance to establish approved cover on eligible cropland.

The program encourages farmers to plant long-term resource-conserving covers to improve soil, water and wildlife resources. CCC makes available assistance in an amount equal to not more than 50 percent of the participant’s costs in establishing approved practices. The durations of contracts are between 10 and 15 years.

The CCC through the Farm Service Agency (FSA) administers CRP. The Natural Resources Conservation Service, Cooperative State Research and Education Extension Service, State forestry agencies, and local soil and water conservation districts provide program support.

Conservation Reserve Program Continuous:

USDA's continuous CRP compensates farmers for installing and maintaining conservation buffers, such as filter strips and riparian corridor buffers, on their property.

In the continuous CRP, USDA basically leases the land from participants for 10 or 15 years to install conservation buffers, whether or not the land is currently in active use. Payments for conservation buffers are based on the average county cropland rental rate plus a 20% bonus for the water quality benefit the buffers provide. Program participants also receive cost-share payments to establish the buffer and other conservation practices necessary to protect the buffer, such as fencing.

Conservation Reserve Enhancement Program:

The Conservation Reserve Enhancement Program (CREP) is a new initiative established as part of the highly successful Conservation Reserve Program (CRP).

USDA's Commodity Credit Corporation (CCC) and the State of Missouri have agreed to implement a Conservation Reserve Enhancement Program (CREP) to reduce the risk of nutrients and sediments from farms entering the streams and reservoirs that supply rural water supplies. Like CRP, CREP contracts require a 10- to 15-year commitment to keeping lands out of agricultural production, ensuring lasting benefits. Participants in the Missouri CREP are eligible for six types of payments: Four from FSA as well as two from the State of Missouri.

PROBLEMS, CONCERNS, AND INTERESTS

Water quality is determined by certain chemical and physical measurements of the water, related to the intended water use. Due to utilization, water quality is perceived differently by different people. Citizens generally demand higher quality water for drinking than for irrigation. The concern for the current water quality condition of the Butler Lake is in regard to drinking water quality. The Butler Lake Watershed Management Committee has identified the following as key points of concern.

Agricultural Non-Point Source Problems:

Excessive chemical, nutrient, erosion, and animal wastes are problems in the tributaries and ground water resources of the area effecting its' downstream neighbors. Possible sources in the watershed include livestock erosion problems, animal waste fertilization, commercially applied fertilizers and commercially and non-commercially applied chemicals.

A. Transport of agricultural amendments into surface Waters.

Over twenty-one percent of the watershed area is made up of Cropland. Agricultural amendments, including nutrients and pesticides, applied to the land surface may travel through the surface and into groundwater. The greatest changes in Water Quality and Chemistry in the Watershed is associated with storm runoff. This usually occurs during the spring and summer months, when agricultural activity is high.

B. Inadequate facilities for mixing pesticides and disposal of pesticide containers.

Proper application of pesticides and disposal of used pesticide containers plays a major role in the Watershed's poor water quality. Many producers mix pesticides in the field, often next to streams or stream tributaries. This practice threatens the quality of the receiving waters as well as the drinking water supplies in which they feed.

C. Inadequate protection of streams and stream tributaries.

Riparian Buffers are critical to maintaining water quality in the Watershed. These areas serve as sponges to help absorb, filter, and break down pollutants before they reach local streams. Landowners and Agricultural producers tend to underestimate the functions and values of these environmentally sensitive areas. Many of these protective riparian zones along tributaries and streams in the Watershed have been destroyed because of encroachment by cattle, or conversion for agricultural uses. Little consideration is given by landowners to the impact of the destruction of these zones on water quality. The protection, restoration, and proper management of these Areas are essential.

D. Active bank erosion along classic gullies and stream channels.

Reconnaissance investigations were conducted in the watershed. Active bank erosion along classic gullies and stream channels was noted at numerous locations throughout the watershed. This is of significant concern because resulting sediments and associated pollutants are delivered to the stream system at very high rates. Two conditions correlated with these eroding reaches: (1) concentrated and uncontrolled livestock grazing and loafing, and (2) the absence of or poorly developed riparian vegetation. Gullies and channels under such conditions have very little protection against erosive

flows, especially when situated downslope of upland areas that experience high runoff due to overgrazed conditions or inadequate land treatment practices.

E. Poorly managed and overgrazed Pastures.

Reconnaissance investigations indicate that there are considerable acreages of Pasture that are in need of some type of treatment. Such conditions result in increased runoff, excessive erosion, and transport of sediment and associated pollutants and contaminants into the stream system.

F. Sheet and Rill Erosion.

Generally, sheet-and-rill and ephemeral gully erosion on cropland is not a significant problem within the project area. Crop fields are situated on gentle slopes and most have soil losses below tolerable limits. However, due to long slope lengths on some fields and the lack of adequate land treatment measures, exceptions can be found where soil losses from sheet-and-rill and ephemeral erosion are excessive. Consideration needs to be given to the fact that many of the cropped soils have moderate to high pesticide loss potentials due to leaching and runoff.

G. Excessive sedimentation to the Butler Lake.

It is estimated that 3,400 tons of soil erosion from all sources occur on an average annual basis within the Butler Lake Watershed (drainage area of 2000 acres). Approximately 1,100 tons of this sediment (about 0.6 tons per each acre of drainage) is delivered annually to Butler Lake. Annual deposition within the lake amounts to about 0.8 acre-feet.

Water monitoring results completed by the City and the Department of Natural Resources have detected high levels of the herbicide Atrazine in their water supplies. The City of Butler's test results are as follows: 4/7/94 - No Detection, 6/6/94 - 13.0 ppm, 9/17/94 - No Detection, and 12/14/94 - No Detection with a four quarter average of 3.25 ppm.

Atrazine is not the only concern in the project area; nitrogen, phosphorus, bacteria and sediment are other major water quality concerns. These pollutants with livestock operations, and commercial fertilizer applied to unprotected crop fields, are contributing to the contamination of the watershed's surface and ground water. The cropland in the watershed is primarily managed to a corn-soybean-small grain cropping sequence. This sequence allows Atrazine to be applied a minimum of 1 out of 3 years.

Sampling of rural water has also detected a concentration of fecal chloroform. The test was done by a private citizen and sample results showed that the water was unfit for consumption. Fecal chloroform is a bacterium, which is an excellent indicator that animal or human waste is prevalent in a water supply.

Rural Non-Point Source Problems:

A. Pollution, trash, public contamination.

B. Runoff from household waste treatment facilities.

Goals and Objectives:

The Butler Municipal Reservoir provides water to approximately 9,800 residents in Bates County. With this figure growing everyday, the Butler Lake Watershed Management Committee (BLWMC) set specific objectives to protect the water quality of this watershed.

The overall Goal of the BLWMC is to reduce the amount of non-point source contaminants (Atrazine, Nitrogen, Phosphorus, Sediment, Chemicals, and Fecal Chloroform) from reaching the tributaries and reservoirs of the Butler Lake watershed.

Objective 1:

The first objective will be to develop a public and landowner awareness of Non-Point Source Pollution by conducting educational and informational activities.

Objective 2:

The second objective will be to improve water quality by reducing runoff of commercial chemicals and nutrients through the implementation of Best Management Practices.

Objective 3:

The third objective will be to reduce animal waste and associated nutrient runoff through the implementation of Best Management Practices.

Objective 4:

The fourth objective will be to reduce household waste and associated nutrient runoff through the implementation of Best Management Practices.

Objective 5:

The fourth objective is to improve the Public Water Supply by reducing sediment loads through the implementation of Best Management Practices.

WATER QUALITY PRACTICES

Information/Education Activities:

Public information and education are an essential part of water quality management and planning of a watershed project. This will be even more important in the Butler Municipal Reservoir watershed because of the effect improper land use has on water quality and the lack of knowledge by landowners on the impacts of Non-Point Source Pollutants. As Water Quality and Water Supply issues continue to grow, the need to educate the communities within this Watershed about impacts of Non-Point Source Pollutants also continues to grow.

Knowledge is lacking in the watershed about the impact certain activities have on the water quality of the watershed. Particularly, the process of planning and managing Best Management Practices (BMPs) for: 1) sheet and rill erosion, 2) nutrient applications, 3) pesticide applications, 4) animal waste application, and 5) human/household waste disposal. A well designed public information and education program is needed to increase the utilization of BMPs by the public and increase the awareness about water quality issues and concerns. The Butler Municipal Reservoir Watersheds has one Municipality and five Public Water Supply District's that rely upon the quality and quantity of water resources available to serve 9,800 Bates County residents. By informing and educating the local communities (city and rural residents), public officials, public water supply district boards, landowners, and agricultural producers about the water quality concerns in the Butler Municipal Reservoir Watershed, a more collective effort to resolving the needs for all stakeholders within and outside its boundary should start to emerge.

Information/Education support activities to meet objective "1" are currently being supported by the "319" Water Quality Demonstration project. This program will be continued through the end of June 2002

The AgNPS S.A.L.T. project is utilizing newsletters, fact sheets, workshops, tours, slide presentations, Enviroscope presentations, poster exhibits, and cooperator banquets as tools to inform and educate landowners, youth, local officials, and other groups within the watershed.

The Watershed Planning Committee will conduct one (1) public meeting to announce the watershed management plan. In addition, there will be continued workshops dealing with animal waste application, nutrient management, pesticide management, planned grazing systems, water monitoring, filter strip/riparian corridor areas and human/household waste management. These workshops will be conducted periodically. Various parties including; NRCS, Bates SWCD, University Extension, MDC, City of Butler, Bates County Health Center, and Ag Service Dealers will conduct these workshops.

Activities will include demonstration tours, fact sheets will be produced, newsletters will be mailed out Quarterly, and one Project Cooperator Banquet will be held to share information on BMPs, new Technology and success stories. Additional tools will include slide presentations on the watershed activities, Enviroscope presentations, and poster exhibits. These tools will provide information and education to cooperators, youth, local communities, and public officials. They will also demonstrate the success of the watershed project.

Results from the City's water monitoring will be used to gauge the effectiveness of the Best Management Practices in reducing pesticide and nutrient runoff. The water monitoring results will

help determine the relationship between pesticide, erosion and animal waste application to the water quality of area streams, wells and water impoundment's.

Rural:

Rural residents and agricultural producers can adopt various land use and production practices, which can significantly affect water quality and environmental health. In agricultural production systems, no-till farming, terraces, waterways, filter strips, field borders, pest management, nutrient management, prescribed grazing, Conservation Reserve Program (CRP), and others can reduce surface runoff and/or contamination of surface water drainageways. By reducing the volume of runoff exiting crop, pasture, and hay fields or the amount of the contaminant available for transport, reductions in water supply contamination occurs. The slowing of runoff velocity by filter strips, waterways, terraces, etc. causes sediment to settle out and cleaner water to reach the stream. Soil bound pesticides and physical transport of excessive nutrients may also be reduced due to the settling effect. Increased infiltration in the field or on streamside borders has also shown a decrease in pesticide, nutrient, and sediment contamination.

Urban:

Urban water quality practices would be promoted to reduce non-point sources of urban pollution. This may include urban pesticide use, construction site erosion and sedimentation, effluent disposal hazards, and wastewater treatment concerns.

Water Treatment Facility:

Butler public water supply facility obtains raw water from the Butler Municipal Reservoir. The water treatment facility would be encouraged to implement certain water quality practices which may reduce contamination levels below designated MCL's. To ensure proper treatment procedures and timing of these procedures, water treatment facility operators will be or have been sent to additional training. Proper operational procedures at treatment facilities are the first step to ensure a safe drinking water supply.

The city of Butler water treatment facility is located 4 miles west of Butler on the North side of 52 highway, adjacent to the Miami Creek. This facility supplies finished drinking water to Bates County Public Water Supply Districts #1, #3, #4 #6 and Steel & King and the City of Butler. Constructed in 1966, the Butler water treatment plant began service in June 1997. This facility provides service to 9,800 customers. Last facility updates took place in 1985.

Gallons pumped in 2000:

Miami Creek 66,341,160 gallons

Butler Lake 176,909,760 gallons

Maris de Cygenes River 125,311,080 gallons

Back wash water (Back) 32,000,000 gallons

Total water needed last year 368,562,000 gallons

Existing Water Treatment Plant

Primary and Secondary Rapid Mix

Two lightning brand flash mixers are contained in a 36"x44"x96" steel box. Two high rate volumetric feeders are provided for alum and lime. The feeders are Wallace & Tiernan Series 32-055, with a feeding capacity of 0.03 to 50 cubic feet per hour and an operating range of 20:1. The feeders are each equipped with a 35 gallon fiberglass solution tank, jet agitator, two-bag capacity loading hopper, a ¾ inch solenoid-operated valve, splitter boxes and water supply. Lime is being split and added to both the primary and secondary rapid mixers. Alum is added to the primary rapid mix but it is possible to split the flow and add to both rapid mixers at the same time.

Powdered Activated Carbon is also added by hand into the primary rapid mix. Chlorine is added to the secondary rapid mix.

Potassium permanganate (KmnO₄) is pumped into the raw water line on the discharge side of the raw water booster pumps.

Primary Clarifier

The primary clarifier is an upflow reactor type clarifier with a sludge blanket also called a solids contact basin. The clarifier has a 40 ft. diameter and was originally designed to have a 1.3 gpm/sq.ft. upflow rate as a secondary clarifier. In 1985 the water treatment plant piping was rearranged so that the secondary clarifier became the primary clarifier and the primary clarifier became the secondary clarifier.

Secondary Clarifier

The secondary basin is used mostly for alkalinity adjustment and chlorine contact. At present, the floc carryover is pumped to the secondary rapid mixing chamber.

The secondary clarifier is rectangular in shape with sloping side walls to a maximum water depth of 8 ft. with an additional 2 ft. of freeboard. The water surface is approximately 93'x155'8" and the side wall slope is 3 to 1. The total volume of the basin is 552,460 gallons, which will give 7.4 hours detention time at the design rate of 1,250 gpm. Three flow-through baffles divide the basin into four sections. The baffles were added to cut down on short circuiting and wind action. In the 1985 renovations, the paddle wheel type mixer was replaced with four steel turbine mixers each with a 5.5 ft. diameter paddle and a 2.5 ft. of submergence as manufactured by General Filter Company.

The original earthen basin was upgraded to an asphalt surface and again by application of a 3-inch thick layer of reinforced concrete to the bottom and sides by a guniting process.

Filtration

The water treatment plant has two high rate filters each with a design filtration rate of 3 gpm/sq.ft. Each filter is 14' x 15'4" with a total surface area of 214 sq.ft. and a design rate of 642 gpm at 3 gpm/sq.ft. Thus the total filtration rate could be 1,284 gpm with both filters operating, but the filtration rate is actually controlled by the filter pumps that take suction directly from filter underdrain collection pipes. During the 1985 water treatment plant renovations the filter underdrain nozzles were removed, and replaced with baffle plate distributors manufactured by General Filter Company. The baffle plates are 6-inch diameter and made of stainless steel. The filters have 27" total dual media with 18" of 0.8-1.2 mm anthracite and 9" of 0.45-0.55 mm sand. Eighteen inches of graded gravel supports the media. The total filter box depth is 8.5 ft. at water level and an additional 3 ft. of freeboard.

A transfer pump is connected to the underdrain of each filter, for a total of two pumps, each rated at 625 gpm at 80 ft. TDH (from DNR final inspection report dated, May 19, 1986), while pumping in parallel. The discharge pipe from each pump combines into a single force main which goes to the above ground clearwell. At the 19 ft. water level in the clearwell the flow rate of the pumps will be 1,250 gpm and when the clearwell is at 36 ft. the flow rate will be 1,000 gpm.

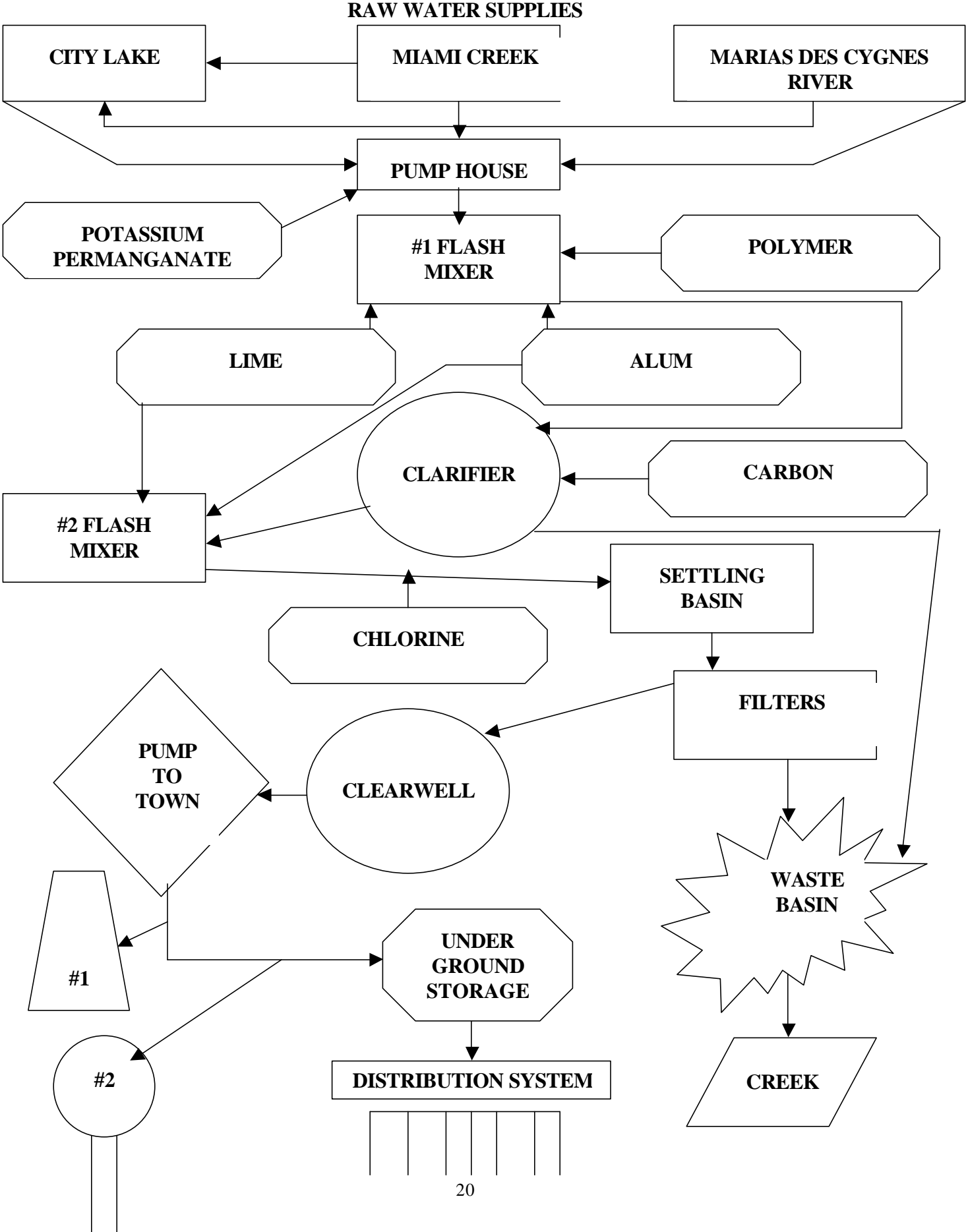
Above Ground Clearwell

The above ground clearwell has a 36' 10" diameter with a 37' high overflow. The total volume is 294,900 gallons. The high service pump shutoff is set at the 8' depth in the clearwell, which corresponds to a 85,600 gallons volume left in the clearwell. The clearwell must be nearly full for the backwash of a filter to start because the backwash rate is controlled by gravity. Usually operators backwash at the end of the production day when a filter needs backwashing.

High Service Pumps

Two high service pumps at the water treatment plant are specified to pump at a rate of 1287 gpm at 315 ft. TDH.

BUTLER WATER TREATMENT FACILITY FLOW CHART



ACTION PLAN

The Butler Lake Watershed Management Committee (BLWMC) is working cooperatively with the Bates County Soil and Water Conservation (BCSWCD) district to address issues concerning watershed stewardship and water quality in the Butler Lake. The BCSWCD has a mission to promote and encourage wise use of our land resources. The BLWMC was formed to facilitate cooperative efforts between all sectors of the watershed, and to develop a comprehensive watershed management plan that will ensure a healthy lake, safe recreation and secure drinking water supply for the future. The key issues of pesticide run off, nutrient loading, and sedimentation will be addressed.

The BLWMC will implement a series of structured educational and informational activities for watershed residents. Field days, water awareness education for youth and citizens, educational tours of the local water plant and watershed, and alliance building seminars will be used to educate and inform the citizens of the watershed.

These activities will also foster:

- increased public involvement in sustaining Butler Lake as a public drinking water supply
- promote factual understanding of operations within the watershed to public officials, community leaders, industry representatives, and agency personnel
- provide educational opportunities for the BLWMC to enhance critical thinking and watershed planning
- foster youth involvement, education, and understanding of healthy watershed systems
- utilize media in delivering accurate information

The target audience includes:

- watershed landowners and agricultural producers
- area students and teachers
- public officials and community leaders
- industry representatives and agency personnel
- local communities

Activities include:

Print and distribute copies of the watershed management plan
Conduct educational watershed tours
Conduct a series of winter producer meetings
Send BLWMC members to training
Educational display development
Development of promotional items

Proposed Solutions:

With the overall Goal of the project being to reduce the amount of non-point source contaminants entering the tributaries and reservoir of Butler City Lake Watershed; a total resource management approach will be used that encourages the use of Non-Point Source Best Management Practices (BMPs) to protect Water Quality.

Resource Management Plans will consist of BMPs that apply sound Conservation Principles that not only minimize water Pollution but also meet the needs of the total ecosystem, that is the soil, water, air, plant and animal resources. The systems applied will be ecologically sound and economically feasible.

While BMP is the terminology used for Practices that maintain or improve water quality, the Natural Resources Conservation Service (NRCS) uses the term “Conservation Practice” to identify practices that are comparable or somewhat similar to BMPs.

A single BMP, or Conservation Practice, will prevent a specific water quality problem, but generally a combination of practices are needed. This combination of practices that, when installed and maintained, will permit sustained use of the Natural Resource, is referred to as a Resource Management System (RMS).

This Conservation Management Systems Approach will be utilized to achieve the Goal and Objectives outlined in this Watershed Plan. Most farmers in the Watershed are aware of potential environmental risks associated with their cropping and livestock operations and are sensitive and responsive to environmental concerns. This is due in large part to the on going “319” Information Education Program in the Watershed sponsored by the Osage Valley RC&D and the Bates SWCD. Cost share and incentive dollars from various other federal and state programs will be used in the watershed to encourage the adoption of these Systems through out the Watershed.

Partnership:

A Watershed Management Planning Committee was formed in April of 2001 to continue these water quality efforts in the Butler Municipal Reservoir Watershed. The Committee is made up of various stakeholders and Partners impacted by the Watershed, including grain and livestock producers, state & federal agency staff, elected officials, and water & sanitation treatment plant operators, Water District Board members and citizens form the Community. The suggestions and comments of these Stakeholders and Partners, as well as Public feedback have been incorporated into this Watershed Management Plan.

The BLWPC members include the following people:

Ed Steele	Grain/Dairy Producer/PWSD Steel & King Board Member
Barbara Pipes	Livestock Producer
Mark Davenport	Livestock Producer
Leland Burch	Livestock Producer

John McCulley	Division Head for Water/Sanitation Treatment, City of Butler
Jim Lewis	Water Plant Supervisor, City of Butler
Len Gilmore	Missouri Department of Conservation
Diane Bradley	Natural Resources Conservation Service
Jodi Welston	Bates County Health Center

Other Cooperating Partners:

- City of Butler, Technical Assistance
- Natural Resources Conservation Service, Technical Assistance
- Missouri Department of Natural Resources
- Missouri Rural Water Association
- Bates County Health Center
- Bates County Soil and Water Conservation District
- Osage Valley RC&D Council, Sponsorship of “319”
- Missouri Department of Conservation, Technical Assistance
- University of Missouri Extension Service, Technical Assistance

The Committee will continue to work closely with Conservation Partners to achieve the stated goal. For example:

- * Assistance will be requested from DNR for on going watershed planning activities and funds.
- * MDC will continue to be involved in Wildlife Habitat development and planning, as well as educational Programs.
- * The U of M Cooperative Extension Service will assist with a number of education and information efforts.
- * The Osage Valley RC&D Council will assist in developing funding proposals and continue to provide staff and support of the ongoing EPA-319 Information Education Project.
- * The Natural Resource Conservation Service will provide technical assistance.
- * Assistance will be requested from Private Consultants and local Agribusiness’s to implement educational activities.

CONTINGENCE PLAN

The City of Butler uses three water sources to provide water to their customers. The most used source is the Butler Municipal Lake. Historically the lake is used 45-50 percent of the time. In dry periods they will use an intake located on the Maris de Cygenes River 30-35 percent of the time and the Miami Creek intake is used the remaining 15-20 percent of the time.

In the event the Butler Municipal Reservoir was to become unstable and or a depleted source of water the city has the Miami Creek intake and the Maris de Cygenes River intake. These water supplies would be an adequate alternative.

Maris de Cygenes River (Bates County Drainage Ditch)

There is a water pump station on the Bates County Drainage Ditch that can transport water 7.5 miles north to the water treatment plant. The drainage area the Maris de Cygenes outtake point is 3,418 square miles. Information that has been provided by USGS, Water Resources Division, in Lawrence, Kansas based on stream gage analysis, would indicate any water to service the 50-year drought conditions should be from storage because in-stream flow will be minimal and the water quality poor. The 14" diameter, cast iron raw water pipeline was constructed in 1966 and the water pump station will be made permanent in September, 2001.

Miami Creek Pump Station

There is a permanent raw water pump station on Miami Creek at the water treatment plant constructed in 1891. The drainage area above the low water dam at the intersection of state highway 52 and Miami Creek is 125 square miles (80,000 miles). During drought conditions Miami Creek is dry and the volume of water behind the low water dam will only supply the water treatment plant for a few days.

Glossary of Acronyms

303(d) list:	The Federal Water Pollution Control Act, section 303(d), requires that each state identify those waters for which existing required pollution controls are not stringent enough to implement state water quality standards. For these waters, states are required to establish total maximum daily loads (TMDLs) according to a priority ranking.
AgNPS	
S.A.L.T.:	Agricultural Non-Point Source Special Area Treatment Project
BLWMC:	Butler Lake Watershed Management Committee
BMP's:	Best Management Practices
CRP:	Conservation Reserve Program
CREP:	Conservation Reserve Enhancement Program
DNR:	Department of Natural Resources
EPA:	Environmental Protection Agency
EQIP:	Environmental Quality Incentive Program
gpm:	Gallons per minute
HAA's:	Halo-Acetic-Acids
MCGA:	Missouri Corn Growers Association
MCL:	Maximum Contaminant Level
MDA:	Missouri Department of Agriculture
MDNR:	Missouri Department of Natural Resources
NPS:	Nonpoint Source Pollution
NRCS:	Natural Resources Conservation Service
PPB:	Parts per Billion
PPM:	Parts per Million
"T":	Tolerable Soil Erosion Level
THM's:	Tri-Halo-Methane's
TOC:	Total Organic Carbon

UOE: University Outreach and Extension
USDA: United States Department of Agriculture
WHIP: Wildlife Habitat Incentive Program

Contributing Authors

Preface:

Background Information Diane Bradley-NRCS

Introduction:

Watershed Overview Diane Bradley-NRCS
Impoundment History and Condition John McCulley- City of Butler
Jim Lewis- City of Butler

Watershed Setting:

Land Use and Cover Diane Bradley- NRCS
Topography & Soils Diane Bradley-NRCS
Climatic Conditions Diane Bradley-NRCS
Upper Osage/
Maris de Cygenes Feature Diane Bradley-NRCS
Woodland Resources Len Gilmore-MDC
Wildlife Resources Len Gilmore-MDC
Wetland Resources Len Gilmore-MDC
Recreational Resources Len Gilmore-MDC
Economics Diane Bradley-NRCS
Government programs Diane Bradley-NRCS

Problems, Concerns, Interests:

Agricultural Nonpoint Source Problems Committee Members
Rural Nonpoint Source Problems Diane Bradley-NRCS/ Jodi Welston-Bates
County Health Center
Goals and Objectives Committee Members/ Diane Bradley- NRCS

Water Quality Practices:

Information/ Education Activities Committee Members/Diane Bradley-NRCS
Rural Diane Bradley-NRCS/ Jodi Welston-Bates
County Health Center
Urban Diane Bradley-NRCS/Jodi Welston-Bates County
Health Center
Water Treatment Facility John McCulley-City of Butler
Jim Lewis-City of Butler
Flow Chart John McCulley-City of Butler
Jim Lewis-City of Butler

Action Plan

Proposed Solutions Committee Members

Partnership Committee Members

Contingence Plan

John McCulley-City of Butler
Jim Lewis-City of Butler

Photos provided by

Diane Bradley-NRCS