

**WATERSHED LAND TRUST
AQUATIC RESOURCE MITIGATION PROGRAM
STATE OF KANSAS**



Submitted to:

U.S. Army Corps of Engineers, Northwestern Division
Kansas City District, Regulatory Program
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Submitted by:

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TABLE OF CONTENTS

1.0	INTRODUCTION	1
1.1	SPONSOR QUALIFICATIONS.....	1
2.0	OBJECTIVES	2
3.0	GEOGRAPHIC SERVICE AREAS	2
4.0	PROGRAM OPERATION	7
4.1	ACCOUNTING PROCEDURES	7
4.2	IN-LIEU FEE PROGRAM ACCOUNT	8
4.2.1	Financial Accounting	8
4.2.2	Credit Accounting	9
4.3	LEGAL RESPONSIBILITY	10
4.4	PROPOSED OWNERSHIP AND LONG-TERM MANAGEMENT	10
4.4.1	Transfer of Long-Term Management Responsibilities	10
4.4.2	Financial Arrangements for Long-Term Management	11
4.5	PROGRAM EVALUATION	11
5.0	DEFAULT AND CLOSURE PROVISIONS	11
6.0	REPORTING PROTOCOLS.....	13
7.0	COMPENSATION PLANNING FRAMEWORK.....	14
7.1	ADVANCE CREDITS – CREDIT RELEASE SCHEDULE.....	14
7.1.1	Advance Credits	14
7.1.2	Credit Release Schedule	15
7.2	PRIORITIZATION STRATEGY	16
7.3	PUBLIC AND PRIVATE STAKEHOLDER INVOLVEMENT	17
7.4	LONG TERM PROTECTION.....	17
7.5	MANAGEMENT, EVALUATION, AND REPORTING	17
7.6	UPPER REPUBLICAN SERVICE AREA.....	18
7.6.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	18
7.6.2	Aquatic Resource Goals and Objectives	20
7.6.3	Advance Credits.....	21
7.6.4	Preservation Strategy	21
7.7	LOWER REPUBLICAN SERVICE AREA	21
7.7.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	22
7.7.2	Aquatic Resource Goals and Objectives	23
7.7.3	Advance Credits.....	24
7.7.4	Preservation Strategy	24
7.8	SMOKY HILL SERVICE AREA.....	25
7.8.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	25
7.8.3	Aquatic Resource Goals and Objectives	27

7.8.4	Advance Credits.....	27
7.8.5	Preservation Strategy	28
7.9	MIDDLE ARKANSAS SERVICE AREA	28
7.9.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	29
7.9.2	Aquatic Resource Goals and Objectives.....	31
7.9.3	Advance Credits.....	32
7.9.4	Preservation Strategy	32
7.10	CIMARRON SERVICE AREA	33
7.10.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	33
7.10.2	Aquatic Resource Goals and Objectives.....	34
7.10.3	Advance Credits.....	35
7.10.4	Preservation Strategy	36
7.11	LOWER ARKANSAS SERVICE AREA	36
7.11.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	36
7.11.2	Aquatic Resource Goals and Objectives.....	37
7.11.3	Advance Credits.....	38
7.11.4	Preservation Strategy	39
7.12	VERDIGRIS – WALNUT SERVICE AREA	39
7.12.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	39
7.12.2	Aquatic Resource Goals and Objectives.....	41
7.12.3	Advance Credits.....	41
7.12.4	Preservation Strategy	42
7.13	NEOSHO SERVICE AREA	42
7.13.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	43
7.13.2	Aquatic Resource Goals and Objectives.....	45
7.13.3	Advance Credits.....	45
7.13.4	Preservation Strategy	46
7.14	MARAIS DES CYGNES SERVICE AREA.....	46
7.14.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	46
7.14.2	Aquatic Resource Goals and Objectives.....	48
7.14.3	Advance Credits.....	48
7.14.4	Preservation Strategy	49
7.15	KANSAS SERVICE AREA.....	49
7.15.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	50
7.15.2	Aquatic Resource Goals and Objectives.....	51
7.15.3	Advance Credits.....	52
7.15.4	Preservation Strategy	52
7.16	MISSOURI SERVICE AREA.....	52
7.16.1	Threats, Historic Aquatic Resource Losses, and Current Conditions.....	53
7.16.2	Aquatic Resource Goals and Objectives.....	54
7.16.3	Advance Credits.....	55
7.16.4	Preservation Strategy	55
8.0	CREDIT FEE SCHEDULE	55
9.0	GOOD FAITH	56

10.0	FORCE MAJEURE	57
11.0	EXECUTION.....	57
12.0	LITERATURE CITED.....	63

1.0 INTRODUCTION

On April 10, 2008, the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA) issued regulations governing compensatory mitigation for activities authorized by permits issued by the Department of the Army (Federal Register, Vol. 73, No. 70, pp 19594-19705). These regulations (Final Rule) establish performance standards and criteria for the use of permittee-responsible compensatory mitigation, mitigation banks, and in-lieu fee (ILF) programs to implement compensatory mitigation projects for activities authorized by USACE permits. To meet the requirements of these regulations, this ILF program instrument (Instrument) revises an existing ILF mitigation instrument between the Watershed Institute, Inc. (TWI) and the Kansas City District of the USACE. This revised Instrument establishes the Watershed Land Trust, Inc. (WLT)—a 501(c)(3) non-profit natural resources management company—as the ILF program sponsor. Additionally, this Instrument incorporates the recently required components to establish, operate, and use an ILF program to compensate for adverse impacts to wetlands, streams, and riparian areas (aquatic resources) throughout the state of Kansas. Instrument contents and format are based on guidance provided by the Environmental Law Institute (ELI 2009).

1.1 SPONSOR QUALIFICATIONS

The WLT is a 501(c)(3) non-profit corporation formed to hold land in fee simple and/or conservation easements in perpetuity. While most land trusts seek to hold large areas of distinctive terrestrial landscapes, the WLT is unique in that its mission and focus is to preserve watersheds and their associated aquatic resources. WLT staff has over 25 years experience in business administration, environmental law and water rights law. The WLT is a member in good standing of the national Land Trust Alliance (LTA) and has adopted their *Land Trust Standards and Practices* (LTSP) (LTA 2004). The LTSP are guidelines for the legal and ethical operation of a land trust focusing on the public interest while conducting a sound program of land transactions and stewardship. While the WLT provides the required financial and legal expertise for this Instrument, TWI assists with technical expertise for implementation and monitoring of compensatory mitigation. TWI was founded as a not-for-profit natural resource management company in 2004. TWI staff provides a multidisciplinary approach with training and experience in self-sustaining stream design, fluvial geomorphology, stream ecology, wildlife biology, endangered species conservation, and environmental and water rights law. Aquatic habitat rehabilitation is the primary focus of TWI. The TWI approach integrates stream stability and

natural channel design concepts into stream mitigation and riparian enhancement/establishment actions.

2.0 OBJECTIVES

The objectives of this Instrument are to:

- Identify and assess ecologically appropriate wetland, stream, and riparian restoration opportunities within established service areas (SA);
- Develop viable plans to offset aquatic resource losses by acquiring—through conservation easement or purchase—sites to apply compensatory mitigation measures;
- Establish financial, technical, and legal mechanisms to ensure long-term protection and success of compensatory mitigation sites.

3.0 GEOGRAPHIC SERVICE AREAS

The WLT ILF program will serve the entire state of Kansas. The Kansas City District USACE and the Kansas IRT determined that the U.S. Geological Survey hydrologic unit codes (HUC) are the appropriate basis to develop service area boundaries (SA). To evaluate appropriate SAs for Kansas, the WLT consulted the following resources:

- Kansas Fish & Game Commission. 1981. Stream and River Evaluation Map of Kansas. Published by the U.S. Fish & Wildlife Service, Office of Biological Services, Denver, CO.
- Hawkes, C.L., D.L. Miller, and W.G. Layher. 1986. Fish Ecoregions of Kansas: Stream Fish Assemblage Patterns and Associated Environmental Correlates. *Environmental Biology of Fishes* 17(4):267-279.
- Kansas Department of Wildlife, Parks, and Tourism f/k/a Kansas Department of Wildlife, Parks and Tourism (Hereinafter referred to as KDWPT). 2006. Stream Monitoring and Assessment Program: Sub-Watershed Report. Environmental Services Section, Pratt, Kansas.
- Missouri Resource Assessment Partnership (MoRAP). 2006. Using GIS and an Aquatic Ecological Classification System to Classify and Map Distinct Riverine Ecosystems Throughout EPA Region 7. University of Missouri, Columbia, MO.
- Kansas Water Office. 2007. Regional Basins: HUC 6. Map. Topeka, KS.

As watershed boundaries and identified ecoregions are key factors determining the structure, function, and biological character of aquatic systems, the WLT considered large scale geographic patterns as the initial criteria for SA delineation. Kansas regional watershed boundaries (HUC 2) vary from north to south while ecoregion boundaries (EPA Level III) vary from east to west. To maintain consistency with the watershed approach required by the Final Rule, the WLT used the HUC 2 divisions as the first cut between SAs. The first cut yields two SAs: Missouri basin (HUC 10) and Arkansas-White-Red basin (HUC 11).

To refine SA delineation, the WLT searched for clear patterns from fish ecoregion, ecological drainage unit (EDU), and HUC 6 boundaries within both HUC 2 basins. While EDU boundaries in western Kansas are surprisingly large—relative to eastern Kansas EDUs—they are very consistent with fish ecoregions identified by Hawkes et al (1986). However, eastern Kansas EDUs are more consistent with the HUC 6 boundaries. As the IRT clearly expressed concern with the large EDUs, the WLT focused on HUC 6 boundaries as the second criteria for SA delineation. This second cut yields 12 SAs, seven in 2-digit HUC 10 and five in 2-digit HUC 11.

To further refine the 12 SAs, the WLT evaluated established Aquatic Ecosystem Types (AES) within the HUC 6 boundaries. MoRAP (2006) generated AES boundaries from data on soil texture, soil depth, infiltration, bedrock geology, relief, and groundwater contributions to identify and map groups of hydrologic units that are relatively similar with regards to these landscape properties that ultimately control in stream habitat conditions and functional processes. From this evaluation the WLT reduced SAs to 10 by combining multiple HUC 6 basins. The Neosho, Verdigris, and Walnut Rivers and Grouse Creek were combined into one SA while the Kansas, Big Blue, and Lower Missouri-Blackwater were combined into a single SA.

Final refinement of the SAs included the review of KDWPT stream monitoring data (1,117 surveys from 1994 through 2004) to test the validity of combining multiple HUC 6 basins. The WLT evaluated and compared fish species collected in each HUC 6 within the combined SAs. Similarity of fish communities in the Kansas-Big Blue-Lower Missouri HUCs supported this combination as one SA. However, fish community differences—26 species found in the Neosho River basin but not in the Verdigris, Walnut, or Grouse—require the Neosho HUC 6 to stand alone as a separate SA. Fish communities of the Verdigris-Walnut-Grouse SA are similar having a high species overlap and these three basins remain combined. The 11 proposed SAs for the WLT ILF program are listed in Table 1 and shown in Figure 1.

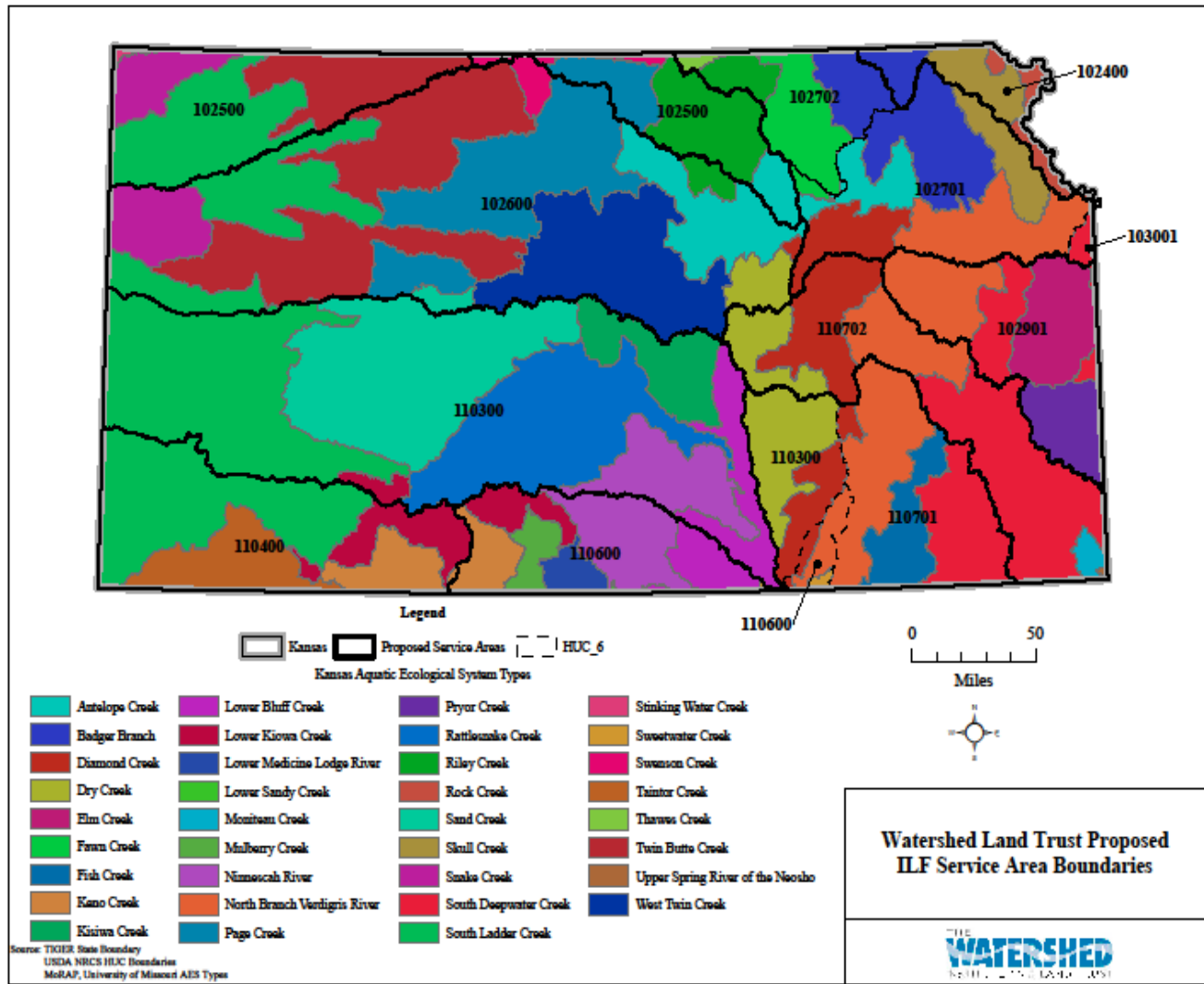


FIGURE 1

TABLE 1.
SERVICE AREA BOUNDARIES
(Also see attached boundary map)

NAME	HUC 8	HUC 8 NAME	RATIONALE
Upper Republican	10250001 10250002 10250003 10250004 10250010 10250011 10250013 10250014 10250015	Arikaree NF Republican SF Republican Upper Republican Upper Sappa Lower Sappa Little Beaver Beaver Prairie Dog	HUC 6 NW Fish Ecoregion KS/Rep EDU
Lower Republican	10250016 10250017	Middle Republican Lower Republican	HUC 6 NE Fish Ecoregion KS/Rep EDU
Smoky Hill	10260001 10260002 10260003 10260004 10260005 10260006 10260007 10260008 10260009 10260010 10260011 10260012 10260013 10260014 10260015	Smoky Hill Headwaters North Fork Smoky Hill Upper Smoky Hill Ladder Hackberry Middle Smoky Hill Big Lower Smoky Hill Upper Saline Lower Saline Upper North Fork Solomon Lower North Fork Solomon Upper South Fork Solomon Lower South Fork Solomon Solomon	HUC 6 NW Fish Ecoregion KS/Rep EDU
Middle Arkansas	11030001 11030002 11030003 11030004 11030005 11030006 11030007 11030008 11030009 11030010 11030011 11030012 11030013 11030014 11030015 11030016	Mid Ark-Lake McKinney White Woman Arkansas-Dodge City Coon-Pickerel Pawnee Buckner Upper Walnut Creek Lower Walnut Creek Rattlesnake Gar-Peace Cow Little Arkansas Middle Ark-Slate North Fork Ninnescah South Fork Ninnescah Ninnescah	HUC 6 SW Fish Ecoregion Upper Arkansas EDU
Cimarron	11040002	Upper Cimarron	HUC 6

WATERSHED LAND TRUST – ILF INSTRUMENT

	11040003 11040004 11040005 11040006 11040007 11040008	North Fork Cimarron Sand Arroyo Bear Upper Cimarron-Liberal Crooked Upper Cimarron-Bluff	SW Fish Ecoregion Upper Arkansas EDU
Lower Arkansas	11060002 11060003 11060004 11060005	Upper Salt Fork Medicine Lower Salt Fork Chikaskia	HUC 6 SE Fish Ecoregion Upper Arkansas EDU
Verdigris-Walnut	11070101 11070102 11070103 11070104 11070106 11030017 11030018 11060001	Upper Verdigris Fall Middle Verdigris Elk Caney Upper Walnut River Lower Walnut River Kaw Lake-Grouse	SE Fish Ecoregion Similar AES types
Neosho	11070201 11070202 11070203 11070204 11070205 11070207	Neosho Headwaters Upper Cottonwood Lower Cottonwood Upper Neosho Middle Neosho Spring	HUC 6 SE Fish Ecoregion Similar AES types
Marais des Cygnes	10290101 10290102 10290103 10290104	Upper Marais des Cygnes Lower Marais des Cygnes Little Osage Marmaton	HUC 6 NE Fish Ecoregion Osage/S. Grand EDU
Kansas	10270101 10270102 10270103 10270104 10270205 10270207 10300101	Upper Kansas Middle Kansas Delaware Lower Kansas Lower Big Blue Lower Little Blue Lower Missouri-Crooked	NE Fish Ecoregion Kansas EDU Similar AES types
Missouri	10240005 10240007 10240008 10240011	Tarkio-Wolf S.F. Big Nemaha Big Nemaha Independence-Sugar	HUC 6 EDU

4.0 PROGRAM OPERATION

The fundamental purpose of the WLT ILF program is to provide compensatory mitigation to offset aquatic resource losses resulting from unavoidable losses to waters of the United States authorized by USACE permits.

When the WLT identifies a potential ILF compensatory mitigation project the WLT will contact the Interagency Review Team (IRT) for a review of the proposed site. At this time the WLT will provide site information to the IRT for review. The information must include the location and the property boundary, a preliminary jurisdictional assessment, soil information, and 7.5 Minute, USGS Quadrangle map of the project site. If the IRT accepts the site as having potential to provide compensatory mitigation credit then and a complete mitigation plan as outlined in 33 CFR 322.4(c)(2) through (c)(14) must be submitted. The mitigation plan must address the following items:

- Objectives
- Site Selection
- Site Protection Instrument
- Baseline Information
- Determination of Mitigation Credits
- Mitigation Construction/Work Plan
- Operation and Maintenance Plan
- Ecological Performance Standards
- Monitoring Plan and Requirements
- Long-term Management Plan
- Adaptive Management Plan
- Financial Assurances
- Credit Release Schedule

Each individual ILF mitigation project, proposed to the IRT, will be subjected to the complete project review process as outlined in 33 CFR 332.8(g)(1) of the federal compensatory mitigation regulations.

4.1 ACCOUNTING PROCEDURES

The WLT will establish and maintain a system for tracking the production of credits, credit transactions, and financial transactions between the WLT and permittees. Credit production, credit transactions, and financial transactions will be tracked on a programmatic basis (i.e., the number of available credits for the entire program by service area) and separately for each individual project.

4.2 *IN-LIEU FEE PROGRAM ACCOUNT*

4.2.1 Financial Accounting

The WLT will establish a restricted account—Kansas Aquatic Resource Trust Fund (KARTF)—to hold and manage all fees received from USACE permittees. Currently held funds by the Watershed Institute ILF KARTF will be transferred to the WLT KARTF along with all ILF Program liabilities. The WLT will track funds accepted from permittees separately from those accepted from other entities and for other purposes (i.e., fees arising out of an enforcement action, such as supplemental environmental projects). The account will be held at a financial institution that is a member of the Federal Deposit Insurance Corporation. Any and all interest accruing from the account will be used to provide compensatory mitigation for impacts to aquatic resources. Funds shall be used solely for activities directly related to physical aquatic habitat and resource establishment, stabilization, restoration, enhancement, and protection including but not limited to the following: site selection, collaboration, land acquisition and/or protection (i.e., appraisals, legal fees, surveys, title insurance, stewardship fees, etc.), development and implementation of physical mitigation and monitoring, baseline documentation, long-term management of mitigation parcels, IRT reporting, and administrative costs. Use of fees is explicitly prohibited for activities such as upland preservation (other than buffers), research, education and outreach. Reporting requirements for financial reporting are at Section 6.0 (Reporting Protocols).

At the time funds are deposited in the KARTF, the WLT shall receive an administrative reimbursement equal to 10% of the funds. The administrative reimbursement will be used for expenses directly related to the day-to-day management of the ILF program and the KARTF. Such costs include bank charges associated with the establishment and operation of the program, staff time for carrying out program responsibilities, expenses for day to day management of the program, such as bookkeeping, mailing expenses, printing, office supplies, computer hardware or software, training, travel, overhead and hiring private contractors or consultants. It is the intent of the WLT to maximize the amount of funds that will be directly applied to the establishment of mitigation sites, implementation of mitigation measures, mitigation monitoring and maintenance, and long-term protection of mitigation areas.

If the USACE determines that the WLT has failed to secure appropriate mitigation site(s) or otherwise provide compensatory mitigation by the third growing season following the sale of the first advance credit in that service area or upon dissolution of the WLT or any other failed

performance factor described in Section 5.0, the USACE may direct the funds from the ILF program account to alternative compensatory mitigation projects. A mitigation project must be commenced by the third full growing season after the first advance credit is secured by a Department of the Army permit recipient. Additional information on failure to fulfill the terms of the instrument is discussed in Section 5.0 (Default & Closure). The USACE has the authority to audit the program account records at any time.

4.2.2 Credit Accounting

All future stream compensatory mitigation activities will be based on approved debit/credit scenarios developed using the Kansas Stream Mitigation Guidance (KSMG). Currently, the State of Kansas does not have wetland mitigation guidance. Therefore, the WLT will implement wetland mitigation based on the acreage of impact and the USACE determined mitigation ratio. The WLT will use USACE established wetland credit/debit guidance when available. For purposes of this document, the WLT considers one acre of wetland impact to equal one credit for advance credit sales. Section 7.1 provides more detail on credit sales.

The WLT will establish and maintain an annual report ledger that tracks the production of released credits for this ILF instrument and for each individual in-lieu fee project. Reporting requirements for the annual report ledger are at Section 6.0. On the income side, the WLT will track the fees and all other income received, the source of the income (i.e., permitted impact, penalty fee, etc.). The ledgers will also include a list of all the permits for which in-lieu fee program funds were accepted, including the appropriate USACE permit number, the service area in which the specific authorized impacts are located, the amount (stream debits or acreage) of authorized impacts, the aquatic resource type impacted, the amount of compensatory mitigation required, the amount paid to the in-lieu fee program for each of the authorized impacts, and the date the funds were received from the permittee.

The WLT will establish and maintain a report ledger that will track all program disbursements/expenditures and the general nature of the disbursement (i.e., costs of land acquisition, planning, site selection, construction, monitoring, maintenance, contingencies, adaptive management, and administration). The WLT may also track funds obligated or committed, but not yet disbursed. The ledger shall also include, for each project, the permit numbers for which the project is being used to offset compensatory mitigation requirements, the service area in which the project is located, the amount of compensation being provided by

method (i.e., restoration, establishment, enhancement, or preservation), the aquatic resource type(s) represented, and the amount of compensatory mitigation being provided (debits or acres). The annual report ledger shall also include a balance of advance credits and released credits at the end of the report period for each service area.

4.3 LEGAL RESPONSIBILITY

The WLT assumes all legal responsibility for satisfying the mitigation requirements of the USACE permit for which fees have been accepted (i.e., the implementation, performance, and long-term management of the compensatory mitigation project(s) approved under this instrument and subsequent mitigation plans). The transfer of liability is established by: 1) the approval of this in-lieu fee instrument; 2) receipt of USACE approval for use of an in-lieu fee program; and 3) the transfer of fees from the permittee to the WLT. As site-specific losses may be small, it is expected the WLT may accrue mitigation payments from multiple authorized activities and apply the funds to one larger mitigation action. Additionally, the WLT will ensure that all required federal, state, tribal, and local permits are obtained prior to implementation of projects carried out under the Instrument. A mitigation project must be commenced by the third full growing season after the first advance credit is secured by a Department of the Army permit recipient.

4.4 PROPOSED OWNERSHIP AND LONG-TERM MANAGEMENT

Approved USACE conservation easements will be used on all approved compensatory mitigation sites as directed by the USACE. In situations where the WLT owns a compensatory mitigation site in fee simple, an entity other than the WLT will hold the conservation easement. In all cases, the WLT will procure a legally binding agreement to ensure that all mitigation properties are protected in perpetuity as viable aquatic habitats. The protection agreements will prohibit physical alterations to the mitigation measures—unless required as corrective actions—as well as activities that negatively affect the aquatic resource functions and values. All mitigation measures will be developed as self-sustaining aquatic systems and long-term management will vary by mitigation site with each guided by site-specific ecological performance standards, monitoring results, and protective agreements.

4.4.1 Transfer of Long-Term Management Responsibilities

In rare situations, the WLT may transfer long-term management responsibilities to another land stewardship entity, such as a public agency, non-governmental organization, or private land

manager. Prior to transfer, the WLT will secure approval from the IRT for the receiving entity. Transfer of long term stewardship responsibilities will not occur until the mitigation site meets established performance standards. Once long term management has been transferred to land stewardship entity, said party is thereby responsible for meeting any and all long-term management responsibilities outlined in the project-specific mitigation plan. Until such time as long-term management responsibilities are transferred to another party, the WLT will be responsible for long-term management of the mitigation project.

4.4.2 Financial Arrangements for Long-Term Management

If the WLT chooses to transfer the responsibilities for long-term management to a long-term steward, the WLT must obtain USACE approval. If long-term stewardship responsibilities are transferred to an approved land stewardship entity, the WLT will also transfer sufficient long-term management funds/account or otherwise arrange for disbursements from such funds/account to the approved land stewardship entity. The amount of the stewardship fee will be determined based upon a variety of factors including but not limited to costs of administration, legal fees, filing fees, interest rates, etc.

4.5 PROGRAM EVALUATION

Due to population dynamics and limited aquatic resources, the WLT does not see major changes in the western Kansas economy in the foreseeable future that would drive a significantly different outlook for community or resource development in the following SAs: Upper Republican, Lower Republican, Smoky Hill, Cimarron, and Lower Arkansas. As such, the WLT does not anticipate the need for a revision to the Compensation Planning Framework of these SAs for a number of years. However, due to population dynamics and abundant aquatic resources, the WLT will periodically review all other SAs as part of its land trust responsibilities and strategic planning. As part of this overall evaluation, the WLT may examine its efforts in achieving the previously identified ILF goals and objectives (Section 7.0).

5.0 DEFAULT AND CLOSURE PROVISIONS

If the USACE determines that the WLT has failed to provide the required compensatory mitigation in a timely manner (i.e., WLT has failed to meet performance-based milestones set forth in the project-specific mitigation plan, failed to meet ecological performance standards, failed to submit monitoring reports in a timely manner, failed to establish and maintain an annual

ledger report and individual ledgers for each project in accordance with the provisions in Section 4.0 (Accounting Procedures), failed to submit an annual financial assurances and long-term management funding report, failed to report approved credit transactions, failed to complete land acquisition/site selection and initial physical and biological improvements by the third growing season after the sale of the first advance credit is sold within the service area, and/or otherwise comply with the terms of the instrument), the district engineer may give written notice of appropriate action to achieve compliance with the terms of the instrument and all approved mitigation plans. The WLT shall be given reasonable time to cure, based upon said notice, as determined by the USACE. Such actions may include suspending credit sales, decreasing available credits, requiring adaptive management measures, utilizing financial assurances or contingency funds, terminating the agreement, using the financial assurances or contingency funds to provide alternative compensation, directing the use of in-lieu fee program account funds to provide alternative mitigation (e.g., securing credits from another third party mitigation provider), or referring the non-compliance with the terms of the instrument to the Department of Justice. Dissolution of the WLT will automatically trigger the termination procedures described below.

Any delay or failure of the WLT to comply with the terms of this instrument shall not constitute a default if and to the extent that such delay or failure is primarily caused by any force majeure or other conditions beyond the WLT's reasonable control and significantly adversely affects its ability to perform its obligations hereunder, such as flood, drought, lightning, earthquake, fire, landslide, lack of sufficient credits within a particular service area, condemnation or other taking by any governmental body. The WLT will give written notice to the district engineer and IRT if the performance of any of its in-lieu fee projects is affected by any such event as soon as is reasonably practicable.

This Instrument may be amended by written approval of the USACE, IRT, and the WLT. Termination of this Instrument will require ninety (90) days written notice to the other signatory party and the IRT. Within sixty (60) days of written notice of termination, the signatory parties and the IRT shall meet to discuss the reasons for notice and any actions that may address the concerns leading to a desire to terminate the Instrument.

Prior to termination, the WLT will provide a complete accounting of ILF funds received and disbursed along with uncompleted projects and associated remaining funds. Where feasible, all

outstanding projects having available funds will be completed, with perpetual protection insured, prior to termination of this Instrument. Upon termination, the USACE and IRT will direct remaining funds as appropriate. With approval by the USACE and IRT, the WLT may transfer interest in land to appropriate state or federal agencies, nonprofit corporations, local governments, or qualified land trusts.

6.0 REPORTING PROTOCOLS

The WLT will provide annual reports to the USACE and IRT containing the following information:

1. All income received, disbursements, and interest earned by the program account.
2. A list of all permits for which in-lieu fee program funds were accepted. This list will include:
 - USACE permit number and permit name;
 - Service area in which the authorized impacts are located;
 - Amount of required compensatory mitigation (credits);
 - Date the funds were received from the permittee.
3. A description of in-lieu fee program expenditures from the account, such as the costs of land acquisition, planning, construction, monitoring, maintenance, contingencies, adaptive management, and administration.
4. The balance of advance credits and released credits at the end of the report period for each service area.
5. Any other information required by the district engineer.

Within the annual report, the WLT will provide a ledger showing the beginning and ending balance of available credits and permitted impacts for each resource type, all additions and subtractions of credits, and any other changes in credit availability (e.g., additional credits released, credit sales suspended). Annual financial data will provide beginning and ending balances, deposits into and withdrawals from the accounts providing funds for financial assurances and long-term management activities.

For each compensatory mitigation project, the WLT will provide an annual monitoring report. The report will document progress towards meeting the established performance standards, and may include plans (such as as-built plans), maps, and photographs to illustrate current site

conditions. If applicable, the monitoring reports will include the results of assessments used to provide quantitative or qualitative measures of the functions provided by the compensatory mitigation project site. The WLT will provide monitoring reports for five years—or longer if required by the USACE—after project completion. If monitoring in years 4 and 5—or the final two years of required monitoring—documents that performance standards and success criteria are met, then annual monitoring will cease. If after the final year there have not been two consecutive years of successful performance, the WLT will follow protocols outlined in Section 7.5.

7.0 COMPENSATION PLANNING FRAMEWORK

The WLT's compensation planning framework follows elements outlined in Section 332.8(c) of the 10 April 2008 Federal Register (page 19681). The WLT used a watershed-based rationale to develop service areas and will follow a watershed approach to select, secure, and implement compensatory mitigation activities. Compensatory mitigation will be habitat-based and linked to the reduction of identified threats, implementation of appropriate in-channel habitat restoration, wetland restoration/creation, riparian habitat improvement, and the preservation of unique habitats.

7.1 ADVANCE CREDITS – CREDIT RELEASE SCHEDULE

7.1.1 Advance Credits

Advance stream credits were calculated from information provided by the Kansas Department of Health and Environment, Watershed Planning Section (KDHE-WPS). The KDHE-WPS is responsible to identify and prioritize impaired streams, lakes, and wetlands and develop Total Maximum Daily Loads (TMDL) for the high priority water bodies as required by the Clean Water Act. Eric Banner, Environmental Scientist with KDHE-WPS prepared a spreadsheet of high priority stream segments having biological, or biologically-related, impairments identified through the TMDL process. The WLT used this information to determine the linear feet of high priority stream segments in each SA, assuming these to be potential mitigation opportunities. For each SA, the WLT caps advance credit sales at 10,000—or one permitted impact exceeding 10,000 debits—prior to initiating a specific mitigation project(s). The sale of the advance stream and wetland credits will provide adequate financing to secure and construct a mitigation project site, which replaces the lost aquatic resources, within the specified service area.

No recent comprehensive inventory of Kansas wetland acres exists and current U.S. Department of Agriculture data on wetland acreage is considered protected information. Therefore, potential advance wetland credits were evaluated using the Kansas Gap Program (KGP) land cover data (<http://www.kars.ku.edu/maps/klcp2005/>) and other wetland resources (Dahl 1990; Monda et al. 1993; Egbert et al. 2001; Wasson et al. 2005). Dahl (1990) estimated that Kansas lost 48% (405,600 acres) of its wetland acres between the 1970s and 1980s. The vast majority of these were shallow and often ephemeral wetlands, drained between the mid-1950s and mid-1970s for conversion to agricultural land (Monda et al. 1993). In a more current review, Wasson et al. (2005) determined that quantity and quality trends in herbaceous wetland habitats are either unknown or declining. Wasson et al. (2005) also identified many “species of greatest conservation need” associated with herbaceous wetland habitats across Kansas. Therefore, the WLT considers wetland habitat—regardless of SA—to be threatened and a high priority for creation, restoration, or protection. For purposes of this document, the WLT considers one acre of wetland impact to equal one credit for advance credit sales. If the USACE requires mitigation at a ratio higher than 1:1, the WLT will adjust credit sales to fit federal requirements. For example, if an applicant proposes to impact 1.5 acres of wetland habitat and the USACE requires a 3:1 mitigation ratio, then WLT advance credit sales would equal 4.5.

To determine potential wetland acres, the WLT tabulated all wetland alliance land cover types mapped by KGP for each service area. To maintain the ecological integrity of mitigation efforts, the WLT will cap advance wetland credit sales in each SA by wetland alliance cover types. For example, Wasson et al. (2005) identified seven wetland alliance land cover types—Salt Marsh/Prairie, Spikerush Playa Lake, Playa Lake, Low or Wet Prairie, Freshwater Marsh, Cattail Marsh, and Weedy Marsh—in the Central Mixed Grass Prairie Conservation Region. The WLT proposes to cap advance wetland credit sales at five (5) credits—or one permitted impact exceeding five credits—per wetland alliance land cover type in each SA prior to initiating a specific mitigation project(s) that exceeds 1,000 acres in that service area. The sale of the advance stream and wetland credits will provide adequate financing to secure and construct a mitigation project site, which replaces the lost aquatic resources, within the specified service area.

7.1.2 Credit Release Schedule

The credit release schedule for advance credits sold by the WLT will be set forth in the Mitigation Plan for each project.

7.2 **PRIORITIZATION STRATEGY**

The WLT may use a variety of available resources—see Table 3—to prioritize projects and focus expenditure of ILF funds within each established SA. Compensatory mitigation site selection will be based on priority criteria, proximity to the permitted activity, similarity of habitat types, number of required mitigation credits (as calculated using the KSMG), wetland acres required, potential of geomorphic stability, hydrologic conditions, and availability of perpetual protection. All mitigation will be “in-kind” unless pre-approved by the IRT.

**TABLE 3.
COMPENSATORY MITIGATION PRIORITIZATION RESOURCES**

ENTITY	RESOURCE
Kansas Dept of Health & Environment	TMDL-High Priority Watersheds
Kansas Dept of Health & Environment	Watershed Condition Reports
Kansas Dept of Health & Environment	303(d) Impaired Waters List
Kansas Dept of Health & Environment	Exceptional State Waters, Special Aquatic Life Use Waters, and Outstanding National Resource Waters
Kansas Dept Wildlife, Parks and Tourism	At-Risk Species, Critical Aquatic Habitats
Kansas Dept Wildlife, Parks and Tourism	Comprehensive Wildlife Conservation Strategy
Kansas Dept Wildlife, Parks and Tourism	HUC Priority Conservation Watersheds
Natural Resources Conservation Service	Rapid Watershed Assessments
WRAPS Programs	WRAPS planning documents
Missouri Resource Assessment Program	Aquatic Ecological System Types

Using the resources in Table 3 as a guide, the WLT will select sites based on the following priority hierarchy:

- 1st – Within an identified High Priority watershed in the same HUC 8 as the authorized activity;
- 2nd – Within the same HUC 8 as the authorized activity;
- 3rd – Outside the same HUC 8 as the authorized activity but within an identified High Priority watershed of the SA;
- 4th – Outside the same HUC 8 as the authorized activity but within the same SA and AES Type—or wetland alliance—as the authorized activity;
- 5th – Any location within the same SA as the authorized activity.

The WLT will make a good faith effort to locate mitigation opportunities in priority level 1 before moving to the next priority level. Every mitigation plan will include full justification for the selected priority level. Additionally, the WLT will give special consideration to streams listed on the Nationwide Rivers Inventory (NRI). The NRI is a register of river segments—compiled and

maintained by the National Park Service (NPS) that potentially qualify as national wild, scenic or recreational river areas (NPS 2010). The WLT will use any funds received from authorized activities on an NRI-listed river to specifically enhance or preserve the outstandingly remarkable values (ORVs) identified for that system.

7.3 PUBLIC AND PRIVATE STAKEHOLDER INVOLVEMENT

In site selection and compensatory mitigation implementation, the WLT will coordinate all activities with the established IRT. In particular, WLT may coordinate with KDWPT (HUC 8 conservation priority watersheds) in identifying compensatory mitigation sites. Additionally, WLT may solicit input from tribes, local watershed organizations—WRAPS Stakeholder Leadership Teams, Watershed Districts—and other appropriate non-governmental organizations in compensatory mitigation site selection. Regulatory agencies will be consulted—and required permits obtained—for all mitigation projects.

7.4 LONG TERM PROTECTION

For all ILF project sites, the WLT will provide long term protection as outlined in Section 4.4.

7.5 MANAGEMENT, EVALUATION, AND REPORTING

Prior to mitigation implementation, WLT will develop a site-specific plan designed to fully compensate for aquatic resource debits resulting from authorized activities under the USACE permit program. This plan will describe mitigation actions, quantifiable performance standards for each action, monitoring requirements, and contingency measures to ensure mitigation success as outlined in 33 CFR 332.4(c)(2)-(c)(14). WLT will conduct annual monitoring for a minimum of five years to determine performance success. If needed, WLT will undertake maintenance activities according to the established contingency measures. Minor corrective actions will be implemented as part of routine maintenance and identified in annual monitoring reports. If, following mitigation implementation and the initial five year monitoring program, established performance standards are not achieved, remedial action will be required. Major corrective actions will be assessed by qualified individuals. From this assessment, the WLT will develop specific recommendations for major corrective actions, new performance standards to measure progress, and a timeline for implementation and monitoring. The WLT will submit a summary of these items to the USACE and IRT for approval. Upon approval, the WLT will implement needed corrective actions.

The following sections outline existing conditions, in-lieu fee objectives, advance credit, and preservation strategy for each SA.

7.6 UPPER REPUBLICAN SERVICE AREA

The Upper Republican SA is located in the High Plains physiographic region of western Kansas. The Kansas portion of the basin is bordered by Colorado on the west and Nebraska on the north covering approximately 4,870 mi². The primary streams of the Upper Republican SA include the mainstem and tributaries of the Arikaree and South Fork Republican rivers, and Beaver, Sappa, and Prairie Dog creeks. The SA streams include 15,230 intermittent stream miles and 760 perennial stream miles (Kansas Water Office [KWO] 2009a). The SA is characterized by irregular rolling plains and breaks with narrow river valleys bordered by steep slopes. Predominant land cover is a mosaic of short-mixed grass rangeland and cropland agriculture. Dry land farming with areas of irrigated cropland are extensive covering almost 60% of the SA (KWO 2009a). Pasture/grassland covers approximately 38% of the SA, including a significant portion of the riparian land use (68%). Few hydric soils or wetland areas occur. Precipitation is low and highly variable ranging from 16 to 24 inches annually. Low precipitation, combined with high evaporation and the development of groundwater resources for irrigation leads to highly intermittent stream flow in this SA. The NRI lists the Arikaree River (10250001) based on fish and wildlife habitat, along with historical and cultural criteria. As noted by the NPS (2010), this system exhibits exceptional fish and wildlife habitat along the river—especially wetlands and supports significant waterfowl use.

7.6.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

Resource concerns in this SA are numerous with water quantity and surface water quality being key issues. Szilagyi (1999) found that overall stream flow in the Republican River basin had significantly decreased during the past 40 to 50 years and noted this general decline could not be explained by long-term precipitation trends. Additionally, Szilagyi (1999) noted that the most significant declines occurred in Colorado and Kansas. For example, Szilagyi (1999) calculated a 77% decrease in stream flow—from 1947 through 1994—entering Nebraska from Beaver and Sappa creeks. Potential contributing factors include increased groundwater pumping and irrigation, expansion of phreatophytes, and improved water and soil conservation practices.

All the major stream systems in the Upper Republican SA are impaired for aquatic life support and the KDHE issued total maximum daily loads (TMDLs) for the Arikaree River (fluoride, pH, selenium, sulfate), South Fork Republican (fluoride, pH), Beaver Creek (fluoride, dissolved oxygen), and Prairie Dog Creek (dissolved oxygen). Additionally, all designated uses of Norton Reservoir—fed by Prairie Dog Creek—are impaired by eutrophication bundled with pH and dissolved oxygen (KDHE 2010). The Unified Watershed Assessment (UWA; KDHE 1999) listed all the major stream systems as watersheds in need of restoration noting that 100% of stream miles in the Arikaree River and Beaver Creek are water quality impaired. The U.S. Fish & Wildlife Service (USFWS 1981) identifies the Arikaree River, Sappa, Beaver and Prairie Dog Creeks as moderate fishery resources.

Based on biological sampling, the KDWPT considered much of this service area to be in fair condition (KDWPT 2006). The KDWPT documented 22 species of fish and 7 mussel species. Of particular note is the presence of the brassy minnow (*Hybognathus hankinsoni*) and Wabash pigtoe mussel (*Fusconaia flava*); both listed as species in need of conservation (SINC) by the KDWPT. Throughout the service area, aquatic macroinvertebrate communities indicate a high impact from nutrient and oxygen demanding pollutants (KDWPT 2006).

The KGP land cover data set identifies eight wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bulrush Marsh, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Grass Playa Lake, Mixed Oak Floodplain Forest, Playa Lake, and Weedy Marsh. Table 4 provides the acreage of each wetland land cover type in the Upper Republican SA.

TABLE 4.
WETLAND ALLIANCE LAND COVER TYPES – UPPER REPUBLICAN SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	9,398
Bulrush Marsh	342
Cattail Marsh	872
Cottonwood Floodplain Forest/Woodland	79,451
Grass Playa Lake	685
Mixed Oak Floodplain Forest	464
Playa Lake	130
Weedy Marsh	245
TOTAL	91,587

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this complex are declining (Wasson et al. 2005). Typical surface water conditions are ephemeral due to the lowering of the water table, and surface and ground water withdrawal. Deciduous floodplains in the SA are dependent upon intermittent flows. The quality and quantity trends of herbaceous wetland habitat are declining (Wasson et al. 2005). Playa Lakes are the most notable herbaceous wetlands found in the Upper Republican SA. Anthropogenic impacts—plowing, drainage, livestock watering, and irrigation—along with sedimentation and run off of agricultural chemicals have had major negative impacts on Playa Lakes.

7.6.2 Aquatic Resource Goals and Objectives

1. Improve aquatic and riparian habitats.
 - 1.1 Stabilize streambed and streambanks in priority locations.
 - 1.2 Target reaches not meeting designated aquatic life uses for dissolved oxygen and pH with in-channel and riparian restoration.
 - 1.3 Restore degraded playa lakes.
 - 1.4 Create new wetland habitat.
 - 1.5 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Acquire remaining stream reaches having relatively permanent flow.
 - 2.2 Acquire functioning playa lakes.
 - 2.3 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.4 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.5 Establish conservation easements to protect existing unique habitats.
3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.6.3 Advance Credits

Based on data provided by the KDHE (personal communication Eric Banner), there are 454,080 linear feet of impaired (high priority) streams in the Upper Republican SA. Assuming a KSMG in-stream “sum of factors” value of 3.25 and a riparian “sum of factors” value of 1.08, there are 1,966,166 potential credits in the SA. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.5% of the potential credits available in the SA.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service area.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, results in advance wetland credits (AWC) as follows: Upper Republican SA – zero AWC.

7.6.4 Preservation Strategy

Non-point source pollution, phreatophyte encroachment, and water management have degraded or eliminated aquatic habitat. Therefore, the WLT will consider free-flowing stream reaches, intact grassland riparian corridors, naturally functioning or restored playas, unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, herbaceous wetlands along and adjacent stream channels are uncommon but considered an outstanding resource value. Reaches of floodplain and streamside wetland habitats will be considered for preservation. The WLT will also consider areas known to support a diverse native aquatic community or populations of the brassy minnow and Wabash pigtoe for preservation actions. The KDWPT identified areas of intact shortgrass prairie as a conservation priority. The WLT will work with the KDWPT to identify stream reaches and wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.7 LOWER REPUBLICAN SERVICE AREA

This SA—approximately 2,660 mi²—is characterized by undulating dissected plains and sandstone hills underlain by the Dakota Formation (Chapman et al. 2001). The SA is transitional,

with a variable climate and average annual precipitation ranging from 24 to 28 inches. Historically, natural vegetation shifted from tallgrass prairie to the east and mixedgrass prairie to the west. Today, the SA is primarily a mixture of cropland agriculture and rangeland. The Republican River, Buffalo Creek, Elk Creek, Marsh Creek, Salt Creek, and White Rock Creek are among the larger streams and rivers in this watershed. According to the Kansas Surface Water Register, the most common designated uses for streams and rivers include: expected aquatic life uses, food procurement, contact recreation, and domestic water supply.

7.7.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

As in the Upper Republican SA, the Lower Republican SA suffers from water quantity and quality degradation. Significant reduction in stream flow from Nebraska into Kansas has resulted in the development of Minimum Desirable Streamflow designations, regulation of junior water right holders to maintain flow, and litigation between Kansas and Nebraska. The KDWPT (1977) noted acute low flows as one of the most serious problems on the Republican River. The USFWS (1981) identifies the Republican River, Spring Creek, Buffalo Creek, and Dry Creek as high-priority fishery resources.

The KDHE ranks the Lower Republican HUC 8 (10250017) watershed eleventh in priority for Kansas watershed restoration (KDHE 2001). According to the UWA (KDHE 1999), approximately 57% of the total miles of water—and 26% of HUC 10250017—do not meet their designated uses while 43% of the lakes/wetlands in this watershed need TMDLs. Sediment and nutrients are the primary impairments. Potential sources of sediment include construction sites, stream bank erosion, and row crop agriculture. Potential sources of excess nutrients include registered and unregistered feedlots, wastewater treatment facilities, septic systems, wildlife, and grazing land. Based on the watershed's land use percentages, the primary pollutant sources for nutrients would be row crop agriculture and grazing land. Riparian buffer establishment and protection are desired implementation activities to meet TMDL goals (KDHE 2010).

Based on biological sampling, the KDWPT considered much of this service area to be in fair to good condition (KDWPT 2006). The KDWPT documented 51 species of fish and 15 mussel species. Of particular note is the presence of the state-threatened plains minnow (*Hybognathus placitus*), and Wabash pigtoe mussel, and creeper mussel (*Strophitus undulatus*), that are SINC. For aquatic macroinvertebrates, the sampled communities indicate a high impact from nutrient and oxygen demanding pollutants (KDWPT 2006).

The KGP land cover data set identifies seven wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bur Oak Floodplain Woodland, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Freshwater Marsh, Mixed Oak Floodplain Forest, and Weedy Marsh. Table 5 provides the acreage of each wetland land cover type in the Lower Republican SA.

TABLE 5.
WETLAND ALLIANCE LAND COVER TYPES – LOWER REPUBLICAN SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	148,054
Bur Oak Floodplain Woodland	1,849
Cattail Marsh	4,541
Cottonwood Floodplain Forest/Woodland	46,246
Freshwater Marsh	189
Mixed Oak Floodplain Forest	206
Weedy Marsh	409
TOTAL	201,494

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this complex are unknown (Wasson et al. 2005). The use of water from the Republican River—including significant storage and usage in Nebraska—for irrigation, industries and municipalities is having a negative impact and deciduous floodplains in the SA are dependent upon intermittent to perennial flows. To support existing water rights and maintain biological integrity, the State of Kansas established minimum desirable stream flows (MDS) in the Republican River. The quality and quantity trends of herbaceous wetland habitat are declining (Wasson et al. 2005).

7.7.2 Aquatic Resource Goals and Objectives

1. Improve aquatic and riparian habitats.
 - 1.1 Stabilize streambeds and streambanks in priority locations.
 - 1.2 Implement in-channel habitat restoration in priority locations.
 - 1.3 Identify and implement riparian improvement projects in priority locations.
 - 1.4 Restore degraded seasonal and permanent wetland habitats.
 - 1.5 Create new wetland habitat.
 - 1.6 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Acquire stream reaches having relatively permanent flow.

- 2.2 Identify areas that maintain habitat features supporting sensitive aquatic species.
- 2.2 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
- 2.3 Establish conservation easements to protect existing unique habitats.
- 3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.7.3 Advance Credits

The WLT will calculate debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 660,000 linear feet of impaired (high priority) streams in the Lower Republican SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 2,956,800 potential credits. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.3% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Lower Republican SA – 20 AWC.

7.7.4 Preservation Strategy

Non-point source pollution and water management have degraded aquatic habitat throughout the Lower Republican SA. Therefore, the WLT will consider free-flowing stream reaches, intact riparian corridors, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, herbaceous wetlands along

and adjacent stream channels will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. The KDWPT identified areas of intact tallgrass prairie as a conservation priority. The WLT will work with the KDWPT to identify stream reaches and wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.8 *SMOKY HILL SERVICE AREA*

The Smoky Hills service area—approximately 18,930 mi²—is characterized by undulating to hilly dissected loess and sand plains (Chapman et al. 2001). The region is transitional, with a variable climate and potential natural vegetation ranging from tallgrass prairie in the east to shortgrass prairie in the west. Roughly 50% of the SA is cropland. Average annual precipitation is highly variable and ranges from 28 inches in the east and 17 inches in the west (Chapman et al. 2001, NRCS 2007). The major streams in this SA are the Smoky Hill, Saline, and Solomon Rivers and their tributaries. Surface waters are generally used for aquatic life support, human health, primary contact recreation, domestic water supply and industrial water supply (KDHE 2001). Stream flow varies greatly increasing from west to east. Approximately 83,508 miles of intermittent and 6,661 miles of perennial stream channels occur in the SA (KWO 2009b, 2009c). The NRI identifies 23 miles—upstream from Wilson Reservoir—of the Saline River as having scenic, recreation, geologic, fish, and wildlife ORVs.

7.8.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

Streams and rivers are impaired by fecal coliform bacteria, sulfate, chloride, nutrients, low dissolved oxygen, and ammonia (KDHE 2001). According to the UWA, 50% to 80% of the streams/rivers do not meet their designated uses (KDHE 1999). Additionally, the western portion suffers from highly intermittent flow conditions. Potential pollution sources include stream bank erosion, row crop agriculture, registered and unregistered feedlots, wastewater treatment facilities, septic systems, wildlife, and grazing land. Based on the watershed's land use percentages, the primary pollutant sources for nutrients would be row crop agriculture and grazing land. Subsurface salt deposits and saline groundwater contribute to the high chloride content of many streams. Riparian buffer establishment/protection and stream stability are desired implementation activities to meet TMDL goals (KDHE 2010).

Based on biological sampling, the KDWPT considered much of this service area to be in fair to good condition (KDWPT 2006). The KDWPT documented 40 species of fish and 16 mussel species. Of particular note is the presence of the following mussel species: Wabash pigtoe, creeper, yellow sandshell (*Lampsilis teres*), cylindrical papershell (*Anodontoidea ferussacianus*), and fat mucket (*Lampsilis siliquoidea*), all of which are SINC. For aquatic macroinvertebrates, the sampled communities indicate a high impact from nutrient and oxygen demanding pollutants (KDWPT 2006). Fish species of note are the federally-endangered Topeka shiner (*Notropis topeka*) found in HUC 10260001; the state-threatened plains minnow; the brassy minnow and blue sucker (*Cycleptus elongatus*) which are SINC. Several stream reaches are designated as high-priority fishery resources and two reaches—above Wilson Reservoir on the Saline River and above Kanapolis Reservoir on the Smoky Hill River—are designated highest-valued fishery resources (USFWS 1981).

The KGP land cover data set identifies 11 wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bulrush Marsh, Bur Oak Floodplain Woodland, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Freshwater Marsh, Grass Playa Lake, Low or Wet Prairie, Mixed Oak Floodplain Forest, Spikerush Playa Lake, and Weedy Marsh. Table 6 provides the acreage of each wetland land cover type in the Middle Arkansas SA.

TABLE 6
WETLAND ALLIANCE LAND COVER TYPES – SMOKY HILL SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	287,534
Bulrush Marsh	1,229
Bur Oak Floodplain Woodland	2,844
Cattail Marsh	28,303
Cottonwood Floodplain Forest/Woodland	213,564
Freshwater Marsh	1,687
Grass Playa Lake	1,938
Low or Wet Prairie	63
Mixed Oak Floodplain Forest	1,876
Spikerush Playa Lake	1,235
Weedy Marsh	26,225
TOTAL	566,498

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this complex are declining in the west and are unknown in the east (Wasson et al. 2005). From east to west, the typical surface water conditions range from ephemeral—due to the lowering of the water table, and surface and ground water withdrawal—to perennial.

Deciduous floodplains in the SA are dependent upon intermittent to perennial flows. To support existing water rights and maintain biological integrity, the State of Kansas established MDS for the Smoky Hill, Saline, and Solomon rivers. The quality and quantity trends of herbaceous wetland habitat are declining (Wasson et al. 2005). Playa Lakes are the most notable herbaceous wetlands found in the Smoky Hill SA. Anthropogenic impacts—plowing, drainage, livestock watering, and irrigation—along with sedimentation and run off of agricultural chemicals have had major negative impacts on Playa Lakes.

7.8.3 Aquatic Resource Goals and Objectives

1. Improve aquatic and riparian habitats.
 - 1.1 Stabilize streambed and streambanks in priority locations.
 - 1.2 Implement in-channel habitat restoration in priority locations.
 - 1.3 Restore degraded playa lakes.
 - 1.4 Create new wetland habitat.
 - 1.5 Identify and implement riparian improvement projects in priority locations.
 - 1.6 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Acquire stream reaches having relatively permanent flow.
 - 2.2 Acquire functioning playa lakes.
 - 2.3 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.4 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.5 Establish conservation easements to protect existing unique habitats.
3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.8.4 Advance Credits

The WLT will calculate debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 1,589,280 linear feet of impaired (high priority) streams

in the Smoky Hill SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 7,119,974 potential credits in the SA. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.1% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Smokey Hill SA – 50 AWC.

7.8.5 Preservation Strategy

Non-point source pollution and water management have degraded aquatic habitat throughout the Smoky Hill SA. Therefore, the WLT will consider free-flowing stream reaches, intact riparian corridors, naturally functioning or restored playa lakes, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, herbaceous wetlands along and adjacent to stream channels will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. The KDWPT identified areas of intact mixedgrass and shortgrass prairie as a conservation priority. The WLT will work with the KDWPT to identify stream reaches or wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.9 MIDDLE ARKANSAS SERVICE AREA

Topography over the approximately 18,140 mi² varies from east to west with flat, lowlands in the east and rolling sand plains in the central and western portions (Chapman et al. 2001). Agriculture dominates the land uses with approximately 65% of the western portion of the SA in cropland (KWO 2009d, 2009e). Roughly 55% of the eastern portion is cropped. Major groundwater aquifers underlie the SA along with alluvial aquifers of the Arkansas River and its tributaries. The primary streams of the Middle Arkansas SA include the Arkansas, Little

Arkansas, the Ninnescah River and its main tributaries, the North Fork and South Fork Ninnescah. Numerous tributary streams occur within these drainages. Additionally, three significant wetland complexes occur within the SA: Cheyenne Bottoms, Quivira, and McPherson. Playa lakes are a significant habitat feature in the western portion of the SA (11030001, Middle Arkansas-Lake McKinney; 11030003, Arkansas-Dodge City). Center pivot irrigation is common and causes variability in stream flow. For example, the Arkansas River channel—in HUC 11030001—typically contains perennial flow; however, irrigation withdrawals create ephemeral conditions by Garden City. Ephemeral to highly intermittent flow is common downstream to near Great Bend where surface flows transition from intermittent to perennial. According to the Kansas Surface Water Register, the most common designated uses for streams and rivers in this watershed include: expected and special aquatic life uses, contact recreation, irrigation, domestic water supply, industrial water supply, livestock, groundwater recharge, and food procurement (KDHE 2007).

7.9.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

The condition of the HUC 8 watersheds vary widely with 11030014 (North Fork Ninnescah) meeting 100% of its designated uses while 11030003 (Arkansas-Dodge City) meets 0% of the designated uses (KDHE 1999). According to the UWA (KDHE 1999), 75% of the HUCs are Category I watersheds. A Category I watershed does not meet state water-quality standards and/or fails to achieve aquatic system goals related to habitat and ecosystem health. The primary pollutant concerns are fecal coliform bacteria, pH, sulfate, ammonia, sediment, total suspended solids, and nutrients (KDHE 2000; KDHE 2001). Resource concerns identified through established Watershed Restoration and Protection Strategy programs (WRAPS; Kansas State University [KSU] 2004; KSU 2008a-2008c)—that may be addressed through in-lieu fee funds—include:

- Establish and maintain native riparian buffers.
- Create and/or restore wetland habitats and playa lakes.
- Protect existing wetlands and playa lakes.

Based on fish sampling, the KDWPT considered much of the western portion—from the Colorado state line to Great Bend—to be in fair to good condition (KDWPT 2006). The KDWPT documented 29 species of fish and 12 mussel species. Of particular note is the presence two state-threatened fish, the flathead chub (*Platygobio gracilis*) and Arkansas darter (*Etheostoma*

cragini), and the SINC yellow sandshell mussel. The eastern portion—Great Bend to the Oklahoma state line—is in fair to good health. Sensitive species include the following fish and mussels: state-threatened Arkansas darter and plains minnow; state-endangered silver chub (*Macrhybopsis storeriana*) and peppered chub (*Macrhybopsis tetranema*); SINC creeper mussel, yellow sandshell mussel, Wabash pigtoe mussel, and fawnsfoot mussel (*Truncilla donaciformis*). For aquatic macroinvertebrates, the documented communities indicate a high impact from nutrient and oxygen demanding pollutants (KDWPT 2006). Several stream reaches—most of the Arkansas, North and South Forks Ninnescah, and Little Arkansas Rivers along with Rattlesnake and Slate Creeks—are designated as high-priority fishery resources. No reaches are designated highest-valued fishery resources or NPS listed (USFWS 1981; NPS 2010).

The KGP land cover data set identifies 15 wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bulrush Marsh, Bur Oak Floodplain Woodland, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Forb Playa Lake, Freshwater Marsh, Grass Playa Lake, Low or Wet Prairie, Mixed Oak Floodplain Forest, Pecan Floodplain Forest, Playa Lake, Salt Marsh/Prairie, Spikerush Playa Lake, and Weedy Marsh. Table 7 provides the acreage of each wetland land cover type in the Middle Arkansas SA.

TABLE 7
WETLAND ALLIANCE LAND COVER TYPES – MIDDLE ARKANSAS SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	107,645
Bulrush Marsh	33,027
Bur Oak Floodplain Woodland	251
Cattail Marsh	25,406
Cottonwood Floodplain Forest/Woodland	228,111
Forb Playa Lake	522
Freshwater Marsh	2,076
Grass Playa Lake	46
Low or Wet Prairie	2,851
Mixed Oak Floodplain Forest	11
Pecan Floodplain Forest	2,161
Playa Lake	100
Salt Marsh Prairie	10,003
Spikerush Playa Lake	800
Weedy Marsh	5,597
TOTAL	418,607

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this complex are declining in the west and are unknown in the east (Wasson et al. 2005). From east to west, the typical surface water conditions range from ephemeral—due to the lowering of the water table, and surface and ground water withdrawal—to perennial. Deciduous floodplains in the SA are dependent upon intermittent to perennial flows. To support existing water rights and maintain biological integrity, the State of Kansas established MDS for the Arkansas, Little Arkansas, South Fork Ninnescah, North Fork Ninnescah, and Ninnescah rivers and Rattlesnake Creek. The quality and quantity trends of herbaceous wetland habitat are declining (Wasson et al. 2005). Playa Lakes are the most notable herbaceous wetlands found in the Middle Arkansas SA. Anthropogenic impacts—plowing, drainage, livestock watering, and irrigation—along with sedimentation and run off of agricultural chemicals have had major negative impacts on Playa Lakes. The Middle Arkansas SA also includes four significant wetland complexes: Quivira National Wildlife Refuge (22,135 acres managed by the U.S. Fish & Wildlife Service), Cheyenne Bottoms Wildlife Area (19,857 acres managed by the KDWPT), McPherson Valley Wetlands Wildlife Area (4,455 acres managed by the KDWPT), and Cheyenne Bottoms Preserve (7,300 acres managed by The Nature Conservancy). These four areas occur within a 50 mile radius in the east central portion of the SA.

7.9.2 Aquatic Resource Goals and Objectives

1. Improve aquatic, riparian, and playa habitats.
 - 1.1 Stabilize streambed and streambanks in priority locations.
 - 1.2 Implement in-channel habitat restoration in priority locations.
 - 1.3 Restore degraded playa lakes.
 - 1.4 Create new wetland habitat.
 - 1.5 Identify and implement riparian improvement projects in priority locations, particularly HUCs 11030001 and 11030003.
 - 1.6 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Acquire stream reaches having relatively permanent flow in the west.
 - 2.2 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.3 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.4 Identify functioning playa lakes for protection.
 - 2.5 Establish conservation easements to protect existing unique habitats.

3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.9.3 Advance Credits

The WLT will calculate debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 13,374,240 linear feet of impaired (high priority) streams in the Middle Arkansas SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 59,916,595 potential credits. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.01% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Middle Arkansas SA – 45 AWC.

7.9.4 Preservation Strategy

Non-point source pollution, agricultural practices, and water management have degraded aquatic habitat throughout the Middle Arkansas SA. Therefore, the WLT will consider free-flowing stream reaches, intact riparian corridors, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, playa lakes, and floodplain wetlands will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. The KDWPT identified areas of intact mixedgrass and shortgrass prairie as a

conservation priority. The WLT will work with the KDWPT to identify stream reaches and wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.10 CIMAARRON SERVICE AREA

The Cimarron SA (~6,800 mi²) is a mix of irrigated and dryland agriculture, rangeland, and areas of bare ground in the western portion transitioning to irregular, dissected slopes, bluffs, and gypsum-capped red buttes in the east (Chapman et al. 2001). Land use is dominated by agriculture with approximately 53% in cropland (KWO 2009f). The Cimarron River enters Kansas in the extreme southwest corner, flows generally east exiting the state in Meade County, reenters 30 miles east in Clark County, then exits again in Comanche County (Kansas Forestry Fish & Game Commission [KFFG] 1976). Crooked Creek and Bluff Creek are the major tributaries. The Cimarron basin contains 6,421 miles of intermittent and 432 miles of perennial streams for a total of 6,853 stream miles (KWO 2009f). Variable but low precipitation—18" average annual rainfall—and irrigation contribute to highly variable surface flow (KFFG 1976). According to the Kansas Surface Water Register, the most common designated uses for streams and rivers in this watershed include: expected and special aquatic life uses, contact recreation, irrigation, domestic water supply, industrial water supply, livestock, groundwater recharge, and food procurement (KDHE 2007).

7.10.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

Resource concerns are numerous in the Crooked Creek HUC 8 (11040007). They include, but are not limited to, soil erosion, aquifer overdraft and inefficient water use on irrigated cropland, hydrologic cycle and plant condition on rangeland, and water for livestock (NRCS 2008). Additionally, the UWA identifies the Crooked and Bluff Creek watersheds as Category I (KDHE 1999). Riparian restoration and protection are desired implementation activities to meet TMDL goals (KDHE 2010).

Based on fish sampling, the KDWPT considered much of this SA to be in fair to good condition (KDWPT 2006). The KDWPT documented 26 species of fish and 5 mussel species. By far the greatest aquatic diversity occurs in HUC 11040008 (Bluff). Of particular note is the presence of the Arkansas darter, the plains minnow, and the newly discovered Red River pupfish (*Cyprinodon rubrofluviatilis*). With the exception of the Crooked Creek watershed—which indicates a high impact from nutrient and oxygen demanding pollutants—aquatic

macroinvertebrate communities indicate a low to moderate impact from nutrient and oxygen demanding pollutants (KDWPT 2006). Most reaches are designated limited to moderate fishery resources; however, Calvary Creek—a tributary to Bluff Creek—is designated as high-priority fishery resource. Approximately 200 miles of the Cimarron River is listed in the NRI for historic and cultural resource values (NPS 2010).

The KGP land cover data set identifies nine wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bulrush Marsh, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Freshwater Marsh, Grass Playa Lake, Playa Lake, Salt Marsh/Prairie, and Weedy Marsh. Table 8 provides the acreage of each wetland land cover type in the Cimarron SA.

TABLE 8
WETLAND ALLIANCE LAND COVER TYPES – CIMARRON SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	3,829
Bulrush Marsh	25,290
Cattail Marsh	2,998
Cottonwood Floodplain Forest/Woodland	105,388
Freshwater Marsh	60
Grass Playa Lake	143
Playa Lake	79
Salt Marsh Prairie	3,144
Weedy Marsh	5
TOTAL	140,936

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this complex is declining (Wasson et al. 2005). Typical surface water conditions are ephemeral, due to the lowering of the water table, and surface and ground water withdrawal. Deciduous floodplains in the SA are dependent upon flows that are typically intermittent. The quality of herbaceous wetland habitat is unknown and the quantity trend is declining (Wasson et al. 2005). Playa Lakes are the most notable herbaceous wetlands found in the Cimarron SA. Anthropogenic impacts—plowing, drainage, livestock watering, and irrigation—along with sedimentation and run off of agricultural chemicals have had major negative impacts on Playa Lakes.

7.10.2 Aquatic Resource Goals and Objectives

1. Improve aquatic, riparian, and playa habitats.

- 1.1 Stabilize streambed and streambanks in priority locations.
- 1.2 Implement in-channel habitat restoration in priority locations.
- 1.3 Restore degraded playa lakes.
- 1.5 Create new wetland habitat.
- 1.5 Identify and implement riparian improvement projects in priority locations.
- 1.6 Establish conservation easements to protect improvement projects.
- 2. Preserve existing unique aquatic habitats.
 - 2.1 Acquire stream reaches having relatively permanent flow.
 - 2.2 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.3 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.4 Identify functioning playa lakes for protection.
 - 2.5 Establish conservation easements to protect existing unique habitats.
- 3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.10.3 Advance Credits

The WLT will calculate stream debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 422,400 linear feet of impaired (moderate priority) streams in the Cimarron SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 1,892,352 potential credits. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.5% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Cimarron SA – zero AWC;

7.10.4 Preservation Strategy

Agricultural practices and water management have degraded aquatic habitat throughout the Cimarron SA. Therefore, the WLT will consider free-flowing stream reaches, intact riparian corridors, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, functioning playa lakes, and floodplain wetlands will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. The KDWPT identified areas of intact mixedgrass and shortgrass prairie as a conservation priority. The WLT will work with the KDWPT to identify stream reaches and wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.11 LOWER ARKANSAS SERVICE AREA

The Lower Arkansas SA covers approximately 3,910 mi² in southcentral Kansas. The western portion of the Lower Arkansas SA is characterized by irregular, dissected slopes, bluffs, and gypsum-capped red buttes and transitions to flat lowland topography in the east (Chapman et al. 2001). Native grass rangeland dominates the western portion while agricultural crops increase to the east. Approximately 44% of the SA is cropped. The Salt Fork of the Arkansas, Medicine Lodge, and Chikaskia Rivers, and their tributaries, are the primary streams. Surface waters are generally used for aquatic life support, ground water recharge, livestock watering, and human health use (KDHE 2007).

7.11.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

All four HUC 8 watersheds are Category I (KDHE 1999). With 69% of stream miles not meeting designated uses, only the Lower Salt Fork (11060004) has over 30% impaired stream miles. Riparian restoration and protection are desired implementation activities to meet fecal coliform and dissolved oxygen TMDL goals (KDHE 2010).

Based on fish sampling, the KDWPT considered this SA to be in good condition (KDWPT 2006). The KDWPT documented 38 species of fish and 17 mussel species. By far the greatest aquatic

diversity occurs in HUC 11060005 (Chikaskia). Of particular note is the presence of the Arkansas darter, plains minnow, creeper mussel, fat mucket mussel, Wabash pigtoe mussel, and the yellow sandshell mussel. Aquatic macroinvertebrate communities indicate a low to moderate impact from nutrient and oxygen demanding pollutants (KDWPT 2006). The Chikaskia River (94 miles) and the Medicine Lodge River (67 miles) are listed on the NRI for scenic, recreational, fish, wildlife, and historic natural resource values (NPS 2010). Many of the streams are considered high-priority fishery resources and the lower Chikaskia—from Argonia to the Oklahoma state line—is designated a highest-valued fishery resource (USFWS 1981).

The KGP land cover data set identifies eight wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bulrush Marsh, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Freshwater Marsh, Low or Wet Prairie, Pecan Floodplain Forest, and Weedy Marsh. Table 9 provides the acreage of each wetland land cover type in the Lower Arkansas SA.

TABLE 9
WETLAND ALLIANCE LAND COVER TYPES – LOWER ARKANSAS SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	42,472
Bulrush Marsh	68,644
Cattail Marsh	7460
Cottonwood Floodplain Forest/Woodland	114,632
Freshwater Marsh	215
Low or Wet Prairie	1,137
Pecan Floodplain Forest	630
Weedy Marsh	19
TOTAL	235,209

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this complex is unknown; however, river and stream habitat trends are both declining (Wasson et al. 2005). Typical surface water conditions are intermittent to perennial. To support existing water rights and maintain biological integrity, the State of Kansas established MDS for the Medicine Lodge and Chikaskia rivers. The quality and quantity trends of herbaceous wetland habitat are declining (Wasson et al. 2005).

7.11.2 Aquatic Resource Goals and Objectives

1. Improve aquatic, riparian, and playa habitats.
 - 1.1 Stabilize streambed and streambanks in priority locations.

- 1.2 Implement in-channel habitat restoration in priority locations.
- 1.3 Identify and implement riparian improvement projects in priority locations.
- 1.4 Restore degraded seasonal and permanent wetland habitats.
- 1.5 Create new wetland habitat.
- 1.6 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Acquire stream reaches having relatively permanent flow.
 - 2.2 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.3 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.4 Establish conservation easements to protect existing unique habitats.
3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.11.3 Advance Credits

The WLT will calculate debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 2,803,680 linear feet of impaired (high priority) streams in the Lower Arkansas SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 12,560,486 potential credits. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.08% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Lower Arkansas SA – 25 AWC.

7.11.4 Preservation Strategy

The WLT will consider free-flowing stream reaches, intact riparian corridors, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, floodplain and fringe wetlands will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. The KDWPT identified areas of intact mixedgrass and shortgrass prairie as a conservation priority. The WLT will work with the KDWPT to identify stream reaches and wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.12 VERDIGRIS – WALNUT SERVICE AREA

This SA—approximately 6,830 mi²—encompasses areas of rocky, rolling hills and cuestas having a mosaic of mostly tallgrass in the west to a mixture of tallgrass prairie and oak-hickory forest in the east (Chapman et al. 2001). The far western boundary—along the Walnut River—is characterized by flat lowland topography supporting increased cropland. Grassland dominates the land cover and less than 20% of the SA is cropped. Floodplain forests are found along many of the major streams. Major waterways include the Verdigris, Fall, Elk, Caney, Walnut, and Whitewater Rivers, and Grouse Creek. Of the 18,242 stream miles in the SA, 15,453 miles are intermittent and 2,789 are perennial (KWO 2009g, 2009h). Surface waters are generally used for aquatic life support, food procurement, domestic water supply, and ground water recharge.

7.12.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

All HUC 8 watersheds—with the exception of the Grouse Creek sub-basin—are Category I for restoration (KDHE 1999). While conditions vary, anywhere from 30% to 75% of the stream miles do not meet their designated uses. Riparian/wetland restoration and protection are desired implementation activities to meet biological, fecal coliform and dissolved oxygen TMDL goals. Additionally, channel bank and bed stability actions are desired to meet sediment TMDL goals (KDHE 2010).

Based on fish sampling, the KDWPT considered this SA to be in good condition (KDWPT 2006). The KDWPT documented 63 species of fish and 32 mussel species. Of particular note is the presence of the state-endangered Neosho mucket mussel (*Lampsilis rafinesqueana*) and Western fanshell mussel (*Cyprogenia aberti*); the state-threatened Ouachita kidneyshell mussel (*Ptychobranhus occidentalis*) and flutedshell mussel (*Lasmigona costata*); and the SINC spotted sucker (*Minytrema melanops*), creeper mussel, fat mucket mussel, Wabash pigtoe mussel, yellow sandshell mussel, washboard mussel (*Megaloniaias nervosa*), deertoe mussel (*Truncilla truncata*), fawnsfoot mussel (*Truncilla donaciformis*), and round pigtoe mussel (*Pleurobema sintoxia*). Documented aquatic macroinvertebrate communities indicate a low to moderate impact from nutrient and oxygen demanding pollutants (KDWPT 2006). The Fall River (56 miles), Caney River (56 miles), Grouse Creek (60 miles), and Otter Creek—tributary to the Fall River—are listed on the NRI for scenic, recreational, fish, wildlife, and historic natural resource values (NPS 2010). Additionally, these same reaches are identified as highest-valued fishery resources (USFWS 1981).

The KGP land cover data set identifies eight wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bur Oak Floodplain Woodland, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Freshwater Marsh, Low or Wet Prairie, Mixed Oak Floodplain Forest, and Weedy Marsh. Table 10 provides the acreage of each wetland land cover type in the Verdigris-Walnut SA.

TABLE 10
WETLAND ALLIANCE LAND COVER TYPES – VERDIGRIS-WALNUT SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	81,109
Bur Oak Floodplain Woodland	2,214
Cattail Marsh	23,478
Cottonwood Floodplain Forest/Woodland	54,714
Freshwater Marsh	189
Low or Wet Prairie	32,780
Mixed Oak Floodplain Forest	57,354
Weedy Marsh	124
TOTAL	251,962

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this deciduous floodplain complex is unknown; however, associated river and stream habitat trends are declining (Wasson et al. 2005). Typical surface water conditions are intermittent to perennial. To support existing water rights and maintain biological integrity,

the State of Kansas established MDS for the Walnut and Whitewater rivers. The quality and quantity trends of herbaceous wetland habitat are unknown (Wasson et al. 2005).

7.12.2 Aquatic Resource Goals and Objectives

1. Improve aquatic and riparian habitats.
 - 1.1 Stabilize streambed and streambanks in priority locations.
 - 1.2 Implement in-channel habitat restoration in priority locations.
 - 1.3 Identify and implement riparian improvement projects in priority locations.
 - 1.4 Restore degraded seasonal and permanent wetland habitats.
 - 1.5 Create new wetland habitat.
 - 1.6 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Acquire stream reaches having good base flow conditions.
 - 2.2 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.3 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.4 Establish conservation easements to protect existing unique habitats.
3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.12.3 Advance Credits

The WLT will calculate debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 5,068,800 linear feet of impaired (high priority) streams in the Verdigris-Walnut SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 22,708,224 potential credits. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.04% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit

regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Verdigris-Walnut SA – 30 AWC.

7.12.4 Preservation Strategy

The WLT will consider free-flowing stream reaches, intact riparian corridors, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, floodplain and fringe wetlands will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. In particular, the WLT will target reaches identified by the NRI and designated as Exceptional State Waters by KDHE or as high-value fishery resources by USFWS. Much of the SA is identified by the KDWPT as a conservation priority due to intact tallgrass prairie. The WLT will work with the KDWPT to identify stream reaches and wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.13 NEOSHO SERVICE AREA

The Neosho SA is approximately 6,320 mi² in size. The headwaters drain the rocky, rolling hills of the Flint Hills while the gently undulating plains of the Osage Cuestas characterize the majority of the SA (Chapman et al. 2001). Potential natural vegetation ranges from a mosaic of mostly tallgrass prairie in the west to a mixture of tallgrass prairie and oak-hickory forest in the east, with floodplain forests along streams. Currently, cropped land comprises approximately 38% of the area (KWO 2009i). This SA also includes a small region of hills and dense forests in the extreme southeast corner of the state. Though minor in geographic size, the primary stream systems—Spring River, Shoal Creek, Cow Creek—are very biologically diverse. The other major waterways of the Neosho SA include the mainstems and tributaries of the Neosho and Cottonwood Rivers. Eighty percent of the 16,696 stream miles streams are intermittent and 20% are perennial (KWO 2009i). Primary designated uses include human health, aquatic life support,

domestic water supply, contact recreation, industrial water supply, and livestock watering (KDHE 2001).

7.13.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

All HUC 8 watersheds in the SA are Category I (KDHE 1999). While conditions vary, anywhere from 23% to 71% of the stream miles do not meet their designated uses. Riparian protection, restoration, and management, along with aquatic habitat improvement are desired TMDL implementation goals (KDHE 2010). Additionally, WRAPS stakeholder leadership teams have identified streambank stabilization and riparian degradation as priority watershed issues (KSU 2009; KSU 2010). To support existing water rights and maintain biological integrity, the State of Kansas established MDS for the Neosho and Cottonwood rivers.

Based on fish sampling, the KDWPT considered this SA to be in good condition (KDWPT 2006). The KDWPT documented 84 species of fish—including 63 species in the Spring River and its tributaries—and 32 mussel species. Of particular note are the 33 fish and freshwater mussel species listed as endangered, threatened, or in need of conservation (see Table 11). Documented aquatic macroinvertebrate communities indicate a low to moderate impact from nutrient and oxygen demanding pollutants (KDWPT 2006). The majority of the Cottonwood and Neosho River mainstems, and most of their tributaries are designated as high-priority fishery resources with the South Fork Cottonwood River, Cedar Creek, Spring River and Shoal Creek designated as highest-valued fishery resources (USFWS 1981). Additionally, 22 miles of the South Fork Cottonwood, 20 miles of Cedar Creek, 53 miles of the Spring River, and 69 miles of Shoal Creek are NRI-listed for scenic, recreational, fishery, and wildlife outstanding natural resource values (NPS 2010).

TABLE 11.
NEOSHO SERVICE AREA SENSITIVE SPECIES

SPECIES	STATUS	SPECIES	STATUS
FISH			
Neosho Madtom	T	Spotted Sucker	SINC
Topeka Shiner	T	Brindled Madtom	SINC
Redspot Chub	T	Blue Sucker	SINC
Gravel Chub	SINC	River Darter	SINC
Slough Darter	SINC	Stippled Darter	SINC
Banded Darter	SINC	Bluntnose Darter	SINC
Greenside Darter	SINC	Northern Hogsucker	SINC
Ozark Minnow	SINC	Speckled Darter	SINC

Spotfin Shiner	SINC	River Redhorse	SINC
Banded Sculpin	SINC		
FRESHWATER MUSSELS			
Neosho mucket	E	Flutedshell	T
Ouachita Kidneyshell	T	Butterfly	T
Rabbitsfoot	E	Ellipse	E
Western Fanshell	E	Spike	SINC
Wabash Pigtoe	SINC	Yellow sandshell	SINC
Fat Mucket	SINC	Round Pigtoe	SINC
Creeper	SINC	Fawnsfoot	SINC

The KGP land cover data set identifies 11 wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bur Oak Floodplain Woodland, Buttonbush (Swamp) Shrubland, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Freshwater Marsh, Low or Wet Prairie, Maple Floodplain Forest, Mixed Oak Floodplain Forest, Pecan Floodplain Forest, and Weedy Marsh. Table 12 provides the acreage of each wetland land cover type in the Neosho SA.

TABLE 12
WETLAND ALLIANCE LAND COVER TYPES – NEOSHO SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	57,721
Bur Oak Floodplain Woodland	3,820
Buttonbush (Swamp) Shrubland	2,668
Cattail Marsh	6,480
Cottonwood Floodplain Forest/Woodland	84,834
Freshwater Marsh	1,523
Low or Wet Prairie	21,984
Maple Floodplain Forest	3,950
Mixed Oak Floodplain Forest	53,098
Pecan Floodplain Forest	27,967
Weedy Marsh	178
TOTAL	264,223

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this deciduous floodplain complex is unknown; however, associated river and stream habitat trends are declining (Wasson et al. 2005). Typical surface water conditions are intermittent to perennial. To support existing water rights and maintain biological integrity, the State of Kansas established MDS for the Neosho, Cottonwood, and Spring rivers. The quality and quantity trends of herbaceous wetland habitat are unknown (Wasson et al. 2005).

7.13.2 Aquatic Resource Goals and Objectives

1. Improve aquatic and riparian habitats.
 - 1.1 Stabilize streambed and streambanks in priority locations.
 - 1.2 Implement in-channel habitat restoration in priority locations.
 - 1.3 Identify and implement riparian improvement projects in priority locations.
 - 1.4 Restore degraded seasonal and permanent wetland habitats.
 - 1.5 Create new wetland habitat.
 - 1.6 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Acquire stream reaches having good base flow conditions.
 - 2.2 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.3 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.4 Establish conservation easements to protect existing unique habitats.
3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.13.3 Advance Credits

The WLT will calculate debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 2,798,400 linear feet of impaired (high priority) streams in the Neosho SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 12,536,832 potential credits. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.08% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland

credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Neosho SA – 50 AWC.

7.13.4 Preservation Strategy

The WLT will consider free-flowing stream reaches, intact riparian corridors, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, floodplain and fringe wetlands will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. In particular, the WLT will target reaches having excellent freshwater mussel populations, and reaches identified by the NRI and designated as Exceptional State Waters by KDHE or high-valued fishery resources by USFWS. Much of the SA is identified by the KDWPT as a conservation priority due to intact tallgrass prairie. The WLT will work with the KDWPT to identify stream reaches and wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.14 MARAIS DES CYGNES SERVICE AREA

The Marais des Cygnes SA (~4,310 mi²) is an undulating cuesta plain that transitions—west to east—from a mosaic of prairie, cropland, and woodland to a more extensive woodland land cover (Chapman et al. 2001). Headwater areas originate in the Flint Hills tallgrass prairie, but cropland is prevalent downstream. The predominant land cover in the basin are grasslands (55%) followed by cropland (25%) and woodlands (16%) (KWO 2009j). Forest density generally increases from west to east. The major streams include the Marais des Cygnes, Little Osage, and Marmaton Rivers and their tributaries. The SA contains 8,821 miles of intermittent and 2,011 miles of perennial streams (KWO 2009j). Primary designated uses of streams include aquatic life support, contact recreation, food procurement, domestic water supply, groundwater recharge, industrial water supply, and livestock watering (KDHE 2000; KDHE 2001).

7.14.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

Water conditions vary widely with HUC 8s having from 10% to 92% of their stream miles not meeting designated uses. According to the UWA (KDHE 1999), all HUC 8s are Category I for watershed restoration. Riparian restoration, wetland creation, and streambank stabilization are desired implementation actions to address WRAPS goals and meet TMDL criteria (LRRCD 2003; KDHE 2010).

Based on fish sampling, the KDWPT considered this SA to be in fair to good condition (KDWPT 2006). The KDWPT documented 43 species of fish and 29 mussel species. Of particular note is state-endangered elktoe mussel (*Alasmidonta marginata*) and mucket mussel (*Actinonaias ligamentina*), and the state-threatened hornyhead chub (*Nocomis biguttatus*), and rock pocketbook mussel (*Arcidens confragosus*). Eleven other fish and freshwater mussel species are listed SINC. Documented aquatic macroinvertebrate communities indicate a moderate to high impact from nutrient and oxygen demanding pollutants (KDWPT 2006). The upper reaches of the Marais des Cygnes River is designated a high-priority fishery resource while the lower reach—from Osawatomie downstream to the Missouri state line—is designated a highest-valued fishery resource (USFWS 1981). The Little Osage and Marmaton River mainstems, and many of their tributaries are designated as high-priority fishery resources (USFWS 1981).

The KGP land cover data set identifies 10 wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bur Oak Floodplain Woodland, Buttonbush (Swamp) Shrubland, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Freshwater Marsh, Low or Wet Prairie, Maple Floodplain Forest, Mixed Oak Floodplain Forest, and Pecan Floodplain Forest. Table 13 provides the acreage of each wetland land cover type in the Marais des Cygnes SA.

TABLE 13
WETLAND ALLIANCE LAND COVER TYPES – MARAIS DES CYGNES SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	17,325
Bur Oak Floodplain Woodland	9,982
Buttonbush (Swamp) Shrubland	2,336
Cattail Marsh	19,427
Cottonwood Floodplain Forest/Woodland	36,395
Freshwater Marsh	2,079
Low or Wet Prairie	22,307
Maple Floodplain Forest	1,519
Mixed Oak Floodplain Forest	29,756
Pecan Floodplain Forest	7,581
TOTAL	148,707

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this deciduous floodplain complex is unknown; however, associated river and stream habitat trends are declining (Wasson et al. 2005). Typical surface water conditions are intermittent to perennial. To support existing water rights and maintain biological integrity, the State of Kansas established MDS for the Marais des Cygnes River. The quality and quantity trends of herbaceous wetland habitat are unknown (Wasson et al. 2005).

7.14.2 Aquatic Resource Goals and Objectives

1. Improve aquatic and riparian habitats.
 - 1.1 Stabilize streambed and streambanks in priority locations.
 - 1.2 Implement in-channel habitat restoration in priority locations.
 - 1.3 Identify and implement riparian improvement projects in priority locations.
 - 1.4 Restore degraded seasonal and permanent wetland habitats.
 - 1.5 Create new wetland habitat.
 - 1.6 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Acquire stream reaches having good base flow conditions.
 - 2.2 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.3 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.4 Establish conservation easements to protect existing unique habitats.
3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.14.3 Advance Credits

The WLT will calculate debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 5,749,920 linear feet of impaired (high priority) streams in the Marais des Cygnes SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 25,759,642 potential credits. Based on these

assumptions, the WLT caps stream sales at 10,000 advance credits, 0.04% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Marais Des Cygnes SA – 50 AWC.

7.14.4 Preservation Strategy

The WLT will consider free-flowing stream reaches, intact riparian corridors, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, floodplain and fringe wetlands will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. In particular, the WLT will target reaches identified as a high-valued fishery resource by USFWS. Parts of the SA are identified by the KDWPT as a conservation priority due to intact tallgrass prairie. The WLT will work with the KDWPT to identify stream reaches and wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.15 KANSAS SERVICE AREA

The Kansas SA—approximately 8,130 mi²—is a diverse region encompassing parts of four different ecoregions: Central Great Plains, Flint Hills, Western Cornbelt Plains, and Central Irregular Plains (Chapman et al. 2001). This diversity leads to a variety of topographic settings, land uses, and stream conditions. The predominant land cover in the basin are grasslands (42%) followed by cropland (33%) and woodlands (18%) (KWO 2009k). Urban areas—Kansas City and its suburbs, Lawrence, and Topeka—cover 4% of the SA. Major waterways include the Kansas, Little Blue, Big Blue, Black Vermillion, Delaware, and Wakarusa Rivers and their

tributaries. The primary designated uses of streams are aquatic life support, food procurement, contact recreation, domestic water supply, and groundwater recharge (KDHE 2000).

7.15.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

According to the UWA (KDHE 1999), designated use impairments occur on 52% to 80% of the stream miles depending on the HUC 8. Basic TMDL strategies to address impairments—that can be assisted by this ILF instrument—include riparian restoration and streambank stabilization (KDHE 2010). Additionally, SA WRAPS stakeholder leadership teams identified reducing erosion and sedimentation through riparian restoration and streambank stabilization as priority goals (KVHA 2005; Bosworth 2007; KAWS 2009a; KAWS 2009b).

Based on fish sampling, the KDWPT considered this SA to be in fair to good condition (KDWPT 2006). The KDWPT documented 52 species of fish and 22 mussel species. Of particular note is the federally-endangered Topeka shiner. Documented aquatic macroinvertebrate communities indicate that all HUC 8s are highly impacted from nutrient and oxygen demanding pollutants (KDWPT 2006). Mill Creek (Wabaunsee County), Lyon Creek (Dickinson County), and Deep Creek (Pottawatomie County) are designated highest-valued fishery resources by the USFWS (1981). Additionally, Mill Creek (79 miles), Lyon Creek (42 miles), and the Kansas River—from Interstate Highway 635 upstream to its confluence with the Delaware River—are NRI-listed for scenic, recreational, fishery, and wildlife outstanding resource values (NPS 2010).

The KGP land cover data set identifies nine wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bur Oak Floodplain Woodland, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Freshwater Marsh, Low or Wet Prairie, Maple Floodplain Forest, Mixed Oak Floodplain Forest, Pecan Floodplain Forest, and Weedy Marsh. Table 14 provides the acreage of each wetland land cover type in the Kansas SA.

TABLE 14
WETLAND ALLIANCE LAND COVER TYPES – KANSAS SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	217,731
Bur Oak Floodplain Woodland	13,381
Cattail Marsh	26,815
Cottonwood Floodplain Forest/Woodland	157,828
Freshwater Marsh	10,961
Low or Wet Prairie	17,228

Mixed Oak Floodplain Forest	11,583
Pecan Floodplain Forest	5,634
Weedy Marsh	534
TOTAL	461,695

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this deciduous floodplain complex is unknown; however, associated river and stream habitat trends are declining (Wasson et al. 2005). Typical surface water conditions are intermittent to perennial. To support existing water rights and maintain biological integrity, the State of Kansas established MDS for the Delaware, Big Blue, and Little Blue rivers and Mill Creek. The quality and quantity trends of herbaceous wetland habitat are unknown (Wasson et al. 2005).

7.15.2 Aquatic Resource Goals and Objectives

1. Improve aquatic and riparian habitats.
 - 1.1 Stabilize streambed and streambanks in priority locations.
 - 1.2 Implement in-channel habitat restoration in priority locations.
 - 1.3 Identify and implement riparian improvement projects in priority locations.
 - 1.4 Restore degraded seasonal and permanent wetland habitats.
 - 1.5 Create new wetland habitat.
 - 1.6 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.2 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.3 Establish conservation easements to protect existing unique habitats.
3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.15.3 Advance Credits

The WLT will calculate debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 15,861,120 linear feet of impaired (high priority) streams in the Kansas SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 71,057,818 potential credits. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.01% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Kansas SA – 40 AWC.

7.15.4 Preservation Strategy

The WLT will consider free-flowing stream reaches, intact riparian corridors, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, floodplain and fringe wetlands will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. In particular, the WLT will target reaches identified as a highest-valued fishery resources by USFWS. A portion of HUC 10270101 is identified by the KDWPT as a conservation priority due to intact tallgrass prairie. The WLT will work with the KDWPT to identify stream reaches and wetlands within this habitat type that provide important physical, chemical, and/or biological functions for preservation.

7.16 MISSOURI SERVICE AREA

The Missouri SA (~1,600 mi²) is characterized by loess deposition with low rolling hills (Chapman et al. 2001). Greater topographic relief is found along the hills bordering the Missouri

River floodplain. The potential natural vegetation of tallgrass prairie with scattered oak-hickory forests along stream valleys is largely replaced with crop and pasture land agriculture. Due to the highly erodible nature of the soil, most steep slopes remain wooded. Cropland (56%) and grassland (24%) are the most widespread land cover classes covering nearly 81% of the basin (KWO 2009i). Primary waterways include the Missouri, South Fork Big Nemaha and Wolf Rivers, and Independence Creek. There are approximately 1,038 perennial miles and 2,303 intermittent miles of stream channel in the SA (KWO 2009i). Dominant designated uses include aquatic life support, domestic water supply, food procurement, and recreation.

7.16.1 Threats, Historic Aquatic Resource Losses, and Current Conditions

Of the main HUC 8 watersheds, Tarkio-Wolf (10240005) and South Fork Big Nemaha (10240007) have designated use impairments on 85% and 67% respectively of their stream miles (KDHE 1999). However, only 1.2% of stream miles in HUC 10240011 (Independence) are impaired. Basic TMDL strategies to address impairments—that can be assisted by this ILF instrument—include riparian restoration and management (KDHE 2010). Additionally, SA WRAPS stakeholder leadership teams identified reducing erosion and sedimentation through riparian restoration and streambank stabilization as priority goals.

Based on fish sampling, the KDWPT considered this SA to be in fair condition (KDWPT 2006). The KDWPT documented 35 species of fish and 12 mussel species. Of particular note is the state-endangered silver chub and state-threatened plains minnow. Other species in need of conservation include: blacknose dace (*Rhinichthys atratulus*), Johnny darter (*Etheostoma nigrum*), brassy minnow, and tadpole madtom (*Noturus gyrinus*). Documented aquatic macroinvertebrate communities indicate that all HUC 8s are highly impacted from nutrient and oxygen demanding pollutants (KDWPT 2006). The Wolf River and Independence Creek are designated high-priority fishery resources by the USFWS (1981). No stream reaches are NRI-listed (NPS 2010).

The KGP land cover data set identifies eight wetland alliances: Ash-Elm-Hackberry Floodplain Forest, Bur Oak Floodplain Woodland, Cattail Marsh, Cottonwood Floodplain Forest/Woodland, Freshwater Marsh, Low or Wet Prairie, Maple Floodplain Forest, Mixed Oak Floodplain Forest, Pecan Floodplain Forest, and Weedy Marsh. Table 15 provides the acreage of each wetland land cover type in the Missouri SA.

TABLE 15
WETLAND ALLIANCE LAND COVER TYPES – MISSOURI SA

ALLIANCE	APPROXIMATE ACRES
Ash-Elm-Hackberry Floodplain Forest	14,878
Bur Oak Floodplain Woodland	415
Cattail Marsh	14,763
Cottonwood Floodplain Forest/Woodland	74,964
Freshwater Marsh	8,878
Low or Wet Prairie	1,071
Mixed Oak Floodplain Forest	934
Pecan Floodplain Forest	673
TOTAL	116,576

The major wetland alliance(s) is the riparian corridor complex. The relative quality and quantity of the components of this deciduous floodplain complex is unknown; however, associated river and stream habitat trends are declining (Wasson et al. 2005). Typical surface water conditions are intermittent to perennial. The quality and quantity trends of herbaceous wetland habitat are unknown (Wasson et al. 2005).

7.16.2 Aquatic Resource Goals and Objectives

1. Improve aquatic and riparian habitats.
 - 1.1 Stabilize streambed and streambanks in priority locations.
 - 1.2 Implement in-channel habitat restoration in priority locations.
 - 1.3 Identify and implement riparian improvement projects in priority locations.
 - 1.4 Restore degraded seasonal and permanent wetland habitats.
 - 1.5 Create new wetland habitat.
 - 1.6 Establish conservation easements to protect improvement projects.
2. Preserve existing unique aquatic habitats.
 - 2.1 Identify areas that maintain habitat features supporting sensitive aquatic species.
 - 2.2 Identify areas that contain habitat features reflecting historic or minimally-altered conditions.
 - 2.3 Establish conservation easements to protect existing unique habitats.
3. Reconnect fragmented aquatic habitats.
 - 3.1 Identify and restore altered stream reaches that function as a barrier to aquatic organism passage.
 - 3.2 Reconnect streams with associated floodplain riparian and wetland habitats.
 - 3.3 Establish conservation easements to protect restored habitats.

7.16.3 Advance Credits

The WLT will calculate debits and credits using the KSMG to fully compensate for aquatic resources lost through authorized activities. Based on data provided by the KDHE (personal communication, Eric Banner), there are 1,346,400 linear feet of impaired (high priority) streams in the Missouri SA. Assuming a KSMG in-stream “sum of factors” value of 3.40 and a riparian “sum of factors” value of 1.08, there are 6,031,872 potential credits. Based on these assumptions, the WLT caps stream sales at 10,000 advance credits, 0.2% of the potential credits available.

Because the State of Kansas does not have an approved wetland assessment method to determine debits and credits the WLT will consider one acre of wetland impact to equal one wetland debit regardless of the wetland type (forested, herbaceous, etc.). The WLT caps the advance wetland credit (AWC) sales at five credits for each wetland alliance cover type that totals greater than 1000 acres in the service.

Using the five advance wetland credits per wetland alliance cover type, greater than 1000 acres, for each of the service areas results in advance wetland credits (AWC) as follows: Missouri SA – 25 AWC.

7.16.4 Preservation Strategy

The WLT will consider free-flowing stream reaches, intact riparian corridors, and unchannelized stream reaches or areas with relatively intact hydrogeomorphic processes for preservation actions. Additionally, floodplain and fringe wetlands will be considered for preservation. The WLT will also consider reaches known to support a diverse native aquatic community or at-risk aquatic species for preservation actions. In particular, the WLT will target reaches identified as a high-priority fishery resource by USFWS. KDWPT has not yet identified any conservation priority areas for this SA.

8.0 CREDIT FEE SCHEDULE

The WLT will determine an appropriate fee schedule to meet compensatory mitigation requirements for each approved project. The fee structure for individual ILF projects will be habitat-based and include all reasonable costs for implementing compensatory mitigation including:

- Site assessment and credit calculation
- Acquisition and permanent protection
- Mitigation planning and design
- Construction and construction oversight
- Long term maintenance and monitoring
- Contingencies
- Adaptive management
- Accounting and legal costs
- Permit requirements
- Administrative overhead (10%)

Due to variability in project size and location, geomorphic setting, habitat conditions, permanent protection availability, and land/easement values it is difficult to standardize mitigation fees. Fee structure may be influenced by, but not limited to the following factors as well as those set forth in 33 CFR 332.8 (o)(5)(ii):

- Length and/or acreage of mitigation area
- Type of mitigation technique used: riparian restoration, stream restoration, aquatic habitat creation, etc
- Location of, and access to, the mitigation site
- Design requirements
- Local material cost
- Contractor availability
- Local hourly cost of equipment
- Local labor cost
- Access to, amount needed, and price of native grass seed, bare-root tree seedlings, and other vegetation
- Local real estate market.

9.0 GOOD FAITH

The signatory parties agree that all will exercise their rights and obligations contained in this Instrument in good faith. The parties also agree that it is their desire to facilitate the process set

forth in this Instrument by open and timely communication and cooperation. The parties further agree that any disputes will be subject to alternate dispute resolution such as mediation.

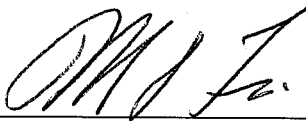
10.0 FORCE MAJEURE

In case of natural catastrophe, the Corps of Engineers, in consultation with the IRT, may require the sponsor to complete activities in order to offset impacts that resulted from the catastrophe, to the extent practicable. The sponsor may not be required to complete some restoration and/or maintenance activities at the mitigation site if the Corps, in consultation with the IRT, determines that the damage was beyond the reasonable control of the sponsor to prevent or to mitigate.

11.0 EXECUTION

Execution of this In-lieu Fee Compensatory Mitigation Instrument by the Kansas City District, U.S. Army Corps of Engineers, in consultation with the sponsor, the Watershed Land Trust, Inc., the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Kansas Department of Wildlife, Parks and Tourism, and the Kansas Department of Health and Environment and the implementation of its terms evidences that the Kansas City District, U.S. Army Corps of Engineers has afforded all cooperating parties (Interagency Review Team) an opportunity to comment on the undertaking and its effects on the aquatic resources in the State of Kansas and that the Kansas City District, Corps of Engineers has taken into account the comments provided by the Interagency Review Team on the identified aquatic resources in order to complete this instrument.

Kansas City District, CORPS OF ENGINEERS

By:  Date: 20 NOV 2013
Mark D. Frazier, Chief
Regulatory Branch, Operations Division

WATERSHED LAND TRUST – ILF INSTRUMENT

Execution of this In-lieu Fee Compensatory Mitigation Instrument by the Kansas City District, U.S. Army Corps of Engineers, in consultation with the sponsor, the Watershed Land Trust, Inc., the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Kansas Department of Wildlife, Parks and Tourism, and the Kansas Department of Health & Environment and the implementation of its terms evidences that the Kansas City District, Corps of Engineers has afforded all cooperating parties (Interagency Review Team) an opportunity to comment on the undertaking and its effects on the aquatic resources in the State of Kansas and that the Kansas City District, U.S. Army Corps of Engineers has taken into account the comments provided by the Interagency Review Team on the identified aquatic resources in order to complete this instrument.

Concur:

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION 7

By: Karen A. Flournoy Date: 11-12-13
Karen A. Flournoy, Director
Water, Wetlands, and Pesticides Division

Execution of this In-lieu Fee Compensatory Mitigation Instrument by the Kansas City District, U.S. Army Corps of Engineers, in consultation with the sponsor, The Watershed Institute, Inc., the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Kansas Department of Wildlife, Parks and Tourism and the Kansas Department of Health and Environment and the implementation of its terms evidences that the Kansas City District, U.S. Army Corps of Engineers has afforded all cooperating parties (Interagency Review Team) an opportunity to comment on the undertaking and its effects on the aquatic resources in the State of Kansas and that the Kansas City District, U.S. Army Corps of Engineers has taken into account the comments provided by the Interagency Review Team on the identified aquatic resources in order to complete this instrument.

Concur:

WATERSHED LAND TRUST, INC.

By:



Date: 11/8/12

Frank L. Austenfeld, Executive Director

WATERSHED LAND TRUST – ILF INSTRUMENT

Execution of this In-lieu Fee Compensatory Mitigation Instrument by the Kansas City District, U.S. Army Corps of Engineers, in consultation with the sponsor, The Watershed Institute, Inc., the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Kansas Department of Wildlife, Parks and Tourism and the Kansas Department of Health and Environment and the implementation of its terms evidences that the Kansas City District, U.S. Army Corps of Engineers has afforded all cooperating parties (Interagency Review Team) an opportunity to comment on the undertaking and its effects on the aquatic resources in the State of Kansas and that the Kansas City District, U.S. Army Corps of Engineers has taken into account the comments provided by the Interagency Review Team on the identified aquatic resources in order to complete this instrument.

Concur:

U.S FISH and WILDLIFE SERVICE

By: David W. Miller / Acting Date: 11/14/13
Heather Whitlaw, Field Supervisor

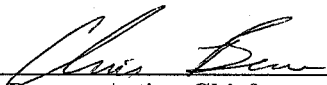
KANSAS ECOLOGICAL SERVICES OFFICE

WATERSHED LAND TRUST – ILF INSTRUMENT

Execution of this In-lieu Fee Compensatory Mitigation Instrument by the Kansas City District, U.S. Army Corps of Engineers, in consultation with the sponsor, The Watershed Institute, Inc., the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the Kansas Department of Wildlife, Parks and Tourism and the Kansas Department of Health and Environment and the implementation of its terms evidences that the Kansas City District, U.S. Army Corps of Engineers has afforded all cooperating parties (Interagency Review Team) an opportunity to comment on the undertaking and its effects on the aquatic resources in the State of Kansas and that the Kansas City District, U.S. Army Corps of Engineers has taken into account the comments provided by the Interagency Review Team on the identified aquatic resources in order to complete this instrument.

Concur:

KANSAS DEPARTMENT OF WILDLIFE, PARKS AND TOURISM

By:  Date: 10/8/13
Chris Berens, Acting Chief
Environmental Services Section

12.0 LITERATURE CITED

- Bosworth, M.K. 2007. Delaware River Watershed Restoration and Protection Strategy. Available online: <http://www.delawareriverwatershed.org/>.
- Chapman, S.S., J.M. Omernik, J.A. Freeouf, D.G. Huggins, J.R. McCauley, C.C. Freeman, G. Steinauer, R.T. Angelo, and R.L. Schlepp. 2001. Ecoregions of Nebraska and Kansas (color poster with map, descriptive text, summary tables, and photographs): Reston, Virginia, U.S. Geological Survey (map scale 1:1,950,000).
- Dahl, T.E. 1990. Wetlands losses in the United States 1780's to 1980's. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. Jamestown, ND: Northern Prairie Wildlife Research Center Online. <http://www.npwrc.usgs.gov/resource/wetlands/wetloss/index.htm> (Version 16JUL97).
- Egbert, S.L., D.L. Peterson, A.M. Stewart, C.L. Lauver, C.F. Blodgett, K.P. Price, and E.A. Martinko. 2001. The Kansas Gap Land Cover Map: Final Report. Kansas Biological Survey Report #98. Lawrence, Kansas. 127pp.
- Environmental Law Institute (ELI). 2009. In-Lieu Fee Mitigation: Model Language and Resources. Funded by the U.S. Environmental Protection Agency through Wetlands Program Development Grant assistance #WD-83417901. Washington, D.C. 108 pp.
- Kansas Alliance for Wetlands & Streams (KAWS). 2009a. Lower Kansas WRAPS Nine EPA Required Elements for Watershed Plans to Restore Impaired Water Bodies. Available online: <http://www.kaws.org/lower-kansas-river-wraps>.
- Kansas Alliance for Wetlands & Streams (KAWS). 2009b. Middle Kansas WRAPS Nine EPA Required Elements for Watershed Plans to Restore Impaired Water Bodies. Available online: <http://www.kaws.org/middle-kansas-river-wraps>.
- Kansas Department of Health & Environment (KDHE). 1999. Kansas Unified Watershed Assessment. In cooperation with the Natural Resources Conservation Service. Bureau of Water, Topeka, Kansas.
- Kansas Department of Health & Environment (KDHE). 2000. Miscellaneous Watershed Condition Reports for the State of Kansas. Bureau of Water, Watershed Management Section. Available online: http://www.kdheks.gov/nps/watershed_condition.htm.
- Kansas Department of Health & Environment (KDHE). 2001. Miscellaneous Watershed Condition Reports for the State of Kansas. Bureau of Water, Watershed Management Section. Available online: http://www.kdheks.gov/nps/watershed_condition.htm.
- Kansas Department of Health & Environment (KDHE). 2007. Kansas Surface Water Register. Division of Environment, Bureau of Environmental Field Services, Topeka, Kansas.
- Kansas Department of Health & Environment (KDHE). 2010. TMDLs for the State of Kansas River Basins. Available online: <http://www.kdheks.gov/tmdl/>.

- Kansas Department of Wildlife, Parks and Tourism. 1977. Lower Republican River Basin Kansas: Preliminary Stream Survey. Kansas, Forestry Fish & Game Commission D-J Project F-15-R-12.
- Kansas Department of Wildlife, Parks and Tourism. 2006. Stream Monitoring and Assessment Program: SubWatershed Report. Environmental Services Section, Pratt, Kansas.
- Kansas Forestry, Fish & Game Commission (KFFG). 1976. Cimarron River Basin: Preliminary Stream Survey. D-J Project F-15-R-12. Pratt, Kansas.
- Kansas State University (KSU). 2004. Watershed Restoration and Protection Strategy for the Little Arkansas River Watershed. Kansas State Research and Extension, Manhattan, Kansas.
- Kansas State University (KSU). 2008a. Watershed Restoration and Protection Strategy: Upper Arkansas – Lake McKinney. Kansas Center for Agricultural Resources and the Environment, Manhattan, Kansas.
- Kansas State University (KSU). 2008b. Watershed Restoration and Protection Strategy: Upper Arkansas – Dodge City. Kansas Center for Agricultural Resources and the Environment, Manhattan, Kansas.
- Kansas State University (KSU). 2008c. Watershed Restoration and Protection Strategy: Upper Arkansas – Pickerel. Kansas Center for Agricultural Resources and the Environment, Manhattan, Kansas.
- Kansas State University (KSU). 2009. Watershed Restoration and Protection Strategy: Neosho Headwaters Watershed. Kansas Center for Agricultural Resources and the Environment, Manhattan, Kansas.
- Kansas State University (KSU). 2010. Watershed Restoration and Protection Strategy: Upper & Lower Cottonwood. Handout from Stakeholder Leadership Team meeting, March 22, 2010. Cottonwood Falls, Kansas.
- Kansas Water Office (KWO). 2009a. Upper Republican River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/UREP/Rpt_UREP_Entire_Basin_Section_KWP_2009.pdf
- Kansas Water Office (KWO). 2009b. Smoky Hill-Saline River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/SHS/Rpt_SHS_Basin_Description_KWP2009.pdf
- Kansas Water Office (KWO). 2009c. Solomon River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/SOL/Rpt_SOL_Basin_Description_KWP2009.pdf
- Kansas Water Office (KWO). 2009d. Upper Arkansas River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/UARK/Rpt_UARK_Basin_Description_KWP2009.pdf

- Kansas Water Office (KWO). 2009e. Lower Arkansas River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/LARK/Rpt_LARK_Basin_Description_KWP2009.pdf
- Kansas Water Office (KWO). 2009f. Cimmaron River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/CIM/Rpt_CIM_Basin_Description_KWP_2009.pdf
- Kansas Water Office (KWO). 2009g. Verdigris River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/VER/Rpt_VER_basin_Description_KWP2009.pdf
- Kansas Water Office (KWO). 2009h. Walnut River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/WAL/Rpt_WAL_Basin_Description_KWP2009.pdf
- Kansas Water Office (KWO). 2009i. Neosho River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/NEO/Rpt_NEO_Basin_Description_KWP2009.pdf
- Kansas Water Office (KWO). 2009j. Marais des Cygnes River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/MDC/Rpt_MDC_Basin_Description_KWP2009.pdf
- Kansas Water Office (KWO). 2009k. Kansas-Lower Republican River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/KLR/Rpt_KLR_Basin_Description_KWP2009.pdf
- Kansas Water Office (KWO). 2009i. Missouri River Basin. Kansas Water Plan, Vol. III. Available online: http://www.kwo.org/Kansas%20Water%20Plan/SWP/KWP_2008/Vol_III_Docs/MO/Rpt_MO_Basin_Description_KWP2009.pdf
- Kaw Valley Heritage Alliance (KVHA). 2005. Upper Wakarusa Watershed (UWW) Watershed Restoration and Protection Strategy. Available online: <http://www.kaws.org/upper-wakarusa-watershed>.
- Lake Region Resource Conservation and Development District (LRRCD). 2003. Watershed Restoration and Protection Strategy for the Marais des Cygnes Basin. Ottawa, Kansas.
- Land Trust Alliance (LTA). 2004. Land Trust Standards and Practices. Available online at: <http://www.landtrustalliance.org/learning/sp/lt-standards-practices07.pdf>
- Monda, M.J., G. Shimek, K.L. Wedel, E. Schenck. 1993. Wetland and Riparian Areas in Kansas: Resources in Need of Conservation. Wetland and Riparian Areas Project (WRAP). Kansas Water Office, Topeka, Kansas. 70pp.
- National Park Service (NPS). 2010. Nationwide Rivers Inventory. Available online at: <http://www.nps.gov/nrcr/programs/rtca/nri/states/ks.html>.
- Natural Resources Conservation Service (NRCS). 2007. Rapid Watershed Assessment Smoky Hill Headwaters Watershed Hydrologic Unit Code – 10260001. Salina, Kansas.

Natural Resources Conservation Service (NRCS). 2008. Rapid Watershed Assessment Crooked Watershed Hydrologic Unit Code – 11040007. Salina, Kansas.

Szilagyi, J. 1999. Streamflow depletion investigations in the Republican River Basin: Colorado, Nebraska, and Kansas. *J. Environmental Systems*, Vol. 27(3) 251-263.

United States Fish & Wildlife Service (USFWS). 1981. Stream Evaluation Map of Kansas. Office of Biological Services, Denver, CO.

Wasson, T., L. Yasui, K. Brunson, S. Amend, V Ebert. October 2005. A Future for Kansas Wildlife, Kansas' Comprehensive Wildlife Conservation Strategy. Dynamic Solutions, Inc. in cooperation with Kansas Department of Wildlife, Parks and Tourism. 170 pp.