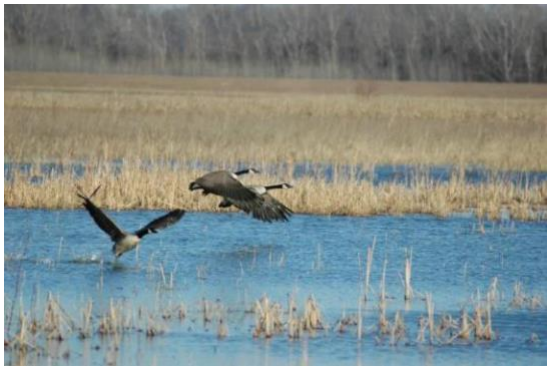
Prospectus:
Southern Illinois In-Lieu Fee Stream & Wetland Mitigation Program

The Land Learning Foundation



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I. Introduction

This document (the Agreement) establishes an in-lieu-fee (ILF) mitigation agreement to be run by the nonprofit organization the Land Learning Foundation, Inc. (LLF). The objective of this program is to satisfy compensatory mitigation for adverse impacts to wetlands, streams, and riparian areas (aquatic resources) throughout Illinois. LLF will cooperate with the members of the Interagency Review Team (IRT) and other appropriate organizations to manage an ILF mitigation program designed to replace aquatic resource functions and values that are adversely impacted under the Clean Water Act Section 404 and Rivers and Harbors Act Section 10 regulatory programs. As a part of the Agreement, LLF will be responsible for the implementation, performance, and long-term management of ILF compensatory mitigation projects as set forth in this Agreement.

II. Objectives of Proposed ILF Program

The objectives of the ILF program are to provide and satisfy permittee-responsible compensatory mitigation requirements issued under Section 404 and 401 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899 in the State of Illinois. These objectives will be achieved through:

1) Identifying and enhancing wetland and stream resources by evaluating the ecological deficiencies on a watershed basis.

2) Identifying and gaining approval of mitigation sites prior or concurrent to the mitigation need which will lessen the temporal loss of wetland and stream functions.

3) Ecological success on a watershed basis will be obtained through the restoration, establishment, preservation and enhancement of wetlands and streams.

III. How the ILF Program will be Established and Operated

a. Establishment of the ILF Program

Upon receipt of signatures from LLF and members of the IRT, the Land Learning Foundation In-Lieu-Fee Program shall be established. LLF will work with the Corps of Engineers (COE) to assure that their requirements of the ILF program are being met. The chairman, staff, and contractors of the LLF will carry out program operations.

When the Department of the Army (DA) permit recipient purchases the required compensatory mitigation credit, as required by the DA permit, from the Land Learning Foundation In-Lieu Fee Program and the COE has recorded the purchase of those mitigation credits, the legal responsibility for providing the required compensatory mitigation is transferred from the DA permit recipient to the LLF.

b. Interagency Review Team

The IRT for the ILF program shall include the St. Louis District of the U.S. Army Corps of Engineers (Corps), the U.S. Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (FWS), and the Illinois Department of Natural Resources (IDNR).

The IRT will provide general guidance and recommendations in development of the ILF document. IRT recommendations will ensure a careful consideration of the ecological suitability of compensatory mitigation sites, the technical feasibility for proposed mitigation techniques, and the long-term protection and maintenance of restoration sites funded under the agreement.

c. ILF Program Site Approval

For each prospective mitigation site, LLF will submit to the IRT and proper authorities a description of the proposed mitigation efforts. Each mitigation plan shall include the following items:

1. Objectives
2. Site Selection
3. Site Protection Instrument
4. Baseline Information
5. Determination of Credits
6. Credit Release Schedule
7. Mitigation Work Plan
8. Maintenance Plan
9. Performance Standards
10. Monitoring Requirements
11. Long-term Management Plan
12. Adaptive Management Plan
13. Financial Assurances
14. Other Information as Required

d. Service Areas

The geographic service area for LLF will be defined by Watersheds. Watersheds are assemblages of like aquatic resources and are currently being used for determining the service area for existing mitigation banks. LLF shall obtain adequate site ownership or formalized access and site protection agreements and initiate biological and physical improvements within three full growing seasons of the date of the final sale of the first advance credit. The COE along with the IRT will determine if in-lieu fee sites are eligible to provide compensatory mitigation credits to permittees on a case-by-case basis. It will be up to the COE's discretion to allow credits from an ILF project site for an authorized impact that is outside its designated service area.

e. Initial Allocation of Credits

The sale of advance credits will fund the initial operations of the ILF program. These advance credits are those credits that are available for sale in each geographical service area prior to an approved mitigation plan.

Data from Illinois Department of Natural Resources (Illinois DNR) will be used to determine a historic baseline for development. As with mitigation banking, a certain percentage of total credits are typically used for advance credits sales to help facilitate the development of a compensatory mitigation project.

Typically, mitigation banks are granted 20% of pre-credit sales and because of the longer time frame between credit sale and project site construction associated with ILF programs, LLF requests 30% of the anticipated credit demand for a single normal year.

Wetland impacts are more difficult to tract so LLF has consulted with wetland consultants and has tracked public notices from several corps districts within the state of Illinois. Based on what has been observed LLF feels that an average cumulative wetland impact per Watershed per year is 10 acres. LLF requests advanced stream and wetland credits as outlined in **Table 1**.

Table 1. Allocation of Credits

WATERSHED	Stream Credits	Wetland Credits
Lower Kaskaskia River	**80,000**	**15**
Big Muddy River	**80,000**	**10**
Mississippi-Cape Girardeau Rivers	**80,000**	**10**
Cahokia-Joachim Rivers	**80,000**	**15**

As approved mitigation plans are developed within each watershed and released credits are generated, the initial advanced credits that are already sold in that service area (watershed) will be deducted from that particular project site. Prior to the Corps, in consultation with the IRT, changing advance credits into released credits a mitigation plan must be approved by the IRT. The conversion of credits will be in accordance with the mitigation plan's credit release schedule.

f. Draft Fee Schedule for Mitigation Credits

The fee schedule for advance and future credits will be determined based on market forces, which are dependent on several factors. These factors are costs associated with restoration, rehabilitation, enhancement and/or preservation. These costs will be determined using cost accounting and will include, appropriate expenses land acquisitions, project planning and design, construction, plant

materials, monitoring, labor, and legal fees as well as administration, contingency costs, and long-term management. Program fees will be subject to Corps review and approval.

g. Methodology for Determining Project-Specific Credits and Fees

The Corps, in consultation with the IRT, will determine the number of wetland credits granted to LLF through their compensatory mitigation activities at an ILF project site. The factors used for determining credits granted would include acreage of wetland establishment, restoration, enhancement and/or preservation: and the expected aquatic ecosystems benefit resulting from the proposed project site. Wetland credits will be determined on an acreage basis as outline in **Table 2**.

Table 2. Wetland Credit Ratios

Mitigation Activity	Credit Ratio (Credit: Acres)
Wetland Establishment/Creation	1:1
Wetland Restoration/Rehabilitation	1:2
Wetland Enhancement	1:3
Upland Buffer Creation/Enhancement	1:4
Wetland Preservation	1:10

The number of stream credits used for impacts and for mitigation projects will be determined using the Corp's Illinois Stream Mitigation Method (ISMM). Permittees will use the ISMM to determine the amount of credits needed for their unavoidable impact and upon the Corps approval will contact LLF with the amount and type of credit needed for a written estimate. The same method will be used for determining the amount of credits generated through LLF mitigation project sites. These stream impact credits will be used to offset the credits generated by the project sites. The fees associated with the credits sales will be determined by LLF and based on current market rates.

h. Monitoring Reports

LLF will provide the Corps with monitoring reports, annually, for each in-lieu-fee project site. The monitoring period is for a minimum of five years, however it may exceed five years, if warranted. The first monitoring report will be submitted after the first full growing season after the ILF project site is constructed and/or planted. These reports will conform to the monitoring requirements of each site's approved mitigation plan and with Regulatory Guidance Letter 08-03 or any future relevant guidance, and will detail the status of aquatic resource improvements at each site. Information gathered during site inspections will be included in the monitoring reports and will help determine

the level of success achieved at each project site as well as identify any problems needing redress through adaptive management. The Corps will distribute monitoring reports to the members of the IRT.

The LLF will perform annual monitoring with onsite field observations, reporting, and compliance actions, as appropriate, at all mitigation sites. Site monitoring will continue until the Corps, in consultation with the members of the IRT, determines that performance standards have been met as set in each site's mitigation plan. This period shall not be less than five years. During this time, the Corps and/or members of the IRT may schedule project inspections of the project site. The Corps, in consultation with the IRT, will determine if a longer monitoring period is required, based on site-specific considerations.

i. Contingency Plans and Remedial Actions

The LLF assumes the financial and actual responsibility for performing any remedial work necessary, including re-planting, re-grading, spraying, burning, etc. to meet the performance standards and/or the repair of any unforeseen excessive erosion conditions within the project sites limits that may negatively impact water quality. The LLF shall continue with remedial responsibilities until the project site is closed or deemed self-sustaining.

Should the Corps, in consultation with the IRT, determine that remedial action is necessary because the site has failed to achieve the success criteria specified in a mitigation plan, the LLF shall develop and implement such remedial action plans in coordination with the Corps and IRT. In the event the LLF fails to implement necessary remedial action at the project site within 90 calendar days, the Corps will notify the LLF that debiting from the site is suspended. If conditions at the ILF site do not improve within 90 days thereafter, the ILF Program Account or long-term management funds shall be transferred to an approved third party.

Upon satisfaction of the Performance Standards and Mitigation Plan Objectives, any remaining contingency funds will be released to the LLF for placement back into the ILF program account.

If the Corps and members of the IRT decide that as a result of review of a monitoring or annual report, an in-lieu fee project site does not meet performance standards as described in the site's mitigation plan, or the in-lieu-fee program is not operating in a manner consistent with this agreement, then the Corps shall provide written notice to LLF of any violation and demand sufficient corrective action. When the violation involves injury to a project site resulting from use contrary to or inconsistent with the purpose of this agreement, the Corp shall provide written notice and LLF must restore the portion of the project site to its prior condition in accordance with a plan approved by the Corps, in consultation with the IRT.

If it is determined that the in-lieu fee program is operating at a credit deficit within a specified geographic service area, LLF shall be notified to immediately cease from debiting credits within that geographic service area. The violation shall be cured by LLF within 90 days of receipt of

notice from the Corps. In circumstances where the violation cannot be reasonably cured in 90 days, LLF will begin to cure the defect within the 90-day period and diligently pursue such cure to completion. In the event of a default or failure by LLF to implement remedial actions necessary to adequately address a failure in meeting success criteria, or for a credit deficit within 90 days, the Corps may notify LLF that debiting from the number of credits available in the specified geographic area is indefinitely suspended and then authorize the financial assurance provider to release the contingency funds to implement necessary remedial actions. The financial assurances used will be in the form of an insurance policy; irrevocable letter of credit from a Federal Deposit Insurance Corporation (FDIC)- approved bank; or in the form of a performance bond, and the Corps has the authority to determine how and where the funds are distributed. The Corps can determine who at the present time is most qualified to take on the deficiency.

j. Establishment of the ILF Program Account & Financial Assurances

The LLF will establish and maintain an ILF Program Account at a banking institution that is a member of hthe Federal Deposit Insurance Corporation (FDIC) names "The Land Learning Foundation Illinois Mitigation Trust Fund" (LLF Trust). All interest and earnings accruing ito the program account will remain in the LLF Trust for use by the ILF program for the purposes of providing compensatory mitigation. The program account may only be used for the selection, design, acquisition, implementation, and management of the in-lie fee compensatory mitigation projects, except for a small percentage, as determined by the district engineer, in consultation with the IRT, which can be used for administrative costs. The LLF recognizes and agrees to adhere to the fact that no more than ten (10) percent of the program account may be used for administrative costs associated with administering the LLF ILF program.

LLF shall provide a form of financial assurance acceptable to the principle Corps district which may include bonding, casualty insurance, or irrevocable letters of credit. The Financial Assurances for each mitigation project will be used by an approved third party in the event that LLF fails to comply with the terms of the mitigation plan to resolve any unforeseen events. The Corps will receive notification at 120 days in advance of any termination or revocation and will be payable at the direction of the Corps to the designee. Should the Financial Assurances remain unused, they will be reduced by 50% after the second years' performance standards have been met and 100% when the last year's performance standards have been met.

At the request of LLF, the Corps, in consultation with the IRT, will conduct a final visit to the site to evaluate the completeness and success of all restoration, enhancement, and protection efforts. Upon satisfaction of the Performance Standards and Mitigation Plan Objectives, any remaining contingency funds will be released to LLF.

k. Annual Reporting

LLF will provide annual reports to the Corps for distribution to members of the IRT for each geographic service area. These reports will include:

- Income received, dispersed, and interest earned by the program account
- Annual financial assurances and long-term management funding.
- A list of permits for which in-lieu-fee program funds were accepted, including the Corps or state permit number, the geographic service area in which the authorized impacts are located, the amount of authorized impacts, the amount of the required compensatory mitigation, the amount paid to the in-lieu-fee program, and the date the funds were received from the permittee. To assist in project tracking, the stream name, watershed and Corps district may also be included in the report.
- A description of in-lieu-fee program expenditures from the account, including costs of land acquisition, planning, construction, monitoring, maintenance, contingencies, adaptive management, and administration.
- The balance of advance credits and released credits at the end of the report period for each geographic service area.
- Any additional information required by the Corps or member of the IRT.

All information listed above will be documented and kept by LLF for each in-lieu-fee project site.

l. IRT Review

The members of the IRT will review and respond to complete submissions of in-lieu-fee project mitigation plan proposals from LLF within timeframes established in Section 332.8 of the April 10, 2008 Final Rule describing Compensatory Mitigation for Losses of Aquatic Resources issued by the Corps and the EPA.

m. Actions Under Multiple Authorities

Proposed in-lieu-fee project activities may address requirements of multiple regulatory programs and authorities for the same activity. However, a single credit may only address the mitigation requirements of a single permitted activity.

n. Default and Closure

If the Corps determines that LLF has failed in meeting its required performance standards associated with compensatory mitigation in a timely manner the corps shall give written notice to LLF of such violation and demand corrective action sufficient to cure the violation. If the actions are still insufficient, the Corps will take appropriate action to achieve compliance with the terms of the mitigation plan and ILF instrument. Actions can include suspending credit sales, decreasing available credits, requiring adaptive management measures, utilizing financial assurances or contingency funds, and implementing the use of the financial assurances.

Either party can terminate this agreement within 60 days of written notification to the other party.

If the ILF operated by LLF is terminated, LLF shall fulfill any remaining project obligations such as completion of construction activities on mitigation sites, maintenance and monitoring on existing mitigation sites, and any long-term obligations related to the mitigation project site.

All debiting of credits shall cease immediately in the event that a natural disaster destroys all or any part of an in-lieu fee project site. Such natural disasters include floods, tornados, fires, earthquakes, droughts, disease, etc., in which the Corps, in consultation with the IRT, determines beyond the control of LLF to prevent or mitigate. LLF will be responsible for any credits that are unsold at the time of the natural disaster. If it is determined by the Corps, in consultation with the IRT that the project success is unattainable even through adaptive management strategies LLF may request early closure of an in-lieu fee project site and forfeiture of the remaining anticipated credits.

IV. Proposed Service Areas

The watershed approach will be used in compensatory mitigation planning and site selection. Although Illinois Water Quality Reports (IWQRs) are primarily watershed assessments, they help identify broad goals, objectives and provide a general direction for improving the physical, chemical, and biological functions within an individual watershed.

In Illinois, Watershed Planning Committees produce watershed plan documents that, collectively, constitute watershed plans. They demonstrate the physical, chemical, and biological functions at work within Illinois' watersheds, and the information located on the Southern Illinois University website describes the current and historical resource conditions, describe the threats to aquatic resources in those watersheds, and collectively these documents provide a hierarchical approach to identifying the locations with the most pressing ecological needs in those watersheds and streams. The Compensation Planning Framework document has more information on watershed needs and probable resource solutions. This information has been gathered from the Illinois government and universities' websites.

The proposed geographic service area for the LLF is defined as the watershed, and LLF proposes to provide compensatory mitigation in four watersheds (Lower Kaskaskia River Watershed, Big Muddy River Watershed, Mississippi-Cape Girardeau Rivers Watershed, Cahokia-Joachim Rivers Watershed and basins). Additional watersheds may be added in the future, to be submitted as proposed amendments to this instrument for Corps and IRT approval. LLF will provide compensatory mitigation for permitted impacts within the same geographic service area in which impacts occur unless the district engineer, in consultation with the IRT, has agreed to an exemption. The watershed was selected because the ILF has concluded that the scale is appropriate to ensure that good, high quality projects can be located and designed, the projects approved can be done in a realistic time frame, and those projects will be able to effectively compensate for adverse environmental impacts across the entire service area.

V. General Need and Technical Feasibility of the Proposed ILF Program

There is a great need for compensatory mitigation alternative within Southern Illinois. The historic and current losses of aquatic resources in the state have been striking. Post European and American settlement in the state, there has been significant channelization and destruction of wetland and stream habitats. Illinois ranks sixth in overall percentage of wetland loss, by the Illinois Department of Natural Resources as a result of conversion to agriculture, levee construction, river management and navigation programs, urban development activities and other actions. Across the watersheds in Illinois, threats to aquatic resources include excessive nutrient loading, stream bank erosion, land clearing, increased runoff due to urbanization, invasive species, increased sediment loading, reduction of historical water levels, water pollution, and inadequate riparian corridors.

Most permittee-responsible and offsite compensatory stream and wetland mitigation projects implemented are small with limited environmental benefits. Common problems with permittee-responsible mitigation plans is that they are designed within a stream reach and not within a watershed context; they often combine poor location with poor (or inadequately implemented) design; they lack competent professional; long-term maintenance or adaptive management may be limited or nonexistent; and many projects lack performance inspections and monitoring. In order to reduce risk and uncertainty and help ensure that the required compensation is provided, the rule establishes a preference hierarchy for mitigation options and the in-lieu-fee program is second in the preference hierarchy. In-lieu-fee programs involve larger, more ecologically valuable compensatory mitigation projects as compared to permittee-responsible mitigation.

VI. Proposed Ownership Arrangements and Long-Term Management Strategy for ILF Project Sites

The In-Lieu Fee Program (ILFP) as operated and administered by LLF will be under the sole ownership of LLF and supported by a long-term In-Lieu Fee Program Management Agreement with MITICO, LLC (MITICO) of Two CityPlace Dr., Ste. 200, St. Louis, Saint Louis, Missouri. LLF (in and through the actions and experiences of its current and past board members) and MITICO (in and through the actions and experiences of its principals, affiliates and contractors) have amassed a significant track record in the areas of environmental land analysis and acquisition, wetland and riparian restoration under the guidelines of the Wetland Reserve Program and current and past mitigation rules as put forth by the United States Army Corps of Engineers (USACE). Please refer to the sponsor qualifications section for detailed qualifications of the board members and managers.

ILFP sites will be under the ownership of LLF, bona fide land trusts, governmental entities, qualified and willing landowners or other entities employing long term conservation methodologies. Conservation easements will be perpetual and, in a form, and substance, meeting the most current requirements of the USACE. Conservation easements shall also include a provision requiring 60-day advance notification to the district engineer before any action is taken to void or modify the instrument, management plan, or long-term protection mechanism, as well as, transfer of title. Conservation easements will be held by LLF and third party, long-term

stewardship agreements will be entered between LLF and qualified participating conservationist entities on a site by site basis.

LLF compensatory mitigation projects will be designed for long term sustainability utilizing natural hydrology and be consistently monitored for management, maintenance and specifically monitored to ensure that long term performance standards are met. Long term management plans will include cost estimates and identify the funding mechanisms to be used to meet costs and needs. Through a series of endowments, contractual arrangements and insurance products, LLF will provide for a continuum of sound management and maintenance practices, in perpetuity.

The ILFP administered by LLF will be operated from the LLF's office in Keytesville, Missouri. This location is central to the state allowing for easy access throughout the services area. Records for the ILFP will be made available to auditing and examining entities, including the Corps, during normal business hours.

VII. Qualifications of the LLF to Complete Mitigation Projects

LLF has a long and successful history of restoring, enhancing, preserving and managing more than 8,000 acres of natural resources. The outstanding efforts of LLF spans more than a decade and include wetland restoration in Saline, Chariton, Carroll, Livingston, Vernon and Linn counties.

Realizing the vital importance of wetlands to many of Missouri's wildlife and plant species, LLF founders began restoring wetland ecosystems in the 1990's. They are restoring more than 8,000 acres of wetlands along the Missouri, Chariton, and Grand Rivers in the state of Missouri and now use those lands as a part of LLF's effort to educate people about the important functions and values of wetlands and riparian (along the banks of rivers and streams) ecosystems.

LLF projects and programs involve students, educators, youth groups, and the general public in the restoration and preservation of local wetlands and riparian areas. LLF believes that their efforts to involve and educate people will ultimately lead to a more informed public that will be able to make knowledgeable decisions concerning local natural resources.

LLF, its sponsors and benefactors have been involved in substantial wetland restoration and management, as well as, significant wetland and riparian mitigation projects statewide, as:

I. Wetland/WRP/EWP

A. **The Rhodes Island Tract,** Saline County, Missouri, directly east of the town of New Frankfort, on the Missouri River. 1,400 acre EWRP wetland and riparian project, under perpetual easement and is an ongoing restoration;
B. **The Dalton Bottoms Tract,** Chariton County, Missouri and along the Missouri River. 1218 acre WRP tract under perpetual easement. This tract lies directly south of the ancient oxbow known as the Dalton Cutoff along Palmer Creek. The tract is an ongoing restoration providing thousands of acre feet of flood storage in high water times;
C. **The Shackleford and Holmes Tract,** Chariton County, Missouri. 965 acre WRP

project located. This tract lies due east of the Dalton Bottoms tract, at the confluence of the Chariton and Missouri Rivers.

D. **The Dean Lake Tract,** Chariton County, Missouri. A 240-acre wetland and riparian restoration with a 100 year old, 30 acre bottom land lake, under perpetual WRP easement. Developed as a base to facilitate learning opportunities for students and educators. Tract lies adjacent to Dean Lake Lodge and Cabins, a heavily improved educational and recreational site availed by its owners to LLF for educational purposes;

E. **The Chowning Tract,** Chariton County, Missouri. Approximately 400 acres of WRP under perpetual easement. Tract fronts Grand River over one mile, open to the flow of the river.

F. **The Seneca Tract,** Chariton County, Missouri. Approximately 778 acres mostly wetland and riparian restoration lying within and without the Garden of Eden Levee. As with Tract C., above, this tract supplies thousands of acre feet of flood storage in high water times;

G. **The Jenkins Tract,** Livingston County, Missouri. A significant, 571-acre wetland and riparian restoration along the Grand River directly across from Fountain Grove Wildlife Area;

H. **The Mudhole Tract,** Ray County, Missouri. A 435-acre wetland restoration tract in the Missouri River bottom between Camden and Orrick in Ray County. Perpetual WRP easement;

II. MITIGATION PROJECTS

A. **The Swan Lake – Dickinson Tract,** Chariton County, Missouri. Land mass in excess of 2,000 acres with combination WRP, wetland and riparian mitigation restoration project currently working through approval process as wetland, riparian and species mitigation bank. Tract(s) adjoin Swan Lake Wildlife Preserve and Yellow Creek Conservation Area;

B. **The Daniels Tract,** Carroll County, Missouri. 120-acre wetland and riparian mitigation project undertaken by LLF to mitigate impacts for Missouri Department of Transportation (MoDOT) with restoration completed in 2008. Tract lies at intersection of State Highway 139 and Big Creek;

C. **Craghurst,** St. Louis County, Missouri. The mitigation site will provide the restoration and preservation of 3,571 linear feet or 39.16 total acres of intermittent stream and associated riparian corridor.

D. **Calvey Creek,** Franklin County, Missouri. The main objective of the mitigation project is to restore and preserve stream channel and riparian corridor habitats while providing enhanced water quality and wildlife habitat. The proposed mitigation project would restore and preserve approximately 4,274 linear feet of perennial stream channel and riparian corridor generating 12,380 stream credits.

LLF, its organizers, benefactors, contractors, staff and volunteers have planted over 400,000 trees, participated in numerous federal and state cost share programs and created significant refuge areas for migrating waterfowl. LLF has developed public opportunities to educate school children and educators about the importance of preserving natural resources for wildlife and future generations.

To date, these educational opportunities have had over 5,000 persons in attendance. The incredible contributions to natural resources by the founders and staff of LLF have earned them several awards including the National Wetland Award from the Environmental Law Institute and the Wildlife Conservationist of the Year Award from the Conservation Federation of Missouri. In addition, LLF assisted a private landowner on the development of a 50 acre wetland mitigation site that was used by the Missouri Department of Transportation (MoDOT) for compensatory mitigation for a MoDOT project. This restoration site is located in Carroll County, Missouri and was completed 7 years ago.

George L. "Larry" Pollard is the current chairman and president of LLF and ensures effective administration of the Land Learning Foundation's Missouri Stream and Wetland In-Lieu Fee Program. Larry has extensive experience in the preservation and enhancement of land and water resources. It is the career experiences in natural resources and the work in recent years with nonprofit associations that will continue to make LLF a success. His experiences, in a sequence from current and ongoing to past accomplishments and education are outlined below:

Since 1998 Larry has drawn together a collaborative effort to create the Chariton County Community Foundation. They were formally recognized as a 501(c) (3) public foundation in fall of 1998. Their purpose is to be a major instrument of philanthropy for community betterment in Chariton County, Missouri. Highlighted achievements the foundation is associated with include establishing county wide 9-1-1 emergency notification, planning and constructing new medical clinic facilities in Brunswick, developing and providing an economic development program for the county, encouraging and assisting a community development program for Brunswick Community and managing a number of scholarship and community betterment funds within the Foundation.

From 1998 to 2003 Larry served as an independent sales representative for Truax Drill Company of Minneapolis, MN. He provided technical assistance teaching and demonstrations on native prairie vegetation re-establishment using the Truax Seeding Equipment.

In 1996 Larry worked out of the Chariton County, University of Missouri Extension Office engaged in developing Small Businesses related to agricultural value-added enterprises. He formed a collaborative effort to create the Chariton County Historical Tourism Council. Their purpose is to preserve and promote historic and natural resources of Chariton County for tourism as a county economic vehicle. They were recognized as a 501(c)(3) educational charitable organization in 1996.

From 1990 to 1994, he served as Regional Wildlife Biologist supporting USDA Soil Conservation Service (now NRCS) for the eleven state Midwest region. Larry was responsible for planning, training, development of technical materials and technical support for SCS conservation programs. He also developed and carried out several wetland restoration training programs and provided technical inputs to the Wetland Reserve Program (WRP). He retired from SCS in April 1994.

From 1976 – 1990: Larry served as State Wildlife Biologist supporting USDA Soil Conservation

Service in Minnesota. He was responsible for personnel training, developing technical materials, and support for SCS conservation programs in Minnesota and primarily the USDA Waterbank Program.

1969 – 1976: Served on various field, area and state office staffs for USDA Soil Conservation Service in Missouri and Oklahoma.

1965: Earned a Bachelor of Science in Agriculture degree with majors in Wildlife Biology and Soil Science.

COMPENSATORY PLANNING FRAMEWORK

VIII. Compensatory Planning Framework

Lower Kaskaskia River Watershed Service Area

Geographic Service Area:

The Lower Kaskaskia River Watershed covers a total of 1,016,985 acres in Madison, Bond, Clinton, St. Clair, Monroe, Randolph, Perry, and Washington counties. The largest cities in the watershed are Belleville (42,806), O'Fallon (16,073), and Mascoutah (5,511). Major streams which comprise the Lower Kaskaskia River Watershed include Horse Creek, Richland Creek South, Silver Creek, Mud Creek, and Sugar Creek. A total of 840 stream miles were assessed on the Lower Kaskaskia River and its tributaries. (*Illinois EPA*)

Threats to the Aquatic Resources in the Lower Kaskaskia River Watershed:

Water Quality Problems

Overall, water quality within the Lower Kaskaskia River Watershed is fair. In fact, Illinois State water quality standards were not met for two streams in the watershed. Water quality problems facing streams in this watershed include:

- A several portions of the Lower Kaskaskia River watershed are identified as EPA CWA Section 303(d) impaired water bodies.
- Waste water discharges from sewage treatment plants throughout the watershed cause low dissolved oxygen from waste water discharges.
- Contamination of aquatic organisms, primarily manganese, sulfate and mercury continues to plague portions of the watershed.
- Nutrient-loaded runoff from pastures, feedlots, and direct contamination to streams by free livestock contributes to increasing in-stream biological oxygen demand (BOD) and suspended solids counts.
- High levels of fecal coliform are present which can result from leaking sewers, septic tanks, and livestock waste.
- Point source municipal and industrial discharges are present.

Many of the water quality problems, especially those involving aquatic life contaminations are

difficult, complex, and expensive to address. However, many of the problems resulting in riparian destruction, stream bank erosion, and sedimentation are an appropriate project that is addressable through the installation of mitigation projects. Preservation projects, especially in streams in rapidly urbanizing areas but still containing high quality of aquatic communities, are particularly adaptable.

Aquatic Resource Problems

Overall, the quality of aquatic resources in the Lower Kaskaskia River Watershed is fair, with some areas of good quality and other areas of degradation. Aquatic resource problems facing streams in this watershed include:

- Destruction of riparian vegetation is a result of row cropping too close to the stream, construction and livestock use.
- Small-scale stream channelization due to bridge construction and replacement is causing bank erosion, riparian destruction, and sedimentation issues downstream.
- Watershed urbanization has adversely impacted riparian corridors and increased storm water runoff, which increases channel instability, as well as depressed aquatic species diversity.
- Livestock access to streams is causing stream bank erosion and sedimentation.

Historic Aquatic Loss in the Lower Kaskaskia River Watershed:

Nearly all of the surface features of the Lower Kaskaskia River Watershed were formed by glaciers during the last two glacial epochs. The landscape in the Lower Kaskaskia River Watershed was formed during the Illinois era. Due to extended exposure to erosion, the area is primarily flat and has rills, creeks, and streams. Water erosion of limestone has contributed to the karst region and also created underground conduits.

Early in Illinois' history, rivers were the primary mode of transportation, causing the French settlers to build villages along the riverbanks. The settlement of English, French, and German settlers altered Illinois' landscape as communities expanded. Prairies were generally un-tillable and far from streams, but the advent of the railroad made prairies more accessible and habitable.

Most new settlers were farmers through necessity, and it is agricultural developments that have produced some of the most significant modifications to the hydrology and habitat of this river basin. Starting in the 1800's, forests were cut down for building materials and for agricultural production; prairies were plowed under and swamps and wetlands were drained. Roads were built, and eventually railroads were installed to connect to the major cities. Later, dams, reservoirs and a navigation channel were constructed, forever altering the hydrology of the river.

Forest cover has been reduced, and forest fragmentation has reduced the nesting success for many species of neo-tropical migrant songbirds. Additionally, the removal of vegetative cover along streambanks has led to an increased rate of streambank erosion concerns throughout the watershed.

Current Aquatic Resource Conditions of the Lower Kaskaskia River Watershed:

The land cover data, collected by the Illinois Gap Analysis Project (IL-GAP) Land Cover, reveal that approximately 691,570 acres, representing over 76 percent of the total watershed area, are devoted to agricultural activities. Corn and soybean farming account for 24 and 27 percent of the watershed area, respectively, and winter wheat/soybean farming and rural grassland each account for 10 percent of the watershed. Upland forest and floodplain forest account for 8 and 6 percent of the total area, respectively. Other land cover types each represent less than 5 percent of the watershed area.

Wetland loss is also extremely high, resulting in increased flooding. Fish nurseries have been lost with the channelization of the river and with the loss of riverine wetlands. Two mainstream dams have created significant habitat fragmentation for fish and macroinvertebrates, both in the river proper and in tributary streams and reservoirs. This has led to the loss of a number of fish species from portions of the river. History has also shown a number of exotic and invasive species entering the watershed. The most damaging plants include reed canary grass, musk thistle, bush and Japanese honeysuckle, garlic mustard, multiflora rose, giant reed, Johnson grass and autumn olive. The most serious animal pests include the house sparrow, starling and several species of Asian carp.

Currently, there are only an estimated 870 000 acres of the original 8.2 million acres of natural wetlands remaining within the State of Missouri. There are currently efforts underway throughout the State of Illinois to protect and improve the functionality of remaining wetlands; promote connectivity among wetland complexes with habitat corridors; and reintroduce native species into wetland habitats. Other than northeastern Illinois, which houses approximately 10.8% of the state's wetland acreage, the second largest concentration of the state's natural wetlands is in the southern counties.

Aquatic Resource Goals and Objectives for the Lower Kaskaskia River Watershed:

Our major goals for the Lower Kaskaskia River Watershed are improving water quality, improving riparian and aquatic habitat conditions, maintaining diverse and abundant populations of native aquatic organisms and sport fish and increasing public appreciation for the stream resources. Cooperative efforts with other resource agencies on water quality, habitat, and watershed management issues will be critical to our mitigation efforts. Legal enforcement of existing water quality and other stream-related regulations and necessary revisions and additions to these regulations will help reduce violations and lead to further water quality improvements. Collaborations with related agencies to promote public awareness and incentive programs and cooperating with citizen groups and landowners will result in improved watershed conditions,

better water quality, and a healthier stream system. Existing onsite habitat improvement projects on federal, state, and local government lands and those of private landowners will focus on improving stream channel and riparian area stability in priority areas in the watershed:

- Restoration of in stream habitats.
- Restoration, expansion, and maintenance of well vegetated riparian areas, especially in areas with high diversity of aquatic life, presence of species of conservation concern, and areas managed for specific species or communities.
- Mitigation planning may identify significant sources of pollutants (i.e. eroded soil and other non-point water quality problems) and strive to restore and stabilize them.
- Restoration of in-channel hydraulics to balance the hydrological and in-channel physical conditions of streams.

Active enforcement of existing water quality and other stream related regulations, and necessary revisions and additions, are detrimental and will help reduce violations and increase water quality improvements. Collaborations with related agencies to promote public awareness and incentive programs and cooperating with citizen groups and landowners will result in improved watershed conditions, better water quality, and a healthier stream system.

Prioritization Strategy for Selecting and Implementing Compensatory Mitigation Strategies for the Lower Kaskaskia River Watershed:

Mitigation projects in the Lower Kaskaskia River Watershed will be located in areas that provide physical, chemical, and/or biological improvements to stream ecological values of the watershed, and are technically feasible and appropriate to install at the project site. The highest priority will be areas of biodiversity that have been deemed affected by excess Total Maximum Daily Loads (TMDL), using the assessment by the Illinois Environmental Protection Agency. (ILEPA). This TMDL assessment for impaired water bodies in the Lower Kaskaskia River Watershed addresses the sources of water body impairments, reductions in source loading necessary to comply with water quality standards, and the implementation of procedures to mitigate the impairment. Specific attention to, and more intensive conservation efforts within these TMDL areas provide an efficient and effective strategy for the long term maintenance of relatively high quality examples of the various ecosystem and community types that exist within this watershed. In addition to TMDLs, other priority sites will be identified when a mitigation project is not possible in a TMDL area:

- 303 (d) listed waters
- Stream reaches managed by Illinois Department of Natural Resources
- Stream reaches containing state or federal species of conservation concern
- Conservation Opportunity Areas

- Areas of high aquatic biodiversity.

- Greenway corridors proposed or managed by federal, state, or local entities for public recreation or habitat conservation purposes.
- Upstream or downstream of all Illinois Department of Natural Resources state parks and other local, state or federally-owned public areas managed for natural resource or public recreation purposes

Preservation Objectives for the Lower Kaskaskia River Watershed:

The priority of projects will continue to be on restoration and establishment. However, preservation projects are an important part of watershed management, in that critical stream reaches, unique habitats, and protection of important water quality areas of the Lower Kaskaskia River Watershed will contribute to sustaining ecological functioning over the long term. Preservation will be used in the Lower Kaskaskia River Watershed when:

- The resources to be preserved provide important physical, chemical and/or biological functions for the watershed;

- The resources contribute significantly to the ecological sustainability of the watershed;

- Preservation is appropriate, practicable, and has the support of the IRT and the Corps;

- The aquatic resources in question are under threat of destruction or degradation; and/or

- The preserved site will be permanently protected by the appropriate real estate provision or legal instrument as part of the in-lieu fee project site mitigation plan.

Preservation efforts will be combined with associated efforts to restore, establish, or enhance other aquatic habitats as is practicable and appropriate. Stream and riparian corridor preservation will receive credit based upon the calculated amount for preservation per the State of Illinois Stream Mitigation Method. Wetland preservation will only be proposed for high quality wetlands and credits will be released at a higher ratio as approved by the Corps, in consultation with the IRT.

Public and Private Stakeholder involvement in plan development and implementation in the Lower Kaskaskia River Watershed:

Mitigation sites within the Lower Kaskaskia River Watershed, the Sponsor will seek out local input from federal and state agencies, municipalities, landowners, natural resource management groups and advisory groups within the watershed as appropriate. The ILF program will work with any willing public agencies to prioritize watersheds in in-lieu-fee projects. IFL project sites will not be placed on public lands.

Long-Term Protection and Management Strategies for Compensatory Mitigation in the Lower Kaskaskia River Watershed:

Each compensatory mitigation site will be protected in perpetuity by a conservation easement held by an approved long-term steward that will be identified within the mitigation plan. These easements ensure that there will be no development or other land use change on the project sites which could diminish the level of physical, chemical, and biological ecosystem functions that each site provides to the watershed. Additionally, the conservation easement will stay with the property if that title to the property is transferred to a third party. It is the intention of LLF to maintain ownership of properties in perpetuity as highly functioning habitat in accordance with the terms of a long-term management plan and conservation easement.

LLF would perform annual monitoring with onsite field observations, reporting, and enforcement actions, as appropriate, on all properties.

Strategy for Periodic Evaluation and Reporting in the Lower Kaskaskia River Watershed:

Evaluation, monitoring, and reporting is required of all compensatory mitigation projects to determine if the project is meeting its performance standards and if additional measures are necessary to ensure that the compensatory mitigation project is accomplishing its objectives. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefit of all compensatory mitigation sites is performing to achieve the goals set forth in this watershed. Project specific mitigation plans will detail the parameters to be monitored, the length of the monitoring period, the dates that the reports must be submitted, the party responsible for conducting the monitoring, the frequency for submitting monitoring reports to the Corps, and the party responsible for submitting those monitoring reports to the Corps and the IRT. Data collection for performance objectives will occur once during the year and will be reported in an annual report until a project has been shown to meet performance standards, unless otherwise specified in the approved project-specific mitigation plan. The level of detail and substance of the report will be commensurate with the scale and scope of the compensatory mitigation project. Compliance monitoring will also be conducted annually until performance standards are met and will be reported in the annual report. After a project has met performance standards, the frequency of all monitory will decrease to a term not to be less than once every five years. Changes in reporting may be required by the Corps and the IRT as necessary to accommodate adaptive changes in the project and unforeseen natural disasters.

Evaluation and reporting will concentrate on those metrics involved in performance standards and will not include species or community biotic sampling until late in the project cycle, if at all. Temporal improvement of biota and their communities often lags restoration projects by years, and sometimes decades, and biological sampling often is inconclusive as to whether a project has improved biotic communities. At the conclusion of the project, aquatic invertebrate and/or other fish diversity indices may be calculated and compared to the before-project condition and to

reference indices obtained from stable streams of similar type, order, and size elsewhere within the watershed, if the biologist in charge of the project determines it is necessary.

References:

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Much of the above referenced information was obtained from the Illinois Environmental Protection Agency (IEPA)

Big Muddy Watershed Service Area

Geographic Service Area:

The Big Muddy River originates in northwestern Jefferson County in the heart of the Southern Till Plain and flows south and west for approximately 114 miles. At mile 76, the Big Muddy River forms the Jackson/Union County line and joins the Mississippi River at river mile 76. The Big Muddy River Watershed drains 1,510,655 acres in Washington, Jefferson, Perry, Franklin, Jackson, and Williamson counties. The largest cities in the watershed are Carbondale (27,033), Mt. Vernon (17,000), and Marion (14,545). Major tributaries within the Big Muddy Watershed include Casey Fork, Middle Fork Big Muddy, Little Muddy River, Crab Orchard Creek, and Beaucoup Creek. A total of 1,480 stream miles were assessed on the Big Muddy River and its tributaries. A total of 39 lakes covering 35,855 acres were also assessed in the watershed. (*Illinois EPA*)

Threats to the Aquatic Resources in the Big Muddy Watershed:

<u>Water Quality Problems</u>

Overall, water quality within the Big Muddy River Watershed is fair. In fact, Illinois State water quality standards were not met for two streams in the watershed. Water quality problems facing streams in this Watershed include:

- A portion of Big Muddy and Kincaid Lake are identified as EPA CWA Section 303(d) impaired water bodies.
- Waste water discharges from sewage treatment plants throughout the basin can cause low dissolved oxygen, algal blooms, and ammonia from waste water discharges.
- Contamination of aquatic organisms, primarily manganese, sulfate and mercury continues to plague portions of the watershed.
- Nutrient-loaded runoff from pastures, feedlots, and direct contamination to streams by free livestock contributes to increasing in-stream biological oxygen demand (BOD), suspended solids counts.
- Resource extraction and contaminated sediments has caused increases in sulfates, pH, mercury, and manganese.

- Point source municipal and industrial discharges are present.

Many of the water quality problems, especially those involving aquatic life contaminations are difficult, complex, and expensive to address. However, many of the problems resulting in riparian destruction, stream bank erosion, and sedimentation are an appropriate project that is addressable through the installation of mitigation projects. Preservation projects, especially in streams in rapidly urbanizing areas but still containing high quality of aquatic communities, are particularly adaptable.

Aquatic Resource Problems

Overall, the quality of aquatic resources in the Big Muddy River Watershed is fair, with some areas of good quality and other areas of degradation. Aquatic resource problems facing streams in this watershed include:

- Livestock access to streams is causing stream bank erosion and sedimentation and watershed pastures contributes to flashier runoff and sediment delivery to the stream.
- Destruction of riparian vegetation is a result of row cropping too close to the stream, construction and livestock use.
- Small-scale stream channelization due to bridge construction and replacement is causing bank erosion, riparian destruction, and sedimentation issues downstream.
- Small-scale in stream gravel mining operations and small scale attempts to remedy stream channel problems are pushing in stream gravel around causing an increase in stream bank erosion and sedimentation.
- Watershed urbanization has adversely impacted riparian corridors and increased storm water runoff, which increases channel instability, as well as depressed aquatic species diversity.

Historic Aquatic Loss in the Big Muddy Watershed:

Agriculture is a major land use within the Big Muddy River Watershed. In 1999, agricultural crop acreage covered 49 percent of the, higher than the 29 percent in 1925. However, Illinois Agricultural Statistics (IAS) data indicate that the acreage of some crops significantly changed from 1925-1999.

In 1925, the dominant crops were small grains (190,633 acres) and corn (131,059 acres), contrasted to soybeans (237,719 acres) and small grains (171,485 acres) in 1999. Soybeans have dramatically changed from 1925 (123 acres) to 1979, where it peaked at 264,281 acres, decreased to 176,787 acres in 1986, and then rose steadily to 237,719 acres in 1999. Small grains gradually declined from 190,633 acres in 1925 to 171,485 in 1999 with an average of 182,344 acres. Corn has

remained steady from 1925 (131,059 acres) to 1999 (129,186 acres) with an average of 115,291 during this time period. Sorghum was harvested in 1965 with 375 acres in the assessment area and rose to 102,409 acres in 1985. This is the same year that small grain' acreage dropped to a record low of 101,853 acres. Sorghum has decreased in acreage through 1999 with 6,242 acres. In 1999, soybean and small grain acreage accounted for 76 percent of the crop acreage in the assessment area, whereas, small grains and com dominated the crop acreage (99 percent) in 1925.

As agricultural needs have grown over the years, agricultural production has contributed to water quality impairment in the Big Muddy River Watershed. Non-irrigated crop production, pasture land, and animal holding and management areas are major causes of water quality impairment in the watershed.

Current Aquatic Resource Conditions of the Big Muddy Watershed:

The Big Muddy River Watershed has experienced considerable land use modification since European settlement, initially including cultivation, removal of wetland areas, and deforestation. Surface mining of coal, such as has been conducted in portions of Jackson and Williamson Counties, has also impacted the local hydrology, although the extent of this modification is unknown because of insufficient local data. Water use and water resource projects, such as reservoirs, also more readily defined impacts on the stream flows. The impact of reservoirs in general is to decrease high flows and low flows, and increase medium flows. Rend Lake in particular has a sizable impact on the downstream flows in Big Muddy River, although the impact is less apparent in its downstream reaches. Reservoirs on smaller watersheds, such as Cedar Lake and Little Grassy Lake, also have impact on the flows immediately downstream, but generally have little overall impact on the water quantity of the major streams in the region such as the Big Muddy River.

Approximately 427 acres of un-degraded habitats (i.e., high-quality natural area) remain in the Big Muddy River Watershed. Compared to other relevant data, this total suggests that habitat degradation among all community types combined has occurred at slightly higher intensity in the Big Muddy River Watershed than it has elsewhere in the state. It is difficult to provide precise estimates for some trend data in the Big Muddy River Watershed at the level of the community class because the region historically was characterized by a complex mixture of dynamic habitat types. Nevertheless, with the data available, the Illinois Department of Natural Resources outlined the trends among community classes as listed below.

> *Prairie*— About 0.01% acres of the original area of prairie in the state persists in a high-quality condition (White 1978); no data are available for the total acreage of all prairie remaining in Illinois including degraded remnants. Most of the original prairie in the Big Muddy River Watershed occurred in the northern region where the topography is less rugged and more suitable for farming. Some of the level ridge tops that may have held small areas of prairie in the steep, rocky topography of the southern portion of the Big

Muddy River Watershed were also farmed or logged during the early white settlement period. Other areas where prairie may have occurred have become overgrown in trees or brush as a result of the absence of fire; historically fire was a common phenomenon on the landscape of the Big Muddy River Watershed.

Forest—About 30% of the original area of forest remains statewide (Iverson et al. 1989), though only about 0.3% of this and 0.1% of original forest area remains in a high-quality condition. Most of the forested areas in the Big Muddy River Watershed, as in the majority of southern Illinois, were cleared for farmland or logged for timber production, firewood, etc. from about the 1820's to the early 1900's. As a result, no high quality forest areas remain in the Big Muddy River Watershed, but some of the forest has re-established and several large tracts of contiguous forest occur. Five tracts of forests greater than 500 acres in size exist in the watershed area. Although often somewhat to severely degraded, the importance of large tracts of forests such as these is becoming increasing apparent, especially for animal species that may require continuous, unfragmented patches for their survival and successful reproduction.

Savanna—Savannas have declined in area throughout Illinois and the Midwest, perhaps more than any other community class (Nuzzo 1986; Taft 1997), and the Big Muddy River Watershed is no exception to this trend.

Wetlands—Natural wetlands in Illinois have declined from pre-settlement statewide estimates of about 23% of the land area to about 2.6% (Havera et al. 1994), or about 11% of the original total. Only about 6,000 acres remain in a high-quality condition (White 1978). Of the remaining wetlands, only a slightly greater proportion remains in a high--quality condition compared to Statewide trends. The assessment area contains a total of 825 acres of wetland that remain in a relatively un-degraded condition. This is about 0.82% of remaining wetlands and 0.31% of what was once their original extent in the Big Muddy River Watershed.

Pine Hills Ecological Area, LaRue Ecological Area, Ozark Hills Nature Preserve, Shawnee National Forest (including Oakwood Bottoms), Trail of Tears State Forest are among the protected Conservation Opportunity Area lands in and abutting the Big Muddy River Watershed. In this area, sedimentation, unnatural flood regimes, and exotic and invasive species (reed canary grass, phragmites, willow, cattails, bighead and silver carp) comprise the landscape. Further, many historical wetlands are still farmed, today. A lack of state and federal program funding limits restoration and management of wetlands. Ongoing efforts are underway by state and local organizations to restore and manage approximately 20,000 acres of wetlands in this watershed.

The species richness of vascular plants within the Big Muddy River Watershed at the time of European settlement is unknown. About 1376 plant taxa have been reported from within the assessment area. The extraordinary loss of most habitat types in the Big Muddy River Watershed

also results in reduction in population sizes for species, particularly those sensitive to habitat degradation. As populations decline in size, they become more likely to undergo local extinctions. Richness of native species probably has declined in the Big Muddy River Watershed since European settlement as a result of habitat destruction and degradation, reduced population sizes, and local extirpations.

Based on information from the Illinois Department of Natural Resources (IDNR) Natural Heritage database, the Big Muddy River Watershed has 21 plant species listed by the Illinois Endangered Species Protection Board (IESPB) as threatened or endangered; 141 species of birds that breed or formerly bred there; 48 mammal species, which represent 81.4% of the 59 mammal species that currently occur in Illinois (Hoffmeister 1989); and 27 amphibian species and 40 reptile species in which represent 68% of the amphibian species and 67% of the reptile species of the State.

Aquatic Resource Goals and Objectives for the Big Muddy Watershed:

Our major goals for the Big Muddy River Watershed are improving water quality, improving riparian and aquatic habitat conditions, maintaining diverse and abundant populations of native aquatic organisms and sport fish and increasing public appreciation for the stream resources. Cooperative efforts with other resource agencies on water quality, habitat, and watershed management issues will be critical to our mitigation efforts. Legal enforcement of existing water quality and other stream-related regulations and necessary revisions and additions to these regulations will help reduce violations and lead to further water quality improvements. Collaborations with related agencies to promote public awareness and incentive programs and cooperating with citizen groups and landowners will result in improved watershed conditions, better water quality, and a healthier stream system. Existing onsite habitat improvement projects on federal, state, and local government lands and those of private landowners will focus on improving stream channel and riparian area stability in priority areas in the watershed:

- Restoration of in stream habitats.
- Restoration, expansion, and maintenance of well vegetated riparian areas, especially in areas with high diversity of aquatic life, presence of species of conservation concern, and areas managed for specific species or communities.
- Mitigation planning may identify significant sources of pollutants (i.e. eroded soil and other non-point water quality problems) and strive to restore and stabilize them.
- Restoration of in-channel hydraulics to balance the hydrological and in-channel physical conditions of streams.

Active enforcement of existing water quality and other stream related regulations, and necessary revisions and additions, are detrimental and will help reduce violations and increase water quality improvements. Collaborations with related agencies to promote public awareness and incentive programs and cooperating with citizen groups and landowners will result in improved watershed

conditions, better water quality, and a healthier stream system.

Prioritization Strategy for Selecting and Implementing Compensatory Mitigation Strategies for the Big Muddy Watershed:

Mitigation projects in the Big Muddy watershed will be located in areas that provide physical, chemical, and/or biological improvements to stream ecological values of the watershed, and are technically feasible and appropriate to install at the project site. The highest priority will be areas of biodiversity that have been deemed affected by excess Total Maximum Daily Loads (TMDL), using the assessment by the Illinois Environmental Protection Agency. (ILEPA). This TMDL assessment for impaired water bodies in the Big Muddy River Watershed addresses the sources of water body impairments, reductions in source loading necessary to comply with water quality standards, and the implementation of procedures to mitigate the impairment. Specific attention to, and more intensive conservation efforts within these excess TMDL areas provides an efficient and effective strategy for the long term maintenance of relatively high quality examples of the various ecosystem and community types that exist within this watershed. In addition to TMDLs, other priority sites will be identified when a mitigation project is not possible in an excess TMDL area:

- 303 (d) listed waters
- Stream reaches managed by Illinois Department of Natural Resources
- Stream reaches containing state or federal species of conservation concern
- Conservation Opportunity Areas
- Areas of high aquatic biodiversity around Carbondale, Mt. Vernon, and Marion.
- Greenway corridors proposed or managed by federal, state, or local entities for public recreation or habitat conservation purposes
- Upstream or downstream of all Illinois Department of Natural Resources state parks and other local, state or federally-owned public areas managed for natural resource or public recreation purposes

Preservation Objectives for the Big Muddy Watershed:

The priority of projects will continue to be on restoration and establishment. However, preservation projects are an important part of watershed management, in that critical stream reaches, unique habitats, and protection of important water quality areas of the Big Muddy River Watershed will contribute to sustaining ecological functioning over the long term. Preservation will be used in the Big Muddy River Watershed when:

- The resources to be preserved provide important physical, chemical and/or biological

functions for the watershed;

- The resources contribute significantly to the ecological sustainability of the watershed;
- Preservation is appropriate, practicable, and has the support of the IRT and the Corps;
- The aquatic resources in question are under threat of destruction or degradation; and/or
- The preserved site will be permanently protected by the appropriate real estate provision or legal instrument as part of the in-lieu fee project site mitigation plan.

Preservation efforts will be combined with associated efforts to restore, establish, or enhance other aquatic habitats as is practicable and appropriate. Stream and riparian corridor preservation will receive credit based upon the calculated amount for preservation per the State of Illinois Stream Mitigation Method. Wetland preservation will only be proposed for high quality wetlands and credits will be released at a higher ratio as approved by the Corps, in consultation with the IRT.

Public and Private Stakeholder involvement in plan development and implementation in the Big Muddy Watershed:

Mitigation sites within the Big Muddy River Watershed, the Sponsor will seek out local input from federal and state agencies, municipalities, landowners, natural resource management groups and advisory groups within the watershed as appropriate. The ILF program will work with any willing public agencies to prioritize watersheds in in-lieu-fee projects. IFL project sites will not be placed on public lands.

Long-Term Protection and Management Strategies for Compensatory Mitigation in the Big Muddy Watershed:

Each compensatory mitigation site will be protected in perpetuity by a conservation easement held by an approved long-term steward that will be identified within the mitigation plan. These easements ensure that there will be no development or other land use change on the project sites which could diminish the level of physical, chemical, and biological ecosystem functions that each site provides to the watershed. Additionally, the conservation easement will stay with the property if that title to the property is transferred to a third party. It is the intention of LLF to maintain ownership of properties in perpetuity as highly functioning habitat in accordance with the terms of a long-term management plan and conservation easement.

LLF would perform annual monitoring with onsite field observations, reporting, and enforcement actions, as appropriate, on all properties.

Strategy for Periodic Evaluation and Reporting in the Big Muddy Watershed:

Evaluation, monitoring, and reporting is required of all compensatory mitigation projects to determine if the project is meeting its performance standards and if additional measures are

necessary to ensure that the compensatory mitigation project is accomplishing its objectives. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefit of all compensatory mitigation sites is performing to achieve the goals set forth in this watershed. Project specific mitigation plans will detail the parameters to be monitored, the length of the monitoring period, the dates that the reports must be submitted, the party responsible for conducting the monitoring, the frequency for submitting monitoring reports to the Corps, and the party responsible for submitting those monitoring reports to the Corps and the IRT. Data collection for performance objectives will occur once during the year and will be reported in an annual report until a project has been shown to meet performance standards, unless otherwise specified in the approved project-specific mitigation plan. The level of detail and substance of the report will be commensurate with the scale and scope of the compensatory mitigation project. Compliance monitoring will also be conducted annually until performance standards are met and will be reported in the annual report. After a project has met performance standards, the frequency of all monitory will decrease to a term not to be less than once every five years. Changes in reporting may be required by the Corps and the IRT as necessary to accommodate adaptive changes in the project and unforeseen natural disasters.

Evaluation and reporting will concentrate on those metrics involved in performance standards and will not include species or community biotic sampling until late in the project cycle, if at all. Temporal improvement of biota and their communities often lags restoration projects by years, and sometimes decades, and biological sampling often is inconclusive as to whether a project has improved biotic communities. At the conclusion of the project, aquatic invertebrate and/or other fish diversity indices may be calculated and compared to the before-project condition and to reference indices obtained from stable streams of similar type, order, and size elsewhere within the watershed, if the biologist in charge of the project determines it is necessary.

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Much of the above referenced information was obtained from the Illinois Environmental Protection Agency (IEPA)

Upper Mississippi-Cape Girardeau Rivers Service Area

Geographic Service Area:

On the basis of physical characteristics, the Mississippi River can be divided into three distinct sections (the Upper, the Middle, and the Lower). The Upper Mississippi-Cape Girardeau Rivers Watershed is located in the Upper section of the Mississippi River. This watershed is contained within Alexander, Jackson, Perry, Randolph, Union, Bollinger, Cape Girardeau, Mississippi, St. Genevieve, and Scott counties. Overall, there are about 1690 miles of primary stream channel in this watershed.

Threats to the Aquatic Resources in the Upper Mississippi-Cape Girardeau Rivers Watershed:

Water Quality Problems

Overall, water quality within the Upper Mississippi-Cape Girardeau Rivers Watershed is fair. Water quality problems facing streams in this watershed include:

- Waste water discharges from sewage treatment plants throughout the basin can cause low DO, algal blooms, and ammonia from waste water discharges.
- Contamination of aquatic organisms, including manganese, barium, copper, and atrazine.
- Nutrient-loaded runoff from pastures, feedlots, septic drainage fields, and direct contamination to streams by free livestock contributes to increasing in-stream biological oxygen demand (BOD), suspended solids, fecal coli form counts, and algae growth.
- Point source municipal and industrial discharges are present.

Many of the water quality problems, especially those involving aquatic life contaminations are difficult, complex, and expensive to address. However, many of the problems resulting in riparian destruction, stream bank erosion, and sedimentation are an appropriate project that is addressable through the installation of mitigation projects. Preservation projects, especially in streams in rapidly urbanizing areas but still containing high quality of aquatic communities, are particularly adaptable.

Aquatic Resource Problems

Overall, the quality of aquatic resources in the Upper Mississippi-Cape Girardeau Rivers Watershed is fair, with some areas of good quality and other areas of degradation. Aquatic resource

problems facing streams in this watershed include:

- Intensive livestock operations and large amount of row crop agriculture increases sediment discharges and fertilizer/livestock wastes in runoff adversely affects stream water quality with increased nitrate levels, which are heightened by weak base stream flows.

- Livestock access to streams is causing stream bank erosion and sedimentation and overgrazing in floodplain and watershed pastures contributes to flashier runoff and sediment delivery to the stream.

- Watershed urbanization has adversely impacted riparian corridors and increased storm water runoff, which increases channel instability, as well as depressed aquatic species diversity.

Historic Aquatic Loss in the Upper Mississippi-Cape Girardeau Rivers Watershed:

The Upper Mississippi River flows roughly 1,300 miles, from Lake Itasca in northern Minnesota to the confluence with the Ohio River at the southern tip of Illinois, over half of the length of the entire Mississippi River. French traders settled the upper river, establishing towns like St. Louis and Prairie du Chien (now in Wisconsin), who's names survive to this day. But the lower river passed into Spanish hands in 1769, the Treaty of Paris (1783) optimistically declared the river as the western boundary of the United States, and republican France reacquired the much-bartered stream only long enough to sell it to the United States as part of the Louisiana Purchase (1803). This last move recognized what had been obvious for a quarter of a century—the growing domination of the river by the Americans. They came by raft, flatboat, and ark (a "raft with a rim"), built and loaded on the left-bank tributaries that were in the forefront of the westward expansion of the United States. Unwieldy and expendable, these craft floated downstream to leave their cargoes and occupants as advance guards of American political and economic expansion. Only the long, slim keelboats made the return trip. They were worked upstream under pole, paddle, or sail or by the backbreaking "cordelle," a system under which the crew went ashore with a long bow hawser and pulled the vessel upstream by brute strength.

Approximately 850 miles of the river, extending from Minneapolis-St. Paul to the Ohio River, is commercially navigable. On the northern 670 miles, this is made possible by a series of 29 locks and dams, most built in the 1930s, which create a stairway of water. In addition, the river is dredged to maintain a minimum main channel depth of 9 feet.

The Illinois River connects the Mississippi River to the Great Lakes. Together, the Upper Mississippi River; Illinois River; and small portions of the Minnesota, St. Croix, Black, and Kaskaskia Rivers provide a 1200-mile commercially navigable river network in the upper Midwest.

Current Aquatic Resource Conditions of the Upper Mississippi-Cape Girardeau Rivers Watershed:

The upper MRB has the most productive soils in the basin with intensive agricultural production, predominately corn and soybean. Land use in many sub-watersheds is dominated by intensive corn–soybean production, often accounting for 90 to 95% of the landscape. Furthermore, these areas have undergone extensive hydrological modifications including channelization of the headwater streams and intensive tile (subsurface, artificial) drainage in fields to lower water tables and efficiently route water to streams (Baker et al., 2008).

The Upper Mississippi – Cape Girardeau Watershed stretches along the eastern border of Ste. Genevieve, Perry, Cape Girardeau, Scott, St. Francis, Bollinger, and Mississippi counties. The river and its associated floodplain provide habitat for numerous native fish and wildlife, and serves as a vital migration corridor for ducks and other waterfowl within the Mississippi Flyway. What is locally referred to as the "batture" lands are unprotected lands inside the levees and bluffs on both the Missouri and Illinois sides, within the floodplain of the river. A 140-mile stretch of the "open river" begins just north of St. Louis, Missouri, at the confluence of the Missouri River and runs south to the confluence of the Ohio River near Cairo, Illinois. This section is called the open river because it is free of dams and does not have as intricate a levee and drainage system as does the river below Cairo.

Many of the wetlands in this watershed have been drained to promote faring of fertile floodplain soils. Further, the development of residential communities within the floodplain has contributed to the degradation of wetland habitat. Small wetlands in the watershed have undergone sedimentation and the invasion of shallow wetlands by native woody species, such as willows, is prevalent throughout the watershed. Local partnerships have been established to increase wetlands within the watershed by at least 4,000 acres. This management process includes ongoing monitoring and management of open wetlands to prevent encroachment of woody species. Additional efforts include establishing buffers between wetlands and agricultural land to prevent herbicide runoff and sedimentation and establishing deeper and shallow wetlands to increase amphibian breeding habitat

There are 3 national refuges along the Upper Mississippi River, totaling over 285,000 acres. They include the Upper Mississippi River National Wildlife and Fish Refuge, Trempealeau National Wildlife Refuge, and Mark Twain National Wildlife Refuge. The states manage another 140,000 acres of refuge lands along the river.

The World Resources Institute (WRI) brief, Awakening the Dead Zone (2003), states that 56% of the nitrogen entering the Mississippi River occurs above where the Ohio River enters near Cairo, Illinois. This is predominantly from agricultural nonpoint sources, loss of aquatic, wetland and forested riparian habitats has exacerbated nutrient and sedimentation loading along this river stretch. Many of these lands were cleared of bottomland hardwood forests in the 1950s-70s and drained for cropping, resulting in the loss of natural ecosystems that were rich in biodiversity and

helped maintain water quality.

Aquatic Resource Goals and Objectives for the Upper Mississippi-Cape Girardeau Rivers Watershed:

Our major goals for the Upper Mississippi-Cape Girardeau Rivers Watershed are improving water quality, improving riparian and aquatic habitat conditions, maintaining diverse and abundant populations of native aquatic organisms and sport fish and increasing public appreciation for the stream resources. Cooperative efforts with other resource agencies on water quality, habitat, and watershed management issues will be critical to our mitigation efforts. Legal enforcement of existing water quality and other stream-related regulations and necessary revisions and additions to these regulations will help watershed violations and lead to further water quality improvements. Collaborations with related agencies to promote public awareness and incentive programs and cooperating with citizen groups and landowners will result in improved watershed conditions, better water quality, and a healthier stream system. Existing onsite habitat improvement projects on federal, state, and local government lands and those of private landowners will focus on improving stream channel and riparian area stability in priority areas in the watershed:

- Restoration of in stream habitats.
- Restoration, expansion, and maintenance of well vegetated riparian areas, especially in areas with high diversity of aquatic life, presence of species of conservation concern, and areas managed for specific species or communities.
- Mitigation planning may identify significant sources of pollutants (i.e. eroded soil and other non-point water quality problems) and strive to restore and stabilize them.
- Restoration of in-channel hydraulics to balance the hydrological and in-channel physical conditions of streams.

Active enforcement of existing water quality and other stream related regulations, and necessary revisions and additions, are detrimental and will help reduce violations and increase water quality improvements. Collaborations with related agencies to promote public awareness and incentive programs and cooperating with citizen groups and landowners will result in improved watershed conditions, better water quality, and a healthier stream system.

Prioritization Strategy for Selecting and Implementing Compensatory Mitigation Strategies for the Upper Mississippi-Cape Girardeau Rivers Watershed:

Mitigation projects in the Mississippi-Cape Girardeau Watershed will be located in areas that provide physical, chemical, and/or biological improvements to stream ecological values of the watershed, and are technically feasible and appropriate to install at the project site. The highest priority will be areas of biodiversity that have been deemed affected by excess Total Maximum Daily Loads (TMDL), using the assessment by the Illinois Environmental Protection Agency.

(ILEPA). This TMDL assessment for impaired water bodies in the Upper Mississippi-Cape Girardeau Rivers Watershed addresses the sources of water body impairments, reductions in source loading necessary to comply with water quality standards, and the implementation of procedures to mitigate the impairment. Specific attention to, and more intensive conservation efforts within these excess TMDL areas provides an efficient and effective strategy for the long term maintenance of relatively high quality examples of the various ecosystem and community types that exist within this watershed. In addition to TMDLs, other priority sites will be identified when a mitigation project is not possible in an excess TMDL area:

- 303 (d) listed waters
- Stream reaches managed by Illinois Department of Natural Resources
- Stream reaches containing state or federal species of conservation concern
- Conservation Opportunity Areas
- Areas of high aquatic biodiversity.
- Greenway corridors proposed or managed by federal, state, or local entities for public recreation or habitat conservation purposes
- Upstream or downstream of all Illinois Department of Natural Resources state parks and other local, state or federally-owned public areas managed for natural resource or public recreation purposes

Preservation Objectives for the Upper Mississippi-Cape Girardeau Rivers Watershed:

The priority of projects will continue to be on restoration and establishment. However, preservation projects are an important part of watershed management, in that critical stream reaches, unique habitats, and protection of important water quality areas of the Upper Mississippi-Cape Girardeau Rivers Watershed will contribute to sustaining ecological functioning over the long term. Preservation will be used in the Upper Mississippi-Cape Girardeau Rivers Watershed when:

- The resources to be preserved provide important physical, chemical and/or biological functions for the watershed;
- The resources contribute significantly to the ecological sustainability of the watershed;
- Preservation is appropriate, practicable, and has the support of the IRT and the Corps;
- The aquatic resources in question are under threat of destruction or degradation; and/or
- The preserved site will be permanently protected by the appropriate real estate provision or legal instrument as part of the in-lieu fee project site mitigation plan.

Preservation efforts will be combined with associated efforts to restore, establish, or enhance other aquatic habitats as is practicable and appropriate. Stream and riparian corridor preservation will receive credit based upon the calculated amount for preservation per the State of Illinois Stream Mitigation Method. Wetland preservation will only be proposed for high quality wetlands and credits will be released at a higher ratio as approved by the Corps, in consultation with the IRT.

Public and Private Stakeholder involvement in plan development and implementation in the Upper Mississippi-Cape Girardeau Rivers Watershed:

Mitigation sites within the Upper Mississippi-Cape Girardeau Rivers Watershed, the Sponsor will seek out local input from federal and state agencies, municipalities, landowners, natural resource management groups and advisory groups within the watershed as appropriate. The ILF program will work with any willing public agencies to prioritize watersheds in in-lieu-fee projects. IFL project sites will not be placed on public lands.

Long-Term Protection and Management Strategies for Compensatory Mitigation in the Upper Mississippi-Cape Girardeau Rivers Watershed:

Each compensatory mitigation site will be protected in perpetuity by a conservation easement held by an approved long-term steward that will be identified within the mitigation plan. These easements ensure that there will be no development or other land use change on the project sites which could diminish the level of physical, chemical, and biological ecosystem functions that each site provides to the watershed. Additionally, the conservation easement will stay with the property if that title to the property is transferred to a third party. It is the intention of LLF to maintain ownership of properties in perpetuity as highly functioning habitat in accordance with the terms of a long-term management plan and conservation easement.

LLF would perform annual monitoring with onsite field observations, reporting, and enforcement actions, as appropriate, on all properties.

Strategy for Periodic Evaluation and Reporting in the Upper Mississippi-Cape Girardeau Rivers Watershed:

Evaluation, monitoring, and reporting is required of all compensatory mitigation projects to determine if the project is meeting its performance standards and if additional measures are necessary to ensure that the compensatory mitigation project is accomplishing its objectives. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefit of all compensatory mitigation sites is performing to achieve the goals set forth in this watershed. Project specific mitigation plans will detail the parameters to be monitored, the length of the monitoring period, the dates that the reports must be submitted, the party responsible for conducting the monitoring, the frequency for

submitting monitoring reports to the Corps, and the party responsible for submitting those monitoring reports to the Corps and the IRT. Data collection for performance objectives will occur once during the year and will be reported in an annual report until a project has been shown to meet performance standards, unless otherwise specified in the approved project-specific mitigation plan. The level of detail and substance of the report will be commensurate with the scale and scope of the compensatory mitigation project. Compliance monitoring will also be conducted annually until performance standards are met and will be reported in the annual report. After a project has met performance standards, the frequency of all monitory will decrease to a term not to be less than once every five years. Changes in reporting may be required by the Corps and the IRT as necessary to accommodate adaptive changes in the project and unforeseen natural disasters.

Evaluation and reporting will concentrate on those metrics involved in performance standards and will not include species or community biotic sampling until late in the project cycle, if at all. Temporal improvement of biota and their communities often lags restoration projects by years, and sometimes decades, and biological sampling often is inconclusive as to whether a project has improved biotic communities. At the conclusion of the project, aquatic invertebrate and/or other fish diversity indices may be calculated and compared to the before-project condition and to reference indices obtained from stable streams of similar type, order, and size elsewhere within the watershed, if the biologist in charge of the project determines it is necessary.

References:

http://epadev.induscorp.com/epadevdb_tmdl_web/attains_watershed.control?p_huc=07140105&p_state=IL&p_cycle=2004&p_report_type=A

http://www.nps.gov/miss/riverfacts.htm

http://www.history.com/topics/mississippi-river

Cahokia-Joachim Rivers Service Area

Geographic Service Area:

The Cahokia-Joachim Rivers Watershed contains 740 square miles, (473,600 acres) and lies immediately adjacent, and flows directly, to the Mississippi River. This watershed is contained within Jefferson, St. Francois, St. Louis City, St. Louis, and St. Genevieve counties in Missouri; and Macoupin, Madison, Monroe, Randolph, and St. Clair counties in Illinois. Overall, there are about 1690 miles of primary stream channel in this watershed.

Threats to the Aquatic Resources in the Cahokia-Joachim Rivers Watershed:

Water Quality Problems

Overall, water quality within the Cahokia-Joachim Rivers Watershed is fair. Water quality problems facing streams in this watershed include:

- Waste water discharges from sewage treatment plants throughout the basin can cause low DO, algal blooms, and ammonia from waste water discharges.
- Contamination of aquatic organisms, primarily phosphorous, copper, and mercury continues to plague portions of the basin.
- Nutrient-loaded runoff from pastures, feedlots, septic drainage fields, and direct contamination to streams by free livestock contributes to increasing in-stream biological oxygen demand (BOD), suspended solids, fecal coli form counts, and algae growth.
- Intensive livestock operations and large amount of row crop agriculture increases sediment discharges and fertilizer/livestock wastes in runoff adversely affects stream water quality with increased nitrate levels, which are heightened by weak base stream flows. Basin streams often have manganese and fecal coli form levels that are commonly above Illinois water quality criteria.
- Point source municipal and industrial discharges are present.

Many of the water quality problems, especially those involving aquatic life contaminations are difficult, complex, and expensive to address. However, many of the problems resulting in riparian destruction, stream bank erosion, and sedimentation are an appropriate project that is addressable through the installation of mitigation projects. Preservation projects, especially in streams in

rapidly urbanizing areas but still containing high quality of aquatic communities, are particularly adaptable.

Aquatic Resource Problems

Overall, the quality of aquatic resources in the Cahokia-Joachim Rivers Watershed is fair, with some areas of good quality and other areas of degradation. Aquatic resource problems facing streams in this watershed include:

- Livestock access to streams is causing stream bank erosion and sedimentation and overgrazing in floodplain and watershed pastures contributes to flashier runoff and sediment delivery to the stream.
- Destruction of riparian vegetation is a result of row cropping too close to the stream, construction and livestock use.
- Small-scale stream channelization due to bridge construction and replacement is causing bank erosion, riparian destruction, and sedimentation issues downstream.
- Small-scale gravel mining operations are pushing in stream gravel around causing an increase in stream bank erosion and sedimentation.
- Watershed urbanization has adversely impacted riparian corridors and increased storm water runoff, which increases channel instability, as well as depressed aquatic species diversity.

Historic Aquatic Loss in the Cahokia-Joachim Rivers Watershed:

According to the Missouri Department of Natural Resources, the Cahokia-Joachim Rivers Watershed includes a 5-mile reach of the Mississippi River (Water Body ID: 1707) near Herculaneum, Missouri. The Herculaneum lead smelter, which has been active since 1892, is located near Joachim Creek at Herculaneum, Mo. in Jefferson County. Approximately 70 percent of the United States' primary lead supply comes from eight mines in southern Missouri, and the Herculaneum smelter constitutes the principal source of refined lead. This smelter has been found to contribute heavy metals to the local environment through wastewater discharges, erosion of slag piles, concentrate transportation and handling, air emission fallout and fugitive emissions. The impaired reach is downstream of the smelter and the confluence with Joachim Creek. Sediments from Joachim Creek are coarse-grained in nature and lack small-grained sediments that could be sampled.

Current Aquatic Resource Conditions of the Cahokia-Joachim Rivers Watershed:

The Cahokia-Joachim Rivers Watershed stretches along the eastern border of St. Louis City, St. Louis County, Jefferson, St. Charles, St. Francis, and Ste. Genevieve counties. The river and its

associated floodplain provide habitat for numerous native fish and wildlife, and serves as a vital migration corridor for ducks and other waterfowl within the Mississippi Flyway. A 140-mile stretch of the "open river" begins just north of St. Louis, Missouri, at the confluence of the Missouri River and runs south to the confluence of the Ohio River near Cairo, Illinois.

Air deposition from the Herculaneum smelter is an historic and current source of lead and zinc contamination to the Joachim Creek and Mississippi River watersheds. Lead and zinc fallout from the smelter contaminates yards and other areas within the watershed that then contribute fine grained contaminated sediment to nearby water bodies. Road dust containing lead and zinc generated along the haul routes in Herculaneum is another source of metals that can contribute to contaminated storm water runoff.

Waste rock and spent ore have also historically been used for roads and other construction in the area and, if present, can contribute lead and zinc to the impaired segment. The volume of contamination coming from these sources relative to the pollutant loading from larger sediment sizes such as the slag pile area is not known.

Wetlands were once a dominant feature of the southern Illinois landscape, but have been reduced by more than 90% for agriculture, development, and other land uses across the state (Dahl 2006). Currently, the Wetlands Campaign, spearheaded by the Illinois DNR, is underway to increase wetland habitat acreage, interconnectedness, and quality in the Cahokia-Joachim Rivers watershed. Among the goals for the watershed is to recognize a net gain of 40% combined wetland types and increasing wetland abundance to increase water storage capacity by 50% within targeted watersheds with persistent flooding issues to increase natural system function. (*Illinois DNR)*

St. Clair county has 38,914 acres of wetland, mostly in floodplain forests, and 12% of the total area of the county is covered by open water, having 7,962 acres (mostly in lakes or rivers). (*St. Clair County*). It is estimated that approximately 79,000 acres of wetlands existed in Macoupin County prior to settlement; and currently there are approximately 20,000 acres of hydric soils in the Macoupin Creek watershed that are not developed, forested or wetland. Conditions are prime for restoration. Madison County has an 83+ acre wetland restoration site aimed at providing storm water storage, clean water, and wildlife habitat for surrounding communities.

Aquatic Resource Goals and Objectives for the Cahokia-Joachim Rivers Watershed:

Our major goals for the Cahokia-Joachim Rivers Watershed are improving water quality, improving riparian and aquatic habitat conditions, maintaining diverse and abundant populations of native aquatic organisms and sport fish and increasing public appreciation for the stream resources. Cooperative efforts with other resource agencies on water quality, habitat, and watershed management issues will be critical to our mitigation efforts. Legal enforcement of existing water quality and other stream-related regulations and necessary revisions and additions to these regulations will help reduce violations and lead to further water quality improvements. Collaborations with related agencies to promote public awareness and incentive programs and

cooperating with citizen groups and landowners will result in improved watershed conditions, better water quality, and a healthier stream system. Existing onsite habitat improvement projects on federal, state, and local government lands and those of private landowners will focus on improving stream channel and riparian area stability in priority areas in the watershed:

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Restoration of in-channel hydraulics to balance the hydrological and in-channel physical conditions of streams. Active enforcement of existing water quality and other stream related regulations, and necessary revisions and additions, are detrimental and will help reduce violations and increase water quality improvements. Collaborations with related agencies to promote public awareness and incentive programs and cooperating with citizen groups and landowners will result in improved watershed conditions, better water quality, and a healthier stream system.

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- Stream reaches containing state or federal species of conservation concern
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- Areas of high aquatic biodiversity.
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Upstream or downstream of all Illinois Department of Natural Resources state parks and other local, state or federally-owned public areas managed for natural resource or public recreation purposes

Preservation Objectives for the Cahokia-Joachim Rivers Watershed:

The priority of projects will continue to be on restoration and establishment. However, preservation projects are an important part of watershed management, in that critical stream reaches, unique habitats, and protection of important water quality areas of the Cahokia-Joachim Rivers Watershed will contribute to sustaining ecological functioning over the long term. Preservation will be used in the Cahokia-Joachim Rivers Watershed when:

- The resources to be preserved provide important physical, chemical and/or biological functions for the watershed;
- The resources contribute significantly to the ecological sustainability of the watershed;
- Preservation is appropriate, practicable, and has the support of the IRT and the Corps;
- The aquatic resources in question are under threat of destruction or degradation; and/or
- The preserved site will be permanently protected by the appropriate real estate provision or legal instrument as part of the in-lieu fee project site mitigation plan.

Preservation efforts will be combined with associated efforts to restore, establish, or enhance other aquatic habitats as is practicable and appropriate. Stream and riparian corridor preservation will receive credit based upon the calculated amount for preservation per the State of Illinois Stream Mitigation Method. Wetland preservation will only be proposed for high quality wetlands and credits will be released at a higher ratio as approved by the Corps, in consultation with the IRT.

Public and Private Stakeholder involvement in plan development and implementation in the Cahokia-Joachim Rivers Watershed:

Mitigation sites within the Cahokia-Joachim Rivers Watershed, the Sponsor will seek out local input from federal and state agencies, municipalities, landowners, natural resource management groups and advisory groups within the watershed as appropriate. The ILF program will work with any willing public agencies to prioritize watersheds in in-lieu-fee projects. IFL project sites will not be placed on public lands.

Long-Term Protection and Management Strategies for Compensatory Mitigation in the Cahokia-Joachim Rivers Watershed:

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LLF would perform annual monitoring with onsite field observations, reporting, and enforcement actions, as appropriate, on all properties.

Strategy for Periodic Evaluation and Reporting in the Cahokia-Joachim Rivers Watershed:

Evaluation, monitoring, and reporting is required of all compensatory mitigation projects to determine if the project is meeting its performance standards and if additional measures are necessary to ensure that the compensatory mitigation project is accomplishing its objectives. This documentation will include an accounting of the acreage and type of all mitigation activities within the service area and how the combined ecological benefit of all compensatory mitigation sites is performing to achieve the goals set forth in this watershed. Project specific mitigation plans will detail the parameters to be monitored, the length of the monitoring period, the dates that the reports must be submitted, the party responsible for conducting the monitoring, the frequency for submitting monitoring reports to the Corps, and the party responsible for submitting those monitoring reports to the Corps and the IRT. Data collection for performance objectives will occur once during the year and will be reported in an annual report until a project has been shown to meet performance standards, unless otherwise specified in the approved project-specific mitigation plan. The level of detail and substance of the report will be commensurate with the scale and scope of the compensatory mitigation project. Compliance monitoring will also be conducted annually until performance standards are met and will be reported in the annual report. After a project has met performance standards, the frequency of all monitory will decrease to a term not to be less than once every five years. Changes in reporting may be required by the Corps and the IRT as necessary to accommodate adaptive changes in the project and unforeseen natural disasters.

Evaluation and reporting will concentrate on those metrics involved in performance standards and will not include species or community biotic sampling until late in the project cycle, if at all. Temporal improvement of biota and their communities often lags restoration projects by years, and sometimes decades, and biological sampling often is inconclusive as to whether a project has improved biotic communities. At the conclusion of the project, aquatic invertebrate and/or other fish diversity indices may be calculated and compared to the before-project condition and to reference indices obtained from stable streams of similar type, order, and size elsewhere within the watershed, if the biologist in charge of the project determines it is necessary.

References:

http://www.dnr.mo.gov/env/wpp/docs/2007annualreport.pdf

https://www.dnr.illinois.gov/conservation/IWAP/Documents/IWAPPlan2015/WetlandsCampaign.pdf

Dahl, T. E. 2006. Status and trends of wetlands in the conterminous United States 1998 to 2004. U.S. Department of the Interior, Fish and Wildlife Service. Washington, D.C. 112 pp.

APPENDIX

A. Corrections Letter
B. Contractor Qualifications

USACE Initial Comments on Land Learning Foundation's Draft Prospectus for the Southern Illinois In-Lieu-Fee Stream & Wetland Mitigation Program

The Corps has reviewed USEPA's comments and concur with all items stated in their document. Rather than echoing the same or stating similar comments in the Corps' review, below I provided additional comments or expanded on USEPA's comments.

Section III. b. Interagency Review Team: Delete Illinois Department of Conservation (IDC). This agency does not exist. Additionally, the Illinois Environmental Protection Agency (IEPA) does not participate in the IRT. Corrections made.

Section III. e. Initial Allocation of Credits and Section IV. Proposed Service Areas: Has LLF completed on-the ground assessments to identify specific mitigation opportunities for both streams and wetlands that could be pursued within each watershed? This would ensure that potential mitigation options can be identified. This could include reaching out to state and federal agencies, or conservation groups that could identify properties with willing landowners that have potential for stream and wetland restoration/enhancement type projects. It has been noted in the draft prospectus that the LLF has completed all of their work in Missouri. Illinois property values tend to be much higher than Missouri making it difficult to find properties that make a mitigation project economically viable for a sponsor or that require a land owner to place perpetual restrictions on. This is particularly evident for stream mitigation project sites in our District. Please provide evidence that the LLF has potential sites within the service areas proposed in the draft prospectus.

Identification of potential sites for mitigation within each service area is not required by the 2008 Mitigation Rule. If the rule did require pre-determination of potential sites, it would prolong ILF program approvals and require premature dedication of financial and human resources at the sole expense of the non profit prior to any impact for which LLF has assumed responsibility in the proposed service areas. LLF and its contractors have successfully identified and worked with numerous landowners willing to preserve natural resources and are further encouraged due to current conservation easement donation benefits. The program is confident that its current processes and procedures may be utilized in southern Illinois to provide the same conservation benefits the organization's existing ILF program provides in Missouri.

Section IV. Proposed Service Areas: Watersheds/Service Areas that encompass the State of Missouri may not be approved as a mitigation option for impacts in the State of Illinois. If you plan on utilizing this ILF program for impacts in the State of Missouri, review and approval of your proposed ILF program will need to be completed by the Missouri Mitigation Banking and ILF IRT. Noted.

Thanks,

Tyson Zobrist
St. Louis District
Regulatory Branch

United States Environmental Protection Agency
Marco Finocchiaro, Life Scientist
312-886-7566
finocchiaro.marco@epa.gov

Date: June 7, 2018

Subject: Comments on the Land Learning Foundation's In-Lieu Fee Program's prospectus for the Southern Illinois In-Lieu Fee Stream & Wetlands Mitigation Program.

Comment 1: In general, USEPA believes the Land Learning Foundation (LLF) has the qualifications to establish a potential ILF program in Southern Illinois
ILF program.

Comment 2: Table 1 outlines LLF's request for advanced stream and wetland credits in each of the proposed service areas. LLF explains that the numbers in the table (80,000 advanced stream credits per service area) represent 30% of the anticipated stream credit demand for a normal year. LLF cites public notices from several Corps Districts as justification for requested advanced wetland credits. However, no supporting information is given to justify the total anticipated stream credit demand of 266,667 credits. Public notices from other Corps Districts are not sufficient in projecting localized credit sales due to different development pressures and resource quality and quantities between Districts. Additionally, impacts proposed during the public notice period likely differ from permitted project impacts. LLF should provide additional information to justify the appropriateness of the proposed advanced credit amounts. This may include an analysis of recently and historically permitted 401 and/or 404 impacts within the proposed service areas.

LLF has sponsored a Stream and Wetland ILF Program in the state of Missouri since August 2015. From experience, although helpful, projections from historical permit demand have been largely inefficient in providing the up-front revenues necessary for a non-profit to fund single-site, comprehensive mitigation solutions, within varying watersheds. Due to a lack of advanced stream and wetland credits available, the Program requested an amendment to the ILF Program (a lengthy process) for additional credits to offset the impact of smaller, less advantageous credit sales. Rather than deny requests for smaller credit sales that disadvantage larger impacts, the Program sells credits for any size impact. To prevent the need for additional advanced credit requests in the near future, the program projected that 80k stream credits per watershed is sufficient to address upfront revenues needed to fund initial projects.

Comment 3: Table 2 described the proposed credit generation ratios for mitigation activities undertaken in individual projects. Restoration via re-establishment and rehabilitation are both proposed at a credit generation ratio of 1:1 results in a gain in aquatic resource function but not area. According to the 2008 Federal Mitigation Rule (Rule), restoration via re-establishment results in both a gain in wetland functions and acreage while rehabilitation only results in a gain in wetland function but not acreage. For these reasons, a credit generation ratio of 1:1 is appropriate for re-establishment and a ratio of 1:2 is appropriate for rehabilitation. Corrected.

Comment 4: A credit generation ratio of 1:2 is proposed for wetland enhancement. According to the Rule, enhancement most often focuses on increasing one particular wetland function with no gain in acreage as opposed to rehabilitation which focuses on returning full natural or historic wetland function. For these reasons, a credit generation ratio of 1:3 is appropriate for wetland enhancement. Corrected.

Comment 5: According to the Rule, the compensation planning framework must contain an analysis of current aquatic resource conditions in the proposed service area, supported by an appropriate level of field documentation. The information provided in the proposed Compensation Planning Framework contains much of the information required by the Rule. However, an analysis of current aquatic resource conditions, supported by an appropriate level of field documentation specifically for wetlands is lacking or absent. Additional information on current wetland conditions should be provided. Additional information provided.

Comment 6: LLF states that in the rare event site protection cannot be executed through fee title acquisition or a perpetual easement, two 20 to 30-year alternative protection instruments are proposed. The goal of the Rule is to ensure permanent protection of all compensatory mitigation project sites. The proposed alternative site protection instruments are inconsistent with the goals of the Rule as they do not afford sufficient site protection. They are inappropriate as site protection instruments and should be removed from the Compensation Planning Framework. Removed.

Comment 7: Under the section titles Historic Aquatic Loss in the Cahokia-Joachim Rivers Watershed, LLF discusses a primary source of lead contamination and heavy metal contamination in Joachim Creek but does not discuss aquatic habitat loss within the watershed. Additional information is needed on historic wetland and stream loss within the Cahokia-Joachim Rivers watershed. Wetland loss information in other sections is heavily generalized. Additional information from sources such as the National Wetland Inventory and USFWS Wetlands Status and Trends reports should be utilized. Additional information added.

Comment 8: Detailed information on credit pricing and associated justification must be proposed before an instrument can be approved. Detailed information on determining the cost per unit credit is located in 40 CFR 230.98(o)(5)(ii). Credit costs should be re-evaluated, at minimum, on an annual basis. Information on credit pricing will be provided to USACE.

Comment 9: Information clearly stating the legal responsibility for compensatory mitigation should be included. The permittee will retain responsibility for providing compensatory mitigation until the appropriate numbers of credits have been secured (with full payment) from the proposed LLF ILF and USACE has received documentation that the LLF ILF has accepted the responsibility for providing the compensatory mitigation. Information added to Section III.a

Comment 10: LLF states that the compensatory mitigation for permitted impacts will be constructed within the watershed that the impact occurred within three years of receiving mitigation credit responsibility. This language should be changed to LLF shall obtain adequate site ownership or formalized access and site protection agreements and initiate biological and physical improvements within three full growing seasons of the date of the final sale of the first advance credit. Language included under "Service Areas" section.

Comment 11: Uses of funds paid to LLF by applicants must be explicitly stated. These uses should include site selection, planning, IRT coordination, design, ecological and cultural resource coordination, acquisition, implementation, monitoring, management and protection of ILF projects as approved by the District Engineer. Info provided in Section III.j.

Comment 12: The right of the Corps of Engineers to audit ILF account records should be explicitly stated. The last paragraph of section VI explicitly states records will be made available for auditing and examining entities during normal business hours. The Corps, specifically, was added per your request.

CONTRACTOR QUALIFICATIONS

The In-Lieu Fee Program (ILF program) as operated and administered by The Land Learning Foundation will be under the sole ownership of the LLF and supported by a long-term In-Lieu Fee Program Management Agreement with MITICO, LLC (MITICO) of Two CityPlace Dr., Ste. 200, St. Louis, Missouri 63141. The LLF (in and through the actions and experiences of its current and past board members) and MITICO (in and through the actions and experiences of its principals, affiliates and contractors) have amassed a significant track record in the areas of environmental land analysis and acquisition, wetland and riparian restoration under the guidelines of the Wetland Reserve Program and current and past mitigation rules as put forth by the United States Army Corps of Engineers (USACE).

Below is a list of proposed Mitico, LLC and other participating contractor qualifications, including the actions and experiences of current and past board members of the Land Learning Foundation:

- Larry Pollard, The Land Learning Foundation
- Phil Bach, Wildhorse Riverworks, Inc.
- Donald Baker, Water Resources Solutions
- Lakeya Brantley, Mitico, LLC
- Dr. Timothy D. Keane
- Matt Roth, On-Site Soils

Larry Pollard

President, Land Learning Foundation

George L. "Larry" Pollard is the current chairman and president of the LLF. Larry has extensive experience in the preservation and enhancement of land and water resources. It is the career experiences in natural resources and the work in recent years with nonprofit associations that will continue to make LLF a success. His experiences, in a sequence from current and ongoing to past accomplishments and education are outlined below:

Since 1998 Larry has drawn together a collaborative effort to create the Chariton County Community Foundation. They were formally recognized as a 501(c)(3) public foundation in fall of 1998. Their purpose is to be a major instrument of philanthropy for community betterment in Chariton County, Missouri. Highlighted achievements the foundation is associated with include establishing county wide 9-1-1 emergency notification, planning and constructing new medical clinic facilities in Brunswick, developing and providing an economic development program for the county, encouraging and assisting a community development program for Brunswick Community and managing a number of scholarship and community betterment funds within the Foundation.

From 1998 to 2003 Larry served as an independent sales representative for Truax Drill Company of Minneapolis, MN. He provided technical assistance teaching and demonstrations on native prairie vegetation re-establishment using the Truax Seeding Equipment.

In 1996 Larry worked out of the Chariton County, University of Missouri Extension Office engaged in developing Small Businesses related to agricultural value added enterprises. He formed a collaborative effort to create the Chariton County Historical Tourism Council. Their purpose is to preserve and promote historic and natural resources of Chariton County for tourism as a county economic vehicle. They were recognized as a 501(c)(3) educational charitable organization in 1996.

From 1990 to 1994, he served as Regional Wildlife Biologist supporting USDA Soil Conservation Service (now NRCS) for the eleven state Midwest region. Larry was responsible for planning, training, development of technical materials and technical support for SCS conservation programs. He also developed and carried out several wetland restoration training programs and provided technical inputs to the Wetland Reserve Program (WRP). He retired from SCS in April 1994.

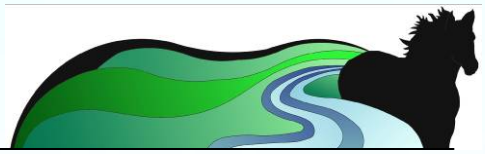
From 1976 – 1990: Larry served as State Wildlife Biologist supporting USDA Soil Conservation Service in Minnesota. He was responsible for personnel training, developing technical materials, and support for SCS conservation programs in Minnesota and primarily the

USDA Waterbank Program.

1969 – 1976: Served on various field, area and state office staffs for USDA Soil Conservation Service in Missouri and Oklahoma.

1965: Earned a Bachelor of Science in Agriculture degree with majors in Wildlife Biology and Soil Science.

Wildhorse Riverworks, Inc.



STATEMENT OF QUALIFICATIONS

1. **Stream Assessment**
    a. **Stream Visual Assessment Protocol (SVAP)**
    b. **Riparian Proper Functioning Condition (PFC)**
    c. **Bank Stability Analysis and Erosion Prediction**
2. **Fluvial Geomorphology Training**
3. **Stream Assessment Training**
4. **Stream and River Rehabilitation**
    a. **Geomorphic Surveys**
    b. **Natural Channel Design**
5. **Riparian Buffer and Filter Design**
6. **Total Station Surveys**
7. **Stream Rehabilitation**
    a. **Soil Bioengineering**
        i. **Brush Layering**
        ii. **Brush Mattress**
        iii. **Live Cribwalls**
        iv. **Live Fascines**
        v. **Live Poles**
        vi. **Live Stakes**
        vii. **Live Siltation**
        viii. **Vegetated Geo-grids**
        ix. **Root Wads**
        x. **Log Vanes**
    b. **Large Wood Debris (LWD)**
    c. **Bendway Weirs**
    d. **Rock Vanes**
    e. **Longitudinal Peaked Stone Toe Protection (LPSTP)**
8. **Stream and River Rehabilitation**
    a. **Natural Channel Design**
9. **Wetland Assessment**
10. **Wetland Design**

May 2011

Wildhorse Riverworks, Inc.
Phil Balch, President
11821 NW 13th Street
Topeka, Kansas 66615

COMPANY BACKGROUND

Wildhorse Riverworks, Inc. (WRI) was incorporated in 2004, but did not begin operation until July 2008. WRI offers a full range of stream and wetland project assistance from the initial site assessment and survey to project design, installation, and planting. Phil Balch is the president and principal of Wildhorse Riverworks, Inc. (WRI). Much of the accomplishments and project history were performed by Mr. Balch during employment with previous firms or agencies.

KEY ACCOMPLISHMENTS

- Member of the Original Kansas Wetland and Riparian Area Program
    - Oversight Team member of the 1st Kansas Riparian Inventory and Mapping Effort - 1995
- Project Manager for Geomorphic Assessment and Classification of Kansas Riparian and Stream Systems and Assessment, Geomorphic Definition and Documentation of Kansas Stream Corridor Reference Reaches in the State of Kansas. Funded through EPA Wetland Grants – through the Kansas Water Office and State Conservation Commission.
- Primary author and editor of Kansas Stream Corridor Management Guide.
- Taught Annual Stream Assessment Classes in Kansas and Missouri 2003 – 2010
- Lectured and Taught Stream Rehabilitation and/or Assessment at National & International Conferences 2004 - 2010 in California, Florida, Louisiana, Minnesota, Ohio, Pennsylvania, and Texas.
- Completed surveys and designs on 336 stream and wetland projects in Colorado, Georgia, Kansas, Nebraska, Missouri, Montana, Mississippi, North Carolina and Wyoming.
- Designed over 70.3 miles of streambank rehabilitation projects or natural channels.
- Designed over 562 acres of riparian habitat
- Designed more than 86 acres of created wetlands.

PROJECT EXPERIENCE

Mr. Balch has over 20 years of experience in the fields of wildlife biology, biological sciences, stream assessments, soil bioengineering, streambank stabilization and riparian restoration.

Before starting Wildhorse Riverworks, Inc., Mr. Balch was a founding partner in The Watershed Institute, Inc., a natural resource consulting group. Prior to helping form the Watershed Institute, he served over 10 years with Kansas State Conservation Commission as the Riparian and Wetland Protection Program Coordinator. While working at the Commission, Mr. Balch developed and expanded the Riparian and Wetland Protection Program. This program provided Kansas landowners technical and financial assistance for various practices such as riparian fencing, alternative livestock water supplies, wetland restoration and creation, riparian buffers and filters, and streambank stabilization. Mr. Balch was responsible for the design and creation of seven stream model trailers in Kansas and numerous others throughout the United States. These trailers were distributed throughout the state and are used for public education on fluvial geomorphology, stream dynamics, and proper stream management. He was also responsible for the creation and development of a statewide Riparian Technical Team. This inter-agency, inter-disciplinary team coordinated training and served as an interagency communication link on various agencies stream activities. To date, Mr. Balch was been responsible for the primary design and construction over-sight for stabilization, riparian restoration and wetland projects on small streams and major rivers (for both rural and urban sites) including the Arkansas, Big Blue, Cottonwood, Kansas, Little Blue, North Platte, Neosho, Republican, and Smoky Hill.

Mr. Balch was the project manager for two statewide stream research projects: The Geomorphic Assessment and Classification of Kansas Riparian and Streams Systems and Assessment, Geomorphic Definition, and Documentation of Kansas Stream Corridor Reference Reaches. Phil is the primary author and editor of the *Kansas Stream Corridor Management Guide*. Currently, Mr. Balch has been responsible for surveying and designing 336 stream and wetland projects totaling over 70 miles of stream rehabilitation, 562 acres of riparian habitat, and over 86 acres of wetlands. He has also been involved in training courses on the subjects of stream

assessment and streambank rehabilitation in Ohio, Kansas, Florida, Missouri, Louisiana, and California. In addition to Kansas streams, Mr. Balch as been involved with stream restoration project design and installation in Colorado, Mississippi, Missouri, Montana, Nebraska and Wyoming along with designing wetland projects in Kansas and Missouri.

TECHNICAL TRAINING

Wildland Hydrology (Dave Rosgen)
Applied Fluvial Geomorphology
River Morphology and Applications
River Assessment and Monitoring
River Restoration and Natural Channel Design

U.S. Environmental Protection Agency
Wetland Plant Identification

Robbin B. Sotir and Associates
Soil Bioengineering for Streambank Stabilization

U.S. Army Corps of Engineers (David Derrick)
Streambank Stabilization
Advanced Streambank Stabilization

USDA – Farm Services Agency
Wetland Delineation

U. S. Forest Service
Designing for Aquatic Organism Passage

Certifications
Open Water Scuba

TECHNICAL SKILLS

Stream Surveys
Total Station and Laser Level

EMPLOYMENT HISTORY

Wildhorse Riverworks, Inc. July, 2008 to Present
The Watershed Institute, Inc. May, 2005 – July, 2008
Tetra Tech EM Inc. July, 2003 – May, 2005
Kansas State Conservation Commission, Riparian and Wetland Coordinator, December 1992 – July 2003
The Nature Conservancy, Assistant Manager of the Gray Ranch, January 1992 – December 1992
Kansas State University, Assistant to Extension Wildlife Specialist, September 1989 – December 1991

EDUCATION

BS, Wildlife Biology, Kansas State University

PUBLICATIONS

4-H Fisheries and Wildlife Projects for the Great Plains, Cooperative Extension Service, Kansas State University. 154 pp.1990.
Kansas Stream Corridor Management Guide, Kansas State Conservation Commission. 44 pp. 2000.

AFFILIATIONS

The Kansas Chapter, Wildlife Society
River Management Society
Kansas Alliance for Wetlands and Streams
Trout Unlimited

Fluvial Geomorphology Surveys, Stream Classification, and Stream Assessments

Geomorphic Survey – Wakarusa River – Kansas


Geomorphic Survey – Republican River - Kansas


Stream Assessment Training – Missouri - 2008


Bank Erosion Pin Installation – Butler County, Kansas


Streambank Project Survey – Big Blue River – Kansas


Streambank Stability Assessment – Little Ark River — City of Wichita, Kansas - ASR II

Project Photos

Native Riparian Planting – Little Blue River – Kansas

Native Riparian Planting – Little Blue River - Kansas

Rock Vane Stabilization – Little Blue River – Kansas

Bendway Weir Stabilization – Republican River - Kansas

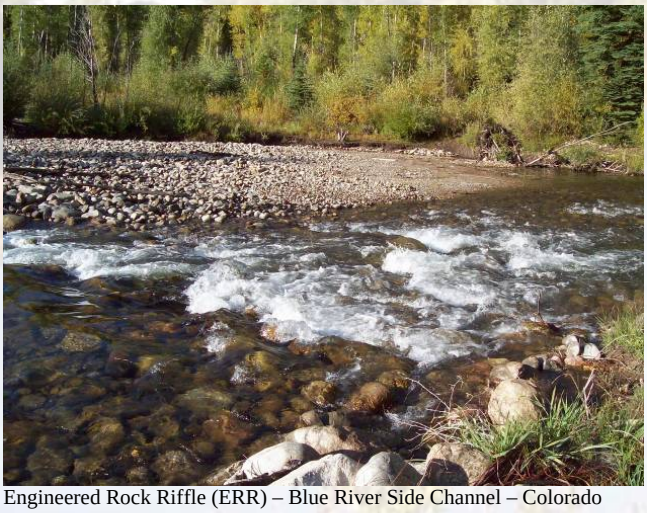
Bendway Weir Stabilization – Little Blue River – Kansas

Riparian Native Grass Filter Strip – Republican River - Kansas

Natural Stream Designs

Large Wood Debris (LWD) Stabilization – Republican River – KS

LWD – Root wad Stabilization – Sharps Creek – KS



Engineered Rock Riffle (ERR) – Blue River Side Channel – Colorado

Engineered Stream Channel – Waste Water Polishing – Grant Co., KS

Step Pool Channel for Aquatic Organism Passage – Montana

Longitudinal Peaked Stone-Toe Protection (LPSTP) Little Blue River

Soil Bioengineering

Willow Brush Mattress – Johnson Co. KS

Phil Balch -Vegetated Geo-grid Installation– Wyandotte Co. KS

Vegetated Geo-grid – Pottawatomie Co. KS

Live Cribwall – Pottawatomie Co. KS

Live Stakes – Little Blue River – Washington Co. Kansas

Live Stakes – Republican River – Clay Co. Kansas

Wetlands

Permanent Wetland – Cherokee County, Kansas

Seasonal Wetland – Butler County, Kansas

Floodplain Wetland Meramec River – St. Louis Co. Missouri

Phil Balch – Project installation – Goodwin Creek - Batesville, MS

Floodplain Wetland, Ninnescah River - Reno County, Kansas

Water Resources Solutions

DONALD W. BAKER, P.E., D. WRE, CPESC

Principal & Owner

Specialization: Stormwater Planning and Design, Natural Stream Channel Design, Hydraulic Structure Design, Erosion Control, Wetlands, Irrigation Design, Water Rights

Education:

B.S., Engineering Physics, Colorado School of Mines, 1989

B.S., Agricultural Engineering, Colorado State University, 1991

M.S., Civil Engineering, University of Kansas, 2004

Professional Registration:

Kansas, Missouri, California, Colorado, Nebraska, Illinois

Certified Professional in Erosion and Sediment Control (CPESC)

Professional Associations:

American Public Works Association, American Society of Civil Engineers, Environmental & Water Resources Institute, Society of American Military Engineers, International Erosion Control Association

Professional Recognition:

American Academy of Water Resources Engineers – Diplomate, 2007

Total Years of Experience:

19

Don Baker is a professional engineer specializing in all aspects of stormwater planning, management, and design, hydraulic structures design, stream, lake and wetland restoration and water quality. He has been involved in irrigation design, water rights, and water supply studies. His primary focus is on stream and river engineering and restoration, water quality, and hydraulic structures design. He holds the prestigious Diplomate, Water Resource Engineering, awarded to him by the American Academy of Water Resources Engineers.

Project Experience

STREAM RESTORATION/FLUVIAL GEOMORPHOLOGY

2011

Wyoming-Nebraska State Line Bendway Weir Study

Nebraska Community Foundation

Principal/Project Manager/Hydraulic Engineer –Currently completing feasibility study and final design project to provide bank stabilization and to provide improved hydraulic conditions for weir measurement structure on the North Platte River. A two-dimensional hydraulic model to model the river hydraulics and sediment transport is part of the project. The project also includes the development and use of a physical hydraulic model to refine the results obtained from the two-dimensional computer model.

2010

Stream Restoration Projects

Kansas State Conservation Commission

Principal Water Resources Engineer – Engineer of record for 20 stream bank stabilization projects in the Big Blue and Cottonwood River basins in eastern Kansas. These projects involve severely eroding stream banks that are adversely affecting adjacent agricultural property. The stabilization projects are funded under the Environmental Quality Incentives Program (EQIP) and by the Kansas State Conservation Commission.

2010

Five Mile Creek Sewer Crossing at Wellington

City of Leavenworth, Kansas

Principal/Project Manager – Managed design of the first project from the Muncie Road Drainage Study. This project included the design of stream stabilization facilities to protect three exposed sanitary sewer main adjacent and crossing the tributary of Five Mile Creek. The facilities included Engineered Rock Riffles, and Longitudinal Peak Toe Stone Protection. In addition, planting and seed mixes were designed to prevent erosion on the stabilized channel slopes.

2010
SCC Stream Restoration Projects
Kansas State Conservation Commission
Principal Water Resources Engineer – Engineer of record for six stream bank stabilization projects on the Smoky Hill River in Geary County, the Kansas River in Riley County, and Spring Creek in Wabaunsee County. These projects involve severely eroding stream banks that are adversely affecting adjacent agricultural property. The stabilization projects are funded under the Federal Fiscal Year (FY) 2008 Environmental Quality Incentives Program (EQIP). In addition, assistance will be provided to the EQIP participant to secure all necessary permits, including those from the U.S. Army Corps of Engineers (USACE); the Kansas Department of Agriculture, Division of Water Resources; and the Kansas Department of Health and Environment (KDHE). The project team will develop a KDHE Stormwater Pollution Protection Plan.

2009 - 2010
Muncie Road Drainage Study
City of Leavenworth, Kansas
Principal/Project Manager – Managed the Muncie Road Drainage Study that included a detention analysis for a watershed tributary to Five Mile Creek, the hydraulic sizing of and RCB for a proposed stream crossing, and a stream stability evaluation and concept plan. The report for the project provided recommendations for future detention in the watershed, and a concept plan to stabilize the degrading stream in the watershed and manage the sediment transport through the watershed.

2008
Peetwood Park Stream Restoration
Mission Hills, Kansas
Principal Water Resources Engineer – Designed stream restoration project for approximately 800 linear feet of Brush Creek in Mission Hills, Kansas. The project is a City demonstration project to illustrate the implementation of the City's stream master plan. Partial funding of the project is provided by Kansas Department of Health & Environment, and Johnson County Stormwater Program. The project includes the construction of a stable planform and bed slope for the stream through the City's Peetwood Park. Stone grade controls provide the vertical control of the stream bed.

2008
Soldier Creek Diversion Unit Repair
U.S. Army Corps of Engineers
Engineering Manager – Managed the engineering for the study and design of the stream stabilization of Soldier Creek in Topeka, Kansas. The project included the design of 2.5 miles of stream and 7.5 miles of levee repair due to damage from a large flood event in 2005. The

stream design included the design of a stable geomorphic planform and grade. Grade controls and flood benches were designed for the stream.

2007-2008
Pope Branch Stream Restoration
District of Columbia Water and Sewer Authority
Engineering Manager – Responsible for managing the stream restoration design of the approximately one-mile long Pope Branch stream in Washington, D.C. The restoration coincides with the relocation and rehabilitation of a sanitary sewer through the valley that has been exposed due to stream degradation. The stream restoration design includes stabilization of high-bank valley walls, grade control structures, and stream re-alignment. The design also includes the restoration of a wetland at the downstream end of the project.

2006-2008
Three Mile Creek Stream Restoration
Leavenworth, Kansas
Engineering Manager – Managed the award-winning stream restoration design for Three Mile Creek at Landing Park. A severe flood event severely scoured Three Mile Creek at the Missouri River and eroded and destroyed much of Landing Park adjacent to Three Mile Creek. The stream restoration included the design of an energy dissipation basin to protect two sanitary inverted siphons beneath the creek, and bank stabilization. The design also included restoration of native vegetation to prevent erosion of the stream banks and to improve the natural habitat along the restored creek. In addition, Landing Park was restored to the original layout before the flood.

2006-2007
Rock Creek Watershed Planning Study
U.S. Army Corps of Engineers
Engineering Manager – Managed the study of the Rock Creek Watershed in northeast Johnson County, Kansas. The study consisted of stream stability assessment, BMP site location and water quality monitoring elements. The stream degradation assessment consisted of field observations recorded on a handheld GPS device using ArcPad. A methodology used to locate, characterize and prioritize stormwater best management practices (BMPs) using GIS data was developed. This methodology uses GIS data and analysis tools in ArcView GIS to find and rate potential locations where structural stormwater BMPs could be implemented. The study deliverables will result in prioritized watershed improvements, conceptual designs and estimated costs.

2005-2006
City Creek - Inland Feeder Pipeline Protection
Los Angeles Metropolitan Water District
San Bernardino County, California
Senior Water Resources Engineer – Reviewed sediment transport and scour analysis of City Creek above the existing Inland Feeder water supply pipeline where the creek has degrade several feet in just a few years. Responsible for developing conceptual design for the facilities to prevent damage to the pipeline as a result of scour. Alternatives analysis for the concept designs included the analysis of single vs. multiple grade controls and a complete stream stabilization concept. The recommended alternatives included a temporary riprap revetment and the complete stream stabilization project. Final design for the project has been delayed.

2005-2006
Mission Hills Creek Masterplan
City of Mission Hills, Kansas
Project Manager – Managed the project that included a channel degradation assessment and conceptual design improvements. Supervised a field biologist to integrate aquatic and terrestrial habitat quality, water quality and channel stability indicators to rate stream degradation conditions. Supervised the hydraulic analysis and stream restoration conceptual designs.

Supervised the development of a GIS database that includes stream assessment results and proposed improvements. Designed and programmed a GIS-based field data entry form using ArcPad.

2005-2006
Davison Channel Improvements
City of Kansas City, Missouri
Project Engineer – Supervised the design of stream channel restoration improvements that included a stream alignment improvements and bank stabilization for a high-bank slope failure. The stream restoration included the design of step-pools with grade controls and planform geometry Permit applications to the Corps of Engineers were required for the project. The project hydraulics were modeled using HEC-RAS.

2004-2005
Kansas River Intake Jetty Study
Water One -Water District No. 1 of Johnson County
Lenexa, Kansas
Project Manager – Supervised the study of the District's jetty to a long-term solution to the stability issues of the jetty/grade control structure in the Kansas River. The project involved a breach analysis of the jetty/grade control to determine likely causes of the 2004 breach. The

project also evaluates several alternatives to stabilize the jetty/grade control and to minimize the chance of future failures.

2004-2006
Manchester Park Improvements
City of Lenexa, Kansas
Project Manager – Supervised the design of American Public Works Association Project of the Year winning parks improvements that included a trail, native vegetation areas, stormwater wetland and stream restoration. The stream restoration included the design of step-pools with grade controls and planform geometry Permit applications to the Corps of Engineers along with a Notice of Intent to the Kansas Department of Health and Environment were required for the project. The project hydrology and hydraulics were modeled using HEC-HMS and HEC-RAS.

2003
Indian Lane Low-Water Crossing Improvements
City of Mission Hills, Kansas
Project Manager/Project Engineer – Supervised the structural design of a quadruple 5'x2.75' RCB low-water crossing to replace an existing low-water crossing, and supervised the design of sedimentation retaining wall for an existing bridge. Designed bank stabilization and conservation culvert associated with the project. Bank stabilization design included the use of native plants. Designed riprap energy dissipater for the culvert and a grade control to protect existing sanitary sewer pipe from scour.

2002
Missouri River Intake Siltation Solutions
City of Mandan and Tesoro Refining & Marketing Co., North Dakota
Engineer – Completed a "desktop" fluvial geomorphology assessment of the Missouri through the Mandan/Bismarck, North Dakota, area to determine the cause of a water supply intake sedimentation issue. Assisted with the development of alternatives and cost estimates to address the sedimentation issue.

2001-2002
Urban Stream Restoration of Gypsum Creek Watershed
City of Wichita, Kansas
Project Manger - Supervised the stream and watershed analysis that included a fluvial geomorphic or stream stability analysis, a wetland and riparian zone analysis and a public information plan. The purpose of the analysis was to develop alternatives that improve water quality in Gypsum Creek and recommend the best alternative. A design workshop was held with stakeholders to develop and evaluate the potential restoration alternatives for the project. The City completed a water

quality and aquatic life sampling program. The success of the proposed improvements will be gauged on the improvement of water quality and the increase in aquatic life.

1998 – 2000
83rd Terrace, Rosehill to Pflumm
City of Lenexa, Kansas
Project Manager - Managed the design of bioengineered channel improvements, enclosed pipe systems and detention facility to control residential street flooding, house flooding, streambank erosion, and utility disruption. The project included the stabilization 3 slope failures. The upstream detention facility was not only be used for flood control, but will also limit the low flows in the channel to help control erosion. The detention facility will be used to mitigate and enhance an existing wetland.

1998 – 2000
84th Street and State Line Road
City of Leawood, Kansas
Project Manager - Managed the design of this stormwater improvements project to reduce house and yard flooding, arterial and residential street flooding, and stream bank erosion. The projects consisted on approximately 600 linear feet of double cell 10'x4' reinforced concrete box, and approximately 400 linear feet of bioengineered stream channel improvements.

1996 – 2000
Brush Creek, Mission Road to Indian Lane
City of Prairie Village/Mission Hills, Kansas
Project Engineer/ Project Manager - Designed and managed stream channel improvements for this bioengineered channel project. Improvements were originally designed to reduce flooding to adjacent churches and arterial street flooding, and stabilize eroding stream channel banks. Project was re-defined to improve street drainage facilities and stabilize stream channel. Responsible for construction administration activities.

Lakeya N. Brantley

2615 Frances Avenue ◦ St. Louis, Missouri 63114 ◦ 912.222.4069 ◦ lbrantle@gmail.com

SUMMARY OF QUALIFICATIONS

- JD/MBA, Admitted to the Missouri Bar
- Taxation and Business Transactional Concentrations
- Excellent written/verbal communicator
- Detail-oriented
- Strong legal research/reasoning
- Legal advisory skills
- Team-player

EXPERIENCE

Mitico, LLC, St. Louis, Missouri
General Counsel **November 2013-Present**
Legal Associate, Compensatory Mitigation **May 2011- November 2013**

- Negotiating, drafting, and executing agreements and contracts
- Advising management within company on project compliance, contract statuses, and legal risks
- Developing regulatory compliance with laws and regulations
- Ensuring project compliance and drafting mitigation monitoring reports for clientele and regulatory agencies
- Keeping abreast of changes in legislative and regulatory environments
- Serving as a liaison between Mitico and regulatory agencies

United States Department of Commerce, United States Embassy Santo Domingo, Dominican Republic
Intern, Foreign Commercial Service (FCS) **July 2013- August 2013**

- Researched Caribbean-wide government regulations and initiatives in renewable energy policies
- Drafted a pilot Caribbean Renewable Energy Resource Guide for the Dominican Republic, Haiti, the Bahamas, Jamaica, Barbados and the Eastern Caribbean, and Trinidad and Tobago on behalf of the FCS

Financial Industry Regulatory Authority (FINRA), Atlanta, Georgia
Legal Extern, Department of Enforcement **May 2013-June 2013**

- Worked closely with senior counsel to provide regulatory guidance memoranda regarding federal securities laws, FINRA, and N ASD rules and regulations
- Worked closely with senior counsel to conduct legal research regarding FINRA-member securities law violations
- Drafted Office of Disciplinary Affairs memoranda detailing securities violations and proposed sanctions
- Drafted letters of Acceptance, Waiver, and Consent in proposed settlement proceedings

Appeals Office of the Internal Revenue Service, St. Louis, Missouri
Legal Extern **August 2012- December 2012**

- Drafted memoranda explaining hazards of litigation for IRS and taxpayers on complex tax issues
- Attended Tax Court proceedings and taxpayer and Appeals Officer conferences
- Conducted extensive legal research on various tax issues for regional IRS Appeals officers

St. Louis University School of Law, St. Louis, Missouri
Faculty Fellow
Appellate Advocacy Faculty Fellow for Professor Paige Canfield **Summer & Fall 2012**

- Researched and briefed moot court problems concerning statutory and constitutional issues for law school courses in Moot Court I and II

Research Faculty Fellow for Professor Anders Walker **Summer 2012**

- Conducted faculty publication research using the social science abstract research (SSNR) database and researched tenure policies for public and private university professors

EXPERIENCE (continued)

United States District Court for the Eastern District of Missouri, St. Louis, Missouri
Judicial Extern, Honorable Judge Nannette Baker **January 2012- May 2012**
Judicial Intern, Honorable Judge Nannette Baker **June 2011- August 2011**

- Conducted extensive legal research regarding criminal, procedural, statutory, and regulatory issues
- Assisted with drafting opinions and other documents
- Attended Rule 16 conferences, discovery hearings, and oral arguments to obtain notes for pending cases
- Reviewed medical transcripts to synthesize information for social security appeals

Department of the Army, Aviation and Missile Command, Redstone Arsenal, Alabama
Federal Career Intern, Logistics Management Specialist **January 2010- July 2010**

- Trained to analyze standard and statistical reports to determine performance trends
- Utilized SAP to track and update equipment inventory at U.S. Army arsenal locations
- Applied knowledge of maintenance and supply management to develop improved methods and procedures of equipment transportation
- Ensured effective equipment readiness of the U.S. Army

EDUCATION

Saint Louis University School of Law, Saint Louis, Missouri
Juris Doctor, Concentrations: Taxation & Business Transactional Law, **December 2013**
GPA: 3.00/4.0

- *Honors*: Dean's Scholar Scholarship (2010-2013); Scovel Richardson Scholarship (2012)
- *Law Review*: St. Louis University School of Law Journal of Health Law & Policy, *Staff Editor* (2012-2013)
- *Activities*: Moot Court I & competitive Moot Court II (2011-2012); Thurgood Marshall Mock Trial Competition, *Placed 4th in Region & Received Highest Individual Scores on Team* (2012); Theodore McMillian Inns of Court, *Pupil* (2012-2013)

Saint Louis University John Cook School of Business, Saint Louis, Missouri
Master of Business Administration, Concentration: Finance, **May 2013**
GPA: 3.49/4.0

- *Honors*: John Cook School of Business Scholarship; Service Through Leadership Scholarship (2012)
- *Activities*: Service Leadership Program, *Graduate Assistant* (2012-2013)

University of Alabama at Birmingham, Birmingham, Alabama
Bachelor of Science: Management & Marketing minor **May 2009**
GPA: 3.43/4.0

- *Honors*: Golden Key International Honors Society
- *Activities*: University Student Government Association; Community Volunteer; Full-time work

PROFESSIONAL MEMBERSHIPS

Missouri Bar Association, *Licensed Attorney* (April 25, 2014)
Bar Association of Metropolitan St. Louis, *Member* (2010-2014)
Mound City Bar Association, *Member* (2010-2014)

COMMUNITY INVOLVEMENT

Juvenile Detention Center, *Volunteer,* St. Louis, MO, August 2010-present
Conservation Federation of MO, *Elected, Board of Directors*, St. Louis, MO, June 2014-present
SLU Law Barrister's Club, *Board Member*, St. Louis, MO May 2014-present

CURRICULUM VITAE

Dr. Timothy D. Keane, Associate Professor
of Landscape Architecture/Regional and Community Planning

EDUCATION:

1981 Bachelor of Science in Landscape Architecture, Iowa State University
1983 Master of Landscape Architecture, University of Michigan
1990 PhD in Landscape Architecture, University of Michigan

PROFESSIONAL DEVELOPMENT/TRAINING:

Training Courses on Fluvial Geomorphology: Dave Rosgen, Wildland Hydrology, Pagosa Springs, CO.:

I. Applied Fluvial Geomorphology, Salina, KS, May 2000
II. River Morphology and Application, Pagosa Springs, CO, August 2000
III. River Assessment and Monitoring, Pagosa Springs, CO, August 2001
IV. River Restoration and Natural Channel Design, Pagosa Springs, CO, Oct. 2002

Field Teaching Assistant : Level III : River Assessment and Monitoring, Missoula, MT. Sept. 2005, August 2006, August 2007, August 2008. Training course on advanced fluvial geomorphology : Dave Rosgen, Ph.D. Wildland Hydrology.

Workshop: A Geomorphic Approach to Natural Channel Design in River Restoration, St. Paul, MN, Sept. 2004.

Corps of Engineers, Manhattan, KS, June 2002 Stream Investigation, Stabilization and Design Workshop, Dave Derrick, U.S. Army

Design and Construction of Bendway Wiers and Vanes on the Ninnescah River Workshop, John McCullah and Phil Balch, Kingman, KS June and July 2002

Workshop: Stream Investigation, Stabilization and Design. U.S. Army Corp of Engineers, Water Operations Technical Support Program, June 4-7, 2002

Workshop: Design and Construction of Bendway Weirs and Rock Vanes on the South Fork of the Ninnescah River (Utilizing the Continuous Berm Machine), June 10-11, 2002.

Field Assessment – Streambank Stabilization, Little Blue River, Washington County, Kansas, with Dave Derrick, Research Hydraulic Engineer, U.S. Army Corp of Engineers and the Kansas State Conservation Commission, Aug 2003.

Conference: Self-Sustaining Solutions for Streams, Wetlands, and Watersheds, American Society of Agricultural Engineers, Sept. 2004, St. Paul, MN

From 2002 -2004 I worked as a consultant to a state agency as well as an environmental engineering firm on an EPA grant to measure and assess the geomorphic parameters of stable, reference reach streams across various hydrophysiographic provinces of the state of Kansas.

PROFESSIONAL ACTIVITY:

NRES Capstone Project: Stream Stabilization, Elm Creek, KS
NRES Capstone Project: Stream Stabilization, Fancy Creek, KS
West Branch, Mill Creek, KS: Stream Stabilization Design
The Homestead, a rural residential facility for the mentally challenged—horticultural therapy and skills training
NRES Capstone Project: Stream Stabilization, Deep Creek, KS NRES
Capstone Project: Stream Stabilization, McDowell Creek, KS
Manhattan Parks Dept., KS Ephemeral Channel Design and Installation
Wildcat Creek Watershed Analysis and Ecological Planning
"Kansas River Reconnection" Manhattan downtown development plan
Development and installation of a fluvial geomorphology training reach on Kings Creek, Konza Prairie, for middle school and high school researchers. This work also involved training of several docents in stream dimension and pattern measurements.
Stream Survey Consultant, Kansas State Conversation Commission, Topeka, KS
Fluvial consultant, Applied Ecological Services, Kansas City office
Stream Survey Consultant, The Watershed Institute, Tetra-Tech EMI, Topeka, KS
Erosion control, resource and range management consultant, Civitas LLC, Manhattan, KS
Affiliate-The Watershed Institute: a non-profit group devoted to the study and application of river rehabilitation and sustainable management.

SPONSORED PROJECT AWARDS:

Hargrove, B., Downey, L., Keane, T., and Middendorf, J. Service and Learning: Creating a model for watershed based water quality improvements through community and college/university partnerships, $142,230. 2/1/05 – 2/1/06

Devlin, D., Mankin, K., Barnes, P., Keane, T. "Measuring Success of a TMDL Implementation Plan: Land, Stream, and Economic Responses to Targeted Stakeholder Actions", $584,899. 10/05 – 10/08.

Hutchinson, S., Keane, T. "Green Technologies for Urban Stormwater Management",Johnson Co. KS. Approx. $125,000.

Hutchinson, S., Keane, T. "Green Technologies for Urban Stormwater Management" City of Mission, KS. Approx. $125.000.

Mankin, K., Keane, T., Devlin, D., Barnes, P., Marston, R., Neel, J., Christian, M., Hargrove, W. "Land Stream Sediment Process Restoration in an Agricultural Watershed." USDA CSREES. $599,804.00. 9/06 – 9/09.

Nelson, N., Keane, T., Barnes, P., Pierzynski, G. "Watershed Level Assessment of Soil, Sediment, Management and Geomorphologic Effects on Phosphorus Loading to Surface Waters". Fertilizer Research Fund. $228,000.

J. Schuessler, Hutchinson, S., Keane, T., Dods, D., O'Hara, M. Multi-Variate study of Stormwater BMPs. USGBC Research Grant, Green Building Research Fund. $149,768.

SPECIAL HONORS, RECOGNITIONS AND AWARDS:

1991 KSU Department of Landscape Architecture Teacher of the Year Award
1994 KSU Department of Landscape Architecture Teacher of the Year Award
1997 KSU Department of Landscape Architecture Teacher of the Year Award
2003 KSU Department of Landscape Architecture Teacher of the Year Award
1994 Wayne McElwee Teaching Award, College of Architecture and Design, KSU
1994-1995 Recognized as an "Extraordinary Teacher" in a college alumni survey
2005 CAPD Wayne Hunt McElwee Teaching Award
2006-2007 The Mary Jarvis Chair in Landscape Architecture, Faculty Member of Distinction

PUBLICATIONS:

(Refereed, past 4 years)

2003 Do artificial nests reveal meaningful patterns of predation in Kansas grasslands? The Southwest Naturalist, September 2003. R.J. Robel, J.P. Hughes, Tim Keane, and K.E. Kemp.

(Non-refereed, past 4 years)

2004 Learning from Nature's Stability: Building a multi-purpose database applicable to stream assessment, restoration, and education. Proceedings of the American Society of Agricultural Engineers, "Self-Sustaining Solutions for Streams, Wetlands, and Watersheds".

2004 "Hydrologic Impacts of Wind Power Development in the Flint Hills of Kansas" (Abstract) accepted for presentation at the International Association of Landscape Ecology conference (Unable to attend to present paper).

ON-SITE SOILS, INC.

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EMPLOYMENT HISTORY

ON-SITE SOILS, INC
1998 to 2013
Soil Scientist / Vice-President
Responsible for:

- Soil Morphology Reports
- Wetland delineations / Mitigation Planning
- Vegetation surveys
- Mitigation bank planning and development
- Managing and scheduling two soil scientists

SCI ENGINEERING
1995 to 1998 Soil Scientist
Responsible for:

- Soil Morphology Reports
- Wetland delineations / Mitigation Planning
- Managing and scheduling two soil scientists

PROFESSIONAL AFFILIATIONS:

Missouri Association of Professional Soil Scientists (MAPSS)
Society of Wetland Scientists.

PROFESSIONAL CERTIFICATIONS:

Certified Professional Soil Classifier - Missouri Association of Soil Scientists
Soil Scientist - Missouri Dept. of Health and Senior Services

EDUCATION:

1994 Missouri State University, B.S. Agronomy (Emphasis in soil science)

Activities: Missouri State University Soil Judging Team
Pi Kappa Alpha Fraternity

PRESENTATIONS

"Suitable Soil Textures for Absorption Trench Backfill" East Missouri Small Flows Organization (Hillsboro, MO October 2009**)**

"Waters of the U.S. – What is a Jurisdictional Waterbody" East Missouri Small Flows Organization (Hillsboro, MO May 2010)

"Redoximorphic Features and Seasonal High Water Tables" East Missouri Small Flows Organization (Hillsboro, MO Oct 2012**)**