REQUEST FOR PROPOSAL

Shoemaker Island Flow-Sediment-Mechanical "Proof of Concept" Experiment Implementation Design Technical Support, Monitoring, and Data Analysis

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Office of the Executive Director
4111 4th Avenue, Suite 6
Kearney, Nebraska 68845

June 21, 2012

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PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
REQUEST FOR PROPOSALS

SUBJECT:	Shoemaker Island FSM "Proof of Concept" Implementation Design Technical Support, Monitoring and Data Analysis
REQUEST DATE:	June 21, 2012
PRE-PROPOSAL MEETING:	July 17, 2012
CLOSING DATE:	July 30, 2012
POINT OF CONTACT:	Jason Farnsworth Headwaters Corporation (308) 991-7602 *farnsworthj@headwaterscorp.com*

I. OVERVIEW

The Platte River Recovery Implementation Program (Program) was initiated on January 1, 2007 between Nebraska, Wyoming, Colorado, and the Department of the Interior to address endangered species issues in the central and lower Platte River basin. The species considered in the Program, referred to as "target species", are the whooping crane, piping plover, interior least tern, and pallid sturgeon. Program participants have reached an agreement for participation in the First Increment of the Program for the period from 2007 through 2019.

A Governance Committee (GC) reviews, directs, and provides oversight for activities undertaken during the Program. The GC is comprised of one representative from each of the three states, three water user representatives, two representatives from environmental groups, and two members representing federal agencies. The GC has named Dr. Jerry Kenny to serve as the Program Executive Director (ED). Dr. Kenny established Headwaters Corporation as the staffing mechanism for the Program. Program staff are located in Nebraska and Colorado and are responsible for assisting in carrying out Program-related activities.

The Program's management objectives are to 1) improve survival of whooping cranes during migration, 2) improve least tern and piping plover production, and 3) avoid adverse impacts on pallid sturgeon in the Lower Platte River. One of the Program's management strategies to achieve these objectives is the Flow-Sediment-Mechanical (FSM) management strategy. The FSM strategy includes the following management actions:

1. Flow – Augment Q1.5 through flow releases to create short duration high flows (SDHF) of 5,000 to 8,000 cfs for 3 days in 2 out of 3 years.

2. Sediment – Augmentation of approximately 150,000 tons of medium sand annually to offset sediment deficit upstream of Kearney.

3. Mechanical - Channel widening, clearing and leveling of in-channel islands and flow consolidation (85 - 90% of 8,000 cfs in a single channel).

The Program has committed to using the process of adaptive management (AM) to reduce uncertainty associated with the ability of management actions to create and/or maintain habitat for the Program's target species. This is achieved by explicitly acknowledging uncertainty in the form of alternative hypotheses of management action performance and testing the hypotheses through implementation of management experiments. Uncertainty associated with implementation of the FSM management strategy is formalized in the Program's Adaptive Management Plan (AMP) in the form of physical process broad and priority hypotheses. Broad hypotheses that pertain to the FSM management strategy include:

PP-1: Flows of varying magnitude, duration, frequency and rate of change affect the morphology and habitat quality of the river, including:

- Flows of 5,000 to 8,000 cfs magnitude in the habitat reach for a duration of three days at Overton on an annual or near-annual basis will build sandbars to an elevation suitable for least tern and piping plover habitat;
- Flows of 5,000 to 8,000 cfs magnitude in the habitat reach for a duration of three days at Overton on an annual or near-annual basis will increase the average width of the vegetation-free channel;
- Variations in flows of lesser magnitude will positively or negatively affect the sandbar habitat benefits for least terns and piping plovers.

PP-2: Between Lexington and Chapman, eliminating the sediment imbalance of approximately 400,000 tons annually in eroding reaches will:

- Reduce net erosion of the river bed;
- Increase the sustainability of a braided river;
- Contribute to channel widening;
- Shift the river over time to a relatively stable condition, in contrast to present conditions where reaches vary longitudinally between degrading, aggrading, and stable conditions; and
- Reduce the potential for degradation in the north channel of Jeffrey Island resulting from headcuts.

PP-3: Designed mechanical alterations of the channel at select locations can accelerate changes towards braided channel conditions and desired river habitat using techniques including:

- Mechanically cutting the banks and islands to widen the channel to a width sustainable by program flows at that site, and distributing the material in the channel;
- At specific locations, narrowing the river corridor and increasing stream power by consolidating over 85 percent of river flow into one channel will accelerate the plan form change from anastomosed to braided, promoting wider channels and more sandbars.
- Clearing vegetation from banks and islands will help to increase the width-to-depth ratio of the river

These hypotheses provide a broad view of the possible changes in river morphology/channel characteristics that may be produced through implementation of FSM management actions. More detailed hypotheses that address uncertainty in underlying physical process relationships are formalized in the AMP as flow, sediment, and mechanical priority hypotheses. The Program has refined the list of priority hypotheses. Tier I physical process priority hypotheses include:

Flow #1: ↑ the variation between river stage at peak (indexed by Q1.5 flow @ Overton) and average flows (1,200 cfs index flow), by ↑ the stage of the peak (1.5-yr) flow through Program flows, will ↑ the height of sandbars between Overton and Chapman by 30% to 50% from existing conditions.

Flow #3: ↑ 1.5-yr Q with Program flows will ↑ local boundary shear stress and frequency of inundation @ existing green line (elevation at which riparian vegetation can establish). These changes will ↑ riparian plant mortality along margins of channel, raising elevation of green line. Raised green line = more exposed sandbar area and wider unvegetated main channel.

Flow #5: ↑ magnitude and duration of a 1.5-yr flow will ↑ riparian plant mortality along the margins of the river. There will be different relations (graphs) for different species.

Sediment #1: Average sediment augmentation near Overton of 185,000 tons/yr under existing flow regime and 225,000 tons/yr under GC proposed flow regime achieves a sediment balance to Kearney.

Mechanical #2: ↑ the Q1.5 in the main channel by consolidating 85% of the flow, and aided by Program flow and a sediment balance, flows will exceed stream power thresholds that will convert main channel from meander morphology in anastomosed reaches to braided morphology with an average braiding index > 3.

The AM process dictates that these hypotheses be tested within the construct of management experiments. Doing so provides a mechanism for prediction, implementation, and analysis of the performance of actions in achieving management objectives. More importantly, it also defines necessary action adjustments based on the range of possible performance outcomes. This ensures that the monitoring and analysis feedback loop is closed and actions are adjusted to improve performance.

Implementation design is the step in the AM process where experimental, civil, and monitoring and analysis designs are developed for a management experiment. This design process is critical to the success of management experiments because it provides a foundation for all subsequent implementation and evaluation actions and ensures that data collection and analysis inform management action decision making. Implementation design components include:

- **Management Action Review and Refinement** – Review proposed management action performance (and associated hypotheses) based on indicators and performance criteria from problem assessment phase and updated/improved conceptual modeling. Refine

performance expectations for management action components/designs based on updated modeling.

- **Experimental Design** – Perform statistical analysis of possible outcomes of management experiment based on refined understanding of performance expectations and remaining model/physical process relationship uncertainty. Use to develop experimental design that presents spatial and temporal distribution of actions (locations, replicates, etc) that are expected to provide information necessary to assess management action performance and facilitate decision making.
- **Civil Design –** Design and permitting for management actions that will be implemented under the experimental design.
- **Monitoring and Analysis Design –** Development of conservation monitoring and data analysis plans for management experiment. Data will be used to evaluate performance.
- **Performance Evaluation –** Development of data analysis decision tree that defines management experiment performance criteria and dictates alternative courses of action under a range of possible outcomes.

The GC submits this Request for Proposals (RFP) to solicit proposals from Consultants to provide technical services in support of the development and implementation of an FSM "Proof of Concept" management experiment at the Program's Shoemaker Island Complex near Wood River, Nebraska. The scope of services includes 2-dimensional hydraulic and sediment transport model development and calibration, statistical analysis for experimental design, annual implementation and effectiveness monitoring, and synthesis and analysis of monitoring data in support of performance evaluation. The term Consultant shall be used throughout this document to describe both the RFP Respondent providing the proposal and Consultant (the successful Respondent) who would be performing the work upon award of the project.

II. PROJECT DESCRIPTION

In 2011, the Program began implementation of a FSM "Proof of Concept" management experiment at the Elm Creek Complex near Elm Creek, Nebraska. That reach was chosen as the first "Proof of Concept" site because flows are consolidated by the Kearney Canal Diversion and the presence of the diversion in the middle of the reach produces a range of hydraulic and sediment transport conditions. The Program has completed the first year of activities associated with that project, including development of monitoring protocols, 2-dimensional modeling, and pre/post runoff monitoring. Analysis of the first year of monitoring data has also been completed and the Program is working with the contractor to finalize the first year monitoring report and implementation design document for that project. While the first year of the management experiment at the Elm Creek Complex provided very useful data, there has been some concern that the presence of the diversion, as well as the general sediment deficit in the reach, may limit the Program's ability to apply learning at this location to other reaches. The Shoemaker Island FSM "Proof of Concept" project will provide another replicate of this management experiment in a reach that is in sediment balance and is not impacted by water development or transportation infrastructure.

The Shoemaker Island Complex includes an approximately 2.6-mile long reach of Platte River channel extending from approximately 1.5 miles downstream of the Highway 11 bridge to approximately one mile upstream of Alda Road as shown in **Figure 1**. The Program owns the north bank and associated accretion lands in this reach. The south bank is in Private ownership and the Program is working with these landowners to obtain permission to implement research and monitoring on their accretion lands. The complex is located in the downstream portion of the Associated Habitat reach where the channel is in sediment balance. Because of this, the Shoemaker Island Complex has been chosen for implementation of second replicate of a "Proof of Concept" management experiment to evaluate the performance of the FSM management actions in creating and/or maintaining channel characteristics that are consistent with the Program's management objectives. Learning objectives for the Shoemaker Island Complex management experiment include:

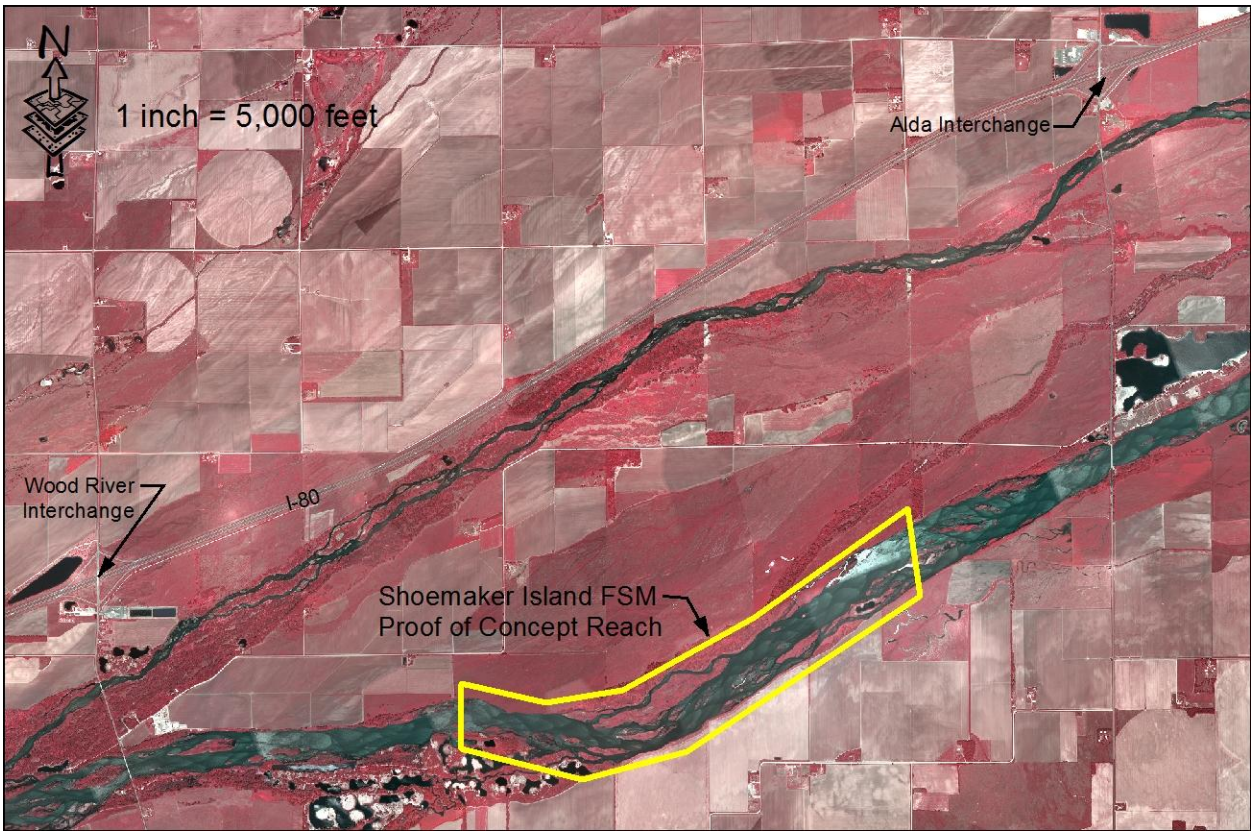

Figure 1. Shoemaker Island FSM Proof of Concept project reach.

1) ***Evaluate the relationship between peak flows (magnitude and duration) and sandbar height and area.*** Understanding the relationship between river stage at peak and sandbar height in relation to maximum water surface elevation are fundamental to testing the Program's FSM management strategy. The EIS analysis assumed that sandbars form to the water surface elevation during high flow events but that under the current flow regime, there is not enough difference between the 1.5-year return frequency flow elevation and the normal water surface elevation during the summer nesting months to create sandbars that are high

enough for nesting. As such, doubling the 1.5-year return frequency flow from approximately 4,000 cfs to approximately 8,000 cfs would increase bar heights by 30% to 50% as presented in Priority Hypothesis Flow 1.

Sandbar formation during the natural flow events of 2010 and 2011, which exceeded SDHF magnitude and duration, indicates that sandbars are not forming to the water surface elevation during high flow events. However, this has raised additional questions about:

- ***i)*** the relationship between sediment transport (surplus/deficit) and the frequency of sandbar occurrence,
- ***ii)*** the relationship between sediment grain size distribution and sandbar height potential, and
- ***iii)*** the role of hydrograph duration and shape in sandbar height.

2) ***Evaluate the relationship between peak flows (magnitude and duration) and riparian plant mortality.*** Understanding the relationship between flow and riparian plant mortality is fundamental to testing the Program's FSM management strategy. Modeling conducted during Environmental Impact Statement (EIS) development indicated that increasing the 1.5-year return frequency flow from approximately 4,000 cubic feet per second (cfs) to approximately 8,000 cfs through the use of SDHF in two out of three years (under sediment balance) would increase riparian plant mortality sufficiently to maintain wide, braided, unvegetated main channels with exposed sandbars. This relationship is presented in Program Priority Hypotheses Flow 3. Analysis of existing system and project-scale vegetation monitoring is ongoing. Preliminary results indicate a need to continue to evaluate the interaction between scour and inundation mortality as well as the role of lateral erosion in vegetation removal from sandbars.

3) ***Evaluate ability of FSM management strategy to create and/or maintain habitat for whooping cranes, least terns and piping plovers.*** Linking physical process relationships to target species habitat requirements is fundamental to development of management experiment performance criteria and action adjustments. The overarching Program objectives relate to target species survival and productivity. As such, Program management strategies must be capable of creating and/or maintaining river conditions that are suitable for achieving those objectives. Specifically, the FSM management strategy must be able to scour enough vegetation to maintain unobstructed view widths suitable for whooping crane roosting and build/maintain bars of sufficient height and lack of vegetation to function as least tern and piping plover nesting habitat.

As discussed in the overview, actions to be taken under the FSM strategy include flow releases, sediment augmentation, and in-channel mechanical actions (flow consolidation and channel manipulation). One-dimensional sediment transport modeling and system-scale geomorphology monitoring from 2009-2011 indicate that this reach is in sediment balance. Flow consolidation is not a potential management action in this reach due to the nature of the flow split upstream of the Highway 11 Bridge (approximately 70-80% of the flow at 8,000 cfs is consolidated in the main channel). The remaining potential FSM action at this site is in-channel clearing and leveling.

The Program has entered into management agreements with private and conservation landowners in the complex reach and has secured the ability to conduct in-channel vegetation control through mechanical disking and clearing. This provides the Program with the opportunity to evaluate the interactions/relationships between flow, sediment, and mechanical actions in this reach. Clearing and leveling of in-channel macroforms would be the primary mechanical actions associated with this management experiment and would likely commence in the fall of 2012.

III. SCOPE OF WORK

The Consultant will be responsible for providing technical services in support of the development and implementation of this "Proof of Concept" management experiment. General Consultant services to be completed for this RFP are as follows:

1) Technical Support for Management Experiment Implementation Design
   a) 2-dimensional hydraulic and sediment transport model development, calibration and sensitivity analysis for complex reach using an existing model platform (e.g., Bureau of Reclamation SRH-2D model, or other Program approved platform).
   b) Model application to refine expectations of management action performance.
   c) Perform statistical analysis of possible outcomes of management experiment based on model uncertainty. Use to develop experimental design that presents spatial and temporal distribution of possible mechanical vegetation treatments that are expected to provide information necessary to assess management action performance and facilitate decision making.
   d) Technical support for development of performance evaluation decision tree based on performance criteria and possible action adjustments.
2) Monitoring and Data Analysis
   a) Annual implementation of project-scale geomorphology and vegetation monitoring before and after an SDHF or natural flow event. The existing project-scale protocol for the Elm Creek FSM project is included as Attachment 1 for reference.
   b) Annual analysis of project-scale geomorphology and vegetation data to evaluate physical process relationships and management action performance. The existing data analysis and reporting plan for the Elm Creek FSM project is included as Attachment 2 for reference.
   c) Annual model refinements and updates based on monitoring data and analysis.
3) Reporting and Performance Evaluation
   a) Development of annual summary report and participation in AMP reporting sessions.
   b) Development of preliminary management experiment performance evaluation report following year-two implementation.

The final tasks and deliverables for the monitoring, analyses, and modeling will be developed jointly by the EDO and the Consultant. **This contract will be on a three year basis, with the option to renew, re-compete, or cancel at the discretion of the Program.**

PROJECT BUDGET

The Program has budgeted $250,000 for this project in calendar-year 2012. An estimated project budget should **NOT** be submitted in the proposal and proposals will not be evaluated based on cost. A final scope of work and project budget will be negotiated prior to commencement of work.

IV. CONTRACT TERMS

The selected Consultant will be retained by:

Nebraska Community Foundation
PO Box 83107
Lincoln, NE 68501

Proposal should indicate whether the Consultant agrees to the contract terms as outlined in the attached Program's Consultant Contract (Attachment 3), or provide a clear description of any exceptions to the terms and conditions.

The initial term of the contract will be for a period beginning in September 2012 and terminating in April 2015 with an option to renew at the sole discretion of the GC. Contracted services will be performed on a time and material not to exceed basis. Under the final contract, written Notice to Proceed from the Executive Director will be required before works begins. All work will be contingent on availability of Program funding.

V. SUBMISSION REQUIREMENTS

All interested parties having experience providing the services listed in this RFP are requested to submit a proposal.

Instructions for Submitting Proposals

One paper copy and one electronic (PDF) copy of your proposal must be submitted to Jason Farnsworth at the Program office in Kearney Nebraska *no later than 5:00 p.m. Central time on July 30, 2012.* Maximum allowable proposal PDF size is 8MB, and proposals are to be limited to a total of 50 pages or less. A proposal is late if received by the office any time after 5:00 p.m. Central time and will not be eligible for consideration.

Questions regarding the information contained in this RFP should be submitted to Jason Farnsworth at *farnsworthj@headwaterscorp.com*. A list of compiled Consultant questions and responses will be maintained on the Program web site (*www.PlatteRiverProgram.org*) in the same location as this RFP solicitation.

RFP Schedule

The ED Office expects to complete the selection process and award the work by approximately August 30, 2012. The following table represents the RFP schedule:

Description	Date	Time (Central)
Issue RFP	June 21, 2012	NA
Pre-proposal meeting	July 17, 2012	2:00 PM
Last day for respondents to submit questions regarding the RFP	July 20, 2012	5:00 PM
Proposals due from respondents	July 30, 2012	5:00 PM
Evaluation of proposals	July 31, 2012 thru September 1, 2012	
Award of Work	On or before September 15, 2012	

Pre-Proposal Meeting

A mandatory pre-proposal meeting of interested parties will be held on July 17, 2012 from 2:00 to 3:30 p.m. Central Time via conference call for the purpose of familiarizing the respondents with the work scope and requirements included herein before submitting a response to this RFP. Please email Jason Farnsworth (farnsworthj@headwaterescorp.com) for the conference call dial-in information along with a list of people from your party expected to join in the pre-proposal conference call by 3:00 p.m. Central Time on July 13, 2012.

The meeting will include a brief overview by the ED Office regarding the objectives of the project, the scope of services, and the timeline. It is the respondent's responsibility, while at the pre-proposal meeting/conference call, to ask questions necessary to understand the RFP so the respondent can submit a proposal that is complete and according to the RFP requirements. No minutes will be distributed by the ED Office regarding the meeting.

Proposal Content

Proposals should respond to the following general topics:

1) **Project understanding:** Discussion that demonstrates the Consultant's understanding of key physical process relationships and uncertainties to be addressed by this project and the adaptive management framework that will be used by the Program and the Consultant to address those uncertainties.

2) **Project approach:** Discussion of the Consultant's approach to achieving the learning objectives of this project including critical issues, tasks, or considerations that may have shaped your approach. This section should not be a reiteration of the general scope of work presented in Section III of this RFP. That scope was provided as general guidance and original thinking and/or discussion of improvements to that approach are welcome.

3) **Qualifications and project experience:** Provide project team organization, resumes/qualifications, and responsibilities. Identify relevant project experience including the involvement/role of the proposed team in those projects.

4) **Schedule:** Identify general schedule and critical issues for tasks in 2012. Given that the final scope will be developed following Consultant selection, the schedule discussion should focus on critical tasks, potential constraints or challenges and how event-based data collection will be accomplished by your team given the need to respond on short notice (e.g., following high flow events associated with snowmelt runoff and/or rainstorms).

5) **Conflict of interest statement** addressing whether or not any potential conflict of interest exists between this project and other past or on-going projects, including any projects currently being conducted for the Program.

6) **Description of insurance** shall be provided with the proposal. Proof of insurance will be required before a contract is issued. Minimum insurance requirements are described in the attached Program's Consultant Contract (Attachment A).

7) **Acceptance of the terms and conditions** as outlined in the attached Program's Consultant Contract, or clear description of any exceptions to the terms and conditions.

Criteria for Evaluating Proposals

The Governance Committee appointed a Proposal Selection Panel that will evaluate all proposals and select a Consultant based on the following principal considerations:

1. The Consultant's understanding of the overall physical process relationships and uncertainties to be addressed in this management experiment using an adaptive management framework.

2. The Consultant's approach to meeting the learning objectives of this project including identification of and addressing critical project tasks and issues.

3. Qualifications and the relevant experience of the proposed project team members and firm.

Award Notice

After completing the evaluation of all proposals and, if deemed necessary, interviews, the Proposal Selection Panel will select a Consultant. That firm will negotiate with the ED Office to establish a fair and equitable contract. If an agreement cannot be reached, a second firm will be invited to negotiate and so on. If the Program is unable to negotiate a mutually satisfactory contract with a Consultant, it may, at its sole discretion, cancel and reissue a new RFP.

Program Perspective

The Governance Committee of the Program has the sole discretion and reserves the right to reject any and all proposals received in response to this RFP and to cancel this solicitation if it is deemed in the best interest of the Program to do so. Issuance of this RFP in no way constitutes a commitment by the Program to award a contract, or to pay Consultant's costs incurred either in the preparation of a response to his RFP or during negotiations, if any, of a contract for services.

The Program also reserves the right to make amendments to this RFP by giving written notice to Consultants, and to request clarification, supplements, and additions to the information provided by a Consultant.

By submitting a proposal in response to this solicitation, Consultants understand and agree that any selection of a Consultant or any decision to reject any or all responses or to establish no contracts shall be at the sole discretion of the Program. To the extent authorized by law, the Consultant shall indemnify, save, and hold harmless the Nebraska Community Foundation, the states of Colorado, Wyoming, and Nebraska, the Department of the Interior, members of the Governance Committee, and the Executive Director's Office, their employees, employers, and agents, against any and all claims, damages, liability, and court awards including costs, expenses, and attorney fees incurred as a result of any act or omission by the Consultant or its employees, agents, sub-Consultants, or assignees pursuant to the terms of this project. Additionally, by submitting a proposal, Consultants agree that they waive any claim for the recovery of any costs or expenses incurred in preparing and submitting a proposal.

VI. AVAILABLE INFORMATION

The following pertinent Program-related documents can be accessed from the Program web site (*www.PlatteRiverProgram.org*):

- *Platte River Recovery Implementation Program, Final Program Document.* October 24, 2006.
- *Platte River Recovery Implementation Program, Attachment 3, Adaptive Management Plan*. October 24, 2006.

428 Attachment 1 – Project-Scale Geomorphology and Vegetation Monitoring Protocol
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PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM
Project-Scale Geomorphology and Vegetation Monitoring

I. PURPOSE

The purpose of project-scale geomorphology and vegetation monitoring is to document changes in channel geomorphology and vegetation parameters on an event-scale at specific project locations during the 13-year First Increment (2007-2019) of the Platte River Recovery Implementation Program (Program). Geomorphology monitoring includes documenting channel shape (including width), channel planform, channel degradation or aggradation, sediment grain sizes, and sediment loads. Vegetation monitoring includes documenting the existence and persistence of vegetation at project locations, the characteristics of existing vegetation (e.g., height, density, and elevation), and the response of the vegetation to high flows in the river.

The Program has committed to using the adaptive management (AM) process to reduce uncertainty associated with Program management actions taken to benefit the Program's target species which include the least tern, piping plover, whooping crane and pallid sturgeon. Monitoring of the implementation and effectiveness of management actions is a fundamental component of AM as it provides the data necessary to reduce uncertainty and facilitate better management decisions. This protocol will serve as the foundation for project-scale implementation and effectiveness monitoring for actions taken under the Flow-Sediment-Mechanical (FSM) management strategy which will include short-duration, high-flow releases (SDHF), sediment augmentation, and mechanical manipulation of the channel through flow consolidation, and various combinations of channel widening, vegetation clearing/discing, and island lowering. A more detailed discussion of the components of the FSM strategy and the uncertainties associated with strategy performance can be found in the Program's Adaptive Management Plan (PRRIP, 2006) and Adaptive Management Implementation Plan (PRRIP, 2011).

This monitoring protocol is intended to be implemented as a part of project-scale management experiments for FSM actions. Management experiments will be subject to a comprehensive implementation design process that will address all facets of experimental design, construction design, and monitoring and assessment of management actions. Data analysis methods and work products will be developed during implementation design for each management experiment and as such, have been omitted from this protocol. The result is a protocol for collection and synthesis of geomorphology and vegetation data that can be applied across sites and in support of a range of management experiments.

II. DESIGN CONSIDERATIONS

II.A. Area of Interest

The area of interest for project-scale geomorphology and vegetation monitoring consists of channels within an area 3.5 miles on either side of the centerline of the Platte River and tributary

basins for project site locations on the order of a few miles in stream length within the Program associated habitat area between Lexington and Chapman.

II.B. Definitions

The following Program-specific definitions are provided as clarification for terms used throughout this monitoring protocol.

- Accretion Zone – area encompassed by existing and former channels of the river.
- Active Channel – portion of the channel where inundation by water and movement of bed sediment occurs sufficiently often to maintain the area devoid of permanent woody vegetation.
- Cross Section – topography data on a line perpendicular to the main channel that traverses the active channel and the accretion zone.
- Flow Consolidation – at least 90 percent of flow occurs in one main channel at flow of 8,000 cfs.
- Green Line – edge of vegetation on a sand bar or adjacent to a wetted channel, defined by at least 25-percent vegetative cover.
- High Bar –a sand bar where *green line* is at a higher elevation than on surrounding bars, potentially due to high-flow sedimentation covering lower elevation vegetation.
- Left/Right Bank – the bank location as viewed looking downstream (may also be referred to as left/right descending bank).
- Main Channel – the river channel that conveys the most flow.
- Sand Bar – formation above water at a total Platte River streamflow of 1,200 cfs.
- Sand-bar Height – Vertical distance from the 1,200 cfs water surface to the median elevation of the sand bar (i.e., point at which 50 percent of the surface area is above and 50 percent is below)
- Section Data – topography data from either cross sections or transects.
- Stratigraphy – the arrangement of soil or alluvial strata as related to origin, composition, distribution, and succession.
- Thalweg – The line joining the deepest points of a stream or river channel.
- Transect – topography data on a line perpendicular to the channel that traverses the active channel and/or accretion zone, but does not include the portion of the floodplain with permanent, woody vegetation.
- Vegetation Assessment Plot – a roughly 2,150 ft^2 (or larger) plot on an individual bar that will be used to evaluate changes due to management actions.
- Vegetation Survey Zone – an area within the belt transect that includes active channel but generally excludes areas of permanent woody vegetation taller than 13 feet in height or other areas that are clearly beyond the effect of high-water flows.
- Vertical Cut Bank –edge of channel or sand bar that appears to have sloughed off, causing the *green line* to be higher than on surroundings and bars.

- Width-to-Depth Ratio – wetted width divided by the maximum channel depth at a given reference streamflow.

II.C. Data Collection Locations

Project-scale geomorphology and vegetation monitoring will be conducted at Program FSM management experiment sites, which will typically be located at Program habitat complexes. Management experiment reach length will range from approximately one to four miles and will encompass all active channel(s) of the Platte River. Transect locations at project sites will be densely spaced to provide sufficient data to document small-scale geomorphic and vegetation changes (approximate spacing of one active channel width). Sampling locations should also be selected to align with geomorphic features such as constructed or natural sand bars.

II.D. Key Data Required

- Flow rate, depth, velocity, and water-surface elevation
- Sediment transport (suspended load, bed load, and total load)
- Channel topography
- Vegetation type, density, and *green line* elevation on bars and channel banks
- Channel width
- Bar/island topography and morphometry
- Land-based photography
- Channel unobstructed view width

III. SAMPLING AND ANALYSIS METHODS

Data to be collected under this protocol are described below. Geomorphology and in-channel vegetation data should be organized by transect location. Interfacing geomorphology and vegetation data at a given transect will facilitate future analyses of the relationships between flow, sediment transport, and geomorphology and vegetation characteristics.

The flow rate at the most representative Platte River gage (i.e., closest gage with minimal intervening tributaries and diversions) should be specified in survey notes for each day of data collection under this protocol. Where available, the 15-minute or hourly resolution real-time data should also be obtained for the data collection period to provide a continuous record of discharge to aid in interpreting water-surface elevations. This is particularly important in areas that are affected by hydropower releases (**Figure 1**).

III.A. Topography

Project topography will be monitored by ground survey methods and ground-based photography. The locations of established control points and permanent benchmarks will be identified prior to conducting the surveys. Where control points or benchmarks have been destroyed, damaged, or are missing, those points will be established as part of the implementation of this protocol. In areas where there is insufficient survey control, new control points or permanent benchmarks

may need to be established. All benchmarks and control points will be established and monumented using standard survey techniques and criteria.

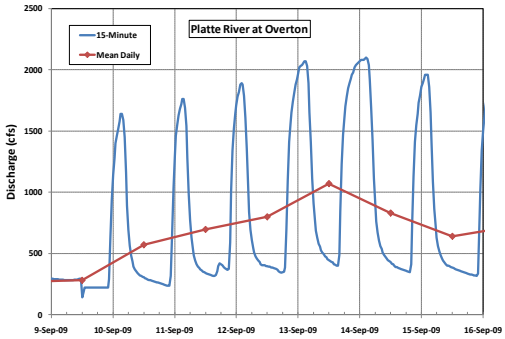

Figure 1. Sample 15-minute flow record for the Overton gage.

Ground surveys (transects and longitudinal profile of bars) will be completed to record channel morphology following significant flow events that may include either natural or augmented flows. Depending on project needs and the occurrence of high-flow events, the surveys may be completed as many as four times each year and a minimum of once each year. Ground surveys and longitudinal profile surveys of bars should occur during baseflow conditions due to difficulty and safety concerns when flows exceed 2,000 cubic feet per second (cfs), but the surveys can be conducted at other flows if circumstances require. Criteria for determining the timing (annual and opportunistic) of ground surveys will be developed as part of the implementation design for each individual project.

Ground Transects

Ground survey transects (cross sections) will be surveyed across the channel at a spacing of no more than one active channel width throughout the project site. Each transect will extend across all active channels and islands of the Platte River and will extend from the confining bank to confining bank, but will not include the upland portions of the cross section beyond the potential bank erosion/deposition zone. An example transect layout for the part of the Elm Creek Complex upstream from the Kearney Diversion Structure is provided in **Figure 2** to illustrate the relative density of the transects in relation to the channel dimensions. Two versions of the figure are provided to further illustrate how the configuration of the sand bars might change in relation to the transects in response to FSM actions (a – August 31, 2009; b – October 28, 2010, soon after completion of FSM actions). In addition, supplementary cross section and longitudinal transects and the perimeter at water's edge will be surveyed across each constructed or natural sand bar from water's edge to water's edge so that the topography of each sand bar can be accurately determined. Detail on the spacing and location of the sand bar cross sections is provided in the following sections. In conducting the surveys, care should be taken by the surveyor to minimize disturbance to the surfaces.

Repeat surveys should have similar resolution of surveys points to the baseline survey, with particular focus on changes in shape and topography of the bars.

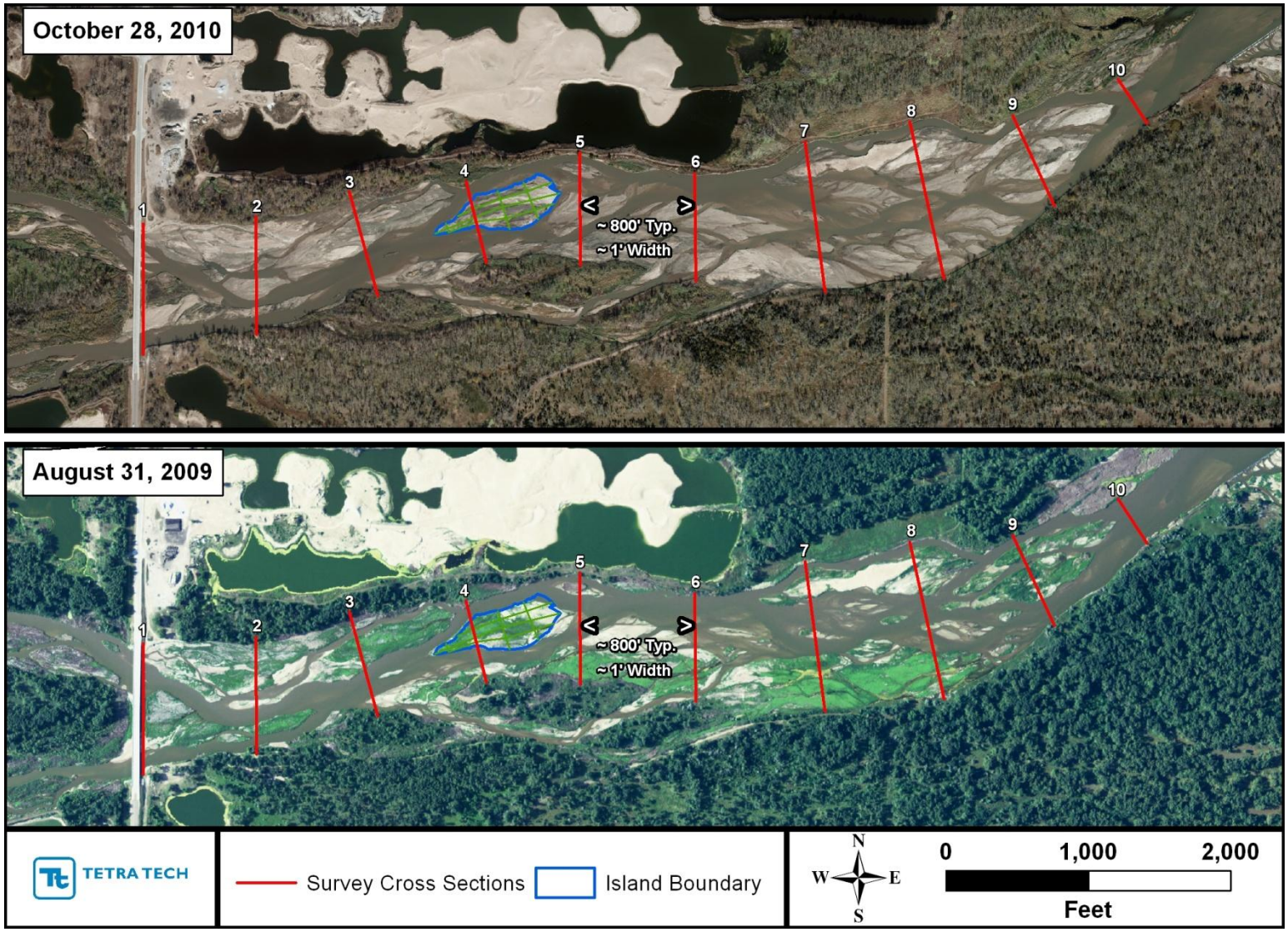

Figure 2. Illustration of example survey transect layout (Elm Creek Complex between Elm Creek Bridge and Kearney Diversion).

Ground Survey Methods

Primary River Transects

Ground surveys will be completed using a survey-grade global positioning system (GPS). The horizontal reference datum for all surveys will be the North American Datum of 1983 (NAD 1983) and the vertical reference datum will be the North American Vertical Datum of 1988 (NAVD 1988). Transect surveys will document the topography of features within the accretion zone, including the elevation and location of breaks in slope, banks, thalweg, bars, and islands.

Each transect will generally be oriented perpendicular to the principal flow direction and will extend through all channels. Doglegs in the transect line may be needed to insure that they remain perpendicular to primary flow direction in major side channels. However, future channel shifts may be problematic with regard to previously established dogleg alignments and accuracy in estimating volumetric changes relative to channel aggradation or degradation at a transect. As a result, the hinge points for doglegs should be established on relatively permanent surfaces (such as islands) and far enough from the active channel to avoid the effects of active bank erosion and long-term channel migration. Hinge points should also be monumented with marker pins. Once a dogleg has been established in the first survey event, the dogleg should be maintained and surveyed as-is throughout the project duration in order to provide data necessary to accurately estimate volumetric changes relative to channel aggradation or degradation at a transect. If significant lateral migration has occurred, it may also be necessary to survey an additional local transect in each split-flow channel that is perpendicular to the primary flow direction.

The location of the cross section will be delineated on the historic outer banks on both sides of the channel with a permanent metal marker (pin) set above the flood elevation and far enough from the active channel to avoid all but the most severe erosion effects. In reducing the survey data, the stationing for each survey point will be defined as the distance from the survey point to the left bank cross-section marker pin. The location of cross-section marker pins, survey monuments, and the extent of the survey beyond the pins will depend on accessibility and private property requirements and restrictions. The marker pins will be composed of 1/2-inch diameter rebar, approximately 36 inches long, driven flush with the ground surface, and topped with an aluminum cap that is stamped with the transect identification. The State Plane Coordinates (NAD83) and elevation (NAVD88) of each marker pin will be established with vertical and horizontal accuracies of 0.1 feet or less using standard survey techniques and criteria, and a detailed description of the location of each pin, including sketch of the surrounding area, will be documented in the survey notes. Depending on the type, location, and extent of Program activities and other potential natural or man-made disturbances, marker pins may be lost, damaged, or displaced over time, and will need to be reestablished as necessary during subsequent surveys.

The surveyor will take GPS readings of easting, northing, and elevation, and appropriately identify at least the following in the data recorder:

- top and toe of bank
- left and right edge of water
- main and secondary channel thalwegs
- all edges of water across the transect
- perimeter of each bar or island
- longitudinal transect along each bar or island from downstream to upstream
- bed or ground elevation along the cross-section transect
- green line (where vegetation cover exceeds 25 percent)
- edge of canopy of permanent woody vegetation > 5 ft tall
- any other significant geomorphic feature in the transect, including whether the flow is consolidated at the transect or if flow is split between multiple channels
- any other point of interest that has been requested by investigators, such as sample points

A standard set of survey codes will be developed by the Program and consultants, as appropriate that can be used across projects to facilitate interpreting the data.

Survey notes should also specify major substrates and general vegetation cover types and boundaries in the section or perimeter survey. When surveying topography in vegetated areas, a maximum height of vegetation will be recorded with the topography point to compute height of vegetation blocking observation view. To adequately define the channel bed, GPS readings will be taken at significant breaks in slope. In areas with no obvious breaks in slope, a GPS survey point will be recorded at least every 50 feet. Measurements during repeat surveys will be taken along the identical orientation of the original transect, as located by the permanent metal pins and the horizontal coordinates.

All transect survey data collected during each survey event will be downloaded and compiled electronically into spreadsheets for future use in identifying volumetric changes of the channel over time. The transect survey data will be differentiated as such in the spreadsheets. Survey points for each cross section will be documented in the spreadsheet by the State Plane easting and northing coordinate pair, elevation, and stationing from the left-descending bank marker pin. Sand-bar perimeter and longitudinal profile survey data will be stored in a separate "Sand Bar" tab in the spreadsheets. Sand-bar survey data will be organized by feature, and numbered from one to the total number of sand bars in the project reach, with one being the most upstream sand bar. Sand-bar longitudinal profile data will include easting and northing coordinate pair, elevation, and stationing from the upstream midpoint to the downstream midpoint. Sand-bar perimeter survey data will include easting and northing coordinate pair, elevation, and stationing from the upstream midpoint and proceeding clockwise around the sand bar. The State Plane zone, point identifiers, and comments will be included. Formatted transect point data and attributes will also be electronically uploaded and seamlessly incorporated into the Program database.

Sand-bar Topography

Additional survey data will be collected to define the shape and topography of all natural and constructed sand bars. The data will include cross-stream and longitudinal (i.e., parallel to flow) transects, the perimeter of each bar, and any supplementary survey points deemed necessary by

the surveyor to adequately define the topography of the bar surface[1]. The surveys will include a minimum of three cross-stream transects, with maximum spacing of 200 feet (**Figure 4**). For bars less than 1 acre in size, a single longitudinal transect will be surveyed from the midpoint of the upstream end of the bar to the midpoint of the downstream end of the bar, with doglegs as needed to run the transect through the highest "crest" of the sand bar. For bars larger than 1 acre in size, at least two additional transects will be surveyed approximately midway between the primary longitudinal transect and the water's edge on either side of the bar (**Figure 4**). In addition to cross-stream and longitudinal transects, the perimeter of the bar along the water's edge will also be surveyed. Additional survey points will be collected, at the discretion of the survey, to insure that the topography is adequately characterized. Ground photography will also be completed for each sand bar above the water-surface elevation at the time of the survey (**Section III.B.**).

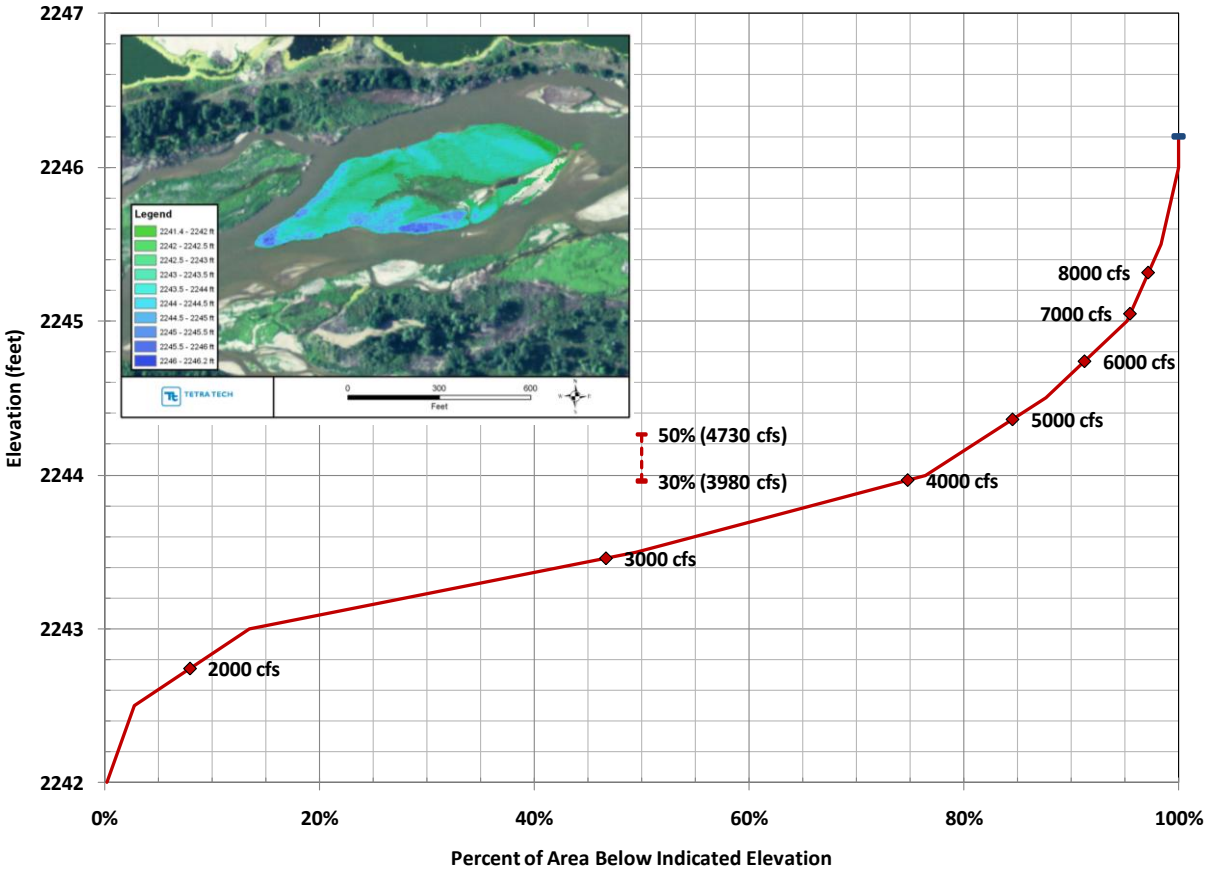

Figure 3. Typical Platte River sandbar showing a color-gradient surface model of the bar and the cumulative percentage of bar area falling below each elevation. The dashed line in the middle of the figure illustrates the required change in median elevation to achieve a 30- to 50-percent increase in median bar height.

[1] A key use of these data are to quantify bar height, both with respect to identifying the median bar elevation and assessing changes in the elevation distribution on the bar, both of which can be quantified by developing a surface elevation model of each bar from the topographic and/or LiDAR data, and computing the cumulate distribution of bar area with elevation (**Figure 3**).

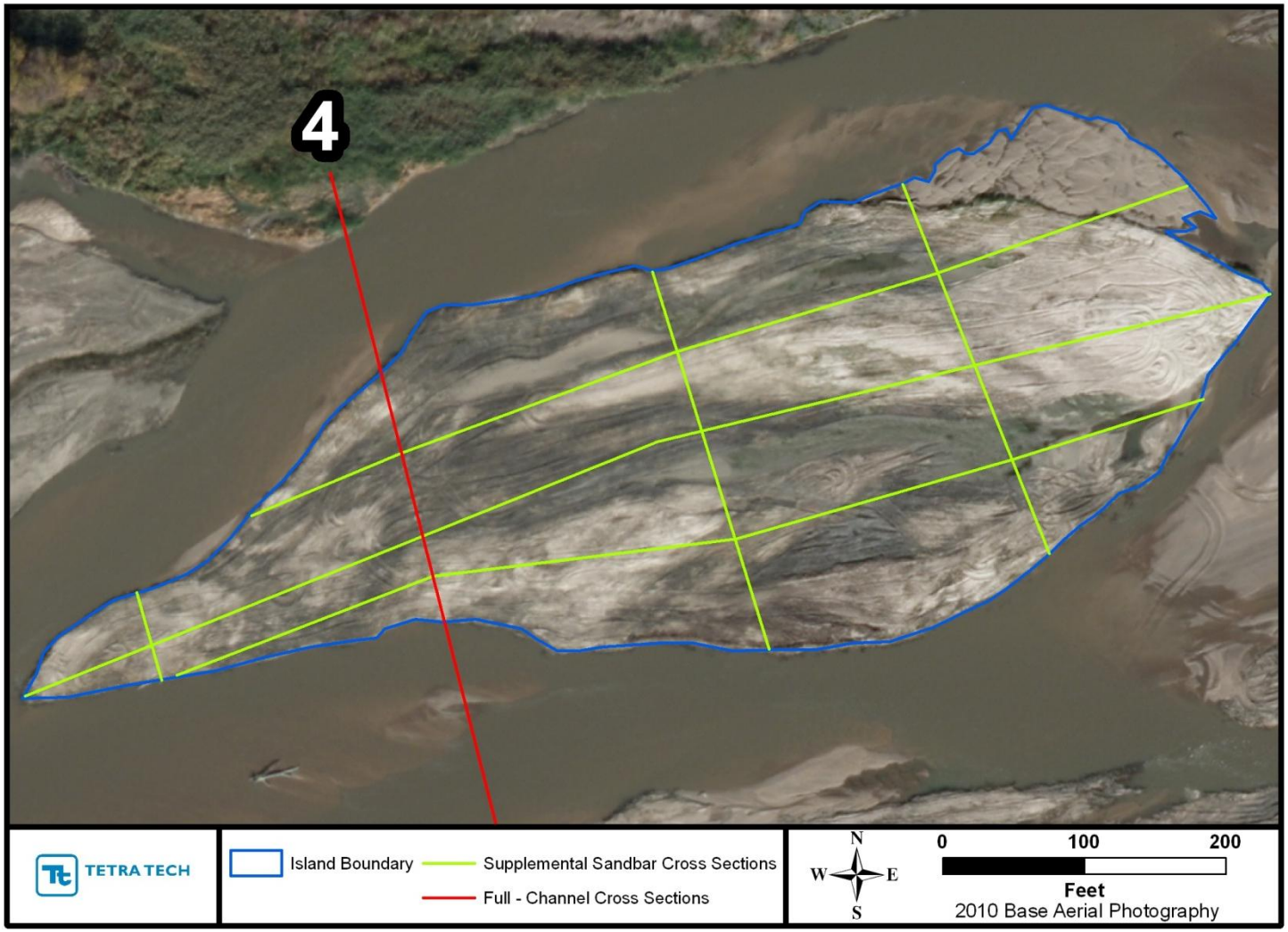

Figure 4. Example layout of longitudinal and supplementary transects at a typical sand bar.

III.B. Documentation of Bank and Channel Features Using Ground Photography

Ground photography will be conducted during each topography transect survey to document and describe bank condition, vegetation type and structure, sand-bar features, and the location of the main channel. Three photographs will be taken on each bank of the main channel from the survey point, with the photographs oriented across the channel and looking up- and downstream through the cross section. The up- and downstream oriented photo points should be located at least 25 feet from the cross-section line and a survey flag should be placed on the cross-section line for visual identification. Three photographs will also be taken on the perimeter of each sand bar, one at the upstream midpoint of the sand bar looking downstream across the bar, and one at the downstream midpoint of the sand bar looking upstream. If the entire bar is not visible in the photographs, additional photos will be taken with similar up- and downstream-oriented views from an appropriate location(s) in the middle of the bar so that the collection of photos cover essentially the entire bar. Additional photographs will document the banks of multi-channel sections and other key features, as appropriate. The location of the photo points will be documented with a hand-held GPS, and the transect and point identification, date, time, lens, azimuth, and waypoint number will be recorded for each photograph. Photographs will be cataloged after fieldwork and archived by the Program for use in clarifying changes detected by the topographic survey.

The Ricoh 500SE with an SE3 Compass/GPS module collects the required data and the digital image in a suitable format, and this equipment or approved equal is recommended for consideration for use in the monitoring efforts.

III.C. Bed and Bar Material Sampling

Bed and bar material samples will be taken during each topography survey event. Due to natural variation in grain sizes in river channels, multiple samples will be collected in the channel and on the bars to provide a well-distributed sample set to reduce uncertainty in bed and bar material data. The samples will be analyzed using standard laboratory sieve analysis. The location of each of the samples will be geo-referenced and the range of materials qualitatively described in the field notes. Bed-material samples will be collected as follows:

- Main channel bed samples – A minimum of two bed material samples will be collected in the main channel channels at every other surveyed transect, preferably at or near the channel thalweg (deepest portion of the channel).

- Sand bars – Samples will be collected from all emergent natural and constructed bars larger than 0.37 acres at each transect. If more than one transect crosses a bar, only one set of samples is required. One additional sample will also be collected in close proximity to the head of the bar. If a surface armor layer or coarse surface lag is present, this should be noted and the surface sampled separately prior to sampling the subsurface material.

Bed and Bar Material Sampling Methods

Bed-material sediment samples will be collected using a sampler that will retain material that accurately reflects the material in the upper 6-10 inches of the channel bed or bar. This includes the top 3 inches of the surface of the bed in order to provide similar data to the BM-54 cable-and-reel bed-material sampler used at bridge sections (Edwards and Glysson, 1999) and to sample bed material that is most readily available for transport.

One method of sampling is to use a rigid can or tube that contains slightly less volume than the sample bags (**Figure 5**). The can or tube should have a beveled end to allow for easy dredging and the other end should be open and covered with a very fine mesh screen or heavy filter cloth that traps all the sediment, but allows water to pass through. Using a sampler that has slightly less volume than the sample bags allows the entire sample to be placed directly into the bag without the potential for sorting or loss of fines. This would also allow for a similar volume of material to be sampled each time at each sample point. Other types of bed-material samplers and sampling procedures can be found in Bunte and Abt (2003).

Figure 5. Pipe dredge used to collect bed-material samples for the reach-wide geomorphic and vegetation monitoring project (Ayres and Olsson, 2010).

At each sample point, the can/tube dredge sampler is pushed vertically or diagonally into the bed of the river in the upstream direction until the sampler is full. All bed samples will be transferred to individual sample bags that are labeled with the transect ID, sample number, and the date the sample was taken. The location of the sample will be recorded with a handheld GPS. All samples will be transferred to a certified geotechnical lab and analyzed for grain-size distributions. The samples will be processed in accordance with ASTM Standard D422.

The results reported for each sample will be compiled in Microsoft Excel and will include the sample description, total sample weight, and the weight and percent passing for each of the sieve

sizes. The $D_{5,}$ D_{16}, D_{50}, D_{84}, D_{95}, and sorting (square root of D_{84}/D_{16}) of each sample will also be reported.

III.D. Vegetation Type, Density, and Green line

Vegetation surveys will be conducted up to four times each year, depending on the flow conditions, and a minimum of once each year, and will be completed simultaneously with the topographic survey to determine conditions after high-flow events.

Vegetation Sampling Methods

Vegetation sampling will be systematically targeted in the range of physical settings within the individual project site that identified based on elevation, sand-bar size, sand bar (mid-channel versus bank-attached). Initially, the sampling will be targeted to a series of elevations that correspond to the water-surface elevation at specific flows in the range between 1,200 and 8,000 cfs, based on the PRRIP LiDAR data and hydraulic model results. These zones are anticipated to produce distinct vegetation growth patterns that can be correlated with flow depths, velocities, and other factors.

Sample Design

A series of Modified Whittaker assessment plots (Stohlgren et al., 1995) of approximately 1000 m^2 each that represent the range of elevations and cumulatively occupy at least 10 percent of the total sand-bar area within the overall project site will be identified (**Figure 6**). The assessment plots will be located in several elevation zones that are equally distributed between the 1,200 cfs water-surface elevation and the water surface associated with either the highest elevation point on the sand bars or the 8,000 cfs water surface, whichever is lower. On smaller bars, where the 1,000 m^2 plot extends beyond the perimeter of the island, the size will be reduced to the perimeter boundary.

In the Modified Whittaker design, the 1,000 m^2 assessment plot has one 100 m^2 subplot, two 10 m^2 subplots, and ten 1 m^2 subplots nested within it (Stohlgren et al., 1995; Comiskey et al., 2000) (inset in **Figure 6**). The 100 m^2 subplot is located in the center of the plot, with the two 10 m^2 subplots in two opposite corners. The ten 1 m^2 subplots are distributed evenly around the edges as shown. The representation of species or mean percent cover by species can be plotted in a species-area curve (**Figure 7**) to demonstrate effectiveness of sampling based on the cumulative area sampled.

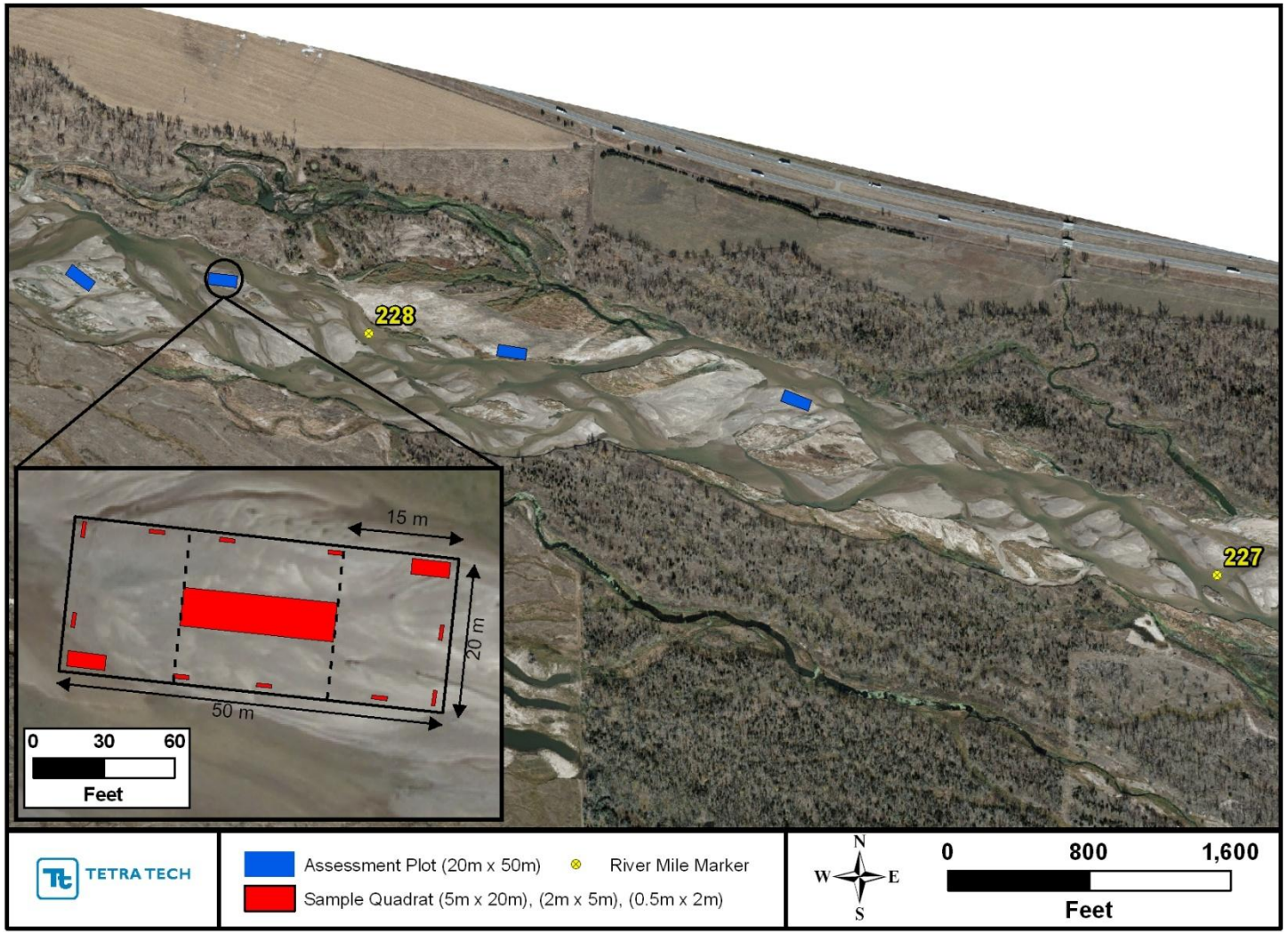

Figure 6. Aerial view of a portion of the Elm Creek Complex showing an example assessment plot layout. Inset shows an example sample quadrat layout within each assessment plot.

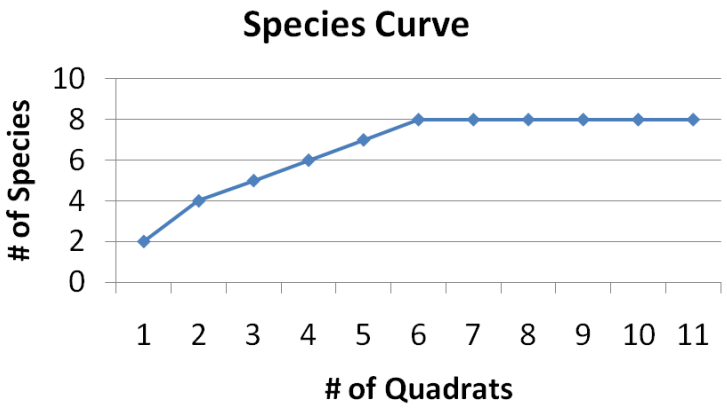

Figure 7. Typical species curve used to demonstrate species richness per sampling effort.

The Modified Whittaker plot design has been cited by many researchers as an effective sampling design to assess species presence and richness at multiple scales so that the data can be extrapolated over a large area. The design is also suitable for use in a variety of vegetation communities, and is very useful for establishing long-term plots for assessing trends associated with management actions or invasion of non-native species. As called for in the design, rectangular plots placed parallel to the environmental gradient tend to encompass more heterogeneity and include more species than round or square plots (National Institute of Invasive Species Science 2011).

Initial sampling will be conducted in late-April or early-May (prior to runoff)[2], and then repeat sampling will occur during the post-runoff period in late-July or August. Comparison of the pre- and post-runoff data will provide a means of assessing the effects of flows at the various bar elevations. In conjunction with the sampling, the horizontal and vertical locations of the corners of the assessment plots and the 100 m^2 subplot, and the center of each of the smaller subplots will be located using survey-grade GPS. To the extent possible, subject to changes in the islands, the pre- and post-runoff sampling will be conducted within the same assessment plots. Since the assessment plots are expected to slowly migrate with the sand bars over time; documentation of the boundaries from year to year will provide data to assess bars migration rates.

Specific data to be collected within each subplot will include the following:

- the horizontal and vertical coordinates of the sample point (using survey-grade GPS).
- a list of the species occurring within the sample area.

[2] Timing of sampling for the pre-runoff conditions will be balanced between flow conditions and stage of leaf-out of vegetation to ensure adequate identification of species present.

- The percent cover or basal area of each species[3].
- age class by species (annual for annual species).
- an estimate of the average height of the woody vegetation.
- an estimate of the average height of the herbaceous vegetation.

Additional notes will be made regarding *green line* elevation on the transects and any assessment plots that include the green line, including:

- Identification of whether the *green line* data point is on a vertical cut bank (GLVG), where the edge of a channel or bar appears to have sloughed off and where green line may be higher than for the surrounding area,
- Identification of whether the green line data point is on a high bar (GLHB), where green line is higher than for surrounding area potentially as a result of sedimentation covering vegetation at lower elevation, and
- Identification of whether the green line is for the main channel and which bank of the main channel (GLLM = green line for left bank of main channel, GLRM = green line for right bank of main channel), bars (GLB), or other features such as side channels (GLO).

III.E. Automated Stage Recorders

At least one automated stage recorder should be installed near the middle of the project reach to provide a continuous record of stage changes during the course of the experiment (**Figure 8**). In project reaches such as the Elm Creek Complex, where a significant hydraulic control occurs within the reach, it may be appropriate to install recorders at approximately mid-reach up- and downstream from the control. The decision to install additional recorders will be made during design phase of each individual project. The stage recorder(s) should be installed at a location where the cross-stream water surface is relatively flat and representative of the primary flow path (e.g., it should not be placed in a side channel where the water-surface profile is disconnected from the main channel or in a bend where superelevation of the water surface may occur at high flows). A manual staff gage should also be installed with the recorder, and the horizontal location and elevation tied-in to the topographic survey. The datalogger should be programmed to record the stage at a frequency of 1 hour or less. The water level on the manual gage should be recorder at the time of installation, on a daily basis during the monitoring surveys, and each time the site is visited to download the datalogger to provide a means of correlating water levels with the recorded data.

III.F. Flow Rate, Depth, and Velocity

If the project site is located more than five miles from an existing stream gage that measures the total discharge in the river or if significant diversions occur between the gage and the project site, streamflow measurements will be made at the beginning of each monitoring event at least one transect within the study reach that is in an appropriate location for such measurements. The

[3] If spring sampling occurs prior to significant leaf out or growth of species, basal area may be a more effective method of determining species representative area than percent cover. Basal area also allows for more accurate comparisons between years of differing climatic conditions.

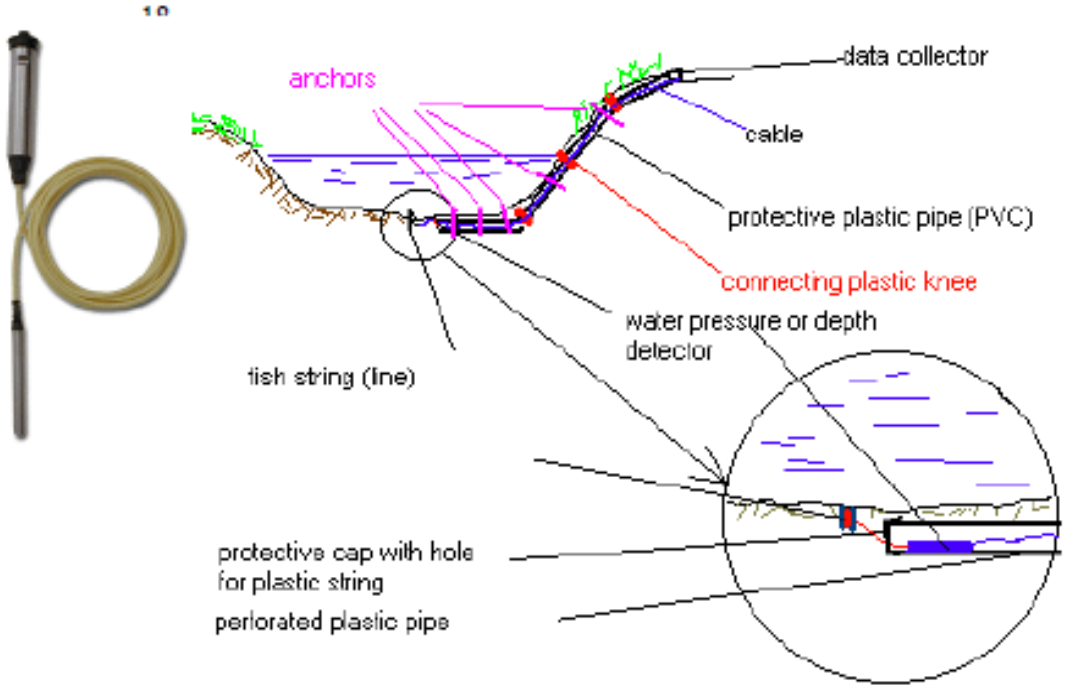

Figure 8. Typical installation of an automated stage recorder.

measurements can be made using standard propeller-type flow meters, electromagnetic flow meters (e.g., Marsh McBirney Flowmate 2000), or Acoustic Doppler Current Profilers (ADCP) following standard U.S. Geological Survey (USGS) flow measurement protocols (Turnispeed and Sauer, 2010; Oberg et al., 2005). The water-surface stage will be monitored during the survey period, and if it changes sufficiently to indicate a change in discharge of more than about 10 percent, the discharge will be re-measured.

III.F. Sediment Transport Measurements

The bed-material load (i.e., load of particle sizes in the sand and coarser size-ranges) is of principal interest in understanding channel change. Accurate measurements of bed load in sand-bed streams such as the Platte River are very challenging because of the formation and migration of bedforms (ripples and dunes) and the difficulty of lowering the sampler onto the bed without disturbing the surface in a way that entrains more sediment into the sampler than is actually moving along the bed. As a result more reliable estimates of the total bed-material load can typically be made using suspended-sediment load data with a suitable algorithm such as the Modified Einstein equation. The procedures for applying the Modified Einstein equation can be found in most sediment-transport textbooks, and application software is publically available from the USGS (MODEIN v1.4, dated 1/16/1994) and Bureau of Reclamation (BORAMEP).

Depending on the project specific needs, both depth-integrated sampling at a single vertical or across the width of the stream and automated pump sampling of suspended sediment may be conducted at a suitable location, preferably near the upstream end of the project reach. The depth integrated samples provide good representation of the average concentration in the water

column and the width integrated samples represent the average concentration across the channel, while the automatic pump samplers provide data at a single point in the stream. The depth-integrated samples are taken at relatively low temporal resolution because they require an on-site field crew, while the automatic pump samples can be obtained at a relatively high temporal resolution. A continuous record of turbidity should also be collected by the automatic pump sampler. Used in tandem, the resulting data should provide a good record of the variability of suspended-sediment loads over the duration of the experiment.

Where possible, like data that are being collected as part of other Program efforts should be used to the maximum extent possible to reduce redundancy and cost. For example, the system-wide and Elm Creek/Kearney Diversion water quality monitoring programs will provide essentially all of the data in this category that is required for the Elm Creek Adaptive Management Experiment.

Suspended-Sediment-Depth Integrated Sampling

When appropriate based on the lack of other data sources and the flow conditions at the time of the surveys, depth-integrated suspended-sediment samples may be collected during each survey event at one transect in the project reach, preferably near the upstream end of the reach. Depending on the length of the reach and conditions within the reach that may cause significant spatial changes sediment load, it may also be appropriate to obtain concurrent samples near the downstream end of the reach. These singular data points can be used as indicators of the suspended sediment load under relatively low flow conditions for use in calibrating models of the reach, but are probably not adequate to define a useful suspended sediment rating curve. As a result, this is a relatively low priority task in the overall monitoring protocol.

If conducted, suspended-sediment samples will be collected using procedures from Edwards and Glysson (1999). The sediment samples will be analyzed by dry sieving to determine their grain-size composition following Standard USGS protocols (Guy, 1969). Total bed-material loads for each suspended-sediment sample will be estimated using the Modified Einstein equation.

Suspended-sediment Pump Sampling

If appropriate considering the needs of the individual project and the availability of other data, point suspended-sediment samples and a continuous record of turbidity may also be collected with a computer-controlled pump sampler (e.g., ISCO automated pump sampler). The sampler will be installed in a secure location near each location at which depth-integrated samples are taken to allow for comparison of suspended-sediment sampling collected with the two different methods.

Bed-load Measurements

Because of the challenges associated with bed-load sampling in sand bed rivers and the large amount of resources and effort required to collect a sample set that is sufficiently robust to develop valid relationships, bed-load sampling is not recommended for this project-scale monitoring protocol. Data from the bed-load sampling that is being conducted for the system-

wide monitoring program should, however, be used in assessing the overall response of the project-scale reaches to the management actions.

IV. REPORTING AND DELIVERABLES

Draft and final annual monitoring reports (in Microsoft Word) will document the activities completed during each water year (October through September), any difficulties encountered, and recommendations, if any, for revising the protocol methodologies. The draft report shall be submitted for review at the beginning of each October to the Program who will have 30 days to review the draft report. A final report that addresses any review comments will be submitted within 14 days after receipt of review comments. Other deliverables to be included with the final annual report will include any raw data (including survey and parametric data), survey and mapping data, State Plane locations of monitoring and sampling sites, ground photographs and field documentation of project activities, and other documents or materials collected and/or developed as a part of annual monitoring activities. Where appropriate, all data will be compiled in Excel spreadsheet format and incorporated into the Program database. Data will be reported in accordance with guidelines outlined in the Program's AMP and the Program's Database Management System.

V. FIELD SAFETY

Since this protocol defines a significant field data collection effort, the safety of field personnel should be a priority when conducting the field work. There are inherent risks and hazards associated with field work, especially when working around water and in or near vehicular traffic, so every effort should be made to minimize those hazards and risks. If a corporate or agency safety manual is not available for use by field personnel, it is highly recommended that a safety plan be developed prior to conducting the tasks defined in this protocol. The safety plan should address issues related to working around and on water, boating safety, traffic safety, severe weather, and wildlife.

All federal and state guidelines should be adhered to when conducting field work using boats and other watercraft. Field personnel should wear U.S. Coast Guard-approved personal flotation device (PFD) at all times while working on or over water. Safe boating procedures should be followed at all times and standard emergency equipment such as fire extinguishers first aid kits and throw-ropes should be included on all manned watercraft. When working over water, such as at bridge railings, field personnel should wear PFD's and appropriate safety harnesses tethered to the bridge railing or other structural feature that will prevent the wearer from being injured from a fall.

When working in or traversing the river by foot, quicksand can be a potential threat. Although drowning in quicksand is impossible, becoming temporarily trapped in quicksand is possible. Therefore, field personnel working in or traversing the river by foot should wear a PFD and be familiar with the procedures to remove themselves from quicksand, should that be necessary. It is recommended that weather forecasts for the study area be checked frequently for potentially severe storms. Severe thunderstorms that can include lightning, hail, high winds, and even

tornadoes pose a significant hazard to field crews in isolated areas where shelter may not be readily available. Field crews should be prepared for and be able to deal with severe weather at all times.

As part of this protocol, field crews may be required to obtain suspended-sediment samples from bridge sites within the study area and, therefore, will be required to deal with traffic and bridge safety issues. Although some bridges have a wide shoulder to work from, minimum traffic safety and control items will be required. These include temporary warning signs placed at each end of the bridge, regularly spaced high-visibility traffic cones placed along the area where the work will be performed, and appropriate high-visibility reflective apparel to be worn by all field personnel. Field vehicles should be parked as far off of the traveled lanes as practicable. It is recommended that field vehicles have flashing hazard lights and supplemental flashers, such as strobe lights and light bars, on the vehicle activated at all times. Vehicles should be parked such that the visibility of oncoming traffic and the field crews are unobstructed.

In addition, field personnel should be familiar with basic first aid and should know the locations of all local emergency medical facilities and hospitals within the study area. In the case of a severe or life-threatening injury, field personnel should rely on emergency 911 services. For non-life-threatening and non-severe injuries, injured field personnel should be transported as soon as possible to a local medical facility such as an urgent care facility or hospital.

VII. REFERENCES

Ayres Associates and Olsson Associates, 2010. Draft Year 2 (2010) Report, Channel Geomorphology and In-channel Vegetation: Monitoring of the Central Platte River. Submitted to Platte River Recovery Implementation Program, November, 41 p.

Bunte, K., and Abt, S.R., 2003. Sampler size and sampling time affect measured bed-load transport rates and particle sizes measured with bed-load traps in gravel-bed streams. In J. Bogen, T.F. and Walling, D. (eds), *Erosion and Sediment Transport Measurement in Rivers—Technological and Methodological Advances*, IAHS Publication 283, pp. 126-133.

Comiskey, J. F. Dallmeier, and S. Mistry. 2000. Draft vegetation sampling protocols for the Selva Maya. Smithsonian Institution Monitoring and Assessment of Biodiversity Program.

Edwards, T.K. and Glysson, G.D., 1999. Field Methods for Measurement of Fluvial Sediment. U.S. Geological Survey Techniques Water Resources Investigations, Book 3, Chapter C2, 89 p.

Guy, H.P., 1969. Laboratory Theory and Methods for Sediment Analysis. U.S. Geological Survey Techniques Water Resources Investigations, Book 5, Chapter C1, 58 p.

Oberg, K.A., Morlock, S.E., and Caldwell, W.S., 2005. Quality-Assurance Plan for Discharge Measurements Using Acoustic Dopper Current Profilers. USGS Scientific Investigations Report 2005-5183, 46 p.

National Institute of Invasive Species Science. 2011. Webpage accessed on 4/19/2011 at: http://www.niiss.org/cwis438/websites/niiss/FieldMethods/ModWhit.php

Platte River Recovery Implementation Program, 2006. Attachment 3, Adaptive Management Plan, October 24, 254 p.

Platte River Recovery Implementation Program, 2011. Adaptive Management Implementation Plan, DRAFT Version 2.0, February 14, 95 p.

Stohlgren, T.J., M.B. Falkner, L.D. Schell. 1995. A modified Whittaker nested vegetation sampling method. Vegetation. 117(2), pp. 113-121.

Turnispeed, D.P. and Sauer, V.B., 2010. Discharge Measurements at Gaging Stations, U.S. Geological Survey Techniques and Methods 3-A8, 106 p.

Attachment 2 – Elm Creek Adaptive Management Experiment Geomorphology and Vegetation Monitoring and Analysis Plan

DRAFT
Platte River Recovery Implementation Program Elm Creek Adaptive Management Experiment Geomorphology and Vegetation Monitoring and Analysis Plan

November 1, 2011

1. PURPOSE

A field monitoring program will be implemented for the Elm Creek Adaptive Management Experiment to collect the necessary data to insure that the management actions are being implemented/constructed in the intended manner based on the experimental design, and to evaluate the performance of the management actions. The specific purpose of the performance monitoring is to test the following hypotheses:

1. The FSM strategy will increase riparian plant mortality and raise the green line, resulting in more exposed sandbar area and a wider, unvegetated main channel, and

2. The FSM strategy will increase the height of sandbars by 30 to 50 percent from existing conditions.

The Elm Creek Complex is approximately four miles in length, extending from the Elm Creek Bridge at the upstream end to RM227, about 2.3 miles downstream from the Kearney Diversion structure (**Figure 1**). Field data collection and sampling will be conducted within this 4-mile reach following the Project-scale Geomorphology and Vegetation Monitoring Protocol (PRRIP, 2011). At least one baseline and one post-flow event sampling period will be conducted during the first year, and at least one additional pre- and post-runoff sampling period will be conducted during each of the subsequent two years of the experiment. If possible, the pre-runoff sampling period during Years 2 and 3 will be timed to serve the purpose of post-construction monitoring to insure that the mechanical actions were properly implemented.

Topographic and sediment data from the sampling events will be compiled and analyzed to assess changes in the channel geometry, bar topography and bed material characteristics within the project reach. These data will also be incorporated into the project-scale hydraulic and sediment transport models, as appropriate, for use in improving model calibration and predictive capability. Predicted sediment transport rates from the modeling will be compared with suspended sediment data being collected for the System-wide and Kearney Canal Water Quality Monitoring Programs. Vegetation data will be analyzed in accordance with the Data Analysis procedures described in a subsequent section of this plan.

Clarifications and/or deviations from the Project-scale Monitoring Protocol and the data analysis plan are presented in the following sections.

2. FIELD SAMPLING PLAN

2.1. Topography and Bathymetry

Twenty-two (22) primary river transects will be surveyed using a Real-time Kinematic (RTK) Global Positioning System (GPS) during each sampling period (**Figure 2**). Average cross sections spacing (excluding the approximately 1,100-foot reach in the backwater upstream from the Kearney Diversion Structure, is approximately 880 feet, which is consistent with the average topwidth of the main channel in the project reach. Up to two additional, supplementary cross sections may be surveyed between the diversion and Transect 9 if the field crew leader determines that it can be done safely based on the flow conditions in the vicinity of the diversion structure.

Each exposed sand bar within the project reach will be surveyed following the procedures described in the Project-scale Monitoring Protocol. The survey crew will use the survey codes shown in **Table 1** to identify each survey point for use in reducing the data.

Table 1. Field survey codes.

Code #	Label	Description	Code #	Label	Description
1	LTP	Left Top of Pin	25	VW	Valley Wall
2	RTP	Right Top of Pin	26	OC	Bedrock Outcrop
3	LBP	Left Base of Pin	27	CV	Colluvium
4	RBP	Right Base of Pin	28	LBB	Left Base of Bank
5	OB	Overbank Topo.	29	RBB	Right Base of Bank
6	LTB	Left Top of Bank	30	LEW	Left Edge of water
7	RTB	Right Top of Bank	31	REW	Right Edge of Water
8	LLF	Lower Limit of Fines	32	C	Channel (Dry)
9	CB	Channel Bed	33	LHWM	Left High Water Mark
10	CBF	Fines (Silt, Clay, Mud)	34	RHWM	Right High Water Mark
11	CBS	Sand	35	EDGRD	Edge of Road
12	CBG	Gravel	36	TOE	Toe of Slope
13	CBC	Cobble	37	TOP	Top of Slope
14	CBB	Boulder	38	RUFBRK	Roughness Break
15	CBW	Wood/Organics	39	EPV	Edge of Perennial Vegetation
16	T	Thalweg	40	CONC	Concrete
17	TBR	Top Bar	41	RR	Riprap
18	LEB	Left Edge of Bar	42	DSTR	Drop structure Crest
19	REB	Right Edge of Bar	43	CLVT	Culvert
20	BR	Bar Topo.	44	BRGA	Bridge Abutment
21	BPERM	Bar Perimeter	45	BRGH	Bridge High Chord
22	BWV	Base of Woody Vegetation	46	BRGL	Bridge Low Chord
23	EDGCN	Edge of Canopy	47	OBP	Other Bank Protection
24	GRLN	Green Line	48	OIFS	Other Infrastructure

2.2. Photographic Documentation

Photographic documentation will be performed in accordance with the Project-scale Monitoring Protocol.

2.3. Bed-and-bar Material Sampling

Bed material samples will be collected at every other cross section and on all exposed sand bars larger than approximately 0.37 acres in size, as specified in the Project-scale Monitoring Protocol. The samples will be analyzed by a qualified soils laboratory to be identified before completion of the first data collection effort. Based on a preliminary estimate, 22 subaqueous samples and approximately 20 bar samples will be collected during each sampling event.

2.4. Vegetation Sampling

Vegetation will be sampled at a minimum of 12 assessment plots that are laid out using the Modified Whittaker procedure, as specified in the Project-scale Monitoring Protocol (**Figures 3a and 3b**).

2.5. Automated Stage Recorders

Two automated water-stage recorders will be installed on the north (left) river bank within the reach. The specific locations of the recorders will be determined in the field during the first sampling event, with one located approximately midway between the Elm Creek Bridge and Kearney Diversion Structure and the other midway between the diversion and the downstream boundary of the project reach. The transducers, data loggers and communications connection for downloading the data loggers will be provided by the Program. The Tetra Tech Project Team will provide other necessary field supplies and will perform the installation. The data loggers will be set to collect samples at 15-minute intervals. The Tetra Tech Team will download the data and perform any required maintenance in conjunction with each of the sampling events. It is strongly recommended that Program or Stakeholder staff check the data loggers at least one every two weeks during the intervening time periods to insure that they are functioning and have not been disturbed. Depending on the time period, it may be necessary to download the data loggers between sampling events. If Tetra Tech staff is in the Elm Creek area for other purposes, the data loggers may be downloaded in conjunction with their other work, if possible. If there is risk of exceeding the data logger capacity, Tetra Tech will notify Program staff so that others can be deployed to download the data.

2.6. Flow Rate, Depth, and Velocity Measurements

Flow rates, depth distribution and velocity measurements will be made in the vicinity of the data loggers during each sampling event using a RiverRay 600-I Acoustic Doppler Current Profiler (ADCP) or similar device. Where depths are too shallow, for effective use of the ADCP (generally less than 1.5 feet), the measurements will be made using a Marsh-McBirney Flowmate 2000 flow meter following standard USGS measurement protocols.

2.7. Sediment-transport Measurements

No bed load or suspended samples will be collected specifically for this project. Data from the System-wide and Kearney Diversion Water Quality Monitoring Programs will be used to the extent possible to validate predicted bed material transport rates from the models.

3. DATA ANALYSIS PLAN

3.1. Topography and Bathymetry

Topographic and bathymetric data from the baseline data collection event will be overlaid onto the PRRIP 2010 LiDAR data for comparison of changes since the LiDAR data were collected. The subaqueous portions of the data will also be used to refine the LiDAR surfaces for use in the models. The data collected on exposed bars will also be analyzed to assess bar topography by creating a surface-elevation model of each bar greater than approximately 0.25 acres in size using the field data, supplemented to the extent necessary with the most recent LiDAR data, and developing an cumulative area versus elevation plot similar to **Figure 4**.

Transect and bar topography data from the subsequent field sampling events will be overlaid onto the previous transects and surfaces to assess changes associated with the flows and management actions since the last survey. Where appropriate, the hydraulic and sediment transport models will be updated with the new data.

3.2. Bed-and-bar Material

Laboratory sieve analysis data will be plotted as standard grain-size distribution curves, and the key statistical parameters compared by location and by subreach-average between successive surveys to assess changes in bed-and-bar gradations.

3.3. Vegetation

Vegetation sampling will produce data describing density, age/species and location/distribution on the sand bars. Companion data will be collected at the vegetation quadrats so that physical setting descriptions can be associated with the biological response data. Physical descriptions used to represent distinct settings include multiple elevation zones described in the Sample Design section. Three statistical approaches will be used for analyzing effects of differing flows, mechanical actions and sediment movement.

Changes in vegetation distribution between years will be determined by estimating total area of vegetation coverage from LiDAR imagery and green line data collected with the geomorphic surveys. Coverage types and densities in the imagery will be compared to ground-truthed field data collected from specific points in the project site to allow larger areas to be evaluated from year to year without requiring intensive field sampling at every location. To determine differences between hydrologic sequences, and between year-to-year vegetation changes, the data will be analyzed using an analysis-of-variance (ANOVA) model or the equivalent non-parametric version (Kruskal-Wallis). These analyses will help to identify changes between treatment effects and between years.

A two- (or more) factor ANOVA model will also be developed that examines the effects of the actions at the site that could include flow manipulation, mechanical actions and sediment augmentation. A predictive approach will be developed for determining combinations of physical factors that result in raising the green line and average sand bar height. The relationship between the combination of quadrat-specific physical field measurements and the biological

response data (vegetation density, identity of indicator species, etc.) collected from multiple locations throughout the project site will be the basis for this analysis.
A multivariate, regression model will be constructed that examines the relationships between physical setting variables (e.g., flow depth, velocity, substrate characteristics, shear stress and/or substrate mobility) and compares the response variables (vegetation community characteristics) against multiple physical gradients. An ordination application such as Canonical Correspondence Analysis (CCA) will be used to develop a visual image that shows the relationships between multiple physical gradients and vegetation response. The strength of the relationships between single or multiple physical variables and the vegetation community response will also be determined. This information will inform on timing and level of flow augmentation that influences physical variables controlling sand bar-building and green line development.

A visual comparison of the physical gradient variables and the vegetation community data will be conducted by partitioning the data into frequency categories and displaying it as histograms. Both physical gradient variables and the vegetation data will be displayed on the same histogram graph to identify patterns in the data that demonstrate more favorable river conditions resulting from the combination of flow augmentation and discing. The display of data characteristics in frequency categories is also a good tool for examining if predictor (physical setting) and response (vegetation) variables are sensitive to one or more environmental gradients.

3.4. Discharge and Stage Data

Discharge and stage data collected in the project reach will be compiled, plotted and evaluated to assess the range of conditions that occur during the period of the experiment. These data will also be used to refine model calibration.

3.5. Sediment Transport

Sediment-transport data collected by the System-wide and Kearney Diversion Water Quality Monitoring Programs will be obtained, plotted and compared with predicted bed material transport capacities, as appropriate, to aid in refining the sediment-transport models and prediction of channel response.

4. REPORTING

Monitoring and data analysis reports will be prepared within 60 days after completion of the second data collection event during each year of the Experiment. These reports will describe the data collection procedures, key issues encountered during the data collection, and results from the data comparisons to assess changes over the intervening periods. The results will also be presented at one Technical Advisory Committee (TAC) meeting and at the PRRIP Adaptive Management Annual Reporting Session that is typically held in late-January or early-February.

5. FIELD SAFETY

Field safety will be emphasized at all times during the data collection events. Safety procedures will follow guidelines in the Project-Scale Monitoring Protocol and sound safety practices when

working in and around active rivers. This includes the use of field personnel with appropriate experience and training and appropriate field safety equipment. A key safety factor at the Elm Creek Complex is the Kearney Diversion Structure. The field crew leader will be responsible for ensuring that data collected in the vicinity of the structure is performed in a safe manner, including identification of areas in the river near the structure within which it is potentially unsafe to work. Data will not be collected in these areas. The crew leader will also be responsible for identifying the nearest medical facility and having on-hand emergency telephone numbers at all times while crews are working at the site.

6. REFERENCES

Platte River Recovery Implementation Program, 2011. DRAFT Project-scale Geomorphology and Vegetation Monitoring, October 15, 13 p.

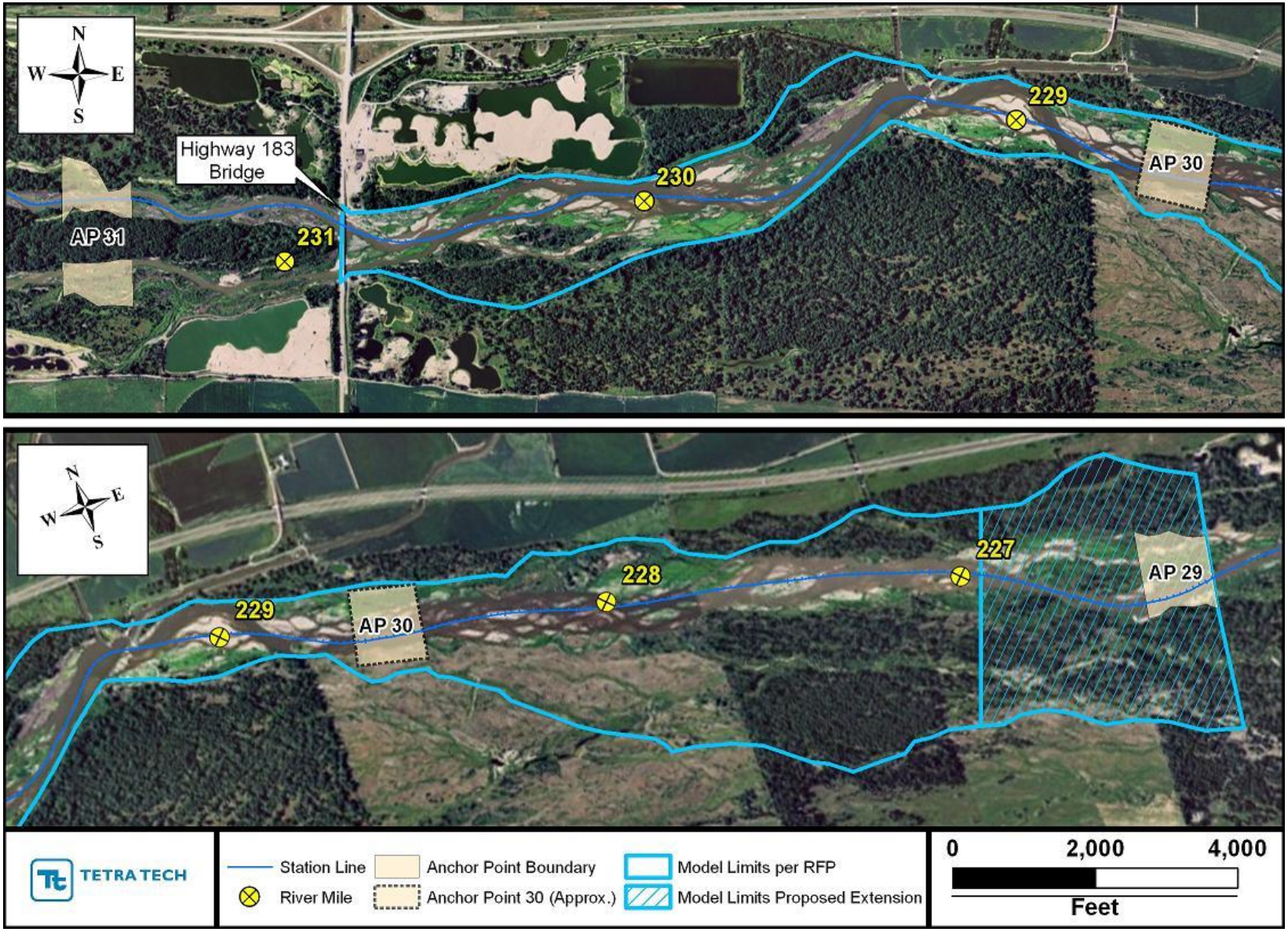

Figure 1. 2009 Aerial photograph of Elm Creek Reach showing the approximate limits of the monitoring reach (not cross-hatched). The 2-D model may be extended downstream through the cross-hatched area.

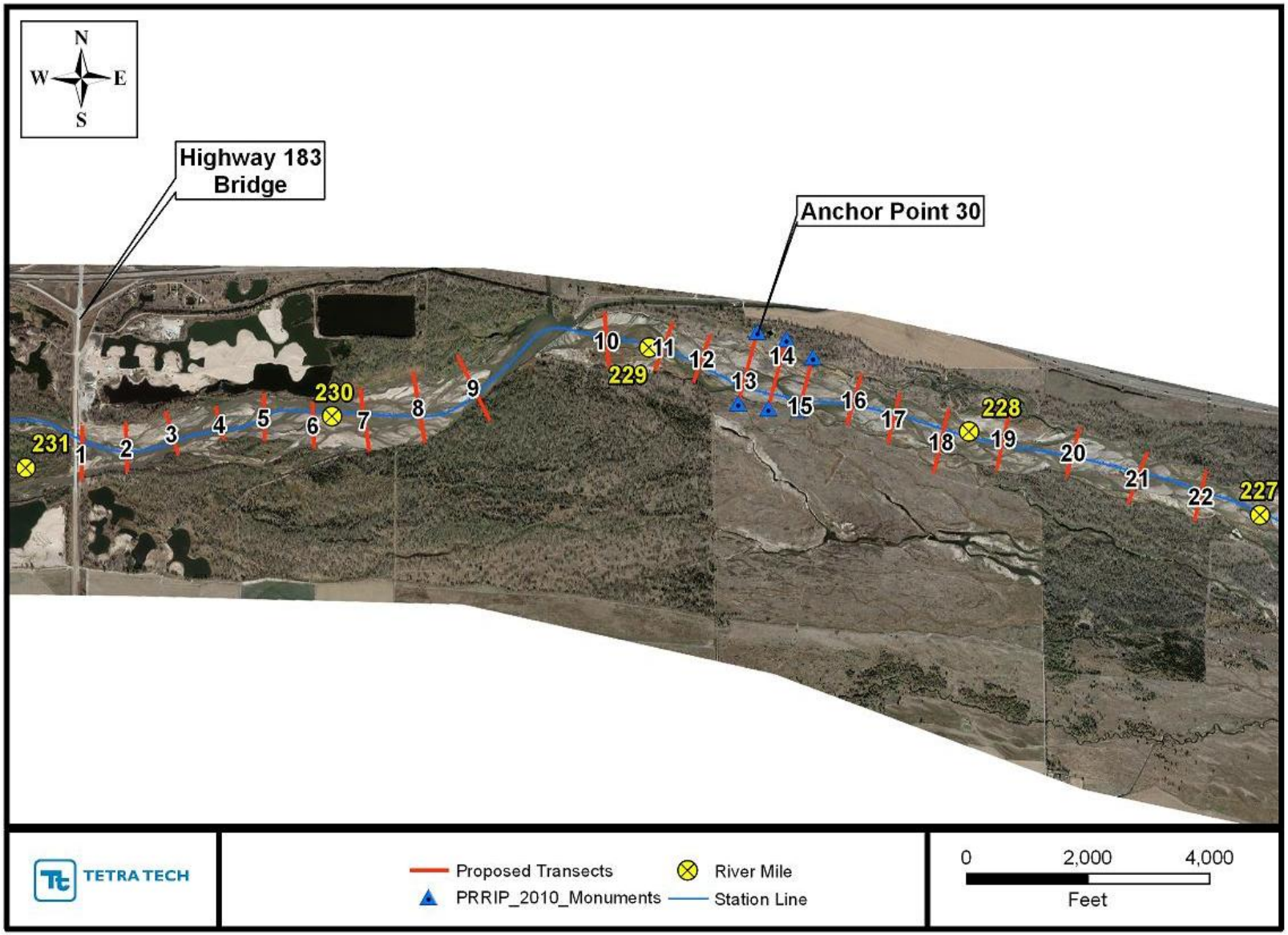

Figure 2. Proposed monitoring cross-section layout for the Elm Creek Adaptive Management Experiment.

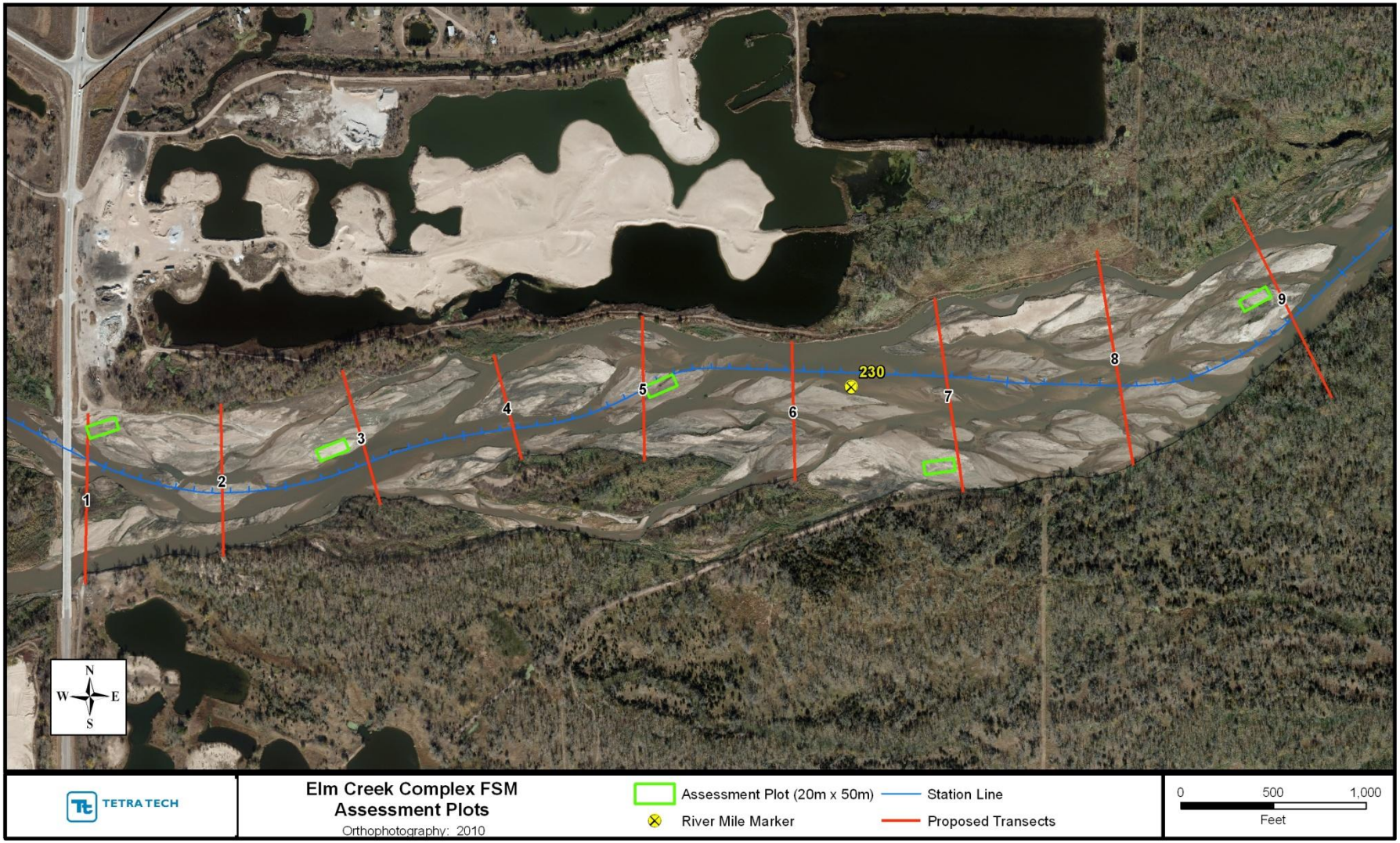

Figure 3a. Proposed vegetation monitoring layout for the upstream portion of the Elm Creek Complex.

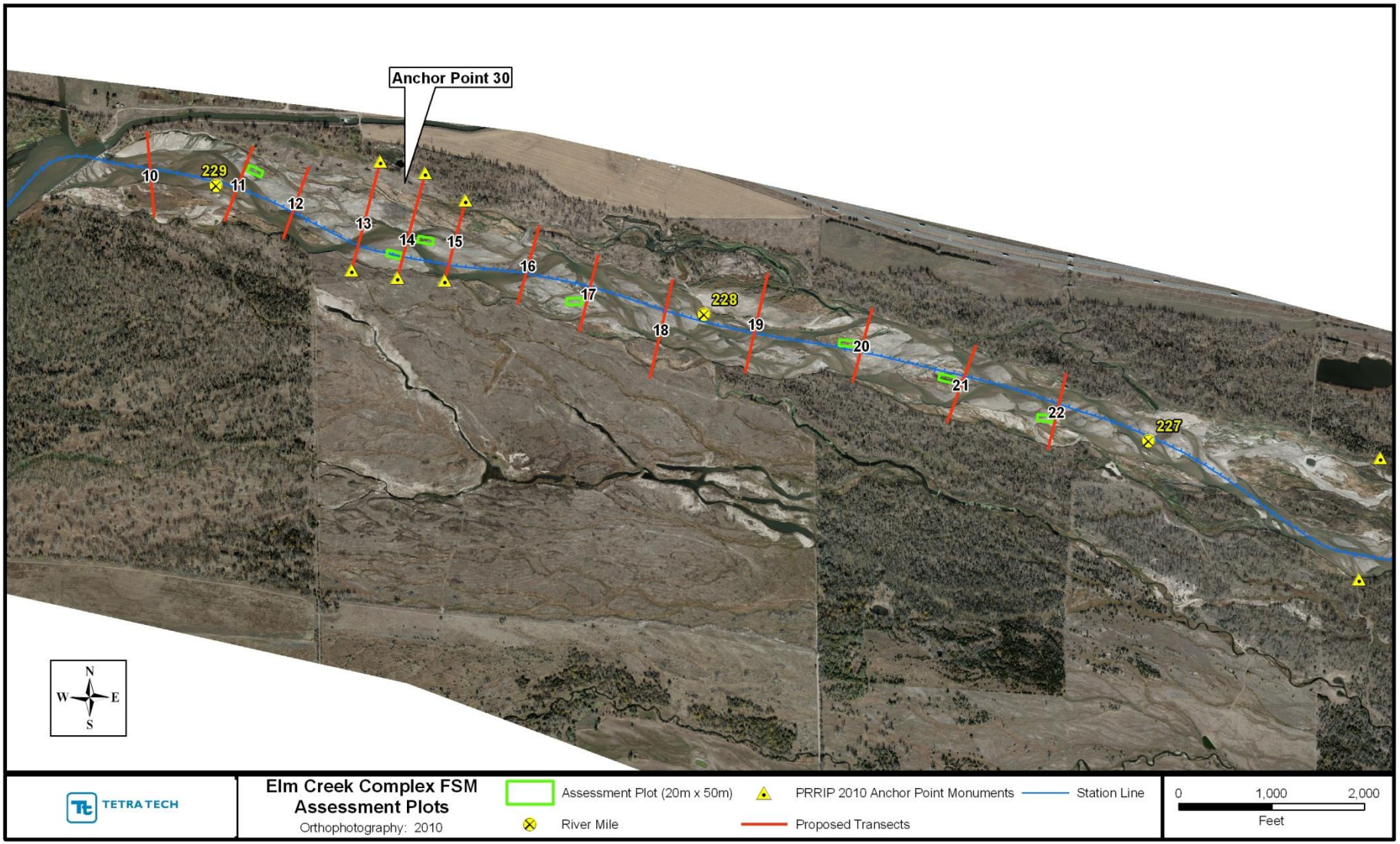

Figure 3b. Proposed vegetation monitoring layout for the downstream portion of the Elm Creek Complex.

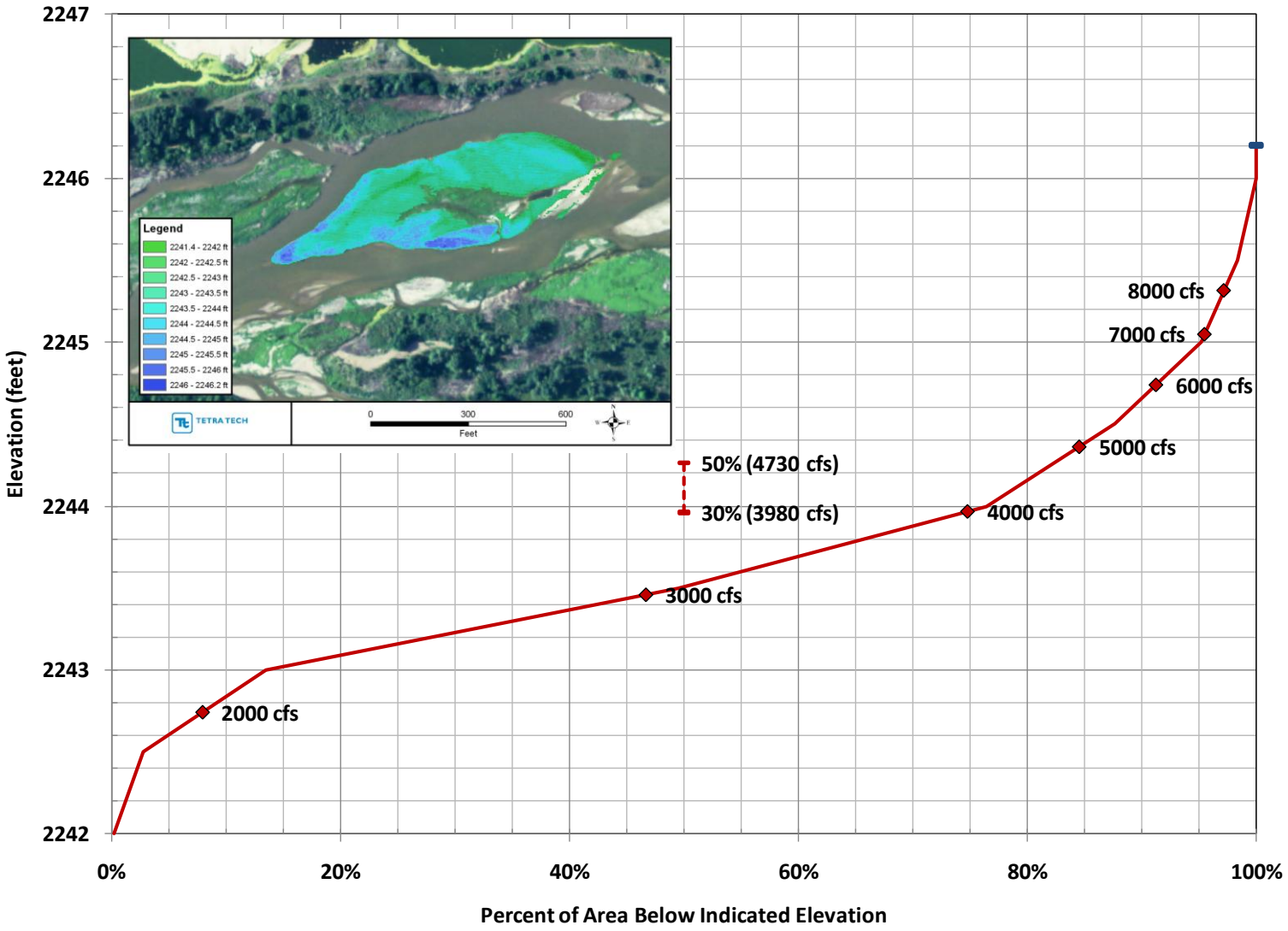

Figure 4. Typical cumulative area versus elevation plot.

433 Attachment 3 – Standard Consultant Contract

Company
Address 1
Address 2
TIN# 00-0000000

Nebraska Community Foundation, Inc.
PO Box 83107
Lincoln, NE 68501-3107
TIN# 47-0769903

PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

Contract between Nebraska Community Foundation, Inc., Platte River Recovery Implementation Program, and [Company].

[Project Name]

1. Parties. This Contract is made and entered into by and between the Nebraska Community Foundation, Inc. ("Foundation") of Lincoln, Nebraska, representing all signatories to the Platte River Recovery Implementation Program ("Program") and _____ ("Consultant"). The following persons are authorized to represent the parties through this Contract: Diane Wilson of the Foundation, Dr. Jerry Kenny of the Program; and [Name] of the Consultant.

2. Purpose of Contract. The purpose of this Contract is to allow the Foundation, acting as the fiscal agent for the Governance Committee (GC) of the Program, to retain the services of the Consultant to render certain technical or professional services hereinafter described in connection with an undertaking to be financed by the Program, and to delegate the Executive Director's Office ("ED Office") through its Executive Director or his designee the authority to administer this Contract.

TERMS AND CONDITIONS

3. Term of Contract and Required Approvals. This Contract is effective when all parties have executed it and all required approvals have been granted. The term of this Contract is from *(contract initiation date)* through *(contract expiration date)*. The services to be performed under this Contract will commence upon receipt of authorization to proceed. All services shall be completed during this term.

If the Consultant has been delayed and as a result will be unable, in the opinion of the Program, to complete performance fully and satisfactorily within this Contract period, the Consultant may be granted an extension of time, upon submission of evidence of the causes of delay satisfactory to the Program.

4. Payment.

A. Reimbursement of Expenses. The Program agrees to pay the Consultant an amount based on the approved budget depicted in Exhibit B and hourly rate and reimbursable expenses price schedules depicted in Exhibit C, attached to this Contract and incorporated by reference as part of this Contract, for the services described in Exhibit A, attached to this Contract and incorporated by reference as part of this Contract. Total payment under this Contract shall not exceed _____ dollars ($_____).

B. Project Budget. The Project budget for each task included in Exhibit A is as follows:

Task	Estimated Cost
Phase I.	
Subtotal Phase I	
Phase II.	
Subtotal Phase II	
Total Project Cost	

The amounts for each task are estimates only, but are not to be exceeded unless authorized in writing by the Program. The Contract total amount is controlling. Payment shall be made directly to the Consultant. The Consultant shall maintain hourly records of time worked by its personnel to support any audits the Program may require. Billing reports shall be submitted no more often than monthly for activities and costs accrued since the last billing report. A brief project progress report summarizing project activities in the billing period must be submitted with each billing.

C. Billing Procedures. The Consultant shall send billing reports for services performed for the various tasks outlined in Exhibit A to the ED Office (address included below). The Program's Executive Director, upon receiving the billing report, will approve the bill and submit the bill for payment. The submittal for payment will then be reviewed by the Signatory Parties of the Program who will advise the Foundation of approval. The Foundation will make payment of these funds directly to the Consultant within 30 days of notice of approval by the Signatory Parties. Payments of bills are due within 60 days after the billing date of the Consultant.

Billing Point of Contact (Program):
Dr. Jerry F. Kenny, Executive Director
Platte River Recovery Implementation Program
Headwaters Corporation
4111 4th Avenue, Suite 6
Kearney, Nebraska 68845
Phone: (308) 237-5728
Fax: (308) 237-4651
Email: kennyj@headwaterscorp.com

D. Money Withheld. When the Program has reasonable grounds for believing that the Consultant will be unable to perform this Contract fully and satisfactorily within the time fixed for performance, then the Program may withhold payment of such portion of any amount otherwise due and payable to the Consultant reasonably deemed appropriate to protect the Program against such loss. These amounts may be withheld until the cause for the withholding is cured to the Program's satisfaction or this Contract is terminated pursuant to Section 8U. Any amount so withheld may be retained by the Program for such period as it may deem advisable to protect the Program against any loss. This provision is intended solely for the benefit of the Program and no person shall have any right against the Program by reason of the Program's failure or refusal to withhold monies. No interest shall be payable by the Program on any amounts withheld under this provision. This provision is not intended to limit or in any way prejudice any other right of the Program.

E. Withholding of Payment. If a work element has not been received by the Program by the dates established in Exhibit A, the Program may withhold all payments beginning with the month following that date until such deficiency has been corrected.

F. Final Completion and Payment. The final payment shall be made upon acceptance of the final report and receipt of the final billing.

5. <u>Responsibilities of Consultant</u>.

A. Scope of Services. The Consultant shall perform the specific services required under this Contract in a satisfactory and proper manner as outlined in Exhibit A. If there is any conflict between this Contract and the provisions of the specific requirements of Exhibit A, the specific requirements shall prevail.

B. Personnel. All of the services required hereunder will be performed by the Consultant or under its supervision, and all personnel engaged in the work shall be fully qualified and shall be authorized, licensed, or permitted under state law to perform such services, if state law requires such authorization, license, or permit.

C. Subcontracts.

(i) Approval Required for Subcontracts. Any subcontractors and outside associates or consultants required by the Consultant in connection with the services, work performed or rendered under this Contract will be limited to such individuals or firms as were specifically identified in the proposal and agreed to during negotiations or are specifically authorized by the Program during the performance of this Contract. The Consultant shall submit a list of the proposed subcontractors, associates or consultants; the scope and extent of each subcontract; and the dollar amount of each subcontract prior to Contract execution to the Program for approval. During the performance of the Contract, substitutions in or additions to such subcontracts, associates, or consultants will be subject to the prior approval of the Program. The Program approval of subcontractors will not relieve the Consultant from any responsibilities outlined in this Contract. The Consultant shall be responsible for the actions of the subcontractors, associates, and subconsultants.

(ii) Billings for Subcontractors. Billings for subcontractor, associates or subconsultants services will not include any mark up. The subcontract costs will be billed to the Program at the actual costs as billed to the Consultant. Subcontract costs will be documented by attaching subcontractor billings to the Consultant's billing submittals.

(iii) Copies of Subcontracts. The Consultant shall provide to the Program copies of each subcontractor contract immediately following execution with the subcontractor. All subcontracts between the Consultant and a subcontractor shall refer to and conform to the terms of this Contract. However, nothing in this Contract shall be construed as making the Program a party of any subcontract entered between the Consultant and a subcontractor.

D. Requests from the Program. The Consultant shall be responsible and responsive to the Program and the ED Office in their requests and requirements related to the scope of this Contract.

E. Presentation of Data. The Consultant shall select and analyze all data in a systematic and meaningful manner so as to contribute directly in meeting the objectives of the Project, and shall present this information clearly and concisely, in a professional manner.

F. Draft of Final Report. The Consultant shall present the Program a draft of the final report covering all work elements of the Project including maps, charts, conclusions and recommendations prior to the publication of any final report and no later than the date specified in Exhibit A. Draft Reports will be provided to the Program in Microsoft Word format for distribution and review. The Program will respond with written comments to the Consultant as soon as possible. The Consultant will address the comments of the Program in the final report. Final Reports will be provided to the Program in Microsoft Word and PDF format.

G. Project Completion Report. A final project completion report in the form described in Exhibit A shall be submitted to the Program by the date specified in Exhibit A.

H. Reports, Maps, Plans, Models and Documents. One (1) copy of maps, plans, worksheets, logs, field notes and other reference or source documents prepared for or gathered under this Contract, and one (1) copy of each unpublished report prepared under this Contract shall be submitted to the Program. If the Consultant writes or uses a computer program or spreadsheet as a part of this project, the Consultant shall submit to the Program for approval all proposed program names and data formats prior to beginning work on that task. All data shall be submitted to Program in written and digital forms with the final report. Digital media shall be labeled by the Consultant to provide sufficient detail to access the information on the media. All user manuals shall be submitted by the Consultant to Program providing complete documentation of computer programs developed under this Contract. The user manual shall also specify the source code language and the type of computer equipment necessary to operate the program(s). Any programs or computer software generated as a part of this Contract shall be the sole property of the Program.

I. Inspection and Acceptance. All deliverables furnished by the Consultant shall be subject to rigorous review by the Program's ED Office prior to acceptance.

6. <u>Responsibilities of the Program.</u>

A. Designated Representative. The Executive Director of the Program shall act as the Program's administrative representative with respect to the Consultant's service to be performed under this Contract and shall have complete authority to transmit instructions, receive information, and interpret and define the Program's policies and decisions with respect to services covered by this Contract.

B. Data to be Furnished to the Consultant. All information, data, reports, and maps as are available to the Program and necessary for the carrying out of the Scope of Services set forth herein shall be furnished to the Consultant without charge and the ED Office shall cooperate with the Consultant in the carrying out of the project.

C. Review Reports. The ED Office shall examine all studies, reports, sketches, opinions of the construction costs, and other documents presented by the Consultant to the Program and shall promptly render in writing the Program's decisions pertaining thereto within the time periods specified in Exhibit A.

D. Provide Criteria. The ED Office shall provide all criteria and full information regarding its requirements for the project.

7. Special Provisions.

A. No Finder's Fees. No finder's fee, employment agency fee, or other such fee related to the procurement of this Contract shall be paid by either party.

B. Publication. It is understood that the results of this work may be available to the Consultant for publication and use in connection with related work. Use of this work for publication and related work by the Consultant must be conducted with prior authorization from the Program's Technical Point of Contact.

C. Publicity. Any publicity or media contact associated with the Consultant's services and the result of those services provided under this Contract shall be the sole responsibility of the Program. Media requests of the Consultant should be directed to the Director of Outreach and Operations in the ED Office.

D. Monitor Activities. The Program shall have the right to monitor all Contract related activities of the Consultant and all subcontractors. This shall include, but not be limited to, the right to make site inspections at any time, to bring experts and consultants on site to examine or evaluate completed work or work in progress, and to observe all Consultant personnel in every phase of performance of Contract related work.

D. Kickbacks. The Consultant certifies and warrants that no gratuities, kickbacks or contingency fees were paid in connection with this Contract, nor were any fees, commissions, gifts, or other considerations made contingent upon the award of this Contract. If the Consultant breaches or violates this warranty, the Program may, at its discretion, terminate this Contract without liability to the Program, or deduct from the Contract price or consideration, or otherwise recover, the full amount of any commission, percentage, brokerage, or contingency fee.

E. Office Space, Equipment, and Supplies. The Consultant will supply its own office space, equipment, and supplies.

8. General Provisions.

A. Amendments. Any changes, modifications, revisions or amendments to this Contract which are mutually agreed upon by the parties to this Contract shall be incorporated by written instrument, executed and signed by all parties to this Contract.

B. Applicable Law/Venue. The construction, interpretation and enforcement of this Contract shall be governed by the laws of the State of Nebraska. The Courts of the State of Nebraska shall have jurisdiction over this Contract and the parties.

C. Assignment/Contract Not Used as Collateral. Neither party shall assign or otherwise transfer any of the rights or delegate any of the duties set forth in this Contract without the prior written consent of the other party. The Consultant shall not use this Contract, or any portion thereof, for collateral for any financial obligation, without the prior written permission of the Program.

D. Audit/Access to Records. The Program and any of its representatives shall have access to any books, documents, papers, and records of the Consultant which are pertinent to this Contract. The Consultant shall, immediately upon receiving written instruction from the Program, provide to any independent auditor, accountant, or accounting firm, all books, documents, papers and records of the Consultant which are pertinent to this Contract. The Consultant shall cooperate fully with any such independent auditor, accountant, or accounting firm, during the entire course of any audit authorized by the Program.

E. Availability of Funds. Each payment obligation of the Program is conditioned upon the availability of funds and continuation of the Platte River Recovery Implementation Program. If funds are not allocated and available for the continuance of the services performed by the Consultant, the contract may be terminated by the Program at the end of the period for which the funds are available. The Program shall notify the Consultant at the earliest possible time of the services which will or may be affected by a shortage of funds. No penalty shall accrue to the Program in the event this provision is exercised, and the Program shall not be obligated or liable for any future payments due or for any damages as a result of termination under this section. This provision shall not be construed to permit the Program to terminate this Contract to acquire similar services from another party.

F. Award of Related Contracts. The Program may undertake or award supplemental or successor contracts for work related to this Contract. The Consultant shall cooperate fully with other contractors and the Program in all such cases.

G. Certificate of Good Standing. Consultant shall provide Certificate of Good Standing verifying compliance with the unemployment insurance and workers' compensation programs prior to performing work under this Contract.

H. Compliance with Law. The Consultant shall keep informed of and comply with all applicable federal, state and local laws and regulations in the performance of this Contract.

I. Confidentiality of Information. All documents, data compilations, reports, computer programs, photographs, and any other work provided to or produced by the Consultant in the performance of this Contract shall be kept confidential by the Consultant unless written permission is granted by the Program for its release.

J. Conflicts of Interest

(i) Consultant shall not engage in providing consultation or representation of clients, agencies or firms which may constitute a conflict of interest which results in a disadvantage to the Program or a disclosure which would adversely affect the interests of the Program. Consultant shall notify the Program of any potential or actual conflicts of interest arising during the course of the Consultant's performance under this Contract. This Contract may be terminated in the event a conflict of interest arises. Termination of the Contract will be subject to a mutual settlement of accounts. In the event the contract is terminated under this provision, the Consultant shall take steps to insure that the file, evidence, evaluation and data are provided to the Program or its designee. This does not prohibit or affect the Consultant's ability to engage in consultations, evaluations or representation under agreement with other agencies, firms, facilities, or attorneys so long as no conflict exists.

(ii) A conflict of interest warranting termination of the Contract includes, but is not necessarily limited to, representing a client in a adversarial proceeding against the Platte River Recovery Implementation Program, its signatories, boards, commissions or initiating suits in equity including injunctions, declaratory judgments, writs of prohibition or *quo warranto.*

K. Entirety of Contract. This Contract, consisting of *(example) twelve* (*12*) pages, Exhibit A, consisting of *eleven* (*11*) pages, Exhibit B, consisting of *one* (*1*) page, and Exhibit C, consisting of *one* (*1*) page, represents the entire and integrated Contract between the parties and supersedes all prior negotiations, representations, and agreements, whether written or oral.

L. Force Majeure. Neither party shall be liable for failure to perform under this Contract if such failure to perform arises out of causes beyond the control and without the fault or negligence of the nonperforming party. Such causes may include, but are not limited to, acts of God or the public enemy, fires, floods, epidemics, quarantine restrictions, freight embargoes, and unusually severe weather. This provision shall become effective only if the party failing to perform immediately notifies the other party of the extent and nature of the problem, limits delay in performance to that required by the event, and takes all reasonable steps to minimize delays. This provision shall not be effective unless the failure to perform is beyond the control and without the fault or negligence of the nonperforming party.

M. Indemnification. The Consultant shall indemnify and hold harmless the Foundation, the Program, the ED Office, and their officers, agents, employees, successors and assignees from any and all claims, lawsuits, losses and liability arising out of Consultant's failure to perform any of Consultant's duties and obligations hereunder or in connection with the negligent performance of Consultant's duties or obligations, including but not limited to any claims, lawsuits, losses or liability arising out of Consultant's malpractice.

N. Independent Contractor. The Consultant shall function as an independent contractor for the purposes of this Contract, and shall not be considered an employee of the Program,

Foundation or ED Office for any purpose. The Consultant shall assume sole responsibility for any debts or liabilities that may be incurred by the Consultant in fulfilling the terms of this Contract, and shall be solely responsible for the payment of all federal, state and local taxes which may accrue because of this Contract. Nothing in this Contract shall be interpreted as authorizing the Consultant or its agents and/or employees to act as an agent or representative for or on behalf of the Foundation or the Program, or to incur any obligation of any kind on the behalf of the Foundation or the Program. The Consultant agrees that no health/hospitalization benefits, workers' compensation and/or similar benefits available to Foundation or Program employees will inure to the benefit of the Consultant or the Consultant's agents and/or employees as a result of this Contract.

O. Notices. All notices arising out of, or from, the provisions of this contract shall be in writing and given to the parties at the address provided under this Contract, either by regular mail, facsimile, e-mail, or delivery in person.

P. Notice and Approval of Proposed Sale or Transfer of the Consultant. The Consultant shall provide the Program with the earliest possible advance notice of any proposed sale or transfer or any proposed merger or consolidation of the assets of the Consultant. Such notice shall be provided in accordance with the notice provision of this Contract.

Q. Ownership of Documents/Work Product/Materials. All documents, reports, records, field notes, data, samples, specimens, and materials of any kind resulting from performance of this Contract are at all times the property of the Program.

R. Patent or Copyright Protection. The Consultant recognizes that certain proprietary matters or techniques may be subject to patent, trademark, copyright, license or other similar restrictions, and warrants that no work performed by the Consultant or its subcontractors will violate any such restriction.

S. Proof of Insurance. The Consultant shall not commence work under this Contract until the Consultant has obtained the following insurance coverages and provided the corresponding certificates of insurance:

(i) Commercial General Liability Insurance. Consultant shall provide coverage during the entire term of the Contract against claims arising out of bodily injury, death, damage to or destruction of the property of others, including loss of use thereof, and including products and completed operations in an amount not less than Five Hundred Thousand Dollars ($500,000.00) per claimant and One Million Dollars ($1,000,000.00) per occurrence.

(ii) Business Automobile Liability Insurance. Consultant shall maintain, during the entire term of the Contract, automobile liability insurance in an amount not less than Five Hundred Thousand Dollars ($500,000.00) per occurrence. Coverage will include bodily injury and property damage covering all vehicles, including hired vehicles, owned and non-owned vehicles

(iii) Workers' Compensation or Employers' Liability Insurance. The

Consultant shall provide proof of workers' compensation coverage Consultant's insurance shall include "Stop Gap" coverage in an amount not less than Five Hundred Thousand Dollars ($500,000.00) per employee for each accident and disease.

(iv) Professional Liability or Errors and Omissions Liability Insurance. The Consultant shall provide proof of professional liability insurance or errors and omissions liability insurance to protect the Foundation, Program and ED Office from any and all claims arising from the Consultant's alleged or real professional errors, omissions or mistakes in the performance of professional duties in an amount not less than One Million Dollars ($1,000,000.00) per claim.

T. Taxes. The Consultant shall pay all taxes and other such amounts required by federal, state and local law, including but not limited to federal and social security taxes, workers' compensation, unemployment insurance and sales taxes.

U. Termination of Contract. This Contract may be terminated, without cause, by the Program upon fifteen (15) days written notice. This Contract may be terminated immediately for cause if the Consultant fails to perform in accordance with the terms of this Contract.

V. Third Party Beneficiary Rights. The parties do not intend to create in any other individual or entity the status of third party beneficiary, and this Contract shall not be construed so as to create such status. The rights, duties and obligations contained in this Contract shall operate only between the parties to this Contract, and shall inure solely to the benefit of the parties to this Contract. The provisions of this Contract are intended only to assist the parties in determining and performing their obligations under this Contract.

W. Time is of the Essence. Time is of the essence in all provisions of the Contract.

X. Titles Not Controlling. Titles of paragraphs are for reference only, and shall not be used to construe the language in this Contract.

Y. Waiver. The waiver of any breach of any term or condition in this Contract shall not be deemed a waiver of any prior or subsequent breach.

9. Contacts.

Administrative Point of Contact (Foundation):
Diane M. Wilson
Chief Financial and Administrative Officer
Nebraska Community Foundation
PO Box 83107
Lincoln, Nebraska 68501-3107
Phone: (402) 323-7330
Fax: (402) 323-7349
Email: dwilson@nebcommfound.org

Admin. Point of Contact (Program):
Dr. Jerry F. Kenny, Executive Director
Platte River Recovery Implementation Prog.
Headwaters Corporation
4111 4th Avenue, Suite 6
Kearney, Nebraska 68845
Phone: (308) 237-5728
Fax: (308) 237-4651
Email: kennyj@headwaterscorp.com

Technical Point of Contact (Program):
Name, Title
Platte River Recovery Implementation Prog.
Headwaters Corporation
Address 1
City, State ZIP
Phone: (000) 000-0000
Fax: (000) 000-0000
Email: email

Media Point of Contact (Program):
Dr. Bridget Barron, Director of Outreach
Platte River Recovery Implementation Prog.
Headwaters Corporation
4111 4th Avenue, Suite 6
Kearney, Nebraska 68845
Phone: (308) 237-5728
Fax: (308) 237-4651
Email: barronb@headwaterscorp.com

Administrative Point of Contact (Consultant):
Name, Title
Company
Address 1
City, State ZIP
Phone: (000) 000-0000
Fax: (000) 000-0000
Email: email

Technical Point of Contact (Consultant):
Name, Title
Company
Address 1
City, State ZIP
Phone: (000) 000-0000
Fax: (000) 000-0000
Email: email

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10. Signatures. By signing this Contract, the parties certify that they have read and understood it, that they agree to be bound by the terms of the Contract, that they have the authority to sign it.

NEBRASKA COMMUNITY FOUNDATION

_____ _____

Diane M. Wilson Date
Chief Financial and Administrative Officer

[***CONSULTANT***]

_____ _____

[*Name, Title*] Date

EXHIBIT "A"
SCOPE OF SERVICES

A. PROJECT DESCRIPTION

1. Location: *[Text]*

2. Purpose: *[Text]*

3. History: [*Text*]

B. PROJECT REQUIREMENTS

1. Monthly Progress Reports and Billing Statements

The Consultant shall submit a brief monthly progress report outlining the study status, progress, and results to date, regardless of whether or not a billing statement is submitted, on or before the last working day of the month. The progress report will also show the percentage of the job completed by task and the percentage of budget spent. The progress report will also include a billing projection for the upcoming month for the purpose of Program reimbursement request planning.

Each billing statement must include a task-by-task report justifying the cost items contained in the billing statement. The monthly progress report may be used as the justification for the billing statement as long as all cost items covered in the billing statement are addressed in the progress report.

2. Computer Models, Statement of Assumptions, Project Work File

a. If the Consultant writes or uses a computer program or spreadsheet as a part of this project, the Consultant shall submit to the Program for approval all proposed program names and data formats prior to beginning work on that task. All data shall be submitted to the Program in written and digital forms with the final report. Digital media shall be labeled by the Consultant to provide sufficient detail to access the information on the media. User manuals shall be submitted by the Consultant to the Program providing complete documentation of computer programs developed under this project. The user manuals shall also contain the source code language and the type of computer equipment necessary to operate the program(s). The computer programs and spreadsheets (written and digital forms) are due on the same date as the final report, which contains the information generated by the programs.

b. To facilitate the Program's accurate evaluation of the Consultant's work product, computations, conclusions and recommendations, the Consultant shall:

* Include in the final report a section describing the assumptions and methodology used by the Consultant in generating the data and conclusions contained in that chapter.

* Maintain a project work file containing the materials used in project analysis. This file will be available for review by the Program and should be organized in such a way as to allow replication of the steps and procedures used by the Consultant to reach the conclusions described in the study.

* Prepare a project notebook containing a description of the assumptions and methodologies used in the project analysis. The notebook shall be organized in such a way as to allow replication of the steps, calculations, and procedures used by the Consultant to reach conclusions, described in the draft final report. The project notebook shall be submitted with the draft final report.

3. Final Report

The Consultant shall use the Contract Scope of Services as the outline for draft and final reports so that Consultant compliance with Contract provisions can be verified. If the final report contains information of an engineering nature, the cover of the final report, all plates, and the executive summary must be stamped and signed by a Professional Engineer licensed in the State of Nebraska or other state if appropriate to location of project site. If the final report contains information of a geologic nature, the cover of the final report, all plates, and the executive summary must be stamped and signed by a Professional Geologist licensed in the State of Nebraska. If the final report contains information of both an engineering and geologic nature, the cover of the final report, all plates, and the executive summary must be stamped and signed by both a Professional Engineer and a Professional Geologist licensed in the State of Nebraska. At a minimum, the reproducible original to be submitted as part of the deliverables required herein must utilize an original seal(s) and original signature(s).

4. Final Report - Digital Format

In addition to the paper submittal described in Section C.4 above, the Consultant shall also provide the final documents and related materials in a digital format. This digital report shall, to the extent feasible, be assembled into one file rather than separate files for text, tables, graphics, etc. This digital report shall be contained on a CD(s) or DVD(s), and shall be in both Word and Adobe Acrobat format. Any plates, figures, etc. not suitable for Word shall be in AutoCAD, ArcGIS, Adobe Acrobat, or compatible format. Other formats may be used if approved in advance by the ED Office. The final documents will also be provided

fully assembled into one file, in a complete “internet ready” digital format to facilitate their distribution via the Office website.

5. Project Access

The ED Office shall be responsible for obtaining access as required for project tasks.

6. Stand-By Time

The Program will not reimburse the Consultant for stand-by time charges for the Consultant's supervisory personnel.

C. SCOPE OF SERVICES

EXHIBIT “B”
BUDGET

EXHIBIT "C"
HOURLY RATE AND REIMBURSABLE EXPENSES
PRICE SCHEDULE 2010