PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

Second Amendment to the Agreement between the Nebraska Community Foundation, Inc. and Tetra Tech, Inc., regarding "Platte River Geomorphology and Vegetation Monitoring and Data Analysis"

This Second Amendment to the Agreement between the Nebraska Community Foundation, Inc. ("Foundation") of Lincoln, Nebraska, representing all signatories to the Platte River Recovery Implementation Program ("Program"), and Tetra Tech, Inc. ("Consultant"), a private consultant of Fort Collins, Colorado, is made and entered into effective on the date of signing below and the final date of this Amendment will be May 1, 2014.

The purpose of this amendment is to:

(1) Compensate the Consultant for additional, unanticipated work that was necessary in order to complete the Year 1 Scope of Work for this project. The nature of the additional effort is presented in **Exhibit A** and mostly related to unanticipated challenges associated with reducing and analyzing data collected by another contractor during the first three years of monitoring.
(2) Increase the contract amount by **$54,643** for the purpose of compensating the Consultant for the additional effort discussed in Exhibit A. This will increase the total approved budget for this contract from $952,185 to **$1,006,828**. This budget increase shall be effective as of the date of this Amendment and funds will become available immediately. A detailed budget breakdown of the additional effort expended by task and labor category is included in **Exhibit B**.

Important Amendment notes:

(1) This is the Second Amendment to the Agreement. **Exhibit C** includes the Original Agreement and First Amendment.

All other terms of the original Agreement remain in effect as originally written in the Agreement dated April 23, 2012. The following parties agree to the terms of this Amendment and the original Agreement:

For the Consultant:

_____ _____

Robert A. Mussetter, PhD, PE Date
Discipline Lead
Tetra Tech, Inc.

For the Foundation:

_____ _____

Diane M. Wilson Date
Chief Operating Officer/Chief Financial Officer
Nebraska Community Foundation, Inc.

EXHIBIT A

TETRA TECH

April 17, 2013

Mr. Jason Farnsworth
Platte River Recovery Implementation Program
Headwaters Corporation
4111 4th Avenue, Suite 6
Kearney, Nebraska 68845

Re: Platte River Geomorphology and Vegetation Monitoring Program

Dear Jason,

As we discussed, Tetra Tech has experienced significant, unanticipated challenges in applying the Data Analysis Plan to the 2009, 2010 and 2011 data for the Platte River Geomorphology and Vegetation Monitoring Program. As a result, we have exceeded the available budget for this task, and we respectfully request that our 2012 budget be increased to cover the overage.

Numerous factors contributed to the challenges, including the following:

1. In general, there were many differences in how the data were collected from 2009, 2010 and 2011. Each of these differences required a substantial additional investment of time and effort well beyond what was allocated for the task. The additional time was spent identifying the differences, studying the differences sufficiently to determine whether they were reconcilable, and if reconcilable, establishing a protocol to align each data-type and/or perform the necessary conversion to make the data comparable. Prior to beginning this process, we had anticipated using lower-salaried technicians or clerical staff to perform much of the data transfer and organization; however, because of the issues with the data, higher-level staff with an understanding of the technical details were required to translate the data correctly. This issue was encountered with the bulk of the vegetation data, requiring substantial time and effort. This is in stark contrast to the effort required to perform the actual analyses, which are relatively straight-forward and mostly automated, once the data are aligned. Some specific examples of particularly large differences in the data that required additional effort are described below.
2. The 2009 data only exist in scanned versions of handwritten data sheets. Interpreting these data sheets and entering the data into spreadsheets, appropriately formatted for analysis, required considerable, unanticipated time and effort. One time-consuming issue occurred because plant species were entered into the field data sheets using a combination of short-hand names, common names, abbreviated taxonomic names, often with difficult to decipher handwriting. Furthermore, methods used and types of data collected in 2009 varied throughout the field season. For example, early on, the field survey focused primarily on the eight species of special interest but evolved to also capture other commonly encountered species. Inconsistencies in how data were collected across species and across APs required a substantial investment of time and effort to interpret the handwritten data before transferring it into suitably formatted spreadsheets for analysis. As a result, substantial time investment was needed to prepare the 2009 data for analysis, and even with this effort, the

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2009 data have limited comparability to data from the later years. While these issues were also encountered in data from other years, they were most pronounced in the 2009 data.

3. Some portions of the 2009 data had been entered into spreadsheets that were provided to Tetra Tech; however, this portion only consists of data summaries required to provide summary metrics for the annual reports. As a result, only the eight species of special interest were included in spreadsheets, and the data were combined across all APs (i.e., they were not separated by AP or transect as needed to conduct the analysis required by the Data Analysis Plan).
4. Data provided to Tetra Tech for 2010 and 2011 had been entered more comprehensively into spreadsheets and included more than the eight species of special interest and spatial detail down to the quadrat level. However, the data were entered into the spreadsheets in a style not compatible with commonly used spreadsheet-style statistical packages including Excel, Systat, and Statview. Consultation with Excel technical support and substantial data transformations performed by higher-level staff were required to convert the 2010 and 2011 data into an appropriate format to facilitate the analyses described in the Data Analysis Plan, both within each year and across years. This effort took substantial time not foreseen prior to the start of this work.
5. Certain data-types were collected differently in each of the three years. Two prominent examples include cover class and vegetation height. In 2012, both cover class and vegetation height were collected using categories split at specific intervals, as specified in the Data Collection Protocol. However, in some years, these data were collected as actual measurements (e.g., vegetation height and cover in 2009). In other years, these data were collected as categorical codes that required transformation (e.g., vegetation height and cover in 2010 and 2011), or in intervals that differed from other years (e.g., vegetation height 2011). For each of these examples, additional time and effort was required to assess differences between the data from each year and to convert each into a comparable format.
6. Species lists varied widely across years. In some cases, species were only identified to genera or growth forms (i.e, not to the species level). In addition, it was necessary to check and revise numerous species to match standard nomenclature[1]. Spelling errors in species nomenclature also required checking and correcting in order to automate searches to allow for accurate analyses. While these issues individually are not difficult to overcome, they required considerable time and effort by experienced botonists to to align the species lists for across year comparisons.
7. Year-to-year differences in the data sets associated with the above issues will likely reduce the accuracy of trend analyses. Specific examples are as follows:
    a. Several species that were commonly encountered during the 2012 field season were not included in the 2009 and 2010 data (the 2011 data are most consistent with the 2012 data in this regard). A review of past summary reports suggests that the proportion of species that were documented each year increased, a common trend in the first few years of most habitat studies. However, as the apparent changes in methods were not documented, it is not possible to rule out the possibility that across-year differences are due to sampling differences rather than actual changes in vegetation.

[1] A number of species have been renamed in recent years as more accurate genetic testing has spurred more accurate classification and naming. USDA is typically recognized as overseeing the most current taxonomy nomenclature. USDA nomenclature was used for the 2012 data collection and will be the standard nomenclature used in this study.

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b. Community types noted as regularly occurring during the 2012 survey were not documented in the 2009, 2010 and 2011 data sets. While the hydrologic conditions were very different in 2012, much longer than four years is required for these community types to establish; thus, it is likely that the many of the community types were actually present in prior years but were not quantified. Because of this, across year comparisons that involve communities may not be appropriate at this time.

c. Other minor components quantified in 2012, such as percent bare ground and percent dead organic matter, were not quantified in prior years of the survey, preventing across years analyses from being performed. These data-gaps are not high priorities, but will reduce comparability of important metrics across years.

In spite of the above issues, the data have, with one exception, now been organized, reduced and the relevant metrics are included in the 2012 draft report. The exception involves the vegetation height data. The 2010, 2011 and 2012 data have been reduced and organized. However, after considerable effort, we have concluded that, while these data were collected in accordance with the protocol, it may not be possible to quantify the relevant Whooping Crane performance metrics in a defensible manner with the available data. After studying this issue in some detail, we believe that a direct field measurement of the relevant unobstructed sight distance can be made relatively easily in the field. We would like to discuss this and other field sampling issues with you in more detail prior to the start of the 2013 field season, and obtain your concurrence with the modified approach going forward.

At the time we provided the budget for this portion of the 2012 work, we believed that the general budget guidelines that you provided to us for this task would be tight but adequate, based largely on an incomplete understanding of the status of the 2009 through 2011 data. As you are no doubt aware, the data sets are very large and complex (25 APs were sampled per year, seven vegetation transects per AP, quadrats at 10- to 15-m spacing total 5,000 to 7,000 quadrats per year, and up to 18 plant species and cover classes were identified per quadrat). For the reasons stated above, it was necessary to manually assess the details of a significant portion of these data sets. The geomorphic data sets were significantly easier to work with than the vegetation data sets. However, due to the sheer size of the combined data sets, the amount of effort required to quantify the 28^{+} individual metrics, once the data sets were aligned, was considerably greater than envisioned at the time the budget was established. In considering this request for additional budget, it is important to note that we have completed the necessary work on essentially all of the 2009 through 2011 data sets; it should be possible to complete the data analysis going forward much more efficiently. In addition, we have identified a number of weaknesses in the data collection protocol through this work that can be overcome in future years to further improve the efficiency with which the data can be analyzed.

The authorized budget for Task 303 (Implement Data Analysis Plan) was $66,502. At this time, we have exceeded the total authorized budget for Year 1 of our contract by $54,643 in overcoming the above issues. The approximate percentage of effort applied to each of the seven issues noted above is as follows:

1. Item 1 – Identifying and rectifying differences among data sheets: 20%
2. Items 2 and 3 - Transferring data from field data sheets: 20%
3. Item 4 – Consistent formatting of spreadsheets for analysis: 20%
4. Item 5 – Issues with vegetation height data: 10%
5. Item 6 – Rectifying species lists and field sheets: 15%
6. Item 7 – Aligning data sets for trend analysis: 15%

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TETRA TECH

Based on the above information, we respectfully request that our Year 1 budget be increased by $54,230.

As always, please call me if you need more information or would like to discuss this in more detail. Thanks very much for your consideration and patience.

Sincerely,

TETRA TECH, INC.

Robert A. Mussetter, PhD, PE
Program Manager

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EXHIBIT B

Budget

	Task	Principal Engineer/ Geomorphologist	Senior Biologist	Statistical Ecologist	Senior Engineer / Scientist	Engineer / Scientist	Junior Engineer /Scientist	Staff Biologist	Staff Ecologist / Technician	Draftsman/Technician	Clerical	Cost
		$228.15	$176.65	$156.05	$114.85	$106.61	$99.40	$94.25	$88.58	$68.50	$78.80	
205	Sediment transport measurements	8.0			8.0		240.0		240.0		5.0	$ 48,252
303	Implement Data Analysis Plan											
303	Geomorph Metrics	25.5	0.0	56.0	22.0	0.0	33.0	0.0	0.0	75.5	0.0	$ 25,534
303	Vegetation Metrics	3.0	38.0	56.0	0.0	0.0	22.0	112.0	0.0	176.5	0.0	$ 40,967
	Subtotal (Task 303)	28.5	38.0	112.0	22.0		55.0	112.0		252.0		$ 66,502
	Subtotal (Tasks 205, 303)	**36.5**	**38.0**	**112.0**	**30.0**	**0.0**	**295.0**	**112.0**	**240.0**	**252.0**	**5.0**	**$ 114,754**
		Approximate Allocation of Task 303 Hours										
303	Geomorph Metrics	90%		50%	100%	80%	60%			30%	50%	
303	Vegetation Metrics	10%	100%	50%		20%	40%	100%	100%	70%	50%	
Actuals												
205	Sediment transport measurements	8.0			69.5		75.0				5.0	$ 17,655
303	Geomorphology Metrics	26.0		8.0	16.0	43.0	160.0	76.0		5.0		$ 37,010
303	Vegetation Metrics											
Item 1	Identifying and rectifying differences among data sheets	4.0	4.0		0.0	1.0	80.0	119.0				**$ 20,893**
Items 2 and 3	Transferring data from field data sheets		2.0		0.0	1.0	80.0	119.0		2.0		**$ 19,764**
Item 4	Consistent formatting of spreadsheets for analysis	2.0	2.0		0.0	1.0	80.0	119.0		4.0		**$ 20,357**
Item 5	Issues with vegetation height data	8.0	4.0		8.0	1.0	40.0	59.5				**$ 13,140**
Item 6	Rectifying species lists and field sheets		8.0		0.0	1.0	60.0	89.0				**$ 15,871**
Item 7	Aligning data sets for trend analysis		8.0		0.0	1.0	60.0	89.0				**$ 15,871**
	Analyzing data	8.0	12.0	16.0	4.0	4.0		16.0				**$ 8,835**
	Subtotal Veg Metrics	22.0	40.0	16.0	12.0	10.0	400.0	610.5		6.0		$ 114,732
	Subtotal	**56.0**	**40.0**	**24.0**	**97.5**	**53.0**	**635.0**	**686.5**	**0.0**	**11.0**	**5.0**	**$ 169,397**
Difference (Actual-Budget)												
205	**Sediment transport measurements**	0.0	0.0	0.0	61.5	0.0	-165.0	0.0	-240.0	0.0	0.0	$ (30,596)
303	Geomorph Metrics	0.5	0.0	-48.0	-6.0	43.0	127.0	76.0	0.0	-70.5	0.0	$ 11,476
303	Vegetation Metrics	19.0	2.0	-40.0	12.0	10.0	378.0	498.5	0.0	-170.5	0.0	$ 73,764
	Subtotal											**$ 54,643**

EXHIBIT C