

STATE OF COLORADO
Colorado Water Conservation Board
Grant Agreement
with
Parker Water and Sanitation District
Contract Number C150479

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1. PARTIES

This Grant Agreement (hereinafter called "Grant") is entered into by and between Parker Water and Sanitation District (hereinafter called "Grantee"), and the STATE OF COLORADO acting by and through the Department of Natural Resources, Colorado Water Conservation Board (hereinafter called the "State or CWCB").

2. EFFECTIVE DATE AND NOTICE OF NONLIABILITY.

This Grant shall not be effective or enforceable until it is approved and signed by the Colorado State Controller or designee (hereinafter called the "Effective Date"). The State shall not be liable to pay or reimburse Grantee for any performance hereunder, including, but not limited to costs or expenses incurred, or be bound by any provision hereof prior to the Effective Date.

3. RECITALS

A. Authority, Appropriation, And Approval

Authority for the agency entering into this Contract arises from Colorado Revised Statutes (CRS) 39-29-109(2)(c), 37-75-102 and 37-75-104(2)(c) and Senate Bill 06-179 adopted by the 2006 General Assembly, and a sufficient unencumbered balance thereof remains available for payment. Required approvals, clearance and coordination have been accomplished from and with appropriate agencies.

B. Consideration

The Parties acknowledge that the mutual promises and covenants contained herein and other good and valuable consideration are sufficient and adequate to support this Grant.

C. Purpose

The Alternative Agricultural Water Transfer Methods Competitive Grant Program provides money to complete water activities that further the understanding and development of alternative agricultural water transfers in Colorado. This Grant is for the Lower South Platte Irrigation Research and Demonstration Project in the South Platte Basin.

D. References

All references in this Grant to sections (whether spelled out or using the § symbol), subsections, exhibits or other attachments, are references to sections, subsections, exhibits or other attachments contained herein or incorporated as a part hereof, unless otherwise noted.

4. DEFINITIONS

The following terms as used herein shall be construed and interpreted as follows:

A. Budget

"Budget" means the budget for the Work described in **Exhibit A**.

B. Evaluation

"Evaluation" means the process of examining Grantee's Work and rating it based on criteria established in §6 and **Exhibit A**.

C. Exhibits and other Attachments

The following are attached hereto and incorporated by reference herein: **Exhibit A**.

D. Goods

"Goods" means tangible material acquired, produced, or delivered by Grantee either separately or in conjunction with the Services Grantee renders hereunder.

E. Grant

"Grant" means this Grant, its terms and conditions, attached exhibits, documents incorporated by reference under the terms of this Grant, and any future modifying agreements, exhibits, attachments or references incorporated herein pursuant to Colorado State law, Fiscal Rules, and State Controller Policies.

F. Grant Funds

"Grant Funds" means available funds payable by the State to Grantee pursuant to this Grant.

G. Party or Parties

"Party" means the State or Grantee and "Parties" means both the State and Grantee.

H. Program

"Program" means the Alternative Agricultural Water Transfer Methods Competitive Grant Program that provides the funding for this Grant.

I. Review

"Review" means examining Grantee's Work to ensure that it is adequate, accurate, correct and in accordance with the criteria established in §6 and **Exhibit A**.

J. Services

"Services" means the required services to be performed by Grantee pursuant to this Grant.

K. Sub-grantee

"Sub-grantee" means third-parties, if any, engaged by Grantee to aid in performance of its obligations.

L. Work

"Work" means the tasks and activities Grantee is required to perform to fulfill its obligations under this Grant and **Exhibit A**, including the performance of the Services and delivery of the Goods.

M. Work Product

"Work Product" means the tangible or intangible results of Grantee's Work, including, but not limited to, software, research, reports, studies, data, photographs, negatives or other finished or unfinished documents, drawings, models, surveys, maps, materials, or work product of any type, including drafts.

5. TERM and EARLY TERMINATION.

Initial Term-Work Commencement

The Parties respective performances under this Grant shall commence on the later of either the Effective Date or April 15, 2011. This Grant shall terminate on December 31, 2013 unless sooner terminated or further extended as specified elsewhere herein.

6. STATEMENT OF WORK

A. Completion

Grantee shall complete the Work and its other obligations as described herein and in **Exhibit A** on or before December 31, 2013. The State shall not be liable to compensate Grantee for any Work performed prior to the Effective Date or after the termination of this Grant.

B. Goods and Services

Grantee shall procure Goods and Services necessary to complete the Work. Such procurement shall be accomplished using the Grant Funds and shall not increase the maximum amount payable hereunder by the State.

C. Employees

All persons employed by Grantee or Sub-grantees shall be considered Grantee's or Sub-grantees' employee(s) for all purposes hereunder and shall not be employees of the State for any purpose as a result of this Grant.

7. PAYMENTS TO GRANTEE

The State shall, in accordance with the provisions of this §7, pay Grantee in the following amounts and using the methods set forth below:

A. Maximum Amount

The maximum amount payable under this Grant to Grantee by the State is \$320,166, as determined by the State from available funds. Grantee agrees to provide any additional funds required for the successful completion of the Work. Payments to Grantee are limited to the unpaid obligated balance of the Grant as set forth in **Exhibit A**. The maximum amount payable by the State to Grantee during each State fiscal year of this Grant shall be:

\$320,166 in FY2011
\$320,166 in FY2012, minus any funds expended in FY2011
\$320,166 in FY2013, minus any funds expended in FY2011 and 2012
\$320,166 in FY2014, minus any funds expended in FY2011, 2012 and 2013

i. Advance, Iterim and Final Payments

Any payment allowed under this Grant or in **Exhibit A** shall comply with State Fiscal Rules and be made in accordance with the provisions of this Grant or such Exhibit. Grantee shall initiate any payment requests by submitting invoices to the State in the form and manner set forth and approved by the State.

ii. Interest

The State shall fully pay each invoice within 45 days of receipt thereof if the amount invoiced represents performance by Grantee previously accepted by the State. Uncontested amounts not paid by the State within 45 days may, if Grantee so requests, bear interest on the unpaid balance beginning on the 46th day at a rate not to exceed one percent per month until paid in full; provided, however, that interest shall not accrue on unpaid amounts that are subject to a good faith dispute. Grantee shall invoice the State separately for accrued interest on delinquent amounts. The billing shall reference the delinquent payment, the number of day's interest to be paid and the interest rate.

iii. Available Funds-Contingency-Termination

The State is prohibited by law from making fiscal commitments beyond the term of the State's current fiscal year. Therefore, Grantee's compensation is contingent upon the continuing availability of State appropriations as provided in the Colorado Special Provisions, set forth below. If federal funds are used with this Grant in whole or in part, the State's performance hereunder is contingent upon the

continuing availability of such funds. Payments pursuant to this Grant shall be made only from available funds encumbered for this Grant and the State's liability for such payments shall be limited to the amount remaining of such encumbered funds. If State or federal funds are not appropriated, or otherwise become unavailable to fund this Grant, the State may immediately terminate this Grant in whole or in part without further liability in accordance with the provisions herein.

iv. Erroneous Payments

At the State's sole discretion, payments made to Grantee in error for any reason, including, but not limited to overpayments or improper payments, and unexpended or excess funds received by Grantee, may be recovered from Grantee by deduction from subsequent payments under this Grant or other Grants, grants or agreements between the State and Grantee or by other appropriate methods and collected as a debt due to the State. Such funds shall not be paid to any party other than the State.

B. Use of Funds

Grant Funds shall be used only for eligible costs identified herein and/or in the Budget. The State's total consideration shall not exceed the maximum amount shown herein.

C. Matching Funds

Grantee shall provide matching funds as provided in **Exhibit A**.

8. REPORTING - NOTIFICATION

Reports, Evaluations, and Reviews required under this §8 shall be in accordance with the procedures of and in such form as prescribed by the State and in accordance with §19, if applicable.

A. Performance, Progress, Personnel, and Funds

Grantee shall submit a report to the State upon expiration or sooner termination of this Grant, containing an Evaluation and Review of Grantee's performance and the final status of Grantee's obligations hereunder. In addition, Grantee shall comply with all reporting requirements, if any, set forth in **Exhibit A**.

B. Litigation Reporting

Within 10 days after being served with any pleading in a legal action filed with a court or administrative agency, related to this Grant or which may affect Grantee's ability to perform its obligations hereunder, Grantee shall notify the State of such action and deliver copies of such pleadings to the State's principal representative as identified herein. If the State's principal representative is not then serving, such notice and copies shall be delivered to the Executive Director of the Colorado Department of Natural Resources.

C. Noncompliance

Grantee's failure to provide reports and notify the State in a timely manner in accordance with this §8 may result in the delay of payment of funds and/or termination as provided under this Grant.

D. SubGrants

Copies of any and all subGrants entered into by Grantee to perform its obligations hereunder shall be submitted to the State or its principal representative upon request by the State. Any and all subGrants entered into by Grantee related to its performance hereunder shall comply with all applicable federal and state laws and shall provide that such subGrants be governed by the laws of the State of Colorado.

9. GRANTEE RECORDS

Grantee shall make, keep, maintain and allow inspection and monitoring of the following records:

A. Maintenance

Grantee shall make, keep, maintain, and allow inspection and monitoring by the State of a complete file of all records, documents, communications, notes and other written materials, electronic media files, and communications, pertaining in any manner to the Work or the delivery of Services (including, but not limited to the operation of programs) or Goods hereunder. Grantee shall maintain such records (the Record Retention Period) until the last to occur of the following: (i) a period of three years after the date this Grant is completed or terminated, or (ii) final payment is made hereunder, whichever is later, or (iii) for such further period as may be necessary to resolve any pending matters, or (iv) if an audit is occurring, or Grantee has received notice that an audit is pending, then until such audit has been completed and its findings have been resolved (the "Record Retention Period").

B. Inspection

Grantee shall permit the State, the federal government and any other duly authorized agent of a governmental agency to audit, inspect, examine, excerpt, copy and/or transcribe Grantee's records related to this Grant during the Record Retention Period for a period of three years following termination of this Grant or final payment hereunder, whichever is later, to assure compliance with the terms hereof or to evaluate Grantee's performance hereunder. The State reserves the right to inspect the Work at all reasonable times and places during the term of this Grant, including any extension. If the Work fails to conform to the requirements of this Grant, the State may require Grantee promptly to bring the Work into conformity with Grant requirements, at Grantee's sole expense. If the Work cannot be brought into conformance by re-performance or other corrective measures, the State may require Grantee to take necessary action to ensure that future performance conforms to Grant requirements and exercise the remedies available under this Grant, at law or inequity in lieu of or in conjunction with such corrective measures.

C. Monitoring

Grantee shall permit the State, the federal government, and other governmental agencies having jurisdiction, in their sole discretion, to monitor all activities conducted by Grantee pursuant to the terms of this Grant using any reasonable procedure, including, but not limited to: internal evaluation procedures, examination of program data, special analyses, on-site checking, formal audit examinations, or any other procedures. All monitoring controlled by the State shall be performed in a manner that shall not unduly interfere with Grantee's performance hereunder.

D. Final Audit Report

If an audit is performed on Grantee's records for any fiscal year covering a portion of the term of this Grant, Grantee shall submit a copy of the final audit report to the State or its principal representative at the address specified herein.

10. CONFIDENTIAL INFORMATION-STATE RECORDS

Grantee shall comply with the provisions on this §10 if it becomes privy to confidential information in connection with its performance hereunder. Confidential information, includes, but is not necessarily limited to, state records, personnel records, and information concerning individuals. The State shall notify the Grantee in writing and notate any State records and information that are classified by the State as being "Confidential" and given to the Grantee in connection with its performance hereunder. The provisions of this Section 10 shall only apply to such notated records and information.

A. Confidentiality

Grantee shall keep all State records and information confidential at all times and to comply with all laws and regulations concerning confidentiality of information. Any request or demand by a third party for State records and information in the possession of Grantee shall be immediately forwarded to the State's principal representative.

B. Notification

Grantee shall notify its agent, employees, Sub-grantees, and assigns who may come into contact with State records and confidential information that each is subject to the confidentiality requirements set forth herein, and shall provide each with a written explanation of such requirements before they are permitted to access such records and information.

C. Use, Security, and Retention

Confidential information of any kind shall not be distributed or sold to any third party or used by Grantee or its agents in any way, except as authorized by this Grant or approved in writing by the State. Grantee shall provide and maintain a secure environment that ensures confidentiality of all State records and other confidential information wherever located. Confidential information shall not be retained in any files or otherwise by Grantee or its agents, except as permitted in this Grant or approved in writing by the State.

D. Disclosure-Liability

Disclosure of State records or other confidential information by Grantee for any reason may be cause for legal action by third parties against Grantee, the State or their respective agents. Grantee shall indemnify, save, and hold harmless the State, its employees and agents, against any and all claims, damages, liability and court awards including costs, expenses, and attorney fees and related costs, incurred as a result of any act or omission by Grantee, or its employees, agents, Sub-grantees, or assignees pursuant to this §10.

11. CONFLICTS OF INTEREST

Grantee shall not engage in any business or personal activities or practices or maintain any relationships which conflict in any way with the full performance of Grantee's obligations hereunder. Grantee acknowledges that with respect to this Grant, even the appearance of a conflict of interest is harmful to the State's interests. Absent the State's prior written approval, Grantee shall refrain from any practices, activities or relationships that reasonably appear to be in conflict with the full performance of Grantee's obligations to the State hereunder. If a conflict or appearance exists, or if Grantee is uncertain whether a conflict or the appearance of a conflict of interest exists, Grantee shall submit to the State a disclosure statement setting forth the relevant details for the State's consideration. Failure to promptly submit a disclosure statement or to follow the State's direction in regard to the apparent conflict constitutes a breach of this Grant.

12. REPRESENTATIONS AND WARRANTIES

Grantee makes the following specific representations and warranties, each of which was relied on by the State in entering into this Grant.

A. Standard and Manner of Performance

Grantee shall perform its obligations hereunder in accordance with the highest standards of care, skill and diligence in the industry, trades or profession and in the sequence and manner set forth in this Grant.

B. Legal Authority – Grantee and Grantees Signatory

Grantee warrants that it possesses the legal authority to enter into this Grant and that it has taken all actions required by its procedures, by-laws, and/or applicable laws to exercise that authority, and to lawfully authorize its undersigned signatory to execute this Grant, or any part thereof, and to bind Grantee to its terms. If requested by the State, Grantee shall provide the State with proof of Grantee's authority to enter into this Grant within 15 days of receiving such request.

C. Licenses, Permits, Etc.

Grantee represents and warrants that as of the Effective Date it has, and that at all times during the term hereof it shall have, at its sole expense, all licenses, certifications, approvals, insurance, permits, and other authorization required by law to perform its obligations hereunder. Grantee warrants that it shall maintain all necessary licenses, certifications, approvals, insurance, permits, and other authorizations required to properly perform this Grant, without reimbursement by the State or other adjustment in Grant Funds. Additionally, all employees and agents of Grantee performing Services under this Grant shall hold all required licenses or certifications, if any, to perform their responsibilities. Grantee, if a foreign corporation or other foreign entity transacting business in the State of Colorado, further warrants that it currently has obtained and shall maintain any applicable certificate of authority to transact business in the State of Colorado and has designated a registered agent in Colorado to accept service of process. Any revocation, withdrawal or non-renewal of licenses, certifications, approvals, insurance, permits or any such similar requirements necessary for Grantee to properly perform the terms of this Grant shall be deemed to be a material breach by Grantee and constitute grounds for termination of this Grant.

13. INSURANCE

Grantee and its Sub-grantees shall obtain and maintain insurance as specified in this section at all times during the term of this Grant: All policies evidencing the insurance coverage required hereunder shall be issued by insurance companies satisfactory to Grantee and the State.

A. Grantee

i. Public Entities

If Grantee is a "public entity" within the meaning of the Colorado Governmental Immunity Act, CRS §24-10-101, et seq., as amended (the "GIA"), then Grantee shall maintain at all times during the term of this Grant such liability insurance, by commercial policy or self-insurance, as is necessary to meet its liabilities under the GIA. Grantee shall show proof of such insurance satisfactory to the State, if requested by the State. Grantee shall require each Grant with Sub-grantees that are public entities, providing Goods or Services hereunder, to include the insurance requirements necessary to meet Sub-grantee's liabilities under the GIA.

ii. Non-Public Entities

If Grantee is not a "public entity" within the meaning of the GIA, Grantee shall obtain and maintain during the term of this Grant insurance coverage and policies meeting the same requirements set forth in §13(B) with respect to sub-Grantees that are not "public entities".

B. Sub-Grantees

Grantee shall require each Grant with Sub-grantees, other than those that are public entities, providing Goods or Services in connection with this Grant, to include insurance requirements substantially similar to the following:

i. Worker's Compensation

Worker's Compensation Insurance as required by State statute, and Employer's Liability Insurance covering all of Grantee and Sub-grantee employees acting within the course and scope of their employment.

ii. General Liability

Commercial General Liability Insurance written on ISO occurrence form CG 00 01 10/93 or equivalent, covering premises operations, fire damage, independent contractors, products and completed operations, blanket Grantual liability, personal injury, and advertising liability with minimum limits as follows: (a) \$1,000,000 each occurrence; (b) \$1,000,000 general aggregate; (c) \$1,000,000 products and completed operations aggregate; and (d) \$50,000 any one fire. If any aggregate limit is reduced below \$1,000,000 because of claims made or paid, Sub-grantee shall immediately obtain additional insurance to restore the full aggregate limit and furnish to Grantee a certificate or other document satisfactory to Grantee showing compliance with this provision.

iii. Automobile Liability

Automobile Liability Insurance covering any auto (including owned, hired and non-owned autos) with a minimum limit of \$1,000,000 each accident combined single limit.

iv. Additional Insured

Grantee and the State shall be named as additional insured on the Commercial General Liability and Automobile Liability Insurance policies (leases and construction Grants require additional insured coverage for completed operations on endorsements CG 2010 11/85, CG 2037, or equivalent).

v. Primacy of Coverage

Coverage required of Grantee and Sub-grantees shall be primary over any insurance or self-insurance program carried by Grantee or the State.

vi. Cancellation

The above insurance policies shall include provisions preventing cancellation or non-renewal without at least 45 days prior notice to the Grantee and Grantee shall forward such notice to the State in accordance with §16 (Notices and Representatives) within seven days of Grantee's receipt of such notice.

vii. Subrogation Waiver

All insurance policies in any way related to this Grant and secured and maintained by Grantee or its Sub-grantees as required herein shall include clauses stating that each carrier shall waive all rights of recovery, under subrogation or otherwise, against Grantee or the State, its agencies, institutions, organizations, officers, agents, employees, and volunteers.

C. Certificates

Grantee and all Sub-grantees shall provide certificates showing insurance coverage required hereunder to the State within seven business days of the Effective Date of this Grant. No later than 15 days prior to the expiration date of any such coverage, Grantee and each Sub-grantee shall deliver to the State or Grantee certificates of insurance evidencing renewals thereof. In addition, upon request by the State at any other time during the term of this Grant or any sub-grant, Grantee and each Sub-grantee shall, within 10 days of such request, supply to the State evidence satisfactory to the State of compliance with the provisions of this §13.

14. BREACH

A. Defined

In addition to any breaches specified in other sections of this Grant, the failure of either Party to perform any of its material obligations hereunder in whole or in part or in a timely or satisfactory manner,

constitutes a breach. The institution of proceedings under any bankruptcy, insolvency, reorganization or similar law, by or against Grantee, or the appointment of a receiver or similar officer for Grantee or any of its property, which is not vacated or fully stayed within 20 days after the institution or occurrence thereof, shall also constitute a breach.

B. Notice and Cure Period

In the event of a breach, notice of such shall be given in writing by the aggrieved Party to the other Party in the manner provided in §16. If such breach is not cured within 30 days of receipt of written notice, or if a cure cannot be completed within 30 days, or if cure of the breach has not begun within 30 days and pursued with due diligence, the State may exercise any of the remedies set forth in §15. Notwithstanding anything to the contrary herein, the State, in its sole discretion, need not provide advance notice or a cure period and may immediately terminate this Grant in whole or in part if reasonably necessary to preserve public safety or to prevent immediate public crisis.

15. REMEDIES

If Grantee is in breach under any provision of this Grant, the State shall have all of the remedies listed in this §15 in addition to all other remedies set forth in other sections of this Grant following the notice and cure period set forth in §14(B). The State may exercise any or all of the remedies available to it, in its sole discretion, concurrently or consecutively.

A. Termination for Cause and/or Breach

If Grantee fails to perform any of its obligations hereunder with such diligence as is required to ensure its completion in accordance with the provisions of this Grant and in a timely manner, the State may notify Grantee of such non-performance in accordance with the provisions herein. If Grantee thereafter fails to promptly cure such non-performance within the cure period, the State, at its option, may terminate this entire Grant or such part of this Grant as to which there has been delay or a failure to properly perform. Exercise by the State of this right shall not be deemed a breach of its obligations hereunder. Grantee shall continue performance of this Grant to the extent not terminated, if any.

i. Obligations and Rights

To the extent specified in any termination notice, Grantee shall not incur further obligations or render further performance hereunder past the effective date of such notice, and shall terminate outstanding orders and sub-Grants with third parties. However, Grantee shall complete and deliver to the State all Work, Services and Goods not cancelled by the termination notice and may incur obligations as are necessary to do so within this Grant's terms. At the sole discretion of the State, Grantee shall assign to the State all of Grantee's right, title, and interest under such terminated orders or sub-Grants. Upon termination, Grantee shall take timely, reasonable and necessary action to protect and preserve property in the possession of Grantee in which the State has an interest. All materials owned by the State in the possession of Grantee shall be immediately returned to the State. All Work Product, at the option of the State, shall be delivered by Grantee to the State and shall become the State's property.

ii. Payments

The State shall reimburse Grantee only for accepted performance up to the date of termination. If, after termination by the State, it is determined that Grantee was not in breach or that Grantee's action or inaction was excusable, such termination shall be treated as a termination in the public interest and the rights and obligations of the Parties shall be the same as if this Grant had been terminated in the public interest, as described herein.

iii. Damages and Withholding

Notwithstanding any other remedial action by the State, Grantee also shall remain liable to the State for any damages sustained by the State by virtue of any breach under this Grant by Grantee and the State may withhold any payment to Grantee for the purpose of mitigating the State's damages, until such time as the exact amount of damages due to the State from Grantee is determined. The State may withhold any amount that may be due to Grantee as the State deems necessary to protect the State, including loss as a result of outstanding liens or claims of former lien holders, or to reimburse the State for the excess costs incurred in procuring similar goods or services. Grantee shall be liable for excess costs incurred by the State in procuring from third parties replacement Work, Services or substitute Goods as cover.

B. Early Termination in the Public Interest

The State is entering into this Grant for the purpose of carrying out the public policy of the State of Colorado, as determined by its Governor, General Assembly, and/or Courts. If this Grant ceases to further the public policy of the State, the State, in its sole discretion, may terminate this Grant in whole or in part. Exercise by the State of this right shall not constitute a breach of the State's obligations hereunder. This subsection shall not apply to a termination of this Grant by the State for cause or breach by Grantee, which shall be governed by §15(A) or as otherwise specifically provided for herein.

i. Method and Content

The State shall notify Grantee of such termination in accordance with §16. The notice shall specify the effective date of the termination and whether it affects all or a portion of this Grant.

ii. Obligations and Rights

Upon receipt of a termination notice, Grantee shall be subject to and comply with the same obligations and rights set forth in §15(A)(i).

iii. Payments

If this Grant is terminated by the State pursuant to this §15(B), Grantee shall be paid an amount which bears the same ratio to the total reimbursement under this Grant as the Services satisfactorily performed bear to the total Services covered by this Grant, less payments previously made. Additionally, if this Grant is less than 60% completed, the State may reimburse Grantee for a portion of actual out-of-pocket expenses (not otherwise reimbursed under this Grant) incurred by Grantee which are directly attributable to the uncompleted portion of Grantee's obligations hereunder; provided that the sum of any and all reimbursement shall not exceed the maximum amount payable to Grantee hereunder.

C. Remedies Not Involving Termination

The State, in its sole discretion, may exercise one or more of the following remedies in addition to other remedies available to it:

i. Suspend Performance

Suspend Grantee's performance with respect to all or any portion of this Grant pending necessary corrective action as specified by the State without entitling Grantee to an adjustment in price/cost or performance schedule. Grantee shall promptly cease performance and incurring costs in accordance with the State's directive and the State shall not be liable for costs incurred by Grantee after the suspension of performance under this provision.

ii. Withhold Payment

Withhold payment to Grantee until corrections in Grantee's performance are satisfactorily made and completed.

iii. Deny Payment

Deny payment for those obligations not performed, that due to Grantee's actions or inactions, cannot be performed or, if performed, would be of no value to the State; provided, that any denial of payment shall be reasonably related to the value to the State of the obligations not performed.

iv. Removal

Demand removal of any of Grantee's employees, agents, or Sub-grantees whom the State deems incompetent, careless, insubordinate, unsuitable, or otherwise unacceptable, or whose continued relation to this Grant is deemed to be contrary to the public interest or not in the State's best interest.

v. Intellectual Property

If Grantee infringes on a patent, copyright, trademark, trade secret or other intellectual property right while performing its obligations under this Grant, Grantee shall, at the State's option (a) obtain for the State or Grantee the right to use such products and services; (b) replace any Goods, Services, or other product involved with non-infringing products or modify them so that they become non-infringing; or, (c) if neither of the foregoing alternatives are reasonably available, remove any infringing Goods, Services, or products and refund the price paid therefore to the State.

16. NOTICES and REPRESENTATIVES

Each individual identified below is the principal representative of the designating Party. All notices required to be given hereunder shall be hand delivered with receipt required or sent by certified or registered mail to such

Party's principal representative at the address set forth below. In addition to, but not in lieu of a hard-copy notice, notice also may be sent by e-mail to the e-mail addresses, if any, set forth below. Either Party may from time to time designate by written notice substitute addresses or persons to whom such notices shall be sent. Unless otherwise provided herein, all notices shall be effective upon receipt.

A. State:

Todd Doherty, Program Manager, Water Supply Planning Section
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, CO 80203
Todd.doherty@state.co.us

B. Grantee:

Frank P. Jaeger, District Manager
Parker Water and Sanitation District
19801 East Main Street
Parker, Colorado 80138
fjaeger@pwsd.org

17. RIGHTS IN DATA, DOCUMENTS, AND COMPUTER SOFTWARE

Any software, research, reports, studies, data, photographs, negatives or other documents, drawings, models, materials, or Work Product of any type, including drafts, prepared by Grantee in the performance of its obligations under this Grant shall be the nonexclusive property of the State and, all Work Product shall be delivered to the State by Grantee upon completion or termination hereof. The State's nonexclusive rights in such Work Product shall include, but not be limited to, the right to copy, publish, display, transfer, and prepare derivative works.

18. GOVERNMENTAL IMMUNITY

Notwithstanding any other provision to the contrary, nothing herein shall constitute a waiver, express or implied, of any of the immunities, rights, benefits, protection, or other provisions of the Colorado Governmental Immunity Act, CRS §24-10-101, et seq., as amended. Liability for claims for injuries to persons or property arising from the negligence of the State of Colorado, its departments, institutions, agencies, boards, officials, and employees is controlled and limited by the provisions of the Governmental Immunity Act and the risk management statutes, CRS §24-30-1501, et seq., as amended.

19. STATEWIDE GRANT MANAGEMENT SYSTEM

If the maximum amount payable to Grantee under this Grant is \$100,000 or greater, either on the Effective Date or at anytime thereafter, this §19 applies.

Grantee agrees to be governed, and to abide, by the provisions of CRS §24-102-205, §24-102-206, §24-103-601, §24-103.5-101 and §24-105-102 concerning the monitoring of vendor performance on state Grants and inclusion of Grant performance information in a statewide Grant management system.

Grantee's performance shall be subject to Evaluation and Review in accordance with the terms and conditions of this Grant, State law, including CRS §24-103.5-101, and State Fiscal Rules, Policies and Guidance. Evaluation and Review of Grantee's performance shall be part of the normal Grant administration process and Grantee's performance will be systematically recorded in the statewide Grant Management System. Areas of Evaluation and Review shall include, but shall not be limited to quality, cost and timeliness. Collection of information relevant to the performance of Grantee's obligations under this Grant shall be determined by the specific requirements of such obligations and shall include factors tailored to match the requirements of Grantee's obligations. Such performance information shall be entered into the statewide Grant Management System at intervals established herein and a final Evaluation, Review and Rating shall be rendered within 30 days of the end of the Grant term. Grantee shall be notified following each performance Evaluation and Review, and shall address or correct any identified problem in a timely manner and maintain work progress.

Should the final performance Evaluation and Review determine that Grantee demonstrated a gross failure to meet the performance measures established hereunder, the Executive Director of the Colorado Department of Personnel and Administration (Executive Director), upon request by the CWCB, and showing of good cause, may debar Grantee and prohibit Grantee from bidding on future Grants. Grantee may contest the final Evaluation, Review and Rating by: (a) filing rebuttal statements, which may result in either removal or correction of the evaluation (CRS §24-105-102(6)), or (b) under CRS §24-105-102(6), exercising the debarment protest and appeal rights provided in CRS §§24-109-106, 107, 201 or 202, which may result in the reversal of the debarment and reinstatement of Grantee, by the Executive Director, upon showing of good cause.

20. GENERAL PROVISIONS

A. Assignment and SubGrants

Unless otherwise specified in Exhibit A, Statement of Work, Grantee's rights and obligations hereunder are personal and may not be transferred, assigned or subGranted without the prior, written consent of the State. Any attempt at assignment, transfer, subGranting without such consent shall be void. All assignments, subGrants, or Sub-grantees approved by Grantee or the State are subject to all of the provisions hereof. Grantee shall be solely responsible for all aspects of subGranting arrangements and performance.

B. Binding Effect

Except as otherwise provided in §20(A), all provisions herein contained, including the benefits and burdens, shall extend to and be binding upon the Parties' respective heirs, legal representatives, successors, and assigns.

C. Captions

The captions and headings in this Grant are for convenience of reference only, and shall not be used to interpret, define, or limit its provisions.

D. Counterparts

This Grant may be executed in multiple identical original counterparts, all of which shall constitute one agreement.

E. Entire Understanding

This Grant represents the complete integration of all understandings between the Parties and all prior representations and understandings, oral or written, are merged herein. Prior or contemporaneous additions, deletions, or other changes hereto shall not have any force or affect whatsoever, unless embodied herein.

F. Indemnification-General

Grantee shall indemnify, save, and hold harmless the State, its employees and agents, against any and all claims, damages, liability and court awards including costs, expenses, and attorney fees and related costs, incurred as a result of any act or omission by Grantee, or its employees, agents, Sub-grantees, or assignees pursuant to the terms of this Grant; however, the provisions hereof shall not be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protection, or other provisions, of the Colorado Governmental Immunity Act, CRS §24-10-101 et seq., or the Federal Tort Claims Act, 28 U.S.C. 2671 et seq., as applicable, as now or hereafter amended.

G. Jurisdiction and Venue

All suits, actions, or proceedings related to this Grant shall be held in the State of Colorado and exclusive venue shall be in the City and County of Denver.

H. Modification

i. By the Parties

Except as specifically provided in this Grant, modifications of this Grant shall not be effective unless agreed to in writing by both parties in an amendment to this Grant, properly executed and approved in accordance with applicable Colorado State law, State Fiscal Rules, and Office of the State Controller Policies, including, but not limited to, the policy entitled MODIFICATIONS OF GRANTS - TOOLS AND FORMS.

ii. By Operation of Law

This Grant is subject to such modifications as may be required by changes in Federal or Colorado State law, or their implementing regulations. Any such required modification automatically shall be

incorporated into and be part of this Grant on the effective date of such change, as if fully set forth herein.

I. Order of Precedence

The provisions of this Grant shall govern the relationship of the State and Grantee. In the event of conflicts or inconsistencies between this Grant and its exhibits and attachments including, but not limited to, those provided by Grantee, such conflicts or inconsistencies shall be resolved by reference to the documents in the following order of priority:

- i. Colorado Special Provisions,
- ii. The provisions of the main body of this Grant,
- iii. Exhibit A.

J. Severability

Provided this Grant can be executed and performance of the obligations of the Parties accomplished within its intent, the provisions hereof are severable and any provision that is declared invalid or becomes inoperable for any reason shall not affect the validity of any other provision hereof.

K. Survival of Certain Grant Terms

Notwithstanding anything herein to the contrary, provisions of this Grant requiring continued performance, compliance, or effect after termination hereof, shall survive such termination and shall be enforceable by the State if Grantee fails to perform or comply as required.

L. Taxes

The State is exempt from all federal excise taxes under IRC Chapter 32 (No. 84-730123K) and from all State and local government sales and use taxes under CRS §§39-26-101 and 201 et seq. Such exemptions apply when materials are purchased or services rendered to benefit the State; provided however, that certain political subdivisions (e.g., City of Denver) may require payment of sales or use taxes even though the product or service is provided to the State. Grantee shall be solely liable for paying such taxes as the State is prohibited from paying for or reimbursing Grantee for them.

M. Third Party Beneficiaries

Enforcement of this Grant and all rights and obligations hereunder are reserved solely to the Parties, and not to any third party. Any services or benefits which third parties receive as a result of this Grant are incidental to the Grant, and do not create any rights for such third parties.

N. Waiver

Waiver of any breach of a term, provision, or requirement of this Grant, or any right or remedy hereunder, whether explicitly or by lack of enforcement, shall not be construed or deemed as a waiver of any subsequent breach of such term, provision or requirement, or of any other term, provision, or requirement.

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21. COLORADO SPECIAL PROVISIONS

The Special Provisions apply to all Grants except where noted in italics.

A. 1. CONTROLLER'S APPROVAL. CRS §24-30-202 (1).

This Grant shall not be deemed valid until it has been approved by the Colorado State Controller or designee.

B. 2. FUND AVAILABILITY. CRS §24-30-202(5.5).

Financial obligations of the State payable after the current fiscal year are contingent upon funds for that purpose being appropriated, budgeted, and otherwise made available.

C. 3. GOVERNMENTAL IMMUNITY.

No term or condition of this Grant shall be construed or interpreted as a waiver, express or implied, of any of the immunities, rights, benefits, protections, or other provisions, of the Colorado Governmental Immunity Act, CRS §24-10-101 et seq., or the Federal Tort Claims Act, 28 U.S.C. §§1346(b) and 2671 et seq., as applicable now or hereafter amended.

D. 4. INDEPENDENT CONTRACTOR

Grantee shall perform its duties hereunder as an independent contractor and not as an employee. Neither Grantee nor any agent or employee of Grantee shall be deemed to be an agent or employee of the State. Grantee and its employees and agents are not entitled to unemployment insurance or workers compensation benefits through the State and the State shall not pay for or otherwise provide such coverage for Grantee or any of its agents or employees. Unemployment insurance benefits shall be available to Grantee and its employees and agents only if such coverage is made available by Grantee or a third party. Grantee shall pay when due all applicable employment taxes and income taxes and local head taxes incurred pursuant to this Grant. Grantee shall not have authorization, express or implied, to bind the State to any Grant, liability or understanding, except as expressly set forth herein. Grantee shall **(a)** provide and keep in force workers' compensation and unemployment compensation insurance in the amounts required by law, **(b)** provide proof thereof when requested by the State, and **(c)** be solely responsible for its acts and those of its employees and agents.

E. 5. COMPLIANCE WITH LAW.

Grantee shall strictly comply with all applicable federal and State laws, rules, and regulations in effect or hereafter established, including, without limitation, laws applicable to discrimination and unfair employment practices.

F. 6. CHOICE OF LAW.

Colorado law, and rules and regulations issued pursuant thereto, shall be applied in the interpretation, execution, and enforcement of this grant. Any provision included or incorporated herein by reference which conflicts with said laws, rules, and regulations shall be null and void. Any provision incorporated herein by reference which purports to negate this or any other Special Provision in whole or in part shall not be valid or enforceable or available in any action at law, whether by way of complaint, defense, or otherwise. Any provision rendered null and void by the operation of this provision shall not invalidate the remainder of this Grant, to the extent capable of execution.

G. 7. BINDING ARBITRATION PROHIBITED.

The State of Colorado does not agree to binding arbitration by any extra-judicial body or person. Any provision to the contrary in this contract or incorporated herein by reference shall be null and void.

H. 8. SOFTWARE PIRACY PROHIBITION. Governor's Executive Order D 002 00.

State or other public funds payable under this Grant shall not be used for the acquisition, operation, or maintenance of computer software in violation of federal copyright laws or applicable licensing restrictions. Grantee hereby certifies and warrants that, during the term of this Grant and any extensions, Grantee has and shall maintain in place appropriate systems and controls to prevent such improper use of public funds. If the State determines that Grantee is in violation of this provision, the State may exercise any remedy available at law or in equity or under this Grant, including, without limitation, immediate termination of this Grant and any remedy consistent with federal copyright laws or applicable licensing restrictions.

I. 9. EMPLOYEE FINANCIAL INTEREST. CRS §§24-18-201 and 24-50-507.

The signatories aver that to their knowledge, no employee of the State has any personal or beneficial interest whatsoever in the service or property described in this Grant. Grantee has no interest and shall not acquire any interest, direct or indirect, that would conflict in any manner or degree with the performance of Grantee's services and Grantee shall not employ any person having such known interests.

J. 10. VENDOR OFFSET. CRS §§24-30-202 (1) and 24-30-202.4.

[*Not Applicable to intergovernmental agreements*] Subject to CRS §24-30-202.4 (3.5), the State Controller may withhold payment under the State's vendor offset intercept system for debts owed to State agencies for: (a) unpaid child support debts or child support arrearages; (b) unpaid balances of tax, accrued interest, or other charges specified in CRS §39-21-101, et seq.; (c) unpaid loans due to the Student Loan Division of the Department of Higher Education; (d) amounts required to be paid to the Unemployment Compensation Fund; and (e) other unpaid debts owing to the State as a result of final agency determination or judicial action.

K. 11. PUBLIC GRANTS FOR SERVICES. CRS §8-17.5-101.

[Not Applicable to Agreements relating to the offer, issuance, or sale of securities, investment advisory services or fund management services, sponsored projects, intergovernmental Agreements, or information technology services or products and services] Grantee certifies, warrants, and agrees that it does not knowingly employ or Grant with an illegal alien who shall perform work under this Grant and shall confirm the employment eligibility of all employees who are newly hired for employment in the United States to perform work under this Grant, through participation in the E-Verify Program or the State program established pursuant to CRS §8-17.5-102(5)(c), Grantee shall not knowingly employ or Grant with an illegal alien to perform work under this Grant or enter into a Grant with a Sub-grantee that fails to certify to Grantee that the Sub-grantee shall not knowingly employ or Grant with an illegal alien to perform work under this Grant. Grantee (a) shall not use E-Verify Program or State program procedures to undertake pre-employment screening of job applicants while this Grant is being performed, (b) shall notify the Sub-grantee and the Granting State agency within three days if Grantee has actual knowledge that a Sub-grantee is employing or Granting with an illegal alien for work under this Grant, (c) shall terminate the subGrant if a Sub-grantee does not stop employing or Granting with the illegal alien within three days of receiving the notice, and (d) shall comply with reasonable requests made in the course of an investigation, undertaken pursuant to CRS §8-17.5-102(5), by the Colorado Department of Labor and Employment. If Grantee participates in the State program, Grantee shall deliver to the Granting State agency, Institution of Higher Education or political subdivision, a written, notarized affirmation, affirming that Grantee has examined the legal work status of such employee, and shall comply with all of the other requirements of the State program. If Grantee fails to comply with any requirement of this provision or CRS §8-17.5-101 et seq., the Granting State agency, institution of higher education or political subdivision may terminate this Grant for breach and, if so terminated, Grantee shall be liable for damages.

L. 12. PUBLIC GRANTS WITH NATURAL PERSONS. CRS §24-76.5-101.

Grantee, if a natural person eighteen (18) years of age or older, hereby swears and affirms under penalty of perjury that he or she (a) is a citizen or otherwise lawfully present in the United States pursuant to federal law, (b) shall comply with the provisions of CRS §24-76.5-101 et seq., and (c) has produced one form of identification required by CRS §24-76.5-103 prior to the effective date of this Grant.

SPs Effective 1/1/09

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22. SIGNATURE PAGE

Grant Routing Number _____

THE PARTIES HERETO HAVE EXECUTED THIS GRANT

* Persons signing for Grantee hereby swear and affirm that they are authorized to act on Grantee's behalf and acknowledge that the State is relying on their representations to that effect.

GRANTEE Parker Water and Sanitation District By: Frank P. Jaeger Title: District Manager <i>Frank P. Jaeger</i> _____ *Signature Date: <u>04/08/2011</u>	STATE OF COLORADO John W. Hickenlooper GOVERNOR Department of Natural Resources Mike King, Executive Director <i>Eric B. Hecox</i> _____ By: Eric Hecox, Section Chief, Water Supply Planning Section, CWCB Signatory avers to the State Controller or delegate that Grantee has not begun performance or that a Statutory Violation waiver has been requested under Fiscal Rules Date: <u>4/6/11</u>
2nd Grantee Signature if Needed By: Title: _____ *Signature Date: _____	LEGAL REVIEW John W. Suthers, Attorney General By: <i>NA</i> _____ Signature - Assistant Attorney General Date: _____

ALL GRANTS REQUIRE APPROVAL BY THE STATE CONTROLLER

CRS §24-30-202 requires the State Controller to approve all State Grants. This Grant is not valid until signed and dated below by the State Controller or delegate. Grantee is not authorized to begin performance until such time. If Grantee begins performing prior thereto, the State of Colorado is not obligated to pay Grantee for such performance or for any goods and/or services provided hereunder.

STATE CONTROLLER David J. McDermott, CPA By: <i>Susan Borup</i> _____ <i>Susan Borup, Controller - Dept of Natural Resources</i> Date: <u>5/2/2011</u>
--

22. SIGNATURE PAGE

Grant Routing Number _____

THE PARTIES HERETO HAVE EXECUTED THIS GRANT

*** Persons signing for Grantee hereby swear and affirm that they are authorized to act on Grantee's behalf and acknowledge that the State is relying on their representations to that effect.**

GRANTEE Parker Water and Sanitation District By: Frank P. Jaeger Title: District Manager _____ *Signature Date: <u>04/08/2011</u>	STATE OF COLORADO John W. Hickenlooper GOVERNOR Department of Natural Resources Mike King, Executive Director _____ By: Eric Hecox, Section Chief, Water Supply Planning Section, CWCB Signatory avers to the State Controller or delegate that Grantee has not begun performance or that a Statutory Violation waiver has been requested under Fiscal Rules Date: <u>4/11/11</u>
2nd Grantee Signature if Needed By: _____ Title: _____ _____ *Signature Date: _____	LEGAL REVIEW John W. Suthers, Attorney General By: <u>NA</u> Signature - Assistant Attorney General Date: _____

ALL GRANTS REQUIRE APPROVAL BY THE STATE CONTROLLER

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STATE CONTROLLER David J. McDermott, CPA By: <u>Susan Borup</u> <i>Susan Borup, Controller - Dept of Natural Resources</i> Date: <u>5/2/2011</u>
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EXHIBIT A

INTRODUCTION AND BACKGROUND

Physical research supported by PWSD and CWCB (2007-2010) has evaluated water conserving cropping practices including limited irrigation and rotational cropping with a variety of crops and crop rotations (corn, wheat, sugarbeet, soybean, sunflower, canola). The research was conducted at the Lower South Platte Irrigation Research and Demonstration project in Iliff, CO and results show as much as 40% reduction in consumptive use compared to fully-irrigated continuous corn. The CWCB-funded research has led to additional supportive work by CSU and USDA-ARS scientists, showing that viable cropping practices reduce consumptive use while avoiding dry-up of irrigated land are attractive alternatives. However, rotational fallow or permanent dry-up are more frequently adopted because they are simpler to administer and enforce in a change of use case. Thus, legal and administrative hurdles stand as major obstacles to adoption of alternative water-conserving practices. This proposal will develop a practical means of calculating and verifying consumptive water use and of addressing return flow concerns and will therefore bring limited irrigation and alternative crop rotation into the feasible set of water saving options. The previous CWCB-funded research also evaluated the role of deficit irrigation in farm level economics, the willingness of farmers to participate in alternative water sharing arrangements, and the contribution that irrigated agriculture makes to the economic vitality of rural communities. The next major step forward is development of a detailed, specific and sophisticated water sharing program that addresses the following: how much water can be released as a result of adopting alternative water saving practices, how much must farmers be paid to participate in the program, what is the cost of this water to the municipal leaser, and how will the alternative transfers impact local businesses and the environment relative to permanent fallowing that follows a 'buy and dry' transfer. This project will address these questions through development of a model water transfer institution based on a case study water organization participant. In addition, the case study will evaluate potential third party impacts.

SPECIFIC PROJECT TASKS

1. Develop a practical means of calculating and verifying consumptive water use and water savings in alternative systems that will satisfy Water Court requirements.
2. Demonstrate a water allocation approach to simplify the administrative burden to maintain return flows.
3. Develop a model water transfer institution based on a case study water organization that will establish a water delivery plan and organizational structure.
4. Evaluate issues associated with, and develop, ultimate treatment and infrastructure delivery options and costs.

TASKS

Task 1: Develop a practical means of calculating and verifying consumptive water use and water savings in alternative systems that will satisfy Water Court requirements.

Description of Task

In this task, we will develop the necessary approaches to implement water transfers based on the cropping strategies developed with the previous CWCB-funded project. Specifically, we will develop, test, and validate a simplified means to calculate consumptive use water savings. CU savings will be determined using the same methodologies that have been employed in Water Court, e.g. the Blaney-Criddle equation, but using crop growth coefficients that reflect irrigation practices evaluated in the previous CWCB-funded research at Iliff. The study is carried out at three scales. Results of field plots will be used to develop stress coefficients. They will be validated at the field scale with independent evapotranspiration measurements, and then refined and further developed at the basin level with satellite based remote sensing. This task is divided into sub-tasks 1A, 1B, and 1C, but work together to bring the previous research to a point where the findings can be implemented.

Sub-task 1A: Apply results from the CWCB-funded research (Iliff site) to develop stress coefficients for major crops corn, alfalfa, and wheat. The stress coefficients can be used with standardized methods to calculate crop ET, a critical step for implementing study findings.

Sub-task 1B: Conduct a field-scale validation of the stress coefficients and consumptive use calculations under limited irrigation by independently measuring actual crop evapotranspiration. The independent evapotranspiration measurement is based on in-field soil moisture sensors, infra-red radiometry, and a land surface energy balance.

Sub-task 1C: Use satellite-based remote sensing to further develop and validate ET measurements, crop coefficients, and stress coefficients under cropping practices with reduced consumptive use. This sub-task will take a multi-farm, to basin, scale approach to determine ET by measuring instant, daily, and seasonal actual ET. The surface energy balance model to be used was developed by the Integrated Decision Support at Colorado State University and is called ReSET (Remote Sensing of ET). This model has been extensively used in the South Platte and Arkansas River Basins as well as other parts of the US to calculate ET and develop crop coefficients. The model will be used to calculate CU for targeted fields (deficit irrigation, rotational fallow) throughout the growing season and compared to historical consumptive use (estimated using the Integrated Decision Support Consumptive Use Model (IDSCU) which has been developed over the last twelve years in close cooperation with water users in the South Platte and the State Engineer's Office (www.ids.colostate.edu/projects/idscu)) to estimate the possible water savings from the alternative management practices and hence determine the amount of water available for possible transfer. The ReSET model has a seasonal module which estimates cumulative ET for the season, which is essential in calculating water savings. The seasonal module uses ET grids derived each day a satellite image is available and a network of weather stations or soil moisture sensors to develop a detailed seasonal ET grid for a particular area of interest (field, canal service area, region) with a 30m by 30m resolution when using Landsat 5 imagery.

Detailed Methods and Procedures

Subtask 1A: This subtask will develop crop stress coefficients that will allow the Iliff-based research results to be applied to limited irrigation systems throughout the South Platte Basin.

Past field research collected detailed water balance data on a replicated field study of alternative water saving crops and cropping systems. The water balance data collected can be used to calculate crop consumptive use and coupled with weather data to develop and evaluate crop stress coefficients for limited irrigation or rotational cropping. Water stress coefficient (K_s) will be based on those developed for the FAO standardized Penman-Monteith equation (Allen et al., 1998). The stress coefficients modify crop coefficients on a daily time step when soil water content is less than a crop-specific readily available water (RAW) level. We will test the use of K_s against observed ET data from the Iliff site for corn and wheat, and for alfalfa from a Fort Collins study, and make adjustments in RAW as needed to obtain reliable ET estimates. These stress coefficients will be subjected to testing and validation in subtasks 1B and 1C so they can provide defensibility in a Water Court proceeding.

Subtask 1B: This subtask is a field-scale validation of the stress coefficients and consumptive use calculations under limited irrigation with an independent measurement of actual crop evapotranspiration. By using state-of-art instrumentation, we will verify consumptive use savings and substantiate how the simplified algorithms developed can be used when farmers choose to conserve water by means other than land dry-up. There are two components to the independent evapotranspiration estimates:

1. *Synoptic surface/canopy temperature and soil moisture monitoring using five in-situ stations.* Each station will have one IRT sensor, two soil water potential sensors and one soil temperature sensor. Additional components for each station include mast or pole with cross-arms, environmental enclosure, datalogger, power supply, pvc pipes, and ancillary material. These stations will acquire every hour surface (canopy) temperature, soil moisture potential, and soil temperature data. The sensors will be mounted at least one meter above the canopy level at all times and will be oriented south to avoid casting shadows at the observed surface.

Five monitoring stations will be installed, one per field. Three of the fields will be from the Lower South Platte Irrigation Research and Demonstration project near Iliff, CO. Two additional fields will be on private land of cooperating farmers. The selected fields will be planted to corn and alfalfa, two crops that consume large amounts of water and that are largely grown in northern Colorado. Measurements will start in June 2011, be collected during the irrigation season, and will end in October 2012, for a two-year study period.

Daily crop water stress indices (CWSI) will be produced using the canopy minus air temperature difference method which is based on an upper and lower boundary temperature difference limits. The methodology outlined by Payero and Irmak (2006), Irmak et al. (2002), Alves and Pereira (2000), and Steele et al. (1994) will be applied.

Relationships between CWSI and soil water potential will be established. The crop consumptive use and crop stress coefficients will be derived from the CWSI using reference (potential) evapotranspiration (ET_r) calculated using weather data.

Soil moisture will be measured at two depths. The first depth will be one foot from

the surface. The soil temperature will be measured at the first foot depth. This sensor will track the soil water status within the root zone. The second soil water potential sensor will be installed below the root zone to determine any deep percolation or water up-flux from high water table.

The CWSI indices will be evaluated using the SMS data and a Large Aperture Scintillometer (LAS) energy balance (EB) system. The procedure detailed in Ezzahar et al. (2009) and Hemakumara et al. (2003) will be followed. Besides installing the LAS transmitter and receiver, a net radiometer sensor and soil heat flux plates will be installed in the field to obtain the needed components of the EB, thus being able to compute ET or CU.

2. *Ground-based remote sensing campaigns of crop surface/canopy reflectance will take place using a handheld multispectral radiometer* (visible and near infra-red bands) every two weeks (from June to October of 2011 and 2012) to follow the crop biomass development stages and derive surface albedo, vegetation indices like the Green Normalized Difference Vegetation Index (GNDVI), the Normalized Difference Vegetation Index (NDVI), and the Optimized Soil-Adjusted Vegetation Index (OSAVI) which can be used to infer on the plant Leaf Area Index (LAI) and fractional vegetation cover (fc); both indicators of crop growth. The data obtained with the handheld multispectral radiometer will be used, in conjunction with weather data and the IRT data, to compute net radiation, soil heat flux, and sensible heat flux. Then, using the EB approach we will be able to get the crop actual CU (CU_a). The CU_a will be related to potential CU to determine the crop water stress and therefore the amount of water saved by the limited irrigation management strategy.

This method will be evaluated using the SMS and LAS EB systems as described above in Sub-task 1B, item (1) for the CWSI derived from IRT sensors only.

Subtask 1C: This sub-task will provide further validation of the crop stress coefficients based on using remote sensing techniques. This sub-task will provide additional defensible documentation that can be used in a Water Court proceeding. The ReSET land surface energy balance model (Elhaddad and Garcia 2008) will be used to process available satellite images of the region. The model estimates the actual ET at the time of a satellite image. Summing up values of actual ET (ET_a) over any length of time (*day, week, month, season*) for a particular field provides an estimate of the actual consumptive use for a field. The model can also be applied to large areas (180 km x 180 km) yet retaining a resolution of 30m x 30 m which allows the model to determine the ET for small parcels.

The ReSET model is built on the same theoretical basis of its two predecessors METRIC (Allen et al. 2007 a,b) and SEBAL (Bastiaanssen et al 1998 a,b) with the additional ability to handle data from multiple weather stations. This enhances regional ET_a estimates by taking into consideration the spatial variability of weather conditions through data acquired from different weather stations (across the area covered by the remote sensing system/imagery).

Cumulative ET calculations derived from ReSET are needed to estimate seasonal water savings from specific fields that either had deficit irrigation or rotational fallowing. Seasonal ET is calculated using actual individual ET grids developed at each image date and filling interpolated ET grids between them. The ET grids on days when images are not available are calculated using the ReSET seasonal tool which is a GIS application that uses a network of available weather stations and/or field soil moisture sensors to estimate the ET taking into consideration the spatial and temporal variability of ET. Next, all calculated ET grids are added to calculate the total water volume per unit area for the season for each field being monitored.

ReSET is currently being used in a joint project between Northern Colorado Water Conservancy District (NCWCD), the US Bureau of Reclamation and CSU to calculate ET in the NCWCD service area. As part of this project, the ReSET model is being used to develop regional crop coefficient curves (Kc) for the Penman-Monteith equation for several agricultural crops. The Kc developed for grain corn fields in the South Platte Basin used data for a period of four years, with a total of 79 Landsat images using over 1,000 corn fields during the growing season which extends from May to October. The Kc curve developed is shown below:

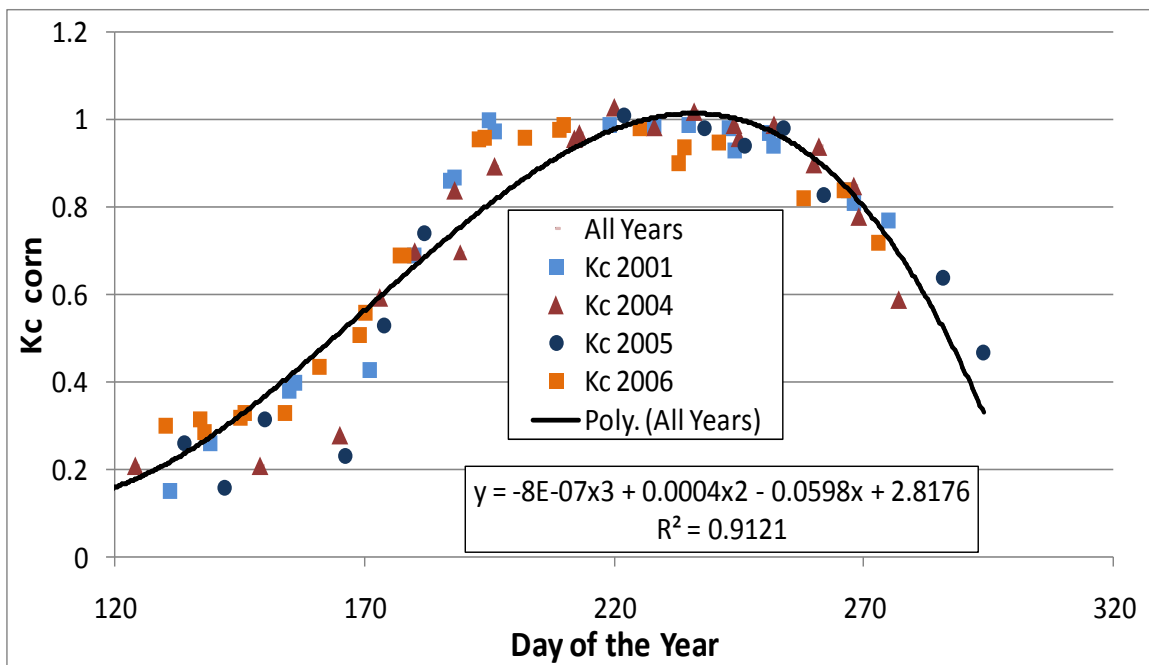


Figure 1. ReSET corn Kc values developed using 2001, 2004, 2005 and 2006 data.

The model has also been applied to the Lower Arkansas River Basin in Colorado to calculate the ET for numerous fields where CSU has been working with the CWCB on an irrigation monitoring project. The ReSET model was used to estimate the ET for each of the fields being monitored. The ReSET ET was used as part of the water budget to determine the irrigation

efficiency and the deep percolation for each irrigation and field that was monitored. A draft of a comprehensive final report on the irrigation monitoring work was recently submitted to CWCB. Another area that the model was used to estimate and accurate seasonal ET for Alfalfa is the Palo Verde Irrigation District in California, San Joaquin Valley in California and the United States, the seasonal estimate by the model was very accurate (1.5% off weather station estimates), also the Bureau of Reclamation is applying ReSET as part of their Colorado River Basin Uses and Losses Report.

As such, these sub-tasks will build on existing data to develop the necessary, but simplified, algorithms to be used for changes of use in Water Court.

Task 1 Deliverables

This task will deliver a procedure to efficiently and economically determine the actual ET from areas of deficit irrigation, alternative crop rotations, or rotational fallowing. The ET can then be compared to historic ET to determine the amount of water for potential transfer. As such, this task will complete the procedures necessary to successfully transfer agricultural water to municipal use .

Task 2: Demonstrate a water allocation approach to simplify the administrative burden to maintain return flows.

Description of Task

Implementation of cropping practices that reduce consumptive use without complete dry-up or fallow is dependent on a reliable approach to maintain and verify historical return flows. Results from the Iliff study do show a reduced volume of water moving below the root zone from limited irrigation, suggesting that return flows would be diminished under these practices. Under a change of use case involving any of these practices, a secondary approach to maintain return flows may be implemented (recharge ponds, wetlands, etc). Field-scale approaches to determine and verify the contributions to return flow under limited irrigation have the potential to be very complex and expensive, making this a significant barrier to adoption of these alternative methods. We propose to demonstrate the feasibility of a water allocation approach to simplify the administrative burden of maintaining return flows when a deficit irrigation or alternative crop rotation is implemented.

Methods and Procedures

The allocation approach is proposed to simplify and reduce the costs to administer a change of use case and protect historic return flows even while maintaining some level of irrigation on the farm. In this approach, 100% of the historic return flows would be met with a secondary method (i.e., constructed wetlands or recharge ponds) and the allowable diversion would be capped at the fraction of historic consumptive use kept for irrigation. The cap in diversion allocation guarantees the target CU savings and historic return flow, and the irrigator is allowed to fully consume the diverted water. A major advantage to this approach is that it motivates the use of efficient irrigation practices. Diversion/flow measurements are needed for the farm and for the diversion into the secondary return flow system, but this approach avoids the need for expensive and complicated instruments such as soil moisture sensors, drainage gauges, etc. at the field level. From the perspective of return flow maintenance, the allocation approach is conservative because water diverted for irrigation that becomes return flow is additional flow above the requirement. For this task, we will use existing field research results to synthesize the costs, strengths, and weaknesses of the allocation approach and we will conduct a field-scale demonstration at the Lower South Platte Irrigation Research and Demonstration site in Iliff, CO.

Task 2 Deliverables

This task will deliver (1) a simplified approach to administer change of use cases and to protect return flow while maintaining on-farm irrigation and (2) a field demonstration of the allocation approach using limited irrigation.

Task 3: Develop a model water transfer institution based on a case study water organization that will establish a water delivery plan and organizational structure. Task 3 has been modified based on comments from the CWCB. The approved scope of work, as well as the budget, for this task will be incorporated into the Lower South Platte Water

Cooperative proposal. However, the approved task description is included in this revised proposal as it is also essential for the completion of the work described in this proposal.

Description of Task

Previous research funded by CWCB creates a better understanding of the role of deficit irrigation in farm-level economics, the willingness of farmers to participate in alternative water sharing arrangements and the contribution that irrigated agriculture makes to the economic vitality of rural communities. The next evolution in identifying and creating a successful alternative to agriculture transfers program is to develop more detailed, specific and sophisticated understanding of a water-sharing program. Relevant questions include: how much water can be released as a result of an innovative alternatives to agriculture program and how much must farmers be paid to participate in the program. The following scope of work is a first step in understanding in the answers to these questions.

Collaborative Scope of Work with the LSP Water Cooperative

The Colorado State University team (contact is James Pritchett) will coordinate activities with the Water Cooperative and Harvey Economics to support the refinement of AgLet and provide specific farm management economic information to individuals/groups supplying water to the cooperative. Specific activities include:

- Coordinating with the Water Cooperative to designate farmers or groups of farmers as candidates for their innovative transfer program (e.g., rotational fallowing, deficit irrigation, interruptible supply). The purpose for designating these “pilot farms” is to use these farm managers as expert advisers in developing a collaborative management plan for releasing water to the cooperative and in refining AgLet to better understand the compensation necessary to release water to the cooperative under a variety of institutional arrangements.
- Create a focus group among potential cooperators to baseline current management practices, production costs and yields for the pilot farms so that this might be inputted into AgLet. The practices include a benchmark of existing farm management activities and those that are likely under a rotational fallowing, deficit irrigation or interruptible supply scenarios. Information includes, but is not limited to, changing crop mix, changing tillage systems, investment in irrigation equipment, altering the intensity of cropping (seeding, fertilizer, chemical), new monitoring/reporting of applied water /consumptive use, new commodity marketing approaches, changes in crop insurance coverage, an altered tax structure and funds needed for debt service.
- Use focus groups with pilot farmers and local crop consultants to develop a collaborative farm management plan for rotational fallowing on the pilot farms. Specifically, these collaborators will need to determine how much land must be fallowed, which farms will fallow and the approximate costs to maintain existing cropping and fallowed lands. The collaborative plan will need to be repeated for deficit irrigation and interruptible supply scenarios.
- The focus group may need to be repeated based on the geographic diversity of

participating operations, the diversity of existing cropping systems and the overall size/scope of the pilot area. Focus group information will need to be representative of collaborating farm types at a minimum.

- Focus group information will be used to refine assumptions currently found in AgLet. The CSU team will work closely with Harvey Economics in suggesting and implementing refinements.
- Work with the CSU-PWSD team to quantify the farm level costs of maintaining return flows and monitoring consumptive use. Integrate these into the farm-level budgets.
- Use Aglet to determine the reservation price per acre for a rotational fallowing program. Illustrate how AgLet can be used by famers to perform sensitivity analysis to their participation in a leasing program.
- Document and report all of the above.

Task 4: Evaluate issues associated with, and develop, ultimate treatment and infrastructure delivery options and costs.

Description of Task

The first two tasks focus on determining methodologies that likely can be successful in Water Court to affect a change of use in Water Court from agricultural use to municipal use, while still maintaining farming practices. Task 3 then evaluates the impacts that likely will occur to rural economies as a result of these changes, as well as the parameters and framework that will be necessary to make these types of alternative agricultural transfers attractive to the farming community. This task is designed to evaluate what remaining issues there are to bring the transferred water to urban communities along the Front Range. The principal issues associated with this task relate to timing of water availability, treatment issues, and the infrastructure required to deliver the water.

Methods and Procedures

Agricultural water rights are only available during the irrigation season, typically April through October. Long distance water deliveries need to be made on an average daily basis, rather than a peak day basis. The first objective of this task will be to evaluate the timing and location of water availability for transfer. As part of this work we will coordinate with the Water Cooperative associated with work they have already completed on the exchange potential on the South Platte River. These data will assist us in evaluating where, and how much, water is available for potential delivery to the urban areas along the Front Range. We will develop a scenario related to where, when, and how much water can be delivered.

Using the water availability values, the water quality of the water will be assessed from existing

data bases to determine the level of treatment that will be required prior to delivery. As part of this assessment, we will also evaluate issues associated with the required treatment technologies, e.g. brine disposal from reverse osmosis treatment. To the extent possible, we will utilize data being developed in the CWCB-funded study on treatment issues.

The water availability values will also be used to assess the need for carryover storage in reservoirs in the Lower South Platte Basin and the infrastructure required to deliver this water to urban areas along the Front Range on a baseload basis.

Work related to water availability assessments, storage needs, and exchange potential on the South Platte River will be conducted by Lytle Water Solutions, LLC of Highlands Ranch, Colorado, while the treatment issues will be assessed and completed by Dewberry-Integra Engineering of Denver, Colorado, and the infrastructure issues will be addressed and completed by States West Water Resources Corporation of Cheyenne, Wyoming.

Task 4 Deliverables

The deliverable from Task 4 will be a final report assessing the issues associated with the ultimate delivery of changed agricultural water to urban areas along the Front Range, the feasibility of such a plan, and the estimated costs for this water collection, treatment, and delivery system.

REPORTING AND FINAL DELIVERABLE

Reporting: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of the executed contract. The progress report shall describe the completion or partial completion of the tasks identified in the statement of work including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Deliverable: At completion of the project, the applicant shall provide the CWCB a final report that summarizes the project and documents how the project was completed. This report may contain photographs, summaries of meetings and engineering reports/designs.

This task is acknowledged as being a part of the scope of work described above. Deliverables are described for each task in the scope of work.

Shown below is the proposed budget for this grant application in the format shown above.

BUDGET

Total Costs						
	Labor	Other Direct Costs	Indirect Costs	Matching Funds	Total Project Costs	Alternative Ag Grant Award 1)
Task 1 – calculating and verifying consumptive water use	\$99,406	\$32,298	\$32,926	\$41,881	\$206,511	\$164,630
Task 2 – water allocation approach	\$91,001	\$1,428	\$23,107	\$41,881	\$157,417	\$115,536
Task 4 – Evaluate delivery issues	\$40,000				\$40,000	\$40,000
Total-Costs:	\$230,407	\$33,726	\$56,033	\$83,762	\$403,928	\$320,166

1) Total project costs minus matching funds.

Project Personnel: 3-Year cost:	Scientists	Graduate Student	Research Associate	Consultants	Total Costs
Task 1 – calculating and verifying consumptive water use	\$29,216	\$46,353	\$23,837		\$99,406
Task 2 – water allocation approach	\$67,164		\$23,837		\$91,001
Task 4 – Evaluate delivery issues				\$40,000	\$40,000
Total Cost:	\$96,380	\$46,353	\$47,674	\$40,000	\$230,407

Other Direct Costs: 3-Year cost:	Equipment	Mileage	Materials / supplies	Tuition	Total
Task 1 – calculating and verifying consumptive water use	\$11,206	\$3,060	\$2,792	\$15,240	\$32,298
Task 2 – water allocation approach		\$1,428			\$1,428
Total Cost:	\$11,206	\$4,488	\$2,792	\$15,240	\$33,726

In-Kind Contributions				
Project Personnel:	Scientist	Equipment		Total
Task 1 – Monitoring crop consumptive use using in-situ sensors	\$11,788	\$34,000		\$45,788
Task 2 – Monitoring crop consumptive use using satellites	\$15,000			\$15,000
Total Units:				
Total Cost:	\$26,788	\$34,000		\$60,788

Note: Scientist contribution includes 0.5 month salary the first year of the project and 0.5 month salary the last year of the project (i.e., year 3). Equipment contribution includes purchasing a Large Aperture Scintillometer (LAS) and ancillary sensors for validation of the in-situ and remote sensing method.

SCHEDULE

Provide a project schedule including key milestones for each task and the completion dates or time period from the Notice to Proceed (NTP). This dating method allows flexibility in the event of potential delays from the procurement process. Sample schedules are provided below. Please note that these schedules are examples and will need to be adapted to fit each individual application.

SCHEDULE

Task 1 – Calculating and verifying consumptive water use	2011				2012				2013			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
A – Acquiring & Installing Instrumentation		X				X						
B – Data acquisition		X	X	X		X	X	X				
C – Data processing and Analysis				X	X	X	X	X	X	X	X	
D - Preliminary reports				X				X				
Final Reports												X

Note: 1Q = first quarter of the year.

Task 2 – Water allocation approach	2011				2012				2013			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
A – Data processing and Analysis		X	X	X	X	X	X	X	X	X		
B - Preliminary reports				X				X				
Final Reports												X

Note: 1Q = first quarter of the year.

Task 3 – Model water transfer institution	2011				2012				2013			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Designate case study scope including participants and advisory committee mtgs.	X	X		X				X				X
Collect Agronomic and Farm Information		X	X	X								
Final Report												X

Note: 1Q = first quarter of the year.

Task 4 – Evaluate delivery issues	2011				2012				2013			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Evaluate water delivery timing					X							
Evaluate treatment/infrastructure issues					X							
Prepare report						X						

Note: 1Q = first quarter of the year.