Water Supply Reserve Account – Grant and Loan Program
Water Activity Summary Sheet
September 11-12, 2014
Agenda Item 13(q)

Applicant: Water Preservation Partnership

Program Sponsor: Colorado State University

Water Activity Name: Economic Analysis and Design of Policies to Reduce Colorado's Groundwater Use in the Northern High Plains Ground Water Basin

Water Activity Purpose: Agricultural Study

County: Counties wholly, or partially within boundaries of the Republican River Basin

Drainage Basin: South Platte (Republican River Basin)

Water Source: Republican River and tributaries

Total Amount Requested: $159,882

Source of Funds: $7,994 South Platte Basin Account; $151,888 Statewide Account

Matching Funds: Basin Account Match ($7,994) = 5% of total grant request
Basin Account & Applicant Match (cash: $56,430) = 35% of total grant request
Applicant Match (cash: $48,436) = 24% of total project costs ($208,318)
(refer to *Funding Summary/Matching Funds*)

Staff Recommendation:
Staff recommends conditional approval (contingent upon the applicant or program sponsor satisfying concerns addressed in the *Issues/Additional Needs* section of this summary) of up to $7,994 from the South Platte Basin Account; and $151,888 from the Statewide Account to help fund the study titled: Economic Analysis and Design of Policies to Reduce Colorado's Groundwater Use in the Northern High Plains Ground Water Basin.

Water Activity Summary: The purpose of this project is to collect, develop, and disseminate the information necessary to promote reductions in groundwater use and to help in the development of policies that would be voluntarily adopted by the various groundwater districts to achieve pumping goals.

Colorado residents in the Northern High Plains Ground Water Basin (NHPGWB) face significant challenges related to groundwater use in the basin. Groundwater pumping within the basin currently exceeds recharge by close to 400,000 acre-feet per year, a deficit that cannot be sustained. Realizing the potentially devastating social and economic impacts associated with continued pumping at these levels, representatives from each of the basin's eight groundwater management districts formed the Water Preservation Partnership (WPP). The challenges facing the WPP are determining (1) by how much pumping should be reduced and (2) which policies should be used to achieve the desired reductions. The WPP has identified a lack of information surrounding the economic impacts of different levels of reductions, the effectiveness of different policies, and the preferences of the producers within each of their districts as the immediate barriers preventing the adoption of policy measures.

The primary goal of this project is to provide the WPP with the information needed to develop, and get support for long-term solutions to the over-pumping problem, while at the same time promoting wise water use in the short-run through the targeted dissemination of information about the problem and strategies for water conservation best management practices. A reduction in pumping is inevitable, either as wells begin to run dry due to continued over pumping or as a result of polices developed as part of a coordinated effort from pumpers in the area that is designed to promote the long-term sustainable use of the aquifer while minimizing the economic impacts of the reductions. Again, the question is by how much and by what means should the reductions be achieved. Achieving this goal involves four interrelated components including: (1) the development of a dynamic, regional hydrologic-economic model capable of modeling the impacts of alternative pumping policies on producers in the area, as well as identifying the broader economic impacts of these policies; (2) the dissemination of outreach materials designed to (a) educate groundwater users about the state of groundwater pumping, (b) provide them information about best management practices, and (c) inform them of the modeling results; (3) the implementation of a survey designed to illicit producer preferences towards different policies; and (4) the design of policies utilizing the economic information and survey responses.

Discussion:
No further discussion is required.

Issues/Additional Needs:
CWCB staff has requested that the applicant and program sponsor obtain additional letters of support, or financial contributions from local entities as a condition of approval.

Threshold and Evaluation Criteria:
The application meets all four Threshold Criteria

Tier 1-3 Evaluation Criteria:

Tier 1: (a) Agriculture serves as the single largest user of water in the basin, however, municipal and other industrial users of water also compete for this resource. Reducing agricultural water use will directly benefit these other interests. In addition, because of agriculture's importance to the local economy limiting the impacts of reductions in water use on the agricultural sector will benefit other linked industries both within and outside of the immediate area.

(b) The Water Preservation Partnership (WPP) is a grassroots group representing all of the groundwater management districts in the Northern High Plains Ground Water Basin (NHPGWB). This includes all of the groundwater management districts located within the Republican River Basin and one outside district.

(c) It is hoped that project findings may assist in a reduction to the potential changes in irrigated acres in the Republican River Basin as identified in the 2010 South Platte Basin Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments.

Tier 2: (d) n/a (not addressed)

(e) The project team is committing to match approximately $48,436 (24% of total study costs) in additional salary/fringe and indirect over the course of the project. This time is

in addition to the significant time donated by the project team leading up to the proposal as part of presentations and meeting/organizing focus groups.

Tier 3: (f) A key component of the project will be identifying polices that will help the districts achieve desired levels of reduction in a way that preserves agriculture and minimizes the direct and indirect regional economic impacts of reduced pumping.

(g) n/a

(h) n/a

(i) Previous research suggests that the potential costs savings from well-designed policies can be large. For example, Kuwayama and Brozovic (2013) showed the potential costs savings of properly designed ground water policies to be in the millions. It is also noted that the requested amount is significantly less than similar projects in surrounding states yet will yield similar deliverables. This is because the project builds off of the hydrologic work by Slattery and the WPP/CSU have agreed to contribute more than the minimum amount of matching funds. In addition, this study may provide a template for future analysis in other geographic areas of the state.

(j) n/a

Funding Summary/Matching Funds:

	Cash	In-kind	Total
WSRA South Platte Basin Account	$7,994	n/a	$7,994
WSRA Statewide Account	$151,888	n/a	$151,888
Colorado State University	$48,436	$0	$48,436
Total Study Costs	**$208,318**	**$0**	**$208,318**

All products, data and information developed as a result of this grant must be provided to the CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to Basin Roundtables and the general public and will help promote the development of a common technical platform. In accordance with the revised WSRA Criteria and Guidelines, staff would like to highlight additional reporting and final deliverable requirements. The specific requirements are provided below.

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 scope 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.

Engineering: All engineering work (as defined in the Engineers Practice Act (§12-25-102(10) C.R.S.)) performed under this grant shall be performed by or under the responsible charge of professional engineer licensed by the State of Colorado to practice Engineering.

Craig Godbout, Program Manager
Colorado Water Conservation Board
1580 Logan Street, Suite 200
Denver, Colorado 80203
Craig.godbout@state.co.us

July 17, 2014

The South Platte Basin roundtable underwent an evaluation and approval process of the Republican River Economic Analysis and Policy Design to Reduce Colorado's Groundwater Use in the Northern High Plains Ground Water Basin Project. The applicant first presented to the South Platte Basin Roundtable Needs Committee in February 2014 and spent several months revising their application following Needs Committee guidance. In June of this year, the project was again presented to the South Platte Roundtable Needs Committee and ultimately received a favorable recommendation.

On July 14, 2014 the project was presented to the full South Platte Basin Roundtable. The roundtable evaluation included a review and discussion of the project, definition of the project scope and budget, and the identification of the project beneficiaries. It was determined that this project helps meet many of the roundtables key goals.

A motion was made and seconded to approve the proposed project for statewide funds of $151,887.90, with an additional $7,994.10 coming from the South Platte Roundtable representing the minimum 5% match required from basin accounts. Total project cost is actually $201,501 with additional match of $41,619 coming from Colorado State University.

A quorum of the roundtable unanimously approved the motion. Please call me with any questions that you may have regarding the South Platte Basin roundtable meeting or the project.

Sincerely,

Sean T. Cronin
Chair, South Platte Basin Roundtable

COLORADO WATER CONSERVATION BOARD

WATER SUPPLY RESERVE ACCOUNT APPLICATION FORM

Today's Date: 07/07/2014

Economic Analysis and Design of Policies to Reduce Colorado's Groundwater Use in the Northern High Plains Ground Water Basin

Name of Water Activity/Project

Colorado State University on behalf of the Water Preservation Partnership

Name of Applicant

South Platte Basin Roundtable

Amount from Statewide Account: $151,888

Amount from Basin Account(s): $7,994

Total WSRA Funds Requested: $159,882

Approving Basin Roundtable(s)
(If multiple basins specify amounts in parentheses.)

FEIN:

Application Content

Required Exhibits

A. Statement of Work, Budget, and Schedule
B. Project Map
C. As Needed (i.e. letters of support, photos, maps, etc.)

Appendices – Reference Material

1. Program Information
2. Insurance Requirements
3. WSRA Standard Contract Information (Required for Projects Over $100,000)
4. W-9 Form (Required for All Projects Prior to Contracting)

Instructions

To receive funding from the Water Supply Reserve Account (WSRA), a proposed water activity must be approved by the local Basin Roundtable **AND** the Colorado Water Conservation Board (CWCB). The process for Basin Roundtable consideration and approval is outlined in materials in Appendix 1.

Once approved by the local Basin Roundtable, the applicant should submit this application **with a detailed statement of work including budget and schedule as Exhibit A** to CWCB staff by the application deadline.

WSRA applications are due with the roundtable letter of support 60 calendar days prior to the bi-monthly Board meeting at which it will be considered. Board meetings are held in January, March, May, July, September, and November. Meeting details, including scheduled dates, agendas, etc. are posted on the CWCB website at: http://cwcb.state.co.us Applications to the WSRA Basin Account are considered at every board meeting, while applications to the WSRA Statewide Account are only considered at the March and September board meetings.

When completing this application, the applicant should refer to the WSRA Criteria and Guidelines available at: http://cwcb.state.co.us/LoansGrants/water-supply-reserve-account-grants/Documents/WSRACriteriaGuidelines.pdf. In addition, the applicant should also refer to the Supplemental Scoring Matrix applied to Evaluation Criteria Tiers 1-3 for Statewide Account requests.

The application, statement of work, budget, and schedule **must be submitted in electronic format** (Microsoft Word or text-enabled PDF are preferred) and can be emailed or mailed on a disk to:

Craig Godbout - WSRA Application
Colorado Water Conservation Board
1313 Sherman St., Room 721
Denver, CO 80203
Craig.godbout@state.co.us

If you have questions or need additional assistance, please contact Craig Godbout at: 303-866-3441 x3210 or craig.godbout@state.co.us.

Water Supply Reserve Account – Application Form
Revised October 2013

Part I. - Description of the Applicant (Project Sponsor or Owner);

1. Applicant Name(s): Colorado State University on behalf of the Water Preservation Partnership

Mailing address:

FEIN #:

Primary Contact: Dale Manning Position/Title: Assistant Professor

Email: Dale.Manning@colostate.edu

Phone Numbers: Cell: Office: 970-491-5706

Alternate Contact: Christopher Goemans Position/Title: Associate Professor

Email: cgoemans@rams.colostate.edu

Phone Numbers: Cell: Office: 970-491-7261

2. Eligible entities for WSRA funds include the following. What type of entity is the Applicant?

[X] Public (Government) – municipalities, enterprises, counties, and State of Colorado agencies. Federal agencies are encouraged to work with local entities and the local entity should be the grant recipient. Federal agencies are eligible, but only if they can make a compelling case for why a local partner cannot be the grant recipient.

[ ] Public (Districts) – authorities, Title 32/special districts, (conservancy, conservation, and irrigation districts), and water activity enterprises.

[ ] Private Incorporated – mutual ditch companies, homeowners associations, corporations.

[ ] Private individuals, partnerships, and sole proprietors are eligible for funding from the Basin Accounts but not for funding from the Statewide Account.

[ ] Non-governmental organizations – broadly defined as any organization that is not part of the government.

3. Provide a brief description of your organization

The Water Preservation Partnership (WPP) is a grassroots group representing all of the groundwater management districts in the Northern High Plains Ground Water Basin (NHPGWB). This includes all of the groundwater management districts located within the Republican River Basin and one outside district. The WPP was formed to tackle the challenge of preserving, for future generations, the Ogallala aquifer water the area depends on. The WPP formed out of a series of meetings initiated by the Colorado Water Institute and the Republican River Basin Water Conservation District. Its membership includes the eight groundwater management districts in the NHPGWB as well as representatives from the Republican River Water Conservation District and the Colorado Agriculture Preservation Association. (see attached letter of support provided by the WPP in Exhibit C)

4. If the Contracting Entity is different then the Applicant (Project Sponsor or Owner) please describe the Contracting Entity here.

Colorado State University is acting as the fiscal agent and applying on behalf of the WPP. The project team includes three faculty members in the Department of Agricultural and Resource Economics (Dale Manning, Project PI; Jordan Suter, Co-PI, and Christopher Goemans, Co-PI) as well as MaryLou Smith who is a Policy and Collaboration Specialist with the Colorado Water Institute.

Colorado State University (CSU) is a public research university located in Fort Collins, Co. CSU is the state's land grant university and the lead research institution in Colorado on issues related to water resource and agricultural issues.

5. Successful applicants will have to execute a contract with the CWCB prior to beginning work on the portion of the project funded by the WSRA grant. In order to expedite the contracting process the CWCB has established a standard contract with provisions the applicant must adhere to. A link to this standard contract is included in Appendix 3. Please review this contract and check the appropriate box.

[X] The Applicant will be able to contract with the CWCB using the Standard Contract

[ ] The Applicant has reviewed the standard contract and has some questions/issues/concerns. Please be aware that any deviation from the standard contract could result in a significant delay between grant approval and the funds being available.

6. The Tax Payer Bill of Rights (TABOR) may limit the amount of grant money an entity can receive. Please describe any relevant TABOR issues that may affect the applicant.

Taxpayer Bill of Rights (TABOR) issues are not anticipated to be relevant to economic analysis, survey work, or policy design conducted as part of this project because the project will not affect governmental revenues or expenditures.

Part II. - Description of the Water Activity/Project

1. What is the primary purpose of this grant application? (Please check only one)

	Nonconsumptive (Environmental or Recreational)
X	Agricultural
	Municipal/Industrial
	Needs Assessment
	Education
	Other Explain:

2. If you feel this project addresses multiple purposes please explain.

In additional to the economic analysis and policy design, the project contains a significant outreach and education component. The project is both a study and a series of efforts designed to support the implementation of groundwater policies.

3. Is this project primarily a study or implementation of a water activity/project? (Please check only one)

X	Study		Implementation

4. To catalog measurable results achieved with WSRA funds can you provide any of the following numbers?

	New Storage Created (acre-feet)
	New Annual Water Supplies Developed, Consumptive or Nonconsumptive (acre-feet)
	Existing Storage Preserved or Enhanced (acre-feet)
	Length of Stream Restored or Protected (linear feet)
	Length of Pipe/Canal Built or Improved (linear feet)
	Efficiency Savings (acre-feet/year OR dollars/year – **circle one**)
	Area of Restored or Preserved Habitat (acres)
X	Other -- Explain: Reduction in annual pumping amounts associated with outreach and estimates of pumping required for different policy alternatives.

4. To help us map WSRA projects please include a map (Exhibit B) and provide the general coordinates below:

Latitude: 102.2258 Longitude: 40.0767

The above coordinates are for Wray, Colorado. This serves as the "homebase" of the WPP. The geographic scope of the project would extend across the eight groundwater management districts in the NHPGWB. This represents all seven groundwater management districts located within the Republican River Basin (RRB) and one outside district. Those districts include: Arikaree, Central Yuma, W-Y, Sand Hills, Frenchman, Marks Butte, the Plains and East Cheyenne. Two maps of the region are included as Exhibits B and C.

5. Please provide an overview/summary of the proposed water activity (no more than one page). Include a description of the overall water activity and specifically what the WSRA funding will be used for. A full **Statement of Work** with a detailed budget and schedule is required as **Exhibit A** of this application.

Overview: Annual withdrawals made by groundwater users located within the NHPGWB currently exceed recharge by an estimated 400,000 acre feet per year. The impacts of this drawdown are already being felt by producers in the region; some predicting a dry-up of their wells within the next 5-10 years. The majority of well users recognize a need for reductions in pumping, but uncertainty exists regarding what levels of reduction should be targeted and how best to achieve them. Groundwater plays a significant role in the NHPGWB, not only representing a critical input to production activities that have supported families throughout the area for generations, but also driving the local economy. Approximately 80 percent of the water pumped is used to support agricultural activities which represent more than 50 percent of the economic activity in the basin. Irrigated acreage in the Republican River Basin represents approximately 16% of total irrigated acreage statewide. While there appears to be significant support for addressing the problem, a lack of information regarding the potential effectiveness and economic impacts associated with alternative polices currently represents the primary hurdle preventing action.

Proposed Analysis: The overarching goal of this project is to develop and begin dissemination of the information needed in the design and implementation of a long-term groundwater management policy. Achieving this goal involves four interrelated components including: (1) the development of a dynamic, regional hydrologic-economic model capable of modelling the impacts of alternative pumping policies on producers in the area, as well as identifying the broader economic impacts of these policies; (2) the dissemination of outreach materials designed to (a) educate groundwater users about the state of groundwater pumping, (b) provide them information about best management practices, and (c) inform them of the modelling results; (3) the implementation of a survey designed to illicit producer preferences towards different

policies; and (4) the design of policies utilizing the economic information and survey responses.

How the WSRA funds will be used: The WSRA funding will be used to complete tasks outlined above and covered in detail in Exhibit A. A complete budget linking funds to specific activities, including a budget justification, is provided in Exhibit A.

Overview of Attachments:

Exhibit A: Statement of Work
Exhibit B: Map of Colorado Designated Basins and Management Districts
Exhibit C: Map of High Plains (Ogallala Aquifer)
Exhibit D: Letter of Support from WPP
Exhibit E: Letter of Support from Dick Wolfe
Exhibit F: Letter of Support from Greg Kernohan

Part III. – Threshold and Evaluation Criteria

1. Describe how the water activity meets these **Threshold Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines.)

   a) The water activity is consistent with Section 37-75-102 Colorado Revised Statutes.[1]

   This project will not affect or injure water rights. The purpose of this project is to collect, develop, and disseminate the information necessary to promote reductions in groundwater use and to help in the development of policies that would be voluntarily adopted by the various districts to achieve pumping goals. The deliverables of the project will not impact the title, allocation, priority, transferability of irrigation shares, water rights, or pumping permits in the basin.

   b) The water activity underwent an evaluation and approval process and was approved by the Basin Roundtable (BRT) and the application includes a description of the results of the BRTs evaluation and approval of the activity. At a minimum, the description must include the level of agreement reached by the roundtable, including any minority opinion(s) if there was not general agreement for the activity. The description must also include reasons why general agreement was not reached (if it was not), including who opposed the activity and why they opposed it. Note- If this information is included in the letter from the roundtable chair simply reference that letter.

[Add after receiving recommendations from BRT]

[1] 37-75-102. Water rights - protections. (1) It is the policy of the General Assembly that the current system of allocating water within Colorado shall not be superseded, abrogated, or otherwise impaired by this article. Nothing in this article shall be interpreted to repeal or in any manner amend the existing water rights adjudication system. The General Assembly affirms the state constitution's recognition of water rights as a private usufructuary property right, and this article is not intended to restrict the ability of the holder of a water right to use or to dispose of that water right in any manner permitted under Colorado law. (2) The General Assembly affirms the protections for contractual and property rights recognized by the contract and takings protections under the state constitution and related statutes. This article shall not be implemented in any way that would diminish, impair, or cause injury to any property or contractual right created by intergovernmental agreements, contracts, stipulations among parties to water cases, terms and conditions in water decrees, or any other similar document related to the allocation or use of water. This article shall not be construed to supersede, abrogate, or cause injury to vested water rights or decreed conditional water rights. The General Assembly affirms that this article does not impair, limit, or otherwise affect the rights of persons or entities to enter into agreements, contracts, or memoranda of understanding with other persons or entities relating to the appropriation, movement, or use of water under other provisions of law.

c) The water activity meets the provisions of Section 37-75-104(2), Colorado Revised Statutes.[2] The Basin Roundtable Chairs shall include in their approval letters for particular WSRA grant applications a description of how the water activity will assist in meeting the water supply needs identified in the basin roundtable's consumptive and/or non-consumptive needs assessments.

The project is designed to have both immediate and long-term impacts on groundwater use in the basin. We anticipate that the outreach programs will lead to short-term reductions in water use; however, that more significant and permanent reductions will result from the policies implemented by the various districts. Implementation of these policies is expected following the economic and outreach portions of this project.

d) Matching Requirement: For requests from the **Statewide Fund**, the applicants will be required to demonstrate a **25 percent** (or greater) match of the total grant request from the other sources, including by not limited to Basin Funds. A minimum match of 5% of the total grant amount shall be from Basin funds. A minimum match of 5% of the total grant amount must come from the applicant or 3rd party sources. Sources of matching funds include but are not limited to Basin Funds, in-kind services, funding from other sources, and/or direct cash match. Past expenditures directly related to the project may be considered as matching funds if the expenditures occurred within 9 months of the date the contract or purchase order between the applicant and the State of Colorado is executed. Please describe the source(s) of matching funds. (NOTE: These matching funds should also be reflected in your Detailed Budget in **Exhibit A** of this application)

The project team is requesting a total of $159,882. Five percent of that amount ($7,994) is being requested as matching funds from the South Platte Roundtable Basin Funds account, representing the minimum match required. The remaining $151,888 is being requested from the Statewide Account. Colorado State University is providing a matching amount equivalent to approximately 30 percent of the total requested amount, exceeding the minimum match required. A detailed breakdown of the budget and a budget justification is provided in Exhibit A.

[2] 37-75-104 (2)(c). Using data and information from the Statewide Water Supply Initiative and other appropriate sources and in cooperation with the on-going Statewide Water Supply Initiative, develop a basin-wide consumptive and nonconsumptive water supply needs assessment, conduct an analysis of available unappropriated waters within the basin, and propose projects or methods, both structural and nonstructural, for meeting those needs and utilizing those unappropriated waters where appropriate. Basin Roundtables shall actively seek the input and advice of affected local governments, water providers, and other interested stakeholders and persons in establishing its needs assessment, and shall propose projects or methods for meeting those needs. Recommendations from this assessment shall be forwarded to the Interbasin Compact Committee and other basin roundtables for analysis and consideration after the General Assembly has approved the Interbasin Compact Charter.

2. For Applications that include a request for funds from the **Statewide Account**, describe how the water activity/project meets all applicable **Evaluation Criteria.** (Detailed in Part 3 of the Water Supply Reserve Account Criteria and Guidelines and repeated below.) Projects will be assessed on how well they meet the Evaluation Criteria. **Please attach additional pages as necessary.**

Statewide funds have been requested since the benefits of the project will be made available to irrigators and groundwater districts throughout the entire state. In addition to documenting and distributing the outcomes of the project, all outreach materials developed and the model (including documentation) will be made publically available. It should also be noted that given the linkages between agriculture in the NHPGWB and other economic sectors throughout the state, the policies adopted will have statewide impacts.

Evaluation Criteria – the following criteria will be utilized to further evaluate the merits of the water activity proposed for funding from the Statewide Account. In evaluation of proposed water activities, preference will be given to projects that meet one or more criteria from each of the three "tiers" or categories. Each "tier" is grouped in level of importance. For instance, projects that meet Tier 1 criteria will outweigh projects that only meet Tier 3 criteria. The applicant should also refer to the Supplemental Scoring Matrix applied to Evaluation Criteria Tiers 1-3 for Statewide Account requests. WSRA grant requests for projects that may qualify for loans through the CWCB loan program will receive preference in the Statewide Evaluation Criteria if the grant request is part of a CWCB loan/WSRA grant package. For these CWCB loan/WSRA grant packages, the applicant must have a CWCB loan/WSRA grant ratio of 1:1 or higher. Preference will be given to those with a higher loan/grant ratio.

Tier 1: Promoting Collaboration/Cooperation and Meeting Water Management Goals and Identified Water Needs

a. The water activity addresses multiple needs or issues, including consumptive and/or non-consumptive needs, or the needs and issues of multiple interests or multiple basins. This can be demonstrated by obtaining letters of support from other basin roundtables (in addition to an approval letter from the sponsoring basin).

While the majority of contact will be with agriculture producers in the basin, the resulting outcomes of the project will have direct and indirect impacts on a wide variety of other groups in and out of the basin. Agriculture serves as the single largest user of water in the basin, however, municipal and other industrial users of water also compete for this resource. Reducing agricultural water use will directly benefit these other interests. In addition, because of agriculture's importance to the local economy limiting the impacts of reductions in water use on the agricultural sector will benefit other linked industries both within and outside of the immediate area.

b. The number and types of entities represented in the application and the degree to which the activity will promote cooperation and collaboration among traditional consumptive water interests and/or non-

consumptive interests, and if applicable, the degree to which the water activity is effective in addressing intrabasin or interbasin needs or issues.

Members of the WPP have indicated that the primary barrier preventing collaboration at this time is the lack of information needed to have an informed, productive discussion. One of the primary goals of this project is to develop the required information and connections so that the districts can come together to adopt groundwater polices. Information will be disseminated through a wide range of venues including public meetings, extension publications, and outreach talks. "Workshops", where producers will be brought in to provide their perspectives on alternative policies, will be held with the sole purpose of promoting cooperation and collaboration among the various parties.

c. The water activity helps implement projects and processes identified as helping meet Colorado's future water needs, and/or addresses the gap areas between available water supply and future need as identified in SWSI or a roundtable's basin-wide water needs assessment.

In addition to supporting the development and implementation of policies geared towards helping groundwater users throughout the NHPGWB, project findings will be applicable and will help provide the necessary tools for the design and implementation of groundwater policies in other areas of Colorado.

Tier 2: Facilitating Water Activity Implementation

d. Funding from this Account will reduce the uncertainty that the water activity will be implemented. For this criterion the applicant should discuss how receiving funding from the Account will make a significant difference in the implementation of the water activity (i.e., how will receiving funding enable the water activity to move forward or the inability obtaining funding elsewhere).

The overarching goal of this project is to help the WPP design and implement groundwater policies that will help the districts achieve desired levels of reductions.

e. The amount of matching funds provided by the applicant via direct contributions, demonstrable in-kind contributions, and/or other sources demonstrates a significant & appropriate commitment to the project.

The project team is committing to match approximately $48,436 in additional salary/fringe and indirect over the course of the project (see detailed breakdown in Exhibit A). This time is in addition to the significant time donated by the project team leading up to the proposal as part of presentations and meeting/organizing focus groups.

Tier 3: The Water Activity Addresses Other Issues of Statewide Value and Maximizes Benefits

f. The water activity helps sustain agriculture & open space, or meets environmental or recreational needs.

A key component of the project will be identifying polices that will help the districts achieve desired levels of reduction in a way that preserves agriculture and minimizes the direct and indirect regional economic impacts of reduced pumping. Minimizing the negative impacts of reductions in groundwater use is a priority in many parts of the state and the results from the project will provide lessons that are broadly applicable.

g. The water activity assists in the administration of compact-entitled waters or addresses problems related to compact entitled waters and compact compliance and the degree to which the activity promotes maximum utilization of state waters.
h. The water activity assists in the recovery of threatened and endangered wildlife species or Colorado State species of concern.
i. The water activity provides a high level of benefit to Colorado in relationship to the amount of funds requested.

Previous research suggests that the potential costs savings from well-designed policies can be large. For example, Kuwayama and Brozovic (2013) showed the potential costs savings of properly designed ground water policies to be in the millions.

We also note that the requested amount is significantly less than similar projects in surrounding states yet will yield similar deliverables. We are able to do this because we are building off of the hydrologic work by Slattery and the WPP/CSU have agreed to contribute more than the minimum amount of matching funds.

j. The water activity is complimentary to or assists in the implementation of other CWCB programs.

Continued: Explanation of how the water activity/project meets all applicable **Evaluation Criteria**.

Please attach additional pages as necessary.

Part IV. – Required Supporting Material

1. **Water Rights, Availability, and Sustainability** – This information is needed to assess the viability of the water project or activity. Please provide a description of the water supply source to be utilized, or the water body to be affected by, the water activity. This should include a description of applicable water rights, and water rights issues, and the name/location of water bodies affected by the water activity.

Other than as outlined above, no supply source or body of water will be directly impacted as part of the project.

2. Please provide a brief narrative of any related studies or permitting issues.

The proposed work will build off of previous hydrologic and economic work done in the basin. Significant groundwater modelling has already been completed by Slattery and Hendrix Engineering (Slattery) as part of the RRWCD compliance efforts. This project will utilize, and build off of, previous work done by Slattery, integrating the predictions of the hydrologic model into the economic model. Funds are included in the proposal for collaboration with Slattery. While the economic modelling will differ substantially from previous work done by Pritchett et al., their findings serve as the starting point for this project. This project will also build off of previous CWCB work completed by Co-PI Goemans looking at the economic impacts of reduced agricultural activity on rural economies in Colorado.

3. Statement of Work, Detailed Budget, and Project Schedule

The statement of work will form the basis for the contract between the Applicant and the State of Colorado. In short, the Applicant is agreeing to undertake the work for the compensation outlined in the statement of work and budget, and in return, the State of Colorado is receiving the deliverables/products specified. **Please note that costs incurred prior to execution of a contract or purchase order are not subject to reimbursement**. All WSRA funds are disbursed on a reimbursement basis after review invoices and appropriate backup material.

Please provide a detailed statement of work using the template in Exhibit A. Additional sections or modifications may be included as necessary. Please define all acronyms and include page numbers.

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.

PAYMENT

Payment will be made based on actual expenditures and invoicing by the applicant. Invoices from any other entity (i.e. subcontractors) cannot be processed by the State. The request for payment must include a description of the work accomplished by major task, and estimate of the percent completion for individual tasks and the entire water activity in relation to the percentage of budget spent, identification of any major issues and proposed or implemented corrective actions. The last 10 percent of the entire water activity budget will be withheld until final project/water activity documentation is completed. All products, data and information developed as a result of this grant must be provided to the CWCB in hard copy and electronic format as part of the project documentation. This information will in turn be made widely available to Basin Roundtables and the general public and help promote the development of a common technical platform.

The above statements are true to the best of my knowledge:

Signature of Applicant: 

Print Applicant's Name: Chris Carsten, Research Administrator, Colorado State University Sponsored Programs

Project Title: Economic Analysis and Design of Policies to Reduce Colorado's Groundwater Use in the Northern High Plains Ground Water Basin

Date: 7/22/2014

Return an electronic version (hardcopy may also be submitted) of this application to:

Craig Godbout – WSRA Application
Colorado Water Conservation Board
1313 Sherman St., Room 721
Denver, CO 80203
303-866-3441, ext. 3210 (office)
303-547-8061 (cell)
craig.godbout@state.co.us

Exhibit E

COLORADO
Division of Water Resources
Department of Natural Resources

1313 Sherman Street, Room 821
Denver, CO 80203

May 30, 2014

Sent via email to: gkernohan@ducks.org

Greg Kernohan
Chair, Needs Assessment Committee
South Platte Basin Roundtable

SUBJECT: Water Preservation Partnership--Republican River Basin

Dear Mr. Kernohan,

It is my understanding that you will be considering a proposal from the Water Preservation Partnership (WPP) in the Republican River Basin at your committee meeting on June 2.

Out office in collaboration with the Republican River Water Conservation District and the local water users have worked for over six years on discrete steps to achieve compliance with the Republican River Compact. These steps have included reductions in water use through surface and well buyouts and land fallowing programs including CREP and EQIP. While these steps have aided in the reduction of overall water use in the basin it is not enough to ensure long-term sustainability of the aquifers in this region. The only viable way is to continue reductions in well pumping. Of course this needs to be done in a manner that maintains an economically viable community.

The proposed study will be a great investment of time and money to identify preferred policies for the WPP to consider to reduce overall pumping in the basin. I believe these efforts will also be viewed favorably by Nebraska and Kansas who are the other signatories to the Compact as meaningful and implementable measures to reduce pumping in the basin to maintain compact compliance.

I applaud the WPP for taking this bold step to look at steps that can be taken to create an economically sustainable aquifer with the basin. I wholeheartedly support this proposal and ask for your favorable approval.

Sincerely,

Dick Wolfe

Dick Wolfe, P.E.
State Engineer, Director

Exhibit F

June 2, 2014

South Platte Round Table -- Needs Committee
Greg Kernohan, Committee Chairman

Dear Greg,

As a Sedgwick County Commissioner I will be attending the annual summer conference of county commissioners this week in Keystone, CO. Therefore I will not be able to present the Water Preservation Partnership proposal to the Needs Committee today.

The WPP has revised the proposal which they presented to the Needs Committee in February. I hope they have answered the questions the committee had at that time.

As you remember, this organization is composed of individuals representing each of the groundwater management districts in the Northern High Plains Basin, along with a member of the Colorado Agriculture Preservation Association and a representative from the Republican River Water Conservation District.

The WPP's main focus is water conservation in the Northern High Plains Basin. Their mission statement is: To work together to preserve for as long as possible the underground water resources we share in common.

There are many aspects to consider in regards to water conservation. One of the projects the Water Preservation Partnership is pursuing is this proposal for an economic analysis to be completed by the CSU Department of Agriculture and Resources Economics.

Please give your kind consideration to the WPP application for funding. It is my hope that you will find this worthy of being presented to the South Platte Round Table and eventually being submitted for state-wide funding from the Colorado Water Conservation Board.

Sincerely yours,

Eugene Bauerle

Exhibit A

Water Activity Name: Economic Analysis and Design of Policies to Reduce Colorado's Groundwater Use in the Northern High Plains Ground Water Basin

Grant Recipient: Colorado State University

Funding Source: Statewide Water Supply Reserve Account with matching funds from CSU and the South Platte Basin Roundtable

Project Team: Dale Manning (PI, Assistant Professor, Department of Agricultural and Resource Economics (DARE), Colorado State University), Jordan Suter (Co-PI, Assistant Professor, DARE), Christopher Goemans (Co-PI, Associate Professor, DARE), and MaryLou Smith (Policy and Collaboration Specialist, Colorado Water Institute Policy and Collaboration Specialist)

In collaboration with: The Water Preservation Partnership

Introduction and Background:

Colorado residents in the Northern High Plains Ground Water Basin (NHPGWB) face significant challenges related to groundwater use in the basin. Groundwater pumping within the basin currently exceeds recharge by close to 400,000 acre-feet per year, a deficit that cannot be sustained.[1] Realizing the potentially devastating social and economic impacts associated with continued pumping at these levels, representatives from each of the basin's eight management districts formed the Water Preservation Partnership (WPP).[2] The challenges facing the WPP are determining (1) by how much pumping should be reduced and (2) which policies should be used to achieve the desired reductions. The WPP has identified a lack of information surrounding the economic impacts of different levels of reductions, the effectiveness of different policies, and the preferences of the producers within each of their districts as the immediate barriers preventing the adoption of policy measures.

Objectives:

The primary goal of this project is to provide the WPP with the information needed to develop, and get support for, long-term solutions to the over-pumping problem, while at the same time promoting wise water use in the short-run through the targeted dissemination of information about the problem and strategies for water conservation best management practices. A reduction in pumping is inevitable, either as wells begin to run dry due to continued over pumping or as a result of polices developed as part of a coordinated effort from pumpers in the area that is designed to promote the long-term sustainable use of the aquifer while minimizing the economic impacts of the reductions. Again, the question is by how much and by what means should the reductions be achieved.

Since all of the groundwater users distributed throughout the aquifer are connected in complex ways, and there exists a significant amount of heterogeneity in the production practices and lands of producers

[1] This figure is based on previous work done by Slattery and Hendrix Engineering. On average, the basin uses 947,291 acre-feet per year, of which 749,880 comes from agricultural well pumping. The average recharge rate is just 550,997 acre-feet per year, leaving a deficit of 396,294 acre-feet.

[2] The WPP mission is to lead water conservation efforts and initiate the implementation of policies that will minimize the impacts of the inevitable reduction in groundwater pumping.

throughout the area, reducing agricultural water will require a coordinated, yet flexible, conservation strategy. Moreover, given agricultures' role in the regional economy (accounting for roughly half of economic activity), impacts to the larger economy must be considered in addition to those on the agriculture sector.

Members of the WPP have already begun considering alternative ways to encourage farmers to reduce groundwater use in order to extend the economic viability of the aquifer, however, there is limited understanding of how different conservation policies may affect economic outcomes across water users and regions over time. The proposed analysis will provide the WPP and producers throughout the region with information on the economic impacts of a set of potential policy alternatives as well as assess the acceptability among constituents of these policies. Specifically, a dynamic cost-benefit analysis of policies will reveal the distribution of costs and benefits across the management districts over time while outreach and surveys will be used to inform constituents and elicit their preferences towards particular policies. The proposed project will be carried out over two years (January 2015-December 2016).

The following provides a detailed overview of each of the tasks that will be completed as part of the project:

Task 1: Development of Dynamic, Hydrologic-Economic Model

Description of Task

Any reduction in pumping is likely to impact agricultural pumpers throughout the region. The timing and magnitude of the impacts on production will differ depending on the policy implemented. Moreover, agricultural industries in the Northern High Plains Ground Water Basin represent a key component of the regional economy (Pritchett and Thorvaldson, 2008); the value of agricultural production represents roughly 50% of the regional economy. Because significant linkages exist between agriculture and other sectors of the local economy, a reduction in water supply will impact producers as well as the local economy as a whole. Task 1 will involve the development of a dynamic hydrologic-economic model capable of estimating the impact of reductions in pumping (different levels and at different times) on agricultural producers and the broader economy across the next 100 years. Importantly, output from the model will illustrate, over the short and long-term, the magnitude and the distribution of costs and benefits across farmers and in the broader local economy. The economic assessments will account for the complex hydrology of the groundwater system, as well as the heterogeneity in production practices and lands that exist throughout the region.

Method/Procedure

The project team will develop a dynamic, hydrologic-economic model of the NHPGWB incorporating the previous hydrologic modelling efforts of Slattery and Hendrix Engineering, input from members of the WPP, and feedback obtained from focus groups. The model will be spatially explicit and capable of analyzing short- and long-run effects of different levels of aquifer pumping on agricultural production. It will allow us to look at economic impacts across time and among different types of water users. The agricultural sector model will account for differences in groundwater levels, saturated thickness, soil type, and precipitation at various points in the aquifer. It will also account for changes in these variables over time. We will build off the work of Jim Slattery (previously funded by the Republican River Water Conservation District) to integrate our model of the agricultural sector with an accurate representation of the hydrology in the region.

Agricultural profits over a period of 100 years will be estimated under the proposed policy alternatives and compared to the baseline of current use levels. In modeling policy impacts, an important input into the economic model is how crop yields respond to deficit irrigation. For example, the first 12 inches of water applied per acre may greatly increase yields and profits. Additional water application above 12 inches will continue to increase yields but by a smaller amount than the first 12. At some quantity of water application, applying additional water may cost more than the value of the yield increase that it brings about. We will work with farmers and agronomists to construct an appropriate water/yield curve for the major crop(s) that reflects the conditions faced by producers. Current water-use rates will be used to construct the baseline scenario.

A model of the regional economy, capturing the linkages between agriculture and other economic sectors (e.g., retail and manufacturing), will overlay the base model and be used to illustrate indirect impacts of various pumping polices on the general economy. Specifically, the model will estimate the impacts of changes in groundwater pumping and agricultural production on regional economic activity, household income, and employment opportunities.

Deliverable

In addition to the model, which will be made publicly available, a report outlining the agricultural and economy-wide impacts associated with different reductions in pumping will be completed. A synopsis of this report will be prepared for submission to an outlet similar to the Colorado Water Institute's Colorado Water. Oral presentations of project findings will be given to the WPP and other interested parties. Most importantly, output from the analysis will be incorporated into the producer survey (Task 3).

Task 2: Education and Outreach

Description of Task

Public understanding of the problem and options available are critical to the ability of the WPP to promote and implement policy initiatives. This component of the project will revolve around the dissemination of a series of outreach materials designed to (a) educate groundwater users about the state of groundwater pumping, (b) provide them information about best management practices, and (c) inform them of the modelling results.

Method/Procedure

This task will focus on utilizing public meetings, focus groups, print advertisements, mailings, etc. to educate the public on the problem faced by groundwater users throughout the NHPGWB. A variety of tools will be utilized to maximize public understanding of the overall problem faced by groundwater users. The particular tools utilized will be determined in conjunction with the WPP; however, they potentially include public meetings, newspaper articles, radio and print advertisements, mailings, flyers, social media presence, and brochures.

In addition, the WPP plans to host a series of meetings with the general public as well as meetings with individual groundwater management districts throughout the Basin to provide accurate information about declining aquifer levels. To ensure that the information reaches broadly, the WPP plans to partner with area organizations (e.g., management districts). The first series of public meetings will be held prior to the release of the economic analysis in order to develop understanding of the physical problem facing area irrigators. A second set of public meetings is planned after the final report and survey are completed to share the findings with the public.

Following the outreach component of this project, pumping data will be analyzed to identify the short-term effects of this information on water use.

Deliverable

Outreach materials created for this portion of the project will be made available online. Estimates of the impacts on water use resulting from the education materials will be incorporated into the final report. Feedback collected during public meetings and focus groups will be incorporated into Tasks 1 and 3.

Task 3: Producer Survey

Description of Task

Once the distributional impacts of policy alternatives are known, we will administer a survey that elicits groundwater users' preferences over the different policies. As part of the survey, we will collect (anonymous) baseline information on farm and farmer characteristics that may explain attitudes toward specific policies.[3] The survey will be analyzed to explore differences across farms and across water management districts. Together with the economic analysis, survey results will provide the baseline information needed by the WPP and management districts to design a politically viable policy aimed at water conservation in the Basin.

Method/Procedure

The survey will be designed by the project team in conjunction with members of the WPP. Prior to mailing, feedback on the survey will be obtained from focus groups. The survey will then be mailed to members of each of the groundwater districts and made available online. In addition to collecting baseline information, the survey will be designed to elicit producer's preferences regarding the type of policy they would like to see implemented as well as the preferred timing of the policy.

Potential conservation policies typically fall under two categories: quantity caps and water use fees. Quantity caps place a limit on the quantity of water each farm or field can use. Limits can be the same or vary by farm or district based on cropping patterns, soil type, historical water use, etc. Normally caps can be used across several years and in some cases (e.g., farmers on the Nebraska side of the Republican River) markets exist to give farmers the option to buy more water if necessary or sell unused water.

A fee-based policy would entail charging irrigators for each unit of water they apply above a particular threshold. Fees can consist of a flat rate, or a fee schedule depending on water use. A key component of a fee-based policy is deciding how to use the revenue. In other contexts (e.g., the San Luis Valley in Colorado), revenue has been used to subsidize water conservation and/or rent land to fallow. Revenue can be used in conjunction with other programs (e.g., CREP, EQIP, AWEP) to increase impacts.

Within each of these categories a wide-range of alternatives exists depending on the details of implementation (examples above). This includes using a combination of both types of policies. A choice-experiment style approach will be used to elicit producer's preferences for the different types of policies and the details of those policies. The particular policies presented in the survey will be based on the analysis completed in Task 1 and conversations with members of the WPP.

[3] Potentially important information includes acres farmed, conservation attitudes, years farming, age, willingness to participate in voluntary programs, etc.

Deliverable

Survey results will be presented to the WPP, presented at outreach talks, and incorporated into the analysis completed in Task 4 and the final report.

Task 4: Policy Recommendations

Description of Task

Based on modelling (Task 1) and survey (Task 3) results, the project team will outline a set of recommended polices that reflect the findings of the economic modelling and the producer preference survey.

Method/Procedure

Results from Task 1 will be combined with the analysis of the survey to create a ranking of policy options. Potential policies will be ranked based on their ability to reduce pumping, their impact on producers and the regional economy, and likely acceptability of the policy based on the survey.

Deliverable

The project team will prepare and deliver a detailed report for decision makers of the WPP. The final report will be submitted to the CWCB and also made available on the WPP website. A project summary will also be prepared for submission to an outlet similar to the Colorado Water Institute's *Colorado Water*. In addition to the project summary, a series of fact sheets will be prepared and delivered to the WPP. Oral presentations of project findings will be given to the WPP and other interested parties.

Future Work: Policy Implementation

Future work, beyond the timeline for the funding, will involve the planning required for implementing the preferred policy. Two broad areas must be considered. First, the appropriate institutions must be used to develop and enforce the policy. This will include the appropriate time for incorporating constituent feedback and other institutional requirements. Second, the researchers will provide information to the public about the policy to help irrigators plan for how best to respond to the policy's implementation. Survey results will inform communication between the research team and the irrigators. Potential methods for disseminating the information include:

1. Town meeting
2. Newspaper articles
3. Information by mail

In addition, we will conduct a follow-up survey that will investigate changes that occur as a result of the policy. We will also utilize pumping-rate data collected by the State of Colorado to assess how the policies influence the choices made by irrigators. We will also ask about acceptance of the policy and investigate if it is achieving the goals of the individual farmers and of the Basin as a whole. Results of the follow-up survey will allow verification of model predictions about the size and distribution of the costs and benefits of the implemented policy.

Summary of Project Deliverables Across all Tasks

Two summary reports will be generated. The first report will outline the dynamic hydrologic-economic model and results, while the second will be a final report detailing project findings and recommendations. Both reports will be made available to the WPP and CWCB, as well as being posted online. A project summary will also be prepared for submission to an outlet similar to the Colorado Water Institute's *Colorado Water*. In addition to the project summary, a series of fact sheets will be prepared and delivered to the WPP. All materials developed as part of the project will be made publically available. This includes the economic model, outreach materials, and survey developed as part of Tasks 1, 2, and 3. Oral presentations of project findings will be given to the WPP and other interested parties.

Budget

The project team is requesting a total of $159,882. Five percent of that amount ($7,994) is being requested as matching funds from the South Platte Roundtable Basin Funds account, representing the minimum match required. The remaining $151,888 is being requested from the Statewide Account. Colorado State University is providing a matching amount equivalent to approximately 30 percent of the total requested amount. A detailed breakdown of the budget and a budget justification follows.

Table 1: Budget Breakdown

Category		CWCB	CSU Match	Total
Personnel	Faculty time	$48,591	$26,421	$75,012
	Graduate Research Assistant	27,146		27,146
	Colorado Water Institute Policy and Collaboration Specialist	15,022		15,022
Fringe Benefits		16,186	6,152	22,338
Travel - Domestic		5,880		5,880
Materials		227		227
Other	Survey and Outreach Mailing Costs	7,273		7,273
	Publication/Presentation Design and Production	2,000		2,000
	Meeting Space and Refreshments	1,400		1,400
	Consultants - Slattery and Hendrix Engineering	6,000		6,000
	GRA Tuition	9,303		9,303
Total Direct Costs		$139,028	$32,573	$171,601
15% Indirect (CWCB)		20,854		20,854
48.7% Indirect (CSU)			15,863	15,863
Total		$159,882	$48,436	$208,318

Budget Justification - CWCB

Personnel

1. Faculty Time: 2 months in year 1 (1.5 mos Manning @ $9203/mo & 0.5 mo Suter @ $9918/mo) and 3 months in year 2 (1.5 mos Manning @ $9571/mo & 1.5 mos Suter @ $10315/mo) for activities related to Tasks 1-4. This includes modelling (e.g., development, runs, and analysis), outreach (e.g., meetings in Wray, presentation of results, etc.), and survey (e.g., design, implementation and analysis) related activities, in addition to time for completing the final report.

2. Graduate Research Assistant: 7.5 months per year (@ $1774/mo in Y1 with 4% annual increase) for data collection, model development, and administering the survey.
3. Colorado Water Institute Policy and Collaboration Specialist: .93 months in years one and two to facilitate meetings of the WPP, meetings of groundwater management districts, and public meetings to assist in educating about and gaining support for the need for pumping reduction policies. Based on a current salary of $7918/mo and 4% annual increase.

Fringe Benefits

4. Fringe benefits are calculated at estimates for each category and fiscal year:

   Faculty and Professional Staff – 23.12% Y1 and 23.44% Y2

   GRA – 4.97 Y1 and 5.04% Y2

Travel - Domestic

5. Economics Team: Includes travels costs (1 day hotel/per diem and mileage) for approximately 5 trips (@ $300/trip) to Wray, Colorado for meeting with the WPP advisory board and producers to collect data and design scenarios, as well as for presentation of results.
6. Specialist: Includes travel costs associated with outreach in Task 2 for approximately 10 meetings per year located throughout the RRB. $219/trip on average includes one night hotel and per diem and mileage or rental car.

Materials

7. $227 is budgeted for outgoing and return envelopes, as well as letterhead needed for survey distribution.

Other

8. Survey and Outreach Costs: $7,273 to cover costs of printing/postage/incentives for approximately 875 survey and 200 pre-survey mailings. See table below for detailed breakdown:

# of surveys (500 desired responses x 1.75 multiple mailing factor)	875				**$7,273.00**
		Per Survey			
	Survey Printing	$1.00			
	Cover Letter Printing	0.05			
	Outgoing Postage	1.50			
	Return Postage	0.55			
	Monetary Incentive	2.00			

	Survey Assembly Service	1.00			
	Sub-total	$6.10	x 875		$5,337.50
	Survey open and data entry service	$3.25	X 500		$1,625.00
# of pre-survey mailers	200				
	printing	$1.00			
	postage	0.55			
	Sub-total	$1.55	X 200		$ 310.00

9. Publication and Presentation Design and Production: Includes costs associated with hiring a professional to aid in the design of outreach materials. Presentation of recommended policies will require professional design help in order to clearly display complex material. Some materials will be presented electronically while others will be distributed in print form.
10. Meeting Space and Refreshments Expense: Covers costs associated with 4 public meetings to be held over two years. Total includes costs associated with the meeting space ($100/meeting) and light refreshments ($5/person x 50 people/meeting = $250/meeting). These public meetings are held to assist in educating about and gaining support for the need for pumping reduction policies, and refreshments are a typical offering at events like this.
11. Slattery and Hendrix Engineering: Slattery and Hendrix have prepared engineering studies and analysis for the groundwater management districts and the Republican River Water Conservation District. They will attend four public meetings during the two year period to present data that shows the need for pumping reduction policies. Lump sum per meeting costs, including preparation time and other expenses = $1500.
12. Tuition for the GRA on the project is budgeted for one semester each year, based on the current rate of $4538/semester and a 5% projected increase.

Indirect Costs

13. Indirect Costs are calculated at the CWCB limitation of 15% of Total Direct Costs.

Budget Justification – CSU Match

Personnel

1. Faculty Time: CSU faculty will contribute an additional 1.35 months in year 1 (0.45 mo each for Manning @ $9203/mo, Suter @ $9918/mo, and Goemans @ $9660/mo) and 1.35 months in year 2 (0.45 mo each for Manning @ $9571/mo, Suter @ $10315/mo, and Goemans @ $10046/mo) for activities related to Tasks 1-4. This includes modelling (e.g., development, runs, and analysis), outreach (e.g., meetings in Wray, presentation of results, etc.), and survey (e.g.,

design, implementation and analysis) related activities, in addition to time for completing the final report.

Fringe Benefits

2. Fringe benefits are calculated at estimates for each category and fiscal year:

   Faculty and Professional Staff – 23.12% Y1 and 23.44% Y2

Indirect Costs

3. Indirect Costs are calculated on the CSU contribution at CSU's federally negotiated rate for on campus research, 48.7% of Modified Total Direct Costs.

Timeline (assuming January 2015 start)

1. **Jan-Feb 2015:** Outreach seminars to inform public of water deficit
2. **Summer 2015**: Economic modeling complete
3. **August 2015**: Summary report for agricultural and economy-wide impacts of reductions in pumping
4. **Summer/Fall 2015**: Policy design and impact estimates
5. **Fall 2015**: Policy survey design
6. **Winter 2016**: Survey implementation and data analysis
7. **Summer/Fall 2016**: Preparation of final report

Proposal Outline for Comments and Discussion: Economic Analysis and Design of Policies to Reduce Colorado's Groundwater Use in the Northern High Plains Ground Water Basin

Date: July, 2014
To: South Platte Basin Roundtable
From: Water Preservation Partnership of Colorado's Northern High Plains in collaboration with CSU Department of Agricultural and Resource Economics and Colorado Water Institute

Who We Are/How our Need Ties into the Projected Supply/Demand Gap

The Water Preservation Partnership (WPP) is a grassroots group representing all of the groundwater management districts in the Northern High Plains Ground Water Basin. We have joined together to tackle the challenge of preserving for future generations the Ogallala aquifer water we depend on for agriculture. The South Platte's Basin Implementation Plan (BIP) draft addresses this challenge when it says "Depletions to the Ogallala Aquifer continue to reduce the amount of readily available water supplies for the agricultural economy in the (Republican River) Basin; in some cases presenting a feasibility issue of proving adequate water supplies for crop irrigation or in some cases no water supply." SWSI 2010 states that in addition to acres removed from irrigation for compact compliance, "an additional 64,000 acres are estimated to be removed from irrigation due to the declining saturated thickness of the Ogallala aquifer." The SWSI 2010 table "Current Irrigated Acres by River Basin" indicates that irrigated acres in the Republican River Basin account for 39.8% of all irrigated acres of the South Platte Basin. Therefore we believe the challenge of preserving water for irrigated agriculture in the Republican River Basin is not only our challenge but a challenge for the South Platte Basin and the entire state of Colorado.

The challenge is that we (groundwater users in eight groundwater management districts) are pumping an amount of water every year that exceeds what is sustainable over the long term. In 2004, the Colorado legislature created the Republican River Water Conservation District (RRWCD) to assist the state in reaching compliance with the Republican River Compact between Colorado, Nebraska and Kansas. Through the RRWCD we pay fees to finance compliance actions, such as retiring acres from irrigation and constructing a pipeline to off-set depletions and enable compact compliance. But now, the bigger issue is the necessity to safeguard the water we have left in the aquifer so we can continue farming and ranching operations and keep our rural communities viable. Without assertive actions, irrigated agriculture, the backbone of Republican River Basin economy, will not survive.

With the help of the Colorado Water Institute and the RRWCD, grassroots concern has manifest into the formation of our partnership—with 100% participation of each of the eight groundwater management districts in Colorado's Northern High Plains as well as one member from the RRWCD and one member from the region's Colorado Agriculture Preservation Association (CAPA). Our stated mission is "to work together to preserve, for as long as possible, the underground water resources we share in common."

Need for Pumping Policy to Preserve Water for as Long as Possible

We already know that we have to reduce the rate of pumping to stretch aquifer supplies for future generations. A hydrologic model developed by Slattery and Hendrix Engineering shows us that we are pumping almost 400,000 acre-feet per year more than is being recharged back into the aquifer. Only by reducing the amount of pumping can we extend the amount of time that irrigated agriculture remains economically viable in this region. However, we are acutely aware that further conservation (beyond that which was required by the State of Colorado to meet compact compliance) will never happen voluntarily because there will always be some who would take advantage of others under a voluntary program. A recent State of the Basin symposium sponsored by RRWCD that drew more than 200 basin farmers, ranchers, equipment suppliers, business owners and citizens showed the level of concern for the region's future and raised questions about what can be done to preserve the water we all depend on. Most people are expecting limitations to be put on pumping but they are questioning "how, and by whom?"

The WPP believes we must follow the lead of groups in Kansas, Texas and elsewhere who have developed grassroots, self-governing policies, by imposing pumping policies upon ourselves. The challenge is determining what the policies should be, taking into consideration their economic feasibility for our agricultural producers and rural communities as well as their regional support. We hope the policies which are ultimately chosen will enable us to substantially reduce annual basin-wide depletions.

Funding for an Economic Analysis and Ag Producer Education/Input

We need to identify the policy(s) best suited to reduce groundwater use and that will garner the support of our constituents. To get buy-in, we need to show our constituents how such policies can stretch the life of the aquifer and the economic effects of the policies on individual operations and the regional economy. That understanding will give ag producers the information they need to decide for themselves which policies they favor to balance the tradeoffs between long-term economic viability and short-term gains.

Colorado State University's Department of Agriculture and Resource Economics has provided us with a proposal to assist in identifying such a policy(s.) Their proposed dynamic cost-benefit analysis of pumping reduction policies will reveal the distribution of costs and benefits across the basin and across time. The analysis will utilize models that account for differences in groundwater levels, saturated thickness, soil type and precipitation in the basin and for changes in these variables over time. Agricultural profits over a period of 100 years will be estimated and compared to the baseline of current use levels. This model will also demonstrate economy-wide impacts of reductions in groundwater pumping and agricultural production, information needed to rigorously evaluate policy alternatives. Policy types to be evaluated will include a uniform restriction, proportional reduction, district specific uniform reduction, and a fee-based policy.

CSU Ag and Resource Economics will work directly with the Water Preservation Partnership throughout the two year project, to gain their input and feedback on the feasibility of policies being considered. Facilitation of meetings with the WPP and individual groundwater management district boards and membership will be facilitated by the Colorado Water Institute. Included in these meetings will be presentations by the groundwater engineer who developed the water balance figures that show the need for pumping restrictions.

Once the distributional impacts of policy alternatives are known, CSU will administer a survey that elicits groundwater users' preferences over the different policies. Together with the economic analysis, the survey results will provide the baseline information needed by the WPP and management districts to design a politically viable policy aimed at reduced pumping.

The final report, along with interim results along the way, will provide the Water Preservation Partnership with policy recommendations to reduce pumping in order to increase the time over which irrigated farming can contribute to the economy of the Northern High Plains Ground Water Basin.

Phase 2 of the project, not included in this proposal, will be to assist the Water Preservation Partnership in the planning required for implementing the policy selected as the preferred option. This will include consideration of the appropriate institutions to develop and enforce the policy and providing information to help irrigators plan for how best to respond to the policy's implementation.

Members of the Water Preservation Partnership are available to answer questions regarding the proposal. We hope you will recommend funding of this project.

Exhibit B

Designated Basins and Management Districts

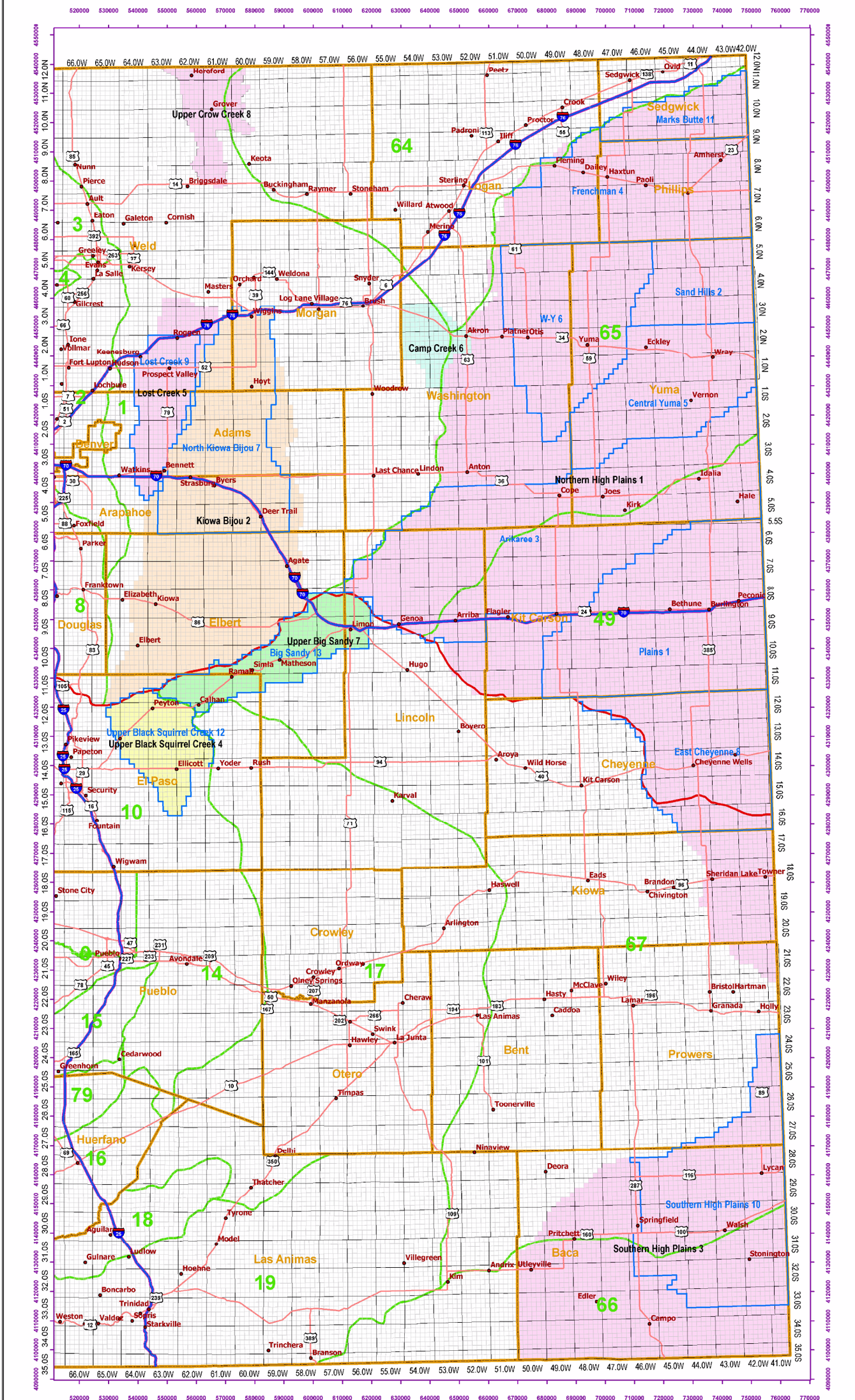

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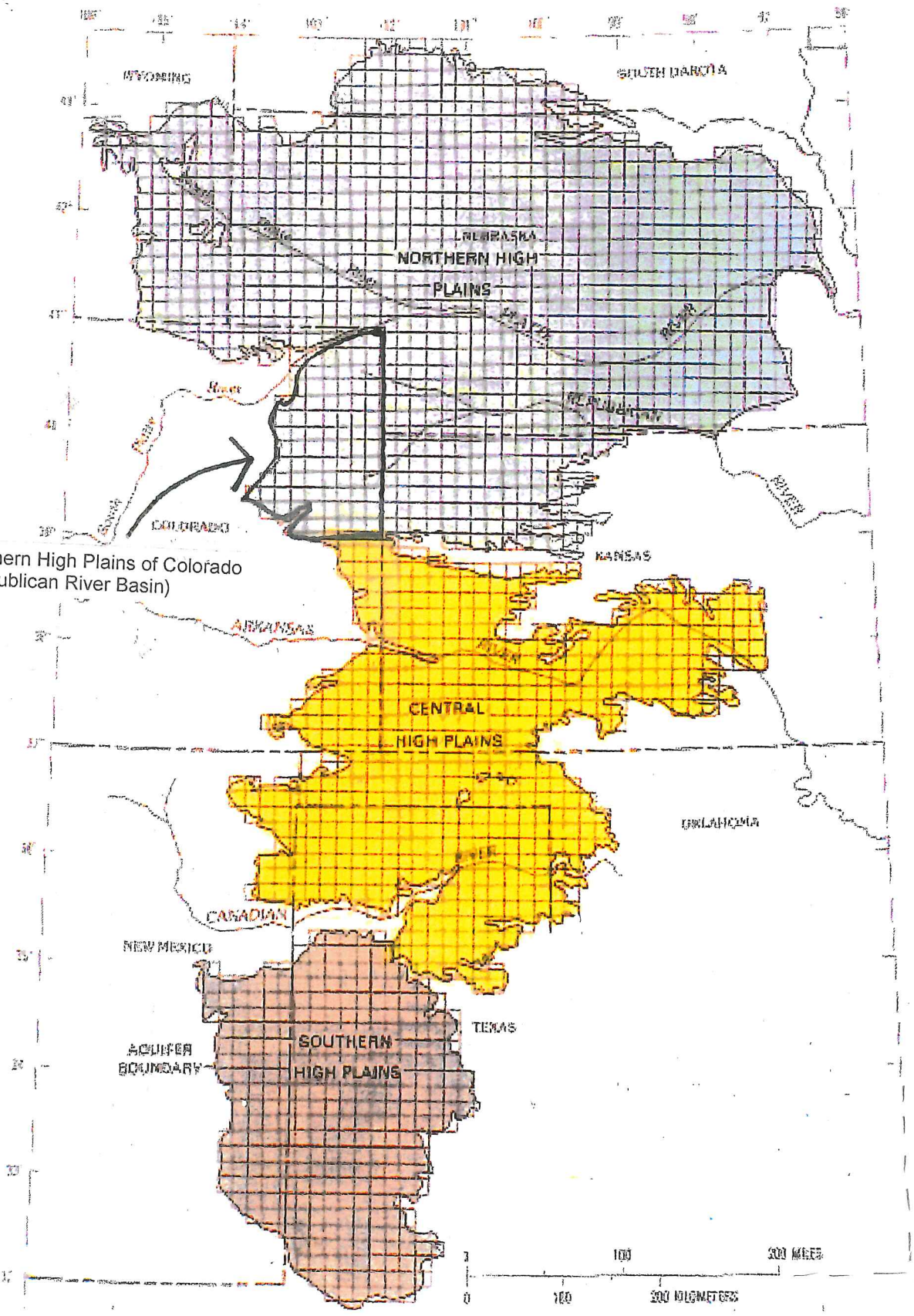
Exhibit C

HIGH PLAINS (OGALLALA) AQUIFER



Northern High Plains of Colorado
(Republican River Basin)