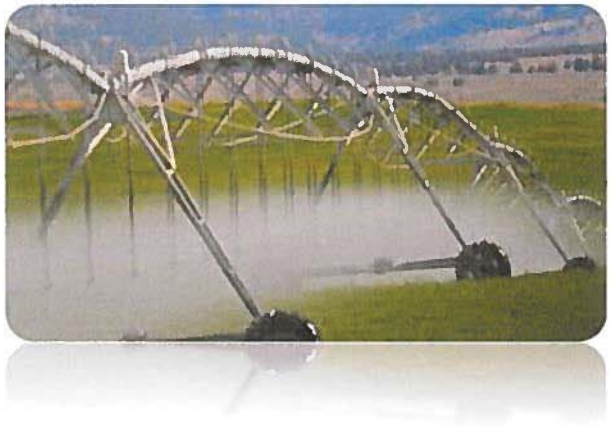
# U.S. Bureau of Reclamation WaterSMART Grants: Water Marketing Strategy Grants Fiscal Year 2019

**Funding Opportunity Number: BOR-DO-19-F006**



**Project Title:** **Harney Basin Groundwater Marketing Development Evaluation**

**Applicant:** **Harney County Court**

**Project Manager:** **Zach Freed**

# Technical Proposal and Evaluation Criteria

## EXECUTIVE SUMMARY

- **Submittal Date:** **July 26, 2019**
- **Submitted by:** **Harney County Court**
- **County and State:** **Harney County, Oregon**

This proposal is to develop a plan for using market-based mechanisms to reduce groundwater use and avert an overallocation crisis in the Harney Basin, Oregon. The Harney County Court, the governing body of Harney County in southeast Oregon, will use the funds to identify legal and logistical alternatives leading to a groundwater market strategy. The development of such a strategy is critical to reducing overall groundwater use in the Harney basin and managing groundwater use in an adaptive way, especially in the face of a changing climate. The project will examine accounting and management tools for a market that considers the all groundwater needs (e.g., irrigation, domestic, municipal, ecological). The plan will incorporate lessons from other areas and explorations in Oregon that identify roadblocks to a market approach (Pagel, 2016) and methods to avoid risk of unintended ecological outcomes.

As background, the Harney County Court and Harney County Watershed Council are cooperating on a collaborative water resource planning effort, called the Harney Community-Based Water Planning (CBWP) Collaborative. The CBWP Collaborative has been partially funded by the Oregon Water Resources Department (OWRD) as a pilot effort in local collaborative water planning. In 2016, the Oregon Water Resources Commission designated an area of the Harney Basin as the Greater Harney Valley Groundwater Area of Concern (GHVGAC). Groundwater has been over allocated in the GHVGAC by more than 110,000 acre-feet per year, and some monitoring wells have shown water-level declines exceeding 60 feet over the past few decades. If the CBWP Collaborative doesn't provide a clear plan and take action leading to sustainable water use, OWRD will regulate groundwater users based on seniority and potentially shut down more than 100,000 acre-feet per year of water use. Such regulation would likely cripple the local agriculture-based economy and may not have benefits to local ecosystems or communities at risk of losing access to drinking water.

The CBWP process is open to the public and engages a diverse group of stakeholders to develop a long-term, integrated water resources strategy to help meet the water needs of the Harney Basin. The Collaborative is currently comprised of approximately 40 diverse stakeholders who regularly attend water-planning meetings, including: farmers/ranchers, rural domestic and municipal well users, Burns-Paiute Tribe members and staff, land managers, conservation nonprofits, business owners, elected officials, federal, state, and local government staff, and scientists/university staff.

As a part of the collaborative planning, participants have demonstrated a growing interest in the theory and on-the-ground application of water markets as a tool to help address groundwater demand, and how a market could be applied to solve problems in the Harney Basin. To learn more about water markets, the Collaborative hosted a presentation from Eureka County's Natural Resources Manager, who described the Diamond Valley, Nevada Water Management Plan (Eureka County, 2018). The Diamond Valley plan uses a "shares" approach with predictable

declining allocations to address groundwater declines in their basin, which was received well by the attending Harney County stakeholders. In January 2019, the Collaborative reached its second-ever consensus decision to support the research and development of a groundwater market and share system with the potential to help reduce groundwater use in the basin.

## BACKGROUND DATA

The Harney Basin is a semi-arid closed basin in southeastern Oregon (Figure 1). The basin encompasses 5,245 square miles of surface area and has a population of less than 7,500. The dominant economic sector is agriculture. About 70% of the basin is public land.

Groundwater irrigated agriculture has significantly increased over the last three decades due in part to the full allocation of surface water in the basin. Based on a 2015 analysis by OWRD, the most current estimation is that more than 110,000 acre-feet per year are legally appropriated beyond available recharge (Figure 2). In 2016 the Oregon Water Resources Commission designated the Greater Harney Valley Groundwater Area of Concern (GHVGAC) and closed the area to new permit applications. A joint groundwater study is being conducted by Oregon Water Resources Department (OWRD) and U.S. Geological Survey (USGS). The study has documented declining groundwater levels in parts of the basin, with three areas of significant decline: Weaver Springs (Figure 3), Crane-Buchanan (Figure 4), and Rattlesnake. Some monitoring wells have shown water-level declines exceeding 60 feet (Figs. 3 and 4). Groundwater irrigation in the basin is conducted by individual irrigators. There is estimated to be 87,264 acres of primary groundwater irrigated acres permitted in the basin (OWRD, 2018). The on-going comprehensive groundwater study is refining the original 2015 analysis of the groundwater budget, with a final report due in 2020. Preliminary results clearly show that the use of groundwater exceeds recharge by a significant amount—potentially even more than the 2015 estimate.

## PROJECT LOCATION

Harney County (Lat: 43.426° N, Lon: 119.131° W) is in the southeastern corner of Oregon in the northern Great Basin. The GHVGAC is in the center of the county, surrounding the terminal Malheur and Harney Lakes (Figure 1). The Malheur National Wildlife Refuge is near the terminal lakes in the middle of the basin, and Bureau of Land Management rangelands are found throughout. The US Forest Service manages the forest lands at the higher elevations of the Silver Creek and Silvies River drainages. The terminal lakes are fed by two major tributaries flowing south from the Blue Mountains (Silver Creek and Silvies River). The Donner und Blitzen River flows north to Malheur Lake from Steens Mountain. The Harney Valley floor is an alluvial basin remnant of pluvial Lake Malheur deposits from Pleistocene interbasin lake with alluvial deposits from smallertributary streams (Poison Creek, Cow Creek, Rattlesnake Creek, Coffeepot Creek, etc.).

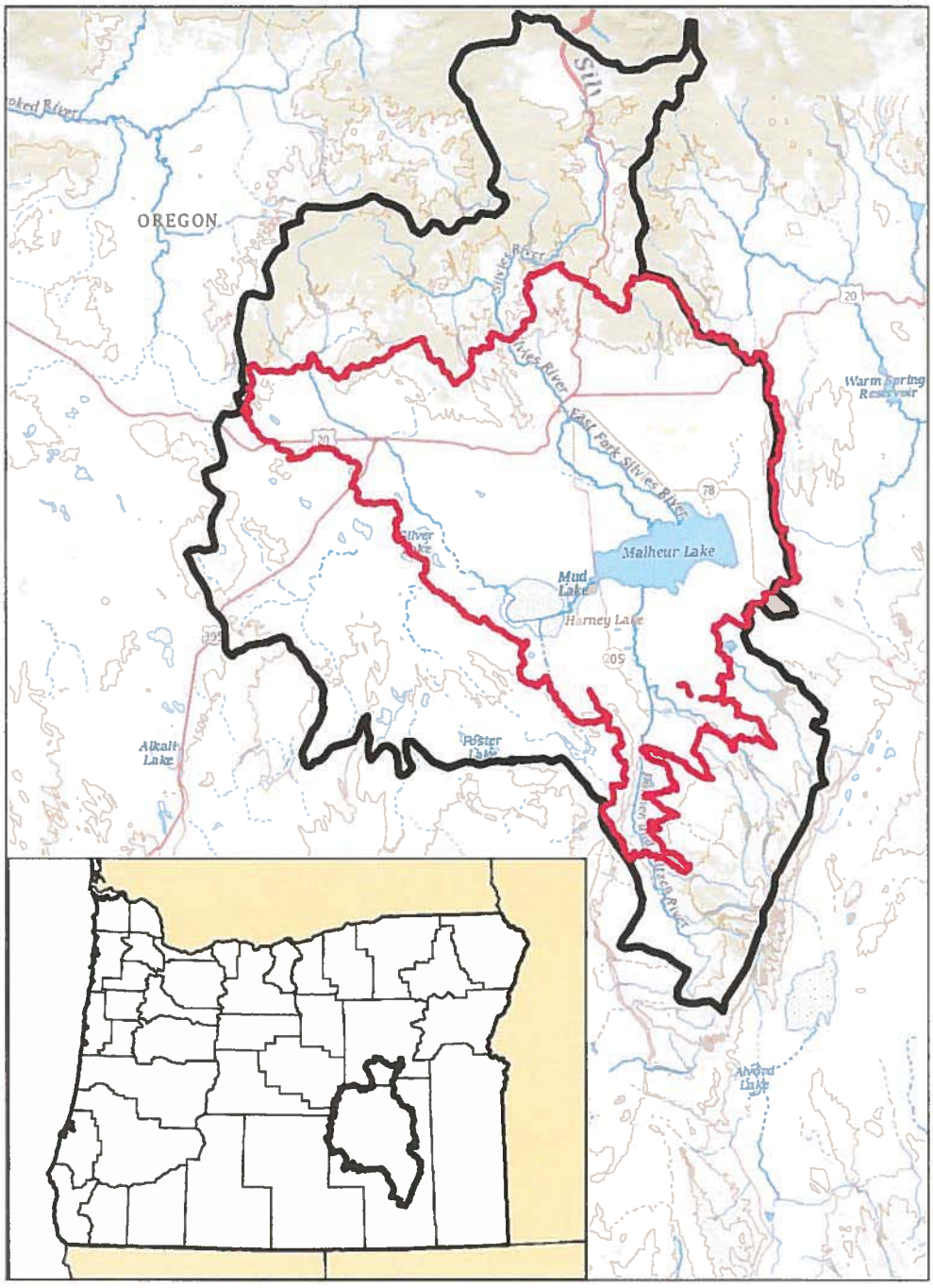



**Figure 1: Harney Basin (black outlines) and the project area, the Greater Harney Valley Groundwater Area of Concern (red outline). Inset map: Oregon county boundaries (thin black lines) and the Harney Basin (thick black line).**

## Water Supply and Demand

The ongoing study of the groundwater conditions in the Harney Basin will develop a model of the aquifer and a hydrologic budget for the Harney Basin aquifer system. The report is scheduled to be completed in 2020. Preliminary information (OWRD, 2015) indicates that the total annual groundwater volume permitted for irrigation within the GHVGAC alone exceeds the groundwater budget for the entire Harney Basin, so the resource is significantly over-appropriated. Figure 2 summarizes the OWRD analysis of groundwater conditions in the Greater Harney Valley (OWRD, 2015). It shows an over allocation of more than 110,000 acre feet/year legally permitted.

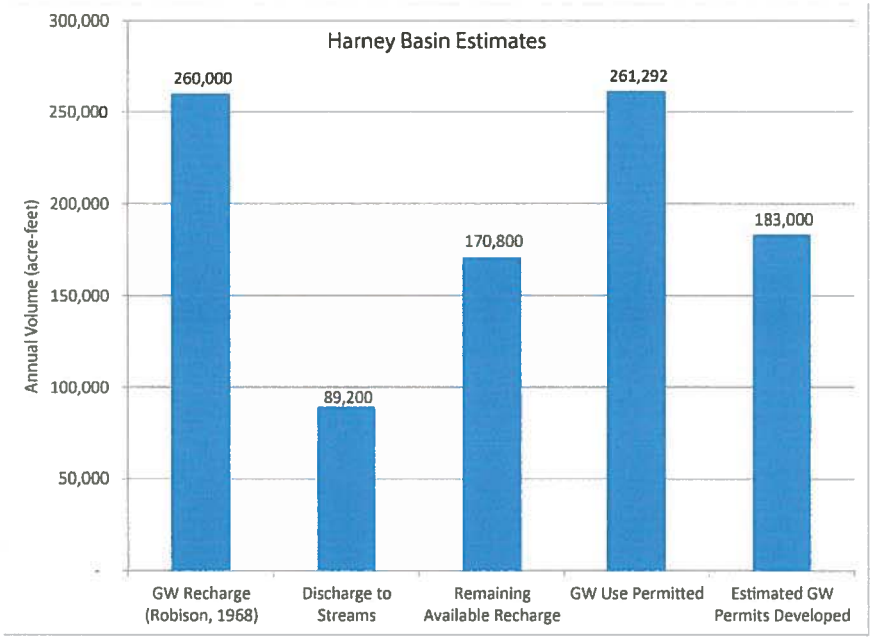



Figure 2: Groundwater Budget for the Harney Basin (OWRD, 2015)

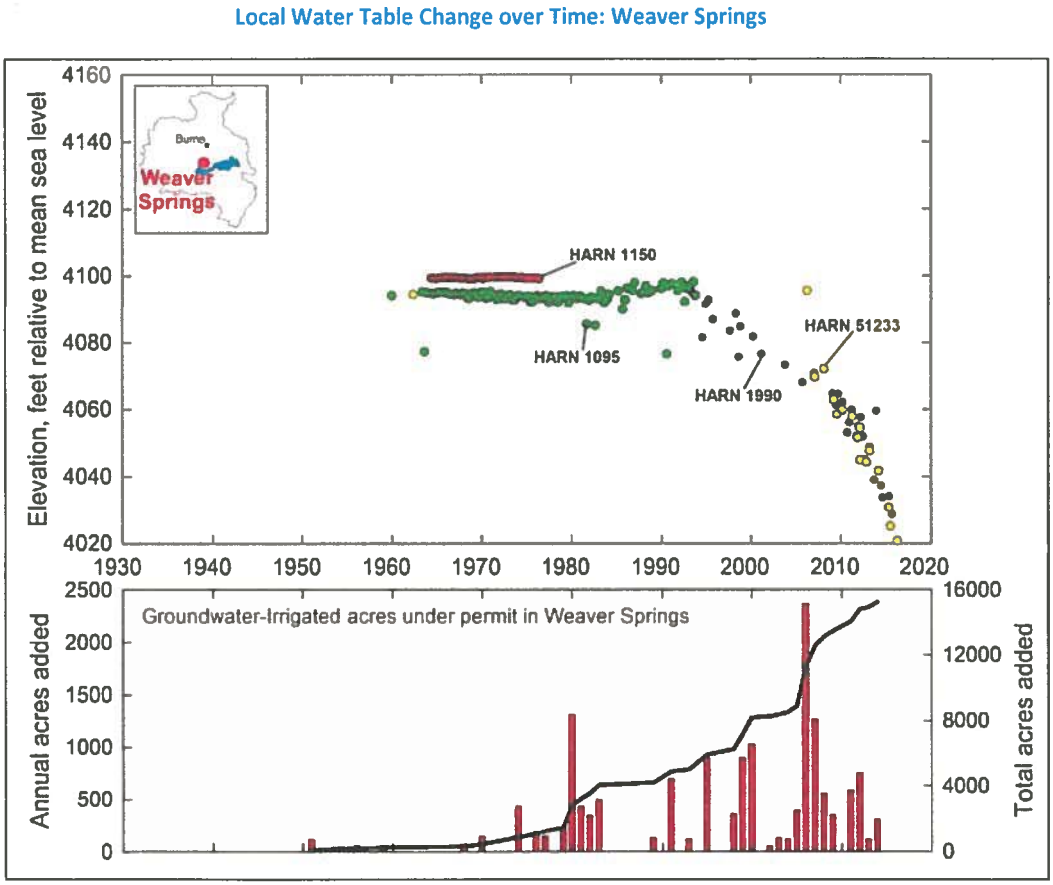



Figure 3: Groundwater Decline in Weaver Springs area of Harney Basin (USGS, 2018). Data in top figure are color-coded by monitoring well and show multiple wells over time, all within the Weaver Springs area. Bottom figure shows cumulative addition of permitted groundwater-irrigated acres in the Weaver Springs area.

Local Water Table Change over Time: Crane-Buchanan

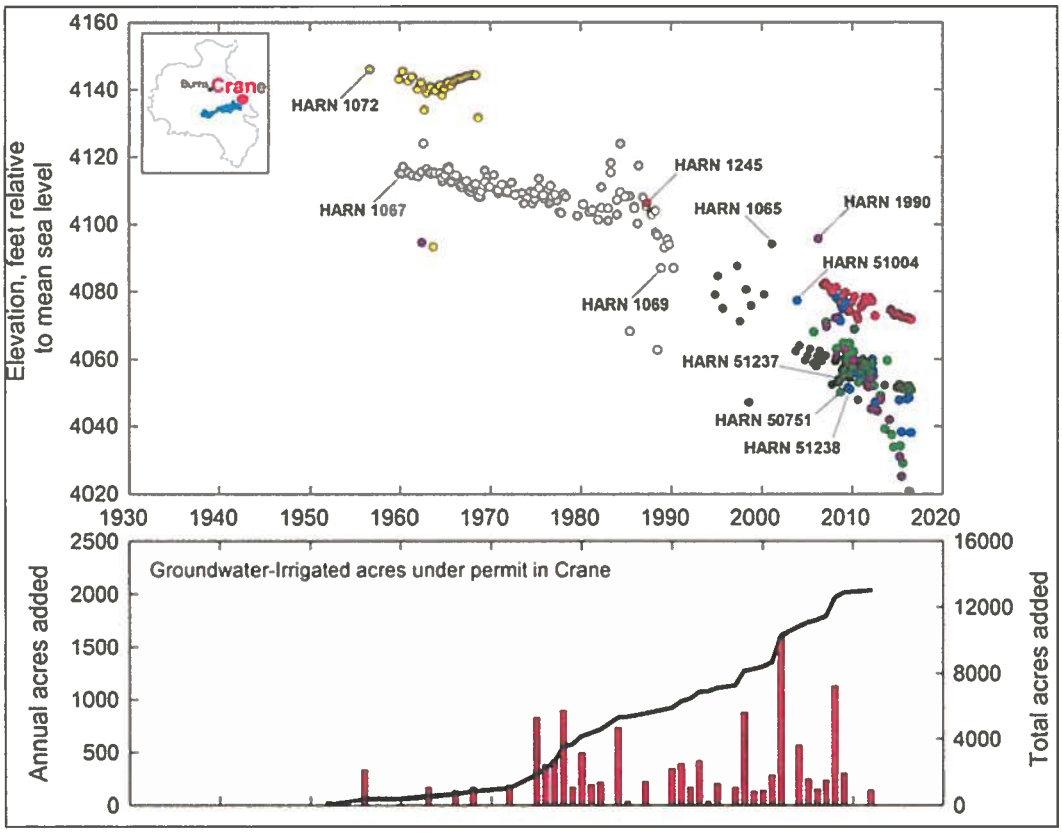



Figure 4: Groundwater Declines in the Crane-Buchanan area of the Harney Basin USGS, 2018). Circles represent monitoring wells.

In addition to the groundwater used for irrigation, more than 1,200 households use groundwater for domestic purposes with many experiencing a loss of capacity by declining groundwater levels and some encountering arsenic contamination as they drill deeper. Municipal wells have not experienced significant declines and appear to be stable. The focus of planning efforts in the Harney Basin is to reduce the rate of decline of groundwater levels and reach a sustainable level of groundwater use.

## PROJECT DESCRIPTION

In 2016, the Harney County Court and the Harney County Watershed Council (HCWC) successfully applied in partnership for a Place-Based Planning (PBP) grant from OWRD. Since the receipt of the PBP grant, as well as several grants from foundations and other state agencies, the Harney Community-Based Water Planning Collaborative (CBWP) has formalized a working agreement and continues to grow. The planning process has been ongoing for approximately three years, with regular full Collaborative meetings as well as Working Group meetings focused on specific issues associated with groundwater issues in the basin: agriculture, domestic and municipal wells, ecology, and vegetation management.

The Collaborative's water planning process will help address social, ecological, and economic water needs in the basin. Domestic drinking water wells have been affected by the decline in

groundwater levels, so addressing domestic water issues has become an important focus of the water resource planning effort in Harney County. In addition, the Harney Basin is the home of the Malheur National Wildlife Refuge, a 187,757 acre refuge surrounding Malheur Lake that is an important waterbird area for migratory and resident waterbirds. The flood irrigated fields of the Silvies River floodplain are critical resting and feeding areas for hundreds of thousands of migratory waterbirds in the Pacific Flyway. Knowledge of the linkage of groundwater to the surface wetlands, groundwater dependent ecosystems, springs, and lake levels is incomplete but being explored by the USGS-OWRD Groundwater Study and The Nature Conservancy's (TNC) Groundwater-Dependent Ecosystem Study.

In addition to planning for a groundwater market approach, the Collaborative has identified other possible strategies to help reduce groundwater use in the basin. For example, an effort identified by the water planning Collaborative is to explore the use of the Conservation Reserve Enhancement Program (CREP) to reduce groundwater irrigation water use in the basin. This effort is ongoing as a cooperative effort between the State of Oregon through the Oregon Watershed Enhancement Board and the U. S. Department of Agriculture through the Farm Service Agency. Also, converting from mid-elevation spray application (MESA) systems to low-elevation spray application (LESA) systems can significantly reduce the amount of irrigated water applied to crops (Peters et al., 2016). Early action efforts in the basin by the local Natural Resources Conservation Service (NRCS) have led to funding for a Conservation Implementation Strategy for "Saving Groundwater in the Harney Basin Using Efficient Irrigation Technologies". This program will cost share improved irrigation technology in the basin. Alternative cropping is being explored by Collaborative participants and agronomic specialists, as well. Harney County has committed to cost sharing an agricultural extension agent with expertise in alternative crops and irrigation technology for the County.

The proposed groundwater market could be used to help reduce total groundwater use by decreasing water allocations and allow an existing water right holder to trade water available under an existing right. Water markets have been established in other countries (e.g., Australia, Chile) and other states (e.g., California, Nevada). Taking examples that are relevant to the Harney Basin will be important since most water markets are designed around surface water to increase flow either towards urban uses or instream uses, while few are groundwater-specific. Under the current circumstances of over allocation in the Harney Basin, potential water market solutions include changing the timing of water distribution and providing transactional approaches to transferring water use among different irrigators. More research is needed to develop a groundwater market plan that could follow Oregon water law and policy, protect water rights, and reduce water use in the basin. A promising groundwater market example from Eureka County, Nevada was discussed with the Collaborative. The Diamond Valley Groundwater Management Plan uses "shares" that can be traded among irrigators within a predictable scheme of declining allocations over time, which appears to be an approach that could be applied within the Harney Basin.

The Collaborative's diverse stakeholders are developing an integrated water management plan to helping reduce groundwater use in the basin while considering social, ecological, and economic needs. By consensus vote, the Collaborative has decided that exploring the

development of a water market is a critical next step to reaching the goal of sustainable water use.

**Proposed Approach:**
To evaluate the potential for a groundwater market for the Harney basin, three major types of considerations need to be evaluated[1]: 1) Foundational, 2) Market-specific, and 3) General.

Foundational Considerations:
Because groundwater markets would be based on transfers of groundwater extraction allocations, a set of foundational considerations shared in common with other programs that limit groundwater pumping needs to be analyzed. These considerations relate to measuring groundwater extractions, setting overall pumping limits for the basins, and establishing individual groundwater extraction allocations. The tasks associated with this consideration involve:

- Determining the tools and method of measuring groundwater use consistently,
- Identifying the overall groundwater use limits and schedule for reduction over time,
- Developing shared allocation among groundwater right holders

These tasks will involve both technical evaluation and community collaboration. The first task (measurement requirement and measurement methods) are legal and technical evaluations. The use limits and allocation of shares involves both technical input from the groundwater study and the Collaborative.

Market-specific Considerations:
These considerations relate to market goals, groundwater rights questions, the potential impacts of trading, trading rules, and the trading system and transfer approval process. Carefully designed rules will be needed to ensure that trades support progress toward sustainability and sufficiently address negative impacts to third parties and the environment.
The tasks involved include:

- Evaluating the geographic scale and timing/seasonality considerations of a trading system,
- Evaluating the economic and ecological effects of a trading system,
- Developing proposed trading rules to optimize outcomes that accomplish ecological, economic and hydrologic goals.

The tasks will require bringing experience from other areas to the Harney Basin and adapting them to meet the local needs. As TNC completes their evaluation of groundwater dependent ecosystems, the results of the study can be used to inform beneficial ecological outcomes of a water market. Economic analysis of reduction in groundwater use on agricultural income, property tax revenues and other economic effects of changing groundwater uses will require additional analysis.

General Considerations:

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[1] From - Trading Sustainably: Critical Considerations for Local Groundwater Markets Under The Sustainable Groundwater Management Act

Any market system proposed needs to establish and maintain monitoring systems that help them understand how program activities affect basin conditions. They will need to exercise oversight and enforcement authority to ensure compliance with program requirements, evaluate program effectiveness, and address problems by making needed changes. Transparency and public engagement will be important throughout. Finally, developing and implementing a groundwater market for reducing groundwater use will require sufficient resources, including human capacity, physical and technological infrastructure, and funding.
Tasks include:

- Developing a monitoring program in collaboration with OWRD
- Identifying the authority for oversight and enforcement of the trading rules,
- Determining the schedule for evaluation and triggers for modifying the program,

Developing a proposed public reporting program to assure transparency of the market,

**Project Scope of Work**

The Harney County Groundwater Market Development Study Report will build on the Diamond Valley, Nevada model due to the similarities in stakeholder composition, climate, and geography. The planning activities in support of developing the tools for a market program include:

- Using the latest information from the USGS and OWRD Harney Basin groundwater study, determine a target range for the magnitude of reductions to water use via the groundwater market.
- Evaluate share reduction schedules and rates of change of other successful groundwater markets using considerations of crop rotation patterns, financing horizons and other factors affecting potential acceptance of the reduction. Summarize existing literature and lessons-learned to develop a set of alternative proposals for annual share reductions in the Harney Basin groundwater market.
- Summarize means and techniques to assure common measurement and reporting of groundwater use within other groundwater markets.
- Coordinate with OWRD to ensure the program meets Oregon water law.
- Legal consultation for the development of a voluntary agreement under Oregon law (ORS 537.745).
- Assess economic, social, and environmental impacts of a groundwater market strategy, with a focus on avoiding unintended negative consequences.
- Identify and develop proposed transaction mechanisms applicable to the Harney Basin.
- Define an implementation pathway, proposing several alternative scenarios that achieve the intended reduction in groundwater use and identifying timelines and next steps.
- Prepare a Groundwater Market Development Study Report summarizing the activities and results of each of the above activities.

**Program Goal 1 – Develop Share Concept and Reach Consensus on Goals**

Based on the initial interest expressed by the CBWP Collaborative to explore the potential of a market approach to help address groundwater use reduction in the Harney Basin, the contractor will search for an approach that is best fit for Harney County groundwater users. Detailed conservations with the CBWP will be required to identify the conditions and approaches that will provide the level of certainty required to proceed.

**Task 1.1: Identify Potential Approaches from Other Communities**
A contractor will be charged with identifying other communities that have explored the use of markets to address groundwater declines, in and outside of the United States. Although the laws governing water rights, transfers and exchanges vary from by state and country, existing water markets in many of the western states as well as other regions can offer insight into methods and strategies for addressing transfers of water using groundwater supplies. Solutions to address potentially affected parties discovered in this research may be informative to the development of new rules under this project. The contractor will provide a comparison of approaches, critical methods, relevance to a closed basin system like the Harney Basin and other information useful for the community to use in selecting an approach for the Harney Basin.

**Product:** A summary memo that identifies the elements of each approach and a comparison of each approach to the conditions in the Harney Basin will be developed.

**Task 1.2: Analysis of Legal Opportunities and Constraints**
Activities under this task will assesses and set forth the primary statutory language and current practical application of the relevant laws to help establish common understanding from which Harney County, its partners, potentially affected parties, and regulators can all proceed in pursuing a water marketing strategy. Under this task, the contractor will gather relevant legal information, including any applicable transfer examples or case law, analyze the current statutory interpretations, and develop initial opportunity concepts. The analysis from Oregon's Umatilla Basin (Pagel, 2016) will be used to help inform opportunities and roadblocks. Information prepared under this task serves as primary materials to guide discussions with the CBWP.

**Product:** A technical memo will be developed in consultation with OWRD that identifies the legal basis and limits of a market approach that could be developed in the Harney Basin.

**Task 1.3 Review Alternative Approaches with the Collaborative**
The information on alternative groundwater market approaches will be presented to the CBWP Collaborative, as well as a summary of the elements that are felt to be appropriate for the Harney Basin will be identified through discussion. A memo compiling the information presented and the approach best suited to the Harney Basin will be developed.

The information on alternative approaches and legal framework will be presented to the CBWP Collaborative with a recommended approach or approaches to consider as relevant to the Harney Basin.

**Product:** A recommendation for consideration by the Collaborative will be developed.

**Program Goal 2- Develop Information and Tools for a Market**

The goal of this effort is to identify the tools, limits, and requirements to establish a functioning groundwater market approach identified by the work from Goal 1.

**Task 2.1: Develop Critical Information Tools for a Market**

Working from the selected approach, we will develop a common measurement and accounting approach for water use to validate share use and exchange. The market area or geographic area that the market would serve would be explored and a recommended market boundary would be provided. Recommendations for a uniform measurement and reporting system will involve the recommendation of: a common measurement device, a common reporting approach, and an accounting approach. The cost and methods to implement the recommended approach will be explored.

**Product:** The recommended approach will be detailed in a technical memo.

### Task 2.2: Review Critical Information Tools with the CBWP

The technical approach to measurement and monitoring and the market area would be presented to the CBWP Collaborative for discussion and review. The discussions will identify issues and concerns and identify recommended approaches suitable for the Harney Basin.

**Product:** The technical memo delivered in Task 2.1 will be shared for consideration by the Collaborative. Feedback and input from the Collaborative will be incorporated into a revised technical memo.

### Task 2.3: Evaluate Share-Allocation Concepts

The conversation in the Harney Basin about share development will require a discussion of the relative weights to be applied for priority dates. The basic decision is to allocate a weighting factor for each water right. The contractor will summarize how other groundwater markets have translated water rights into shares, identify alternative strategies, and provide a recommendation for the CBWP.

**Product:** A technical memo providing information and defining a pathway for the Harney Basin. In addition, the memo will include examples as illustrated by Table 1.

Table 1: Example Table of Groundwater Rights and Associated Shares[2]

| Permit No. | Cert. No. | Priority Date | MOU | Water Right Duty (Acre-Feet) | Owner of Record | Priority Factor | Shares |
|---|---|---|---|---|---|---|---|
| 87603 | 58765 | 3/2/2008 | IRR | 69.120 | John and Jane Doe | 0.33 | 22.8096 |
| 00001 | 00001 | 3/2/1930 | IRR | 18.880 | Fred and Wilma Flintstone | 0.9997 | 18.82336 |
| 61248 | 12433 | 3/2/1948 | IRR | 236.800 | Joe and Marilyn DiMaggio | 0.5 | 118.40 |

### Task 2.4: Identify Share Allocation Reductions Schedule

The primary purpose of a water market in the Harney Basin is to reduce irrigation water use. The use of shares to facilitate irrigator choice of water use is proposed within declining availability of groundwater. A depletion rate of available shares is needed to provide assurance

[2] Table modified from Diamond Valley Groundwater Management Plan (Eureka County Nevada, 2018)

of decreased groundwater use and assure predictability of groundwater availability to irrigators. Using the best available information, the contractor will identify a target goal for sustainable groundwater use, and a schedule of annual share reductions to meet that goal. This task will be difficult and may require re-evaluation of the goal based on completion of the USGS/OWRD Groundwater Study. It is anticipated that the sustainable groundwater use amount or range will be an outcome of the ongoing USGS/OWRD groundwater study. The contractor will summarize the methods and rate of declines from other groundwater markets and provide a recommendation for the CBWP. The contractor will also identify mechanisms for adaptively managing the reduction schedule and target goal for sustainable use based on monitoring. Subsequent discussion with the stakeholders and others will provide an idea of an acceptable schedule of depletion for groundwater allocation for the market.

**Product:** A technical memo summarizing share allocation and reduction methods from other groundwater markets and applying lessons-learned to develop a recommendation for the CBWP.

### Program Goal 3- Develop Market Specific Tools

Using information gathered and the tools identified as necessary for a market approach to groundwater use, specific materials will be developed for the Harney Basin. The goal of this effort is to develop materials that can be used in a Harney Basin groundwater market.

**Task 3.1: Suggested Contract Terms**

Specific contract terms will be developed through the workshop process to provide satisfactory guidance relative to groundwater share exchange in Harney County. Suggested standards will be formalized. A monitoring and reporting system will be recommended.

**Product:** Template agreements for share exchanges, written share exchange protocol, and a memo detailing a proposed monitoring and reporting system.

**Task 3.2: Evaluate and Recommend Harney Basin Groundwater Market Authority**

Alternative approaches to managing the groundwater market will be developed and alternative approaches to managing the market will be discussed and evaluated. Using the experience from other areas will be necessary to develop the range of options and their benefits, costs and opportunities created.

**Product:** The information will be summarized in a technical memo that compiles information from other areas and develops a recommended approach for the Harney Basin.

**Task 3.3: Evaluate Potential Ecological Effects of Market Activities**

Using information developed by TNC on Groundwater Dependent Ecosystems (GDE) of the Harney Basin, evaluate the potential effects of market activities on Harney Basin GDEs and other ecosystems. If potential negative effects are identified, develop and recommend mitigation strategies as appropriate. Recommend a monitoring system of potentially-affected habitats or communities to mitigate the likelihood of unforeseen consequences.

**Product:** Memo report on potential unintended consequences of a groundwater market affecting GDEs and other ecosystems, and summary of recommended monitoring to ensure non-target effects don't impact local ecosystems.

**Program Goal 4 – Build Public Knowledge and Develop Public Review Report**

Once the technical details have been developed, the benefits and approach needs to be shared with the entire community. Building awareness and understanding is the goal of this effort. A report including all technical memos and deliverables identified above and clearly defining an implementation pathway will be written and shared with the CBWP.

**Task 4.1: Review proposed approach with the CBWP Collaborative**

Regular updates and final work sessions that focus on the Harney Basin Groundwater market will be scheduled for Collaborative input and consideration.

**Task 4.2: Prepare Groundwater Market Development Study Report.** Create a Groundwater Market Development Study Report summarizing the activities and results of each activity. Clearly identify the necessary steps for implementing the proposed program. Identify the potential effects on agricultural groundwater use, domestic well users, and ecological priorities. The public review report should be a summary with illustrations and images that convey the information in a manner accessible to the general public.

**Product:** Final technical report and public review report.

**Grant Administration and Project Management**

The Harney County will be responsible for coordinating the project with the program management by TNC. The project manager will coordinate with Reclamation by updating project status, completing significant milestones, and preparing deliverables. Specific subtasks are as follows:

**a. Select Technical Consultant:**

Harney County will select a qualified consultant to assist with the technical and legal tasks. The project manager will develop a request for proposals, select a proposal review team, establish review criteria and recommend selected contractors for County approval.

**b. Prepare Financial Reports:**

Financial reports will be prepared by the project manager using the SF-425, Federal Financial Report, at the interval required by Reclamation. The reports will provide sufficient detail for Reclamation to approve of all expenditures.

**c. Prepare Program Performance Reports:**

This sub-task involves submission of project performance reports per Reclamation guidelines. Reports could include the following content: (1) summarize activities performed during the reporting period, (2) compare actual accomplishments to milestones, (3) provide status of activities, (4) discuss schedule and budget activities, and (5) form the basis for determining whether invoices are consistent with work performed.

**d. Prepare Final Report:**

A final report will be prepared in the format required by Reclamation and will summarize activities performed during the project's duration. The report will provide sufficient detail to show how the project objectives and goals were met.

**e. Budget Management:**

The project manager will monitor expenditures and match funding. Financial reports will be prepared by the project manager. The reports will provide sufficient detail for Reclamation to approve all expenditures.

| Project Start Date: September 15, 2019<br>Project End Date: October 31, 2021<br>Project Duration: 2 years | 2019 | | | | 2020 | | | | 2021 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Task** | Sept | Oct | Nov | Dec | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| **Element 1: Develop Share Concept and Reach Consensus on Goals** | | | | | | | | | | | | |
| Task 1.1: Identify Potential Approaches from Other Communities | | | | | | | | | | | | |
| Task 1.2: Analysis of Legal Opportunities and Constraints | | | | | | | | | | | | |
| Task 1.3 Review Alternative Approaches with the Collaborative | | | | | | | | | | | | |
| **Element 2- Develop Information and Tools for a Market** | | | | | | | | | | | | |
| Task 2.1: Develop Critical Information Tools for a Market | | | | | | | | | | | | |
| Task 2.2: Review Critical Information Tools with the CBWP | | | | | | | | | | | | |
| Task 2.3: Evaluate Share-Allocation Concepts | | | | | | | | | | | | |
| Task 2.4: Evaluate Share Allocation | | | | | | | | | | | | |
| **Element 3- Develop Market Specific Tools** | | | | | | | | | | | | |
| Task 3.1: Suggested Contract Terms | | | | | | | | | | | | |
| Task 3.2: Evaluate and Recommend Harney Basin Groundwater Market Authority | | | | | | | | | | | | |
| Task 3.3: Evaluate Potential Ecological Effects of Market Activities | | | | | | | | | | | | |
| **Element 4- Build Public Knowledge and Develop Public Review Report** | | | | | | | | | | | | |
| Task 4.1: Review proposed approach with the CBWP Collaborative | | | | | | | | | | | | |
| Task 4.2: Prepare Development Study Report. | | | | | | | | | | | | |
| **Other- Administrative and Collaborative Check-in** | | | | | | | | | | | | |
| Collaborative Review | | | | | | | | | | | | |
| Grant Administration and Project Management (Report to BoR) | | | | | | | | | | | | |

## EVALUATION CRITERIA

Evaluation Criterion A—Water Marketing Benefits:

- Explain whether the water market/activity will address a specific water supply shortfall and describe the extent of benefits to different sectors, including agricultural, municipal/industrial, tribal and environmental sectors, including:
  - *Will the water marketing strategy address a specific water supply shortfall?*

The Oregon Water Resources Department designated the Greater Harney Valley Groundwater Area of Concern (GHVGAC) in April of 2016 due to observations of groundwater decline. One assessment estimated the water supply shortfall at 110,000 acre-feet per year (OWRD, 2015), and an on-going comprehensive groundwater study by OWRD and USGS will provide a thorough assessment of current conditions when it is completed in 2020. However, groundwater declines have been clearly observed in monitoring wells (Figs. 3 and 4), with at least three known areas of significant groundwater decline (Weaver Springs, Crane-Buchanan, and Rattlesnake). The primary use of groundwater in the areas of decline is agricultural irrigation. The proposed groundwater market is targeted to specifically reduce agricultural groundwater use. A groundwater market that enables a transaction system, converts water rights to shares, and utilizes a transparent and equitable share reduction schedule would decrease water use while ensuring water is allocated where it is most highly valued.

  - *What is the nature and severity of the shortfall and which sectors are affected? Please provide support for your response.*

The primary use of groundwater irrigation in Harney County is to grow alfalfa, both to sustain the livestock industry and for export. The primary agricultural production in Harney County is livestock. According to the Census of Agriculture conducted by the United States Department of Agriculture in 2017, agriculture in Harney County was valued higher than $82 million: 36% in crops and 64% in cattle. Recent evaluation of evapotranspiration for the basin has developed an estimate of 300,000 to 370,000 acre feet/year of water use against an estimate of 160,000 to 220,000 acre feet/year of recharge—leaving an estimated 80,000 to 210,000 acre-feet/year deficit. The overuse of groundwater is being felt by vulnerable communities in the basin via loss of well production and domestic wells going dry or having water quality impacts. Finally, the outdoor recreation industry is reliant upon birdwatching and fly-fishing, which are dependent upon groundwater for wetland habitat and cold-water refuges, respectively.

  - *How and to what extent will the water market/water marketing activities, once implemented, address the shortfall? Please describe the expected benefits.*

The water market approach is only one of a number of tools being developed to reduce groundwater irrigation use in the basin. A groundwater Conservation Reserve Enhancement Program (CREP) is being explored with the State of Oregon as sponsor to provide conservation contracts to halt groundwater irrigation for voluntary enrollees during 15-year contracts. Harney County Court is exploring a way to fund an agricultural extension position to focus on alternative crops and ways to reduce uses of irrigation. The Natural Resources Conservation Service has funded an irrigation technology Conservation Implementation Strategy in the County. As a result of conversations and concerns voiced within the Collaborative, the Harney County Court is exploring projects and funding to help those who perhaps cannot afford to deepen wells or who are hauling water due to quality concerns. The County Court is pursuing a "community well" to

help secure quality drinking water for residents of the Crane-Buchanan area of the basin. With partial support from Business Oregon, the County is also working in conjunction with Anderson Perry & Associates in conducting a Development study to assess the most effective way to deliver quality water to others who may be in need in other areas of the basin.

No single action can fully address the significant shortfalls in groundwater supply. However, a combination of actions will provide different options for groundwater users in the basin and can collectively allow the basin to reach a balance between water supply and demand. The agency coordination, water quantification and monitoring standards, legal framework, and potential water market system proposed in this project will help reduce impacts on local water supplies in Harney County. The establishment of a water market can provide a powerful integration of public and private efforts to alleviate water scarcity within the County.

A well-functioning water market in Harney County will directly address the shortfall between supply and demand by reducing the amount of available market shares over time. It will also indirectly address the issue by providing financial incentives for improving water use efficiency by enabling those users and purveyors willing to use less water to be compensated by those needing more water. One of the primary advantages of such a scheme is predictability of water availability and reduced transaction costs within the system. Finally, the ability to transfer water to other users increases drought resiliency within the basin by allocating water where it is most highly value.

- *Will the water market/water marketing activities benefit multiple sectors and/or types of water uses? If so, to what extent and which sectors and water uses will benefit?*

The proposed water market (shares) approach is anticipated to be used in conjunction with an agreed-upon declining allocation of groundwater available to reach a sustainable level over a specific time period. Stabilizing groundwater levels will help domestic well users and local groundwater-dependent ecosystems; however, the greatest benefit will be to provide flexibility and predictability for agricultural irrigators under a system of declining available use of groundwater. The primary benefit will be to allow trading of shares rather than shutoff by seniority date, providing a glide-path for eliminating use of groundwater and conversion to other land uses. While municipal wells have not yet been affected, they could be with additional groundwater level declines.

- Explain how and to what extent the proposed water market or water marketing activities will improve water supply reliability in general in the area upon implementation of the strategy (address all that apply):

  - *Reducing the likelihood of conflicts over water*

Current conflicts exist between agricultural irrigators and domestic well owners, which has both made collaborative management of water resources more difficult and more important. The CBWP has recently obtained funding to conduct a statistically valid survey of domestic well users to determine the scale and issues associated with domestic groundwater; however, the study has not yet completed. The groundwater market will specifically increase cooperation and decrease conflict by allowing water transfers while indirectly reducing the likelihood of conflict by addressing the water supply shortfall.

- *Increasing resiliency to drought*

A water market will provide the flexibility for irrigators to change the use of groundwater during times of decreased availability. For groundwater, this is particularly important during drought events because decreasing availability of surface water generally shifts the burden of water demand to groundwater. Short-term transfers of shares can lessen the economic impact of shortages during droughts by shifting water to activities and places where the lack of water will be more costly. This will likely reduce conflicts over water and increase resiliency to drought because water is sold/transferred to where it is needed most. If the market is efficient it can respond to shortages within a declining allocation.

- *Sustaining agricultural communities*

A groundwater market is one of the many strategies that could be used to help sustain agriculture—the core economic sector in the Harney Basin--while helping to address groundwater declines and therefor also helping to sustain water supply for the community and its environment. Creating management flexibility within a disciplined decline in overall use will allow agricultural groundwater users to plan for the future and schedule management decisions under a predictable decline in available groundwater conditions. A successful groundwater market, in conjunction with other water management strategies, may also prevent or limit widespread regulation of agricultural entities by OWRD. The groundwater market will equitably reduce demand over time, allowing small businesses with junior water rights to persist, whereas regulation by water right seniority would immediately result in economic loss.

- *Demonstrating a water marketing approach that is innovative and which may be applied by others*

Water markets are dominantly focused on surface water and environmental flows in Oregon and the rest of the Pacific Northwest. This proposal will explore the potential to partially address groundwater declines in an agriculturally dominated basin. Upon completion of the Harney Basin Groundwater Study Report and pending approval from the CBWP Collaborative, the groundwater market will then be part of a "Voluntary Agreement" allowed in Oregon Water Law (ORS 537.745) between the market participants and OWRD. This will be a unique opportunity consistent with the goals of the 2017 Oregon Integrated Water Resource Strategy (Muckin and Bateman, 2017). The opportunity to learn from the experiences in Harney County and implement a groundwater market could be considered in other semi-arid portions of Oregon and other states.

- *Providing instream flows for species, recreation or water quality objectives.*

There is an ongoing evaluation of groundwater-dependent ecosystems of Harney Basin by TNC. The results of that evaluation may provide information on where and how market applications can be used to address ecological objectives. In addition to indirectly benefiting baseflow (instream flows dependent upon groundwater) for sensitive species such as the Malheur Lakes redband trout, the groundwater market will specifically incorporate protections for high-priority ecosystems and habitat. Many of the streams in the Harney Basin have exceeded state temperature standards, so increasing the baseflow in local streams by stabilizing aquifer levels may contribute thermal buffering to help meet water quality objectives. The most significant forms of ecotourism in the basin (recreational birding and fly fishing) will both directly benefit from more balanced water use for people and nature.

- Explain the extent to which the water market/activity will be ready to proceed upon completion of the strategy, addressing each of the following:
  - *Describe your plans and timeline for implementing the strategy upon its completion.*

Development of the contractor's recommendations for a water marketing strategy will occur in 2021, which will provide a framework for a potential groundwater market to open for a pilot program in 2022. Issues to be considered include the parameters of the market (for example, identification of participants, defining declining groundwater pools that can trade within a geographic area; rules for the market, measurement and reporting, etc.) as well as an analysis of the risk of unintended economic and ecological consequences in the water market strategy document.

  - *Are there complex issues, including issues of law or policy, that would need to be resolved before the strategy could be implemented?*

Groundwater law in Oregon is not well developed and the ability to develop a market will require significant legal analysis and development of a legal underpinning to support a market in the Harney Basin The evaluation of a potential market in the Umatilla Basin by Pagel (2016) found that "The local vision for a water banking and marketing program makes good sense but cannot be realized without new tools for more effective water management and more timely and integrated regulatory review. Such changes can be made within the legal framework of the prior appropriation doctrine by focusing on voluntary transactions…" The proposal in the Umatilla basin was for Aquifer Recharge and Water Bank which is a much more complex effort than what is envisioned for the Harney Basin. Additionally, the Harney Basin CBWP Collaborative is directly working with OWRD to develop the voluntary agreements and transactions necessary to execute these strategies. However, it is critical to develop a clearer understanding of the legal mechanisms for a groundwater market, which is one of the main objectives of the proposed development study.

  - *Explain whether previous planning, outreach and/or water marketing activities have been completed, including work on any of the required Project elements 1 to 3.*

The CBWP Collaborative has explored water markets by hosting guest speakers who presented on water markets established in Washington and Nevada at Collaborative meetings that were open to the public. Presentations have provided examples and situations that helped to develop ideas of how market forces and trading rules might be applied within the prior appropriation scheme. The presentations raised local interest among all attending stakeholders to pursue the issue further.

Evaluation Criterion B—Level of Stakeholder Support and Involvement:

- Identify stakeholders in the planning area who have committed to be involved in the planning process.

The Harney CBWP Collaborative has been engaged since 2016 in an effort to identify conditions, agree on issues, develop strategies to address the issues, and produce a plan to implement strategies. In this effort the Collaborative has engaged a cross section of: local community members (e.g., landowners, rural domestic well and municipal water users, irrigators, and business owners), the Harney County Farm Bureau, The HCWC, the Natural Resources Conservation Service, the U.S. Fish and Wildlife Service, U. S. Forest Service, Bureau of Land

Management, USDA Agricultural Research Station, Oregon Water Resource Department, Oregon Department of Agriculture, Oregon Department of Environmental Quality, Oregon Watershed Enhancement Board, Oregon Department of Fish and Wildlife, Business Oregon, TNC, Water Watch of Oregon, Ducks Unlimited, Portland Audubon Society, and the Burns Paiute Tribe. The Collaborative has welcomed all and solicited input from all that can make a difference in the use of water resources in the basin.

- *Describe their commitment.*

The diverse groups and individuals have participated in the planning effort for three years. They are strongly committed to making a difference in how groundwater is used in the basin. Several of the partners have provided both expertise and funding to advance the planning to address groundwater declines. The Oregon Watershed Enhancement Board has provided non-federal funds for the exploration of Groundwater Dependent Ecosystems, Citizen monitoring of groundwater levels, and domestic well survey while the OWRD has partially funded the collaborative planning program. Oregon Department of Environmental Quality has provided funding to support the compilation of water quality data.

At present, there are 31 diverse signatories of individuals and organizations/agencies on the Collaborative Working Agreements, which provide eligibility for participation in consensus decision-making so long as a signatory has attended at least two of the last four full Collaborative meetings. Approximately 40 people attend each full Collaborative meeting.

- *Please explain whether the project is supported by a diverse set of stakeholders.*

Multiple meetings were held in the summer and fall of 2018 with the Agriculture Working Group and the full Collaborative to learn about the fundamental of water market approaches. As the second-ever consensus decision, the Collaborative's diverse signatories agreed to support TNC and CBWP staff to pursue funding for a development study of water markets. Collaborative signatory members include: rural domestic well users; stock well users; municipal water users; landowners; tribal members and staff; surface and groundwater irrigators; representatives from agricultural associations; a recreation-focused non-profit; conservation non-profits; business owners; and county, state, and federal government agencies.

- *Describe stakeholders in the planning area who have expressed their support for the planning process, whether or not they have committed to participate.*

The CBWP Collaborative supports the development study and exploration of a market approach as long as it can help to result in the reduction of groundwater use in the basin. As mentioned, there are 31 signatories on the Collaborative's Working Agreements, and we are endlessly impressed by attendance at the group's meetings. Approximately 40 people attend the full Collaborative meetings and, for the couple of years that monthly meetings were being held for one or all of the four Working Groups (agriculture, domestic and municipal, ecological, and vegetation management), around 10-15 people participated in each Working Group meeting. It is estimated that since July 2016, well over 5,000 volunteer hours have been contributed to this project.

- *Is there opposition to the proposed strategy?*

There is no known opposition to the proposed groundwater market development study.

- *Do any separate planning efforts express support for the proposed water market/transaction? Or, will the proposed water marketing strategy complement other ongoing or recent planning efforts within the area?*

The water market exploration is part of the Harney Basin CBWP, a comprehensive water resource planning effort in the Harney Basin. A market approach is only a part of and a complement to other tools being developed to reduce groundwater use in the basin. The exploration of a market approach will complement the 2017 Integrated Water Resources Strategy (Munkin and Bateman, 2017) which does not yet identify market forces as a potential for addressing water resources in the state but encourages innovative and collaborative solutions to water management.

- *Please describe any relevant planning efforts, including who is undertaking these efforts and whether they support or are complemented by the proposed water marketing strategy. Explain how the proposed water marketing strategy will avoid duplication or complication of other ongoing planning efforts.*

In 2016 the Harney County Court and HCWC were awarded partial funding for a Place-Based Planning (PBP) water program as authorized by the 2015 Oregon Legislature (Senate Bill 266). The water market approach proposed is an integral part of the strategy the Harney Basin CBWP Collaborative is considering in the development of their plan.

There are three other collaborative planning processes underway in the Harney Basin whose work relates to our water planning effort: the Harney Basin Watershed Initiative, the Harney County Restoration Collaborative, and the Harney County Wildfire Collaborative. Several members of these collaboratives, including staff who help support these projects, also participate in the CBWP Collaborative. This helps the different planning groups track each other's work, allowing us to identify opportunities to partner and/or inform each other as well as to avoid duplication of work.

A market approach that results in decreased groundwater use will help the Harney Basin Wetland Initiative by reducing the effect of groundwater extraction on groundwater dependent ecosystems and increasing baseflow of surface water to wetlands and lakes.

- *Describe what efforts that you will undertake to ensure participation by a diverse array of stakeholders in developing the water marketing strategy.*

As a part of the Collaborative process there will be continual engagement of all stakeholders during the development of the study and public outreach following completion of a final report. Progress and considerations developed as the potential for a market approach is explored will be presented as a regular item during the Collaborative monthly meetings. In particular, seven separate check-ins are proposed during which the project manager will specifically solicit feedback from Collaborative members and stakeholders about progress and next steps.

Evaluation Criterion C—Ability to Meet Program Requirements:

- *Describe how the three elements of a water marketing strategy will be addressed within the required timeframe.*

Refer to the tasks, details, and charts in the Scope of Work in the Technical Proposal/Project Description section of this application as well as the budget presented under the Project Budget section. Harney County and its partner organizations fully recognize integration of the three elements throughout the water market strategy development is essential for timely success of the effort. The collaborative process of the CBWP assures integration of partnership development, scoping and planning and program development for a full Development Study Report evaluation.

- *Describe the availability and quality of existing data and models applicable to the proposed water marketing strategy.*

The ongoing groundwater study by OWRD and USGS will produce two reports; "Groundwater Resources of the Harney Basin, Oregon" and "Hydrologic Budget of the Harney Basin Aquifer System, Oregon" by December 31, 2020. Information from the study has been shared with the Harney Groundwater Study Advisory Committee, comprised of local agencies, stakeholders including the Project Manager for this proposal, and residents. The Harney Basin collaborative will be receiving timely and on-going information due to the coincident science effort and planning effort, so planning will be informed by the most up-to-date data and rigorous, peer-reviewed models.

- *Identify staff with appropriate technical expertise and describe their qualifications. Describe any plans to request additional technical assistance from Reclamation, or by contract.*

Critical staff will be Zach Freed, TNC who will oversee the contracting and work program completion, and Rianne BeCraft who is the Project Manager for the CBWP. Rianne will assist with communications between the market development study and the Collaborative stakeholders. Zach Freed holds a Master of Science degree in Aquatic Ecology from the University of Maryland and has a decade of experience in hydrology, water management, and groundwater contamination in the Pacific Northwest. Rianne BeCraft holds a Master of Science degree in Water Resources Management and Policy and a Graduate Certificate in Water Conflict Management from Oregon State University. With over eight years of combined experience in collaborative process, public outreach, and project management, Rianne has supported numerous initiatives focused on natural resource planning. She has served as project manager for the CBWP since December 2017.

The market development study itself will be performed by a well-qualified consultant with specific experience in developing and evaluating water markets in the United States. The consultant will be determined through an open competitive process.

If pilot activities are to be a part of the project, please include the following:

- *Describe any permits or approvals that will be required, along with the process for obtaining such permits or approvals.*

We are unaware of any permits required to establish a groundwater market in the Harney Basin. While it is unlikely that significant permitting will be required for this assessment specifically, Harney County will consult with legal counsel to determine the legal foundation needed to implement a water market system. The Collaborative is exploring a "Voluntary Agreement" as

### Required Permits or Approvals

There are no known permits or approvals necessary for the development of a groundwater market. The potential for Oregon Water Resources Commission approval of a "Voluntary Agreement" under ORS 537.745 that includes a groundwater market may be the only required review.

## PROJECT BUDGET

### *1) Funding Plan and Letters of Commitment*

- How you will make your contribution to the cost share requirement, such as monetary and/or in-kind contributions and source funds contributed by the applicant.

The cost share from the County will be in the form of cash from a state grant from the OWRD for the PBP program. In-kind contributions will be made from County Commission and County staff participation in the development of the groundwater market development study. The Nature Conservancy of Oregon has committed funding to support the market development study.

- Describe any in-kind costs incurred before the anticipated Project start date that you seek to include as costs.

We do not seek to include any prior in-kind costs incurred before the Project start date.

- Provide the identity and amount of funding to be provided by funding partners, as well as the required letters of commitment.

| Funding Source | Amount |
|---|---|
| **Non-Federal** | |
| The Nature Conservancy | $35,000 |
| Oregon Water Resources Department | $20,000 |
| **Non-Federal Total** | **$55,000** |
| **Other Federal** | |
| None | |
| **Requested Reclamation Funding** | **$50,000** |

Describe any funding requested or received from other Federal partners

Not Applicable.

- Describe any pending funding requests that have not yet been approved, and explain how the Project will be affected if such funding is denied.

Funding for this effort, aside from the requested Reclamation funding, has been secured.

### *2) Budget Proposal*

| Budget Item | Cost/Unit | Quantity | Total |
|---|---|---|---|
| **Salaries and Wages** | | | |

| | | | |
|---|---|---|---|
| Project Manager | | | 24,500 |
| **Contractual** | | | |
| Contractor A Legal Analysis | $20,000 | lump sum | $20,000 |
| Contractor B (Strategy Development Economics) | $50,000 | lump sum | $50,000 |
| **Travel** | | | $0 |
| **Equipment** | | | $0 |
| **Total Direct Costs** | | | **$** |
| **Indirect Cost** | | | $10,500 |
| **Total Cost Estimate** | | | **$105,0000** |
| **Matching Funds Secured (cash)** | | | $55,000 |
| **Requested Reclamation Funding** | | | $50,000 |

### *3) Budget Narrative*

Fringe Benefits:

Total = $0.00

No fringe benefits costs being requested in this proposal.

Travel:

Total = $0.00

No travel costs requested in this proposal.

Equipment:

Total = $0.00

No equipment costs requested in this proposal.

Materials and Supplies:

Total = $0.00

No materials and supplies costs requested in this proposal.

Contractual:

Total = $70,000

- Contractor A – Technical Development: Lump sum payment to be no more than $50,000.
- Contractor B – Legal analysis: Lump sum to be no more than $20,000

The County plans to hire a professional consultant with expertise in water market strategies, water delivery systems, and customer use characteristics. Ideally, this consultant will be familiar with the Harney County/Great Basin area as well as Oregon water regulations and other items that would be used for developing a water marketing strategy. This consultant will be selected in accordance with Harney County contractor solicitation/purchasing/hiring requirements as well as standard Public Contract Code requirements.

Harney County plans to hire a professional legal consultant familiar with Oregon Water Law and with a working relationship with the Oregon Water Resources Department.

Other Expenses:

Total = $0.00

No additional expenses requested in this proposal.

Indirect Costs:

Total = $10,500

Total Costs:

- Total Requested Reclamation Funding = $50,000
- Total Applicant Cost Share Funding = $55,000
- Total Project Cost = $110,000

## ENVIRONMENTAL AND CULTURAL RESOURCES COMPLIANCE

- Will the proposed Project impact the surrounding environment (e.g., soil [dust], air, water [quality and quantity], animal habitat)? Please briefly describe all earth-disturbing work and any work that will affect the air, water, or animal habitat in the area. Please also explain the impacts of such work on the surrounding environment and any steps that could be taken to minimize the impacts.

The proposal will not require any earth disturbance. If the groundwater market is adopted, changes to cropping patterns may occur with crop rotations shifting between fields. The only environmental effects could be a decreased use of agricultural chemicals and electric power from decreased groundwater use.

- Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the area? If so, would they be affected by any activities associated with the proposed Project?

The only listed species in the region is greater sage grouse which is a candidate species. The irrigated areas of the basin do not have critical habitat or essential habitat for sage grouse. The development of a groundwater market will not have an effect on sage grouse.

- Are there wetlands or other surface waters inside the Project boundaries that potentially fall under Clean Water Act (CWA) jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have.

While there are wetlands in the basin, establishment of a groundwater market will not have a direct effect on wetlands or other waters of the U.S.

- When was the water delivery system constructed?

The water delivery system is a series of wells, pumps and irrigation systems each developed by individual landowners. There is no basin-wide system of delivery of groundwater.

- Will the proposed project result in any modification of or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those

features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously.

The proposed project involves mostly outreach, planning, scoping and regulatory processes activities that will result in the development of a groundwater marketing system in Harney County; as such it is not expected to result in modification to irrigation systems. Should the groundwater marketing activity that results from this project go forward, it will make use of existing irrigation and other water conveyance systems within Harney County when transferring supplies between users.

- Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question.

No

- Are there any known archeological sites in the proposed area?

The basin is the home of the Wadika People (Burns Paiute Tribe) and there are archeological sites throughout the area. Since the groundwater market will apply to existing irrigation systems, no impact to archeological resources is anticipated.

- Will the proposed Project have a disproportionately high and adverse effect on low income or minority populations?

The only potential effect on low income or minority populations could be from the alleviation of domestic well conditions by stabilizing the groundwater levels in the basin. The development of a groundwater market system is not anticipated to have an adverse impact to vulnerable populations.

- Will the proposed Project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands?

The proposed project involves mostly outreach, planning, scoping and program development of a groundwater marketing system and should not result in physical impacts to tribal lands or limited access to any sacred sites. Burns Paiute Tribal representatives will be invited to participate in the development of the market.

- Will the proposed Project contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area?

The proposed project is not expected to result in the introduction, continued existence, or spread of noxious weeds or non-native invasive species.

## EXISTING ANALYSIS CONTRIBUTING TO THE WATER MARKETING STRATEGY

The following publications have been reviewed in preparing this application and in the consideration of developing a water market development study for the Harney Basin.

Culp, Peter W., Robert Glennon, and Gary Libecap. 2014. Shopping for water: How the water market can mitigate water shortages in the American West. The Hamilton Project. Stanford Woods Institute for the Environment. 36 p.

Eureka County Department of Natural Resources. Diamond Valley Groundwater Management Plan. Eureka County, Nevada. 30 p. with appendices

Green Nylen, Nell, Michael Kiparsky, Kelly Archer, Kurt Schnier, and Holly Doremus. 2017. Trading Sustainably: Critical Considerations for Local Groundwater Markets Under the Sustainable Groundwater Management Act. Center for Law, Energy & the Environment, UC Berkeley School of Law, Berkeley, CA. 90 pp. law.berkeley.edu/trading-sustainably

Mucken, A. and B. Bateman (eds.) 2017. Oregon's 2017 Integrated Water Resource Strategy. Oregon Water Resources Department. Salem, OR. 186 pp.

Oregon Department of Water Resources. 2015. Draft Guidelines A Tool for Conducting Place-Based Integrated Water Resources Planning in Oregon. February 2015. Salem, Oregon. 26 pp.

Pagel, Martha. 2016. Oregon's Umatilla Basin Aquifer Recharge and Basalt Bank. Case Study Final Report on Political Economy of Water Markets. AMP Insights. 16 pp.

Peters, Troy, H. Neibling, R. Stroh, B. Molaei, and H. Mehanna. 2016. Low Energy Precision Application (LEPA) and Low Elevation Spray Application (LESA) Trials in the Pacific Northwest

Richter, B. 2016. Water Share: Using water markets and impact investment to drive sustainability. The Nature Conservancy: Washington, D.C. 86 pp.

Wheeler, Sarah Ann, Adam Loch, Lin Crase, Mike Young, and R. Quentin Grafton. 2017. Developing a water market readiness assessment framework. Journal of Hydrology 552:807-820.

Young, M. 2015. "Unbundling Water Rights: A Blueprint for Development of Robust Water Allocation Systems in the Western United States." NI R 15-01. Durham, NC: Duke University. 47 pp. http://nicholasinstitute.duke.edu/publications

Zeff, Harrison, Greg Characklis, Marc Jeuland, David Kaczan, Brian Murray, and Katie Locklier. 2016. "Benefits, Costs, and Distributional Impacts of a Groundwater Trading Program in the Diamond Valley, Nevada." NI R 16-02. Durham, NC: Duke University. 39 pp. http://nicholasinstitute.duke.edu/publications.

**IN THE COUNTY COURT OF THE STATE OF OREGON**
**FOR THE COUNTY OF HARNEY**

| | | |
|---|---|---|
| **In the Matter of Declaring Part of Malheur Lake Basin in Harney County Oregon Groundwater Area of Concern;** | ) ) ) | **RESOLUTION # 2019-20** |

**Whereas**, Oregon Water Resource Department (OWRD) declared part of Malheur Lake basin in Harney County, Oregon a Groundwater Area of Concern in April 2016; and

**Whereas**, United States Geological Survey and OWRD are conducting a comprehensive groundwater study of our basin; and

**Whereas**, the groundwater study is showing there are areas of groundwater declines in parts of our basin; and

**Whereas**, these groundwater declines can have lasting impacts in/for our community, and

**Whereas**, local recommendations should be evaluated and included in the potential remedies of these declines; and

**Whereas**, local recommendations can provide our community with an ability to address and protect our economic, social and ecological concerns; and

**Whereas**, local recommendations can protect Harney County from a one-size-fits-all regulatory approach;

**THEREFORE, BE IT RESOLVED** that all local recommendations should be evaluated with OWRD in addressing our declining groundwater levels. These recommendations should include, but not be limited to, development or implementation of water markets, conservation projects, alternative crops, volunteer agreements, efficiency upgrades, and water districts. In Order to help accomplish this Harney County approves of applying for the WaterSmart grant from the Bureau of Reclamation.

**IN WITNESS WHEREOF** we have hereunto signed our names as members of the County Court of the County of Harney, Oregon, this 3RD day of July, 2019.

HARNEY COUNTY COURT

County Judge

Mark Owens, County Commissioner

Patty Dorroh, County Commissioner