OREGON WATER RESOURCE DEPARTMENT
WATER CONSERVATON, REUSE AND STORAGE
FEASIBILTY STUDY GRANT PROGRAM

I. Grant Information

Study Name: *Pilot Study to Assess the Potenial Water Conservation in Upland Soils By Increasing Organic Content*

Type of Feasibility Study: ☒ Water Conservation ☐ Reuse ☐ Above-Ground Storage
☐ Storage Other Than Above-Ground [Including Aquifer Storage and Recovery (ASR)]

Program Funding Dollars Requested: $ $37,000.00
Note: Request may not exceed $500,000

Total Cost of Feasibility Study: $ 74,900

II. Applicant Information

Applicant Name: *Rogue Basin Partnership*		**Co-Applicant Name:**
Address:	*PO Box 1214*	Address:
	Medford, OR 97501	
Phone:	*541-414-9064*	Phone:
Fax:	*na*	Fax:
Email:	*info@roguepartners.org*	Email:

Principle Contact: *Sam Whitridge, RBP Coordinator*	
Address:	*same as above*
Phone:	
Fax:	
Email:	

Certification:

I certify that this application is a true and accurate representation of the proposed work for a project feasibility study and that I am authorized to sign as the Applicant or Co-Applicant. By the following signature, the Applicant certifies that they are aware of the requirements of an Oregon Water Resources Department grant, have read and agree to all conditions within the sample grant agreement and are prepared to conduct the feasibility study if awarded.

Applicant Signature: _____ Date: *1/27/2016*

Print Name: *Robert A. Coffan* Title: *Chair*

III. Feasibility Study Summary

Please give a brief summary of the feasibility study using no more than 150 words.

Each year, more of the precipitation that falls in the Rogue Basin flows quickly to the ocean during the wet season rather than infiltrating into the soil to be conserved for use in the summertime. Studies show that it is feasible to conserve water by detaining precipitation that falls on rural lands during the wet season, minimizing runoff and increasing infiltration, providing base-flow for in-stream and agricultural use by adding organic material and other amendments in upland soils. Prior to attempting large-scale implementation, it is prudent to assess the feasibility on a small scale. We will perform an initial Pilot Study using three types of rural land: timberland, oak savannah, and pastureland. We will also determine if the initial changes to the soil horizon are self-sustaining for the long term. Results will inform decisions on potential next steps to consider larger-scale implementation of the conservation concept.

IV. Grant Specifics

Section A. Common Criteria

Instructions: Please answer all questions contained in this section. It is anticipated that completed applications will result in additional pages.

1. Describe your goal and how this study helps to achieve the goal.

   THE PILOT STUDY WILL HELP DETERMINE HOW TO DETAIN AND CONSERVE WATER FOR INSTREAM AND AGRICULTURAL USE DURING THE SUMMER MONTHS. The overarching goal is to detain precipitation that falls and runs off rural lands during the wet season in the Rogue Basin and conserve that water as infiltration for agricultural use and increased baseflow to streams and rivers during the warm summer months. This will also help maintain reservoir levels during the summer months. This Pilot Study will determine the feasibility of the concept of reducing runoff and increasing infiltration by adding organic material and other amendments to the shallow soils on three types of rural land: timberland, oak savannah, and pastureland. We will assess what forms of mulch (composition, particle size, etc.) are most effective at increasing water infiltration into the ground. The study will also help determine if the initial changes to the soil horizon will be self-sustaining for the long term. Results from the Pilot Study will help make decisions on potential next steps, if any, to consideration of the concept on a larger scale.

2. Describe the water supply need(s) that the proposed project addresses. Identify any critical local, regional, or statewide water supply needs that implementation of the project associated with the feasibility study will address. **Responses should rely upon solid water availability and needs data/analysis.** For examples of water supply needs see "Criteria and Evaluation Guidance Document."

   ADDITIONAL CONSERVED WATER IS NEEDED FOR INSTREAM AND AGRICULTURAL USE DURING THE SUMMER MONTHS. Each year, more and more of the precipitation that falls in the Rogue Basin flows quickly into our streams and rivers and out to the Pacific Ocean during the wet season rather than infiltrating into the soil. There are two reasons for this; more of our precipitation is falling as rain instead of snow, and more of the rainfall is running off the land due to increased storm intensity and changes in land use. This is a concern throughout the State. The need for long-term water conservation and natural storage has been made abundantly clear by our Governor in her July 2015 Proclamation (Brown 2015).

   "Water is the foundation of our economies, communities, ecosystems, and the health and welfare of Oregonians: Oregon has had the lowest statewide snowpack on record, peaking at between thirty to ninety percent below normal and melting off weeks to several months earlier than normal. Preparedness must start now, given the long lead time needed to implement solutions to water resources challenges and mitigate the impacts of drought."

   If we cannot restore the natural hydrology prior to human involvement, we must emulate the natural system with a planned system to conserve water and keep it in our Oregon watersheds through the warm summer months. This project will assess one method to minimize the water that runs off the land during higher intensity, flashy, rainfall events, and increase the water that infiltrates into the shallow subsurface thereby contributing to much needed base flow during the summer months.

   Long-term water availability is also paramount to the Rogue Basin Partnership, and is the backbone of our Rogue Restoration Action Plan (Plan, 2015). The Action Plan articulates Priority Actions to effectively manage our water resources for the benefit of local communities, the economy and native species (http://www.roguepartners.org/rogue-restoration-action-plan/).In this comprehensive Action Plan, the RBP assessed and prioritized "basinwide water resource limiting factors and existing conditions", as well as "projected climate impacts and long-term resiliency" as Priority Actions.

3. Explain how the proposed project will meet the water supply need(s), and indicate what percentage of that need will be met. (For example: If your water supply need is 20,000 acre-feet of additional water and the project will supply 10,000 additional acre-feet, 50 percent of your need will be met).

>100% INCREASE BECAUSE IT IS WATER THAT IS OTHERWISE RUNNING OFF INTO THE OCEAN DURING HIGH INTENSITY STORM EVENTS. More water will be available for instream use (fish and riparian wildlife) and less water will be needed for agricultural use (more water retained in a pasture requires less irrigation water). There are many methods, or Best Management Practices (BMPs) identified to detain stormwater runoff in urban areas. There are other BMPs that are better suited to achieve the same goals in rural upland areas. For example, according to the USDA Natural Resource Conservation Service, an increase in just one percent of organic matter in the top six inches of soil would hold approximately 27,000 additional gallons of water per acre (NRCS 2013) (Attachment 1). This would reduce flooding, minimize runoff and erosion, and detain moisture in the soil horizon, allowing more of it to infiltrate into shallow groundwater. Using the NRCS observation, and assuming that the process could be applied to just 1 percent of the land in the 3.3 million-acre Rogue Basin, results in approximately 2,700 acre feet of water per year detained in the basin. Though the concept is sound, the method to achieve this on a large scale needs to be cost-effective in order to be realistic for upland areas in a watershed. Therefore, it is prudent to perform an initial "reality check" on a smaller scale.

We will perform an initial Pilot Study to determine the feasibility, and efficacy of reducing the immediate runoff from storms and increasing the storage capacity of the soil by adding organic material, such as biochar, and other amendments to the shallow soils on three types of rural land uses in the Rogue Basin: timberland, open oak savannah, and pastureland. The project is not intended to quantify an actual percentage or volume of water conservation within the entire 3.3 million-acre Rogue Basin. However it will be designed to collect quantitative data regarding changes to soil holding capacity and water infiltration down through the soil horizon on three types of upland land use. The project will also be designed to determine if the initial changes to the shallow soil horizon will be self-sustaining for the long term. Results from the Pilot Study will help make decisions on potential next steps, if any, to considering the concept on a larger scale.

This initial Pilot Study is designed to assess the feasibility of an overarching water conservation goal. If the results from this feasibility study show that water can be detained and conserved in upland areas due to altering soil organic content, and that it is potentially economically feasible, resultant increases to instream flow and reduced irrigation needs could be very significant in some areas.

4. Describe the technical aspects of the feasibility study and why your approach is appropriate for accomplishing the specific study goals and objectives.

Adding organic material to the soil to reduce runoff and detain water has been studied and documented. It saves water and increases drought tolerance by increasing infiltration and water holding capacity as soil organic matter increases (NRCS 2013). Positive effects of mulching pertaining specifically to water conservation and storage include: decrease the evaporation of soil moisture, increase of infiltration rates, reduced erosion, reduced runoff, and reduction of soil temperatures (Thurston 1997). Also of importance, the use of biochar (one type of organic amendment) can increase soil fertility, increase agricultural productivity, and serves as a potential mechanism for carbon sequestration (Matovic 2010).

The tasks for this Pilot Study are shown in Table 1. The basic technical aspects will likely include the following. However, one of the tasks to be performed in the Pilot Study is to design the field program, so these aspects are subject to change and improvement.

Test plots will be set up on three different types of land use: timberland, oak savannah, and non-irrigated pasture land. The locations of potential examples are shown in Figure 1. Additional detail on land use information is shown in Figure 2.

At least one plot will be on BLM land, and other plots will likely be on private land. Landowner access and use agreements will be obtained.

Each site will be selected on a slope, or gradient, to better assess changes in runoff during higher intensity precipitation events. Each site will be selected with an ephemeral or perennial drainage nearby so that long-term changes (not included in this proposal) in flow regime can be observed over time. A baseline assessment will be performed at each site and include parameters such as soil type, initial organic content, soil horizon, bulk density, vegetation type and health, and rooting depth.

Five test plots will be set up at each site, all in similar aspect and condition. One plot will be a control, along with two sets of paired plots. One pair of plots may be altered with a selected percent of mulch added to the surface (for example, an increase of 1-2%), one with no other amendments, and one with selected amendments. Amendments could include pH adjustment, addition of mycorrhizal compounds, etc. The second pair of plots would vary from the first pair of plots only by an increase in organic content (for example, an increase of 3-5%). Other adjustments that may be considered could be the size of the mulch used, or the application method to the soil. Again, specific design components are part of the design task in this application.

Types and locations of various mulch materials will be investigated for use to increase organic content. One possible tool for our region is conifer bark, which is amended and used by locals to create high quality compost. Another is biochar, a partially pyrolytized (charcoal-like) biomass material, which stays in the soil horizon for a long time (100s-1000s of years).

The three sites will be monitored for one year. The primary response variable will be the differences in vertical migration of water content through the soil horizon at each of the test plots. Nested sets of soil moisture sensors, such as the IRROMETER Model 200SS sensor by Watermark (Attachment 2) will be installed at selected depths in each plot and collect soil moisture, electroconductivity, and temperature in real time using a data logger. In addition, field staff will perform periodic field monitoring at specific times that would likely include 1) summer measurements, 2) as the soil becomes wetted in the fall, 3) runoff and deep infiltration during high flow precipitation events during the wet season, and 4) drying out during the spring and summer. Vertical moisture profiles will be prepared for each plot.

Field staff will also be "on call' to access each site during a high intensity precipitation event to observe differences in runoff at each of the plots. This will likely be limited to observation and photo documentation; quantification of runoff from each of the plots is beyond the scope of this initial study.

Other field parameters that may be monitored would include: pre- and post- project soil assessment of basic parameters such as organic content, NO3, TKN, bulk density. Long-term monitoring would also likely include, changes in rooting depth, changes in vegetation, and how the changes in rooting depth and vegetation contribute to natural changes in organic content.

The plots will also be monitored for potential unanticipated negative changes to the soil, such as invasive vegetation, or a reduction in soil fertility or health.

Photo-documentation will be performed throughout the study.

The three sites will be monitored for one year as part of this grant. However, site access and study aspects will be designed to accommodate additional observation and measurement for up to 5 years. One important reason for this is to determine whether or not initial changes to the shallow soil horizon will be self-sustaining for the long term. That is, will the initial changes improve vegetative type, growth, and rooting depths thereby increasing organic content and infiltration capacity over time?

A peer review process will be incorporated into the study, including: initial study design, quality assurance/quality control of data collection, data assessment, and reporting.

This pilot study also lends itself very well to education and outreach in the community. Several entities are interested in observing and/or participating in the process, including Southern Oregon University, the Jackson Soil and Water Conservation District, and the BLM.

THE APPROACH DESCRIBED ABOVE IS APPROPRIATE FOR THE PROJECT GOALS BECAUSE IT PROVIDES AN EXCELLENT "FIRST STEP" TO ASSESS THE CHANGES IN MOISTURE CONTENT AND WATER INFILTRATION IN A COST EFFECTIVE MANNER. RESULTS FROM THE PILOT STUDY WILL

HELP MAKE DECISIONS ON POTENTIAL NEXT STEPS, IF ANY, TO CONSIDERING CONSERVATION ON A LARGER SCALE.

5. Describe how the feasibility study will be performed. Include:
    a. General summary statement that describes the study progression.
    b. When the feasibility study will begin.
    c. Listing of key tasks to be accomplished with each task having:
        i. Title
        ii. Timeline for completion
        iii. Description of the activities to be performed in this key task
        iv. Description of the resources necessary for accomplishing the key task

    Example:

    (i) Streamflow measurement;
    (ii) September-April;
    (iii) Weekly streamflow measurements will be performed to gather hydrographic data for the hydrologic analysis to take place in May;
    (iv) A technician will be hired to perform the streamflow measurements.

    (Key tasks listed here are to be placed in Section VI. Project Feasibility Study Schedule for a quick reference "graphical" representation of the schedule.)

    See Table 1

6. Please provide the following data and information for the proposed project and the project's sources of water supply:

    a. The location of the proposed project. Include the basin, county, township, range and section. Attach a **map** that identifies the project's implementation area to this application.

    Please see Figure 1 and Figure 2

    b. The name(s) and river mile(s) of the source water and what they are tributary to, if applicable.

    The pilot study will likely be performed in the Little Butte Creek Watershed of the Rogue Basin, which has been identified as a high priority basin in the RBP Action Plan. Additional detail regarding location to surface water features and river miles will be determined once the actual test plots locations are selected. The location lends itself well to monitoring access and data collection, as well as educational and outreach aspects for communities in Southern Oregon. However the results from the study would be used throughout the entire Rogue Basin.

    c. Whether the project will be off-channel or on-channel (for above-ground storage only).

    NA

    d. Water availability to meet project storage. For above-ground storage the Department typically evaluates availability using a 50 percent exceedance water availability analysis.

    NA. No additional water is needed; this is an assessment of changes to the overall mass balance of water in the system.

e. Proposed purposes and/or uses of conserved or stored water.

INSTREAM USE FOR FISH AND RIPARIAN WILDLIFE FROM WATER CONSERVED ON OAK SAVANNAH AND TIMBERLAND. AGRICULTURAL USE TO OFFSET IRRIGATIONON AGRICULTURAL LAND. The overarching goal is to increase instream flow as baseflow in the streams and rivers of the Rogue Basin during the drier summer months that would otherwise run off during high intensity precipitation events during the wet season. The longer these streams hold and/or transport water, the longer they provide habitat for aquatic and aquatic-dependent organisms. Riparian vegetation is likely to undergo less stress if summer droughts persist. It is also possible that stream temperatures would decrease with this subsequent increase in baseflow. In addition, water retention on agricultural land precludes the need for the same amount of irrigation water.

f. Environmental flow needs and water quality requirements of supply source water bodies.

NA

7. What local, state or federal project permitting requirements/issues/approvals do you anticipate in order for the feasibility study to be conducted? If approvals are required, indicate whether you have obtained them. If you have not obtained the necessary permits/governmental approval, describe the steps you have taken to obtain them. If no permits are needed, please provide explanation.

Aside from establishing landowner agreements to access the site (see Table 1), no permits are forseen on private land. Work is not being performed in waters of the State, there will be no fill or removal, no water-quality issues, and no land use compatibility issues. For site(s) located on BLM-managed lands, NEPA clearance work will have to be conducted. Due to the low impact of the project, clearance work is expected to be minimal, but is not yet complete.

8. Describe the level of involvement, interest and/or commitment of local entities associated with the feasibility study. Describe how the feasibility study and/or proposed project will benefit/impact these entities. Attach letters of support if available.

Many people involved with water resource management in the Rogue Basin have been meeting to discuss the importance of exploring new water conservation concepts and practices for several years now. We all see the critical importance of determining methods to passively detain and conserve water within Oregon's watersheds as storm events become flashier and runoff increases. Some of these methods have not been vetted, and it is not known how effective or economically realistic they might be on a large scale. Initial steps, such as this feasibility study, must be taken to begin the process.

Each of the entities introduced below have attended several meetings and field trips pertaining specifically to this feasibility study. Letters of support, including potential involvement and matching funds, are attached.

Rogue Basin Partnership (see Attachment 3: list of members and active participants).

Jackson Soil and Water Conservation District

Seven Basins Watershed Council

US Bureau of Land Management

Southern Oregon University

Hamman Logging

Katalyst, Inc.

Afternoon Zephyr Farm

Southern Oregon Climate Action Now

9. Identify when matching funds will be secured, from whom, and the dates of matching funds availability.

   Please refer to Table 1

10. Provide a description of the relevant professional qualifications and/or experience of the person(s) that will play key roles in performing the feasibility study. If the personnel have not been decided upon, include a description of the professional qualifications and/or experience of the person(s) you anticipate will play key roles in performing the feasibility study.

    Rogue Basin Partnership (RBP): The RBP will be the administrative manager. The RBP will work with the rest of the Team, make the contractual arrangements, and be the direct point of contact with the OWRD liaison. One mission of the RBP is to encourage and empower its partners to perform the work and be employed in the community. Therefore, the RBP will hire a Technical Project Manager for the project; likely from one of the members or active participants.

    Jackson Soil and Water Conservation District (JSWCD): JSWCD staff have participated in site selection and helped to facilitate the initial meetings and a tour to develop this concept. The soil science and engineering staff will assist with set-up and monitoring. They have performed soil moisture monitoring using in-situ tensiometers and dataloggers to track vertical migration of water through the unsaturated zone in several upland locations throughout Jackson County. The JSWCD is also interested in what can be learned about longer-term aspects of the study, such as improving grasslands dominated by shallow rooted annual vegetation to perennial dominated plant communities with more extensive and deeper rooted species, sustainable soil horizon health, and improved water retention. Please see the attached letter of support.

    Southern Oregon University: This project lends itself very well to the involvement of student interns interested in hydrology and soil science. Dr. Charles Lane, R.G., Professor in the Environmental Studies Department, will provide peer review for the field work design, and work directly with the other hydrologists and soil scientists. Dr. Lane has more than 25 years of experience in Hydrogeology, Hydrology, and Soil Science. Dr. Lane will also help select and manage SOU Capstone students to participate as interns for this project. SOU is also interested in the long-term aspects of this project, with specific interest in creating a GIS layer pertaining to soil moisture for regional use, in collaboration with the BLM, RBP and others. Please see the SOU letter of support for more information.

Bureau of Land Management (BLM): The BLM hydrology and soil science staff have participated in site selection and helped to facilitate initial meetings and a tour to develop this concept. BLM staff will assist with set-up and monitoring on all sites. BLM staff will also assist with soils mapping using their database containing soils and vegetation information on the upland areas. The BLM is interested in longer-term aspects of the study, and the possibility of expanding it to other areas if it appears to be effective. Some timber harvesting techniques can be very detrimental to upland areas, with significant impacts to runoff and soil erosion (Photographs 1 and 2). While interested and supportive of general soil health and water conservation, the BLM is specifically interested in the possibility of incorporating aspects of this study into potential future timber sales.

Hamann Logging: Mr. Don Hamann of Butte falls OR has been a self-employed logger for 35 years, logging small private ownerships, industrial lands, and government sales. For the last 10 years he has focused mainly on stewardship and more ecologically sensitive jobs, including rehabilitation of agricultural lands. During his lifetime of work in the natural resource world, Mr. Hamann has observed the signs of significant degradation of savannah and agricultural grasslands (Photographs 3 and 4) in the Rogue Basin, which adversely impacts increased runoff and leads to reduced water retention and infiltration. Mr. Hamann has performed research using mulching techniques on rural lands, including costs for selection, preparation, and application. One possible tool for our region is conifer bark which is amended and used by locals to create a great quality compost. Mr. Hamann will take the lead on mulch selection and plot construction. He will also assist the team in most other aspects of the project.

Katalyst, Inc. Robert Coffan of Katalyst, Inc. will provide peer review for the set-up and design of the study, all as an in-kind contribution to the project. Mr. Coffan, a hydrologist and hydrogeologist for over 25 years, has significant experience in experimental design of geochemical and hydrologic processes in the unsaturated zone. He has extensive familiarity with numerical fate and transport groundwater modeling as well as vadose zone models to estimate the travel time though the unsaturated zone to the groundwater table, which requires a thorough review of crop usage, precipitation, irrigation usage, and field loading rates to determine recharge. Mr. Coffan was a former adjunct professor of hydrology and hydrogeology at SOU, covering groundwater, fate and transport hydrologic modeling, surface water, water quality, and a section on unsaturated flow characteristics. Mr. Coffan has also designed several soil-uptake related experiments such as assessment of the bioconcentration of a nerve gas daughter product in selected vegetables in gardens near the Rocky Mountain Arsenal in Denver, CO, and a bench study at SOU to use soil amendments to reduce arsenic and other metals in simulated runoff from soils with elevated arsenic and lead that flows through bioretention swales for a site in the Rogue Basin.

Afternoon Zephyr Farms. Kent Knock (co-owner) is a garlic grower in the Rogue Basin, and has a strong interest in conserving water on a large scale in our upland areas. Not only is he familiar with sustainable agricultural practices, he is also a Geochemist. He has a Ph.D in chemistry from Arizona

State University in Tempe. Most of his career was spent in Aerospace as a process chemist. He has designed and carried out geochemical surface water studies in Washington State as part of a proposed nuclear power plant construction project (near the Skagit River). Afternoon Zephyr Farm has recently been experimenting with water detention for several years on some steep hillsides with promising results. Mr. Knock will assist with project setup and design, and also help with field monitoring and data analysis and reporting- all as an in-kind contribution to the project.

Technical Project Manager (TBD): This project will require technical project management to successfully install the field study design, and more importantly, to perform the field monitoring over the year. The successful PM will have more than 10-years experience in water resource management, water quality, and project management in those fields. Much of the monitoring is weather dependent and will require close orchestration of field staff response and data collection timed with wet weather events. Though there are several parties who will contribute in-kind assistance, the project manager will also be responsible to collect all of the data observations and prepare the report for others to review. The technical PM will likely be one of the members or active participants of the RBP.

Oregon Water Resources Department (OWRD): The OWRD will be the principal cash funder of the FS. Once the FS is approved and an award is made, the OWRD will allow the rest of the Team to perform the work as laid out in the FS. The OWRD Project Manager assigned to the project will review progress, and be updated by RBP as needed.

11. If the project concept is ultimately deemed feasible, describe how the project will be implemented. Response should include a tentative funding plan for project implementation (e.g. other state or federally sponsored grant or loan programs) and the project proponent's track record in implementing similar projects.

The schedule and funding for this Pilot Study is shown in Table 1, along with the hierarchy of tasks to be performed to successfully implement the project. All of the cash funding is being requested from the OWRD. Similar work performed in an agricultural setting has been funded by the JSWCD.

If the results from this feasibility study show that water can be detained and conserved in upland areas, and that it is potentially economically feasible, funding would be solicited from other sources to determine the resultant next steps towards actual implementation. Next steps could include:

Economical assessment to implement the process on a larger scale.

Selection of areas with the best potential to retain and conserve additional water from technical, land use, and political perspective (low hanging fruit).

Bench-scale projects on 2-3 upland areas from 20-100 acres to observe changes in instream flow (timberland oand oak savannah) or irrigation amounts (pastureland) in those areas.

Outreach to raise awareness. Presentations and/or publications to large land owners and special interest groups interested in promoting watershed health.

Factoring the concept into BLM Timber Sale areas.

Partnership development with entities concerned with both rural and urban water conservation in addition to soil health in mind.

The report would be used as a tool to solicit funding from the OWRD Supply Development funding program. Other potential funding sources include:

Oregon Watershed Enhancement Board

Oregon Department of Environmental Quality

National Marine Fisheries

NRCS

US Fish and Wildlife

REFERENCES:

Brown 2015. State of Oregon, Office of the Governor Proclamation: Water Awareness Month. Kate Brown, Governor. July 2015.

Matovic 2010. Biochar as a Viable Carbon Sequestration Option: Global and Canadian Perspective. Darko Matovic. Elsevier, Science Direct Journal. October 2010.

NRCS 2013. Secrets in the Soil. United States Department of Agriculture, Natural resources Conservation Service. February 2013.

Plan 2015. Rogue Restoration Action Plan, 2015-2025. Rogue Basin Partnership. October 2015. http://www.roguepartners.org/rogue-restoration-action-plan/

Thurston 1997. Slash/Mulch System Sustainable Methods. David Thurston, Westview Press. 1997.

Section B. Unique Criteria

Instructions: Address the set of items below that applies to the type of feasibility study that this grant will fund.

☒ Water Conservation or ☐ Reuse

1. Water Conservation or Reuse projects that are identified by the Department in a statewide water assessment and inventory receive a preference in the scoring process. Contact the Department's Grant Specialist to include your project on the inventory.
   The Specialist has been contacted, and the request form to be added to the OWRD Inventory of Potential Conservation Opportunities is included herein as Attachment 4.

2. Explain how the associated project will either: (a) mitigate the need to develop new water supplies and/or (b) use water more efficiently. Reference documentation and/or examples of the success of similar or comparable water conservation/reuse projects that would be available upon request.

   a) The resultant implementation project could provide an additional 2,700 acre feet of water on oak savannah and timberland for instream use for fish and riparian wildlife. Water detained on agricultural land would also reduce the need for irrigation. As stated above, this initial pilot project is designed to assess the feasibility of an overarching water conservation goal. If the results from this feasibility study show that water can be detained and conserved in upland areas due to altering soil organic content, and that it is potentially economically feasible, resultant increases to instream flow could be very significant in some areas. For example, using the NRCS observation of detaining an additional 27,000 gallons of water per acre per year by increasing the organic content in the upper 6-inch soil horizon by just 1 percent, and assuming that the process could be applied to just 1 percent of the land in the 3.3 million-acre Rogue Basin, results in approximately 2,700 acre feet of water per year detained in the basin (NRCS 2015 and Thurston 1997)

b) Keeping more water within the Rogue Basin into the warmer summer months, rather than exacerbating flashy runoff that flows out into the ocean during storm events is a more efficient use of water in Oregon.

3. Provide a description of: (a) Local, state and/or federal permitting requirements and issues posed by the **implementation** of the project associated with the feasibility study and (b) property ownership status within the project implementation area. If permitting or other approvals are not needed please indicate and provide an explanation.

   a) For site(s) located on BLM-managed lands, NEPA clearance work will have to be conducted. Due to the low impact of the project, clearance work is expected to be minimal, but is not yet complete.

   b) Aside from establishing landowner agreements to access the site (see Table 1), no permits are needed for the actual FS work. However, subsequent IMPLEMENTATION would likely include bench-scale projects on 2-3 upland areas from 20-100 acres to observe changes in instream flow in those areas. Permitting and approvals for implementation could include:
   - *Approvals for mulch and amendment use by private landowners and the BLM and USFS on public lands,*
   - *Land access agreements*
   - *Certification that mulch or amendments are "weed free"*

☐ Above-Ground Storage

Please answer the following three questions **BEFORE** proceeding:

Will the project divert more than 500 acre-feet of surface water annually?	☐ Yes	☐ No
Will the project impound surface water on a perennial stream?	☐ Yes	☐ No
Will the project divert water from a stream that supports sensitive, threatened or endangered species?	☐ Yes	☐ No

If you answered "Yes" to any of these questions, by signature on this application, you are committing to include the following required elements in your feasibility study.

Describe how you intend to address the required elements in your feasibility study:

a) Analyses of by-pass, optimum peak, flushing and other ecological flows of the affected stream and the impact of the storage project on those flows.

b) Comparative analyses of alternative means of supplying water, including but not limited to the costs and benefits of water conservation and efficiency alternatives and the extent to which long-term water supply needs may be met using those alternatives.

c) Analyses of environmental harm or impacts from the proposed storage project.

d) Evaluation of the need for and feasibility of using stored water to augment instream flows to conserve, maintain and enhance aquatic life, fish life and any other ecological values.

Is the proposed storage project for municipal use?

☐ Yes ☐ No

If "Yes," then please describe how you intend to address the following required element in your feasibility study:

e) For a proposed storage project that is for municipal use, analysis of local and regional water demand and the proposed storage project's relationship to existing and planned water supply projects.

Proceed in addressing the following items:

1. Describe to what extent the project associated with the feasibility study includes provisions for using stored water to augment instream flows to conserve, maintain and enhance aquatic life, fish life or other ecological values. Projects that include the above provisions receive preference in the scoring process.

2. Provide a review of: (a) Local, state and/or federal permitting requirements and issues posed by the **implementation** of the project associated with the feasibility study and (b) property ownership status within the project implementation area.

☐ Storage Other Than Above-Ground [Including Aquifer Storage and Recovery (ASR)]

Please answer the following three questions **BEFORE** proceeding:

Will the project divert more than 500 acre-feet of surface water annually?	☐ Yes	☐ No
Will the project impound surface water on a perennial stream?	☐ Yes	☐ No
Will the project divert water from a stream that supports sensitive, threatened or endangered species?	☐ Yes	☐ No

If you answered "Yes" to any of these questions, by signature on this application, you are committing to include the following required elements in your feasibility *study.*

Describe how you intend to address the required elements in your feasibility study:

a) Analyses of by-pass, optimum peak, flushing and other ecological flows of the affected stream and the impact of the storage project on those flows.

b) Comparative analyses of alternative means of supplying water, including but not limited to the costs and benefits of water conservation and efficiency alternatives and the extent to which long-term water supply needs may be met using those alternatives.

c) Analyses of environmental harm or impacts from the proposed storage project.

d) Evaluation of the need for and feasibility of using stored water to augment instream flows to conserve, maintain and enhance aquatic life, fish life and any other ecological values.

Is the proposed storage project for municipal use?

☐ Yes ☐ No

If "Yes," then please describe how you intend to address the following required element in your feasibility study:

e) For a proposed storage project that is for municipal use, analysis of local and regional water demand and the proposed storage project's relationship to existing and planned water supply projects.

Proceed in addressing the following items:

1. Underground storage projects that are identified by the Department in a statewide water assessment and inventory receive a preference in the scoring process. Contact the Department's Grant Specialist to include your project on the inventory.

2. Provide a review of: (a) Local, state and/or federal permitting requirements and issues posed by the **implementation** of the project associated with the feasibility study and (b) property ownership status within the project implementation area.

V. Match Funding Information

Applicants must demonstrate a minimum dollar-for-dollar match based on the total funding request. The match may include a) secured funding commitment from other sources, b) pending funding commitment from other sources, and/or c) the value of in-kind labor, equipment rental, and materials essential to the feasibility study. For secured funding, you must attach a letter of support from the match funding source that specifically mentions the dollar amount shown in the "Amount/Dollar Value" column. For pending resources, documentation showing a request for the matching funds must accompany the application.

In the "type" column below matching funds may include:	**In the "status" column below matching funds may have the following status:**
• **Cash** - Cash is direct expenditures made in support of the feasibility study by the applicant or partner*.	• **Secured** - Secured funding commitments from other sources.
• **In-Kind** - The value of in-kind labor, equipment rental and materials essential to the feasibility study provided by the applicant or partner.	• **Pending** - Pending commitments of funding from other sources. In such instances, Department funding will not be released prior to securing a commitment of the funds from other sources. Pending commitments of the funding must be secured within 12 months from the date of the award.

*"Partner" means a non-governmental or governmental person or entity that has committed funding, expertise, materials, labor, or other assistance to a proposed project planning study. OAR 690-600-0010.

Match Funding Source (if in-kind, briefly describe the nature of the contribution)	**Type** (✓ One)	**Status** (✓ One)	**Amount/ Dollar Value**	**Date Match Funds Available** *(Month/Year)*
Jackson Soil and Water Conservation District (technical staff ($35/hr) and some field equipment)	☐ cash ☒ in-kind	☒ secured ☐ pending	*$10,000.00*	*April 16*
Katalyst, Inc. (Principal Hydrologist ($100/hr))	☐ cash ☒ in-kind	☒ secured ☐ pending	*$3,500.00*	*April 16*
SOU (Principal Hydrogeologist ($90/hr) 2 student interns ($15/hr))	☐ cash ☒ in-kind	☒ secured ☐ pending	*$4,100.00*	*July 16*
Zephyr Farms (Agricultural Chemist ($100/hr)	☐ cash ☒ in-kind	☒ secured ☐ pending	*$2,000.00*	*April 16*
Hamann Logging (construction foreman ($60/hr)	☐ cash ☒ in-kind	☒ secured ☐ pending	*$2,800.00*	*April 16*
BLM (Technical Staff, Soil scientist, hydrologist, and GIS $50/hr)	☐ cash ☒ in-kind	☐ secured ☒ pending	*$9,500.00*	*Pending*
OTHER (An in-kind value or $2000 each for land use for three land parcels for the year-long study has been assigned as a match.	☐ cash ☒ in-kind	☐ secured ☒ pending	*$6,000.00*	
	☐ cash ☐ in-kind	☐ secured ☐ pending		
	☐ cash ☐ in-kind	☐ secured ☐ pending		
	☐ cash ☐ in-kind	☐ secured ☐ pending		

VI. Feasibility Study Schedule

Estimated Study Duration: <u>April 1, 2016</u> to <u>September 1, 2017</u>

Place an "X" in the appropriate column to indicate when each Key Task of the project will take place.

	2016			2017				2018 & Beyond
Feasibility Study Key Tasks	**2nd Qtr**	**3rd Qtr**	**4th Qtr**	**1st Qtr**	**2nd Qtr**	**3rd Qtr**	**4th Qtr**	
Site Selection and Landowner Agreements	X							
Project Design and Technical Management	X	X						
Peer Review	X	X	X	X	X			
Plot Construction	X							
Monitoring		X	X	X				
Data Analysis		X	X	X	X			
Reporting				X	X	X		
Outreacht	X	X	X	X	X	X		
Project Management	X	X	X	X	X	X		

- **Please Note**: Successful grantees must include all invoices and identify which key tasks are associated with each invoice when requesting financial reimbursement.

VII. Feasibility Study Budget

Section A

Please provide an estimated line item budget for the proposed feasibility study. Examples would include: labor, materials, equipment, contractual services and administrative costs.

Line Items	**Number of Units*** *(e.g. # of Hours)*	**Unit Cost** *(e.g. hourly rate)*	**In-Kind Match**	**Cash Match Funds**	**OWRD Grant Funds**	**Total Cost**
Staff Salary/Benefits	*600*	*$50.00*	*$29,900*			*$29,900*
Contractual/Consulting	*180*	*$85.00*			*$16,000*	*$16,000*
Equipment (must be approved)	*1*	*$1,000.00*	*$1,000*			*$1,000*
Supplies	*1*	*$1,000.00*			*$1,000*	*$1,000*
Other: 90 tensiometers	*90*	*$55.00*			*$5,000*	*$5,000*
Student Intern	*200*	*$15.00*	*$1,000*		*$2,000*	*$3,000*
Lab Analyses and Lab Shipping	*1*	*$5,500.00*			*$5,500*	*$5,500*
Land Use	*3*	*$2,000.00*	*$6,000*			*$6,000*
Administrative Costs**	*300*	*$25.00*			*$7,500*	*$7,500*
		Total for Section A	*$37,900*		*$37,000*	*$74,900*
		Percentage for Section A	***51%***		***49%***	***100%***

** Note: The "Unit" should be per "hour" or "day" – not per "project" or "contract."* *Units x Unit Costs = Total Cost*
*** Administrative Costs may not exceed 10 percent of the total funding requested from the Department*

Section B

If grant amount requested is $50,000 or greater, you MUST complete Section B. Key Tasks in Section B should be the same as the Key Tasks in Section VI (Feasibility Study Schedule).

Feasibility Study Key Tasks	In-Kind Match	Cash Match Funds	OWRD Grant Funds	Total Cost
NA Cash amount requested is <$50k				
Total for Section B				

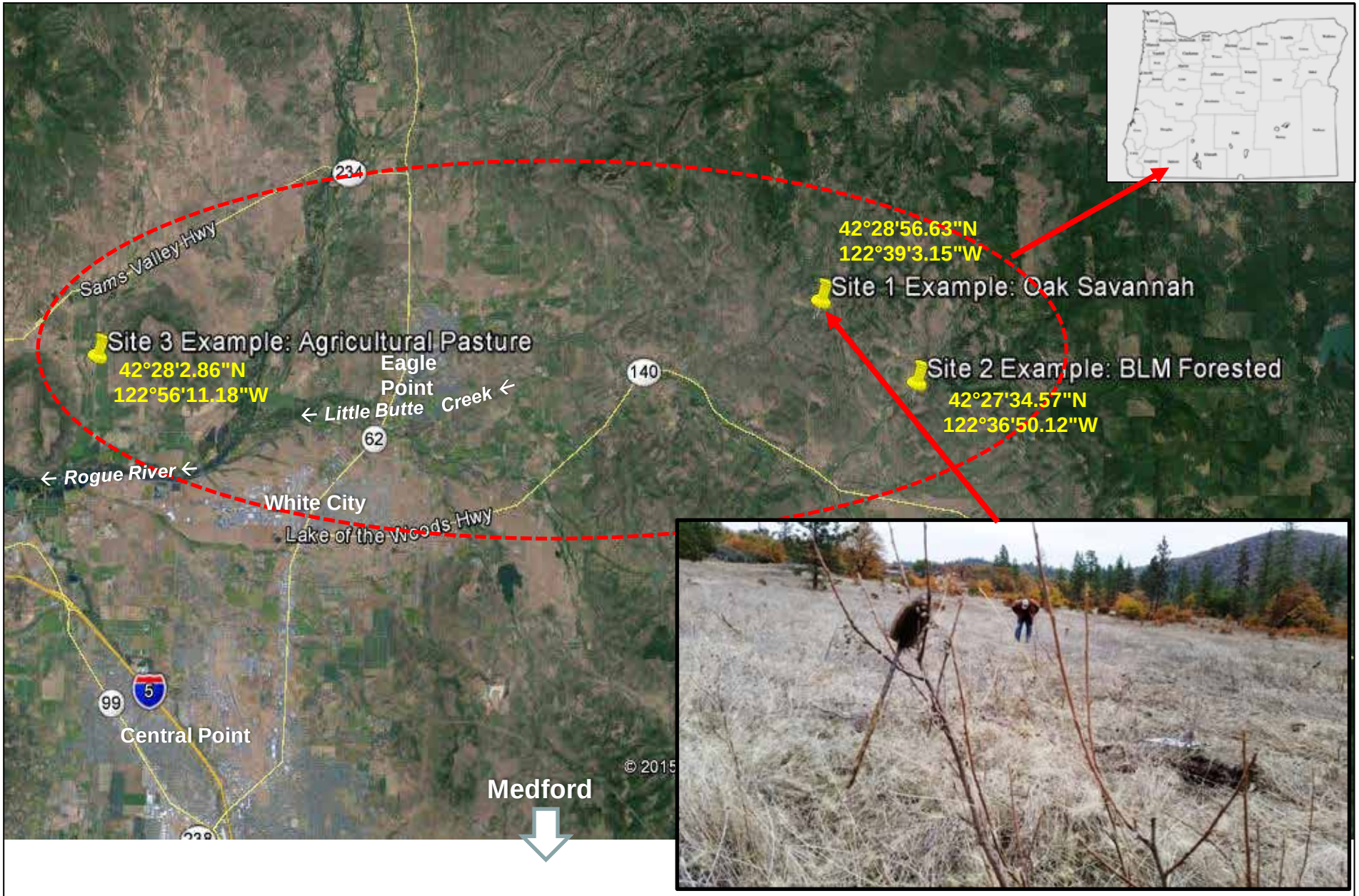
Totals in Section B must match the totals in Section A

Feasibility Study to Assess Increases in Water Content in Upland Soils by Adding Organic Matter

Table 1 Key Tasks and Estimated Costs

Key Tasks				Estimated Costs per Task (BOLD indicates that the in-kind funds are secured)								
				JSWCD	Land Use	Katalyst	SOU	Zephyr	Hamann	BLM	OWRD	Total
i) Task Title	**ii) Timeline***	**iii) Description of activities to be performed**	**iv) Description of resources needed to accomplish**	In Kind	In Kind	In Kind	In Kind	In-Kind	In Kind	In Kind	Cash	
Site Selection and Landowner Agreements	Apr-16	Firm up the tentatively selected sites, secure landowner agreement to perform the work over time. Look at access/fencing issues.	Hammond and JSWCD/NRCS to work with BLM and the two private landowners. An in-kind value of $2000 each is allocated for land access and use.	**$ 1,000**	$ 6,000				**$ 1,000**	$ 1,500		**$ 9,500**
Project Design and Technical Management	MAY-JUN 2016	Plot layout, mulch types, amounts, mulch sources, soil amendments, etc. Define field monitoring parameters. Depth to restrictive layer. Define laboratory analyses. Set up study to continue potentially for 3-5 more years.	Hire a Technical PM to oversee the project. JSWCD (in-kind) will assist Hammond (hired), along with peer review team (hired and in-kind)	**$ 2,000**		**$ 1,000**	**$ 800**	**$ 500**	**$ 300**	$ 1,000	$ 8,000	**$ 13,600**
Peer Review	MAY-2016-MAY 2017	Review all aspects of the study to insure integrity of data collection and presentation of results	Katalyst and SOU (in-kind). BLM staff as well.			**$ 1,500**	**$ 500**			$ 500		**$ 2,500**
Plot Construction	JUL-AUG 2016	Plot layout to be defined in design task, but likely to include 5 plots about 25 ft x 100 ft ea on three different land uses. Plots to include a control and 4 plots a varying organic additions and amendments. Install nested tensiometers (90 ea). Data logger software.	Hire Hamman to perform construction with oversite from PM and rest of Team	**$ 1,000**			**$ 300**		**$ 500**	$ 1,000	$ 9,000	**$ 11,800**
Monitoring	SEP 2016-JUL 2017	Monitoring through the wet season of 2016-2017. Baseline analyses. Field parameters first year. Monitor soil horizon wetting in fall, drying in spring. Monitor potential runoff during high precip events.	Hammond, along with possible university students. JSWCD staff to review field reports and initial results. PM Oversight.	**$ 5,000**			**$ 1,000**	**$ 500**		$ 4,000	$ 6,000	**$ 16,500**
Data Analysis	SEP 2016-JUL 2017	Actual laboratory analyses (will be determined in design task, but likely to include a combination of : %moisture, %organic, bulk density, nitrate, pH	Hire an accredited lab				**$ 500**	**$ 500**			$ 5,500	**$ 6,500**
Reporting	JUN-AUG 2017	A technical report will be prepared. Vetted and reviewed by the Team. Written report, on-line at RBP website, and at least one presentation	Main author to be the Technical PM (hired), with input and review from entire Team (in-kind). GPS/graphics from BLM	**$ 500**		**$ 1,000**	**$ 500**	**$ 500**	**$ 1,000**	$ 1,000	$ 1,000	**$ 5,500**
Outreach	JUN-SEP 2017	The team will perform additional outreeach about the concept and the pilot study itself and encourage tours and visits.	Many Team members will all participate in outreach in their respective areas, such as flyers, staff and Board meetings, student presentations, and website links.	**$ 500**			**$ 500**			$ 500		**$ 1,500**
Project Management	MAY 2016-SEP 2017	Administrative and Technical Project management throughout the Study	The RBP will manage the administrative aspects. Technical management is covered in Task								$ 7,500	**$ 7,500**
			Sub Total	**$ 10,000**	$ 6,000	**$ 3,500**	**$ 4,100**	**$ 2,000**	**$ 2,800**	$ 9,500	**$ 37,000**	**$ 74,900**
			Percent of Total	13%	8%	5%	5%	3%	4%	13%	49%	100%

** assuming award in March 2016, actual funding in place MAY 2015, first year completion and report submittal by SEP 2017.*



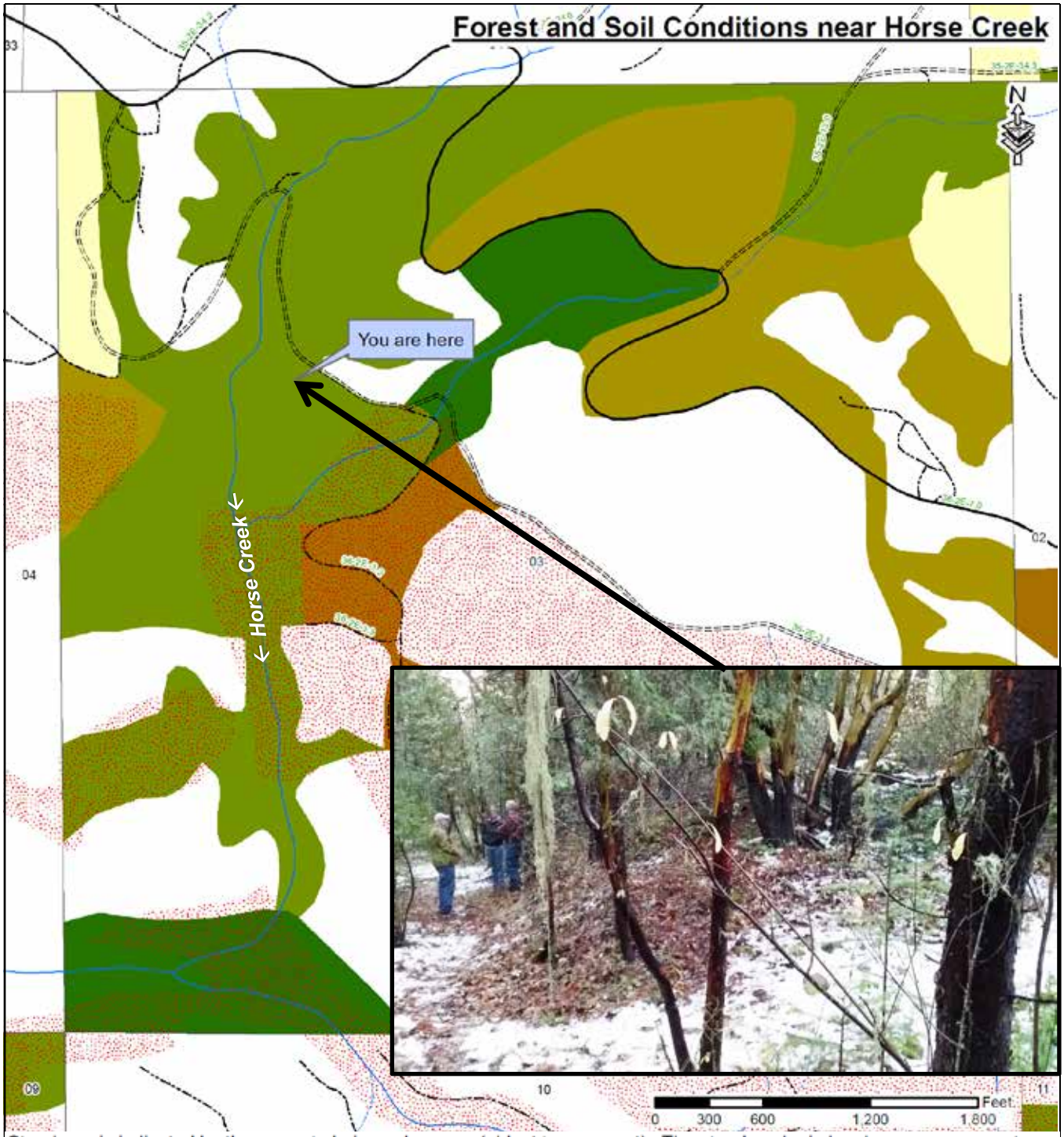
Source: 2015 aerial photograph modified from Google Earth

0 2.5 5

Approximate Scale (in miles)

Figure 1. General Site Location, Rogue River Watershed, Jackson County

OWRD Feasibility Study Grant Ap.
Increased Infiltration



Stand age is indicated by the green to beige color ramp (oldest to youngest). The stand you're in has legacy components dating to 1800, but most of the stand was born in 1920. Stand age is only defined on forested BLM-managed lands.

All TPCC in map view either has reforestation problems or is restricted for reforestation, groundwater, slope, or is non-forest (rock, non-suitable woodland, non-commercial species).

The red dotted areas are fragile soils (primarily high clay pyroclastics). Fragile soils are defined across land ownerships.

Dashed blue lines are intermittent streams while solid blue lines are perennial.

Solid black lines are roads, double black lines are gravel roads, and dashed black lines are natural surface roads.

Source: Courtesy of BLM

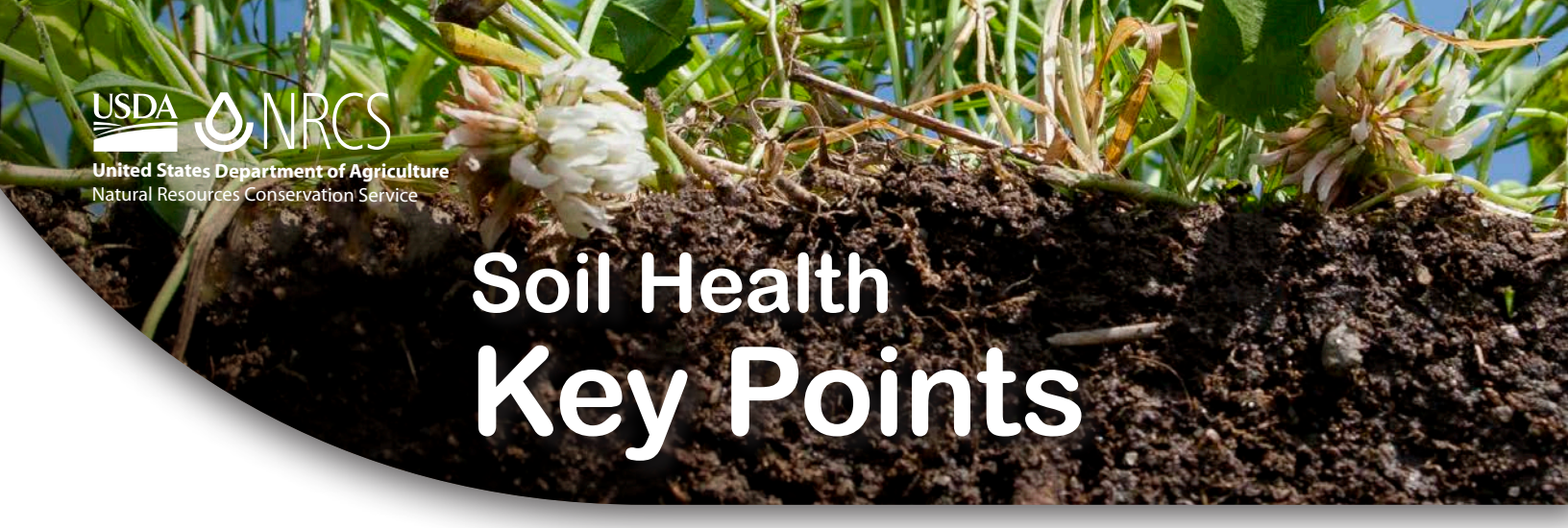
Figure 2. Example of a Potential Open Timberland Site

Photograph 1. Present day timber harvesting on private land in an upland area in Josephine County in the Rogue Basin in October, just prior to the wet season. Soil erosion and runoff are significant issues, and immediate soil amelioration could drastically help detain water. 10-7-2015.

Photograph 2. Present day condition of timber harvesting on private land approximately 5 years ago in an upland area of the Rogue basin in Josephine County. Little to no soil horizon has developed. 10-7-2015.

Photograph 3. An example of a potential open oak savannah site. Sloped to Little Butte Creek drainage (right). Very weak soil horizon over clay soils, choked with invasive vegetation, know to generate runoff during storm events. 11-12.2015.

Photograph 4. A baseline characterization would be performed for each site in the Pilot Study. Nested tensiometers (soil moisture probes will be installed vertically to monitor spatial and temporal changes in water migration in real time through one season.



USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Soil Health
Key Points

unlock the SECRETS IN THE SOIL

What's critical about soil health now?

1. World population is projected to increase from 7 billion in 2013 to more than 9 billion in 2050. To sustain this level of growth, food production will need to rise by 70 percent.
2. Between 1982–2007, 14 million acres of prime farmland in the U.S. were lost to development.
3. Improving soil health is key to long-term, sustainable agricultural production.

Soil health matters because:

1. Healthy soils are high-performing, productive soils.
2. Healthy soils reduce production costs—and improve profits.
3. Healthy soils protect natural resources on **and** off the farm.
4. Franklin Roosevelt's statement, "The nation that destroys its soil destroys itself," is as true today as it was 75 years ago.
5. Healthy soils can reduce nutrient loading and sediment runoff, increase efficiencies, and sustain wildlife habitat.

What are the benefits of healthy soil?

1. Healthy soil holds more water (by binding it to organic matter), and loses less water to runoff and evaporation.
2. Organic matter builds as tillage declines and plants and residue cover the soil. Organic matter holds 18-20 times its weight in water and recycles nutrients for plants to use.
3. One percent of organic matter in the top six inches of soil would hold approximately 27,000 gallons of water per acre!
4. Most farmers can increase their soil organic matter in **three to 10 years** if they are motivated about adopting conservation practices to achieve this goal.

USDA is an equal opportunity provider and employer.

unlock the SECRETS IN THE SOIL

How to begin your path to Healthy Soils:

1. Keep it covered.
2. Do not disturb.
3. Use cover crops and rotation to feed your soil.
4. Develop a **soil health management plan** with the help of NRCS.

Follow four basic soil health principles to improve soil health and sustainability:

1. Use plant diversity to increase diversity in the soil.
2. Manage soils more by disturbing them less.
3. Keep plants growing throughout the year to feed the soil.
4. Keep the soil covered as much as possible.

What is a Soil Health Management Plan?

1. It's a roadmap to soil health.
2. It outlines a system of practices needed to enhance crop production and soil function, and improve or sustain water quality, air quality, energy efficiency and wildlife habitat.

   Some of the recommended conservation practices include: Conservation Crop Rotation, Cover Crops, No Till, Mulching, Nutrient Management, and Pest Management.
3. It provides environmental, economic, health, and societal benefits.
4. It **saves energy** by using less fuel for tillage, and maximizes nutrient cycling.
5. It **saves water** and increases drought tolerance by increasing infiltration and water holding capacity as soil organic matter increases.
6. It **reduces disease** and pest problems.
7. It **improves income sustainability** for farms and ranches.
8. It **improves plant health**.

February 2013

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

IRROMETER®

Model 200SS WATERMARK Sensor

shown here actual size

US Patent No. 7,705,616

In use since 1978, the patented WATERMARK sensor is a solid-state electrical resistance sensing device that is used to measure soil water tension. As the tension changes with water content the resistance changes as well. That resistance can be measured using the WATERMARK Sensor.

The sensor consists of a pair of highly corrosion resistant electrodes that are imbedded within a granular matrix. A current is applied to the WATERMARK to obtain a resistance value. The WATERMARK Meter or Monitor correlates the resistance to centibars (cb) or kilopascals (kPa) of soil water tension.

The WATERMARK is designed to be a permanent sensor, placed in the soil to be monitored and "read" as often as necessary with a portable or stationary device. Internally installed gypsum provides some buffering for the effect of salinity levels normally found in irrigated agricultural crops and landscapes.

Features:

- ***Proven stable calibration***
- ***Range of measurement from 0 to 239 cb (kPa)***
- ***Fully solid-state***
- ***Will not dissolve in soil***
- ***Not affected by freezing temperatures***
- ***Internally compensated for commonly found salinity levels***
- ***Inexpensive, easy to install and use***
- ***Compatible with AC or DC reading devices (specialized circuit required)***
- ***NO maintenance required***

Specifications –

MATERIALS: ABS plastic caps with stainless steel body over a hydrophilic fabric covered granular matrix.

DIMENSIONS – DIAMETER: .875 in. (22 mm)
LENGTH: 3.25 in. (83 mm)
WEIGHT: .147 lb. (.067 kg) – with 5 ft. lead

WIRE LEADS: AWG 20, 2 leads

WARRANTY: One year

ORDERING INFORMATION: **Catalog #200SS**
Standard length leads: **–5** = 5 ft. (1.5 m), **–15** = 15 ft. (4.5 m) –OR– **–**_ _ _ = custom length.
Catalog #200SS-X = without leads.

WATERMARK Soil Moisture Sensors are shipped bulk unless specified to be in retail packaging (add **-PKG**).

APPLICATIONS INCLUDE –

- Irrigation Scheduling • Water Table Monitoring
- Leak Detection • Agronomy Research • Environmental Monitoring
- Anywhere you need to know when or if the soil moisture status is changing

OPERATING PRINCIPLE: The WATERMARK sensor is a resistive device that responds to changes in soil moisture. Once planted in the soil, it exchanges water with the surrounding soil thus staying in equilibrium with it.

Soil water is an electrical conductor thereby providing a relative indication of the soil moisture status. As the soil dries, water is removed from the sensor and the resistance measurement increases. Conversely, when the soil is rewetted, the resistance lowers.

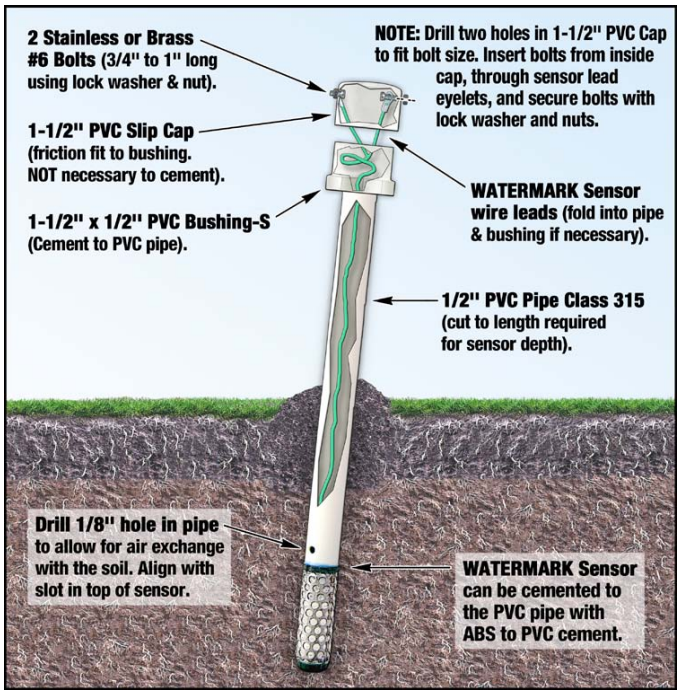
The WATERMARK sensor is unique in that it takes its resistive measurement within a defined and consistent internal matrix material, rather than using the surrounding soil as the measurement medium. This unique feature allows the sensor to have a stable and consistent calibration that does not need to be established for every installation.

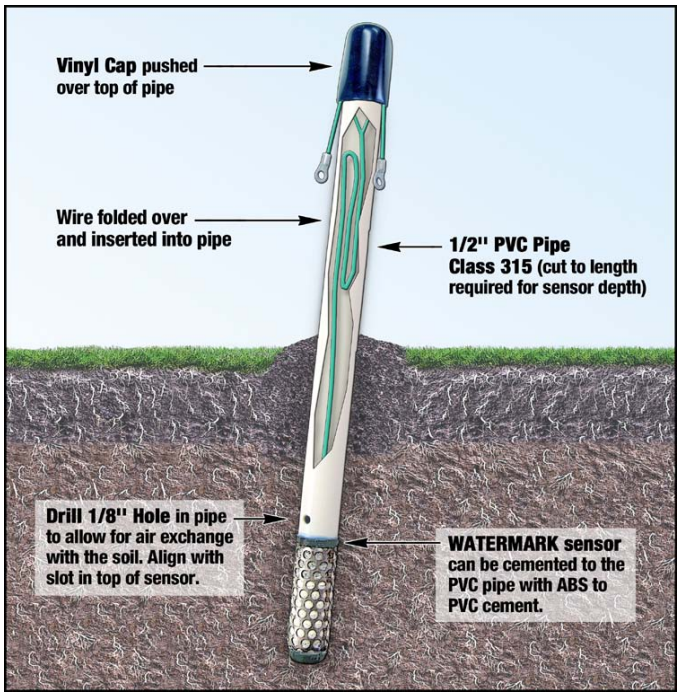
The relationship of ohm of resistance to centibars (cb) or kilopascals (kPa) of soil water tension is constant and built into the reading devices that are used to interrogate the sensor. The sensor is calibrated to report soil water tension, or matric potential, which is the best reference of how readily available soil water is to a plant. The WATERMARK sensor consists of stainless steel electrodes imbedded in a defined and consistent internal granular matrix material that acts like a soil in the way it moves water. This matrix is encased in a hydrophilic material that establishes good hydraulic conductivity with the surrounding soil and is held in place by a durable stainless steel perforated shell with plastic end caps.

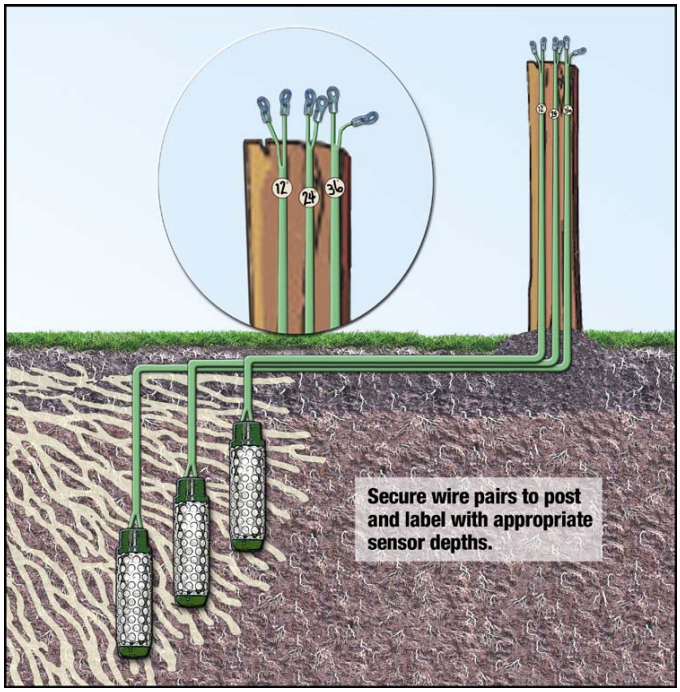
SPECIFICATION INFORMATION: The soil moisture measurement device, or sensor, shall represent soil moisture status in units of soil water tension or matric potential, registering in centibars (cb) or kilopascals (kPa) when read with a compatible reading device. Its construction shall be of the Granular Matrix Sensor (GMS) type and require no on-site calibration or routine maintenance. It shall be durable, long-lasting, not subject to dissolving in a wet soil environment with an outer surface of stainless steel and ABS plastic. It shall be the WATERMARK sensor as manufactured by the IRROMETER Company, Inc. of Riverside, California.

WATERMARK

Installation Examples:







WATERMARK

IRROMETER®
THE IRROMETER COMPANY, INC.
1425 Palmyrita Ave., Riverside, CA 92507
(951) 682-9505 PHONE
(951) 682-9501 FAX
www.IRROMETER.com
sales@IRROMETER.com

Irrigation Association™ Bronze Member

RBP Member Organizations

Applegate Partnership and Watershed Council
Cow Creek Band of the Umpqua Tribe of Indians
Illinois Valley Watershed Council
Jackson Soil and Water Conservation District
Lomakatsi
Lower Rogue Watershed Council
Rogue Riverkeeper
Rogue River Watershed Council
Rogue Valley Council of Governments
Seven Basins Watershed Council
Southern Oregon Forest Restoration Collaborative
Southern Oregon Land Conservancy
The Freshwater Trust
Trout Unlimited
WaterWatch of Oregon

RBP Active Participants

Bonneville Environmental Foundation
Bureau of Land Management
Illinois Valley Soil and Water Conservation District
Klamath Basin Rangeland Trust
Klamath Bird Observatory
Katalyst, Inc.
Lower Rogue Soil and Water Conservation District
Medford Water Commission
Middle Rogue Steelheaders
Patton Environmental
Sustainable Northwest
The Selberg Institute
U.S. Fish and Wildlife Service
Williams Creek Watershed Council

Request to be added to the Oregon Water Resources Department's

Inventory of Potential Conservation Opportunities

The purpose of this inventory is to catalogue potential conservation projects that water users themselves have identified but not yet pursued because of financial, institutional, or other barriers. For the purpose of this application, water storage other than above-ground are included as conservation opportunities and are most likely capital conservation projects.

As a water provider or user, you know your water demands and water conservation opportunities better than anyone. We would appreciate your assistance with this important data collection effort by completing this survey. Your participation will help provide the building blocks we need to begin to identify and achieve potential future water supplies. Please answer the questions as completely as possible, to the best of your ability. We appreciate your help with this important effort.

This inventory of already-identified, potential conservation projects includes both capital and programmatic projects. Capital projects are defined as one-time, large investments resulting in water savings. Examples include reclaimed water plants, reservoir covering, transmission line upgrades reducing leaks, or industrial engineering modifications to re-use process water. Programmatic projects are defined as ongoing investments resulting in water savings. Examples include facilitating upgrades to more efficient water using devices (e.g., distributing free showerheads, toilet rebates) and distribution system leak detection programs. The conservation inventory is primarily intended to include "planned" projects rather than projects that are currently being implemented. However, currently active programmatic projects may be listed if they will continue or expand in future years. The inventory of projects submitted will be compiled by county or basin.

Examples are provided below.

	Example **Capital Conservation Project**	**Example** **Programmatic Conservation Project**
Project Description Provide brief sentence	Line 3 miles of unlined ditch.	Toilet rebate program for residential customers
Estimated Future Savings Provide brief sentence, including information regarding savings seasonality.	20 acre feet of water per year	If we spend our full budget each year, we estimate 50,000 gallons of water save per year
Seasonality Indicate what part of the year savings are generated (e.g. year-round; summer only; etc.).	Peak (irrigation) season savings.	Savings should occur throughout the year.
Estimated Future Costs Provide brief sentence.	$500,000 total project costs.	$40,000 a year.
Implementation Schedule Provide brief sentence.	Not set. Have conducted cost and savings estimate, but still seeking funding.	We started the program in 2005 and plan to implement until 2015.
Project Funded? Designate either "yes", "no", or provide brief sentence if necessary	No. Pursuing grant funding.	Yes. IN our CIP through the next 5 years.

To add a project to the inventory of potential conservation opportunities, please provide the following information for each conservation project.

This is a ☒ Capital Conservation Project ☐ Programmatic Conservation Project	
Project #/Name	**Pilot Study to Assess the Potenial Increase in Water Conservation and Infiltration in Upland Soils By Increasing Organic Content: Rogue Basin Partnership**
Project Description	The overarching goal is to detain precipitation that falls and runs off of rural lands during the wet season in the Rogue Basin and increase water conservation and infiltration for agricultural use and provide more baseflow to streams and rivers later during the warm summer months. This Pilot Study will determine the feasibility of the concept by adding organic material and other amendments to the shallow soils on three types of rural land: timberland, oak savannah, and pastureland. The study will also help determine if the initial changes to the shallow soil horizon will be self-sustaining for the long term. Results from the pilot study will help make decisions on potential next steps, if any, to considering the concept on a larger scale.
Estimated Future Savings	Any/all water detained from runoff would be water conserved. 2700 ac-ft/yr
Seasonality	Winter runoff conserved for summer agricuture and instream baseflow.
Estimated Future Costs	$75,000 for pilot study only. Implementation is a projected outcome.
Implementation Schedule	Pilot study = 2016-2017 if funded. Implementation depends on what is learned in pilot.
What are the barriers to implementation, e.g. funding?	Funding fior Pilot Study. Scale of actual implementation will depend on economics.

This is a ☐ Capital Conservation Project ☐ Programmatic Conservation Project	
Project #/Name	
Project Description	
Estimated Future Savings	
Seasonality	
Estimated Future Costs	
Implementation Schedule	
What are the barriers to implementation, e.g. funding?	

- Include this form with your application -

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Medford District Office
3040 Biddle Road
Medford, Oregon 97504
email address: BLM_OR_MD_Mail@blm.gov

JAN 27 2016

IN REPLY REFER TO:

7100 (ORM050)

Oregon Water Resources Department
Water Conservation, Reuse, and Storage
Feasibility Study Grant Program
725 Summer St NE, Suite A
Salem OR 97301

To Whom It May Concern:

This letter is in support of the water conservation, reuse and storage feasibility study grant program that the Rogue Basin Partnership (RBP) is seeking funding for. The goal of the pilot study is to help determine how to detain and conserve water for instream and agricultural use during the summer months. This would be achieved by increasing the organic content in the upland soils.

The Bureau of Land Management (BLM) would like to enhance and/or create value-added partnerships. While the BLM has worked with the Rogue Basin Partnership in the past, we see many more opportunities where our respective jurisdictions overlap and fostering that relationship is essential for moving forward with whole watershed restoration planning.

In an attempt to make this project a success, the BLM would like to contribute staff time for clearance work, NEPA preparation and site design. Pending the NEPA decision, one of the pilot sites could be located on BLM-managed lands and there would be various effectiveness monitoring activities valued at a total contribution of $9,500.

In closing, the BLM wishes to partner with the RBP to move forward with the feasibility study. The BLM understands the value of this study and the value of working relationships outside of the federal nexus. Please consider this project for funding and don't hesitate to contact us if questions arise.

Sincerely,

Teresa J. Trulock
Field Manager
Butte Falls Resource Area

January 23, 2016
Don Hamann Inc.
PO BOX 198
Butte Falls, OR. 97522
Dhinc30@wildblue.net

OWRD
Water Conservation, Reuse and Storage
Feasibility Study Grant Program
725 Summer St NE, Suite A
Salem, OR. 97301

Subject: Support of Oregon Water Resources Department Feasibility Study application: "Pilot Study to Assess the Potential Increase in Water Infiltration in Upland Soils by Increasing Organic Content".

To Whom It May Concern,

Don Hamann Inc. has been involved in natural resource management for over thirty years. Our daily hand's on experience has opened our eyes to soils with greatly reduced capacity for water infiltration and storage.

We also observed that wood fiber is cheap and abundant in the Pacific Northwest. Some trials with wood or bark to soils could supply some incredible multiple benefits for society, especially water storage.

Don Hamann Inc. is willing to be in kind partners for up to Two Thousand Eight hundred dollars. We whole heartedly support the funding of this feasibility study.

Sincerely,
Don Hamann
Don Hamann
Don Hamann, Inc.

Jackson Soil & Water Conservation District
89 Alder Street, Central Point, Oregon 97502
Telephone: (541) 664-1070 FAX: (541) 727-7471
web-site: www.jswcd.org

January 21, 2016

Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301

Re: Pilot Study To Assess The Potential Increase In Water Infiltration In Upland Soils By Increasing Organic Content

To Whom It May Concern

The Jackson Soil and Water Conservation District (The District) strongly supports the Pilot Study to Assess the Potential Increase in Water Infiltration in Upland Soils by Increasing Organic Content. Issue 1, Resolution 3.c. of the Districts "Vision for the District" directs the District to develop and improve water storage facilities, including but not limited to watersheds for the capture, storage, and beneficial release of water.

This feasibility study is very complementary to our Mission & Vision Statement and our Long Range Plan. The District is committed to the improvement of upland function and realizes that our watersheds are our largest water storage reservoir.

Finding economically feasible solutions to improving the organic matter content will greatly improve the storage capacity and infiltrations rate of these soils. It will also decrease direct overland flow, which will decrease erosion potential and help improve water quality. The long term benefits of improving vegetative cover and rooting mass and depth of the plant community will have the potential to maintain and improve upland function.

If you have any questions related to this letter of support, please call me at (541) 664-1070 Ext. 411 or e-mail me at randy.white@jswcd.org.

Sincerely,

Randy White

Randy White, District Manager

Jackson SWCD prohibits discrimination in its programs on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital of familial status. (Not all prohibited bases apply to all programs.) Jackson SWCD is an equal opportunity employer.

Afternoon Zephyr Farm

2583 E. Evans Creek Road
Rogue River, OR 97537
20 January 2016

OWRD
Water Conservation, Reuse, and Storage
Feasibility Study Grant Program
725 Summer St. NE, Suite A
Salem, OR 97301

Dear Fellow Water Conservationists:
The "Pilot Study to Assess the Potential Increase in Water Infiltration in Upland Soils by Increasing Organic Content" is an effort to begin to build the ability to capture and detain rainwater in rural areas of Oregon during periods of excess runoff. Afternoon Zephyr Farm strongly supports this effort. We will be providing technical support and labor to support the project as "in kind" contributions. The reasons that Afternoon Zephyr Farm thinks this effort is important enough to contribute support are as follows:

1. The precipitation that falls in Southern Oregon tends to come almost exclusively in winter when the weather is cool and damp. During much of the precipitation period the surface soil is saturated and the water runs off into streams and ends up in the Pacific Ocean before summer, when it is most needed where it fell.
2. Ongoing climate change is likely to increase winter runoff because more precipitation is likely to come as rain instead of the slower released snowpack.
3. Changes to the landscape since arrival of Europeans tends to decrease infiltration of precipitation into the soil by many mechanisms such as decreased/altered vegetation cover, and agricultural/ forestry practices which favor runoff and drainage over what occurred before modern practices were introduced. "Hard" surfaces such as roads, roofs, pavement, etc. are vastly increased in quantity.
4. Water that infiltrates the soil eventually reaches streams and the ocean but it takes much longer than over-the-surface runoff. This delay in arrival at the streams increases off-peak flow and decreases peak flow in streams.
5. Water in and traveling through the soil is less subject to loss and is cooler on arrival at the stream.
6. Eventually all the precipitation water works its way to the Ocean, but if more is held in the uplands longer, the streamflows will be equal to or larger than current flows but the recharged water "reservoirs" in the landscape will be in much better condition with less dramatic swings between flood and drought.
7. It should be possible to use the above ideas to increase water infiltration on large areas of rural Oregon and thus detain rainwater in the uplands while increasing summer stream flows, decreasing summer stream temperatures and decreasing winter peak flood heights.

Afternoon Zephyr Farm has had some small scale success at increasing precipitation infiltration on our land but we think that now is the time to further develop and refine techniques for detaining water in the uplands where it will be needed in the future. Increased soil absorbency is an important factor that needs to be developed as a tool to increase the water resiliency overall in the Southern Oregon area. We strongly support this effort and plan to contribute to it.

Kent K. Knock, Ph.D.
Co-owner, Afternoon Zephyr Farm

Kent K. Knock
22 Jan 2016

Southern Oregon Climate Action Now

SOCAN

Confronting Climate Change

http://socan.info

7113 Griffin Lane
Jacksonville
Oregon 97530-9342
alanjournet@gmail.com
541-301-4107
kathleendconway@gmail.com
541-324-4501
January 15th 2016

OWRD
Water Conservation, Reuse, and Storage
Feasibility Study Grant Program
725 Summer St NE, Suite A
Salem OR 97301

SUBJECT: Support for Oregon Water Resources Department Feasibility Study application: "Pilot Study to Assess the Potential Increase in Water Infiltration in Upland Soils by Increasing Organic Content".

Colleagues:

This letter is to express the strong support by Southern Oregon Climate Action Now (SOCAN) for the Rogue Basin Partnership (RBP) application: "Pilot Study to Assess the Potential Increase in Water Infiltration in Upland Soils by Increasing Organic Content".

For the past several years SOCAN has promoted public awareness and supported projects which address climate change impacts of concern in the Rogue Basin. One of the major concerns expressed at SOCAN's recent climate summit, "Our Critical Climate, Trends, Impacts and Solutions" was that of lack of adequate water supplies. A trend of reduced rainfall and snow pack (10% of normal snow pack last winter!) resulted in serious drought conditions here in SW Oregon – similar to that faced by California. As a result we experienced reduced stream flows, a shortened irrigation season and increased fire dangers. While individual years may have more normal precipitation, we expect these disturbing trends to continue as a result of long term climate change.

The lack of snow pack is of particular concern because it provides natural storage of winter precipitation delaying runoff, promoting infiltration and assuring better water supplies and stream flows into the summer and fall.

The feasibility study proposed by RBP addresses this issue directly by investigating the long term possibility of conserving large amounts of water using soil augmentation. Should this technique prove feasible, it will represent a major pro-active approach to reducing the negative adverse effects of climate change on our limited water supplies.

It could also enhance the carbon sequestration capacity of the forest soils, a valuable step towards compensating for local emissions.

SOCAN therefore supports the application for feasibility funding.

Sincerely

Alan Journet Ph.D. Kathy Conway Ph.D.

Co-Facilitators Southern Oregon Climate Action Now

Southern OREGON UNIVERSITY

Oregon Water Resources Department January 27, 2016

Water Conservation, Reuse, and Storage Feasibility Study Grant Program

725 Summer St NE, Suite A

Salem OR 97301

RE: Southern Oregon University support for OWRD Feasibility Study application: "Pilot Study to Assess the Potential Increase in Water Infiltration in Upland Soils by Increasing Organic Content".

This letter is to express SOU's support for and willingness to participate in the Rogue Basin Partnership (RBP) application: "Pilot Study to Assess the Potential Increase in Water Infiltration in Upland Soils by Increasing Organic Content". This feasibility study - investigating water conservation though the use of water soil augmentation – is especially appropriate given the climate change/water usage issues developing in southern Oregon. The Little Butte system is likewise an appropriate location given its microclimatic and geologic conditions. We at SOU have been conducting a variety of hydrogeologic and climatologic investigations (most involving our students as will be the case here) in the Little Butte System over the last twenty years and are pleased to participate in this grant application. By this letter we also confirm our commitment of $4100 of in-kind service to the grant.

The question of water retention in soils of the Western Cascades is a critical one as we consider changing climatic conditions and the flashy nature of rainfall throughput on stream systems such as the Little Butte. We look forward to the opportunity to participate.

Respectfully yours,

Department of Environmental Studies • 1250 Siskiyou Boulevard • Ashland, Oregon 97520-5073

TEL 541-552-6477 • FAX 541-552-6415

Afternoon Zephyr Farm

2583 E. Evans Creek Road
Rogue River, OR 97537
20 January 2016

OWRD
Water Conservation, Reuse, and Storage
Feasibility Study Grant Program
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Dear Fellow Water Conservationists:
The "Pilot Study to Assess the Potential Increase in Water Infiltration in Upland Soils by Increasing Organic Content" is an effort to begin to build the ability to capture and detain rainwater in rural areas of Oregon during periods of excess runoff. Afternoon Zephyr Farm strongly supports this effort. We will be providing technical support and labor to support the project as "in kind" contributions. The reasons that Afternoon Zephyr Farm thinks this effort is important enough to contribute support are as follows:

1. The precipitation that falls in Southern Oregon tends to come almost exclusively in winter when the weather is cool and damp. During much of the precipitation period the surface soil is saturated and the water runs off into streams and ends up in the Pacific Ocean before summer, when it is most needed where it fell.
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Afternoon Zephyr Farm has had some small scale success at increasing precipitation infiltration on our land but we think that now is the time to further develop and refine techniques for detaining water in the uplands where it will be needed in the future. Increased soil absorbency is an important factor that needs to be developed as a tool to increase the water resiliency overall in the Southern Oregon area. We strongly support this effort and plan to contribute to it.

Kent K. Knock, Ph.D.
Co-owner, Afternoon Zephyr Farm

Kent K. Knock
22 Jan 2016

My planned in-kind commitment is $2000.00
KKK 8 Feb 2016

Jackson Soil & Water Conservation District
89 Alder Street, Central Point, Oregon 97502
Telephone: (541) 664-1070 FAX: (541) 727-7471
web-site: www.jswcd.org

January 21, 2016

Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301

Re: Pilot Study To Assess The Potential Increase In Water Infiltration In Upland Soils By Increasing Organic Content

To Whom It May Concern

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This feasibility study is very complementary to our Mission & Vision Statement and our Long Range Plan. The District is committed to the improvement of upland function and realizes that our watersheds are our largest water storage reservoir.

Finding economically feasible solutions to improving the organic matter content will greatly improve the storage capacity and infiltrations rate of these soils. It will also decrease direct overland flow, which will decrease erosion potential and help improve water quality. The long term benefits of improving vegetative cover and rooting mass and depth of the plant community will have the potential to maintain and improve upland function. Consequently, the District will commit $10,000.00 of in-kind match to the Pilot Study to Assess the Potential Increase in Water Infiltration in Upland Soils by Increasing Organic Content.

If you have any questions related to this letter of support, please call me at (541) 664-1070 Ext. 411 or e-mail me at randy.white@jswcd.org.

Sincerely,

Randy White

Randy White, District Manager

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KATALYST , INC.
facilitating community change… adding value to our natural resources *(541) 227-9024 * rcoffan@gmail.com*

February 8, 2016

Water Resource Department
725 Summer St, NE, Suite A
Salem, OR 97301

RE: Support for Pilot Study to Assess the Potential Water Conservation in Upland Soils By Increasing Organic Content

Grant Reviewers:

Katalyst, Inc. (Katalyst) believes strongly that people throughout the state of Oregon and the northwest need to better understand how the changes in climate and land use are affecting our water resources, and what can be done to help the situation. The proposed project submitted to you by the Rogue Basin Partnership titled *Pilot Study to Assess the Potential Water Conservation in Upland Soils*, is an excellent "first step" to that end, and Katalyst fully supports it. More specifically, Katalyst Principal Hydrologist, Robert Coffan, will provide oversight for the following aspects of the project:

- Technical oversight during the design of the research/data collection aspects to develop the Work Plan;
- Peer review as the monitoring season unfolds and data are being reviewed and analyzed; and
- Technical review during reporting as part of the QA process, all totaling at least $3500 of services contributed as in-kind donation to the project.

On behalf of Katalyst, and all of the many partners in the Rogue Basin concerned with our precious water resources, I look forward to the assistance of our state's Water Resources Department to implement this project.

Please feel free to contact me anytime with questions, ideas, or concerns.

Sincerely,

Robert A. Coffan, President

February 8, 2016

Teresa Trulock
Bureau of Land Management (BLM)
Medford District Office
3040 Biddle Rd.
Medford, OR 97504

Dear Ms. Trulock

The Rogue Basin Partnership (RBP) is submitting a proposal to the Oregon Water Resources Department (OWRD) for a pilot study to determine the feasibility of reducing runoff and increasing infiltration by adding organic material and other amendments to the shallow soils on three types of rural land in the Rogue Basin: timberland, oak savannah, and pastureland.

As you know, during the development of this proposed pilot study, we identified BLM-managed land as the location of one of the three feasibility test sites, and assigned a value for its use for the duration of the project. I am writing to formally request this match contribution for the pilot study. The in-kind value for the use of this land parcel is $2,000.

If you agree to this $2,000 match contribution, please sign your name below. By signing you are stating that this match contribution is secured.

Thank you for your willingness to participate in this feasibility study.

Sincerely,

Robert Coffan
RBP Chair

_____ _____
Signature Date

February 8, 2016

Don Hamann Inc.
P.O. Box 198
Butte Falls, OR 97522

Dear Mr. Hamann,

The Rogue Basin Partnership (RBP) is submitting a proposal to the Oregon Water Resources Department (OWRD) for a pilot study to determine the feasibility of reducing runoff and increasing infiltration by adding organic material and other amendments to the shallow soils on three types of rural land in the Rogue Basin: timberland, oak savannah, and pastureland.

As you know, during the development of this proposed pilot study, you were identified as the contact person for selection of two of the three feasibility test sites. There is a value for land use for the duration of the project, which is appreciated. I am writing to formally request this match contribution for the pilot study. The in-kind value for the use of these land parcels is $2,000 each for a total match contribution of $4,000.

If you agree to this $4,000 match contribution, please sign your name below. By signing you are stating that this match contribution is secured.

Thank you for your willingness to participate in this feasibility study.

Sincerely,

Robert Coffan
RBP Chair

_____ _____
Signature Date