



OREGON WATER RESOURCE DEPARTMENT
WATER CONSERVATION, REUSE AND STORAGE
FEASIBILITY STUDY GRANT PROGRAM

I. Grant Information

Study Name: Understanding Meadow Storage Capacity in Upper John Day

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

Program Funding Dollars Requested: \$ 56,282
Note: Request may not exceed \$500,000

Total Cost of Feasibility Study: \$ 130,429

II. Applicant Information

Table with 2 columns: Applicant Name, Co-Applicant Name, Address, Phone, Fax, Email. Applicant: North Fork John Day Watershed Council.

Table with 1 column: Principle Contact: Valeen Madden, Address, 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.

Applicant Signature: Elaine Eisenbraun Date: 1/16/2015

Print Name: Elaine Eisenbraun Title: Executive Director

III. Feasibility Study Summary

Please give a brief summary of the feasibility study using no more than 150 words. The majority of John Day River water comes from the North Fork, with the Desolation Creek tributary providing abundant source points.

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.

Goal 1: To identify meadow and wetland restoration activities can enhance water storage in the upper John Day, based upon the study of wetland system dynamics in natural (1) and degraded (2) sites.

Objective 1.1: Immediately upon project initiation, three upland meadows will be equipped with recording devices purposed to provide water input, output, temperature, and volume data, as recorded in data reports.

Objective 1.2: Immediately upon project initiation, vegetation monitoring sites will be located in the three upland study meadows (Same three meadows as indicated in Objective 1.1), as indicated in photopoints.

Objective 1.3: Within two years of project initiation, the study team will characterize the hydrologic regimes of three meadow complexes, as revealed in reports and publication.

Objective 1.4: Within two years of project initiation, valid increases of the late-season or base flow water storage capacity of high mountain meadows in the Desolation Creek watershed, will be presented in reports and publication.

Objective 1.5: Within two years of project initiation, valid reductions of peak flows, below the restored meadows in the Desolation Creek watershed, will be presented in reports and publication.

Objective 1.6: Within two years of project initiation, the data will characterize the influence of meadow systems on reduced variation in stream temperatures, as documented in reports and publication.

Objective 1.7: Within two years of project initiation, comparative data between restored meadows and those retaining current conditions will be evaluated, as documented in reports and publication.

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.”

The John Day Basin represents a classic western, xeric ecosystem with complex, linear interdependencies between sub-humid upland forest systems and naturally dry farmlands, downstream. As the 4th largest basin in Oregon, it drains over 8,000 square miles (ODEQ). 54% of the basin is classified as farmland. Within this area, Desolation Creek has been identified as a high priority restoration area (USFS 2013). Desolation Meadow was historically used by the Warm Springs and Umatilla Native Americans as a traditional fishing site. Both Tribes consider the Desolation Creek watershed to be part of their ceded lands (Desolation Ecosystem Analysis, 1999). This area has been impacted by land-use practices since the late 1800's (USFS Grazing Report, 1910).

Oregon Senate Bill 839 calls for the protection of Seasonally Varying Flows to maintain the biological, ecological and physical functions of the watershed during periods outside of the irrigation season. The 2014 science subgroup reviewing the Bill, found broad consensus that ecosystem function is critically dependent upon protection of a variable flow regime. The 1992 Water Resources Commission acknowledges the need for non-structural storage methods. In 1993, the Oregon Legislature codified the policy declaring it a high priority to enhance watershed storage capacity through natural processes using non-structural means. Little information exists to inform the the capacity of value that can be derived from restoration actions that invigorate and return natural storage. The below described study will inform restoration practitioners so that a clear understanding of costs and benefits preceeds those restoration actions which are clearly necessary, but unpredictable under current knowledge regimes regarding water storage volumes.

The Desolation Creek Watershed (HUC 17070202) is located east of highway 395 in northern Grant County. It flows northwest to join the North Fork John Day River one mile northeast of Dale, Oregon and drains approximately 69,000 acres. It drains over 8,000 square miles (ODEQ). The fishery is an economic boon for the John Day Basin creating jobs as it restores an ecosystem. The Northwest Power Planning Council had stated an objective of increasing average John Day steelhead production from escapement level of 15,000 to 23,000 (ODFW 1985). The estimated total Economic Impacts of Columbia River Salmon and Steelhead catch was \$88,783,000 in 2005 dollars (NW Council.org 2005) which is equivalent to \$107,747,467 in 2015 dollars. The John Day contributes significantly to this number as a result of its high quality, dam-free state. The Upper North Fork, in turn, with its high flow of cold water, and extensive meadows is contributing vastly to the entire system indicating a strong argument for concerted attention to restoration of its upper reaches.

The landscape supporting the headwaters of the John Day River irrigates 60,103 acres of farmland producing crops that help feed the world and sustain a region. Using the figures from Oregon's Integrated Water Resources Strategy, 85% of all water diverted in Oregon is used for Agricultural purposes, while 6% is for municipal water, 6% for self-supplied industrial production, and 1% for non-municipal domestic purposes. The North Fork John Day produced between 50 cubic feet per second (CFS) during the summer months and 5,500 cfs during the winter months in 2015. By assuring that more water travels appropriately through the system, the available water for both instream and extractive uses will rise and extend across a greater temporal period. The John Day River is unique in its lack of dams, native runs of fish, and contribution to Columbia River agricultural and industry.

See Attachment A

As Climate Change brings increased air temperatures into eastern Oregon's future, a secondary impact will include temporal and spacial changes in the delivery of fresh water. Scientists anticipate increased winter runoff from water melting earlier in the season and falling as rain rather than snow, earlier peak streamflows in the spring, and diminished runoff during the summer when water is most needed for human consumption and ecosystem health. (Graves, D. 2008) The consequential outcome of these changes is significantly altered flows for all water users. In contemplating climate change and water storage for the assiduous Columbia, parent system to the John Day, it is important to keep in mind that 70% of the Basin's water storage capacity occurs in natural systems and snowmelt cycles. (Miles et al. 2000)

Who is affected by this imminent climate-induced change in hydrology? Hydropower facilities which support the west's growing cities, are designed to operate in coordination with seasonal snowmelts. Anadromous fish runs are adapted to typical flows which will certainly be altered. And, irrigated croplands depend upon snowmelt to last through the dry summer months. Models indicate that early season water inputs from precipitation and snow melt will increase in the John Day. Summer inputs will decline in the John Day with the greatest impact expected in August when a 23% to 25% decrease will occur.(Graves, D. 2008)

What if land management practices were able to mitigate this 25% reduction in water flows? The North Fork of the John Day contributes 70% of the larger River's flow and Desolation Creek provides a significant input. Even during drought and climate change, water doesn't simply vanish, it relocates by means of evaporation, consumption, and other actions. So, it follows, that management of the water and storage on site can provide terrific restorations of water in its traditional cycles.

Johnson and Adams determined in, "Benefits of Increased Streamflow: The Case of the John Day River Steelhead Fishery" that increased summer flows have a value of \$4.86 per acre-foot (corrected for inflation) for the fishery value, alone. Add to that, the farm value and hydroelectric value, and each acre foot of water delivered in a timely manner is extremely valuable. California farmers pay about \$70 per acre foot for irrigation water and during recent droughts, farmers were faced with paying 4 times the standard rate. Private, residential users pay as much as \$6.30 per cubic meter of water in this nation (that equates to \$7,775 per acre foot). Other water consumers are numerous: beef producers, fast food companies, municipal uses, and home landscapes - all found downstream of Desolation Creek. The alcoholic beverage business is burgeoning. Miller Corporation, alone, sells \$34 billion worth of beer requiring fresh water to manufacture. Truly, the water storage and delivery issue is a critical one. Citicorp's chief economist, Willem Buiters suggests, "Water as an asset class, in my view, will eventually become the single most important physical commodity - dwarfing oil, copper, agricultural commodities, and precious metals." (Fortune, "What is Water Worth 5/1/14)

The upper reaches of the North and Middle Forks of the John Day River provide vital headwaters habitat supporting the high value fisheries of the John Day River basin. It is in these basins where the greatest good can

be generated across the entire length of the assiduous John Day and its beneficiary, the mighty Columbia - with its many diverse uses, values, and demands. Given the headwaters' benefits to the hydrologic system, no other geographic community can provide as much benefit for an equivalent cost or effort expended. Investing in the headwaters, means investing wisely in the productive foundation and source of all John Day and Columbia River values.

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).

The project feasibility study ultimately informs a basin that is 69,000 acres in size. The feasibility study is designed to look at comprehensive water storage and exchange in this landscape scale environment. When low-lands in the basin that are likely sites for water storage (meadows, riparian areas) are quantified, the acreage is: 225. If each meadow/riparian acre stores an average 1 acre-feet of water (333,333 gallons), with an average maximum capacity of 3acre-feet (1 million gallons), the potential increase to full capacity across the basin would reach an additional 2 acre-feet or 666,666 gallons of water.

By monitoring both degraded and intact meadows, the study team expects to detect changes in water levels, water temperatures, and water volumes associated with recovering meadows. Within the first year of this work the study will calculate expected targets of change for lagging and buffering of flows and water temperature (Arrigoni et al. 2008). Expected observations will include an increase in the average water level in meadows, and increase in the water volume in those meadows, along with appropriate buffering and lagging of water temperatures in streams that intersect the meadows.

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

Evaluation: Statistically sound determination of changes in water level, increased flow contribution to Desolation Creek

Reference Comparison:As a part of the evaluation, above, the reference variations will be charted and narrated.

Report: Results will be presented at professional workshops and in professional publications.

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.)

a. GENERAL SUMMARY: The study progression begins with finalization and survey of the study sites. To characterize the hydrology of the 2 target restoration meadows/wetlands and the single reference meadow. Each site will be bracketed by installing hydrologic monitoring sites at the upstream and downstream boundaries of the specific geologic feature. Stream discharge equipment will be installed immediately downstream of each identified study site. Cross-stream sections will be surveyed to evaluate meter measurements at one representative transect in each site. Vegetation response sites will be located along three randomly located lateral transects in each system. Details are delineated below:

Study sites will be clearly identified, coded, delineated, and made apparent to all people who are operating for any purpose on the property. The general sites have already been located, but the microsite location of loggers will need to be accurately and carefully determined utilizing topographic breaks where valley morphology suggests that shallow groundwater movement is constrained or can be easily estimated. A well driller, licensed and bonded for development of monitoring wells will establish the final points. Cultural review will be a critical second step, especially due to the large role of the Confederated Tribes of Umatilla Indian Reservation.

As introduced above, several data collection activities will take place concurrently. These include piezometer installations, temperature loggers (ground water and in-stream), stream level loggers, stream meter measures and fixed-point vegetation response studies. Ground Water Study: Piezometers contain instruments for measuring the pressure of a liquid or gas; they are often placed in boreholes to monitor the pressure or depth of groundwater. They will be installed in the upper 8 feet of soil profile in accordance with ORS chapter 468B. Installation will be provided by a licensed and bonded contractor, in accordance with ORS 537.747(3), selected from the OWRD list. There will be a total of 6 units placed in the meadows, two at each focused study site; each will be 1 inch in diameter, capped with bentonite and fitted with locking mechanisms. These units (piezometers containing a level logger) will bracket each of the meadows- one unit placed at the head of the meadow and one at the outfall. Each piezometer will be deployed with an included water temperature logger (model Onset 2016). The temperature and level logger (one instrument) will be near the bottom of the piezometer to assure that base flows are measured. Recordings will be registered hourly throughout the year (2016 through 2018). A set of metrics will be calculated for these groundwater data that include: 1) annual maximum and minimum water table depth at each piezometer location, 2) plots of water table depth for each piezometer and 3) changes in storage volume and duration for the water table within the available plant rooting zone.

In-Stream Study: A. Immediately downstream of each focused study site, one stream gauge equipped with a water level logger and a temperature logger will be installed. B. At each focused study site, a representative stream transect will be identified and permanently recorded using GPS coordinates that are quickly transferred to a master GIS database. Each stream gauge site will capture consistent flow velocities across the prismatic cross-section. Using this information, bulked stage-discharge relationships will be established for each of the gauge sites. The metrics used to show before and after change (relative to the restoration of the meadows) are: 1) annual minimum discharge at upstream and downstream gauges, 2) difference between gauges (at the top and bottom of the meadows) at time of minimum flows, and 3) % attenuation vs. peak discharge, to test for significant changes in attenuation and lag time before and after anticipated meadow restoration. In order to measure precipitation for this area the study will use the CASE weather station operated by the USFS just south of Dale, Oregon (published in real time through Mesowest at (<http://mesowest.utah.edu/cgi-bin/droman/mesomap.cgi?state=OR&rawsflag=3>)).

Vegetation Study:

Data will be collected and downloaded quarterly by North Fork John Day Watershed Council staff, and immediate reporting to the Confederated Tribes of Umatilla Indian Reservation will occur. At the close of the study cycle, partners will be able to express changes in species composition and density, in direct correlation with other monitoring data.

b. FEASIBILITY STUDY INITIATION: The feasibility study will begin immediately upon receipt of the award approval from Oregon Water Resources Department. Anticipated deployment season is late summer of 2016.

c. TASKS:

1.i. TITLE: Purchase monitoring supplies ii.TIMELINE: August, 2016

iii.ACTIVITIES: Research price points, select most cost effective supplies, and purchase iv.

RESOURCES REQUIRED: Staff person 1 day, purchasing and aligning infrastructure including: computer, phone, accounting systems

2.i. TITLE: Finalize monitoring microsites ii.TIMELINE: August, 2016 iii.ACTIVITIES:

Schedule field time with CTUIR, USFS, DCLLC, NFJDWC, travel to sites (420 miles total for four organizations to meet at sites), on-site visit (4 people) iv.RESOURCES REQUIRED: 6 T-posts to mark site, flagging (1 roll), GPS to record sites.

3.i. TITLE: Install Monitoring Stations: ii.TIMELINE: August, 2016 through September, 2016

iii.ACTIVITIES: Schedule installation with all partners; collect all supplies and tools; meet team on site (420 miles x 2 days); install piezometers, stage gauges, temperature loggers, and vegetation monitoring stations. iv.RESOURCES REQUIRED: 6 Piezometer Stations including: 60' of 1" diameter standpipe tubing, 6 protective covers, bentonite, piezometer tips, bore driver, protective caging, 18 T-posts; 8 water temperature loggers including 2 anchor bricks, 2 T-posts, 10' of cabling; 3 Stream Gauge Stations including: 3 T-posts, 3 staff gauges, 3 lengths of 1 1/4" PVC pipe 5' tall, 3 pipe adapters for screw cap, 3 screw-on end caps, PVC glue, 2 U-bolts per, cabling, 9 level loggers (Onset), 1 logger reader, 3 cable clamps; Vegetation monitoring stations including: 1 Solar Pathfinder including tripod; 1 copy of "Flora of the Pacific Northwest", 9 Vegetation isolation cages, 100' tape, 2 magnifying glasses;

4.i. TITLE: Collect Monitoring Data: ii.TIMELINE: August, 2016 through December, 2018

iii.ACTIVITIES: Four times per year - collection and review of data at all stations, upload data to data bank, delivery of data to CTUIR, evaluation of data. iv.RESOURCES REQUIRED: Data collection and management materials including: 1 field computer, 3 clipboards, 80 data collection sheets, vehicle, all monitoring supplies listed in appendices

5.i. TITLE: Results Sharing: ii.TIMELINE: November, 2017 through December, 2018

iii.ACTIVITIES: Compilation, Assessment, and Evaluation of Data, 1 meeting of all team partners at central location in Ukiah to review data (290 miles), Draft Publication, Partners review Publication, Final Draft produced, Publish in one environmental publication and present at 1 meeting. iv.RESOURCES REQUIRED: software, computer, printer, paper, ink (as match)

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.

A map is included as attachment A. The proposed project is located in T. 7S, R. 32 E; sections: 16, 28, and 27 and T. 9S, R.34E; sections 5 and 6.

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

Desolation Creek runs over 22 miles from source to outlet as a major tributary of the North Fork of the John Day River. The minor tributaries pertinent to this study in Desolation Creek include Lucky Creek Meadow, Wassen Meadow, and Desolation Meadow.

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

The project resulting from the feasibility study will be restoration that encourages natural floodplain storage, best categorized as off-channel water.

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

50% Exceedance Criteria - Water availability for storage is evaluated under the 50 Percent Exceedance system as a measure of the natural median flow for any given month. Water rights are then subtracted from the median value to determine storage availability in any month. In this instance, there are no water rights in the immediate area. The 50% exceedance is currently under study.

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

To restore ecosystem function and increase base flows in downstream waterways, which contributes to the economic, ecologic, and social values articulated in section 2, above and which also supports the needs described in "f" below.

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

The "Oregon Mid-C Steelhead Conservation & Recovery Plan: Summary of Tributary Habitat, Hydropower, Harvest and Hatchery Recovery Strategies, Actions & Prioritization Information" identifies the following limiting factors for Desolation Creek: degraded floodplain connectivity and function, degraded channel structure and complexity, degraded riparian area, altered hydrology, degraded water quality, altered sediment routing, passage barriers, channel structure, impaired fish passage, habitat diversity, water temperature, degraded riparian area, low flows, and high temperatures. The same document identifies specific threats including: livestock overgrazing of riparian area, mining, channelization, stream bank armoring, agricultural practices, sediments, changes in plant communities, water withdrawals and loss of beaver dams.

The Umatilla National Forest reports in "Desolation Ecosystem Analysis" (1999) that "In many respects, the Desolation Watershed is one of the most diverse watersheds on the Umatilla National Forest." The water generally seems clear and cold, but Desolation Creek does not meet State water quality standards for temperature. Fish habitat has been a high priority for management by private, federal and Tribal entities. Meadows are a significant component of the Desolation landscape; this is in contrast to all other areas of the Umatilla National Forest and local private lands, thus identifying this as some of the most significant meadow habitat found in the region. The above mentioned Ecosystem Analysis determined that a targeted maximum standard water temperature for Desolation tributaries is 55° to 60° F.

The Oregon Senate Bill 839 Science Subgroup states that all streams and rivers should have instream flows that maintain or restore, to the greatest extent possible, ecological functions and processes similar to those exhibited in their natural or unaltered state. It is widely accepted that a naturally variable flow regime supports sustainable freshwater ecosystems. But, what is the natural flow regime? After decades of ecosystem degradation, it is important to study the system in order to determine the target flow patterns.

Climate Change requires an informed, comprehensive approach to protect water systems including flows and quality water. While restoration actions will continue throughout the area, it is important to make the effort to pause and collect the data that provides the direction for apparently nuanced processes that actually will bring exponential results. Scientists anticipate increased air temperatures in eastern Oregon resulting in temporal and spatial changes in the delivery of fresh water. Residents can expect increased winter runoff from water melting earlier in the season and falling as rain rather than snow, earlier peak streamflows in the spring, and diminished runoff during the summer when water is most needed. The outcome of these changes is: significantly altered flows for all water users.

- 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.

The Grant County Watermaster has been contacted to determine any possible constraints on sinking piezometers. The geotechnical holes associated with the piezometer will be established by a licensed and bonded well driller, certified in monitoring wells as required by the Watermaster and OWRD.

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.

The Umatilla National Forest has been contacted for discussion of value to the U.S. Forest Service, identification of potential control meadows, and to discuss the project methodology. The Umatilla National Forest is involved by committing one meadow on USFS lands, participating in the piezometer site selection, and using the results to inform management. The USFS region is providing advice for the vegetation study through the efforts of an area ecologist who will visit the site with NFJDWC to initiate the vegetation study. The Confederated Tribes of Umatilla Indian Reservation are committed to restoration of First Foods resources in their Ceded Lands which include the Desolation Creek area. They are providing the science technical lead for the study, participation in site evaluation, the assessment which matches this study (financially, formatively, and summatively) and will author the publication. Ecotrust Forest Management will provide full-time staffing on site to protect study sites and to help with data collection. NFJDWC will lead the technical efforts - collecting data, uploading data, managing contracts, managing the grant, administration, and author the report. Tetra Tech is producing the associated Desolation Creek Geomorphologic Assessment and is prepared to offer advice and will meet with study participants to facilitate harmony of the two processes.

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

The North Fork John Day Watershed Council will provide data collection and evaluation services in the years extending beyond the funding period of the Oregon Water Resources Grant, and NFJDWC will provide personnel time for publication of outcomes. NFJDWC match will occur throughout the study process. It is secured.

The Confederated Tribes of the Umatilla Indian Reservation will provide study design, personnel time for: deployment of monitoring devices, data bank, evaluation of data and publication of outcomes, as well as the cost of the associated stream system Assessment which is so critical to understanding the entire system. CTUIR match will occur throughout the study period. It is secured.

The Umatilla National Forest will provide one site for deployment of monitoring devices, and personnel time to visit the site with the study team and determine exact monitoring locaitons and vegetation monitoring systems. Umatilla National Forest match will occur throughout the study period. It is secured.

Desolation Creek, LLC will provide restoration projects on two active meadows, personnel time to locate deployment sites and to protect and police the sites to assure prevention of disturbance, and personnel to assist with data collection. Desolation Creek, LLC match will occur throughout the study period. It is secured.

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.

Scott O'Daniel: Feasibility Study Lead - Scott O'daniel is the Research Geographer for the Confederated Tribes of Umatilla Indian Reservation. Mr. O'Daniel's earned a Masters Degree from the University of California at Santa Barbara in Geography and has conducted studies on floodplains for the CTUIR for 19 years. Mr. O'Daniel will lead the study design, provide the primary role in identifying monitoring sites and deliver training to all monitoring technicians to assure that all data is gathered within the quality assurance and quality control standards established by the Confederated Tribes. Scott will also provide advice and housing for the data management, along with authoring of the study results.

John Zakrajsek: North Fork Habitat Biologist for the Confederated Tribes of the Umatilla Indian Reservation. Mr. Zakrajsek carries a Master's Degree in Geology from the University of Idaho. John's role in the project includes providing a comprehensive understanding of how the study will intersect with the existing Desolation Creek Assessment. His role is primarily focused on the associated Stream Hydrologic Assessment.

Marty Eisenbraun: Natural Resources Manager: Ecotrust Forest Management - Parent Company to Desolation Creek, LLC - Mr. Eisenbraun brings an intimate knowledge of the landscape and ecosystem to the project. With a forest management background, Marty oversees the comprehensive project activities on the Desolation Creek private lands. He monitors restoration construction, performs maintenance on the structures and installations, represents the landowners' interests, and delivers quality data on a wide variety of resources.

Valeen Madden: Private Lands Project Coordinator: North Fork John Day Watershed Council - Valeen brings 6 years of data collection and project management background to this undertaking. She has collected quality data on vegetation, in-stream water quality, macro-invertebrates, and upland conditions to a diverse number of projects. Ms. Madden works under the utmost quality controls. Valeen will provide the primary data collection technical services. She will collect the data, upload it, and run evaluations.

Elaine Eisenbraun: Executive Director: North Fork John Day Watershed Council - Ms. Eisenbraun brings 30 years of project management, research, and resource management to the project. She has been the executive director of a research education center. Ms. Eisenbraun will provide supervisory management to the data collection and management. She will collaborate in the field to check QA/QC, and to guarantee overall best practices. Elaine will assist with data evaluation authoring publication of results.

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.

Several large meadows in the private lands on lower Desolation Creek have been subjected to a wide variety of land use changes that result in the meadows having decreased hydrologic capacity. By monitoring both degraded and intact meadows the study will show changes in water level, water temperatures and the volume of water that is stored in association with recovering meadows. It is expected that the average water level in the meadows will increase (and the volume as well) along with the buffering and lagging of water temperatures of the streams that intersect these meadows.

1. Characterizing the site boundaries -

Study sites boundaries will be located at topographic breaks where valley morphology suggests that shallow groundwater movement is constrained or can be estimated easily. Using a combination of 10m USGS DEMs and aerial imagery, a reconnaissance level map of locations will be created to be re-examined in the field before final locations for piezometers and stage gauges are installed.

2. Characterizing the hydrology -

To initially characterize the hydrology of the 2 target restoration meadows/wetlands, Lucky and Wassen, and the reference meadow (Desolation), within the Umatilla National Forest, the study will bracket the feature (meadow) by installing shallow piezometers at the upstream boundary of the meadow and at the downstream boundary. Additionally, there will be stage gauges installed at the inlet and outlet of these meadows to monitor stream flow. These shallow piezometers in combination with stage gauges will allow for the capture of comprehensive data combining the Piezometer and stage gauge installation methods.

The approved contractor will install the piezometers in the upper 8 feet of the soil profile. Piezometers will be 1 inch interior diameter, capped with bentonite and fitted with locking mechanisms. The team will also deploy self-contained water level loggers that measure water temperature (Onset 2016), into each of the piezometers. These instruments will be placed near the bottom of the piezometer to assure that base flows are measured. The level loggers will record water levels hourly year round and be downloaded quarterly. Data QA/QC, management, and dissemination are addressed below.

The stream gauges equipped with water level loggers will be installed in the channel downstream of each meadow. Using data gathered from the stream gauges the team will develop stage-discharge relationships for each study site below a meadow. (3). during the installation, a representative stream transect will be identified at each site, for taking current meter measurements. Ideal sites will display consistent flow velocities through relatively prismatic cross-sections. Gauges for these control points will be placed at locations with better flow conditions. The study will use water level loggers that also measure water temperature (Onset 2016) to monitor changes in both the piezometers and the stage gauges. These will be visited no less than 4 times per year by NFJDWC staff to check on the integrity of the equipment and to download the data. In addition, the landowner will make frequent and regular checks of the sites.

The study will collect 1 to 2 years of hourly water level and water temperature information to provide adequate data to characterize the annual flow regime and the buffering of lagging associated with the meadow storage (Arrigoni et al 2007). The study team will seek to extend the study over additional years beyond the efforts for the pertinent grant funds from OWRI in order to provide a more comprehensive picture of meadow systems.

All data from this effort will be stored both with the NFJDWC and the CTUIR. An outcome will include the development of a photo point database that tracks both seasonal and annual changes associated with seasonal inundation and the results of restoration efforts. Along with the analytical outputs from each of the sites, these photos will add inferential or context-specific information that will aid in the interpretation of the assessment of relative storage associated with each meadow.

3. Vegetation Study -

Data will be collected and downloaded quarterly by North Fork John Day Watershed Council staff, and immediate reported to the Confederated Tribes of Umatilla Indian Reservation. Upon initiation of the project, vegetation response sites will be located along three randomly located 100' lateral transects in each system. On each

transect, a 1 meter by 1 meter frame will be placed on the upstream side of the transect, set square to the tape and aligned to extend forward (up-tape) from the corner location point. Corner location points will occur every 20 feet on the transect. Once during each data collection trip, the solar pathfinder will be set up at a predetermined, permanent, representative site, so that solar tracking takes place a minimum of once per year at each meadow at the same calendar time each year. In addition, 3 vegetation isolation cages will be set up at each site and plant species will be recorded to determine the site species potential. At the close of the study cycle, the team will be able to present trends in species composition and cover.

Implementation of the project will take place through competitively obtained grant funds from state, private and federal sources. The North Fork John Day Watershed Council has a strong track record of success in obtaining and implementing grants. The Council works on an average of 25 - 34 grant projects per year. With a staff of 6 year-round employees, and the support of a summer staff of approximately 40 people, the Council accomplishes a large portfolio of work. The Watershed Council also employs one of only two credentialed grant writers in Oregon, east of Portland. The Council participates in many Oregon Watershed Enhancement Board funded projects and also oversees projects funded by U.S. Forest Service, Bureau of Reclamation, U.S. Department of Fish & Wildlife, NOAA, Oregon Department of Parks and Recreation, Oregon Department of Environmental Quality, Oregon Youth Conservation Corps, Ecotrust, Audobon, National Fish & Wildlife Foundation, National Forest Foundation, Keen, Bella Vista, Confederated Tribes of Umatilla Indian Reservation and many more entities.

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.

This is water conservation in the natural sense, as opposed to the legal application. It is designed to generate higher quantities and qualities of water to downstream needs.

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.

The project will mitigate the need to develop new water supplies by enhancing existing flows. Similar work has taken place in northern California (Henery, et. al. 2011: Meadow Restoration to Sustain Stream Flows and Native Trout), where researchers take an innovative approach to quantifying benefits of meadow restoration. Also in the Sierra Mountains, researchers state that more " water will fall as rain rather than snow which will run off immediately in large winter pulses that will increase flooding and are likely to be beyond the storage capacity of the existing reservoir system. Meanwhile there will be much less snowmelt that recharges streams and helps keep a reliable water supply for people and wildlife in summer and autumn. These changes are a monumental challenge for the people, economy and environment of California. An innovative solution may help provide part of the solution to this problem: mountain meadow restoration and conservation." (Timothy Male, USFWS, et. al. Sierra Nevada Meadow Restoration)

See Attachment C

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.

The project will require Cultural Review, planned to be implemented by the Confederated Tribes of Umatilla Indian Reservation.

The study also requires the services of a licensed and bonded monitoring well driller as per Grant County Water Master and OWRD for the feasibility study. For the implementation, permits for typical riparian, meadow, and hydrologic restoration projects in the area of times require: Cultural Reviews - These studies seek to locate and identify above and below ground sites that contain historic and historically sensitive artifacts, locations, and concerns. If greater than 50 cubic yards of organic and inorganic materials are moved, the restoration team will need an Oregon Department of State Lands "Removal and Fill" permit. It is often associated with an Army Corps of Engineers Department of the Army Permit.

Above-Ground Storage

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

- | | | |
|--|------------------------------|--|
| Will the project divert more than 500 acre-feet of surface water annually? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Will the project impound surface water on a perennial stream? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No |
| Will the project divert water from a stream that supports sensitive, threatened or endangered species? | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> 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.

No by-pass will take place. The optimum flows based on both volume and timing will be established at the study conclusion. The impact of restoration projects will be determined by comparing the active sites with the control site. Science, studies and observations all indicate that restoration can and should improve hydrologic function and wet meadow connectivity, and this study will bring hard numbers toward that end for the Desolation Watershed.

- 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.

Alternative 1: Do nothing - If the study is not completed, restoration work will still continue in the Desolation Watershed, and it will persist as good, important restoration. However, there is always room to increase efficiencies and to increase the body of knowledge that is foundational to any decision making. In this instance, the study team is confident that additional knowledge will provide value-added to the restoration industry.

Alternative 2: Hard change - It is likely that water supplies can be enhanced in the John Day system through a variety of hard practices including: rapid enactment of earlier water rights in each season, voluntary use reductions, downstream water restrictions, legal water conservations, reservoir construction, and other practices. These are available, proven and possible alternatives. Each has a significant cost to the wildlife, farmers, residents, and financial picture (both finite and comprehensive). The establishment of the costs and their analysis is an enormous undertaking, one that would require the cooperation of a wide selection of entities. It is outside of the scope of this study. If water users and managers are serious about moderating the reduced flows and the impacts of climate change, then action needs to be swift and efficient. Enhancement of existing systems is a more natural and a more streamlined path, than are the alternative 2, hard practices.

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

There is no anticipated nor likely harm from scientifically installed restorations that have as their nucleus, a close connection to fully naturally functioning systems. Natural storage defines the re-established use of historic "sponges" - those intrinsic soil/geologic formations that consist of well aerated soils able to absorb water and filter various organic and inorganic elements into and out from the water. Because anthropogenic impacts must be figured into the equation, no system is likely to be 100% natural in the immediate future. But, an intact system can replicate a virgin system as much as possible and have an enormously positive impact.

- 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.

Degradated meadows define a far too common condition in the Blue Mountains. In addition, the number of and destruction from stand-replacing wildfires are on the rise all too rapidly. When a wildfire scorches and blackens a meadow, riparian area and adjacent forest, the impact on water systems is enormous and far reaching. Climate change is upon this area. While people continue to discuss climate change as a future force, it is here and it is now. Weather is changing. Most human farm, industrial, and general life practices are built and based upon the conditions and natural systems that are current, understood and well defined. The changing climate is unpredictable at the local level. Scientists have modeled the regional expectations, but finite, local change is uncertain. Even if the modeled predictions are projected upon the local scene, the ability of people to respond rapidly, effectively, and in a comprehensive way that benefits all systems, is limited. It is limited by dollars, designs, and creative change patterns. On the other hand, nature has thousands of years of experience adapting to change. The natural world maintains an almost magical ability to shift, transport, re-populate, and evolve rapidly and effectively with the least possible loss of systems dynamics. It follows that cooperation with the natural system is the wise and effective approach to augmenting water conservation, utilization, and storage.

As clearly delineated in Question 2 and 6 above, fisheries in the Blue Mountains and John Day system face enormous challenges in the near and distant futures. Fish are a mainstay of social, ecologic, and economic efforts in the area. They are an important First Food for the Umatilla Tribes, a basic component of the dynamic ecosystem in the waterways, and the key to job development and financial

resource inputs in the area.

Anadromous fish runs in the Columbia bring 1 million salmon and steelhead per year. Page I-7 of the Environmental Assessment for the North Fork of the John Day Wild and Scenic River Management Plan states, "The value of the only remaining genetically viable run of spring Chinook salmon in the entire Columbia River Basin is incalculable." Three of the critical species that will benefit from this project include bull trout, steelhead, and Chinook salmon.

*Bull Trout (*Salvelinus confluentus*) are rated as at moderate to high risk of extinction throughout the North Fork John Day River drainage (Ratliff and Howell, 1992). They are federally listed as "Threatened." Resident forms complete their entire life cycle in the tributary streams in which they spawn and rear. Bull trout require especially clean, cold water temperatures above 59 °F are thought to limit the survival of juveniles. Headwater streams provide habitat for resident forms of bull trout in all their life stages and for connected, habitats with structural components that provide good hiding cover (boulders and large wood).*

*Steelhead (*Oncorhynchus mykiss*) are listed as threatened under the ESA. A recovery plan has been developed for the Oregon Steelhead Populations in the Middle Columbia River Steelhead Distinct Population Segment including a recovery plan for the North Fork John Day areas. Annual steelhead spawning index counts have been measured by the ODF&W since 1959 in the John Day River Basin. The management goal is 8.6 redds per mile. The 5-year average remains well below that goal. The Upper NFJD is critical to recovery of threatened Mid- Columbia steelhead providing source waters to the only 'Highly Viable' population in the John Day. Steelhead are capable of surviving in a wide range of temperature conditions. They do best where dissolved oxygen concentration is at least 7 parts per million. This is a unique species; individual development is dependent on environment. Adults migrate from a marine environment into the freshwater streams and rivers of their birth in order to mate (anadromy).*

*The Chinook salmon (*Oncorhynchus tshawytscha*) is the largest species in the Pacific salmon genus, *Oncorhynchus*. The common name refers to the Chinookan people. Chinook salmon (*Oncorhynchus tshawytscha*) feed on terrestrial and aquatic insects, amphipods, and other crustaceans while young, and primarily on other fishes when older. Adults migrate from a marine environment into the freshwater streams and rivers of their birth in order to mate (anadromy). They spawn only once and then die (semelparity).*

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.

N/A

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.

The study and the anticipated projects are 100%, completely intended, planned and designed to enhance flows to conserve, maintain, and enhance aquatic life, fish life and other ecologic values.

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.

Permits for typical riparian, meadow, and hydrologic restoration projects in the area oft times require: Cultural Reviews - These studies seek to locate and identify above and below ground sites that contain historic and historically sensitive artifacts, locations, and concerns.

If greater than 50 cubic yards of organic and inorganic materials are moved, the restoration team will need an Oregon Department of State Lands "Removal and Fill" permit. It is often associated with an Army Corps of Engineers Department of the Army Permit.

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.
N/A
- 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.
N/A
- c) Analyses of environmental harm or impacts from the proposed storage project.
N/A
- 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.
N/A

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.
N/A

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.

The study team is pleased and willing to include the project in the inventory and contact the Department's Grant Specialist to do so.

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.

Permits for typical riparian, meadow, and hydrologic restoration projects in the area oft times require:
Cultural Reviews - These studies seek to locate and identify above and below ground sites that contain historic and historically sensitive artifacts, locations, and concerns. If greater than 50 cubic yards of organic and inorganic materials are moved, the restoration team will need an Oregon Department of State Lands "Removal and Fill" permit. It is often associated with an Army Corps of Engineers Department of the Army Permit.

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:
<ul style="list-style-type: none"> • Cash - Cash is direct expenditures made in support of the feasibility study by the applicant or partner*. 	<ul style="list-style-type: none"> • Secured - Secured funding commitments from other sources.
<ul style="list-style-type: none"> • In-Kind - The value of in-kind labor, equipment rental and materials essential to the feasibility study provided by the applicant or partner. 	<ul style="list-style-type: none"> • 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)
<i>Confederated Tribes of Umatilla Indian Reservation - Cultural, Assessment, Geomorph</i>	<input type="checkbox"/> cash <input checked="" type="checkbox"/> in-kind	<input type="checkbox"/> secured <input checked="" type="checkbox"/> pending	\$30,000	April 16
<i>North Fork John Day Watershed Council</i>	<input type="checkbox"/> cash <input checked="" type="checkbox"/> in-kind	<input checked="" type="checkbox"/> secured <input type="checkbox"/> pending	\$30,147	June 16
<i>Ecotrust Forest Management</i>	<input type="checkbox"/> cash <input checked="" type="checkbox"/> in-kind	<input type="checkbox"/> secured <input checked="" type="checkbox"/> pending	\$10,000	June 16
<i>USFS - Site, personnel</i>	<input type="checkbox"/> cash <input checked="" type="checkbox"/> in-kind	<input type="checkbox"/> secured <input checked="" type="checkbox"/> pending	\$4,000	June 16
	<input type="checkbox"/> cash <input type="checkbox"/> in-kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in-kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in-kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in-kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in-kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in-kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		

VI. Feasibility Study Schedule

Estimated Study Duration: July 1, 2016 to December 31, 2018

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

Feasibility Study Key Tasks	2016			2017				2018 & Beyond
	2 nd Qtr	3 rd Qtr	4 th Qtr	1 st Qtr	2 nd Qtr	3 rd Qtr	4 th Qtr	
<i>Finalize Sites</i>		X	X					
<i>Install monitoring</i>		X	X					
<i>Collect data</i>		X	X	X	X	X	X	X
<i>First year analysis</i>			X	X				
<i>Second year analysis</i>							X	X
<i>Publication</i>								X
<i>Administration and Seek funds to extend study</i>				X	X	X	X	X
<i>Long term data collection (not this grant funding)</i>								X
<i>Remove monitoring devices</i>								X
<i>Purchase supplies</i>		X	X					
<i>Meet with partners</i>		X	X	X	X	X	X	X
<i>Cultural</i>	X							
<i>Hydrogeomorphic Assessment</i>	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	1,350	\$40.00	\$29,440		\$24,560	\$54,000
Contractual/Consulting	6 <i>piezometers</i>				\$10,000	\$10,000
Equipment (must be approved)	N/A					
Supplies	37 items, see <i>attachment B</i>		\$1,960		\$13,656	\$15,586
<i>Other: Riparian Gemorphic Assessment</i>	1	\$20,000.00	\$20,000		\$0	\$20,000
<i>Cultural Surveys</i>	80	\$100.00	\$8,000		\$0	\$8,000
<i>Travel</i>	2,500	\$0.54	\$150		\$1,200	1,350
<i>Landowner (construction, monitor, maintenance)</i>	250	\$40.00	\$10,000		\$0	\$10,000
Administrative Costs**	10%		\$4,597		\$6,896	\$11,493
Total for Section A			\$74,147		\$56,282	\$130,429
Percentage for Section A			57%	0%	43%	100%

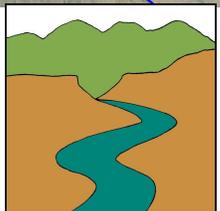
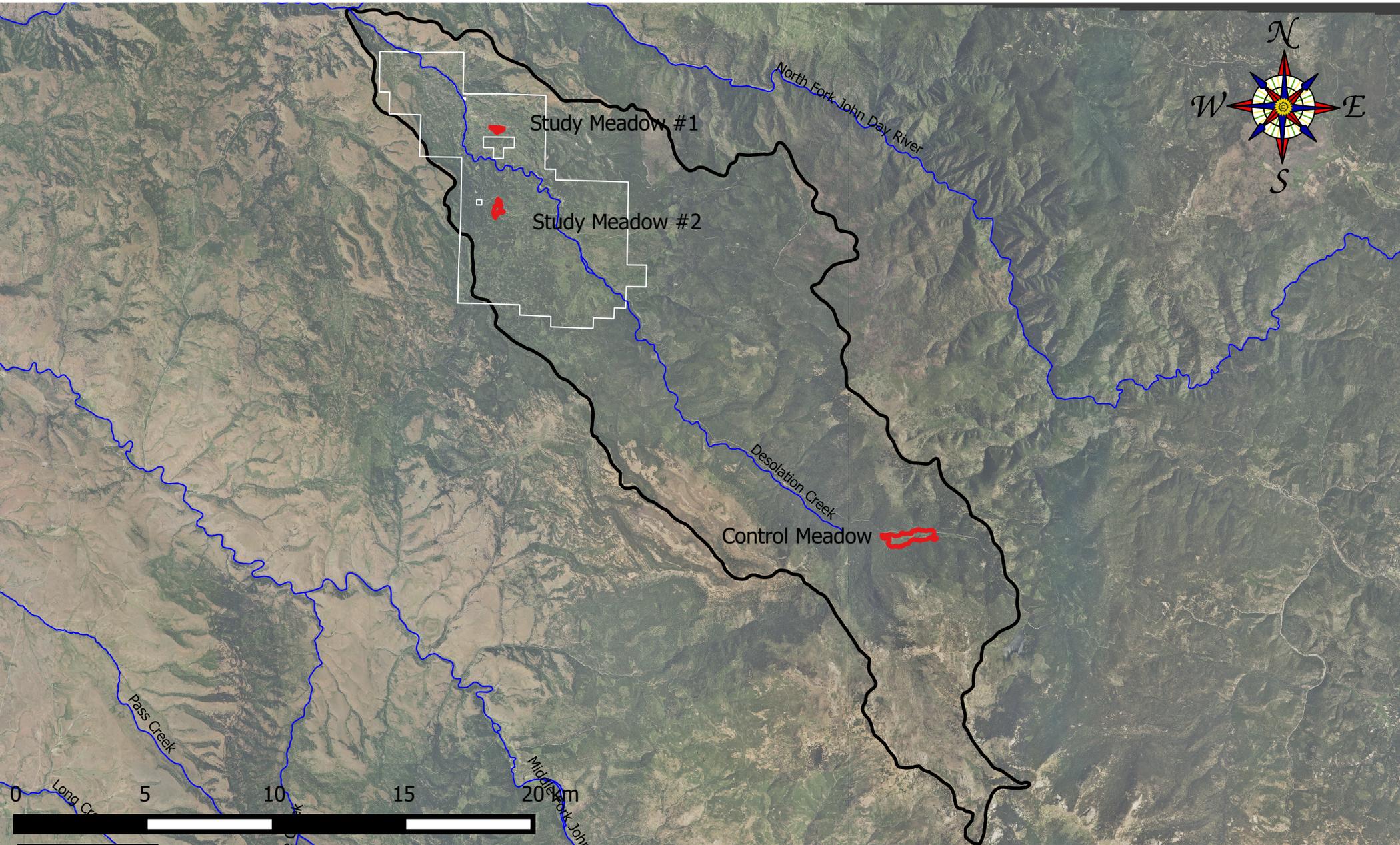
* Note: The "Unit" should be per "hour" or "day" – not per "project" or "contract." $Units \times Unit\ Costs = Total\ Cost$

** Administrative Costs may not exceed 10 percent of the total funding requested from the Department

Section B

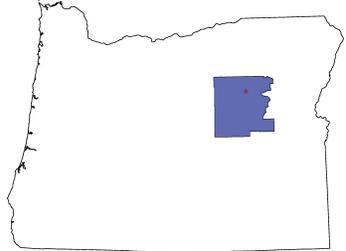
If grant amount requested is \$50,000 or greater, you **MUST** complete Section B. Key Tasks in Section B should be the same as the Key Tasks in Section VI (Feasibility Study Schedule).

Understanding Meadow Storage Capacity in Upper John Day



North Fork John Day Watershed Council

Created by: North Fork John Day Watershed Council
 Address: 691 North HWY 395
 Long Creek, Or 97856
 Date: January 26, 2016



Legend

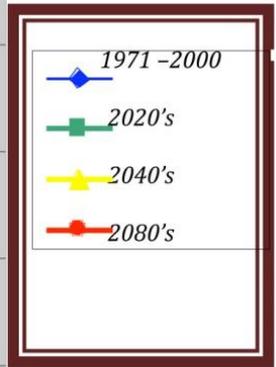
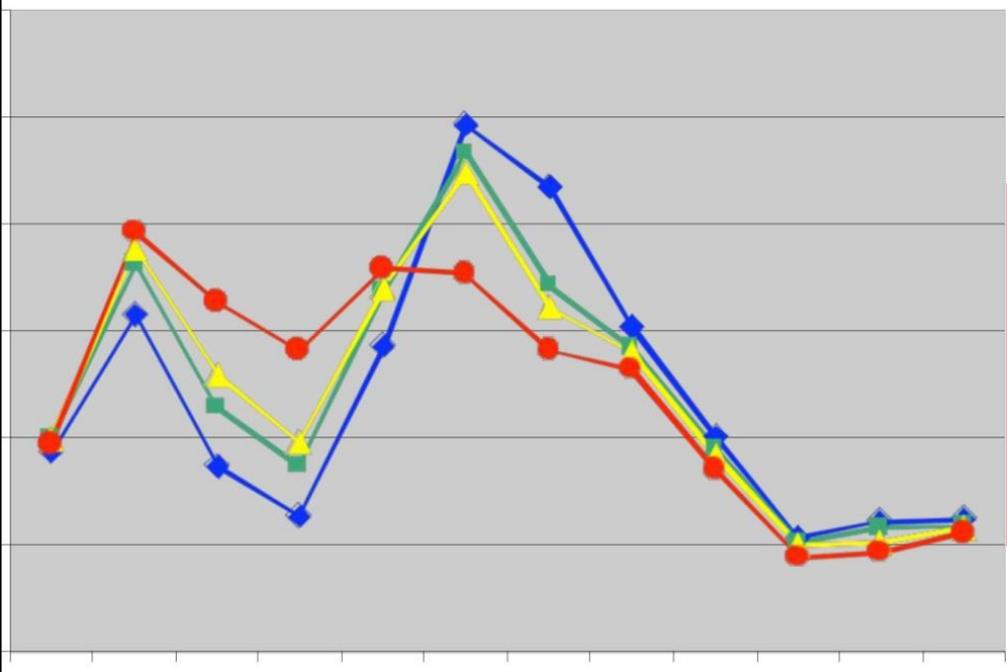
- Major JD Streams
- Study Meadows
- Desolation Creek, LLC Property
- Desolation Creek Sub-Watershed

Supplies Itemization

Item	Qty	Cost per	Total
Hoboware Shuttle & software	1	\$ 350.0	\$ 350.0
Piezometers and supplies	11	\$ 495.0	\$ 5,445.0
Slide Hammer	1	\$ 180.0	\$ 180.0
Drivehead Assembly	6	\$ 172.8	\$ 1,036.5
3' Stainless Driver Point	6	\$ 52.3	\$ 313.5
Delrin Caps	6	\$ 9.0	\$ 54.0
T-posts (6 ft)	29	\$ 6.0	\$ 174.0
Flagging	1	\$ 5.0	\$ 5.0
GPS	1	\$ 550.0	\$ 550.0
Piezometer guard	6	\$ 50.0	\$ 300.0
Baro loggers	2	\$ 495.0	\$ 990.0
Temperature loggers	8	\$ 125.0	\$ 1,000.0
Bricks	2	\$ 5.0	\$ 10.0
Staff Gauges	3	\$ 100.0	\$ 300.0
1 1/4" PVC	15	\$ 1.1	\$ 16.5
Pipe Adapters	3	\$ 4.0	\$ 12.0
Screw Caps	3	\$ 6.0	\$ 18.0
PVC Glue	1	\$ 10.0	\$ 10.0
U- bolts	6	\$ 5.0	\$ 30.0
Level logger	3	\$ 600.0	\$ 1,800.0
Logger Reader	1	\$ 375.0	\$ 375.0
Cable Clamps	3	\$ 2.0	\$ 6.0
Solar Pathfinder	1	\$ 300.0	\$ 300.0
Flora of PNW	1	\$ 100.0	\$ 100.0
Vegetation Isolation Cages	9	\$ 25.0	\$ 225.0
100' Tape	1	\$ 60.0	\$ 60.0
Magnifying Glasss	2	\$ 50.0	\$ 100.0
Mapping Frame 1 meter	1	\$ 145.0	\$ 145.0
Clip Boards	2	\$ 8.0	\$ 16.0
Data Sheets (100/pkg)	1	\$ 14.0	\$ 14.0
Data Software	1	\$ 300.0	\$ 300.0
Data Computer	1	\$ 900.0	\$ 900.0
Printer	1	\$ 125.0	\$ 125.0
Supplies- paper, ink, pencils	1	\$ 75.0	\$ 75.0
Camera	1	\$ 250.00	\$ 250.0
37 Items			\$ 15,585.50

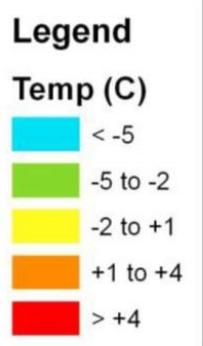
John Day Subbasin

Modeled
Rainfall &
Snowmelt
(Acre-feet)
12,000
10,000
8,000
6,000
4,000
2,000
0

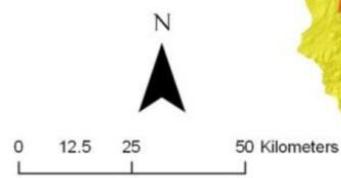
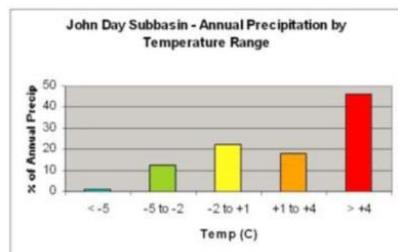
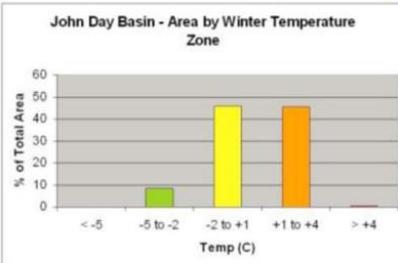
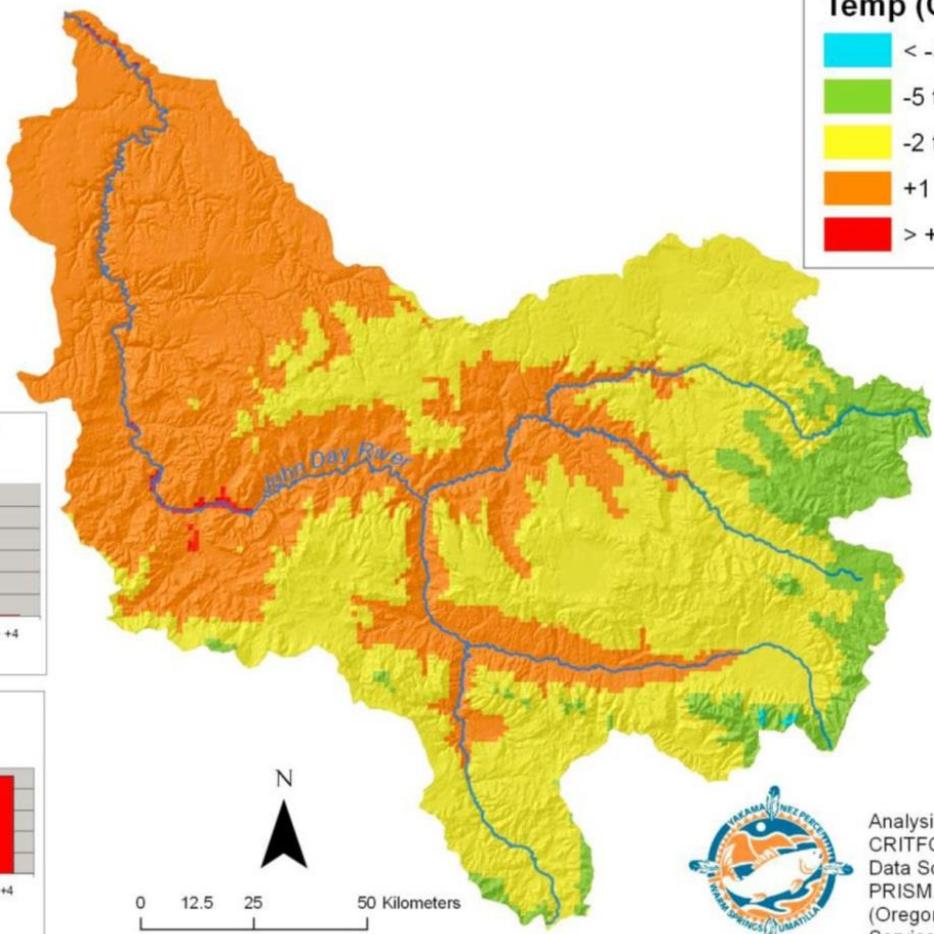


Oct Nov Dec Jan Feb Mar Apr May Jun Jul Aug Sept

John Day River Subbasin Mean Winter (Nov-Mar) Temperatures (1971-2000)



Areas shown in yellow are likely most at risk for loss of snowpack from near-term climate change.



Analysis by
CRITFC
Data Source:
PRISM, 2007
(Oregon Climate
Service Group)

EARTH & WATER WORKS, INC.

LA GRANDE, OR 97850

541-963-2244

WWC# 1775 CCB# 142427

Date
1/29/2016

ESTIMATE

ESTIMATE#
23592

Name / Address
North Fork John Day Watershed Council

Description	Qty	Cost	Total
INSTALL & REMOVE 6-HAND DRIVEN PIEZOMETERS (MONITOR WELLS)			
INSTALLATION			
START CARD PERMIT (STATE PERMIT REQUIRED)	6	225.00	1,350.00
TRAVEL	5	60.00	300.00
8' DRIVEN PIEZOMETER	6	900.00	5,400.00
-3FT BENTONITE SEAL IN 4" TOP HOLE			
-PIEZOMETER WILL BE DRIVEN FROM 3' TO 8' WITH A FENCE POST DRIVER			
-ALL PIEZOMETERS & FENCE POST DRIVER WILL BE PROVIDED BY WATERSHED COUNCIL			
-MONITOR WELL FLUSH MOUNT VAULT & SEAL			
REMOVAL			
WELL ABANDONEMENT PULL PIEZOMETER AND FILL WITH CEMENT	6	500.00	3,000.00
TRACKHOE	3	80.00	240.00
TRAVEL	6	60.00	360.00
Total			\$10,650.00

This estimate is good for 10 days. All work to be completed in a workmanlike manner according to standard practices. Any alterations from above specifications involving extra cost will be executed upon agreement with the customer or agent, and will become an extra charge over and above the estimate. All agreements contingent upon accidents or delays beyond our control. The customer agrees to pay for any and all work over and above this estimate required by the Oregon Water Resource Dept. Providing access for drilling equipment in and out of a site will be the responsibility and expense of the customer. The customer agrees to pay the reasonable attorney's fees & collection costs if a suit or action is filed hereon.

The above prices, conditions and specifications are satisfactory and are hereby accepted. You are authorized to do the work as specified. Payment will be made as outlined above.

Acceptance Sign. _____ Date: _____



February 1, 2016

Oregon Water Resources Department

725 Summer Street NE, Suite A
Salem, OR 97301

Subject: Letter of Support for NFJDWC Meadow Storage Study

Dear ORWD Grant Specialist:

Tetra Tech was recently hired by the Confederated Tribes of the Umatilla Indian Reservation to conduct a Desolation Creek Geomorphic and Hydrologic Assessment and Action Plan for the Desolation Creek watershed. We will be working in partnership with the North Fork John Day Watershed Council (NFJDWC), among others, to assemble existing data and collect new information leading to implementation of restoration actions that will have measurable benefits to Endangered Species Act (ESA) – listed fish and other aquatic and terrestrial species of concern.

Tetra Tech supports the NFJDWC's study to determine the feasibility of increasing meadow and wetland storage capacity through restoration actions. We believe the results of this study could be a valuable addition to the assessment component of the plan, and contribute toward our knowledge and understanding of system-wide hydrology in the watershed.

Respectfully submitted
Tetra Tech, Inc.

A handwritten signature in black ink, appearing to read 'Vana Nelson', with a horizontal line extending to the right.

Aquatic Habitat Biologist

Desolation Creek Assessment and Action Plan Project Manager



ECOTRUST FOREST
MANAGEMENT

February 1, 2016

Oregon Water Resources Department
725 Summer Street
Salem, Oregon 97301

RE: Letter of Support for the Understanding Meadow Storage Capacity in Upper John Day Project

Ecotrust Forest Management (EFM) is pleased to support the application titled, "Understanding Meadow Storage Capacity in Upper John Day," submitted to the Oregon Water Resources Department for funding through the "Water Conservation, Reuse and Storage Feasibility Study Grant Program," by the North Fork John Day Watershed Council.

Ecotrust Forest Management, the manager of Desolation Creek LLC, the landowner of the Desolation Creek property, is committed to managing forests for a diverse array of products, including enhanced water quality. As an important source of cold, clean water into the John Day River, the restoration of Desolation Creek and its associated springs and meadows has been a priority throughout our ownership. This mission is shared by our community partners who include the Confederated Tribes of the Umatilla Indian Reservation, ranching families who have grazed the land for multiple generations, and the North Fork John Day Watershed Council.

Funding for this project will provide the opportunity to gather critical information about the retention cycle of wetland meadows that we anticipate will add great value to understanding natural water storage potential on a regional level. Our support of this project also includes a \$10,000 funding match.

We strongly urge funding for this important project which has the potential to strengthen regional water storage to help ensure a steady supply of cold, clean water for the communities of Eastern Oregon into the future.

Very truly yours,

Ecotrust Forest Management

Bettina von Hagen, CEO



United States
Department of
Agriculture

Forest
Service

Umatilla
National
Forest

2517 S.W. Hailey Avenue
Pendleton, OR 97801
541-278-3716

File Code: 1560

Date: February 8, 2016

Oregon Water Resources Department
Attention: Grant Specialist
725 Summer Street NE, Suite A
Salem, OR, 97301

Dear Grant Specialist:

The North Fork John Day Watershed Council in Partnership with the Confederated Tribes of the Umatilla Indian Reservation and the Umatilla National Forest, has submitted a grant proposal to your organization. The grant is for a planned feasibility study of the Storage Other Than Above Ground Type. The aim of the grant is to Understand Meadow Storage Capacity in the Upper John Day. The project area is within the Desolation Creek Watershed of the North Fork John Day River Sub-basin.

The Council and Tribes will study the feasibility of increasing meadow storage capacity through active restoration. The study analyzes three meadows, two undergoing restoration and one control site. The water balance is calculated by installing shallow piezometers, including level and temperature loggers at two meadow boundaries, and installing stage gauges. Ambient measurements will be taken on representative stream transects. Hourly logger data will be collected and stored at NFJDWC and CTUIR. After analysis, recommendations will articulate best restoration practices in the region.

The Desolation Creek drainage is located within the North Fork John Day River sub-basin, a key Major Population Group in the Mid-Columbia Steelhead Recovery Plan which was finalized in 2010. Desolation Creek is a priority watershed for the CTUIR and the UNF.

The grant application submitted by the Watershed Council would help the Partners understand meadow storage capacity so we could prioritize them for restoration and refine our restoration tools. The Umatilla National Forest is committed to providing \$4000 of employee salary as an in kind match for the project. I believe that your support in funding this grant application would be funds well spent.

Sincerely,

Ian Reid
North Fork John Day District Ranger

cc: Ed Farren
Katherine Ramsey
North Fork John Day Watershed Council



**Confederated Tribes *of the*
Umatilla Indian Reservation**

DNR Fish & Wildlife Programs



46411 Timine Way
Pendleton, OR 97801

www.ctuir.org

email: info@ctuir.org

Phone 541-276-3447

February 8, 2015

OWRD

ATTN: Grant Specialist
725 Summer Street, Suite A
Salem, OR 97301

To Whom It May Concern:

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR) urge you to support the North Fork John Day Watershed Council's (NFJDBC) 2015-17 Water Conservation, Reuse and Storage Feasibility Study Grant Program application. The NFJDBC functions as one of the primary partnering entities in the North Fork John Day basin for public and private landowners interested in improving land management practices and restoring or improving habitat for listed and non-listed aquatic and terrestrial wildlife.

The CTUIR recently entered into a conservation agreement for a period of 15 years with Desolation Creek LLC whereby the two parties have agreed to implement a suite of actions to address physical and biological processes and in turn improve habitat for wildlife on their Desolation Creek property. Under the conservation agreement the CTUIR and its collaborators will be using a process driven approach to undertake a geomorphic assessment and develop an action plan for the entire Desolation Creek basin by incorporating information from the private land and those surrounding the property managed by the Umatilla National Forest. The final action plan will create a scientifically defensible approach to habitat restoration throughout the basin.

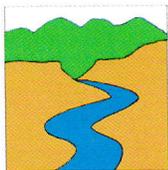
For the CTUIR this process driven approach was established through their Umatilla River Vision which identifies key Touchstones (Hydrology, Connectivity, Geomorphology, Aquatic Biota, and Riparian Vegetation) for resource management and restoration. This document is the mechanism under which the CTUIR works to support their First Foods of Water, Salmon, Deer, Couse, and Huckleberry integral to tribal culture. That is, supporting the First Foods supports the tribal culture. Recovering processes tied to extensive meadow habitats in Desolation Creek supports all the First Foods within the immediate meadows and/or within the Desolation Creek watershed.

The NFJDBC's efforts to quantitatively qualify upland meadow contributions to streamflow and water storage complements efforts being conducted under the assessment and action plan funded by the CTUIR. Restoration actions developed under the action plan will be implemented over the next seven to ten years allowing for the incorporation of data developed under this grant into realized actions. Toward this effort the CTUIR will be contributing \$30,000 of in-kind by providing guidance on equipment installation and data collection, data storage, securing cultural resource surveys, and reconciling this effort with the larger basin wide assessment.

Please contact John Zakrajsek (NF John Day Habitat Biologist) at 541-427-7943 with any additional questions about CTUIR's support for this proposal and fisheries habitat work within the NF John Day Basin.

Sincerely,

Gary A. James
Fisheries Program Manager



N o r t h F o r k J o h n D a y W a t e r s h e d
C o u n c i l

691 N Hwy 395 PO Box 444 Long Creek, OR 97856 541 421-3018
www.nfjdw.org

February 8, 2016

Oregon Water Resources Department
725 Summer Street
Salem, Oregon 97301

RE: Letter of Support for the Understanding Meadow Storage Capacity in Upper John Day Project

The North Fork John Day Watershed Council is committing its support for the “Understanding Meadow Storage Capacity in Upper John Day”, submitted to the Oregon Water Resources Department for funding through the “Water Conservation, Reuse and Storage Feasibility Study Grant Program”.

Funding for this project will provide the opportunity to gather critical information about the retention cycle of wetland meadows that we anticipate will add great value to understanding natural water storage potential on a regional level. Our support of this project also includes a \$30,147 secured funding match.

We strongly urge funding for this important project which has the potential to strengthen regional water storage to help ensure a steady supply of cold, clean water for the communities and landscapes of Eastern Oregon into the future.

Sincerely,

Elaine Eisenbraun
Executive Director
North Fork John Day Watershed Council