Grant Application

Computational Modeling to Enhance the Drought Resiliency of Shoshone-Bannock Water Resources

Submitted to:

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BUREAU OF RECLAMATION
POLICY AND ADMINISTRATION
DENVER, COLORADO

WATERSMART: DROUGHT RESILIENCY GRANT PROGRAM FOR FISCAL YEAR 2016
FUNDING OPPORTUNITY ANNOUNCEMENT NO. R16-FOA-DO-006

April 11, 2016

Submitted by:
Shoshone-Bannock Tribes
P.O. Box 306
Pima Drive
Fort Hall, Idaho 83203
www.shoshonebannocktribes.com

Project Manager:
Elese Teton, MS, PE
Tribal Water Engineer
P.O. Box 306
Pima Drive
Fort Hall, Idaho 83203
eteton@sbtribes.com
p. (208) 239-4580
f. (208) 239-4592

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Date:	April 11, 2016
Applicant:	Shoshone-Bannock Tribes
Address:	P.O. Box 306, Pima Drive, Fort Hall, Bingham County, ID 83203

1.1 EXECUTIVE SUMMARY

The Shoshone-Bannock Tribes are pleased to submit this proposal to the United States Bureau of Reclamation (USBR) WaterSMART Drought Resiliency program. The Tribes believe that there is a clear need to take a prominent role in managing the water resources that sustain our culture and livelihoods. Accordingly, over the past twenty years the Tribes have been proactive in securing the quantification of our water rights, establishing and growing a capable water resource management department, and enacting regulations and policies that sustain water resources and the environment.

While changing drought conditions in the Western United States have the potential to inflict devastating effects on Tribal and regional water resources, the Tribes presently lack a comprehensive set of base information and modeling tools to effectively mitigate the impact of drought conditions on our water resources. Accordingly, drought has been continually identified as a significant long-standing threat to our water resources. The Tribal Water Resources Department (TWRD) developed a Drought Contingency Plan in March 2006 as part of a Comprehensive Water Master Plan. The Tribes' Drought Contingency Plan was subsequently updated in 2013 to include details concerning the drought advisory committee, drought monitoring, and drought response. The Mitigation Strategy of this Drought Contingency Plan states that:

> *"The primary recommendation for the Tribes is to expand their data collection network, thereby allowing the use of other, more Reservation-specific drought indices and ultimate development of a numerical groundwater or water balance model."*

Accordingly, the Tribes' have identified a need for assistance to better understand the complexities and uncertainties associated with changing drought conditions, then clearly define how to build resiliency to drought's impact on Tribal and regional water resources. This proposal sets forth two objectives and five associated activities that directly address the problem stated above, the primary recommendation of the drought plan, and the goals of Task B of the FY2016 WaterSMART Drought Resilience Program Funding Opportunity Announcement. The first objective is to *establish an in-depth knowledge base of the problem of drought* by conducting research on contemporary topics related to drought in the Western United States, gathering and compiling regional climatic, hydrologic, and drought data pertaining to Shoshone-Bannock water resources, then compiling this information in a usable format. The second project objective is to *perform predictive modeling of potential drought scenarios and mitigation techniques* by:

- ✓ Building a model to integrate Tribal water rights with regional water supply and demand;
- ✓ Quantifying cultural, economic, and water resource effects from potential drought scenarios, and;
- ✓ Simulating potential operational and infrastructural improvements for the purposes of enhancing drought resiliency in high risk areas.

The proposed project is expected to be completed in one year, finishing in the fall of 2017, and will result in a set of best management practices for enhancing Tribal drought resiliency and their associated quantifiable water supply and economic benefits. This project's deliverables will include a comprehensive set of region-specific drought information, a calibrated rule-based RiverWare model, and a final report containing the methodology, results, and recommendations of the study. It is also important to note that, while this project does not directly take place on a Federal facility, investments that build Tribal water resource drought resiliency have a significant ancillary benefit to regional water supply reliability. Tribes are very active in operating a Tribal Water Storage Bank for the purposes of leasing federally reserved storage water from American Falls and Palisades Reservoirs to water users in the Upper Snake River Basin.

1.2 BACKGROUND DATA

1.2.1 Cultural Value of Water to the Tribes

For the Shoshone and Bannock people, no single natural resource has been more culturally vital than water. As reflected in our oral traditions, history, and ceremonies, the physical, social, and spiritual sustenance that water provides frames all aspects of Tribal communal life and experience. The many rivers, lakes, streams, creeks, and springs, and their related environment throughout Idaho and beyond are an integral part of Tribal lifestyle today and into the future. When Shoshone and Bannock say "water is life" they are speaking in terms of our creation story, where they originated from, and thus give respect to their place of origin. We also mean that water is a living being or spirit that has healing powers, and finally we know that all human and non-human beings must have water to survive.

Tribal people understand the importance of water – the water people, plants and medicines, earth and their source, and their interconnection based on the creation story. We know that we are from the water and we are shaped from the earth. Protection and preservation of these resources is extremely culturally vital to the Tribes. The special relations Tribal people have with the water is very much part of our peoples prayers, thinking and values relied upon in decision-making, and preparing policies of the Tribes. We have a special relationship with our land and water which we view with a spirituality and sacredness not generally comprehensible by others. The land and water is more than just a habitat or political boundary; it is the basis of the Tribes origin, social organization, the economic system, and cultural identification. And it is the threats to the land and water, and thereby to Tribal lifestyle, that prompts and guides the Shoshone-Bannock Tribes efforts to protect and preserve the water for present and future generations.

1.2.2 Tribal Water Resources Department

The Tribal organization that will be managing the proposed project is the Tribal Water Resources Department (TWRD). The TWRD and Tribal Water Commission were established following the 1990 Fort Hall Indian Water Rights Agreement. The Agreement specifically calls for adoption of a Tribal Water Code which would establish the following: Reservation Watermaster, Tribal Water Commission, and monitoring and enforcement capabilities. The Tribal Water Code was authorized by the Secretary of Interior in May 2007, after several years of negotiation. The importance of establishing a Tribal agency to manage and monitor the Reservation's water resources was evident soon after the 1990 Agreement was passed. The TWRD was officially established and staffed starting in 1998. In its initial years, the TWRD was focused on establishing a monitoring program for surface and ground water sites across the Reservation, and developing a fundamental knowledge about the management and protection of Tribal water rights and resources. Over time, the TWRD has expanded its breadth of issues, both on and off Reservation. Section 2B of the Tribal Water Code provides the duties and responsibilities of the Tribal Water Engineer and ultimately the TWRD. The Tribal Water Engineer is responsible for water rights administration, technical studies and research, and enforcement of water regulations.

The TWRD continues to perform numerous parallel projects related to streamflow monitoring, water quality monitoring, irrigation system evaluations, water permitting and regulation, and others. Most of the TWRD staff have worked at the Department for many years, providing a well-established knowledge of equipment, travel, and personnel logistics. The following provides a short summary of the technical capabilities of the primary TWRD staff who will work on the proposed project.

Elese Teton, Project Manager, Tribal Water Engineer. Ms. Teton has served as the Tribal Water Engineer since joining the TWRD in 1998, and provides management oversight of the Department in this capacity. Ms. Teton graduated from Utah State University with B.S. and M.S. degrees in environmental

engineering (water quality emphasis). In addition, Ms. Teton is a registered Professional Engineer in the State of Idaho. Ms. Teton has successfully administered, managed, and grown the TWRD for more than fifteen years, working on a variety of projects and programs.

Spence Ward, Deputy Engineer. Mr. Ward has served as the Deputy Tribal Water Engineer since joining the TWRD in 2006, and provides supervision to the water resource technicians and conducts various monitoring, investigation, and analytical duties. Mr. Ward graduated from Idaho State University with a B.S. in civil engineering, and is a registered Professional Engineer in the State of Idaho.

Tribal Water Resources Commission. The Commission is the non-technical side of Tribal water administration, with important duties and responsibilities related to policy, judiciary, and conflict resolution, as defined in the 2007 Tribal Water Code. The Commission is comprised of five members, appointed by the Tribal Business Council, with each commissioner serving a three year term with eligibility for reappointment. Many of the current Water Commissioners have been serving for over ten years.

The TWRD have an excellent working relationship with Reclamation's Boise, ID office. Reclamation has been, and continues to be, a proactive trustee of Tribal water resources. In January of 2014, Reclamation employee Matt Howard informed the TWRD that they were not being mitigated for impacts caused to their Federal contract storage rights by the operation of the Water District 01 Rental Pool Program. Reclamation aided with the technical and legal investigations, and ultimately helped the Tribes in reaching a settlement with Water District 01 near the end of July 2015.

1.2.3 Fort Hall Reservation Hydrology

The Fort Hall Reservation is located in the semi-arid climate of southeast Idaho. From a hydrologic perspective, the Reservation is located at the boundary of two dominant landforms. To the east and south, the Reservation contains basin and range landforms. Mountain ranges include the Portneuf Range along the Reservation's eastern edge and the Bannock Range along the southern edge. Tributary streams and large springs drain from these mountains and form some of the Reservation's major surface water features, such as Ross Fork, Bannock, and Lincoln Creeks.

The other dominant landform on the Reservation, located towards the north and west, is the Snake River Plain. The Snake River Plain is an expansive area characterized by a flat topography and deep soils that are good for agriculture. Along the Reservation's northern boundary are the Blackfoot and Snake Rivers. These major river systems drain high elevation lands located off-Reservation and carry substantially higher flows than the Reservation's creeks. The western corner of the Reservation is submerged under American Falls Reservoir, which is one of the largest reservoirs in Idaho.

The Reservation's groundwater is found in the valleys of the basin and range formations, and to a much larger extent in the Snake River Plain aquifer. The Snake River Plain aquifer represents a vast storage of groundwater that stretches across much of the Upper Snake River Basin in southeastern Idaho. The Fort Hall Bottoms is a unique area on the Reservation located near the eastern extends of American Falls Reservoir. The Bottoms area contains numerous springs that discharge large quantities of water from the Snake River Plain aquifer underlying the Reservation. Figure 1 shows a map of the Reservation's water resources.

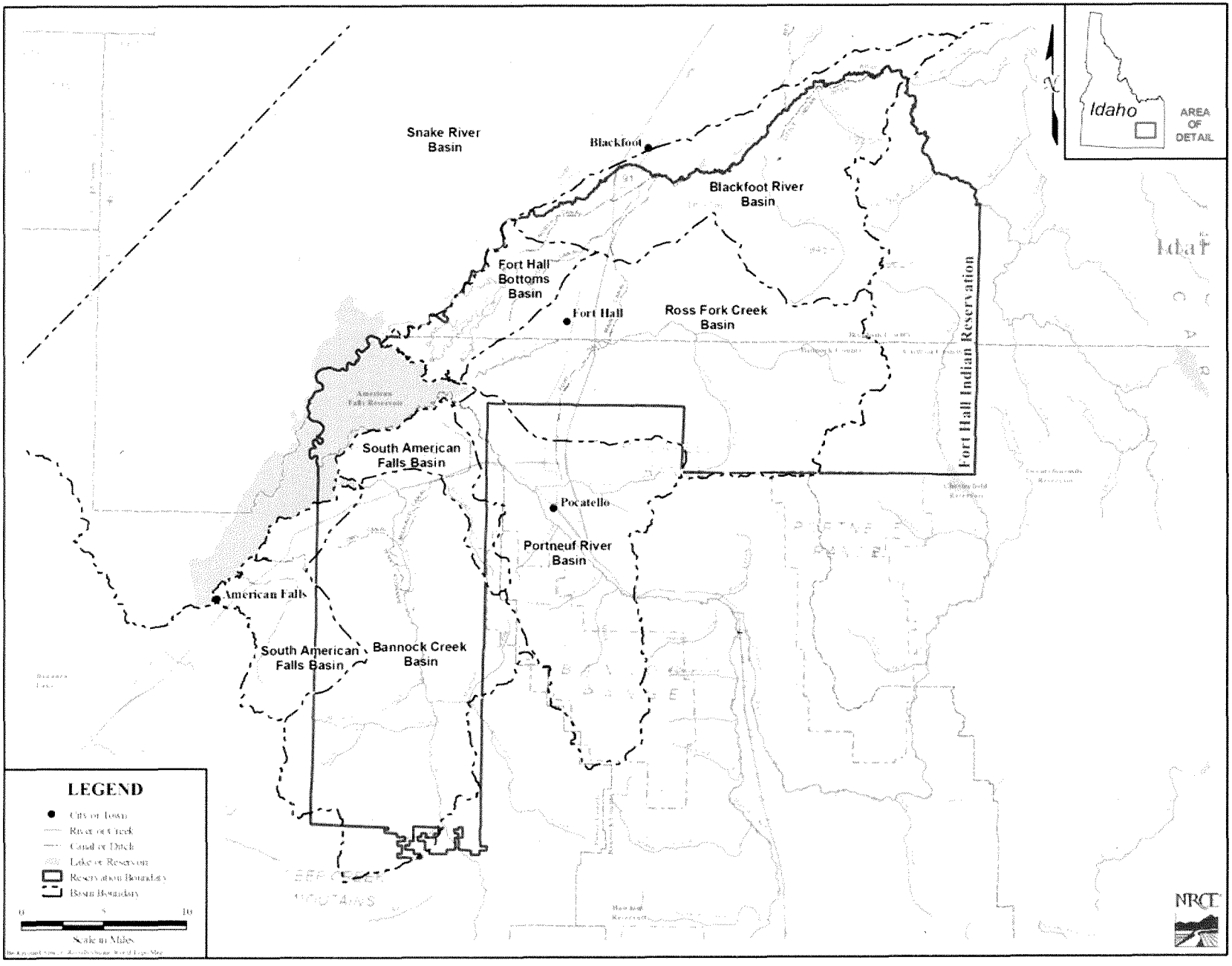

Figure 1: Water Resources of the Fort Hall Reservation

1.2.4 Shoshone-Bannock Water Rights

The Tribes' water rights were settled in the 1990 Fort Hall Indian Water Rights Settlement. The Tribes, State of Idaho, U.S. government, and certain Idaho water users first started water rights negotiations in 1985, in conjunction with the Snake River Basin Adjudication initiated by the State of Idaho. Resolution of the Tribes' water rights was sought through negotiation to avoid lengthy and costly litigation in court. The Tribes undertook studies to quantify our Federal reserved water right claims and through negotiations with the State of Idaho, the Federal government, and Snake River water users represented by the Committee of Nine, the Tribes signed the 1990 *Fort Hall Indian Water Rights Agreement*. Federal legislation to authorize and fund the Agreement was passed by the U.S. Congress under Public Law 101-602 in November 1990. The terms of the Agreement were later decreed by the SRBA court in the 1995 *Partial Final Consent Decree Determining the Rights of the Shoshone-Bannock Tribes to the Use of Water in the Upper Snake River Basin.*

The Agreement also includes provisions on other aspects of the Tribes' water rights, besides the quantification of those water rights. Perhaps most significantly, the Tribes are allowed to lease water for off-Reservation use using Federal contract storage rights included in the Tribal Water Bank. The Tribes may lease any portion of our water rights for on-Reservation use, as long as the conditions of the water rights are preserved. Under the Agreement, the Tribes have rights to four distinct types of water: (1) natural surface water flows, (2) groundwater, (3) storage water in reservoirs, and (4) instream flows. This section provides a listing of the Tribes' water rights divided by type of water.

1.2.4.1 Natural Surface Flow Rights

Natural surface flow rights are for the diversion of water from a naturally flowing water source. As a natural source, the available water supply under these rights can vary substantially from year to year depending on the climate and hydrologic conditions, and may be highly susceptible to drought conditions. The water rights provide the maximum extent of diversion and use allowed by the Tribes if the source water is available under the water right priority date.

Table 1: Tribal Natural Surface Flow Water Rights

Right #	Source	Diversion Volume (AFY)	Consumptive Use Volume (AFY)	Maximum Diversion Rate (cfs)	Purpose	Priority Date
01-10223	Snake River/Sand Creek	100,000	60,986	390	Irrigation	6/14/1867
27-11373	Ross Fork Creek	5,000	3,320	29.07	Irrigation	6/14/1867
27-11374	Lincoln Creek	5,700	3,768	33	Irrigation	6/14/1867
29-466	Bannock Creek	3,095	1,842	16.25	Irrigation	6/14/1867
29-467	Bannock Creek	629	374	3.3	Irrigation	4/1/1889
29-468	Rattlesnake Creek	571	340	3	Irrigation	4/1/1892
29-469	West Fork Bannock Creek	190	113	1	Irrigation	4/1/1894
29-470	West Fork Bannock Creek	248	147	1.3	Irrigation	4/1/1894
29-471	Bannock Creek	248	147	1.3	Irrigation	4/1/1894
29-472	West Fork Bannock Creek	190	113	1	Irrigation	4/1/1898
29-473	West Fork Bannock Creek	190	113	1	Irrigation	4/1/1898
29-474	West Fork Bannock Creek	190	113	1	Irrigation	4/1/1901
29-12049	Bannock Creek	18,833	11,205	98.87	Irrigation	6/14/1867
29-12050	Portneuf River / Jeff Cabin Creek	970	727	9.7	Irrigation	6/14/1867
29-231	Toponce Creek	259	154	1.59	Irrigation	2/16/1869
29-238	Toponce Creek	282	168	1.733	Irrigation	2/16/1869
29-12051	Mink Creek	104	62	0.75	Irrigation	2/26/1869
27-11375	Blackfoot River	150,000	79,546	1,380	Irrigation	6/14/1867

1.2.4.2 Storage Water Rights

These rights are for the storage of water in reservoirs. Water rights 27-2007 and 25-2160 do not provide for the direct use of water, but rather for the right to impound and store water for use by the Tribes' natural flow rights listed in Table 1. The storage of water allows the Tribes to utilize water independent of the natural spring runoff cycle and to hold water over for use in drought years.

The Tribes also have federally reserved storage rights for a percentage of accrual in American Falls and Palisades Reservoir. These water resources are extremely important for the Tribes because they may be leased through the Tribal Water Bank. It should be noted that historic Tribal water accrual in Palisades Reservoir has been highly vulnerable to drought due to its relatively junior priority date.

Table 2: Tribal Storage Water Rights

Right #	Storage	Maximum Storage Volume (AFY)	Purpose	Priority Date
27-2007	Blackfoot Reservoir	348,000	Irrigation	9/3/1907
25-2160	Grays Lake	100,000	Irrigation	8/23/1919
1-2064	American Falls Reservoir	46,931	Use or Lease	3/30/1921
1-2068	Palisades Reservoir	83,900	Use or Lease	7/28/1939

1.2.4.3 Groundwater Rights

The Tribes' groundwater rights allow for the diversion and use of groundwater within the Reservation. At the present time, the largest use of groundwater on the Reservation is for irrigation in the Gibson Unit and the northern portion (north of Interstate 86) on the Michaud Unit. These groundwater extractions for irrigation draw water from the Snake River Plain aquifer. The Tribes also pump groundwater to serve the domestic and municipal water demands of the Reservation.

Table 3: Tribal Groundwater Rights

Right #	Source	Diversion Volume (AFY)	Consumptive Use Volume (AFY)	Maximum Diversion Rate (cfs)	Purpose	Priority Date
27-11376	Fort Hall Reservation	125,000	93,615	813.40	--	6/14/1867
29-12052	Bannock Creek Basin	23,500	17,843	154.93	Irrigation	6/14/1867

1.2.4.4 Instream Flow Rights

The Tribes have the right to utilize some of our water rights in a non-consumptive manner to provide for instream flows. The Tribes may utilize the following water rights for instream flow purposes: (1) Any water accrued under Federal contract storage rights, (2) Any natural flows for water features located entirely within the Reservation, and (3) Up to 15,000 acre-feet per year of water accrued under the Blackfoot Reservoir and Grays Lake storage rights for use in the Blackfoot River.

1.2.5 Fort Hall Irrigation Project

The Fort Hall Irrigation Project (FHIP) is operated by the Fort Hall Agency of the BIA. The FHIP was first constructed around 1891 and contains a total of approximately 70,000 acres divided into the following units: the Upper and Lower Fort Hall Unit, Michaud Unit, and the minor units of Little Indian, Bannock Creek, Ross Fork Creek, and Lincoln Creek. The Gibson Area and northern Michaud Area are groundwater served areas leased by private irrigators. Thompson Farms are a group of center-pivot irrigated lands located in

Buckskin Basin, just north of the Ross Fork Unit, and served from groundwater. A map showing the locations of the various FHIP units is provided in Figure 2.

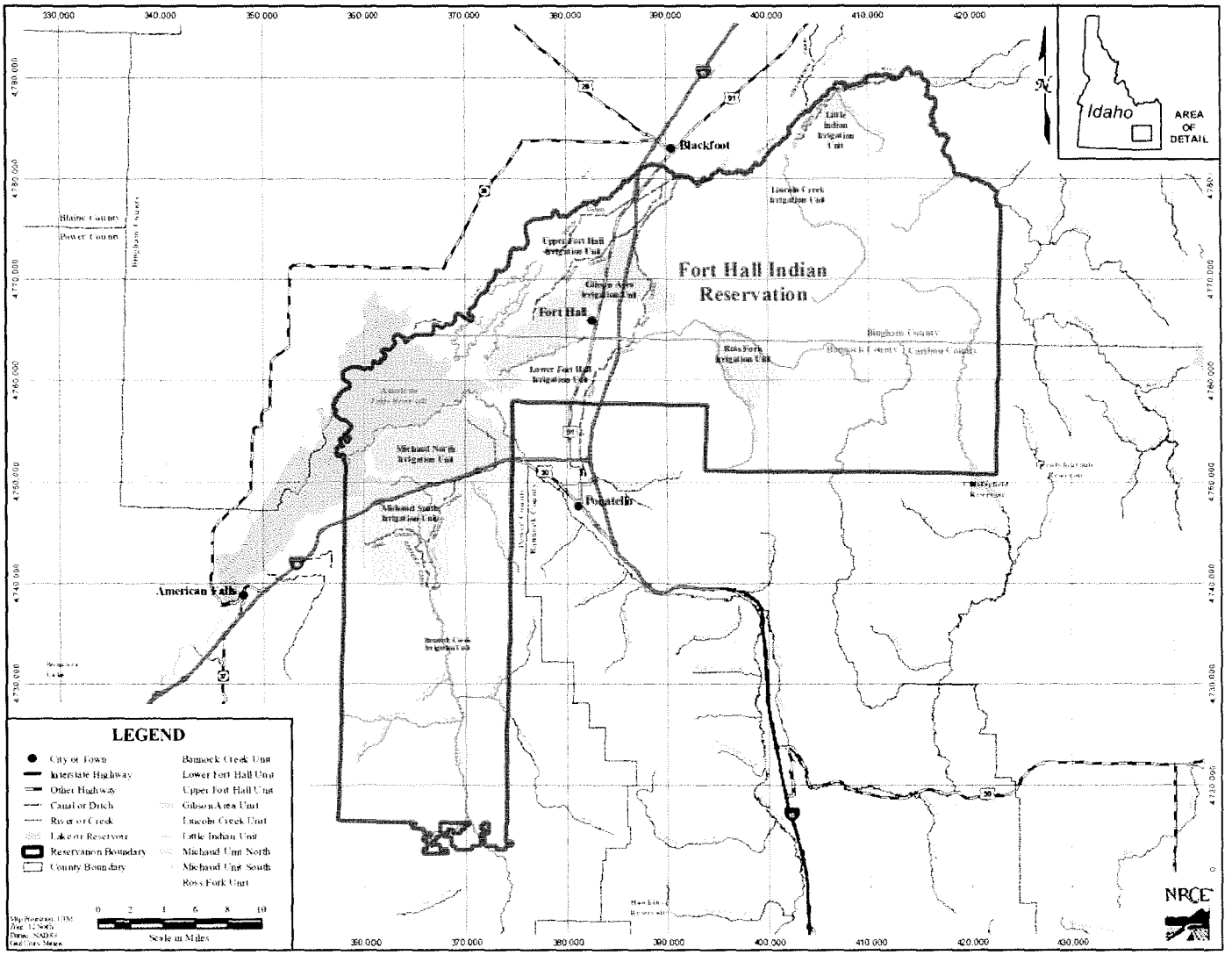

Figure 2: Map of Fort Hall Irrigation Project Units

Irrigation water delivered to the Fort Hall Units is diverted from the Blackfoot River and conveyed through the Little Indian Canal, Fort Hall Main Canal, and North Canal. In addition to natural Blackfoot River flows, the river conveys releases from Blackfoot Reservoir, as well as Snake River and Sand Creek water diverted through the Reservation Canal. The Blackfoot Reservoir has an active capacity of approximately 340,000 acre-feet and serves as the primary source of water supply for the Fort Hall Irrigation Project. Upstream of the Fort Hall Main and North Canals, flow in the Blackfoot River is supplemented with Snake River water through the Reservation Canal. The Reservation Canal conveyed an average of 124,000 acre-feet for the years 2001 to 2005 from the Snake River to Blackfoot River. The main distribution conveyances of the Fort Hall Irrigation Units are the Little Indian Canal, Fort Hall Main Canal, and North Canal. These are open channel, unlined canals totaling approximately 48 miles in length.

Groundwater use is limited in the Fort Hall Irrigation Unit, with approximately 4,700 irrigated acres served by groundwater. The Gibson Terrace area, located between the Upper and Lower units, is a major area of groundwater use for agriculture but is not technically part of the Fort Hall Irrigation Unit. The Gibson area

includes approximately 15,100 irrigated acres, all served by groundwater. Total groundwater use in the Fort Hall Irrigation Unit and the Gibson area is roughly estimated to be 59,400 acre-feet per year, based on the acreages provided.

1.2.6 Current and Projected Water Demand

The project aims to serve the entire Tribal membership on the Reservation, estimated at 3,500 Tribal members based on 2010 Census data. The Tribes current water uses are known to the extent that certain canals and groundwater pumps are monitored for flow quantities. The TWRD monitors most of the major surface water canals on the Reservation, as well as a large number of irrigation wells. The Tribal Utilities Department monitors the flows of the Fort Hall Townsite water supply system. At the present time, the Tribes utilize a fraction of our total available water rights on an annual basis. Table 4 provides an estimate of current average water uses on the Reservation, and compares these current water uses to the Tribes' applicable water rights. Table 5 shows the estimated crop distribution on the Fort Hall Irrigation Project.

Table 4: Current Tribal Water Uses

Geographic Area	Source	Purpose	Water Rights	Water Rights Volume (AFY)	Estimated Current Water Use (AFY)
Fort Hall Unit	Snake River; Blackfoot River	Irrigation	01-10223, 27-11375	265,000	165,789
Little Indian Unit	Blackfoot River	Irrigation	27-11375		9.777
Bannock Creek Unit	Bannock Creek	Irrigation	29-466 to 29-474, 29-12049	23,813	6,393
Rattlesnake Creek Basin	Rattlesnake Creek	Irrigation	29-468	571	743
Ross Fork Unit	Ross Fork Creek	Irrigation	27-11373	5,000	3,420
Lincoln Creek Unit	Lincoln Creek	Irrigation	27-11374	5,700	2,430
Michaud Unit	Portneuf River	Irrigation	Exchange	--	--
Reservation-Wide	Groundwater	Irrigation	27-11376	115,000	73,063
Reservation-Wide	Groundwater	Individual Domestic Wells	27-11376		250
Fort Hall Townsite	Groundwater	DCMI	27-11376	10,000	600
Bannock Creek Basin	Groundwater	Irrigation	29-12052	23,500	0
Reservation-Wide	Various Sources	Stockwater	All	--	114
Allotments 61, 71, 72	Toponce Creek	Irrigation	29-231, 29-238	541	360
--	Jeff Cabin Creek	Irrigation	29-12050	970	0
Pocatello Lands	Mink Creek	Irrigation	29-12051	104	0
--	Palisades Contract Storage	Exchange / Lease	--	83,900	31,028
--	American Falls Contract Storage	Exchange / Lease	--	46,931	45,716
Total				*581,030*	*339,684*

Table 5: Estimated Crop Distribution from BIA Crop Reports (1994-2000)

Crop	Average Acreage	% of Total
Alfalfa	4,122	6.2
Barley	455	0.7
Beans	95	0.1
Corn	81	0.1
Garden	45	0.1
Native Hay	826	1.2
Oats	333	0.5
Other Crops	201	0.3
Pasture, Dry	3,575	5.4
Pasture, Irrigated	6,566	9.9
Peas	2	0.0
Peas & Oats	219	0.3
Potatoes	15,881	24.0
Sugar Beets	1,411	2.1
Wheat, Spring	10,041	15.2
Wheat, Winter	19,371	29.3
Yards (Lawn)	2,973	4.5
Total Crops	*66,197*	*100.0*

1.3 TECHNICAL PROJECT DESCRIPTION

1.3.1 Need for Assistance and Problem Statement

The Tribes understand that it is imperative to continually protect and preserve our valuable water resources to ensure that these assets remain viable and sustainable for current and future Tribal members. While the Tribes have demonstrated our willingness to expend significant effort and financial resources through the long-term actions of the Tribal Water Resources Department, the Tribes' have a need for assistance to better understand the complexities and uncertainties associated with changing drought conditions, then clearly identify ways to build resiliency to drought's impact on Tribal and regional water resources. Provided below is the Problem Statement for this project summarizing the overall need for assistance.

Problem Statement

The Shoshone-Bannock Tribes realize that changing drought conditions in the Western United States could inflict potentially devastating effects on Tribal and regional water resources. The Tribes presently lack sufficient base information and modeling tools to effectively mitigate the effects of drought conditions on our water resources.

The Tribes do not presently have the financial resources to fully address this problem without federal assistance. Funding through this program would greatly enhance the Tribes' technical expertise in the area of drought mitigation and planning. The Tribal Water Resources Department will retain and utilize this knowledge long after the grant period ends.

1.3.2 Project Objectives and Activities

The Tribes have established the following two objectives and their associated activities to directly address both the Problem Statement presented in the preceding section and the goals of Task B of WaterSMART Drought Resilience Program Funding Opportunity Announcement No. R16-FOA-DO-006.

Objective 1: *Establish an in-depth knowledge base of the problem of drought.* The Tribes do not currently have a comprehensive understanding of the nature of regional drought and have not yet compiled an exhaustive set of information associated with this topic. This objective will address these deficiencies by researching current literature, gathering pertinent data, then compiling this information. Upon the completion of this objective, the Tribal Water Resources Department will have established a significant knowledge base. Specific activities for this research and information gathering effort will include the following:

Activity 1.1: Conduct research on contemporary topics related to drought in the Western United States including drought related impacts on water resources, areas and resources susceptible to drought, drought mitigation case studies, drought scenario testing, real-time operational modeling, and water resources optimization under supply limiting conditions. This research will utilize federal and State agency reports, private industry information, scientific journals, and other sources. The research is intended to build a sufficient knowledge base for the Tribes to explore established, yet creative, ways of building drought resilience.

Activity 1.2: Gather and compile regional climatic, hydrologic, and drought data pertaining to Shoshone-Bannock water resources including historical and forecasted precipitation, evaporation, streamflow, and non-Tribal water right data, as well as regional drought frequency, duration and occurrence information. Data will be gathered from the PRISM climate group (http://www.prism.oregonstate.edu/), the United States Geological Survey (USGS; http://waterdata.usgs.gov/), and Idaho Department of Water Resources (IDWR; https://www.idwr.idaho.gov/). The data will be compiled and stored in the existing TWRD database for continued use and reference. In addition, the data will be analyzed for spatial and temporal trends and directly utilized when performing the second objective of this project.

Objective 2: *Perform predictive modeling of potential drought scenarios and mitigation techniques.* Due to the complexity of regional hydrology and water rights, the Tribes will need to create a comprehensive computational model to estimate how changing drought conditions will affect our water resources. The resulting tool will be used to identify areas and resources that have a high risk to drought and, finally, mitigation techniques and best management practices that will build drought resiliency. Specific activities for this modeling effort will include the following:

Activity 2.1: Build a model to integrate Tribal and non-Tribal water rights with regional water supply and demand. RiverWare has been selected as the modeling platform because it is well suited for operational decision-making, responsive forecasting, operational policy evaluation, system optimization, water accounting, water rights administration, and long-term resource planning. Because the USBR and USACE regard RiverWare as a preferable river modeling software platform, its results are typically more defensible than an in-house spreadsheet model. Also, due to modified rulesets, RiverWare supports the modeling of alternative scenarios to determine impacts from climate change and operational management strategies, such as water exchanges.

There are two options for obtaining a regional RiverWare model. Reclamation has an existing RiverWare model able to simulate daily reservoir operations and flows in the Upper Snake River Basin. Unfortunately,

funding for this effort was discontinued two years ago. While this model is not fully tested and would need a significant amount of work, use of Reclamation's existing work would add to the knowledge of the Tribes, make model development more efficient, and increase simulation accuracy. In addition, there are no foreseen problems with sharing this model with the Tribes (personal communication, Bob Lounsbury, USBR Boise office, April 8, 2016).

If significant problems arise when attempting to adapt Reclamation's Upper Snake River model to this drought resiliency investigation, the Tribes may need to build a new RiverWare model. In this case, the physical attributes of the region, such as reservoirs, stream bifurcations and confluences, gaging stations, and water user diversions will first be inserted and correctly linked. Next a set of logic rules based upon water rights, existing operating policy, and physical constraints will be established to govern water flow throughout the model. Finally historical data will be used to calibrate and verify the model's performance.

Activity 2.2: Quantify cultural, economic, and water resource effects from potential drought scenarios. The first step in accomplishing this activity will be to use the findings from Objective 1 to formulate a realistic range of drought scenarios. Input data, including the magnitude and timing of streamflow, precipitation, and evaporation, will be adjusted to establish potential drought scenarios. The RiverWare model constructed and calibrated with historic data in Activity 2.1 will then be used to simulate these hypothetical scenarios and quantify their volumetric effects on individual Tribal water resources. Next, cultural, economic, and water quality impacts caused by water quantity reductions will be estimated for the drought scenarios tested. Finally, regional areas and resources particularly susceptible to drought will be identified and ranked.

Activity 2.3: Simulate potential operational and infrastructural improvements for the purposes of enhancing drought resiliency in high risk areas. This activity will build upon the effort of each previous activity and significantly work toward enhanced Tribal drought resiliency. Findings from Activities 1.1 and 1.2 will be used to establish a set of operational and infrastructural drought mitigation techniques applicable to the study region. The RiverWare model developed under Activity 2.1 will then be used to quantify benefits associated with drought mitigation for the critical areas and resources found under Activity 2.2. Finally, mitigation techniques with be ranked in accordance with benefits and implementation feasibility. This activity will result in a set of best management practices and their associated quantified benefits for enhancing Tribal drought resiliency. Results and recommendations will be compiled into a final report.

1.3.3 Consultants

While the Tribal Water Resources Department will manage the proposed project, the Tribes will contract with Natural Resources Consulting Engineers, Inc. (NRCE) to perform all research and modeling activities as defined in the Project Objectives and Activities section. A close working relationship has existed between NRCE and the Shoshone-Bannock Tribes since the 1980's. NRCE was the lead technical expert for the Tribes in the negotiations and ultimate approval of the 1990 Fort Hall Indian Water Rights Agreement. Since that time, NRCE has helped to establish and train the TWRD, and has contributed on-going technical support to the TWRD to help protect and manage the Tribes' water resources.

In working on these projects and in acting as technical consultant to TWRD over many years, NRCE has developed a comprehensive understanding of the water resources on the Reservation and the water rights of the Tribes. Specific to the proposed project, NRCE was contracted to draft and update the Tribes' drought plan in 2006 and 2013. In addition, NRCE developed a drought monitoring tool used to automatically download and generate a report on current US Drought Monitor maps and various drought indices. Finally,

NRCE has extensive experience related to water right and water resource modeling. The following are descriptions of key personnel representing NRCE regarding the proposed project.

Woldezion Mesghinna, Ph.D., P.E., President, Principal Engineer. Dr. Woldezion Mesghinna has over 43 years of experience in multiple facets of civil engineering, water resources, waste water, and irrigation and drainage engineering. He oversees projects throughout the western United States and Africa. Some of Dr. Mesghinna's work has included developing methodologies for undepleted flow determinations, analyzing multiple reservoir operations, analyzing availability of water supply and arability of lands, and designing several large-scale irrigation systems.

Brent Cody, Ph.D., P.E., Senior Engineer. Dr. Brent Cody is NRCE's project manager and primary liaison for the Shoshone-Bannock Tribes. He has extensive experience involving data analysis and visualization, optimization, and computation modeling. He has used Microsoft Excel to create a variety of tools including a Drought Monitoring Interface to automatically download, analyze, visualize, and generate Microsoft Word reports from region-specific drought information. He has also created several RiverWare models performing scenario testing and optimization of Native American water resources.

Cristina Golebiewski, M.S., P.E., Associate Engineer. Ms. Golebiewski is primarily responsible for estimating crop irrigation and diversion requirements, producing cost estimates for irrigation systems, and providing technical support and analysis for domestic, commercial, municipal, and industrial water uses. Ms. Golebiewski is experienced in performing surface water data analysis and modeling.

Michael Sanders, M.S., Associate Hydrologist. Mr. Sanders has experience conducting climate change impact analyses for water resources and supports NRCE in water rights and resources related investigations. Mr. Sanders has modeled potential climate change impacts to water supply and agricultural demand using downscaled data from General Circulation Models. Analyses have included estimates of climate variables, streamflow, and recharge.

1.3.4 Plan for Oversight of Federal Award Funds

The Tribes have over 30 years of experience in managing various grant-funded programs. The Tribes maintain a Policies and Procedures Manual, with the following policies and procedures in place to accept any newly-funded program and ensure continued success:

- Personnel Management: The Tribes have developed and adopted a personnel management system which prescribes procedures for employment, including: hiring, transfers, termination, grievances, employee performance evaluations, schedules, orientation, and training.
- Financial Management: The Tribes use a computerized financial accounting system. The system is supervised and maintained by an accounting staff comprised of nine individuals, including four accountants. The Finance Department is currently responsible for over 100 grants and contracts from various State and Federal agencies, including the Department of Health and Human Services. A year-end financial report is compiled and produced by independent auditors.
- Administrative Management: The Tribes' Contracts and Grants Office was established in the 1980's to provide technical and management assistance to the Tribes' departments in preparing and submitting grant applications to federal, state, local and private funding agencies, and to coordinate and manage all federal, state, local and private grants that have been awarded to the Tribes via its Contracts division. The Senior Contracting Officers works with each individual department and program, along with the respective Finance Department accountants and technicians, to prepare and submit periodic reports to granting agencies as required. Contract Office personnel are responsible

for entering and tracking all contracts/grants in their computerized system; hard copy files are kept in the Contracts Office as reference for annual audits by agency and independent auditors.

1.4 EVALUATION CRITERIA

1.4.1 Evaluation Criterion A – Project Benefits

Will the project make additional water supplies available? This project will not directly make any additional water supplies available. The proposed project will provide tools and information with the purpose of improving management of existing water supplies to build drought resiliency.

How will the project build long-term resilience to drought? How many years will the project continue to provide benefits? The proposed project will build resilience to drought through a methodical approach that 1) compiles drought knowledge, 2) identifies drought susceptible locations and resources, then 3) quantitatively evaluates and ranks potential mitigations techniques. The resulting set of best management practices will be specifically tailored to build drought resiliency for the Tribes.

The proposed project will continue to provide benefits for decades into the future, as project-developed tools and strategies can continually be deployed to plan and evaluate drought mitigation. The RiverWare model developed in this project will continue to be a valuable long-term tool for the evaluation of management practices and other potential drought mitigation measures, so that appropriate and effective mitigation measures can be promptly implemented at the onset of drought.

How will the project improve the management of water supplies? If so, how will the project increase efficiency or operational flexibility? The proposed project will improve the management of the Tribes' water supplies by constructing and utilizing a well-designed, flexible model that integrates regional water resources and water rights pertaining to the Tribes. Due to its flexible operational logic, the RiverWare model developed by this project can be used to evaluate a wide range of potential changes and strategies to improve distribution or use of water resources. The model can also be adapted to provide real-time decision support to increase the efficiency of water resource management on the Fort Hall Reservation.

Will the project make new information available to water managers? If so, what is that information and how will it improve water management? Several new sources of information will be made available to water managers. First, the literature review and data gathering efforts will establish an in-depth knowledge base of the problem of drought. The Tribes do not currently have a comprehensive understanding of the nature of regional drought and have not yet compiled an exhaustive set of information associated with this topic. This objective will address these deficiencies by researching current literature, gathering pertinent data, then compiling this information. Also, results from the modeling analyses will provide a set of realistic drought severity scenarios, information regarding high-risk locations and resources, and ranked best management practices for building water resources drought resiliency. The model and results will allow for the optimization of management decisions to protect water resources and Tribal interests. This information will confirm or improve the existing management practices of the Tribes' water resources.

Will the project have benefits to fish, wildlife, or the environment? If so, please describe those benefits. The RiverWare model developed for this project will be comprehensive in its inclusion of water sources and management options. Instream flows and other conditions relevant to fish and wildlife habitat will be evaluated using the model in order to better protect fish and wildlife from habitat degradation.

What is the estimated quantity of water that will be better managed as a result of this project? How was this estimate calculated? What percentage of the total water supply does the water better managed represent? How was this estimate calculated? The effort will model and evaluate all available Tribal water resources. The Tribes have water rights to approximately 286,699 acre-feet per year of surface water flows, 130,831 acre-feet per year of federally reserved storage water in American Falls and Palisades Reservoirs, 148,500 acre-feet per year for groundwater use, and 15,000 acre-feet per year for instream flows. Per water right quantities, the total amount of water resources that will be better managed by this project is estimated at 581,030 acre-feet per year.

At stated by the second objective of this project (Section 1.3.2), the Tribes will need to create a comprehensive computational model to estimate how changing drought conditions will affect water resources. Therefore, this estimate represents 100% of the Tribes' water supply. The entire supply system can be better managed with the additional information supplied by this project. The RiverWare model will integrate and test mitigation techniques that utilize all supply sources to determine better management practices.

Provide a brief qualitative description of the degree/significance of anticipated water management benefits. Immense benefits to water resource management are expected as a result of the proposed project. Most significantly, the risks associated with large-scale drought on Tribal water resources are currently unknown. The Tribes have great interest in first quantifying the extent and location of these, then developing a mitigation plan. The knowledge base, modeling tools, and analyses performed by this project will provide the Tribes' water managers valuable information that has previously been lacking. Water managers will be able to make better informed management decisions regarding all water resources utilized by the Tribes.

How does the new tool or program increase the flexibility of acquiring water on the open market? This project will open up more opportunities to acquire water on the open market because of the Tribes ability to market water through the Tribal Water Bank. Tribal storage accrued in Palisades Reservoir may be leased anywhere above Milner Dam while storage accrued in American Falls Reservoir may be leased anywhere in Idaho. If the Tribes use the RiverWare model to determine best management practices that mitigate the effects from drought, we will be able to make additional water available on the open water through the Tribal Water Bank.

What is the scope of water users and uses that will benefit? The Tribes and residents of the Fort Hall Reservation will all benefit from effective management of water resources and drought resiliency. The project aims to serve the entire Tribal membership on the Reservation, estimated as 3,500 Tribal members based on 2010 Census data, as well as all non-Indian users of the Fort Hall Irrigation project and any water users leasing water though the Tribal Water Bank.

Are there any legal issues pertaining to water marketing that could hinder project implementation? There are no legal issues pertaining to water marketing that could hinder project implementation.

This project does not involve salt water barriers or wells. This project is not a Metering/Water Measurement Project or an Environmental/Wildlife Project.

1.4.2 Evaluation Criterion B – Drought Planning and Preparedness

Attach a copy of the applicable drought plan, or sections of the plan, as an appendix to your application. These pages will not be included in the total page count for the application. The Tribal Water Resources Department (TWRD) developed a Drought Contingency Plan in March 2006 as part of a Comprehensive Water Master Plan that also include water conservation, groundwater management and monitoring, and water development planning. The Master Plan was completed by Natural Resources Consulting Engineers, Inc. (NRCE) with funding assistance from the Administration for Native Americans (ANA) under Grant Number 90NR0216/01 awarded in December 2005. In 2013, NRCE updated this plan to include details concerning the drought advisory committee, drought monitoring, and drought response. The original 2006 and the updated 2013 Shoshone-Bannock Drought Plans are attached in Appendix A.

Explain how the applicable plan addresses drought. The Tribes developed drought response guidelines to associate the type of response to the severity of drought, using drought monitoring indices. Drought statuses are defined as follows: (1) normal, above normal, or wet; (2) below normal; (3) moderate drought. To mitigate effects from these specific drought conditions, the Tribes developed specific municipal/domestic water use sector response actions. The following are examples of municipal water use sector response actions:

- Limit lawn watering and outdoor uses to designated hours on designated days,
- Restrict the washing of vehicles, equipment, and spraying of hard surfaces,
- Restrict the filling of ponds and pools and the operation of fountains,
- Provide rebates for household plumbing fixtures that reduce water use,
- Increase penalties for wasting water or non-permitted uses,
- Provide rebates for household and commercial business water use audits.

The Tribes also developed specific agricultural and range water use sector response actions for consideration, examples of which are as follows:

- Identify opportunities to reuse irrigation tail water,
- Conduct daily measurements or observations of farm headgate and pumping diversions,
- Install additional flow meters to monitor diversion rates,
- Prohibit or restrict water use for soil tilling and practices outside of crop irrigation,
- Provide information on temporary fallowing practices and conservation programs,
- Increase frequency of range patrols to asses animal health and range conditions,
- Revise BIA Project irrigation schedules to reduce irrigation times,
- Consider alternate grazing options and relocation of livestock.

The drought plan's primary recommendations for the Tribes is to expand our data collection network, thereby allowing the use of other, more Reservation-specific drought indices and ultimately development of a numerical groundwater or water balance model to provide a more direct relationship between the selected drought indices and the targeted water use sectors. The specific data recommended for collection for the Tribes' consideration are provided below:

- For the municipal sector, after collecting sufficient groundwater level data, develop a drought indicator based on groundwater levels to better characterize that regime on the Reservation.
- For the agricultural sector, implement an irrigation supply management model.

Explain whether the drought plan was developed with input from multiple stakeholders. Was the drought plan developed through a collaborative process? One of the main factors in successful implementation of the Drought Plan is the involvement of all appropriate Tribal departments, agencies, and the community. Involving the appropriate departments and the community includes proper coordination of drought related actions by governmental organizations. Support is provided by several agencies and programs that can provide drought assistance to the Tribes and Reservation residents.

Does the drought plan include consideration of climate change impacts to water resources or drought? The Tribes' Drought Contingency Plan uses multiple drought monitoring indices which consider climate change impacts on water resources and drought. Other drought monitoring indices utilize precipitation, temperature, and soil moisture data to determine drought conditions. NRCE created a drought monitoring tool for the TWRD to automatically compile and present current data and maps regarding the status of drought for the Reservation and Tribal water resources. It estimates a drought status value by applying a custom weight scheme, defined by and specific to the Tribes, to the aforementioned standard drought indices.

The Tribes have also recently developed a groundwater monitoring program, the purpose of which is to provide records of water-level changes and trends in aquifers of importance to the Reservation. These records may be used, in conjunction with climate data, to gain an understanding of the relationships between precipitation in the mountains, recharge, and groundwater supply.

Describe how your proposed drought resiliency project is supported by an existing drought plan. There are two primary objectives included as part of the proposed project. The first is to develop an in-depth knowledge base of the problem of drought, which will require extensive literature review concerning regional drought problems as well as the collection of regional climatic, hydrologic, and drought data pertaining to tribal water resources in the area. This objective will address one of the more specific goals discussed in the current drought plan, which is to collect, analyze, and disseminate drought related information in a timely manner. The second objective of the proposed project is to develop a predictive model to evaluate potential drought scenarios and mitigation techniques. This objective will address the goals discussed in the current drought plan related to the identification of drought prone areas and vulnerable water use sectors, as well as the identification of mitigation and response actions.

Does the drought plan identify the proposed project as a potential mitigation or response action? The current project is in response to the primary recommendation of the drought plan. *Section 7.1: Mitigation Strategy* of the drought plan states the following "The primary recommendation for the Tribes is to expand their data collection network, thereby allowing the use of other, more Reservation-specific drought indices and ultimate development of a numerical groundwater or water balance model."

Does the proposed project implement a goal or need identified in the drought plan? The proposed project will implement one primary goal identified in the drought plan, which is to provide an effective and systematic approach of assessing drought conditions. This should further aid in the development of mitigation actions and programs that will be used to reduce the risk and vulnerability of drought. Other goals discussed in the drought plan that will be addressed as part of the proposed project include the collection, analysis and dissemination of drought related information. Once the model is completed, it can be used to identify areas that are prone to drought as well as vulnerable water use sectors.

Describe how the proposed project is prioritized in the referenced drought plan? As discussed above the proposed project is in response to the primary recommendation of the drought plan.

1.4.3 Evaluation Criterion C – Actual or Potential Drought Impacts Addressed

What are the ongoing or potential drought impacts to specific sectors in the project area if no action is taken? Potential drought impacts have been identified in several sectors throughout the proposed project's affected area. Severe drought conditions will potentially impact the availability of water to satisfy agricultural and domestic demand on the Fort Hall Reservation, as well as the Tribes' ability to lease water on the open market. Dry conditions may also result in over-pumping and depletion of Snake River Plain Aquifer groundwater. Groundwater depletion often results in higher pumping cost, land subsidence leading to a reduction in aquifer porosity and storage space, reduced spring flows, and development of deeper wells. Drought also poses significant risks to wildlife and ecosystems in the area. Low streamflow caused by dry conditions can lead to elevated stream temperatures, putting salmonids and other cold water fish species at risk. The low streamflows can also affect habitat for numerous other species such as waterfowl and amphibians. The Fort Hall Bottoms wetland area of the reservation is particularly susceptible as it contains multiple springs serving critical habitat for several fish and bird species. Additionally, drought increases risk of large fires and makes fire suppression more difficult. These large fires can destroy winter ranges which are depended upon by various species. Wildlife and ecosystem impacts also damage the value of reservation lands for recreation or ceremonial purposes.

Describe existing or potential drought conditions in the project area. Drought conditions currently do not exist in the area of the proposed project as shown by Drought Monitor (droughtmonitor.unl.edu) or the Palmer Drought Severity Index (ncdc.noaa.gov/temp-and-precip/drought/historical-palmers). Potential for drought periods in the area increases in the future with the advance of climate change.

Is the project in an area that is currently suffering from drought or which has recently suffered from drought? The area of the proposed project is not currently suffering from drought. However, the area is just recovering from an extended period of drought and dry conditions. Both the drought monitor (droughtmonitor.unl.edu) and the Palmer Drought Severity Index (ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/) show southeastern Idaho undergoing moderate to severe drought conditions from late summer of 2012 through the summer of 2014. Less severe, abnormally dry conditions persisted through much of the project area through the end of 2015, finally disappearing in March of 2016.

Describe any projected increases to the severity or duration of drought in the project area resulting from climate change. There are several demonstrated trends in hydrology and meteorology in Idaho and across the western United States that can affect the likelihood and severity of drought. Klos et al. (2015) found trends of increased extreme precipitation events, earlier streamflow, and reduced spring snowpack in Idaho for a period of 1975-2010. These trends were approaching statistical significance in Idaho and are also demonstrated across the western United States. These trends are in response to increased temperature, and are expected to continue and perhaps worsen with the advance of climate change. Increased extreme precipitation events, earlier streamflow, and reduced spring snowpack in Idaho will lead to increased likelihood of drought during dry years. Earlier and increased runoff from more intense rain events (as opposed to delayed snowmelt runoff) are expected to exacerbate dry conditions increasing the severity of future droughts. Increased evapotranspiration due to warmer temperatures and longer growing seasons may also further demand stress on water resources during drought conditions.

1.4.4 Evaluation Criterion D – Project Implementation

Describe the implementation plan of the proposed project. A methodical set of objectives and activities, described in detail in Section 1.3.2, will be used to implement this project. Table 6 provides a timeline for the initiation and completion of each activity described above. This timeline corresponds to the start and end dates of Fiscal Year 2017 but may be adjusted based upon actual project start date. Activities were scheduled in sequence, such that literature review and data gathering precede model construction and drought scenario testing. The proposed project is scheduled to be completed in one year.

Table 6: Schedule of Project Objectives and Tasks.

Objective	Activity	2016			2017								
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1 - Establish Tribal knowledge base	*1.1 - Conduct Research*												
	1.2 - Gather Data												
2 - Model drought and mitigation scenarios	*2.1 - Model Construction*												
	2.2 - Drought Scenario Testing												
	2.3 - Drought Mitigation & BMPs												

Describe any permits that will be required, along with the process for obtaining such permits. There will be no permits required for this project.

Identify and describe any engineering or design work performed specifically in support of the proposed project. This project does not include any construction-related engineering or design work. However there will be significant engineering work in the form of water resources modeling and scenario testing as described in Section 1.3.2. Also, as described in Section 1.3.3 this work will be completed by Natural Resources Consulting Engineers.

Describe any new policies or administrative actions required to implement the project. There will be no new policies or administrative actions required to implement the project.

1.4.5 Evaluation Criterion E – Nexus to Reclamation

How is the proposed project connected to a Reclamation project or activity? The Tribes' storage rights in American Falls and Palisades reservoirs are Federal contract storage rights. They provide for a fixed percentage of storage accrual plus carryover in the Federal reservoir projects. The Palisades Dam was constructed in 1957 as principal features of the Bureau of Reclamation's Palisades Project. The American Falls Dam was originally built in 1928 and then reconstructed in 1978 by the Bureau of Reclamation.

Does the applicant receive Reclamation project water? The Tribes' storage rights in American Falls and Palisades reservoirs are Federal contract storage rights. The Tribes may exchange a portion of our American Falls Reservoir storage rights for the ability to pump water from the Portneuf River into the Michaud Canal for use by the Michaud Unit. The Tribes utilize our Palisades Reservoir storage rights in an exchange for the ability to pump water from the Portneuf River.

Is the project on Reclamation project lands or involving Reclamation facilities? Is the project in the same basin as a Reclamation project or activity? This project does not physically take place on Reclamation project lands or involving Reclamation facilities. However, the proposed project will evaluate water supply and drought conditions in several basins, including the Snake River Plain. The American Falls and Palisades Reservoir are both located within the Snake River Plain.

Will the proposed work contribute water to a basin where a Reclamation project is located? If drought resiliency is achieved as a result of implementation of the proposed project, the water savings will contribute water to the Snake River Basin, most significantly as the Tribes are able to build drought resiliency to their water supplies available for leasing.

Will the project help Reclamation meet trust responsibilities to any tribe(s)? The United States holds in trust federal contract storage rights for water that accrues up to 2.8059% of the storage space in American Falls Reservoir and 6.9917% of the storage space in Palisades Reservoir for the benefit of the Tribes. This effort will investigate drought mitigation techniques that affect the region. Through better informed best management practices, more water will be retained in the Upper Snake River reservoir system and, therefore, additional lower priority reservoir storage accrual, directly benefiting federally reserved Tribal storage water in Palisades Reservoir. This will build storage water drought resiliency and increase Reclamation's ability to provide reliable trust water to the Tribe.

1.5 PERFORMANCE MEASURES

As discussed in Section 1.3.2 of this proposal, the two main objectives of the proposed project are to establish an in-depth knowledge base of the drought problem and perform predictive modeling of potential drought scenarios and mitigation techniques. As part of the first objective, the Tribes will conduct research on contemporary topics related to drought in the Western United States. To complete the first task in this objective, the Tribes will identify and summarize at least five studies that explore different methods of building drought resilience. The final task under the first objective is to gather and compile over 20 regional climatic, hydrologic, and drought data timeseries pertaining to Tribal water resources. In order to obtain a comprehensive understanding of historic trends, this project will attempt to gather daily data covering at least a 50 year period, depending upon availability. These data will be analyzed for spatial and temporal trends.

The second objective's first task is to build and calibrate a model to integrate Tribal and non-Tribal water rights with regional water supply and demand using RiverWare modeling software. This model will be able to evaluate alternative scenarios to determine impacts from climate change and operational management strategies, such as water exchanges. The performance measure for this task is to deliver a calibrated and quality control checked model. The second task under this objective requires the quantification of cultural, economic, and water resource effects from potential drought scenarios. Using the results from the literature review performed as part of Objective 1, the Tribes will select parameter values, including the magnitude and timing of streamflow, precipitation, and evaporation, for four different drought scenarios as follows: (1) incipient drought; (2) mild drought; (3) moderate drought; and (4) severe drought. Under each of these scenarios, the Tribes will quantify the volumetric effects on Tribal water resources and determine three areas/resources that have a high risk associated with drought. The final task will be to simulate potential operational and infrastructural improvements for enhancing drought resiliency in high risk areas. The Tribes will develop a set of four final improvement plans or mitigation techniques to propose based on the results of the model simulations and the aforementioned literature review and data gathering effort. The Tribes will test these techniques by applying them to the model and quantify (1) the total water supply benefits in AF/year and (2) the total economic benefit in 2017 US dollars. The Tribes will rank each plan on a scale of 1 to 5, where 5 is the most feasible and beneficial option and a rank of 1 is the least feasible and beneficial option. The Tribes will also identify 4 detailed best management practices and compile all findings in a Final Report. The following table provides a summary of performance measures related to this project.

Table 7: Summary of Performance Measures

Objective	Performance Measure	Target
1 - Establish Tribal knowledge base	Number of Case Studies Investigated	*5 Studies*
	Number of Drought Related 50 year Datasets	*20 Time Series*
2 - Model drought scenarios and mitigation techniques	Water Rights/Resources Model Construction/Calibration	*1 RiverWare Model*
	Identify and Evaluate Scenarios of Drought Intensity	*4 Drought Scenarios*
	Identify High Risk Locations and Resources	*3 Locations/Resources*
	Identify Mitigation Techniques	*4 Mitigation Techniques*
	Evaluate Mitigation Technique Benefits for all Drought Scenarios	*16 Model Runs*
	Total water supply benefit per model run	*TBD AF/yr.*
	Total economic benefit per model run	*TBD $/yr.*
	Number of Detailed Best Management Practices	*4 BMPs*
	Compile Report of Findings	*1 Report*

Environmental and Cultural Resources Compliance

The following are Reclamation's questions and the Tribes' responses regarding environmental and cultural resources impacts and costs:

Will the proposed project impact the surrounding environment? The proposed project will not impact environmental surroundings such as soil, air, or animal habitat. The proposed project is designed to model climate change and drought scenarios but will not directly affect the quality and quantity of water in the area. No earth-disturbing work will take place as part of this project and thus the project will not affect the air, water, or animal habitat in the project area.

Are you aware of any species listed or proposed to be listed as a Federal threatened or endangered species, or designated critical habitat in the project area? If so, would they be affected by any activities associated with the proposed project? Species listed or proposed to be listed as a Federal threatened or endangered species will not be affected by any activities associate with the proposed project. Designated critical habitat in the project area will also be unaffected by the proposed project.

Are there wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States?" If so, please describe and estimate any impacts the proposed project may have. No wetlands or other surface waters inside the project boundaries that potentially fall under CWA jurisdiction as "Waters of the United States" will be impacted by the proposed project.

When was the water delivery system constructed? The Fort Hall Irrigation Project was first constructed around 1891.

Will the proposed project result in any modification of, or effects to, individual features of an irrigation system (e.g., headgates, canals, or flumes)? If so, state when those features were constructed and describe the nature and timing of any extensive alterations or modifications to those features completed previously. The proposed project will not result in any modification of or effects to individual features on the irrigation system such as headgates, canals, or flumes.

Are any buildings, structures, or features in the irrigation district listed or eligible for listing on the National Register of Historic Places? A cultural resources specialist at your local Reclamation office or the State Historic Preservation Office can assist in answering this question. The site of the original Fort Hall (National Register of Historic Places Reference Number 66000306) is located 11 miles west of Fort Hall, Idaho on the Fort Hall Indian Reservation.

Are there any known archeological sites in the proposed project area? No archeological sites will be disturbed with this project.

Will the proposed project have a disproportionately high and adverse effect on low income or minority populations? The proposed project will not have a disproportionately high and adverse effect on low income or minority populations. It will add benefit to all water users in the region.

Will the proposed project limit access to and ceremonial use of Indian sacred sites or result in other impacts on tribal lands? The proposed project will not limit access to or ceremonial use of Indian sacred sites or result in other impacts on tribal lands.

Appendix B

Letters of Support

United States Department of the Interior
BUREAU OF INDIAN AFFAIRS
Fort Hall Irrigation Project
P.O. Box 220
Fort Hall, Idaho 83203-0220

In Reply Refer to
Irrigation Project Office

April 8, 2016

To Whom This May Concern,

This letter of support states that I approve of the FY2016 Drought Resiliency Project Proposal being submitted to the U.S. Department of the Interior, Bureau of Reclamation, Policy and Administration by the Shoshone-Bannock Tribes.

The Tribes water rights are a primary responsibility of the Fort Hall Irrigation Project. The Tribes would like to gather information pertaining to regional drought, perform computer modeling to identify vulnerable areas and test drought mitigation techniques. The proposed project will add value by modeling climate change and drought scenarios, and provide a direct benefit to the Fort Hall Irrigation Project's water supply during moderate and severe drought conditions.

Sincerely,

David Bollinger
Irrigation Project Manager
DOI/BIA Fort Hall Irrigation Project
Fort Hall, Idaho 83203
(208) 238-1992