Verde River Basin Integrated Hydrologic Modeling Project

Applicant Name:
The Nature Conservancy
1819 E. Morten Ave #100
Phoenix, AZ 85020

Project Manager:
Selena Pao
Verde River Project Manager
1819 E. Morten Ave #100
Phoenix, AZ 85020
spao@tnc.org
928-679-0075

Table of Contents

Technical Proposal and Evaluation Criteria

Executive Summary

April 12, 2022

The Nature Conservancy

Camp Verde, Yavapai County, Arizona

The Verde River and its tributaries are a critical resource for biodiversity, agriculture, recreation, cultural traditions, and municipal uses in Arizona. The river flows for nearly 190 miles before merging with the Salt River north of Phoenix and becoming a critical component of Salt River Project's and City of Phoenix's water supply portfolio. The Verde River is also a critical component of water supply for the Fort McDowell Yavapai Nation and the Yavapai-Apache Nation. Rural communities across northern Arizona source water from aquifers connected to the river and more than 6,000 acres of agricultural lands source surface water to produce crops.

The river faces tremendous threats from groundwater pumping, climate change, intractable water policy, and inefficient agricultural water use. Without relevant and continued monitoring and management, the Verde River will not be able to sustainably support the biodiversity and people that depend on it. The Nature Conservancy in Arizona and the Yavapai-Apache Nation have partnered to develop the Integrated Hydrologic Verde River Basin Model (Verde Model) that incorporates groundwater, surface water, water quality, and climate. The Verde Model was developed over the past three years building on the USGS Northern Arizona Groundwater Flow Model by adding an integrated MIKE SHE modeling component and adding additional data to improve predictions. In this project, the partners and other watershed stakeholders will work to develop a wide range of scenarios with water managers and improve the model when needed.

The refined model and scenarios will promote comprehensive management and collaboration in the Verde River Basin, simulating the cumulative impacts of land and water management choices and conservation strategies. Understanding the impacts of these management choices will provide direction on how best to achieve long-term goals.

The project will be completed in 2 years with an estimated completion date of January 17, 2025. The project is not located on a federal facility but proposed modeling on a river system upstream of the Salt River Project reservoirs which is a federal facility.

Technical Project Description

The Verde River faces tremendous threats from groundwater pumping, climate change, inflexible water policy, and inefficient agricultural water use. Without relevant and continued monitoring and management, the Verde River will not be able to sustainably support the biodiversity and people that depend on it. The Nature Conservancy in Arizona and the Yavapai-Apache Nation have partnered to develop the Integrated Hydrologic Verde River Basin Model

(Verde Model) that incorporates groundwater, surface water, water quality, and climate. The Verde Model was developed over the past three years building on the USGS Northern Arizona Groundwater Flow Model by adding an integrated MIKE SHE modeling component and adding additional data to improve predictions.

Founded in 1951, The Nature Conservancy is the world's leading conservation organization. The Nature Conservancy (TNC) in Arizona has worked with public and private partners to conserve land, protect flows in Arizona's rivers, restore thousands of acres of forests, and address urban heat and its impacts. TNC's vision is to save the lands and waters of Arizona that are needed to support and sustain habitat for wildlife, livable communities, and natural areas for future generations guided by science-based planning and non-confrontational values. TNC is a 501(c)3 non-profit organization and a Category B applicant.

The Yavapai-Apache Nation (YAN) and its People have lived within the Verde Valley since time immemorial and long before non-native settlers first arrived in the 1860s. The Nation relies upon the surface water of the Verde River and groundwater of the Verde Valley to sustain its People through farming, domestic, commercial, industrial, cultural and religious uses. The continuing flow of the Verde River and the plant, animal and human life which it sustains is of paramount importance to the Nation. Today the Yavapai-Apache Nation is geographically, socially and economically intertwined with the Verde Valley communities of Camp Verde, Clarkdale, Cottonwood, Sedona and Rimrock. The Nation recognizes that the collective future of our Verde Valley communities depends on working together as good stewards of our water resources. YAN is a federally recognized Indian tribe and a Category A applicant that fully supports this funding application.

Detailed Project Description

The primary objective of this project is to develop and run scenarios to compare land and water management choices in the Verde Watershed. YAN, TNC and other stakeholder desire to understand future water scenarios within the watershed and on its downstream water users.

The newly developed Integrated Hydrologic Verde River Basin Model (Verde Model) incorporates groundwater, surface water, water quality, and climate. The Verde Model was developed over the past three years, building on the USGS Northern Arizona Groundwater Flow Model by adding an integrated MIKE SHE modeling component and additional data to improve predictions.

Background USGS Northern Arizona Groundwater Flow Model (NARGFM)

NARGFM is a numerical flow model (MODFLOW) of the groundwater flow system in the primary aquifers in northern Arizona. It was published in 2011 by the US Geological Survey in cooperation with the Arizona Department of Water Resources and Yavapai County. It was developed to simulate interactions between the aquifers, perennial streams, and springs from predevelopment and transient conditions during 1910 through 2005. It is a large-scale model

covering many surface water basins throughout much of Northern Arizona. The following statement was included in the report summary related to the limitations of the model:

"Better information on several aspects of the groundwater flow system are needed to reduce uncertainty of the simulated system. Many areas lack documentation of the response of the groundwater system to changes in withdrawals and recharge. Data needed to define groundwater flow between vertically adjacent water-bearing units is lacking in many areas. Distributions of recharge along losing stream reaches are poorly defined. Extents of aquifers and alluvial lithologies are poorly defined in parts of the Big Chino and Verde Valley sub-basins. Aquifer storage properties are poorly defined throughout most of the study area. Little data exist to define the hydrologic importance of geologic structures such as faults and fractures. Discharge of regional groundwater flow to the Verde River is difficult to identify in the Verde Valley sub-basin because of unknown contributions from deep percolation of excess surface water irrigation."

Background on MIKE SHE Modeling Approach

MIKE SHE is an innovative, flexible tool for hydrologic modeling. A full suite of pre- and postprocessing tools and a mix of advanced and simple solutions to represent hydrologic processes allows the model to be customized to meet local hydrologic systems conditions. MIKE SHE represents most aspects of the hydrologic cycle with process models for evapotranspiration, overland flow, unsaturated flow, groundwater flow, and channel flow and their interactions. Flexibility in the system allows each process to be represented at different levels of spatial distribution and complexity to meet the modeling goals and align with available data.

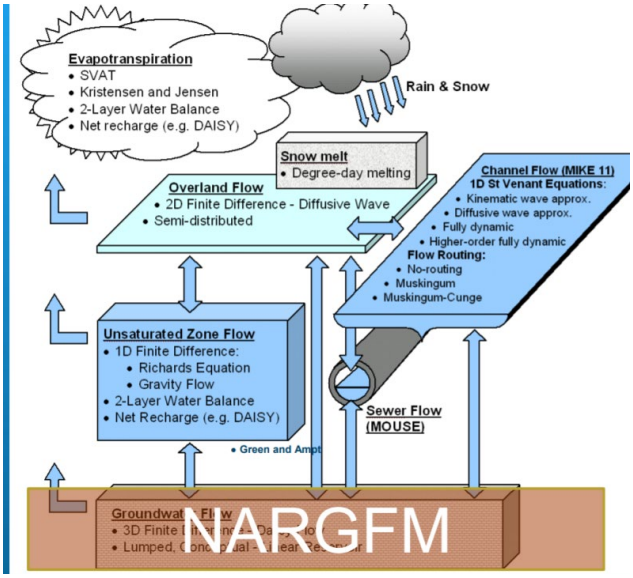
Integrated Hydrologic Verde River Basin Model

For the development of the Verde Model, YAN and TNC contracted with Lacher Hydrological Consulting with a subcontract to Integrated Hydro Systems, LLC. The two principals from each company were Laurel Lacher and Bob Prucha. Each are highly qualified and have extensive experience developing groundwater modeling tools. Lacher brings a unique experience in modeling complex southwest desert systems. Prucha brings extensive experience in development and application of the MIKE SHE modeling approach.

The Integrated Hydrologic Verde River Basin Model is a MIKE SHE model integrated with the USGS NARGFM model as the basis for the groundwater function of the Verde Basin. To

improve the accuracy of the NARGFM model, bore hole records were examined and additional data was added to the NARGFM model to increase its accuracy. For the MIKE SHE modeling portion, a wide variety of data sources were utilized including high resolution LIDAR data, land surface area mapping, irrigation ditch features, and high resolution climate data.

Figure X. Conceptual View of model components



By combining the climate, land surface and irrigation system components in the MIKE SHE and groundwater components of NARGFM, an integrated model was produced to help better understand water scenarios.

The sub model for the Verde Valley-Oak Creek area of the model was able to reproduce flows at Verde River gages with more than 90% accuracy. Given the quality of these results, we feel confident in developing scenarios that will have an appropriate level of accuracy to evaluate land and water management options.

Proposed Approach

TNC and YAN propose a simple approach to utilizing the Integrated Hydrologic Verde River Basin Model to better understand land and water management decisions on water security for the Verde River. This will be accomplished by 1) engaging stakeholders to develop scenarios, 2) running modeling scenarios to assess management choices and 3) communicating results to stakeholders.

TNC and YAN will convene a diverse set of stakeholders to develop a set of scenarios. Stakeholders will include elected officials from city and county governments, town managers, public works directors and economic development staff from city and county governments. Scenarios will focus on:

- Evaluation of land use changes such as high density, planned area development compared to traditional, low density development under current zoning regulations;
- Impacts of modifications of irrigation systems based on potential infrastructure and market investments;
- Implications of effluent recharge, re-use and discharge and reductions in groundwater pumping;
- Evaluation of stormwater management alternatives;
- Impacts of climate change predictions on overall water supply.

Within the Verde Valley-Oak Creek area, a sub-model has already been developed at a 100-meter grid scale. This detailed model can be used to evaluate projects at a much finer scale while the larger model can be used to evaluate larger scale questions. Projects are evaluated through running comparative scenarios. As needed and as budgets allow, smaller scale models can be developed for more detailed project evaluations in other parts of the watershed.

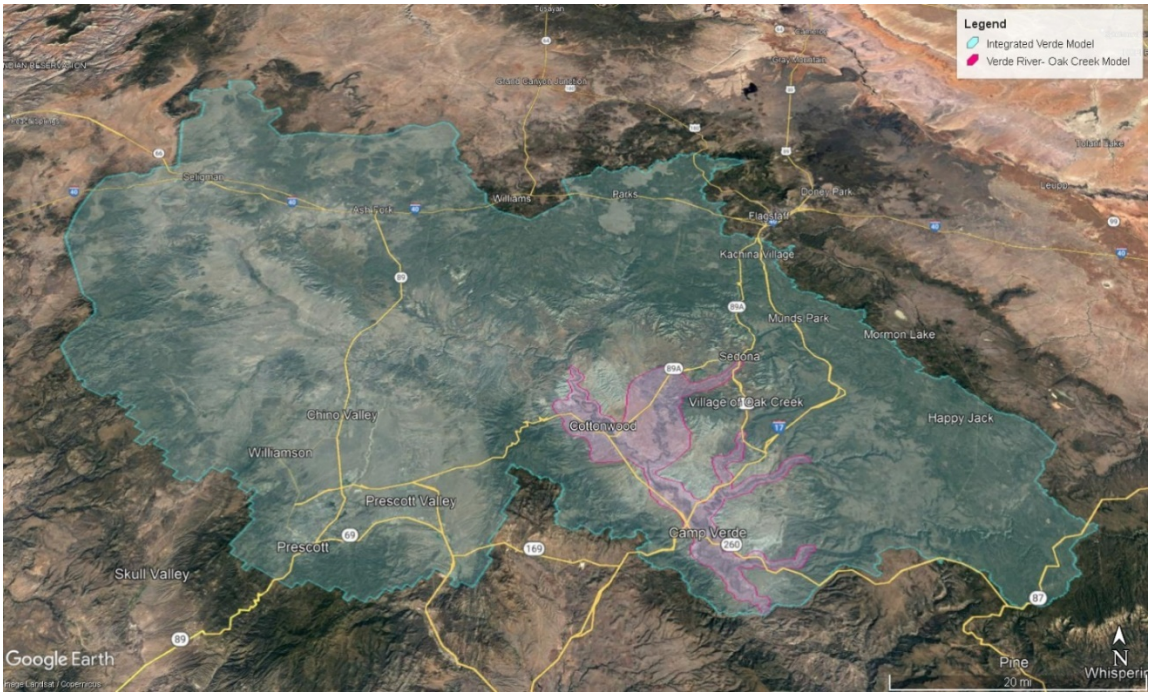
Project Goals

With current threats to the Verde River, decisions made in the near future will determine its fate well through this century. While regional partnerships are underway to ensure comprehensive management of the Verde River, impacts of diverse land and water management choices are not considered at scale. To address this, we propose, via partnerships with stakeholders, to utilize the Integrated Verde River Model to model choices and climate predictions to enable water managers to make informed management choices.

As a direct result of the grant activities, the projected outcomes are as follows: 1) updating integrated water model as needed; 2) a comprehensive set of scenarios to better understand how action or inaction can impact the Verde River and water supplies within the watershed and 3) an established, engaged stakeholder group that will serve as an advocate and ambassador for the model and continue to build buy-in among new and different stakeholders.

Project Location

The location of the proposed project is within the Verde Watershed in Yavapai County in Arizona. The project area will focus on the include the detailed focus in the Verde Valley (middle Verde basin) but also include the upper Verde watershed as shown on the map below.



Evaluation Criteria

A – Benefits to Water Supply Reliability

1. **Describe in detail the water management issue(s) that are occurring within your project area that your project will address. Describe the severity of the water management issues to be addressed with supporting details. For example, will your project address water supply shortfalls or uncertainties, the need to meet competing demands for water, complications arising from drought, conflicts over water, or other water management issues?**

The Verde River faces significant risks. Unrestricted groundwater pumping coupled with fast growth and limited land use planning has resulted in increased demand. Surface water diversion continues without adjudication to manage water use or provide certainty for people or the environment. Climate change impacts habitat, natural recharge and nature-based water demand – resulting in lower summer baseflows. Through various stakeholder processes and planning efforts, the following are identified as the most pressing threats and challenges to the Verde River:

1. Climate change and drought that reduce aquifer recharge and alter precipitation and temperature regimes;
2. Increases in groundwater pumping due to increases in population and development of wells for agricultural uses;
3. Increasing population that infringes on natural habitat and alters landscape conditions;
4. Limited water management and legal framework due to incomplete adjudication, lack of groundwater regulation to protect stream flows, and unresolved tribal water rights; and
5. Diverse stakeholders without common goals and limited forums for reaching shared goals.

This project will address water supply shortfalls and uncertainties by providing water managers an integrated water quality and quantity model to assimilate the cumulative impacts of possible strategies and how best to achieve long-term goals. The model will be a decision support tool to better understand how action or inaction can impact the Verde.

2. **Explain how your project will address the water management issues identified in your response to the preceding bullets and provide support for your response. For example, will your project improve water management by supporting:**
    - **Water supply reliability**
    - **Drought management activities**
    - **Other improvements to water supply reliability**

The decisions that land and water managers make in the near future will forever impact the Verde River. These decisions include agreement to tribal water rights settlements, siting of wastewater treatment plants, allocation of effluent resources, support for protection of

sensitive lands and approval of land use and zoning changes. Developing scenarios and exploring the impacts of a diverse set of land and water management scenarios will allow water managers and other stakeholders to direct funding towards the most beneficial projects and mitigate and avoid the most detrimental projects.

The model will provide the ability to evaluate the impacts of:

- Effluent re-use, recharge and discharge across a wide spatial scale
- Stormwater capture and recharge at multiple scales across the watershed
- Effectiveness of green and other nature-based infrastructure investments
- Irrigation conveyance efficiency projects
- On-farm water management choices
- Land use planning choices and land protection efforts
- Drought response plans and water conservation ordinances.
- Water market and trading scenarios within surface water and stored water
- Septic to sewer conversion programs

YAN, TNC, municipalities, county and other stakeholders have limited funding and capacity. As water supply decisions are made, the long-term impacts need to be considered while investment decisions are being made. Utilizing this modeling tool will allow stakeholders to understand the magnitude of their impacts, including identifying potential mechanisms for mitigation and avoiding adverse impacts to historic water users and ecological functions.

3. **Describe to what extent your project will improve water management. Describe the significance or magnitude of the benefits of your project, either quantitatively or qualitatively, in improving water management, with supported details.**

The model is a decision support tool that will allow stakeholders to evaluate land and water management choices while considering climate change factors. With increased pressure on the Verde flows, comprehensive planning to effectively manage a shared resource for the long-term becomes a high priority. We also expect to see a continued shift toward the recognition of collective action – those cumulative impacts can benefit flows or that perceived small demands on the river can add up to major threats. The model and scenarios will be available for managers and elected officials to utilize in planning to help communities meet their sustainability goals. The expected long-term outcome is a river that is managed collectively to achieve long-term flow and protection goals. Above all, the goal of this project is to ensure that the actions that communities, farmers, and other users take will contribute to the health of the watershed.

4. **Explain how your project complements other similar efforts in the area where the project is located. Will your project complement or add value to other, similar efforts in the area, rather than duplicate or complicate those efforts? Are there other similar efforts in the area that have used a similar methodology successfully which can be complimented? Applicants should make a reasonable effort to explore and briefly**

describe related ongoing projects. Consider efforts by any Federal, state, local agency, or non-governmental organizations.

The Verde Model encompasses the Upper and Middle Verde basins with an emphasis on the middle Verde and Oak Creek and includes surface water, groundwater, and water quality. The Verde Model will provide the stakeholders in the middle Verde resources and tools to evaluate land and water management choices.

Another similar effort is the NARGFM model produced by USGS in 2011. The model is complementary to the Verde Model as it is based off and builds upon the NARGFM model. There is another model that was developed by the Town of Chino Valley that focuses on groundwater in the Upper Verde River.

B – Need for Project and Applicability of Project Results

1. **Will the project result in an applied science tool(s) or information that is readily applicable, and highly likely to be used by water resource managers in the West?**

The Verde Model integrates surface water and groundwater processes. Components can be added to evaluate water quality implications. The tool will allow water resource managers in the Verde watershed to make more informed decisions. The modeling scenarios will be developed collaboratively with surface and groundwater users. Scenarios will assess land management choices and water management choices.

2. **Explain who has expressed the need and describe how and where the need for the project was identified (even if the applicant is the primary beneficiary of the project). For example, was the need identified as part of a prior water resources planning effort, determined through the course of normal operations, or raised by stakeholders? Provide support for your response (e.g., identify the entities that have expressed a need or cite planning or other documents expressing a need for the project).**

The Yavapai-Apache Nation (YAN) identified the need for this project in order to analyze and understand impacts to the Verde in response to land and water planning threats. YAN was concerned about risks to long-term water security in response to a pump-back storage facility. The Bureau of Indian Affairs (BIA) provided funding to start development of the model. In collaboration with conservation organizations and other stakeholders, the need for a watershed scale model that encompassed groundwater and surface water was needed.

3. **Who will be involved in the project as project partners? What will each partner or stakeholder's role in the project be? How will project partners and stakeholder be engaged in the project and at what stages? If you are a Category B applicant, be sure to explain how your Category A partners will be engaged in the project.**

Yavapai-Apache Nation is an Indian tribe that has water delivery authority and is a project partner. YAN will work with TNC to develop a set of shared scenarios to evaluate potential threats and solutions of shared concerns.

Other stakeholders will include municipalities in the Verde Watershed, Yavapai County and agricultural water users. These stakeholders will be engaged through regular meetings to identify their concerns and potential management actions. Stakeholders are currently engaged through the Sustaining Flows Council that has met for more than 3 years and consists of elected officials and water managers.

4. **Will the results of your project inform water resource management actions and decisions immediately upon completion of the project, or will additional work be required?**

The result of the project will inform water resource management actions and decisions immediately upon completion of the project. The project will include all stakeholders and partners participating in providing scenarios for the model, and the information will help the water resource managers in their decision making.

5. **If applicable, will the results of your project be transferrable to other users and locations? Note: not all water management solutions are transferrable.**

The Verde Model is specific to the Verde Watershed. However, the MIKE SHE modeling tool paired with groundwater models is applicable to other areas. MIKE SHE modeling tools have been developed in southern Arizona along the San Pedro River and have proven to be a useful tool.

C – Project Implementation

Describe your project implementation plan:

1. **Briefly describe and provide support for the approach and methodology that will be used to meet the objectives of the project. You do not need to repeat the full technical project description included in Section D.2.2.4 under the Technical Project Description. However, you should provide support for your chosen methodology, including use of any specific models, data, or tools.**

The project implementation plan is as follows

1. TNC will contract with a qualified facilitation consultant to convene and facilitate a diverse set of stakeholders and engage the already developed Sustaining Flows Council that meets in the Verde Watershed.
2. TNC will contract with a qualified consultant to run the Verde Model.

3. The facilitation consultant will convene at least 3 stakeholder meetings to understand the concerns of land and water managers, information that will help water managers in their decision making and provide scenarios for the model.
4. The modeling consultant will run the scenarios based on the feedback from the stakeholders.
5. The modeling consultant will present on the results and provide the stakeholders the opportunity to ask questions for clarification.
6. The modeling consultant will provide a report based on the results of the scenarios with recommendations.
7. The communications consultant will develop publicly accessible communications materials to ensure a wide range of stakeholders can access and understand the results.

2. Describe the work plan for implementing the proposed scope of work. Such plans may include, but are not limited to:

1. an estimated project schedule that shows the stages and duration of the proposed work,
2. milestones for each major task,
3. start and end dates for each task and milestones, and
4. costs for each task

The following is an outline of the proposed work plan

1. Task 1- Stakeholder Input: Through facilitated meetings, convene three stakeholder meetings to develop shared scenarios to evaluate future land and water management choices.
    a. Milestone: By June2023, have hosted three stakeholder meetings and have developed 3 shared scenarios.
2. Task 2 – Evaluate Management Scenarios: Modeling consultant will run three scenarios through the model to evaluate choices. This may include model updates needed to ensure accuracy of the model.
    a. Milestone: By April 2024, modeling scenarios are run and shared back with stakeholders.
3. Task 3 – Communication and Outreach: Provide results of modeling scenarios to stakeholders and discuss implication of management choices.
    a. Milestone: By January 2025, Complete 1) a technical report on modeling tools and results of the scenarios and 2) a short, publicly accessible communications document on the results of the scenarios.

3. **Provide a summary description of the products that are anticipated to result from the project. These may include data, metadata, digital or electronic products, reports, and publications. Note: using a table to list anticipated products is suggested.**

Products	Description
Memo to stakeholders confirming the scenarios to be evaluated	This document will memorialize for stakeholders the scenarios that are collaboratively developed and the assumptions that will be utilized within the model to produce the modeled results.
Technical Report summarizing modeling tool and results of scenarios	Technical report that summarizes the modeling tool including the assumptions made to develop it and sources of data. This report will also summarize the modeling results. Modeling files will be retained by TNC and YAN.
Presentation based on the scenario results	Public presentation on modeling results to stakeholders. This presentation will be provided in multiple forums.
Publicly accessible communications documenting the results of the scenarios	Publicly accessible communication document that can help communicate results to a broad audience. This may be a web-based communication such as a story map.

1. **Identify staff with appropriate credentials and experience and describe their qualifications. Describe the process and criteria that will be used to select appropriate staff members for any positions that have not yet been filled. Describe any plans to request additional technical assistance from Reclamation or via a contract. Please answer the following:**

   Have the project team members accomplished projects similar in scope to the proposed project in the past either as a lead or team member?

This work will be led by the Rural Communities Project Manager of The Nature Conservancy. The Verde Program of the Nature Conservancy has supported development of science-based evaluation tools in the past and can draw from diverse science resources within TNC. Rural Communities Project Manager has worked in the Verde Basin for more than 5 years and has experience working with communities in developing on-the-ground projects. Rural Communities Project Manager has also worked with consultant to review the current model.

2. **Is the project team capable of proceeding with tasks within the proposed project immediately upon entering into a financial assistance agreement? If not, please explain the reason for any anticipated delay.**

The project team is ready to move forward when funding is awarded. Match funding has been secured and is in place.

D – Dissemination of Results

Explain how project results will be disseminated, including:

1. **Describe how the tools, frameworks, or analyses developed under the proposed scope of work will be disseminated, communicated, or made available to water resources managers who may be interested in the results.**

The following products will be provided to municipal and agricultural water managers in the Verde watershed:

- Technical Report summarizing modeling tool and results of scenarios will be shared via email.
- Presentation on scenarios results will be provided to Sustaining Flows Council, Verde Front Coalition and Greater Chino Valley Partnership to ensure a wide range of stakeholders are hearing the results. Additional presentations can be made upon request. These three coalitions consist of land and water managers at staff and elected official levels.
- Publicly accessible communications document will be a resource for managers to share with their constituents to help build support for sustainable water management choices.

2. **If the applicant is the primary beneficiary of the project, explain how the project results will be communicated internally, and to interested stakeholders and interested water resources managers in the area, if appropriate.**

The Nature Conservancy and Yavapai-Apache Nation co-developed the model and will work together to communicate with stakeholders and develop additional scenarios. Modeling consultant and TNC will work to educate and inform Yavapai-Apache Nation Tribal Council on modeling results and implications.

3. **If the applicant is not the primary beneficiary of the project (e.g., universities or research institutes), describe how project results will be communicated to project partners and interested water resources managers in the area.**

N/A

4. **Describe how the project results will be shared with other water managers in the West that could use the information to support water management objectives.**

Results will be available to other western communities and will demonstrate a range of mechanisms to evaluate mitigation measures for changing land and water uses as well as implications of climate change on water supply. The final technical report will be publicly available.

E- Presidential and Department of the Interior Priorities

1. **Please provide specific details and examples on how the project will address the impacts of climate change and help combat the climate crisis.**

Climate change scenarios for the Verde Watershed predict increased temperatures and more intense rainfall. A range of climate change scenarios will be overlaid with land and water management scenarios so that a range of results is demonstrated. This will allow managers to evaluate projects based on their response to climate change.

2. **Does this proposed project strengthen water supply sustainability to increase resilience to climate change?**

This model is a unique model that interlaces land surface with precipitation and rainfall to evaluate surface water functions and groundwater connections. This model design allows water managers to evaluate mitigation options and how they will function in the face of climate change predications. For example, stormwater management may be a key strategy for protecting baseflows in the Verde River. Stormwater is significantly impacted by land use changes and by climate change and is underutilized as a water resource in this area. This model can help us understand the size and scope of stormwater management projects that will positively benefit the Verde River and downstream water users.

3. **Does the proposed project contribute to climate change resiliency in other ways not described above?**

Climate change resiliency relies on having tools to make management choices. The modeling efforts will explicitly account for a range of climate change predications and overlay them with water management scenarios. This will provide information to make informed decisions to maintain water security for rural communities, downstream water users and natural ecosystems.

4. **Sub-criterion No. E2. Disadvantaged or Underserved Communities: Will the proposed project serve or benefit a disadvantaged or historically underserved community? Benefits can include, but are not limited to, public health and safety by addressing water quality, new water supplies, or economic growth opportunities.**

The communities that encompass the Verde Valley are by definition an underserved rural community as defined in the E.O 13985. Rural communities encompass large geographic areas and ideal require a vehicle for reliable transportation. Without a reliable vehicle, a resident of the Verde Valley would suffer from geographic isolation since there is a limited public transport available to the public. Another disparity the community faces as an underserved rural community is the restricted access to quality health care. The community lacks a health care workforce and specialty care that is required for the population and its size. This has caused the constituents to delay important, much needed care or travel out of county lines to receive the required care. These disparities have limited people's opportunities within the community.

This project will benefit more than 6 rural communities in Arizona and the Yavapai-Apache Nation. The Yavapai-Apache Nation is a federal recognized Indian Tribe without a recognized

water right or a Tribal Water Settlement. As the Nation seeks to achieve their Tribal Water Settlement, it is critical that they understand the water management options available to those that utilize the same water supplies as the Nation. The Verde Valley communities, with the exception of Sedona, all struggle to meet community needs with limited budgets while meeting the needs of new residents. Yavapai County is one of the fastest growing counties and struggles with ensuring affordable housing. Water quality concerns are not well understood, and the state has not yet completed the adjudication process to delineate surface water rights. These uncertainties complicate planning and lead to distrust amongst stakeholders. This modeling effort can build communication and common understanding across these communities.

5. **Sub-criterion No. E.3. Tribal Benefits: Does the proposed project directly serve and/or benefit a Tribe? Will the project improve water management for an Indian Tribe?**

This project directly benefits the Yavapai-Apache Nation as a partner and Category A partner in the development of this project. As the Nation seeks to achieve their Tribal Water Settlement it is critical that they understand the water management options available to those that utilize the same water supplies as the Nation. This model and the scenarios are an opportunity to select and ensure investment in projects that will protect the Nation's water interests in the future. The model is already being used to develop options for the Tribal Water settlement and this work will build on these existing efforts.

6. **Does the proposed project support Tribal resilience to climate change and drought impacts or provide other Tribal benefits such as improved public health and safety by addressing water quality, new water supplies, or economic growth opportunities?**

This project will allow the Nation to evaluate the impacts of climate change on long-term water supplies. This is critical to the development of their economic growth which includes commercial and agricultural enterprises. This includes evaluation of how and where to site water infrastructure for recharge of effluent and stormwater and domestic and agricultural wells, and inform land use choices.

Project Budget

Funding Plan

TNC will provide non-federal cost share for staff time and contracted services. TNC will utilize grant funding from the Nina Mason Pulliam Charitable Trust that is expected to be awarded in June 2022 and from existing general private donor contributions. Additionally, YAN will provide $10,000 in cash toward contracting services. If the request to NMPCT is not funded, general funding from TNC is available.

Budget Proposal

Table 1 – Summary of Non-Federal and Federal Funding Sources

Funding Sources	Amount
Non-Federal Entities	
Nina Mason Pulliam Charitable Trust	$15,000
The Nature Conservancy Funds	$39,273
Yavapai-Apache Nation	$10,000
Non-Federal Subtotal	$64,273
REQUESTED RECLAMATION FUNDING	$64,273

Table 2 – Total Project Cost Table

Source	Amount
Costs to be reimbursed with the requested Federal Funding	$64,273
Costs to be paid by the applicant	$64,273
Value of third-party contributions	$0
TOTAL PROJECT COST	$128,546

Table 3 – Budget Proposal

Budget Item Description	COMPUTATION		Quantity type	TOTAL COST
	$/Unit	Quantity		
Salaries and Wages				
TNC Project Manager	$45,900	0.2	FTE	$9,180
Fringe Benefits				
Full-Time Employees	45%	$9,180	percent of salary	$4,131
Equipment				
Supplies and Materials				
Contractual/Construction				
Facilitation Consultant	$200	75	hours	$15,000
Lacher Hydrological Consulting	$300	227	hours	$68,100
Communications Consultant	$120	50	hours	$6,000
Third-Part In-Kind Contributions				
Other				
TOTAL DIRECT COSTS				$102,411
Indirect Costs				
TNC ICR	25.52%	$102,411	NICRA rate	$26,135
TOTAL ESTIMATED PROJECT COSTS				$128,546

Budget Narrative

Salary and Wages (0.2 FTE is about 270 hours over 2 year grant period)

Task 1- Stakeholder Input

Project manager will dedicate 30 hours to support this task. This will include selecting and managing contractor, preparing for and attending meetings and having follow up conversations with stakeholders.

Task 2 – Evaluate Management Scenarios

Project manager will dedicate 170 hours to support this task. This will include managing contractor, reviewing scenarios and aiding in securing information to develop scenarios.

Task 3 – Communication and Outreach: Provide results of modeling scenarios to stakeholders and discuss implication of management choices.

Project manager will dedicate 50 hours to support this task. This will include selecting and managing contractor, reviewing scenarios and aiding in securing information to develop scenarios.

Project Management: Project manager will dedicate 20 hours to support overall project management over the course of the grant. This will include budget review and preparation of grant reports.

Fringe Benefits

Rate is determined by TNC's Negotiated Indirect Cost Rate Agreement (NICRA). The rate applicable at the time a cost is incurred is the rate that will be used. The proposed rate in the NICRA currently being negotiated for FY23 (July 2022-June 2023) is 45%.

Contractual

Task 1- Stakeholder Input

- Facilitation Consultant: Facilitation consultant will lead stakeholder engagement efforts to get input on types of land and water management choices should be utilized to develop scenarios. This will include setting up meetings, developing notes and confirming input from stakeholders. This will account for 75% of projected costs for this consultant.
- Lacher Hydrological Consulting: Lacher will attend stakeholder meetings and provide context on what types of decisions can be modeled, the amount of data needed to develop scenarios and capabilities of the model to provide input on potential land and water management choices. This will account for 15% of projected costs for this consultant.
- Communications Consultant: will not contribute to this task.

Task 2 – Evaluate Management Scenarios

- Facilitation Consultant: Consultant will provide clarification of input from stakeholders and convene additional meetings with stakeholders as needed. This will account for 10% of projected costs for this consultant.

- Lacher Hydrological Consulting: Lacher will oversee the running of the scenarios and updates to the model as needed to run scenarios. This may include subcontracts to qualified sub-contractors to develop specific component within the model. This will account for 65% of projected costs for this consultant.
- Communications Consultant: will not contribute to this task.

Task 3 – Communication and Outreach:

- Facilitation Consultant: Consultant will convene stakeholders and get feedback on modeling results and communications materials. This will account for 15% of projected costs for this consultant.
- Lacher Hydrological Consulting: Lacher will develop a technical report on modeling tools and results of the scenarios. This will account for 20% of projected costs for this consultant.
- Communications Consultant: Consultant will review technical report on modeling tools and results of scenarios and participate in stakeholder meetings to develop short, publicly accessible communications document on the results of the scenarios. This will account for 100% of projected costs for this consultant.

Contractor Selection:

Facilitation contractor will be selected utilizing standard competition guidelines for contracts over $10,000 per 2 CFR 200. Communications consultant will be selected utilizing standard requirements for contracts under $10,000 per 2 CFR 200.

We are requesting approval to select Lacher Hydrological Consulting through non-competition for the completion of the modeling tasks associated with this project. Lacher has developed the modeling tool over the last three years in collaboration with Yavapai-Apache Nation and The Nature Conservancy. Lacher was selected by Yavapai-Apache Nation to initiate the modeling effort as the most qualified and reasonably priced consultant. TNC choose to continue the modeling efforts with private funds with Lacher in order to ensure continuity as the model was developed. Given the in-depth knowledge of the area and expertise in running the model, continuing to engage with Lacher will likely result in the best quality products with the lowest costs. Another consideration is that the model is also being used by the Yavapai-Apache Nation in development of their Tribal Water Rights Settlement and changing modeling consultants at this stage would require vetting the consultant to ensure there were no conflicts with parties involved in the settlement process and bringing them into a non-disclosure agreement.

Consult costs are estimated to be:

	Facilitation Consultant	Lacher Hydrological Consulting	Communications Consultant
Salary and Wages:	$14,500	$42,600	$5,200
Sub-contracts:		$25,000	
Travel:	$500	$500	$300
Supplies:			
Printing:			$500
Total Cost:	$15,000	$68,100	$6,000
Average Hourly Cost:	$200	$300	$120
Estimated Cost per Task			
Task 1:	$11,250	$10,215	$0
Task 2:	$1,500	$44,265	$0
Task 3:	$2,250	$13,620	$6,000

Indirect Costs
Rate is determined by TNC's NICRA. The rate applicable at the time a cost is incurred is the rate that will be used. The proposed rate in the NICRA currently being negotiated for FY23 (July 2022-June 2023) is 25.52%.

Environmental and Cultural Resources Compliance

Compliance is not required.

Required Permits or Approvals

Permits and approvals are not required for the project.

Letters of support for the project and letters of participation- See Appendix

Official Resolution- See Appendix

The Nature Conservancy

The Nature Conservancy
Phoenix Conservation Center
1819 E. Morten Ave., Suite 100
Phoenix, AZ 85020

Tel : 602.712.0048

www.nature.org/arizona

CERTIFICATION OF CORPORATE ACTION

The Nature Conservancy, a District of Columbia non-profit corporation, (the "Conservancy"), having its registered offices at 4245 North Fairfax Drive, Suite 100, Arlington, Virginia 22203 USA:

1. Is duly organized, validly existing and in good standing under the laws of the District of Columbia;

2. Is qualified to transact business in the State of Arizona;

3. Is doing business in Arizona at 1819 E. Morten Ave., Suite 100, Phoenix, AZ 85020;

4. Has standard operating procedures approved by its Board of Directors to delegate authority to its employees to act on behalf of The Nature Conservancy in conducting business;

5. Has taken the appropriate action to authorize Daniel Stellar, State Director of the Conservancy's Arizona Business Unit, to act on behalf of The Nature Conservancy to transact any and all business associated with The Nature Conservancy's work in Arizona, including the authority to commit The Conservancy to provide funding and/or in-kind contributions in connection with any submittal to the Bureau of Reclamation, Department of the Interior; and

6. To work with the Bureau of Reclamation to meet established deadlines for entering into and fulfilling a grant or cooperative agreement.

Executed on this 6th day of April, 2022.

THE NATURE CONSERVANCY
A District of Columbia non-profit corporation

By _____
Melinda Y. Ching, Assistant Secretary

Delegation from AZ State Director Daniel Stellar to Maria Elena Rodriguez to submit the application. TNC Grant Specialists are the AOR in grants.gov.

From: Daniel Stellar
To: Maria Elena Rodriguez
Cc: Sonja Stupel; Kimberly Schonek; Selena Pao; Kristi Smith
Subject: RE: ASAP: request delegation of authority to Maria submit proposal
Date: Wednesday, April 13, 2022 4:09:12 PM
Attachments: image003.png

I delegate authority to Maria Elena Rodriguez to submit this proposal and sign these forms on behalf of TNC.

For future for tracking please copy Kristi and please also indicate if something has a less than one-day turnaround in the subject line in addition to the ASAP.

Thanks Maria – let me know if you need anything else.

From: Maria Elena Rodriguez <maria_rodriguez@TNC.ORG>
Sent: Tuesday, April 12, 2022 3:23 PM
To: Daniel Stellar <daniel.stellar@TNC.ORG>
Cc: Sonja Stupel <sstupel@TNC.ORG>; Kimberly Schonek <kschonek@TNC.ORG>; Selena Pao <spao@TNC.ORG>
Subject: ASAP: request delegation of authority to Maria submit proposal

Hi Dan,

We are ready to submit a proposal for the Verde River Basin Integrated Hydrologic Modeling Project to BOR under their WaterSMART Applied Science grants. Normally, I would have you sign several standard forms as approval of the application, but this one needs to be submitted through grants.gov and TNC has made grants specialists the authorized representatives in the system. So I will be submitting the application and my signature will be added to the forms by the system upon submittal. **Therefor I ask that you provide one-time delegated authority for me to submit this proposal and sign the forms on behalf of TNC.**

Summary-
Total project: $128,546
BOR ask: $64,273
Match: $64,273 (anticipate $10k from YAN and $15K from Pullium, the remainder is general funds)
Two year grant term starting in approximately Feb 2023
Full ICR included in budget

The budget is about $13k for Selena's time over 2 years and $89,100 for contractors for getting stakeholder input, modeling various scenarios of water in the Verde watershed, and communication and outreach of results. The rest is indirect.

For reference, the forms I will be "signing" are attached (these are standard certifications and assurances along with TNC/project basic info and budget) and here is the application:

YAVAPAI-APACHE NATION

Executive Office

Chairman Jon Huey

Vice Chairwoman Tanya Lewis

2400 West Datsi Street, Camp Verde, AZ 86322

Phone (928)567-1021 **Fax (928)567-3994**

April 12, 2022

United States Bureau of Reclamation
P.O. Box 25007, 86-63000
Denver, CO 80225

Re: The Nature Conservancy Bureau of Reclamation WaterSMART, Applied Science Grant Proposal - No. R22AS00165

Dear Grant Review Committee Members,

The Yavapai-Apache Nation (the Nation) is pleased to provide a letter of support for The Nature Conservancy's Integrated Model proposal to the United States Bureau of Reclamation's WaterSMART – Applied Science Grant No. R22AS00165. The Yavapai-Apache Nation and The Nature Conservancy (TNC) have been working closely over the past 2 years to develop an Integrated Hydrologic Verde River Basin Model (Verde Model) and are excited to continue our partnership to develop a useful tool for water managers.

The Verde River is an integral part of the social and cultural fabric of the Yavapai-Apache Nation. Not only does the Nation and our community members have a traditional association to the Verde River going back many hundreds of years, we are also part of the modern Verde Valley community that relies on the Verde Watershed every day. The Nation has a personal stake in conserving and protecting the Verde River as an essential part of our cultural and community interests. The River is part of the character of the Yavapai-Apache people and of the entire Verde Valley. The Verde Model will promote comprehensive management and collaboration in the Verde Basin to provide direction to stakeholders on how to best achieve long-term goals aimed at protecting the Verde River and its watershed.

The Yavapai-Apache Nation will continue to be an integral partner in the Verde Model project and in the work vital under the TNC proposal. We will work closely with TNC and convene stakeholders to develop and run scenarios for the Verde Model. We will promote engagement and buy-in among new and different stakeholders. The Nation is prepared and committed to the project and the following outcomes: 1) updating the Verde Model as needed; 2) developing and analyzing a comprehensive set of model scenarios to better understand how action or inaction can impact the Verde River and water supplies within the watershed and; 3) an established, engaged stakeholder group that will serve as an advocate and ambassador for the model and continue to build buy-in among new and different stakeholders.

As part of the Nature Conservancy's grant proposal, be advised that the Nation is committed to provide $10,000.00 in matching share funds in addition to the funds contributed by the Conservancy.

For any questions you might have, please feel free to contact me by email or phone as follows: jhuey@yan-tribe.org, phone, 928-567-1021

Thank you for your consideration.

Sincerely,

Jon Huey
Tribal Chairman
Yavapai-Apache Nation

CC:
Yavapai-Apache Tribal Council
The Nature Conservancy

April 6, 2022

Bureau Of Reclamation
P.O. Box 25007, 86-63000
Denver, CO 80225

Re: The Nature Conservancy BOR's WaterSMART – Applied Science Grant Proposal (No. R22AS00165)

Dear Grant Review Committee Members,

This letter serves as our expression of support for The Nature Conservancy's Integrated Model proposal to Bureau of Reclamation's WaterSMART – Applied Science Grant No. R22AS00165. The Town of Clarkdale manages land and water in the Verde River Basin and sees value in additional planning tools.

The integrated Verde Model will provide our town the information to promote comprehensive management and collaboration in the Verde Basin to provide direction on how to best achieve long-term goals. The conservation and protection of the Verde River is an important component to our mission, and we are committed to participating as a stakeholder in the development of the Verde Model.

We look forward to engaging with The Nature Conservancy and Yavapai-Apache Nation to produce the following outcomes: 1) as needed update the existing MIKESHE Verde River Model; 2) a comprehensive set of scenarios to better understand how action or inaction can impact the Verde River and water supplies within the watershed and 3) an established, engaged stakeholder group that will serve as an advocate and ambassador for the model and continue to build buy-in among new and different stakeholders.

For any further questions, please feel free to contact me at any time. Thank you for your consideration.

Sincerely,

Susan Guthrie, APR, CM-ICMA, MPA
Town Manager
Town of Clarkdale
Susan.Guthrie@Clarkdale.AZ.gov

Friends of the VERDE RIVER
Working Collaboratively for a Healthy Verde River

SUSTAINING FLOWS RESTORING HABITAT PROMOTING COMMUNITY

April 10, 2022

Bureau Of Reclamation
P.O. Box 25007, 86-63000
Denver, CO 80225

Re: The Nature Conservancy BOR's WaterSMART – Applied Scient Grant Proposal (No. R22AS00165)

Dear Grant Review Committee Members,

On behalf of Friends of the Verde River, I am pleased to support The Nature Conservancy's Integrated Model proposal to Bureau of Reclamation's WaterSMART – Applied Science Grant No. R22AS00165. Friends of the Verde River works with land and water managers in the Verde River Basin and sees value in additional planning tools.

The Integrated Verde Model will provide our organization the information to promote comprehensive management and collaboration in the Verde Basin to provide direction on how to best achieve long-term goals. The conservation and protection of the Verde River is an important component to our mission, and we are committed to participating as a stakeholder in the development of the Verde Model.

We look forward to engaging with The Nature Conservancy and Yavapai-Apache Nation to produce the following outcomes: 1) as needed update to the existing MIKESHE Verde River Model; 2) a comprehensive set of scenarios to better understand how action or inaction can impact the Verde River and water supplies within the watershed and 3) an established, engaged stakeholder group that will serve as an advocate and ambassador for the model and continue to build buy-in among new and different stakeholders.

For any further questions, please feel free to contact me at any time. Thank you for your consideration.

Sincerely,

Nancy L.C. Steele, D. Env.
Executive Director
NancyS@verderiver.org

April 15, 2022

Bureau Of Reclamation
P.O. Box 25007, 86-63000
Denver, CO 80225

Re: The Nature Conservancy BOR's WaterSMART – Applied Scient Grant Proposal (No. R22AS00165)

Dear Grant Review Committee Members,

This letter serves as our expression of support for The Nature Conservancy's Integrated Model proposal to Bureau of Reclamation's WaterSMART – Applied Science Grant No. R22AS00165. Environmental Defense Fund supports land and water management in the Verde River Basin and sees value in additional planning tools.

The integrated Verde Model will provide our organization the information to promote comprehensive management and collaboration in the Verde Basin to provide direction on how to best achieve long-term goals. The conservation and protection of the Verde River is an important component to our mission, and we are committed to participating as a stakeholder in the development of the Verde Model.

We look forward to engaging with The Nature Conservancy and Yavapai-Apache Nation to produce the following outcomes: 1) as needed update the existing MIKESHE Verde River Model; 2) a comprehensive set of scenarios to better understand how action or inaction can impact the Verde River and water supplies within the watershed and 3) an established, engaged stakeholder group that will serve as an advocate and ambassador for the model and continue to build buy-in among new and different stakeholders.

For any further questions, please feel free to contact me at any time. Thank you for your consideration.

1875 Connecticut Avenue, NW
Washington, DC 20009
T 202 387 3500
F 202 234 6049
New York, NY / Austin, TX / Bentonville, AR / Boston, MA / Boulder, CO / Raleigh, NC
Sacramento, CA / San Francisco, CA / Washington, DC / Beijing, China / La Paz, Mexico
edf.org

Sincerely,

Chris Kuzdas, PhD
Water Program Manager
Environmental Defense Fund
602-478-9548
ckuzdas@edf.org

HAUSER & HAUSER FARMS
CAMP VERDE, ARIZ.

April 15, 2022

Bureau Of Reclamation
P.O. Box 25007, 86-63000
Denver, CO 80225

Re: The Nature Conservancy BOR's WaterSMART – Applied Scient Grant Proposal (No. R22AS00165)

Dear Grant Review Committee Members,

This letter serves as our expression of support for The Nature Conservancy's Integrated Model proposal to Bureau of Reclamation's WaterSMART – Applied Science Grant No. R22AS00165. Hauser and Hauser Farm is one of the largest surface water users in the Verde Valley with more than 500 acres of irrigated lands protected by Conservation Easements. As a family farmers, we look into the future and see value in planning tools that allow us better understand how long term drought, changes in land use and increased groundwater pumping will impact our business and livelihood.

The integrated Verde Model will provide information to promote comprehensive management and collaboration in the Verde Basin to provide direction on how to best achieve long-term goals. The conservation and protection of the Verde River is an important component to our livelihood and family, and we are committed to participating as a stakeholder in the development of the Verde Model.

For any further questions, please feel free to contact me at any time. Thank you for your consideration.

Sincerely,

Claudia Hauser

Claudia Hauser
Owner
Hauser and Hauser Farms
652 Montezuma Castle Hwy
Camp Verde, AZ 86322
928-300-4035