



INTERLOCAL COOPERATION CONTRACT NO. 26-007-AMS
BETWEEN THE
EDWARDS AQUIFER AUTHORITY
AND
THE UNIVERSITY OF TEXAS AT AUSTIN FOR
LONG-TERM CLIMATE VARIABILITY AND ITS INFLUENCE ON EDWARDS AQUIFER
RECHARGE THROUGH TREE-RING STREAMFLOW RECONSTRUCTIONS

This INTERLOCAL COOPERATION CONTRACT (Contract) is made and entered into under the Texas Interlocal Cooperation Act (ICA), Chapter 791, Texas Government Code, by and between the EDWARDS AQUIFER AUTHORITY (EAA), a conservation and reclamation district and a political subdivision of the State of Texas, with its principal place of business located at 900 E. Quincy Street, San Antonio, Texas 78215, and THE UNIVERSITY OF TEXAS AT AUSTIN, an institution of higher education (Contractor), an agency of the State of Texas and an institution of higher learning in the University of Texas System, with its principal place of business located at 3925 W. Braker Lane, Suite 3.340 (Mail Code A9000), Austin, Texas 78759-5316. Each of these entities is, at times, referred to in this Contract individually as a “Party”, and both are referred to collectively as “Parties.”

RECITALS

WHEREAS, the EAA was created in 1993 by the Edwards Aquifer Authority Act, Act of May 30, 1993, 73rd Leg., R.S., ch. 626, 1993 Tex. Gen. Laws 2350, as amended (Act); and

WHEREAS, under Section 1.02 of the Act, the EAA is a conservation and reclamation district created by virtue of Article XVI, Section 59 of the Texas Constitution, and is a governmental agency and body politic and corporate vested with the full authority to exercise the powers and to perform the functions specified in the Act; and

WHEREAS, under Section 1.08(a) of the Act, the EAA has all the powers, rights and privileges necessary to manage, conserve, preserve, and protect the Edwards Aquifer (Aquifer) and to increase the recharge of, and prevent the waste or pollution of water in, the Aquifer; and

WHEREAS, under Section 1.27 of the Act, the EAA may conduct research; and

WHEREAS, under Section 1.11(d)(2) of the Act, and other applicable law, the EAA may enter into contracts; and

WHEREAS, under Section 49.057(a), Texas Water Code, the EAA may contract with all persons, firms, partnerships, corporations, or other entities, public or private, deemed necessary by the EAA Board of Directors (Board) for the conduct of the affairs of the EAA; and

WHEREAS, under Section 49.211(a), Texas Water Code, the EAA has the functions, powers, authority, rights, and duties that will permit it to accomplish the purposes for which it was created or the purposes authorized by the Constitution, the Texas Water Code, or any other law; and

WHEREAS, under Section 49.213(b), Texas Water Code, the EAA may enter into contracts with any person or any public or private entity in the performance of any purpose or function permitted by the EAA; and

WHEREAS, under Section 49.213(c)(7), Texas Water Code, the EAA may enter into contracts with persons or any public or private entities on the terms and conditions the Board may consider desirable, fair, and advantageous for, among other things, the exercise of any rights, powers, and duties granted to the EAA; and

WHEREAS, this Contract is an interlocal contract entered into under the authority of the ICA, Chapter 791, Texas Government Code; and

WHEREAS, under Section 771.002(1)(B) of the ICA, the Contractor is a state university, or a part of a state institution of higher education and, therefore, under Section 791.011(b)(1) of the ICA, is a “state agency”; and

WHEREAS, Section 791.011(b)(1) of the ICA authorizes a local government to contract with a state agency, including with a state institution of higher education or university system, to perform governmental functions and services; and

WHEREAS, under Section 791.003(3) of the ICA, the activities that are the subject of this Contract are governmental functions and services in that they involve the public health and welfare, planning, administrative functions, and/or other governmental functions in which the Parties are mutually interested; and

WHEREAS, the EAA Board of Directors approved this Contract on April 14, 2026 and authorized the EAA General Manager to execute the Contract; and

WHEREAS, the EAA Board has elected to pursue developing multi-century tree-ring records to improve understanding of climate and streamflow variability across the Edwards Aquifer region; and

WHEREAS, the EAA and Contractor have been authorized by their respective governing bodies to enter into this Contract; and

WHEREAS, it is in the public interest that the EAA enter into this Contract.

AGREEMENT

NOW THEREFORE, for and in consideration of the mutual promises and agreements set forth in this Contract, the EAA and Contractor agree as follows:

ARTICLE I – TERM; DESCRIPTION OF WORK

Section 1.1. Term. This Contract is effective and commences on the date that it has been executed by both parties (Effective Date) and terminates on December 31, 2027 (Expiration Date).

Section 1.2. Services. Subject to the terms and conditions of this Contract, the EAA engages the Contractor to perform, for the benefit of the EAA, the work set forth and described in this Contract and in the following documents (Services) which are attached hereto: (1) the Scope of Work which is attached hereto as Exhibit A (Scope of Work); and (2) the Budget Estimate which is attached hereto as Exhibit B (Budget Estimate). The Contractor accepts such engagement and agrees to devote its best efforts and abilities and furnish all necessary labor, machinery, equipment, tools, and transportation necessary in furtherance thereof.

Section 1.3. Commencement and Completion of Services. All Services will be completed and delivered to the EAA by the Expiration Date and shall be completed in compliance with the schedules, budgets, descriptions, and specifications contained herein and, in the Exhibits, attached hereto. It shall be the Contractor's responsibility to ensure that the completion times for the tasks required under this Contract are met. At the sole option of the EAA, this Contract may be renewed and extended for up to one additional year, with such election made by the EAA giving the Contractor written notice to renew and extend this Contract prior to the end of the then Contract period. Time is of the essence in the performance of this Contract.

ARTICLE II – AMENDMENTS

Section 2.1. Amendments. The EAA may request changes or additions to the Scope of Work during the progress of the Services. Upon mutual agreement, the EAA and Contractor will make the necessary written revisions to the Scope of Work to reflect such changes or additions. Upon such request by the EAA, Contractor may propose the necessary revisions to specific tasks in the Scope of Work, associated schedules, and costs. This Contract, including any changes to the Scope of Work, may be amended only by written agreement of the Parties.

Section 2.2. Delegation to the General Manager. The Board of Directors of the EAA delegates the authority to the General Manager to enter into amendments to this Contract without further authorization by the Board consistent with the General Manager's authority to enter into contracts under Section 5.01 of the EAA's Bylaws.

ARTICLE III – COMPENSATION

Section 3.1. Fees and Expenses. The EAA agrees to pay the Contractor for the Services rendered under this Agreement in accordance with the Scope of Work and Budget Estimate, but in no event shall payments to the Contractor exceed \$165,299.43. The Contractor may not exceed

this amount and will be responsible for the payment of all of its other additional costs and expenses. The Contractor is not authorized to expend any additional funds in excess of this amount without the prior written approval from the EAA. The EAA will not be held accountable for any unauthorized work performed or funds expended by the Contractor in providing the Services under this Agreement.

Section 3.2. Payment. All “invoice packets” from the Contractor to the EAA for the Services for each previous month’s activities shall be sent no later than the 30th day of each month beginning on May 31, 2026, and shall provide an itemization of the Services rendered, and any costs and expenses incurred during the billing cycle. Documentation in the invoice packet must be sufficiently itemized and detailed and include invoices and/or receipts for all purchases and expenses (summary credit card charge receipts are not acceptable) which allows the EAA to clearly discern purchases made. Purchases and expenses documented with lost receipt forms are not eligible for reimbursement. Receipts without purchase details or that are not legible are not acceptable at any time. Alcohol purchases will NOT be reimbursed under any circumstances. Mileage will be reimbursed at the current IRS approved rate, if submitted. In no event will the EAA pay per-diem related expenses; expenses will be paid at cost with appropriate documentation. The monthly invoice packet will be submitted electronically in Adobe Acrobat (pdf) format via email to the Sr. Director of Aquifer Science at pbertetti@edwardsaquifer.org and accounting@edwardsaquifer.org. If the Contractor utilizes subcontractors (see Article V), the Contractor shall submit a Subcontractor Utilization Report with each invoice submitted to the EAA for payment. The terms of each invoice shall be net thirty (30) days upon EAA receipt and approval of that invoice.

ARTICLE IV – INDEPENDENT CONTRACTOR

Section 4.1. No Employment Relationship. The Parties understand and agree that this Contract does not create a fiduciary relationship between them, that they are separate entities, that the Contractor is an independent contractor with respect to the performance of the Services and is not subject to the direct or continuous control and supervision of the EAA, and that nothing in this Contract is intended to make either Party a subsidiary, joint venturer, partner, employee, agent, servant or representative of the other Party for any purpose whatsoever. The Contractor shall provide any and all equipment and materials necessary for the performance of the Services. The EAA shall have no right of direction or control of the Contractor, or its employees and agents, except in the results to be obtained, and in a general right to order the performance of the Services to start or stop as agreed to herein, to inspect the progress of the Services, and to receive reports. The Contractor shall accommodate reasonable requests from the EAA to allow EAA employees, agents or representatives to accompany and observe Contractor personnel in carrying out the Services under this Contract.

ARTICLE V – CONTRACTOR PERSONNEL AND SUBCONTRACTORS

Section 5.1. Personnel. The Contractor will provide any and all personnel necessary for its performance of the Services. The Contractor will be responsible for its employees and agents in all respects, including, without limitation, their compliance with applicable laws and their safety, including without limitation, all Occupational Safety and Health Administration (OSHA)

standards, requirements, and regulations. To the extent authorized by law, each Party indemnifies and holds harmless the other Party, as well as the other Party's officers, employees, and directors, from and against any claims brought by any employee, subcontractor, or other agent of the indemnifying Party relating in any way to the gross negligence or willful malfeasance of the Party in connection to the Services performed under this Contract.

Section 5.2. Subcontractors. In performing the Services under this Contract, the Contractor may retain and utilize as its subcontractors, to the extent that they are not already employees of the Contractor, those individuals identified to and approved in writing by the EAA, in advance. The EAA, in consultation with the Contractor, shall have the right to terminate, limit, or alter, at any time, the participation of any subcontractor utilized by the Contractor. No additional subcontractors may be retained by the Contractor to perform any Services under this Contract without the prior written consent of the EAA, provided that no such consent shall be necessary for the retention of any subcontractor previously approved by the EAA and identified by the Contractor on the Effective Date of this Contract.

ARTICLE VI – TERMINATION

Section 6.1. Termination for Convenience. Either party may terminate this Contract at any time, including at the expiration of each budget or payment period during the term of this Contract, with or without cause, upon ten (10) days' prior written notice to the other party.

Section 6.2. Termination for Cause. If the Services are not being carried out in a manner satisfactory to the EAA, the EAA may terminate this Contract upon the failure of Contractor to cure the unsatisfactory condition within twenty (20) days after receipt of written notice from the EAA. The word "satisfactory" or "unsatisfactory" in this Section 6.2 means that the Contractor has either reasonably complied, or not complied, with all performance requirements and obligations as set forth in Exhibit A of this Contract and other applicable provisions of this Agreement.

Section 6.3. Actions in the Event of Early Termination. Upon receipt of a notice of termination under this Article, Contractor shall immediately stop all work in progress, including all work performed by its employees, agents, or subcontractors. Insofar as possible, all work in progress will be brought to a logical termination point. Within 30 days of the final invoice following termination, the EAA shall pay Contractor all moneys then due and owing for the Services rendered, and costs and expenses, including non-cancellable costs, reasonably incurred up to the time of termination. Contractor will deliver to the EAA copies of all finished and unfinished documents, data, studies, surveys, drawings, maps, reports, photographs, and other materials prepared by Contractor, and each Party shall be free to utilize such documents, data, studies, surveys, drawings, maps, reports, photographs, and other materials pursuant to Article VII.

ARTICLE VII – OWNERSHIP OF MATERIALS

Section 7.1. Ownership. All information, documents, property, or materials produced, created, or supplied under this Contract by the Contractor, its employees, agents or subcontractors or anyone else, and whether finished or unfinished or in draft or final form, will be the jointly

owned property of EAA and the Contractor. Each Party shall have unlimited non-commercial rights to technical and other data resulting directly from the performance of the Contractor's Services under this Contract for the purposes of research and education.

Section 7.2. Delivery of Documents upon Termination. Upon termination of this Contract under Sections 1.3 or 6.1, all such information, documents, property and materials not already in the possession of the EAA will be delivered to the EAA within 30 days of termination.

Section 7.3. Nondisclosure of Documents. Both Parties recognize that each Party is subject to the provisions of Chapter 552, Texas Government Code. If a request for public information is filed with one of the Parties under Chapter 552, any information, property, or materials produced, created, or supplied under this Contract that is subject to disclosure under Chapter 552 may be disclosed by the Party to any third-party without the prior written consent of the other Party. To the extent allowable by law, if such a request is filed, the Party receiving the request shall promptly give notice to the other Party of the request and provide a schedule of the documents provided.

Section 7.4. Record Copies. The Contractor shall retain a record copy of all information, documents, property, or materials developed in the course of performing the Services for a minimum of three (3) years. Upon request of the EAA, such information, documents, property, or materials will be promptly supplied to the EAA, including after the Expiration Date or the termination of this Contract under Section 6.1. The EAA will reimburse the Contractor for actual cost of time and expenses of reproduction of such materials when requested.

Section 7.5 Publications. For publications, the publishing Party shall provide the other Party a thirty-day (30) period in which to review proposed publications, identify proprietary or confidential information, and to submit comments. The publishing Party will give full consideration to all comments before publication. All publications created by the Contractor pertaining to this Contract shall acknowledge that research performed by Contractor was funded in part by the EAA.

ARTICLE VIII – PERFORMANCE

Section 8.1. Performance of Services. The Contractor agrees that it will perform all Services in a good and workmanlike manner, strictly in accordance with the standards of the Contractor's profession, the Scope of Work, and as otherwise provided in this Contract and the Exhibits hereto. To the extent permitted by law, the Contractor's failure to timely perform the Services as agreed shall constitute a breach of this Contract and shall be subject to all applicable remedies at law or equity. Judgment of nonperformance shall rest solely with the EAA.

ARTICLE IX – LIQUIDATED DAMAGES

THIS ARTICLE INTENTIONALLY LEFT BLANK

ARTICLE X – BOND COVERAGE

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ARTICLE XI – INSURANCE

Section 11.1. Insurance Coverages. EAA acknowledges that, because Contractor is an agency of the State of Texas, Chapters 101 and 104, Texas Civil Practice and Remedies Code and Chapter 2259, Texas Government Code, apply to govern or address liability for the tortious conduct of the agents and employees of Contractor and that Workers' Compensation Insurance coverage for employees of Contractor is provided by Contractor as mandated by the provisions of Chapter 503, Texas Labor Code. The liability of Contractor and its members for personal injury and property damage is controlled by the Texas Tort Claims Act, Texas Civil Practice and Remedies Code, Chapter 101, Section 101.021. The limits of liability are \$250,000 for each person, \$500,000 for each single occurrence for bodily injury or death and \$100,000 for each single occurrence for injury to or destruction of property.

Section 11.2. No limitations. Contractor's obligation to obtain and maintain the foregoing policy or policies in the amounts specified shall not be limited in any way by reason of any insurance that may be maintained by the EAA, nor shall Contractor's performance of this obligation relieve it of liability under the indemnity provisions set forth in Section 12.2.

ARTICLE XII – ASSUMPTION OF RISK AND INDEMNIFICATION

Section 12.1. Risk. To the extent authorized by law, each Party shall assume all risks associated with its or its subcontractors' performance under this Contract and shall waive any claim against the other Party for damages arising out of the performance of the Services under this Contract.

Section 12.2. Indemnification. To the extent authorized by law, each Party shall defend, indemnify, and hold harmless the other Party, its directors, officers, employees, and agents from any and all damages, loss, or liability arising from (a) other contracts or arrangements between the indemnifying Party and any third parties that are entered into to perform the Services of this Contract, (b) any claims brought by any person relating to this Contract or the Services, or (c) the quality or the performance of the Services. The foregoing indemnification is limited to the extent that such liability, loss, or damage was caused by the negligent act, error, or omission of the indemnifying Party or any person or entity for whom the indemnifying Party is legally liable.

Section 12.3. Sovereign Immunity. Nothing herein shall constitute a waiver of the State's right or either Party's right to assert sovereign immunity.

ARTICLE XIII – NOTICES

Section 13.1. Notices to the EAA. All notices or communications under this Contract to be mailed or delivered to the EAA shall be in writing and shall be sent to the EAA's principal place of business as follows, unless and until the Contractor is otherwise notified:

EDWARDS AQUIFER AUTHORITY
Attention: Shelly Hendrix, Sr. Director of Finance/CFO
900 E. Quincy Street
San Antonio, Texas 78215
contracting@edwardsaquifer.org

Section 13.2. Notices to the Contractor. All notices or communications under this Contract to be mailed or delivered to the Contractor shall be in writing and shall be sent to the address of the Contractor as follows, unless and until the EAA is otherwise notified:

Associate Director of Contracting
Office of Sponsored Projects
The University of Texas at Austin
Peter T. Flawn Academic Center (FAC)
Suite 426, MC: A9000
2304 Whitis Ave
Austin TX 78712-1111
osp@austin.utexas.edu

with copy to:

Department of Jackson School of Geosciences
Attention: Didey Montoya
The University of Texas at Austin
didey@austin.utexas.edu

Section 13.3. Effective Date of Notice. Any notices or communications required to be given in writing by one Party to the other shall be considered as having been given to the addressee on the date the notice of communication is posted by the sending Party. Electronic notices shall be deemed delivered as of the stamp date generated by the receiving Party's system.

ARTICLE XIV – MISCELLANEOUS

Section 14.1. Entire Agreement. This Contract and the attached Exhibits constitute the entire agreement between the Parties regarding the Services to be performed by the Contractor and there are no representations, warranties, agreements or commitments between the Parties except as set forth herein. Unless otherwise authorized herein, no amendments or additions to this Contract shall be binding on the Parties unless in writing and signed by the Parties.

Section 14.2. Non-Waiver. No delay or failure by either Party to exercise any right under this Contract, nor any partial or single exercise of that right, shall constitute a waiver of that or any other right, unless otherwise expressly provided herein.

Section 14.3. Headings. Headings in this Contract are for convenience only and shall not be used to interpret or construe its provisions.

Section 14.4. Governing Law. This Contract shall be deemed to have been executed and performed in the State of Texas and shall be construed in accordance with and governed by the laws of the State of Texas. Venue for any disputes or claims arising from this Contract shall be exclusively in the proper courts in Travis County, Texas. The dispute resolution process provided for in Section 2009.053(c) of the Texas Government Code shall be used to resolve a dispute arising under this Contract.

Section 14.5. Counterparts. This Contract may be executed in two or more counterparts, each of which shall be deemed an original but all of which together shall constitute one and the same instrument.

Section 14.6. Binding Effect. The provisions of this Contract shall be binding upon and inure to the benefit of the Parties and their respective successors and assigns; provided, however, that neither Party may assign any of its rights nor delegate any of its duties hereunder without the other Party's prior written consent.

Section 14.7. Validity. The invalidity of any provision or provisions of this Contract shall not affect any other provision of this Contract, which shall remain in full force and effect, nor shall the invalidity of a portion of any provision of this Contract affect the balance of such provision.

Section 14.8. Intentionally left blank.

Section 14.9. Survival. Termination of this Contract for breach shall not constitute a waiver of any rights or remedies available at law or in equity to a Party to redress such breach. All remedies, either under this Contract or at law or in equity or otherwise available to a Party, are cumulative and not alternative and may be exercised or pursued separately or collectively in any order, sequence or combination. In addition, to these provisions, applicable provisions of this Contract shall survive any termination of this Contract.

Section 14.10. Attachments. The Exhibits, schedules and/or other documents attached or referred to, are incorporated in and made a part of this Contract of for all purposes. As used herein, the expression Contract means the body of this Contract and such attachments, Exhibits, schedules and/or other documents, and the expressions herein, hereof, and hereunder and other words of similar import refer to this Contract and such attachments, exhibits, schedules and/or other documents as a whole and not to any particular part or subdivision thereof.

Section 14.11. Costs. If any legal action, arbitration, or other proceeding is brought by a Party for the enforcement of this Contract or because of an alleged breach or default of this Contract, the prevailing Party shall be entitled to, if awarded by a Court of competent jurisdiction,

recover reasonable costs incurred, including but not limited to attorney's fees, in such action or proceeding in addition to any other relief to which it or they may be entitled.

Section 14.12. Authority to Contract. Each Party represents and warrants for the benefit of the other Party that: (1) it has the legal authority to enter into this Contract; (2) this Contract has been duly approved and executed; (3) no other authorizations or approvals are or will be necessary in order to approve this Contract and to enable that Party to enter into and comply with the terms and conditions of this Contract; (4) the person executing this Contract on behalf of each Party has the authority to bind that Party; and (5) the Party is empowered by law to execute any other agreement or documents and to give such other approvals, in writing or otherwise, as are or may hereafter be required to implement and comply with this Contract.

Section 14.13. Officers or Agents. No officer or agent of the Parties is authorized to waive or modify any provision of this Contract. No amendment to or rescission of this Contract may be made except by a written document signed by the Parties' authorized representatives.

IN WITNESS WHEREOF, this Contract is executed as of the day and date first stated above, in Section 1.1.

EDWARDS AQUIFER AUTHORITY

THE UNIVERSITY OF TEXAS AT AUSTIN

By: _____
Roland Ruiz
General Manager

By: _____
Jessica C. Fernandez
Associate Director of Contracting
Office of Sponsored Projects

ATTEST:

By: _____
Jennifer Wong-Esparza
Assistant to the Board Secretary

APPROVED AS TO FORM:

Deborah Trejo
Legal Counsel
Edwards Aquifer Authority

EXHIBIT A SCOPE OF WORK

BACKGROUND

The Edwards Aquifer is the primary source of drinking water for more than 1.7 million people in central Texas, a region that includes several of the fastest-growing metropolitan areas in the United States. Aquifer levels have recently declined to concerning levels, raising questions about the combined effects of increasing water demand and intensifying dry and hot climate conditions. The lowest recorded levels occurred during the 1950s Texas drought—still regarded as the state’s worst-case scenario for water planning. Tree-ring studies indicate that droughts of similar or greater duration and intensity have occurred approximately once per century (Cleaveland et al., 2011), suggesting that the impacts of future droughts could be substantially more severe given today’s population, which is roughly five times larger than in the 1950s. Climate model projections further indicate continued warming and increased aridity across Texas, placing unprecedented stress on water resources throughout the 21st century (Kloesel et al., 2018; Nielsen-Gammon et al., 2020).

The Edwards Aquifer straddles the west–east climate transition known as the 100th Meridian, which separates the humid southeastern U.S. from the arid southwest (Powell, 1890). Over the past several decades, this transition has shifted eastward due to rising temperatures, increasing aridity across the IH-35 corridor where aquifer reliance is greatest (Seager et al., 2018a, b). Recharge to the aquifer is governed by the balance between precipitation and evapotranspiration, with evapotranspiration playing a dominant role (Yang & Bertetti, 2023). Although long-term trends point toward a drying southwestern U.S. and a wetter southeastern U.S. (Bhatia & Popovich, 2021), the implications of these shifting gradients for Edwards Aquifer recharge remain poorly constrained. Understanding how climate variability influences recharge processes is therefore essential for sustainable water management.

Tree-ring records provide annually resolved and, in some cases, seasonally resolved insights into past hydroclimate variability that extend well beyond the instrumental record. Such reconstructions have proven critical elsewhere in the western U.S., where long-term streamflow records revealed that modern water allocations were based on anomalously wet periods (Trouet, 2022). In Texas, however, tree-ring coverage remains sparse, and regional drought atlases often rely on extrapolation from distant sites (Stahle et al., 2020). Existing chronologies on the Edwards Plateau demonstrate recurrent, multi-decadal droughts (Cleaveland et al., 2011), but most records are concentrated in the eastern plateau or far western Texas, leaving a substantial geographic gap across the Edwards Aquifer region.

Bald cypress (*Taxodium distichum*) is particularly well suited for addressing this gap. This riparian species reaches its western range limit in central Texas and exhibits strong sensitivity to moisture

availability. Its annual growth increments can be precisely cross-dated, and sub-annual features—including earlywood, latewood, and false rings—provide reliable indicators of seasonal climate variability and hydrologic conditions. Bald cypress has been widely used to reconstruct precipitation, drought, and streamflow, as well as to assess long-term changes in hydrologic regimes (Cleaveland et al., 2011; Stahle & Cleaveland, 1988, 1992; Banner et al., 2024). In central Texas floodplain forests, it is a key subdominant species with documented drought sensitivity.

Developing new, spatially distributed bald cypress chronologies across the eastern, central, and western Edwards Plateau will allow for improved reconstructions of multi-century climate and streamflow variability for the rivers that recharge the aquifer, including the Frio, Medina, Cibolo, and Blanco Rivers. These long-term records will provide critical context for modern recharge estimates and enhance the ability of water managers to anticipate and plan for future climate extremes.

References:

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PROJECT SUMMARY

This project will develop multi-century tree-ring records to improve understanding of climate and streamflow variability across the Edwards Aquifer region. Using bald cypress tree-ring data, the research will establish a west–east transect across the aquifer that captures spatial differences in precipitation and hydrologic response. The resulting reconstructions will provide long-term context for recent droughts and enable improved assessment of aquifer recharge dynamics. By expanding and updating tree-ring chronologies and linking them to seasonal climate and river discharge, this project will support more informed water resource management under increasing climate stress.

PROJECT DURATION:

The project duration is 18 months and includes the following timeline:

	Month																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
Sampling																			
Planning and Permits	X	X																	
Sampling Campaigns		X	X	X	X														
Chronology Development																			
Eastern Edw. Aq. Section				X	X	X	X												
Western Edw. Aq. Section					X	X	X	X											
Env. Reconstruction																			
Eastern Edw. Aq. Section						X	X	X	X										
Western Edw. Aq. Section								X	X	X	X								
East-West Data Analysis												X	X	X					
Integration with Aquifer Data															X	X	X		
Report Writing																	X	X	X

PROJECT TASKS:

The project will involve the following tasks:

Task 1 – Sampling: Field campaigns will collect bald cypress increment cores from riparian sites across the western, central, and eastern Edwards Aquifer region, capturing a west–east precipitation gradient. Necessary permits and land access approvals will be secured prior to sampling.

Task 2 – Chronology Development: Tree cores from each site will be processed, measured, and cross-dated to develop robust site-level chronologies. Existing eastern chronologies will be updated, and a new western chronology will be established to fill spatial gaps.

Task 3 – Environmental Reconstruction: Tree-ring indices will be analyzed to reconstruct seasonal climate variables and streamflow for the major recharge rivers in both eastern and western sections. Statistical models, including transfer functions and principal component regression, will be applied and validated to ensure reliability.

Task 4 – East–West Data Analysis: Comparisons across the transect will evaluate how spatial gradients in aridity and shifting climate boundaries influence aquifer recharge and hydrologic variability.

Task 5 – Report Writing: Methods, results, and interpretations will be synthesized into a final technical report, including figures, datasets, and implications for water resource management.

DELIVERABLES:

The project will deliver updated and newly developed bald cypress tree-ring chronologies across the Edwards Aquifer region, along with validated reconstructions of seasonal climate and streamflow for key recharge rivers. An east–west comparative analysis will evaluate spatial differences in climate sensitivity and recharge variability. Results and datasets will be synthesized and provided in a final technical report.

EXHIBIT B
PROJECT BUDGET

The total budget for this project is \$165,299.43. The full breakdown is as follows:

	<u>Estimated</u> <u>Budget</u>
<u>Salaries</u>	
Senior personnel	\$ 29,709.56
Post-doctoral fellow	\$ 70,000.00
Fringe Benefits	\$ 32,170.48
Domestic travel (Sampling)	\$ 3,610.60
Materials	\$ 1,000.00
Consulting services (Bryan Black, UA)	\$ 7,248.00
Indirect Costs (15%)	\$ 21,560.79
Total	<u><u>\$165,299.43</u></u>

Salary (\$99,709.56)

Salaries are requested to support Senior Personnel (\$29,709.56) and a Post-doctoral Fellow (\$70,000). PI Banner will manage the team, coordinate individual responsibilities and take a lead role in directing project activities. The role of Senior Personnel Abella-Gutierrez will be to design the sampling strategy, obtain research permits, contribute and support sampling, chronology development, and environmental reconstructions, and lead the East–West data analysis and the collaboration with the EAA scientific team to integrate tree-ring results with Aquifer data. The Post-doctoral Fellow will lead the sampling campaign, chronology development, and environmental reconstruction; participate in data analysis; and prepare the technical report.

All Senior Personnel will participate in the development of the technical report, with particular attention to providing recommendations for water resource management.

The recruitment, selection, and mentoring of the post-doctoral fellow will be a team effort by SP Abella-Gutierrez, PI Banner, and Consultant Black.

Fringe benefits (\$32,170.48)

Fringe rates for benefits-eligible full-time employees (including post-doctoral fellow) are calculated at 32.2% during FY 25/26 and 32.70% for FY 26/27.

Domestic travel (\$3,610.60)

Travel funds in the amount of \$3,610.60 are estimated to support field sampling activities.

Materials (\$1,000)

Material funds in the amount of \$1,000 are estimated to acquire a 39-inch long increment borer to take tree core samples.

Consulting services – Bryan Black, UA (\$7,248.00)

Bryan Black, Professor and Associate Director of the Laboratory of Tree-Ring Research at the University of Arizona, will oversee the tree-ring chronology development and environmental reconstruction, and review and edit the technical report.

Indirect costs (15%) (\$21,560.79)

Materials are calculated at 15% of Modified Total Direct Cost (MTDC) Rate.