SEMINOLE TRIBE OF FLORIDA

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HOLLYWOOD, FLORIDA 33024
PHONE (954) 966-6300

WEBSITE:
http://www.semtribe.com

September 29, 2014

Mr. Leonard Rawlings, P.E.
Eastern Regional Hydrologist
Bureau of Indian Affairs
545 Marriott Drive, Suite 700
Nashville, TN 37214

Re: Funding Proposal to the Gulf Coast Ecosystem Restoration Council entitled "Giving the Land a Voice: Documenting Pre-channelization Conditions of the Big Cypress Seminole Indian Reservation Using LiDAR, Paleoecology and Dendrochronology"

Dear Mr. Rawlings:

Attached you will find a copy of our application to the United States Department of the Interior, Bureau of Indian Affairs (BIA), for the Secretary's recommendation to the Gulf Coast Ecosystem Restoration Council of the RESTORE Act. As a stakeholder in a congressionally designated critical project in the restoration of the Everglades, we thank you for the opportunity to submit a proposal that supports those goals on a Tribal level.

The Tribe is requesting $790,200.00 for the anticipated project lifespan of eight (8) years.

Your timely assistance approving this proposal will assist the Tribe in completing tasks to protect Tribal resources on Seminole Indian lands. If you should have any questions concerning this request, please do not hesitate to call Ms. Cherise Maples at 954-965-4380 extension 10632.

Sho Na Bish,

James E. Billie, Chairman of the Tribal Council

Cc: Cherise Maples, Director
Adam Nelson, Executive Director
Suresh Geer, Executive Director of Finance
Kirk G. Meyer, Awarding Official
File

"BUT I HAVE PROMISES TO KEEP & MILES TO GO BEFORE I SLEEP"

Appendix A: Council Member Applicant and Proposal Information Summary Sheet

Council Member: Secretary, Department of Interior	Point of Contact: **Libby Washburn** Phone: **202-219-7499** Email: **elizabeth_washburn@ios.doi.gov**

Project Identification

Project Title: Giving the Land a Voice: Documenting Prechannelization Conditions on Big Cypress Reservation Using LiDAR, Paleoecology & Dendrochronology	Project
State(s): Florida	County/City/Region: Broward and Hendry Counties

General Location: *Projects must be located within the Gulf Coast Region as defined in RESTORE Act. (attach map or photos, if applicable)*

Project Description

RESTORE Goals: *Identify all RESTORE Act goals this project supports. Place a **P** for Primary Goal, and **S** for secondary goals.*

P Restore and Conserve Habitat
___ Restore Water Quality
___ Restore and Revitalize the Gulf Economy
___ Replenish and Protect Living Coastal and Marine Resources
S Enhance Community Resilience

RESTORE Objectives: *Identify all RESTORE Act objectives this project supports. Place a **P** for Primary Objective, and **S** for secondary objectives.*

S Restore, Enhance, and Protect Habitats
S Restore, Improve, and Protect Water Resources
___ Protect and Restore Living Coastal and Marine Resources
___ Restore and Enhance Natural Processes and Shorelines
S Promote Community Resilience
___ Promote Natural Resource Stewardship and Environmental Education
P Improve Science-Based Decision-Making Processes

RESTORE Priorities: *Identify all RESTORE Act priorities that this project supports.*

___Priority 1: Projects that are projected to make the greatest contribution
___ Priority 2: Large-scale projects and programs that are projected to substantially contribute to restoring
___ Priority 3: Projects contained in existing Gulf Coast State comprehensive plans for the restoration ….
X Priority 4: Projects that restore long-term resiliency of the natural resources, ecosystems, fisheries …

RESTORE Commitments: *Identify all RESTORE Comprehensive Plan commitments that this project supports.*

X Commitment to Science-based Decision Making
X Commitment to Regional Ecosystem-based Approach to Restoration
X Commitment to Engagement, Inclusion, and Transparency
X Commitment to Leverage Resources and Partnerships
X Commitment to Delivering Results and Measuring Impacts

RESTORE Proposal Type and Phases: *Please identify which type and phase best suits this proposal.*

X Project ___ Planning ___ Technical Assistance X Implementation ___ Program

Project Cost and Duration

Project Cost Estimate:		**Project Timing Estimate**:
Total :	$ 790,200.00	Date Anticipated to Start: 10 / 2015 Time to Completion: 7 ~~months~~ / years Anticipated Project Lifespan: 8 years

RESTORE Act Project Proposal
Seminole Tribe of Florida
Giving the Land a Voice: Documenting Pre-Channelization Hydrologic Conditions on Big Cypress Reservation Using LiDAR, Paleoecology and Dendochronology

Seminole Tribe of Florida
Environmental Resource Management Department
6300 Stirling Road
Hollywood, FL 33024
954-965-4380

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EXECUTIVE SUMMARY

The Seminole Tribe of Florida Big Cypress Reservation is located in Hendry and Broward Counties, Florida and is bordered by the Big Cypress National Preserve, Miccosukee Indian Reservation and Water Conservation Area 3A to the south, and the Everglades Agricultural Area to the north (Figures 1-2). The Big Cypress Reservation is home to multiple culturally important and/or threatened and endangered species, including the Florida Panther (Figure 3), Audubon's Crested Caracara, the Gopher Tortoise, Eastern Indigo Snake, Gopher Frog, Bald Eagle, Golden Eagle, large wading birds, Snail Kite, Sherman's Fox Squirrel, Florida White Tail Deer, and the Florida Black Bear (Lampl Herbert, 2006). Seminole Tribe members have voiced concerns of changing environmental conditions in Big Cypress Reservation to State and Federal Representatives. Environmental conditions in Big Cypress Reservation are dependent on fresh water supplies, adequate ground water table levels, and surface water levels. Data exists to represent surface and ground water conditions today; however data to represent pre-channelization conditions of Big Cypress Reservation do not exist. The lack of historical record prevents the accurate characterization and quantification of the damage and extent of drainage to the pre-channelized natural environment (DeBellevue, 1976).

The Seminole Tribe of Florida (Tribe) has set aside over 14,000 acres in Big Cypress Reservation to remain in native, undisturbed condition. Additionally, the Tribe has multiple active wetland restoration projects in Big Cypress Reservation. Data representing pre-channelization hydrologic and ecologic condition would assist the Tribe in documenting changes verbalized by members of the Tribe, as well as provide a focused goal for wetland protection and restoration efforts.

The Seminole Tribe of Florida proposes to partner with the US Geologic Survey (USGS) to collect and perform multi-proxy analysis (pollen, charcoal, carbon accumulation, geochronology) of sediment cores from disturbed and undisturbed wetland locations within Big Cypress Reservation. Core samples will be paired with stream gages with the longest records to calibrate the pollen based estimates of hydroperiod with instrument records. Paleohydrologic evidence is proposed to be collected ("pollen study") from approximately 36 sites within the Seminole Tribe of Florida Big Cypress Reservation to assist in the development of a hydrologic reconstruction representing Big Cypress Reservation pre-drainage, and post-drainage. Sediments in the Everglades have been proven to provide an archive of wetland responses to multi-decadal climate processes as well as anthropogenic changes (such as the system of levees and drainage canals constructed by the Central and Southern Florida Flood Control Project) (USGS, 2004), (Willard and Bernhardt, 2006), (Bernhardt, 2011).

The Seminole Tribe of Florida also proposes to partner with the University of Arkansas (UA) Department of Geosciences Tree Ring Laboratory to perform tree-ring chronologies (dendrochronology) on Big Cypress Reservation cypress trees. Dr. Stahle of UA has developed a 1,000 year baldcypress chronology from trees on the Peace River, less than 150 miles away from the Big Cypress Reservation (Stahle, 2006 and 2011). Cypress tree ring study can provide a chronological record of water availability and change; which would include a pre-channelization hydrologic record for Big Cypress Reservation, as well as the environmental impact to Big

Cypress Reservation as a result of the Central and Southern Florida Flood Control Project (C&SF) construction of canals throughout Big Cypress Reservation.

This project would compare the USGS paleohydrologic information with the UA tree ring information collected in Big Cypress Reservation to cross-reference and calibrate a historical record of hydrologic and ecologic conditions in Big Cypress Reservation.

Finally, the Seminole Tribe of Florida recently collaborated with the USGS National Geospatial Technical Operations Center (NGTOC) to collect Light Detection and Ranging (LiDAR) data for Big Cypress Reservation. The data set is USGS Quality Level 1 (QL 1), the most stringent, has a 9.25 centimeter vertical accuracy, and has 16 points per square meter. The complete data set will be received by the Seminole Tribe in December 2014, after USGS completes its quality assurance and quality control. A pilot data sample of 6 square miles indicates the final data set is expected to exceed 15 terabytes. The Seminole Tribe of Florida proposes to provide to a qualified professional contractor the raw LiDAR data set to create a three dimensional model of Big Cypress Reservation today (post-channelization). A pre-channelization three dimensional model of Big Cypress Reservation will also be developed incorporating historic aerials taken in the 1940s and the 1964 C&SF "As Builts" which superimpose the canal construction locations and dimensions over aerials believed to be from the 1950s (pre-channelization). The pre-channelization aerials will be compared with the current LiDAR for reference areas and combined with the data obtained through the pollen study and tree-ring data to create a three dimensional model of Big Cypress Reservation pre-channelization. The model will be used to define and document pre-drainage hydrologic and ecologic conditions in Big Cypress Reservation to fill the data gap of "lack of historical data". This model will also be used to define and document the post-channelization changes to Big Cypress Reservation to provide the best available science for future Tribe water management operations, protection of existing natural systems, and wetland restoration activities.

PROPOSAL NARRATIVE

INTRODUCTION/BACKGROUND

The Seminole Tribe of Florida Big Cypress Reservation is located in Broward and Hendry Counties, Florida (see Figure 1). Big Cypress Reservation (BC) is 52,338 acres and is home to approximately 600 Seminole Tribe members. Less than 1% of the land use in BC is residential and commercial. Wetland and Open Forest account for 66% of the total land in BC. Unimproved pasture accounts for 27% of the BC land use (with a pasture density of approximately 1 cow per 8 acres). Cropland accounts for approximately 8% of the land use, and levees, canals and roads account for the final 8% of BC land use.

Big Cypress Reservation is bordered is by the Big Cypress National Preserve, Miccosukee Indian Reservation and Water Conservation Area 3A to the south, and the Everglades Agricultural Area to the north (Figure 2). The Big Cypress Reservation is home to multiple culturally important and/or threatened and endangered species, including the Florida Panther (Figure 3), Audubon's Crested Caracara, the Gopher Tortoise, Eastern Indigo Snake, Gopher Frog, Bald Eagle, Golden Eagle, large wading birds, Snail Kite, Sherman's Fox Squirrel, Florida White Tail Deer, and the Florida Black Bear.

In the 1960s, levees and drainage canals were constructed throughout BC as part of the Central and Southern Florida Flood Control Project (C&SF). On the western side of the Reservation, the West Feeder Canal divides BC in an east-west manner, and the North Feeder and L28 Interceptor Canals separate the western side of BC from the eastern side of BC in a north-south manner. The northern boundary of the eastern side of BC is separated from its upstream watershed by multiple canals, including the L28 Borrow Canal which is also the north-eastern and eastern boundary of the Big Cypress Reservation (Figure 4).

The C&SF project was authorized by Congress in 1948 for the purpose of flood control, regional water supply for agricultural and urban areas, prevention of salt water intrusion, water supply to Everglades National Park, and to preserve fish and wildlife, recreation and navigation. The C&SF Project performed its authorized functions well. However, the C&SC Project also had unintended adverse effects on the natural environment (SFWMD, 1999). The Water Resources Development Act (WRDA) approved the Comprehensive Everglades Restoration Plan (CERP) in 2000. CERP includes more than 60 elements, has a time frame over 30 years, and an estimated cost over $11 billion. The goal of CERP is to capture fresh water that flows unused to the ocean and redirect it to areas that need it most; the majority of which is devoted to environmental restoration (www.evergladesplan.org).

In January 2014, the Seminole Tribe of Florida celebrated the 118th anniversary of Big Cypress Reservation. At one time, the Seminole people called all of Florida their home. After fighting in three Seminole Wars, the Seminole people moved to the interior swamp land of southern Florida to prevent being relocated to Oklahoma. In 1889 and 1896, the US Department of Interior Bureau of Indian Affairs (BIA) purchased tracts of land in what is now Big Cypress Reservation. The Seminole Tribe of Florida recognizes that its historical, cultural, religious, recreational and economic welfare is tied to the land. Tribal members have voiced concerns to State and Federal

agencies and have said, "when the land dies, we die". The connection to the natural ecosystem is integral to the Tribal culture.

Changes to the natural systems in Big Cypress Reservation can't be documented as the Tribe had no surface or ground water monitoring equipment in BC during the decades from the 1890s through the 1970s. In 1987, the Seminole Tribe signed a Water Rights Compact with the State of Florida and the South Florida Water Management District. The Compact provided that the Tribe was entitled to an amount of water available within the larger Basin proportionate to the land sizes. The 1987 Compact did not define what was meant by the term "available water". In 1998, the SFWMD produced a technical report on the determination of the Seminole Big Cypress Reservation Entitlement amount. The 1998 technical report noted that "available water" should include surface water and stored water (ponded and shallow groundwater); however hydrologic data in the area was of poor quality. Additionally, shallow sub surface storage, or ground water was not included in the modeling because of the lack of data. As a result, the Seminole Tribe's water rights entitlement was based on the SFWMD regional surface water data (canal flows) for the period of 1987-1988 (SFWMD, 1998).

More recently, in 2014, the Seminole Tribe performed an analysis of surface water and ground water interaction in BC. The project was to gather information to identify if the regional canals drain ground water from BC as nutrient pollutant loading calculations are performed by the SFWMD using canal data at points located at BC's southern boundaries. Surface water flows are observed in the canals during the peak of dry season, when there is no surface water run-off. The Tribe has an EPA approved Numeric Nutrient Criteria Development plan, and surface water quantity is equally important as surface water quality. Schlumberger Water Services reviewed surface water and ground water data for Big Cypress Reservation and noted "the evaluation of surface water/ground water interaction at the Big Cypress Reservation is greatly hampered by the paucity of long-term monitoring data on the water table aquifer and data on the hydrologic impacts of the canal system" (Schlumberger, 2014).

The common factor amongst all items discussed to this point is the "lack of historical data". This project is submitted to "let the land speak for itself". Rather than having zero data on pre-channelization conditions in BC, and zero data on the impact of the regional water management system on BC, the Seminole Tribe seeks to obtain the best scientific available data through the use of tree-ring study, paleohydrologic data from sediment cores, and a resulting three dimensional model of Big Cypress Reservation pre and post channelization.

PROPOSAL EVALUATION CRITERIA

1. Comprehensive Program Goals
   The Primary Initial Comprehensive Plan of the RESTORE Council and RESTORE Act **Goal** for this project is to *Restore and Conserve Habitat, with the secondary goal of Enhancing Community Resilience*.

2. Comprehensive Plan Objectives:
   The Primary Initial Comprehensive Plan of the RESTORE Council and RESTORE Act **Objective** for this project is to *Improve Science Based Decision Making Processes. The secondary objectives are to Restore, Improve and Protect Water Resources, Promote Community Resilience and Restore, Enhance and Protect Habitats.*

3. Comprehensive Plan Priority Criteria
   This proposal addresses the priority criteria as a project that is expected to make a contribution to protecting and restoring the natural resources, ecosystems, wildlife habitats and wetlands of the Gulf Coast region, without regard to geographic location within the Gulf Coast Region. This project will provide the best available science to reveal the hydrologic past for Big Cypress Reservation which will allow for organic future decision making processes for the Tribe. The Big Cypress Reservation is part of the greater Everglades ecosystem and hydrologically connected to and upstream of the Big Cypress National Preserve, the Miccosukee Indian Reservation and State of Florida Water Conservation Area 3A. It is anticipated that "letting the land speak for itself" will assist with changing the non-Tribal perception of Big Cypress Reservation as "last stop of the upstream Agricultural area", to a sensitive sub-basin of the western Everglades. Finally, this project will provide the Seminole Tribe of Florida the data to better understand and manage its use of surface water within the Reservation boundaries, to protect the established surface water designated uses and to protect downstream users.

4. Comprehensive Plan Commitments
   This proposal would achieve all of the commitments in the Comprehensive Plan. Better understanding of past hydrologic and ecologic characteristics of Big Cypress Reservation would assist with the overall regional ecosystem based approach to restoration. This project would gather the first (scientifically documented, rather than oral history) data available for historic hydrologic and ecologic conditions in Big Cypress Reservation. Decisions within the Tribe and regionally would benefit from any increase in understanding of past conditions. This project demonstrates engagement, inclusion and transparency as USGS would be performing the paleoecologic work. USGS work is open and available to the public. This project would achieve leveraging resources and partnerships as USGS and the University of Arkansas would be providing support. The Seminole Tribe would publish the three-dimensional model in the "Seminole Tribune"; the Tribe's newspaper. The Tribune is publically available on-line. It is anticipated the study results would be delivered through inter-agency meetings, such as Recover, CERP Task Force, Western Basins Task Force, etc. It is also expected that the University of Arkansas and USGS would report results in published papers.

5. Science – included in following narrative with progress measurement and tracking.

6. Environmental Compliance – included in following narrative and in Appendix B.

IMPLEMENTATION METHODOLOGY: PALEOECOLOGY/GEOCHRONOLOGY

USGS would travel to Big Cypress Reservation for field observation and site selection. USGS would collect approximately six (6) core samples per year to represent disturbed and undisturbed wetland areas. Core sampling is performed with piston corer with a 10-cm diameter barrel or a Russian type peat corer. Cores would be taken to bedrock. Sediment lithology would be described and sediment would be sampled for pollen and microscopic charcoal in 1-cm increments. All samples would be oven dried at 50 degrees C, and then USGS would store the dried samples at room temperature. Core chronologies are based on pollen biostratigraphy and radiocarbon dating (14C), lead-210 (210Pb). Radiocarbon dates would be obtained from bulk sediment picked clean by a Miami lab frequently utilized by USGS, Beta Analytic. The radiocarbon dates would be converted to calendar years (Bernhardt and Willard 2009).

Approximately three (3) sediment cores can be analyzed for palynomorphs in a single year from the time of collection. The methodology for determining the pollen records is expected to be as follows. Each .5e1.5 g sample of dry sediment would be spiked with one tablet of exotic Lycopodium spores to calculate palynomorph concentration (grains/g). Samples would be processed with HCl and HF to remove carbonates and silicates, respectively, acetolyzed (1 part sulfuric acid: 9 parts acetic anhydride) in boiling water bath for 10 min, neutralized, and treated with 10% KOH for 10 min in a water bath at 70 _C. After neutralization, the residual samples would be sieved with 149 mmand 10 mmnylonmesh to remove the coarse and clay fractions, respectively. When necessary, samples would be swirled in a watch glass to remove additional mineral matter. Samples would be stained with Bismarck Brown and mounted on microscope slides in glycerin jelly. At least 300 pollen grains and spores would be counted for each sample to determine percent abundance and concentration. Spores, excluding bryophyte spores, would be included in the pollen sum. Pollen data are archived on the SOFIA (South Florida Information Access http://sofia.usgs.gov) and Neotoma Paleoecology Database (http://www.neotomadb.org/) (Bernhardt and Willard 2009).

The methodology for charcoal analysis is expected to be as follows. The metric of charcoal area per pollen grain (C/P) would be used to quantify changes in local fire regime. This method has been previously published in the Everglades cores from tree islands. Microscopic charcoal particles greater than 50 by 10 mm (500 mm2) would be counted on slides prepared for pollen analysis. This size fraction is considered to represent fire events within 20 km (Bernhardt and Willard 2009).

Carbon analysis would also be performed on the dried cores. The dried samples would be subsampled to obtain volumetric measurements and weighed. Loss-on-ignition (LOI) analysis would be performed at 550 _C using standard methods. To calculate carbon density, the bulk density of the sample would be multiplied by the LOI to obtain the ash-free bulk density. This value would be multiplied by the assumed average amount of carbon in the organic fraction of the sediment. Carbon accumulation rates would be determined as follows: the radiometric dates obtained from each core and accretion rates would be determined from the Bayesian age model program Bacon . These rates would be multiplied by the carbon density of each sample to obtain carbon accumulation rates (g C m_2 yr_1) for each core (Jones et al, 2014)..

Statistical analysis would be performed to measure the relationships between changes in carbon accumulation rates and environmental changes in the cores (Jones et al, 2014). Study results would be described in terms of wetland community types, climate factors, the impact of nutrient dynamics, fire, and water management impacts. Big Cypress Reservation would be described in context of the global carbon cycle, and conclusions would be drawn.

IMPLEMENTATION METHODOLOGY: DENDOCHRONOLOGY TREE-RING ANALYSIS

The dendrochronology team would communicate with the Paleoecology team prior to sample site selection. A field visit at Big Cypress Reservation would be completed to gather information prior to sampling. In addition, the BC LiDAR data would be compiled and the current state of Big Cypress Reservation would be available as a three-dimensional figure to review for topographic features of interest prior to sample collection. The determination of the number of living cypress trees to be sampled will be finalized after coordination with the Paleoecology team; however it is anticipated that up to 40 living trees would be sampled in Big Cypress Reservation. Dead wood from downed logs if available would also be incorporated into the study.

The cores from the living trees would be dried and mounted for surface preparation. Tree cores are sanded with increasingly finer sandpaper (ie 120, 220, 320, 400 grit) until the finish is so smooth that the tracheid cells are visible through a microscope. The skeleton plot method would be used for dating all cores and cross sections from Big Cypress Reservation. This method utilizes cross matching of radii within trees from multiple trees in a stand allows for accurate calendar year dating of baldcypress. After specimens are calendar dated, ring widths would be measured under a microscope using a 0.001 mm precision micrometer. Ring widths from each site would be processed under quality control software which uses correlation analysis to quantify the degree of common variance among dated ring width series and identifies possible dating errors. A tree-ring chronology development program would be utilized to address the Florida climate and precipitation patterns (Stahle, 2006). Tree ring chronologies would be compared to Florida regional climate records compiled by the National Oceanic and Atmospheric Administration from 1895 to 2014 to identify potential evidence of change in tree growth response to precipitation following the C&SF channelization work in the 1960s..

IMPLEMENTATION METHODOLOGY: LIDAR 3-D MODELING

The Seminole Tribe of Florida recently collaborated with the USGS National Geospatial Technical Operations Center (NGTOC) to collect Light Detection and Ranging (LiDAR) data for Big Cypress Reservation. The data set is USGS Quality Level 1 (QL 1), the most stringent, has a 9.25 centimeter vertical accuracy, and has 16 points per square meter. The complete data set will be received by the Seminole Tribe in December 2014, after USGS completes its quality assurance and quality control. A pilot data sample of 6 square miles indicates the final data set is expected to exceed 15 terabytes. The Seminole Tribe of Florida proposes to provide to a qualified professional contractor the raw LiDAR data set to create a three dimensional current model of Big Cypress Reservation which represents post-channelization. This model will be referenced by the dendrology and paleoecology teams prior to sample site selections. Data

obtained from the dendrology and paleoecology results will be utilized in concert with historic aerials of Big Cypress Reservation taken in the 1940s and 1950s which depict pre-channelization. In particular, the C&SF "as-builts" for the canals travelling through Big Cypress Reservation, drawn in 1964, overlay detailed aerials taken in the 1950s which clearly show the natural features the canals were constructed through. The pre-channelization model will be used to define and document pre-drainage hydrologic and ecologic conditions in Big Cypress Reservation to fill the data gap of "lack of historical data". The pre and post-channelization models will be used to define and document the changes to Big Cypress Reservation to provide the best available science for future Tribe water management operations, protection of existing natural systems, and wetland restoration activities.

MONITORING AND ADAPTIVE MANAGEMENT

Adaptive management is included within this project as a function of repeating data collection over the course of 6 years. It is anticipated that the study will be enhanced and refined based on information obtained from the prior year's work. This project was specifically designed to carry the work over time rather than obtaining all samples in one event. Should a set of samples prove unproductive, the study would be modified for the next year; utilizing adaptive management strategies, rather than a sample collection of meager scientific value.

MEASURES OF SUCCESS

The objective metric of project success shall be measured by an annual summary of activities and recommendations for the next sample collection event. The production of any hydrologic and ecologic chronology for Big Cypress Reservation shall be considered successful as compared to the current data gaps.

RISKS AND UNCERTAINTIES OF THE PROPOSED ACTIVITIES

Risks and uncertainties of the proposed activities are not expected as all activities within this project have been performed in Florida with success.

OUTREACH AND EDUCATION

Outreach and education from this project is expected. The Seminole Tribe will publish the 3-D LiDAR rendering of Big Cypress Reservation in the Tribe's newspaper which is available to the public and on-line. It is further expected that the results of this project will be presented at several scientific meetings including Recover, the CERP Task Force, the Western Basins Task Force, and other forums selected by USGS and University of Arkansas. Scientific Peer-reviewed papers would also be expected to be published in professional journals.

PARTNERSHIPS/COLLABORATIONS

The Seminole Tribe of Florida will collaborate with USGS to collect and perform multi-proxy analysis (pollen, charcoal, carbon accumulation, geochronology) of sediment cores. The Seminole Tribe of Florida also proposes to partner with Dr. David Stahle of the University of Arkansas (UA) Department of Geosciences Tree Ring Laboratory to perform the tree-ring chronologies.

PROJECT BENEFITS

The benefits of this project echo the benefits of the RESTORE Act goals, objectives and priority criteria. As discussed in the introduction, the Big Cypress Reservation is home to and provides a habitat for, multiple threatened, endangered or culturally important species. The Seminole Tribe of Florida is committed to preserving and protecting natural resources and habitats. Fresh surface water supply and adequate ground water levels are essential to support the Tribe's commitment to the preservation of Big Cypress Reservation natural systems. Members of the Seminole Tribe of Florida have addressed State and Federal representatives to discuss fresh water concerns and illustrated changes they have seen during their lifetimes, most recently in January 2013 to members of an Everglades Restoration task force.

The current state of Big Cypress Reservation fresh surface and ground water is documented. The C&SF drainage canal system has been operating as designed and is effective in conveying water off the Big Cypress Reservation. Negative impacts of the C&SF drainage system in Big Cypress Reservation include the diversion of upstream watershed flows, the reduction of hydroperiods (as local rainfall sheetflow is conveyed off the Reservation which could recharge the aquifer and provide standing water hydroperiods for native wetlands), groundwater tables are lower at the beginning of all dry seasons, and the canals act as conveyances for the rapid transport of pollutants onto and through the Reservation. Quantification of Big Cypress Reservation water balances are complicated as errors inherent in stream gaging are close to the majority of actual flow rates, and the Tribe's entitlement water rights (Schlumberger, 2014)..

The lack of historical surface water and ground water physical data prevents the comparison of present to past. As a result, regional water management decisions are frequently made with no data, data representing channelized conditions, or leaving a "gap in the map". The recent surface water ground water interaction study noted that "the Big Cypress Reservation is essentially a passive participant in the regional water management system in that hydrologic conditions on the reservation are largely controlled by the operation of the canal system, actions of other landowners, and climatic variations" (Schlumberger, 2014).

Big Cypress Reservation is an integral part of the Greater Everglades natural resources, ecosystems, wildlife habitats and wetlands. This project will provide the best available science to reveal the hydrologic past of Big Cypress Reservation and "let the land speak for itself". This project will provide the Seminole Tribe of Florida the data and tools to better understand and manage the use of surface water within the Reservation boundaries, to protect, conserve and restore habitats, to enhance the Tribal resilience to regional water management operations current and future, and will improve future decision making processes using science to protect, improve and restore water resources. The benefits of this project are also directly transferable to areas outside of Big Cypress Reservation; including the western basin of the Everglades and Big Cypress National Preserve.

LOCATION INFORMATION

Figure 1 provides the general area of Big Cypress Reservation within the State of Florida. Figure 2 provides a regional view of Big Cypress Reservation. Figure 3 provides the telemetry data for the Florida panther in Big Cypress Reservation to demonstrate the importance of ecosystem protection of Big Cypress Reservation to this endangered species. Figure 4 provides a current aerial of Big Cypress Reservation with the major C&SF canal features identified.

BUDGET

The table below summarizes the associated costs of this project. Should funding for this request be limited, adjustments could be made with the duration of the project and future Restore grant requests can be submitted.

Proposal Budget	
Item Detail	*Cost*
Dendochronology analysis and reporting	
Dendochronology analysis and reporting (University of Arkansas Department of Geosciences) $100,000.00 per year times 6 years	$600,000.00
Dendochronology travel expenses:	
Airfare 3 travelers round-trip 7 trips	$10,500.00
Per Diem, Rental Car, Lodging 3 travelers 7 trips	$7,350.00
Swamp Buggy Rental 7 trips	$2,800.00
Miscellaneous Field Supplies 7 trips	$1,400.00
USGS Paleoecologic analysis and reporting	
Radiocarbon dating @ $575 each for 6 samples per year, times 6 years	$ 20,700.00
Lead 210 analysis ($1,400 per core * 36 cores)	$50,400.00
Pollen identification	USGS in-kind
Paleoecologic travel expenses:	
Airfare 3 travelers round-trip 7 trips	$10,500.00
Per Diem, Rental Car, Lodging 3 travelers 7 trips	$7,350.00
Swamp Buggy/Airboat Rental 7 trips	$2,800.00
Miscellaneous Field Supplies 7 trips	$1,400.00
LiDAR 3-D Model	
Post Channelization (current)	$25,000.00
Pre-Channelization (time period to be determined based on Paleoecology and Dendrology results includes pre-channelization aerial analysis)	$50,000.00
Project Budget Total:	$790,200.00

ENVIRONMENTAL COMPLIANCE CHECKLIST (APPENDIX B)

The Environmental Compliance Checklist is attached. There are no state or federal permits anticipated for this project.

DATA/INFORMATION SHARING PLAN

Data from this project will be shared. The Seminole Tribe will publish the 3-D LiDAR rendering of Big Cypress Reservation in the Tribe's newspaper which is available to the public and on-line. It is further expected that the results of this project will be presented at several scientific meetings including RECOVER, the CERP Task Force, the Western Basins Task Force, and other forums as selected by USGS and University of Arkansas. Scientific Peer-reviewed papers would also be expected to be published in professional journals.

FIGURE 1: BIG CYRESS RESERVATION – STATE OF FLORIDA

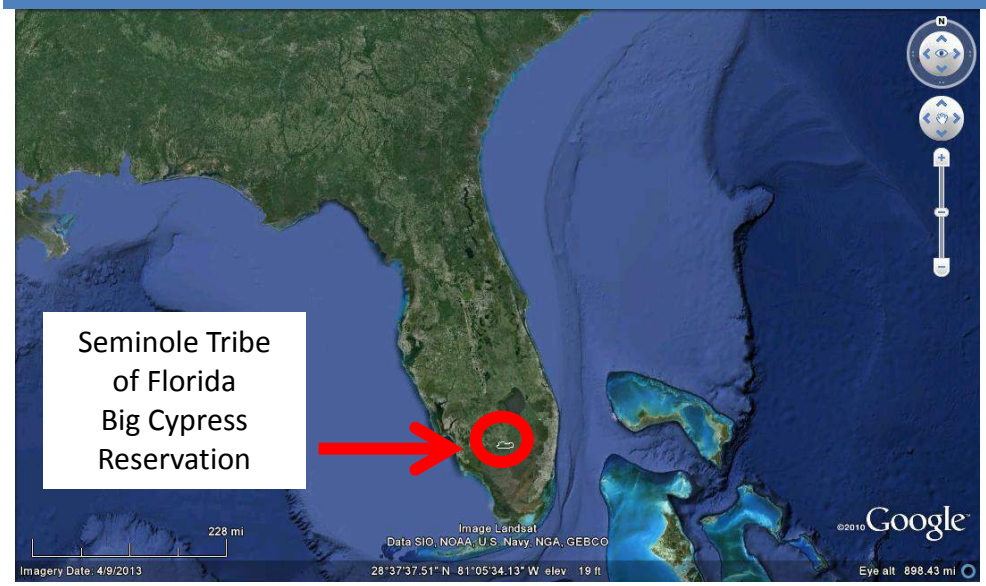

FIGURE 2: BIG CYPRESS RESERVATION-REGIONAL VIEW (SOURCE USGS SOFIA)

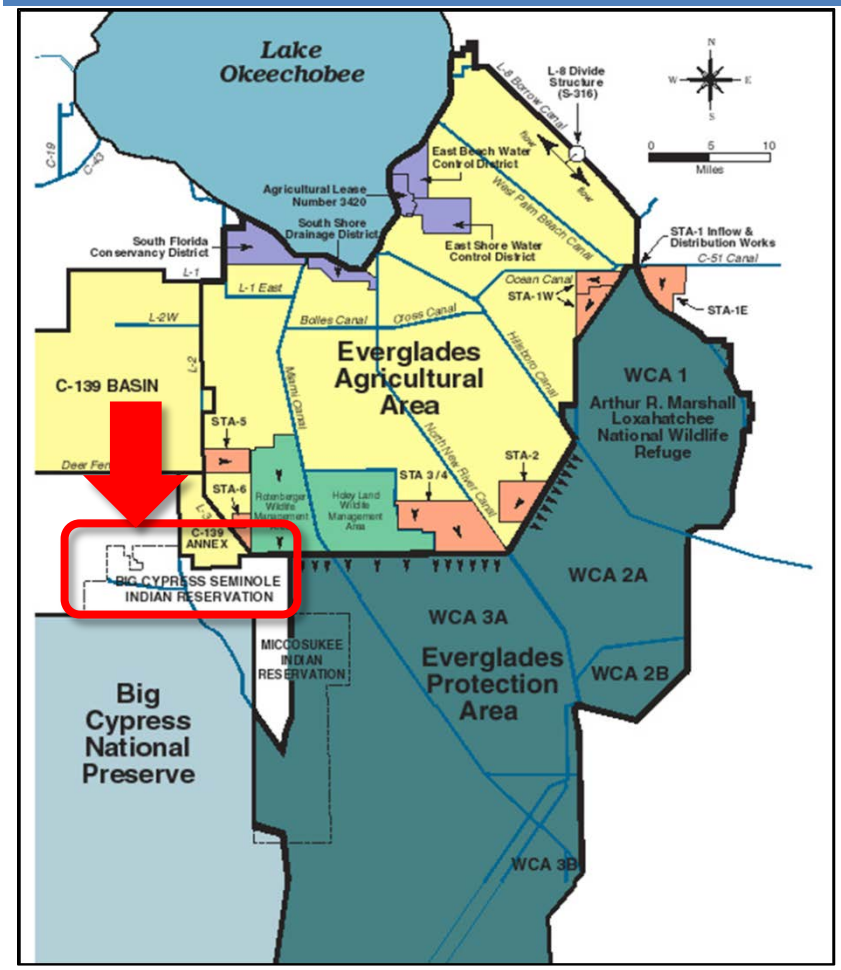

FIGURE 3: BIG CYPRESS RESERVATION PANTHER TELEMETRY (SOURCE L HERBERT 2006)

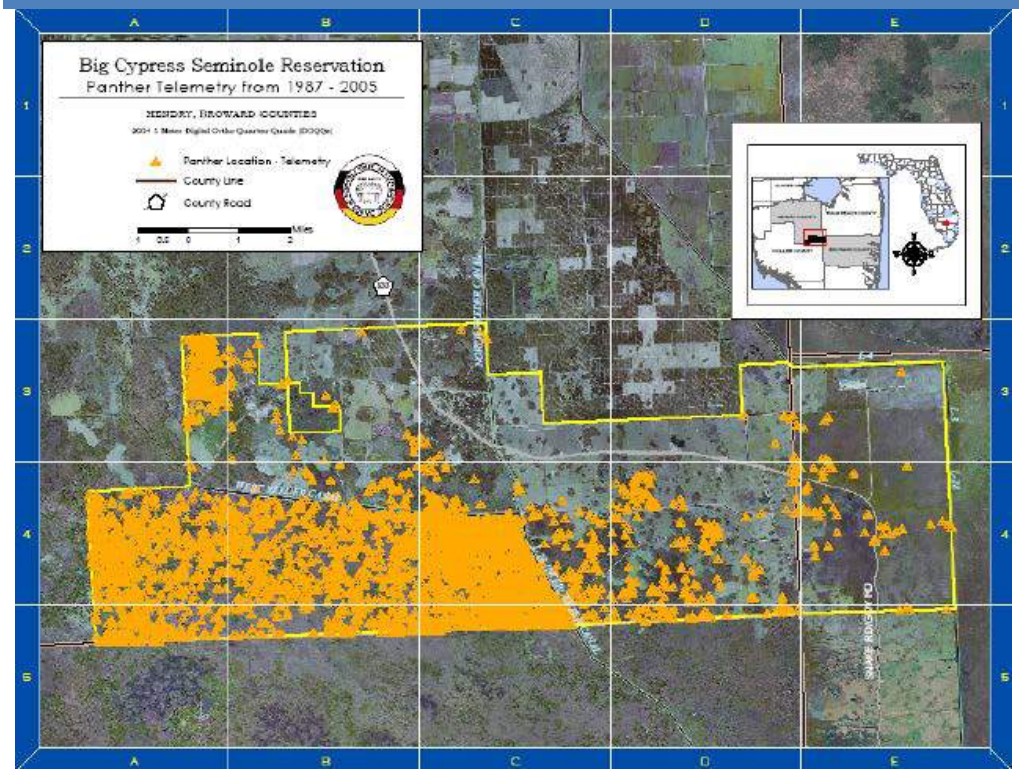

FIGURE 4: BIG CYPRESS RESERVATION C&SF CANAL DIAGRAM

REFERENCE LIST

Bernhardt, Christopher, 2011, "Native Americans, Regional Drought, and Tree Island Evolution in the Florida Everglades", The Holocene 1-12, hol.sagepub.com.

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Appendix B

Gulf Coast Ecosystem Restoration Council
Environmental Compliance Checklist

Please check all federal and state environmental compliance and permit requirements as appropriate to the proposed project/program

Environmental Compliance Type	**Yes**	**No**	**Applied For**	**N/A**
Federal				X
National Marine Sanctuaries Act (NMSA)				X
Coastal Zone Management Act (CZMA)				X
Fish and Wildlife Coordination Act				X
Farmland Protection Policy Act (FPPA)				X
NEPA – Categorical Exclusion				X
NEPA – Environmental Assessment				X
NEPA – Environmental Impact Statement				X
Clean Water Act – 404 – Individual Permit (USACOE)				X
Clean Water Act – 404 – General Permit(USACOE)				X
Clean Water Act – 404 – Letters of Permission(USACOE)				X
Clean Water Act – 401 – WQ certification				X
Clean Water Act – 402 – NPDES				X
Rivers and Harbors Act – Section 10 (USACOE)				X
Endangered Species Act – Section 7 – Informal and Formal Consultation (NMFS, USFWS)				X
Endangered Species Act – Section 7 - Biological Assessment (BOEM,USACOE)				X
Endangered Species Act – Section 7 – Biological Opinion (NMFS, USFWS)				X
Endangered Species Act – Section 7 – Permit for Take (NMFS, USFWS)				X
Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) – Consultation (NMFS)				X
Marine Mammal Protection Act – Incidental Take Permit (106) (NMFS, USFWS)				X
Migratory Bird Treaty Act (USFWS)				X
Bald and Golden Eagle Protection Act – Consultation and Planning (USFWS)				X
Marine Protection, Research and Sanctuaries Act – Section 103 permit (NMFS)				X
BOEM Outer Continental Shelf Lands Act – Section 8 OCS Lands Sand permit				X
NHPA Section 106 – Consultation and Planning ACHP, SHPO(s), and/or THPO(s)				X
NHPA Section 106 – Memorandum of Agreement/Programmatic Agreement				X
Tribal Consultation (Government to Government)				X
Coastal Barriers Resource Act – CBRS (Consultation)				X
State				
As Applicable per State				X

OTHER: LETTER OF SUPPORT

United States Department of the Interior
U.S. GEOLOGICAL SURVEY
Reston, VA 20192

TAKE PRIDE IN AMERICA

15. September 2014

Seminole Tribe of Florida
Environmental Resource Management Department
6300 Stirling Road
Hollywood, FL 33024
954-965-4380

Dear Ms. Lisa Meday,

I am writing to indicate my willingness to provide in-kind support of pollen analysis for your grant entitled, "Giving the Land a Voice: Documenting Pre-Channelization Hydrologic Conditions on Big Cypress Reservation Using LiDAR, Paleoecology and Dendochronology."

Our palynology lab, housed within the US Geological Survey Eastern Geology and Paleoclimate Science Center, has over two decades of experience analyzing pollen from cores collected in the greater Everglades. Results from past work resulted in eight peer-reviewed papers and several Open File Reports. We understand that travel and fieldwork expenses will be covered from this grant by the Seminole Tribe of Florida. Data from this study will not only help understand past hydrologic variability on these lands as detailed by the grant, but also can tie into the network of cores we have in the Everglades under study by our U.S. Geological Survey research group- giving a greater understanding of past climate dynamics in the region.

Sincerely,

Christopher E. Bernhardt, PhD
Research Geologist
Eastern Geology and Paleoclimate Science Center
U.S. Geological Survey

ELIGIBILITY REVIEW

Bucket 2 – Council Selected Restoration Component

PROPOSAL TITLE

Giving the Land a Voice: Documenting Prechannelization Conditions on Big Cypress Reservation Using LIDAR, Paleontology & Dendrochronology

PROPOSAL NUMBER

DOI-T-2

LOCATION

Big Cypress Reservation, Broward and Hendry Counties

SPONSOR(S)

Department of the Interior

TYPE OF FUNDING REQUESTED (Planning, Technical Assistance, Implementation)

Implementation

REVIEWED BY:

Bethany Carl Kraft/ Ben Scaggs

DATE:

November 18, 2014

1. Does the project aim to restore and/or protect natural resources, ecosystems, fisheries, marine and wildlife habitat, beaches, coastal wetlands and economy of the Gulf Coast Region?

◉ YES ○ NO

Notes:

Documenting Pre-channelization Hydrologic conditions on Big Cypress Reservation using LiDar, Paleoecology and Dendrochronology.

2. Is the proposal a project?

◉ YES ○ NO

If yes, is the proposed activity a discrete project or group of projects where the full scope of the restoration or protection activity has been defined?

◉ YES ○ NO

Notes:

3. Is the proposal a program?

◯ YES ◉ NO

If yes, does the proposed activity establish a program where the program manager will solicit, evaluate, select, and carry out discrete projects that best meet the program's restoration objectives and evaluation criteria?

◯ YES ◯ NO

Notes:

4. Is the project within the Gulf Coast Region of the respective Gulf States?

◉ YES ◯ NO

If no, do project benefits accrue in the Gulf Coast Region?

◯ YES ◯ NO

Notes:

Eligibility Determination

ELIGIBLE

Additional Information

Proposal Submission Requirements

1. Is the project submission overall layout complete? ***Check if included and formatted correctly.***

A. Summary sheet	☑	F. Environmental compliance checklist	☑
B. Executive summary	☑	G. Data/Information sharing plan	☑
C. Proposal narrative	☑	H. Reference list	☑
D. Location information	☑	I. Other	☑
E. High level budget narrative	☑		

If any items are NOT included - please list and provide details

2. Are all proposal components presented within the specified page limits (if applicable)?

◉ YES ○ NO

Notes: