

4-A\1.25

October 12, 2016

Mr. Edmund Oborny
Vice President
BIO-WEST, Inc.
1812 Central Commerce Court
Round Rock, TX 78664

Re: Contract Renewal No. 3 and Amendments for the Comprehensive Biological Monitoring Program for Comal and San Marcos Springs Ecosystems Project

Dear Mr. Oborny:

Please regard this letter as the third formal renewal out of four possible authorized renewals, and first amendment of the Contract No. 14-689-HCP ("Contract") originally dated February 12, 2014 between the Edwards Aquifer Authority ("EAA") and BIO-WEST, INC. ("Contractor") for the Comprehensive Biological Monitoring Program for Comal and San Marcos Springs ecosystems project.

The original Contract term, which was February 12, 2014 through December 31, 2014, has been renewed twice. The Contract is hereby renewed and extended for an additional year pursuant to the provisions of Article I, paragraph 1.3, thereunder. The new Contract expiration date shall be December 31, 2017. The Contract is renewed and extended under the same terms and conditions originally set forth in the existing Contract except as amended below. The total annual amount under the Contract, as now renewed and amended, is not to exceed \$734,352.

The amendments to the Contract include modifications to certain task language and removal of the Flow Partitioning Task. The underlined text below indicates language added to the Contract. The strike-through text indicates deleted language from the Contract.

Amended sections of the Scope of Work are restated in full, as follows:

EXHIBIT A, SCOPE OF WORK

Subtask 4.2 Dip Net Sampling

The Contractor will conduct dip net timed surveys as well as presence/absence surveys in specified ~~reaches~~ sections throughout the spatial extent of both systems (below). All fountain darters collected by dip net monitoring will be examined visually for evidence of gill parasites. Dip nets of approximately 40 cm x 40 cm (1.6 mm mesh) will be used for both timed surveys as well as

presence/absence surveys. Dip netting for timed surveys will be conducted in all habitat types within each ~~reach~~ section, moving upstream during the sampling process, up to a depth of 1.4 m. All habitat types within a ~~reach~~ section will be sampled, with prime darter habitat receiving the most effort.

- Timed Surveys: To balance the sampling efforts, the following predetermined time constraints will be used for each ~~reach~~ section to provide consistent timed surveys: San Marcos River system - Hotel Reach-0.5 hour, City Park Reach-1.0 hour, I-35 Reach-1.0 hour, Lower San Marcos River/Todd Island-1.0 hour, Comal River - Upper Spring Run-0.5 hour, Spring Island area-0.5 hour, Landa Lake-1.0 hour, new Channel-1.0 hour, Old Channel-1.0 hour, Garden Street-1.0 hour. Fountain darters will be identified, counted, measured, and returned to the river at the point of collection.

Presence/absence surveys will be conducted by taking 4 dip net sweeps at 50 permanent sample site locations within the four representative reaches at Comal Springs (Upper Spring reach (5 locations), Landa Lake reach (20 locations), Old Channel reach (20 locations), and New Channel reach (5 locations)) and the 50 permanent sample site locations within the three representative reaches in San Marcos Springs (Spring Lake Dam reach (15 locations), City Park reach (20 locations), and I-35 reach (15 locations)).

Task 5. Comal Springs Invertebrate Sampling

The Contractor will conduct sampling for Comal Springs invertebrates during the Spring and Fall sampling events.

- One drift net each will be placed over the main spring orifice of Spring Run 1, Spring Run 3, and Spring Run 7 at Comal Springs. The drift nets are anchored with rebar and have a mesh size of 350 μ m, 0.45 m x 0.30 m rectangular opening and taper to detachable 0.28 m long cylindrical bucket of 300 μ m. The buckets will be removed at 6 hour intervals and the contents sorted in the field. All endangered invertebrates will be identified and counted in the field, and returned to the orifice they were collected upon completion of the 24-hour sample period. All other non-endangered invertebrates will be preserved and transported to an off-site laboratory for taxonomic classification. Coordination with the USFWS San Marcos Aquatic Resources Center (SMARC) will take place each time to assist with refugia collections when needed.
- Comal Springs riffle beetle sampling will be conducted in three locations (Spring Run 3, western shoreline of Landa Lake, and Spring Island area.) Ten springs within each of the three locations will be identified by the Contractor and sampled using the cotton lure method (below) or a Contractor suggested and EAHCP staff approved alternate method. Lures will be set and left in place for approximately four weeks, then retrieved. Comal Springs riffle beetles and other endangered invertebrates will be identified and counted in the field, and returned to the orifice they were collected. Coordination with the ARC will take place each time to assist with refugia collections or research activities when needed.
 - o The cotton lure quantitative survey method will follow the Comal Springs riffle beetle cotton lure standard operating procedure. Basically, the lures are constructed

from ~~consists of~~ bed sheets (50% cotton, 50% polyester) that are cut into 15 cm x 15 cm squares (~~i.e. lures~~) that are “S” folded and placed in wire “cages”. At each Comal Springs location (Spring Run 3, Spring Island, western shore of Landa Lake), 10 springs found in potential habitat will be selected and will be sampled with a lure. Depth (m), current velocity (m/s), and landmark distance measurements will be taken at each spring. ~~Each square will have the corners folded inward and placed in the spring.~~ To help in relocation, a brightly colored piece of aquarium gravel will be placed on top. Rocks will be loosely stacked over the square to keep it in place and serve as camouflage without deterring flow through the area. Approximately four weeks later, squares will be relocated and removed followed by depth and current velocity measurements. Beetles will be identified, counted, and returned to their spring of origin. Other spring invertebrates collected on the squares will also be noted. These include two other non-listed riffle beetles (*Microcylloepus* sp. and *Stenelmis* sp.), and the endangered Comal Springs dryopid beetles (*Stygoparnus comalensis*), and the endangered Peck’s cave amphipods (*Stygobromus pecki*).

Task 10. Flow Partitioning within Landa Lake

~~The Contractor will conduct flow partitioning measurements within Landa Lake during Spring and Fall sampling events. This element will provide a better understanding of the spring flow influence within Landa Lake as upwelling flow within Landa Lake plays a role in understanding Comal Springs riffle beetle survival during low-flow events.~~

- ~~An Acoustic Doppler profiler (or similar device) will be used to measure the flow patterns and current velocities from Spring Island through the upper portion of Landa Lake and will be measured concurrently with discharge measurements at Comal Springs.~~

Based on 2013. findings to date and Science Team input. 2014 sampling may be adjusted.						
	<i>Comal</i>					
<i>Location</i>	<i>Dominant Vegetation</i>					
Old Channel	Hygrophila	Ludwigia	Bryophytes	Cabomba	Sagittaria	
Landa Lake	Hygrophila	Ludwigia	Bryophytes	Cabomba	Sagittaria	Vallisneria
New Channel	Hygrophila	Ludwigia	Cabomba			
Upper Spring						
Run Reach	Hygrophila	Sagittaria	Bryophytes	Ludwigia		
	<i>San Marcos</i>					
<i>Location</i>	<i>Dominant Vegetation</i>					
Spring Lake Dam	Hygrophil	Potamogeton	Hydrilla	Vallisneria	Sagittaria	
City Park	Hygrophila	Potamogeton	Hydrilla	Sagittaria	Cabomba	
1-35	Cabomba	Hygrophila	Hydrilla	Ludwigia		

~~The macroinvertebrate sampling will gather baseline data on the two non-listed macroinvertebrate species, the Edwards Aquifer diving beetle and Texas troglobitic water Slater that are covered in the EAHCP.~~

- ~~• Macroinvertebrate sampling will be conducted using a modified Ekman sampler within each of the seven study reaches (4 reaches in the Comal system and 3 reaches in the San Marcos system, described above) to characterize food sources available for fountain darters.~~
- ~~• Samples will be collected in triplicate from designated aquatic vegetation types (based on majority of species present or adjusted based on fountain darter habitat quality) within each of the seven study reaches of the two ecosystems. Upon collection, macroinvertebrate samples will be preserved and transferred to a laboratory for processing.~~

~~Macroinvertebrate food source monitoring will be conducted during Spring and Fall sampling events to better understand the food source base for fountain darters in each system and how that food base responds to varying flow conditions.~~

~~The Contractor will utilize the most current data on dominant aquatic vegetation known to be fountain darter habitat and sample within the City Park, IH 35 and Spring Lake Dam reaches on the San Marcos River, and the Upper Spring Run, Landa Lake, New Channel, and Old Channel reaches on the Comal River.~~

Task 140. Macroinvertebrate Community Assessment Food Source Monitoring

The macroinvertebrate community assessment will be conducted using rapid bioassessment (RBA) protocol as described in “Surface Water Quality Monitoring Procedures, Volume 2: Methods for Collecting and Analyzing Biological Assemblage and Habitat Data.” TCEQ RG-416. 2014. The general procedure is to collect and identify (to lowest practical taxonomic level practical) the first one hundred macroinvertebrates. The RBAs will be conducted in five reaches in the Comal and 4 reaches in the San Marcos. One composite sample will be collected from each reach (i.e. 9 samples total across both systems). Samples will be collected at the drop-net fountain darter sites. Macroinvertebrate community assessments will be conducted during comprehensive and critical period sampling events.

Task 11. Fish Community Sampling

Subtask 11.1 The Contractor will collect fish from both the Comal and San Marcos river systems and test them for contaminants using the analytical methods found in the table shown below. The fish will be collected once per year in odd numbered years in conjunction with routine Biological Monitoring sampling. The fish will be collected at two locations within each system, for a total of four sampling sites. For each river system, one site will be located near the spring orifices or in the far upper reaches of the system, and the second site will be located at the most downstream biomonitoring reach for each system (Lower River Reach – Comal; I-35 Reach – San Marcos).

At each of the four sites, two fish species will be collected. The species will include fountain darters and a predator species such as largemouth bass, warmouth, or rock bass. The Contractor

will collect fountain darters and the same predator species at each of the four locations so that the results may be compared. The length, weight, and sex of the individual fish will be recorded prior to creating the homogenate. For each sample, whole body organisms will be combined to create a composite sample for tissue analysis. Tissue analysis will be conducted for the parameters described in the table below.

<u>PARAMETER</u>	<u>METHOD</u>	<u>METHOD DESCRIPTION</u>	<u>METHOD</u>	<u>METHOD</u>	<u>UNITS</u>
			<u>DETECTION LIMIT</u>	<u>REPORTING LIMIT</u>	
<u>PCBs</u>	<u>8082A</u>	<u>GC</u>	<u>2.8</u>	<u>10</u>	<u>ug/Kg</u>
<u>PAHs</u>	<u>8270D</u>	<u>GC-MS SIM</u>	<u>0.01-.1*</u>	<u>.1-1*</u>	<u>ug/Kg</u>
<u>PBDEs</u>	<u>8270D</u>	<u>GC-MS</u>	<u>.01-.05*</u>	<u>.1-1*</u>	<u>ug/Kg</u>
<u>SVOCs</u>	<u>8270D</u>	<u>GC-MS SIM</u>	<u>10-200*</u>	<u>40-400*</u>	<u>ug/Kg</u>
<u>Metals</u>	<u>1631, 6010C, 6020A, 7742</u>	<u>CVAA, ICPMS, AA</u>	<u>0.1</u>	<u>1</u>	<u>ug/Kg</u>
<u>PPCPs</u>	<u>-</u>	<u>LC-MS/MS</u>	<u>-</u>	<u>-</u>	<u>-</u>
<u>* detection and reporting limits vary by congener or analyte</u>					

EXHIBIT B, BUDGET ESTIMATE

TASK		ESTIMATED COST	
COMPREHENSIVE SAMPLING PROGRAM			
Task 1.	Literature Review		\$ 0
Task 2.	Aquatic Vegetation Mapping		\$56,833.
Task 3.	Texas Wild-rice Mapping		\$14,513.
Task 4.	Fountain Darter Sampling		\$82,837.
Task 5.	Comal Springs Invertebrate Sampling		\$47,582.
Task 6.	Salamander Visual Observations		\$23,683.
Task 7.	Comal Springs Discharge Measurements	\$4,539	<u>\$ 8,218.</u>
Task 8.	Water Quality Sampling		\$ 4,190.
Task 9.	Fixed Station Photography		\$ 2,154.
Task 10.	Flow Partitioning in Landa Lake		\$18,679.
Task 10.	Macroinvertebrate Rapid Bioassessment		<u>\$45,000.</u>
Task 11.	Fish Community Sampling	\$68,754	<u>\$89,613.</u>
Task 12.	EAHCP Habitat Baseline and Disturbance		\$14,822.
Task 13.	Annual “Take” Estimation		\$18,830.
	Comprehensive Subtotal	\$417,029	\$408,275.

Mr. Edmund L. Oborny
October 12, 2016 - Page 6

CRITICAL PERIOD SAMPLING PROGRAM

Task. 14	High/Low Flow Monitoring	\$217,384
Task 15.	EAHCP Low Flow Sampling Program	\$108,693
	<u>Critical Period Subtotal</u>	<u>\$326,077</u>

TOTAL PROJECT COST	\$743,106	<u>\$734,352</u>
--------------------	----------------------	------------------

Please sign below to reflect your approval and acceptance of this renewal and amendments of the Contract and return a signed original of this letter to the EAA.

Please contact the EAA immediately if you have any questions about this Contract renewal.

Sincerely,

Roland Ruiz
General Manager

APPROVED AND ACCEPTED:
BIO-WEST, INC.

Edmund L. Oborny
Vice President

Date