

Work Plan Development Process

5.3.1/5.4.1 Texas Wild-Rice Enhancement and Restoration

Texas State University and the City of San Marcos are partnering to undertake a program of Texas wild-rice (TWR) enhancement and restoration in Spring Lake and the San Marcos River. No changes will be made to this measure because 2013 work has just begun due to delays in contracting.

Long-term Objective: To restore 8000 m² of TWR (in addition to the existing 4000 m²) and successfully implement the State Scientific Area (SSA) protection program for existing and restored areas of TWR during flows of 120 cfs and below (see HCP Section 5.6).

Assumptions: Existing areal coverage of TWR is approximately 4000 m². The average long term biological goal for TWR (HCP Table 4-10) is 12,000 m². To achieve this goal would require an 8000 m² increase over the first phase of the HCP period with an annual goal of approximately 1100 m² of TWR restoration each year. It is also assumed that production of Texas wild rice will still occur at the Freeman Aquatic Building at Texas State University and the U.S. Fish and Wildlife Service San Marcos Fish Hatchery. Production of plants at the FAB is assumed to be incorporated into this workplan budget.

Enhancement and restoration of TWR focuses on selective gardening of non-native vegetation in mixed stands of TWR and removal of non-native vegetation in areas adjacent to existing TWR stands. The work plan will also include selective TWR planting in areas where non-native vegetation and sediment is removed as discussed in HCP measures 5.3.6/5.4.4 (Sediment removal) and 5.3.8/5.4.3/5.4.12 (Control of non-native plant species).

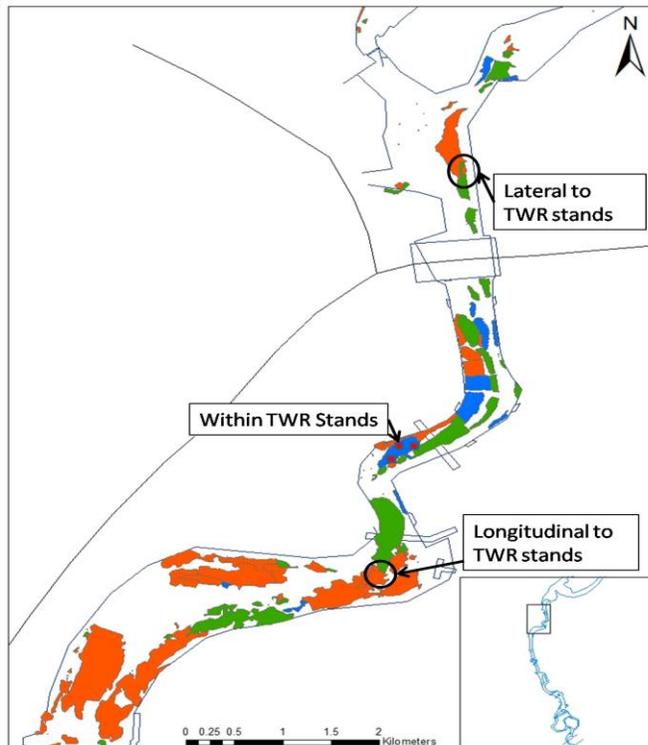
Hardy et al. (2011a) estimated that the removal of *Hydrilla verticillata* and *Hygrophila polysperma* within TWR stands and in a 2-meter buffer around those stands could potentially provide over 1,000 m² of additional optimum TWR habitat area over the entire simulated flow range (45 to 80 cfs) within the San Marcos River downstream of Spring Lake. Proactive planting and conservative non-native vegetation removal has a high potential for the expansion of existing TWR stands that would remain hydraulically suitable at these modeled flow levels (Hardy et al. 2011a). In addition, TWR areal coverage within Spring Lake is targeted for 1500 m².

Target 2014/Performance Measure: Successful expansion of TWR stands through selective gardening within and around existing stands and plantings where non-native vegetation and silt is removed. These strategies will target a goal of 1100 m². This 1100 m² will optimally be in addition to an 1100 m² completed in 2013. The 2014 target goal may be adjusted depending on “lessons learned” from 2013 work. Due to contractual delays and testing of various methods, 2013 work has just begun (April). Given the four-month delay, it may (or may not) be necessary to carry 2013 funds over to 2014. As much as possible will be accomplished prior to December 31, 2013.

Methods: Model results from Hardy et al. (2011a) were used to identify restoration/enhancement areas for TWR that have a high probability of success (i.e., optimal habitat). TWR stands were identified as mono (i.e., 100% TWR) or mixed (i.e., TWR stands mixed with *Hydrilla* or *Hygrophila*). *Hydrilla* and *Hygrophila* were selected due to their high relative abundance in the San Marcos River. In mixed stand areas, the non-natives will be removed and the original TWR stand monitored for expansion. Similarly, for TWR stands occupying optimal areas with adjacent non-native vegetation, the non-native plants will be removed and the TWR monitored for expansion. Finally, in optimal areas for TWR that are

unoccupied by TWR, any non-native vegetation that is present will be removed and TWR planted and monitored to assess the success of transplants.

The specific areas chosen for field trials will first consider only optimal habitat areas that remain suitable over the full range of discharges between the long-term average and lower flows as show in model results from Hardy et al (2011a). In 2013, TWR stands will be selected upstream of IH-35. TWR stands will be selected based on predicted TWR optimal conditions and hydraulic habitat homogeneity within and around the stand, a practical working environment (i.e. manageable current velocity), and suitability over the critical flow ranges.



When gardening or removal of adjacent non-native vegetation is undertaken, the non-native vegetation will be fanned to displace fountain darters prior to uprooting the vegetation. The non-native aquatic plants will be shaken, fountain darters (or other native species) salvaged and returned to the river, and the non-native vegetation bagged for disposal at the city's composting facility.

Monitoring: Replanted areas will be monitored weekly for the first three months, then monthly to evaluate success rate. The treatment areas will be weeded as needed. Turbidity will be monitored during and after all removal efforts. In addition, colonization of vegetation, macroinvertebrates, and fish will be monitored in all treatment areas and compared to the reference site for each reach.

Allocated funds for 2014 from Table 7.1: \$ 175,000 plus 2% (\$3500)

Signage & Marketing: \$1000 (not included in estimated budget)

Estimated Budget: \$178,500

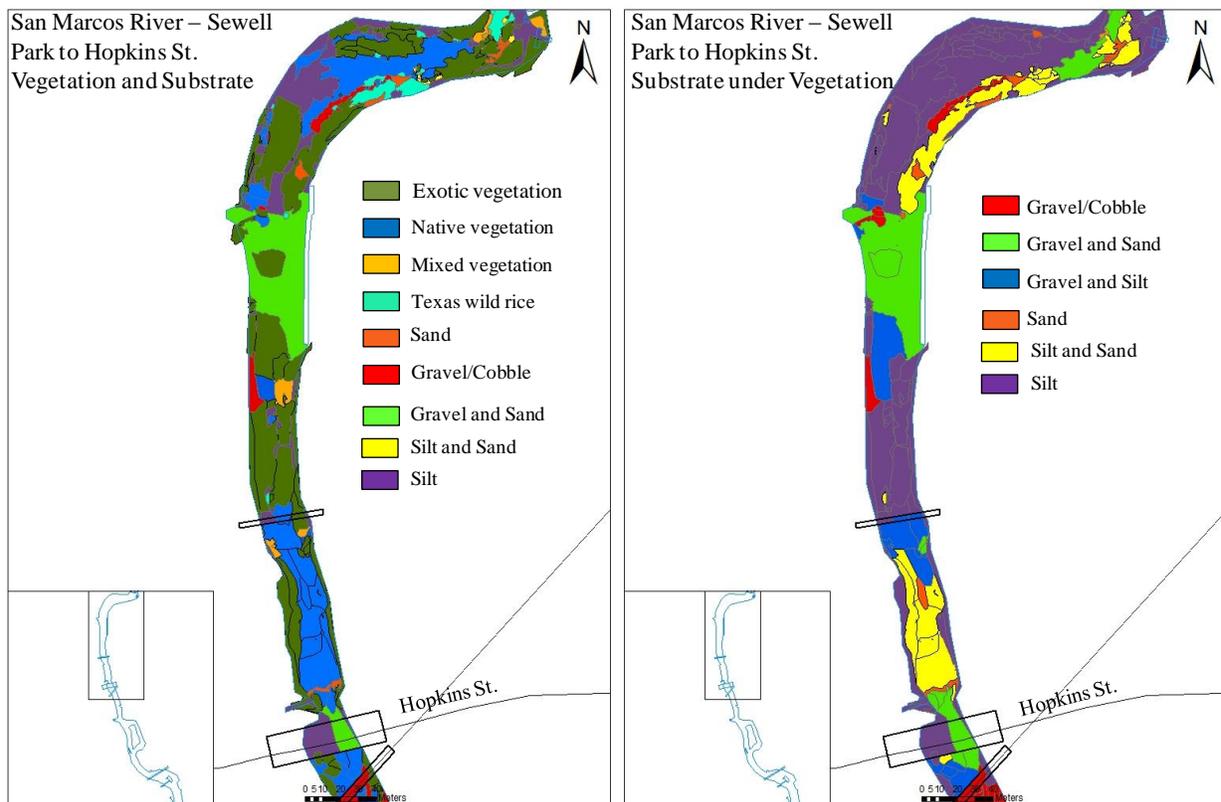
5.3.6/5.4.4 Sediment Removal

The City of San Marcos and Texas State University will remove sediment from the river bottom at various locations from Spring Lake to IH-35. No changes will be made to this measure because 2013 work has not yet begun due to delays.

Long-term Objective: Initial removal of targeted fine sediments and then maintenance removal of accumulations of sediment detrimental to TWR and native vegetation restoration efforts as necessary.

Assumptions: FY 2014 sediment removal efforts and budget target a practical restoration effort that is integrated with other Work Plan efforts and minimizes potential negative impacts on the aquatic ecosystem and Covered Species habitats.

Hardy et al. (2011b) estimated 21,500 m² (12,750 m³) of fine sediment in the San Marcos River between City Park and Rio Vista Falls. As illustrated in figure below, there is a high correlation between the distribution of fine sediment and non-native vegetation. Therefore, areas with fine sediment accumulation and associated non-native vegetation will be targeted for removal. Native replanting is addressed in Measure 5.7.1. In addition, approximately 150 m² of fine sediment and Texas wild rice restoration is targeted for removal in Spring Lake based on a site reconnaissance by TPWD and Meadows Center. Estimates for upper and lower Sewell Park still need to be accomplished.



Target 2014/Performance Measure: Successful removal of 3000 m² (and associate volumes) of fine silt and associated non-native vegetation. The 2014 target goal may be adjusted depending on “lessons learned” from 2013 work. Due to contractual delays and testing of various methods, 2013 in-river work

has just begun (April). Given the four-month delay, it may (or may not) be necessary to carry 2013 funds over to 2014. As much as possible will be accomplished prior to December 31, 2013.

Methods: Removal of non-native vegetation prior to sediment removal is covered under Work Plan elements 5.3.8, 5.4.3, and 5.4.12. As specified in the HCP, hydrosuction will be used to remove accumulations of sediment. Divers will be trained on equipment operations, diving safety protocols, and recognition of all stages of listed species from larval to adult. Sediment will be vacuumed using a hose. A 1" strainer will be used on the front of the dredge and the collected sediment will be subsampled.

Divers will fin the area proposed for sediment removal, remove all vegetation and then scan the area for the presence of listed species and other biota. In addition, placement of stakes around the area prior to vegetation removal will keep divers within designated area. One worker will be stationed by the geotube/tank to ensure diver safety, monitor operations, and answer public questions. Based on discussions with the Meadows Center Diving Control Officer, it is assumed that sediment removal will be accomplished through a maximum of three 2-hour dive cycles each day with a one hour surface interval between dives. During the recreation season, this may be reduced to one 2-hour cycle prior to 1100 and a possible evening suctioning after 1900. Disposal of removed sediment will be at the Texas State University Composting Center or Animal Shelter compost site.

Monitoring: Turbidity will be monitored during and after all removal efforts. In addition, colonization of vegetation, macroinvertebrates, and fish will be monitored in all treatment areas and compared to the reference site for each reach. After targeted depth of fine sediment removal has been achieved, the bed elevation will be measured from existing benchmarks and the sediment composition delineated (i.e., sand, gravel, etc). Bed elevation and substrate composition will then be monitored at each location before and after the recreation season.

Allocated funds for 2014 from Table 7.1: \$ 25,000 plus 2% (\$500)

Signage & Marketing: \$1000 (not included in estimated budget)

Estimated Budget: \$175,500

This project was awarded \$500,000 in 2013. Due to permit restrictions, (TPWD only allowed the removal of 1750 CY in 2013) and the physical and temporal limitations of this project - it was not possible to expend the entire \$500,000 in 2013. Therefore, only \$151,800 from \$500,000 budget was requested for 2013, with the intent to spread the remainder over the next three years (2014-2016). For 2014, \$150,000 plus \$25,500 as noted above is being requested for an estimated budget of \$175,500.

5.3.8/5.4.3/5.4.12**Control of Non-Native Plant Species**

The City of San Marcos and Texas State University are partnering to implement an on-going non-native plant replacement program for the San Marcos River from Spring Lake to city limits. Non-native species of aquatic, littoral, and riparian plants will be replaced with native species to enhance Covered Species habitat.

Long-term Objective: To keep the density of non-native aquatic and littoral plants as low as possible through monitored removal along the San Marcos River.

Assumptions: Non-native aquatic plants will be removed in association with fine sediment removal and TWR enhancement Work Plans 5.3.6/5.4.4 and 5.3.1/5.4.1. It is also assumed that production of native aquatic plants will still occur at the Freeman Aquatic Building at Texas State University and the U.S. Fish and Wildlife Service San Marcos Fish Hatchery. Production of plants at the FAB is assumed to be incorporated into this work plan budget.

Target 2014/Performance Measure: *Non-native Aquatic* - Non-native aquatic plant removal directly correlates with sediment removal. Therefore the optimal 2014 goal is 3000 m² of plant removal, but this amount may be adjusted depending on what work is accomplished in 2013. Due to contractual delays and testing of various methods, 2013 in-river work has just begun (April). Given the four-month delay, it may (or may not) be necessary to carry 2013 funds over to 2014. As much as possible will be accomplished prior to December 31, 2013.

Littoral – areas cleaned of elephant ears in 2013 will be re-visited for the next phase of elephant ears and replanted with native littorals. Work will be continued downstream of San Marcos Plaza (Veramendi to Rio Vista).

Methods

Non-native Aquatic Plants - Divers that will be conducting sediment control will first remove non-native aquatic plant species from the area to be worked that day. Removal will initially focus on hydrilla and hygrophylla as these species are the most actively invasive. Additionally, hydrilla is very dense and hides the presence of tilapia so focusing on hydrilla removal will help to increase rate of tilapia removal. Prior to plant removal, the area will be fanned or sampled with appropriate gear to remove fountain darters and other native species. The non-native aquatic plants will be removed, shaken and bagged for disposal at the composting facility. Denuded areas will either be targeted for TWR or selected native species planting. TWR and native species will be obtained from the USFWS SMARC, Tx State FAB, the San Marcos River, or approved vendors. Initial efforts for restoration of TWR or native vegetation will target planting of approximately 20 percent of the surface area restored.

Littoral - On the banks, elephant ear (*Colocasia esculentes*) is the focus of removal efforts. Mechanical removal will be used wherever possible. Chemical removal consists of the use of glyphosate dripped onto the surface of the leaves to remove more “entrenched” elephant ear plants.

Monitoring: *Aquatic vegetation* - Replanted areas will be monitored monthly to evaluate success rate. The planted areas will be weeded (i.e., non-native species removed) and replanted as needed to meet target areal coverage. An annual river inventory will be conducted to identify the presence and location of new non-native vegetation establishment. Turbidity will be monitored during and after all removal efforts. In addition, colonization of vegetation, macroinvertebrates, and fish will be monitored in all treatment areas and compared to the reference site for each reach. After targeted depth of fine

sediment removal has been achieved, the bed elevation will be measured from existing benchmarks and the sediment composition delineated (i.e., sand, gravel, etc). *Littoral* – annual river inventory of removal and native re-plantings will be accomplished.

Allocated funds for 2014 from Table 7.1: \$ 175,000 plus 2% (\$3500)

Signage & Marketing: \$1000 (not included in estimated budget)

Estimated Budget: \$178,500

5.3.3/5.4.3 Management of Floating Vegetation Mats and Litter

The City of San Marcos and Texas State University will perform activities to manage floating vegetation and litter removal to enhance habitats for Covered Species. Management activities will include removal of vegetation mats that form on top of the water surface as well as on top of Texas wild-rice plants, particularly during low flows, and removal of litter for the littoral zone and stream bottom. Texas State University will manage aquatic vegetation in Spring Lake through use of its harvester boat and through hand cutting of vegetation by divers authorized to dive in Spring Lake.

Long-term Objective: Minimize impacts of floating vegetation and litter on TWR stands and overall aquatic community within the San Marcos River.

Assumptions: Existing vegetation management activities in Spring Lake will continue to follow the Spring Lake Management Plan (approved by the President’s Cabinet) as described under Methods. Litter and floating vegetation mat removal will follow the existing protocol and schedules currently employed by the City of San Marcos as described below under Methods.

Target 2014/Performance Measure: Continued implementation of the established protocols.

Methods: *Spring Lake* - Each week about five springs will be cut, thus returning to cut the same springs every two to three weeks. During summer algal blooms, the springs will be managed more frequently (up to four springs per day), but mostly to remove algae. Texas State employees and supervised volunteers will fin the area around the springs to remove accumulated sediment, and then clear a 1.5 meter radius around each spring opening in Spring Lake with a scythe. Over the next 1.5 meter radius around the spring opening, they will shear vegetation to a height of 30 cm, and then to one meter over the following three meter radius. Plant material will not be collected, but carried away by the current. Cumulatively, about six meters of vegetation around each spring opening will be modified. Mosses will not be cut. The volume of plant material to be removed will vary by the amount of time between cuttings, and season. The harvester boat will remove a range of 15 to 20 boatloads of plant material a month from Spring Lake. The harvester will clear the top meter of the water column, cutting vegetation from sections one, two, and three once a week (See HCP Figure 5.2). The harvested vegetation will be visually checked by driver for fauna caught in the vegetation. If the driver observes fauna, he/she will stop work and put the animal(s) back into Spring Lake if appropriate. Texas State employees and supervised volunteers are trained to recognize the Covered Species through the Diving for Science program (Section 5.4.7.1), and avoid contact with them. Vegetation mats will be removed from zones four and five on an as-needed basis (See HCP Figure 5-2). The total area cut will equal about nine surface acres. The Spring Lake Area Supervisor also schedules cleanup of nuisance floating species such as water hyacinth and water lettuce from Spring Lake. The floating plants will be collected by hand and shaken prior to removal from the river to dislodge any aquatic species caught in the plant. The plants will be deposited into dump trucks and taken to the Meadows Center compost area.

San Marcos River – Floating vegetation will be pushed downstream and inorganic litter will be picked up weekly from the substrate, surface and littoral zones of the San Marcos River from upper Sewell Park to IH-35 during the recreational season (May 1st to September 30th) and monthly during offseason. Monitoring of downstream Texas wild-rice stands to keep the stands clear of drifting vegetation will also be undertaken. Divers will not pick up litter within Texas wild-rice stands. Contractor will tour the river with HCP manager for the purpose of recognizing Texas wild-rice. On Texas wild-rice stands, contractor

will lift (not push) the floating material from the top of the Texas wild-rice stands and allow it to float downstream.

Monitoring: Floating vegetation and litter are targeted for weekly removal during the recreation season and then monthly during the remainder of the year. In the event of low flows, this activity will be monitored for potential impacts on listed species and will be suspended if impacts are observed.

Allocated funds for 2014 from Table 7.1: \$ 80,000

Estimated Budget: \$80,000

5.3.5/5.3.9/5.4.11/5.4.13 Non-Native Species Control

The City of San Marcos, in partnership with Texas State University, will implement non-native, invasive faunal control in the San Marcos River on a periodic basis with expanded efforts of control, if needed, at low flows. The species include suckermouth catfish, tilapia, and *Melanoides* and *Marisa cornuarietis* (snails). Educational materials will be provided to local pet shops and commercial outlets who sell aquarium species. Alternatives, such as a university release pond, will be offered to fish and snail owners.

Long-term Objective: Reduction of non-native, invasive species in the San Marcos River to levels that minimize their direct and indirect impacts on Covered Species and the aquatic ecosystem.

Assumptions: The primary effort in 2014 will continue to use the methods that have proven to be effective in 2013 and to test other control measures for the more elusive target species within Spring Lake and the San Marcos River.

Target 2014/Performance Measure: Establish population numbers for each species and begin measuring reduction percentages for species (suckermouth catfish) with an established removal method. For the species that are more difficult to capture (tilapia), contractor will test and refine control measures.

Methods: In Spring Lake, tilapia removal will be targeted during the winter to early spring period. Methods will be undertaken in a manner that avoids impacts to resident turtles and other native species. Block seining could be employed in shallow areas. Catfish control will be approached using divers and gigs within Spring Lake and the San Marcos River. The level of effort for all testing of control measures will be confined to the existing budget allocation for FY2014.

Although not targeted for systematic removal during 2014, effective removal of *Melanoides* and *Marisa cornuarietis* will continue to be accomplished by determining the locations of highest snail density and using dip nets to remove the snails weekly. The species will be controlled by diving several hours after sunset to hand-pick the snails from the submergent vegetation.

Monitoring: It is assumed that the integrated biological monitoring program will assess the status of non-native animal species.

Allocated funds for 2014 from Table 7.1: \$ 35,000

Estimated Budget: \$35,000

5.4.6 Sessom Creek Sand Bar Removal

Based on the 2013 study results, it is assumed for the purpose of budgeting that Texas State University and the City of San Marcos will completely remove the sediment island at Sessom Creek and the 'cut-grass' island below University Bridge.

Long-term Objective: Remove the necessary amount of sediment in the channel at Sessom Creek confluence and in Sewell Park necessary to maintain optimal conditions for listed species in the San Marcos River.

Assumptions: To meet the 2014 work plan deadlines, it is assumed that the entire islands at confluence and Sewell Park will be removed.

Target 2014/Performance Measure: Removal of the islands at confluence and in Sewell Park in accordance to the recommendations from the 2013 study results.

Methods: The specific methodology will follow the recommendations contained in the 2013 work plan study results but will likely be the use of backhoes and hydro-suction for the island at Sessom Creek and hydro-suctioning for the cut-grass island area.

Monitoring: Not Applicable

Allocated funds for 2014 from Table 7.1: \$ 75,000 (plus 2% - \$1500)

Signage: on-site signage during construction: \$1000

Estimated Budget: \$ 76,500

5.3.7 Designation of Permanent Access Points/Bank Stabilization

The City of San Marcos and Texas State University will stabilize banks and establish permanent river access points in eroded areas, to include locations such as Clear Springs Apartments, City Park (targeted for completion in 2013), Hopkins Street Underpass, Bicentennial Park, Rio Vista Park, Cheatham Street underpass, and Ramon Lucio Park and potentially other areas (as determined during the Adaptive Management Process). Areas around and between access points will be planted with vegetation that discourages streamside access (*e.g.*, prickly pear and acacia). River trail location will be revised to maximize width of riparian vegetation and ease of use for the public. Public access is causing increasingly eroded bank areas that contribute significantly to river turbidity. Turbidity has been shown to have a direct impact on fountain darter feeding ability (Gabor presentation, April 2013). Creating public access areas is critical to the total effort of reducing sediment input and resulting turbidity.

Long-term Objective: To reduce bank loss and sediment input through the stabilization of banks and minimization of access at non-designated sites through provision of safe access for the public.

Assumptions: Design, dimensions and materials will differ between access points. It is also assumed that there will be sufficient funds to support these projects.

Target 2014/Performance Measure: Implement one or more site construction projects based on the designs completed in 2013 as funding allows.

Methods: *Bank Stabilization/permanent access points* – Design specifications and construction plans will be followed. Prior to each construction period, the area will be swept clean of darters and exclosures (silt fence) will be put into place to keep darters out of the construction area. No work outside this area will occur.

Monitoring: Surveys will be performed by the contracted conservation resource to determine use of access points versus use of unauthorized access.

Allocated funds for 2014 from Table 7.1: \$ 20,000 plus 2% (\$400)

Signage, Identification & Marketing: \$2000 on-site signage & public meetings (not included in estimated budget)

Estimated Budget: \$41,400 - \$665,850

In 2013, \$469,200 of the allocated \$500,000 was spent on design, plans and specifications (\$172,000) with the remaining \$297,200 to be spent on one of the six bank stabilization sites (completed by December 31, 2013). The remaining five bank stabilization sites total \$665,850 (see attached construction estimate). The least expensive site is \$41,400; so in 2014 we are requesting new funding for the construction of at least one site (\$41,400) or all (\$665,850). The original cost estimate, and basis for the \$500,000 allocation, was obtained in 2011 from a local engineer. The researched and detailed cost estimate attached to this work plan is significantly more as shown in the 2014 work plan request.

5.7.1 Native Riparian Habitat Restoration

The City of San Marcos and Texas State University will undertake a program to increase the area and density of the riparian zone on public and private lands from the Spring Lake Dam to IH-35 using native vegetation. As plans take shape for the reestablishment of the riparian zone, private landowners will be asked to participate in the plan. It is hoped that funding will allow donation of native plants to private landowners.

Long-term Objective: Establish a robust native riparian community that benefits Covered Species and the habitat quality adjacent to and within the San Marcos River as well as prevents public access in undesirable locations. The zone of prohibitive vegetation along the uppermost edge of the riparian community should encourage river users to access the river via hardened access points.

Assumptions: Removal of non-native riparian vegetation (Measure 5.3.8) will occur prior to or simultaneous with Measure 5.7.1 and is funded from the Measure 5.7.1.

Target 2014/Performance Measure: Seven segments (upper Sewell Park to Ramon Lucio Park) along the San Marcos River were bid in 2013, so the cost of implementing this measure is now firm. One and one-half segments (Bicentennial & half of Veramendi) out of the seven segments were completed with 2013 funding. In 2014, the 3.5 segments above Rio Vista are proposed for invasive removal and native plantings. These segments have had elephants ears removed so bank is exposed to erosion. Replanting and fencing (city-funded) is needed as quickly as possible.

Methods: Identify and remove invasive trees, shrubs and vines (*Ligustrum* sp., Chinaberry, Chinese Tallow, Paper Mulberry and Japanese Honeysuckle). Remove woody species to be spot treated with approved herbicide to prevent regrowth. All removed material must be recycled on site. Plant dense barrier (5 – 10 ft deep) of prohibitive native species behind and along fence line. Fill in open areas behind barrier with native trees and shrubs as funding allows; use hands-on public workshops to educate and stretch funding. Vegetation such as big bluestem, switchgrass, Indian grass, black willow, Texas red oak, bur oak, pecan, bald cypress, American beautyberry, and buttonbush will be used. Prefer use of plants achieving a USDA bank stabilization rating of 6 or greater. Adequate erosion control on slope and drainage areas will be provided by contractor. Fencing, provided by the City, will stay in place for at least two years to prevent foot traffic and allow the establishment of the newly-planted species. Plants will be irrigated by contractor for the first year to optimize their survival rate. Weeding and pruning to be done by contractor for length of project.

Monitoring: Monitoring will occur weekly in newly planted areas to ensure success and revise methods as needed.

Allocated funds for 2014 from Table 7.1: \$ 20,000 plus 2% (\$400)

Signage: \$3000 – on-site signage & public meetings (not included in estimated budget)

Estimated Budget: \$200,000 (Moving \$180,000 from HCP Measure 5.7.6 - Impervious Cover/WQ Protection)
The cost of riparian restoration was originally based on vegetative transects performed in 2011. Surveys by the contractor have shown a higher percentage of invasive trees, shrubs and vines than was

estimated by the vegetative transects. Increased tree removal and required plantings have increased the overall cost of this critical effort. Riparian restoration not only increases riverine integrity, it is how we plan to prevent undesired access and subsequent bank erosion. The total cost for restoration from upper Sewell Park to Ramon Lucio was bid at \$537,404. After the completion of the 2013 riparian restoration, the remaining cost is approximately \$437,500. The City has provided and will continue to provide all fences to protect the sites as well as game cameras and other security measures as needed to prevent theft, vandalism and unauthorized access. Theft, vandalism and unauthorized access have already occurred and steps have been taken.

5.7.6 Impervious Cover/Water Quality Protection

The City of San Marcos and Texas State University will implement the program to protect water quality and reduce the impacts incentives for the program based upon the LID/BMP practices. Urban land development tends to increase the intensity of storm water flows and the amount of nonpoint source (NPS) pollution reaching local water resources. Buildings, roads, and other impervious surfaces shed rain more rapidly than areas covered by vegetation, and most typical urban land uses require rapid drainage of storm water. The very rapid, direct connection of developed land across paved surfaces and through drainage conveyances to waterways tends to carry more pollutants more quickly from the land surface to water resources. A number of water quality problems and impairments in Texas are attributed in full or in part to such urban storm water runoff carried through storm sewers and channelized streams.

Long-term Objective: Implement a program that minimizes the impacts associated with urbanization and changes in land use/cover in the Upper San Marcos watershed; manage stormwater as close to its source as possible, treat stormwater as a resource rather than a waste product; emphasize conservation and the use of on-site features to protect water quality; and increase infiltration to groundwater and aquifer recharge for the protection of riverine integrity.

Assumptions: Construction of the proposed sediment retention ponds under Measure 5.7.4 will be funded under this Measure.

Target 2014/Performance Measure: Begin the implementation of the Water Quality Protection Plan by Texas State University and City of San Marcos that incorporates all jurisdictional watershed areas for the purpose of meeting the goals stated in the long-term objective. Include public education, staff integration, five conceptual designs for retrofit water quality projects, grant proposals, and coordination with ongoing stormwater management plans for city and university.

Methods: City of San Marcos and Texas State University have a contract for the implementation of the developed plan.

Monitoring: N/A

Allocated funds for 2014 from Table 7.1: \$ 500,000 (plus 2% = \$10,000)

Marketing: \$1000 (not included in estimated budget)

Estimated Budget: \$330,000 (Moved \$180,000 to HCP Measure 5.7.1 – Riparian Restoration)

5.7.4 Minimizing Impacts of Contaminated Runoff

The City of San Marcos will construct two sedimentation ponds along the river to help reduce the amount of contaminated material that enters the river as a result of rain events. The first pond will be located in Veramendi Park beside Hopkins Street Bridge. The second pond will be created by widening the drainage ditches that run alongside Hopkins Street and cut directly to the San Marcos River.

Long-term Objective: Reduce the input of sediment and roadway pollutants into the San Marcos River.

Assumptions: Construction of the proposed sediment retention ponds are funded under Measure 5.7.6.

Target 2014/Performance Measure: Design the Best Management Practices (BMPs) to be constructed at Veramendii Park and along Hopkins Street that will reduce total suspended solids (TSS) by 85%.

Methods: A contractor will be retained to research applicable BMP designs and recommend the most economic and efficient methods to control contaminants.

Monitoring: N/A

Allocated funds for 2014: \$0

Estimated Budget: See Measure 5.7.6

5.4.9 Management of Golf Course and Grounds

Texas State University will develop a golf course management plan that will document current practices and include an Integrated Pest Management Plan (IPMP). The golf course management plan and IPMP will incorporate environmentally sensitive techniques to minimize chemical application, improve water quality, and reduce negative effects to the ecosystem. Expanded water quality sampling targeted at Golf Course operations will be conducted as described in Section of 5.7.2. of the HCP.

Long-term Objective: Management of the golf course and grounds to minimize and reduce negative effects to aquatic ecosystem in Spring Lake and the San Marcos River.

Assumptions: None

Target 2014/Performance Measure: Finalization of the Gold Course Management Plan and Integrated Pest Management Plan.

Methods: The golf course and grounds will be maintained in an aesthetically pleasing, yet environmentally sensitive manner. It is the responsibility of the Golf Course Manager to maintain the course and grounds in accordance with the Integrative Pest Management Plan (IPM). This plan will describe the activities and materials to be used to control pests (i.e. insects, weeds, and other living organisms requiring control) on the golf course in a way that minimally impacts the environment. The IPM will be developed and updated by the Golf Course Manager, in consultation with the Lake Manager and the Environmental Review Committee. The Golf Course Manager will consult with the Lake Manager on any unique situation that may arise outside of routine maintenance that could impact Spring Lake.

Monitoring: Each year the Golf Course Manager will report to the Lake Manager detailed information on maintenance activities and materials used during the year.

Allocated funds for 2014: \$ 0

Estimated Budget: \$ 0

Protocol for Implementation of HCP Measures Requiring Diving and/or Boating

All activities in Spring Lake must be submitted to the Spring Lake Environmental Review Committee and/or the Spring Lake Diving Control Board for approval as outlined in the Spring Lake Management Plan. This includes required training and orientation for any diving based activities in Spring Lake by the RSI Diving Safety Officer, using guidelines set out in the RSI Diving Safety Manual for Spring Lake and the San Marcos River. This includes an orientation that covers: instruction on safety, basic boat handling, and on-site rules and regulations. The orientation will cover information specific to Spring Lake's sensitivity, endangered species as well as cultural resources. Activities downstream of Spring Lake dam will follow the procedures outlined in the Spring Lake Management Plan.

All personnel implementing any portion of the HCP for the City of San Marcos and Texas State University will undergo an orientation at the NFHTC to ensure awareness of the listed species and safe procedures while working in and along the San Marcos River.