



Appendix I | 2022 City of San Marcos and Texas State University Reports



Appendix I1 | **Aquatic Vegetation Restoration**

Edwards Aquifer Habitat Conservation Plan Annual Report

Texas Wild-Rice Enhancement, Non-Native Aquatic Vegetation Removal and Vegetation Mat Mitigation in the Upper San Marcos River for Year 2022

The Meadows Center for Water and the Environment

Texas State University



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City of San Marcos / Edwards Aquifer Habitat Conservation Plan

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The Habitat Field Crew at The Meadows Center for Water and the Environment, part of Texas State University, serves as a pillar of environmental stewardship for the Upper San Marcos River, whether it's striving to restore and preserve the unique aquatic ecosystem of the Upper San Marcos River and its inhabitants, engaging in community outreach, mentoring students and volunteers through hands-on experience, or by simply leaving the river in a better state than it was when our crew arrives on site. The success of our efforts is a direct result of our dedicated crew, both past and present, who constantly push the boundaries of conservation to revitalize the headwaters of this highly unique ecosystem. However, we are not alone in this endeavor. It is only possible through the coordinated efforts of fellow EAHCP contractors, Texas State University Departments, volunteer groups, and other organizations, that all continue to play critical roles in the progression of this program.

Texas Wild-Rice Enhancement (EAHCP 5.3.1)

EAHCP Obligations:

The City of San Marcos, in partnership with the Meadows Center for Water and the Environment (Texas State University), will identify areas of optimal habitat for *Zizania texana* (Texas wild-rice) and target those areas for restoration. Restoration will include the removal of non-native submersed aquatic vegetation (SAV) species, propagation and planting of Texas wild-rice and continual monitoring of new and existing stands.

2022 Compliance Actions:

Texas wild-rice coverage was increased through maintenance of existing stands with a focus on reaches that have not already exceeded the 2027 goal from EAHCP Table 34. Existing stands throughout the river were maintained by gardening non-native regrowth within stands combined with clearing adjacent suitable habitat of non-native SAV to allow for expansion. New stands were established by clearing non-native SAV from areas of suitable habitat, allowing for Texas wild-rice to naturally seed these areas and, through regular gardening, preventing non-natives from overtaking the seedlings.

Prior to clearing, non-native vegetation was fanned to displace fountain darters (*Etheostoma fonticola*) or any other aquatic fauna. Removal was performed manually by hand with vegetation being captured in bags or skiffs, when possible, to minimize non-native propagation by fragmentation downstream. After removal, the collected material was sorted, any native biota caught within was returned to the river, and all remaining vegetation was disposed of at either the COSM or Spring Lake composting facility.

Texas wild-rice was not planted during the 2022 work period due to all reaches in the work zone having achieved target coverage. Efforts were made to enhance existing stands through the control of non-native species. The implementation of Condition M on June 1st, 2022, severely limited restoration activities for the rest of the year, which also included the advancement of Texas wild-rice plantings in areas where supplemental efforts may be needed, such as in Spring Lake. The planting of other native species was prioritized during the short window before Condition M was implemented due to low flows in the upper San Marcos River.

Observationally, Texas wild-rice coverage in both spillways of Spring Lake has stabilized after losses in coverage were observed. These losses are possibly due to construction that took place on Spring Lake Dam, a period of low flow conditions, competition from other species or a combination of factors.

Low flow conditions during 2022 have allowed for the expansion of non-native floating vegetation to expand in areas currently occupied by Texas wild-rice. *Nasturtium officinale* (Nasturtium) and *Ceratopteris thalictroides* (Ceratopteris) expanded from Sewell Park to City Park. This expansion denuded Texas wild-rice and other native plants. The removal of these two species is especially difficult, expensive and time consuming. Outside funding was necessary to implement the effective removal and maintenance of these species and will be for the foreseeable future. Decreased water levels also caused several mature stands of Texas wild-rice to become fully exposed and lead to some areas fully desiccating and dying.

Texas Wild-Rice Seedling Propagation

Texas wild-rice that was grown from seedlings is being maintained in the outdoor, aquifer fed, raceways at the Freeman Aquatic Building (FAB) on the campus of Texas State University. Planting did not take place in 2022 due to Condition M protocols and natural expansion in the river. Texas wild-rice has also exceeded its coverage goals in many reaches. The effort in planting of other native plants was prioritized to help promote a more heterogeneous native aquatic plant community. Texas wild-rice expansion is continually observed in the river via both seed and tiller reproduction. Seedling growth is frequently observed in freshly denuded areas. Care is taken to allow this expansion to occur naturally when conducting maintenance removal in those areas.



Figure 1. Texas wild-rice plants Texas State University raceways.

Proposed Activities for 2023:

To continue with the top-down strategy, the maintenance of *Hydrilla verticillata* (Hydrilla) and *Hygrophila polysperma* (Hygrophila) will continue from Spring Lake to the Hopkins Street bridge. The river section between the Hopkins Street Bridge to the railroad bridge just upstream of Cypress Island will be in recovery. Most of the native species planting will take place in this Recovery Zone. Bulk removal will commence in the 2023 work zone in between the Cypress Island railroad bridge and Rio Vista Dam if flows increase to a sustained level above the limits of Condition M. Effort will go towards fostering the natural expansion of native species into areas cleared of Hydrilla and Hygrophila and increasing the density of Texas wild-rice in areas it is already present. Outside funding will continue to be necessary to suppress *Nasturtium* and *Ceratopteris* in the upper sections of the river, especially in dense stands of Texas wild-rice.

Control of Non-Native Plant Species (EAHCP 5.3.8)***EAHCP Obligations:***

The COSM will partner with Texas State University to develop and implement a non-native plant removal program reaching from Spring Lake downstream to the city boundary. Aquatic, littoral, and riparian non-native plant species will be removed and replaced with native species. The riparian zone will be re-planted to cover a minimum of 15 meters in width where possible. The COSM will install fencing to protect the new plantings while they mature. Appropriate permits will be obtained for the removal of non-native plants.

2022 Compliance Actions:**Non-Native Aquatic Plant Removal**

The strategy of non-native removal shifted to a top-down methodology in 2019 to include non-designated reaches that have not been treated previously. This minimizes the spread of non-native plants from upstream sources. Each reach is designated as a Work Zone, Recovery Zone, or Maintenance Zone. A Work Zone will receive focused effort and large-scale non-native submerged aquatic vegetation (SAV) removal. The next level is a Recovery Zone which has already received removal treatment in the past, but still requires regular small-scale removal to prevent non-native SAV from reestablishing. This allows for natural expansion of native SAV. This is often the time when native planting occurs in areas that don't have enough coverage to support natural expansion. The final designation is a Maintenance Zone, which has had nearly all non-native SAV removed, and the focus has shifted to supporting native populations.

The primary focus in 2022 was concentrated on the bulk removal of Hydrilla from Snake Island to the railroad bridge just upstream of Cypress Island and the planting of native species in the section between Hopkins Street and Snake Island. This effort was prioritized early in the season, in anticipation of low flow conditions that would cause the implementation of Condition M protocols. Bulk Hydrilla removal efforts and native species planting were successfully completed in mid-May and the implementation of Condition M protocols occurred on June 1st, 2022. This effort continued simultaneously with the maintenance of Hygrophila and Hydrilla in Recovery and Maintenance Zones. Low flows in the Spring of

2022 provided an opportunity for *Nasturtium* and *Ceratopteris* to expand in shallow areas from Sewell Park to City Park. These shallow areas have been dominated by Texas wild-rice but the expansion of *Nasturtium* and *Ceratopteris* denuded large areas of previously healthy Texas wild-rice. Outside funding allowed for increased removal efforts in these areas, targeting these floating species. After Condition M was implemented, effort was split between maintaining the *Hydrilla* removal in the work zone and removing any regrowth from Spring Lake to the work zone.

Nasturtium, *Ceratopteris*, *Eichhornia crassipes* (water hyacinth) and *Pistia stratiotes* (water lettuce) and vegetation mats consisting of dislodged *Ceratophyllum demersum* (*Ceratophyllum*) from Spring Lake interfere with photosynthetic processes by blocking sunlight to underlying SAV. This can eventually lead to die off, therefore, removing floating vegetation and clearing vegetation mats covering native SAV is necessary to maintain the health and continued expansion of stands. Currently, all these species persist in Spring Lake which continues to serve as source population that spread downstream requiring regular removal. Outside funding was acquired to supplement the effective management of these species, both in Spring Lake and the upper reaches of the river.

Prior to clearing, non-native vegetation was fanned to displace fountain darters (*Etheostoma fonticola*) or any other aquatic fauna. Removal was then performed manually by hand with removed vegetation being captured in bags or skiffs, where access and conditions allow, to minimize non-native propagation by fragmentation. After collected vegetation was sorted, any native biota caught within was returned to the river, and the vegetation was disposed of at either the COSM or Spring Lake composting facility. The bycatch has been reduced significantly due to the shift in removal methods. Allowing large clumps of vegetation to float downstream before collecting it gives any biota time to escape. Removing smaller vegetation patches by hand into a mesh bag also results in almost no bycatch. The vegetation is still checked, but due to such reduction in numbers, bycatch is no longer reported.

Denuded areas (not due to recreation) with suitable habitat are typically replanted with native SAV species grown at the Texas State University raceways at the Freeman Aquatic Building. At the end of each month the number of individuals for each native SAV being maintained in the raceways were recorded to track inventory and assess stock in relation to work plans (**Table 1**). Native SAV species were selected for replanting based on habitat preference and corresponding suitability of denuded area. Efforts in the river were aimed at allowing for natural expansion of native stands, but if a native species is not present in an appropriate area, then raceway stocks will be used to introduce those species to that area. The 2022 Work Zones did receive several rounds of plantings that will continue into 2023 as those reaches transition into Recovery Zones.

Geographic area of removal, planting, and number of individuals of each species planted were tracked with polygons created in ArcMap and overlaid on georeferenced aerial imagery of the river. Using this data, estimates of area planted for each native SAV species were generated throughout the year to evaluate work progress (**Table 2** and **Table 3**). All data reported is from Jan 1st, 2022 – Oct 31st, 2022.

Table 1. Number of individual plants per species maintained each month in the raceways at the Freeman Aquatic Building through October 31st, 2022.

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct
Zizania	681	534	216	195	195	195	195	195	195	195
Ludwigia	2960	1980	1720	1400	600	600	600	600	600	1250
Potamogeton	0	0	0	0	0	0	0	0	0	0
Sagittaria	0	0	0	0	0	0	0	0	0	0
Cabomba	920	920	336	272	0	0	0	0	0	77

Hydrocotyle	0	0	0	0	0	0	0	0	0	0
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Native Planting and Non-Native Removal

Table 2. Number of individuals of each native species planted in the San Marcos River and planting effort (days) per reach in 2022. *denotes reaches that were designated as Work Zones in 2022. **Denotes planting not funded by the HCP

River reach	Designation	Species	N (individuals planted)	Area planted (m ²)	Effort (days worked)
Spring Lake	Restoration	No Planting	0	0	0
Spring Lake Dam	LTBG	No Planting	0	0	0
Sewell Park	Restoration	Ludwigia	470	24.3	1
Below Sewell Park	Restoration	No Planting	0	0	0
City Park	LTBG	Cabomba	77**	1.98	1
		Ludwigia	1250**	5.25	
Below City to Hopkins*	None	Ludwigia	1040	16.5	3
Hopkins/Snake Island*	Restoration	Cabomba	402	8.94	4
		Ludwigia	4104	244.96	
Bicentennial*	None	No Planting	0	0	0
Cypress Island	Restoration	No Planting	0	0	0
Rio Vista	None	No Planting	0	0	0
I-35 Upper	LTBG	No Planting	0	0	0
I-35 Lower	Restoration	No Planting	0	0	0
Total River		Ludwigia	5824	956.4	9
		Cabomba	479	35.22	

Table 3. Estimated area (m²) of non-native vegetation and floating non-native vegetation removed by reach in 2022. *Denotes reaches that were designated as Work Zones in 2022. **Denotes planting not funded by the HCP

River reach	Species	Area Removed (m ²)	Effort (days worked)
Spring Lake	Hydrilla	1.5	3
	Hygrophila	19.6	
	Ceratopteris	0	
Spring Lake Dam LTBG	Hydrilla	0	13
	Hygrophila	24.4	
	Nasturtium	7.8	
	Ceratopteris	9.0	
Sewell Park	Hydrilla	0.4	13
	Hygrophila	17.1	
	Nasturtium	90.4	
	Ceratopteris	35.6	
Below Sewell*	Hydrilla	8.7	26

	<i>Hygrophila</i>	19.4	
	<i>Nasturtium</i>	770.9	
	<i>Ceratopteris</i>	301.7	
City Park LTBG	<i>Hydrilla</i>	2.3	16
	<i>Hygrophila</i>	41.0	
	<i>Nasturtium</i>	48.8	
	<i>Ceratopteris</i>	15.2	
Below City to Hopkins*	<i>Hydrilla</i>	81.7	27
	<i>Hygrophila</i>	87.9	
	<i>Nasturtium</i>	24.8	
	<i>Ceratopteris</i>	12.4	
Hopkins/Snake Island*	<i>Hydrilla</i>	111.5	57
	<i>Hygrophila</i>	456.2	
	<i>Limnophila</i>	4.9	
Bicentennial*	<i>Hydrilla</i>	3958.7	62
	<i>Hygrophila</i>	728.5	
	<i>Limnophila</i>	10.3	
Cypress Island	No Removal	0	0
Rio Vista	No Removal	0	0
I-35 LTBG	No Removal	0	0
I-35 Lower	No Removal	0	0
Total River	<i>Hydrilla</i>	4164.8	217
	<i>Hygrophila</i>	1399.1	
	<i>Nasturtium</i>	942.7	
	<i>Ceratopteris</i>	373.8	
	<i>Limnophila</i>	11.6	

2022 LTBG and Restoration Reaches (Submersed Aquatic Vegetation Non-Native Removal and Native Planting Sites)

In 2019, aquatic vegetation treatment work plans were developed based on the new top-down strategy with a focus on thorough non-native removal, starting with the upper most sources. Vegetation treatment efforts included both the non-native removal and native planting starting in the upper most reaches, with planting being focus on LTBG (Long Term Biological Goal) and restoration reaches, both having target coverage goals for native species (Table 34). Native species approved for planting were *Ludwigia repens* (Ludwigia), *Cabomba caroliniana* (Cabomba), *Sagittaria platyphylla* (Sagittaria), *Potamogeton illinoensis* (Potamogeton), and *Hydrocotyle verticillata* (Hydrocotyle). The non-designated reaches that have historically not been treated are now part of the removal plan and often require a significant amount of effort to remove large areas of non-native SAV and restrict any regrowth. **Figure 2** shows all the reaches within the EAHCP area of responsibility.

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Figure 2. LTBG, restoration, and non-designated reaches for the 2022 work year.

Spring Lake

For 2022, Spring Lake was designated as a Maintenance Zone with limited removal. The continued maintenance of *Hygrophila* was the focus of effort. This removal mainly took place above the Eastern and Western spillways, but the entire lake was patrolled. Removal occurred on 3 days and resulted in the removal of 19.6 m² of *Hygrophila* and 1.5 m² of *Hydrilla*. *Hygrophila* is currently in a maintenance level within the lake and native SAV species are established. *Ludwigia* and *Cabomba* are continuing to expand in areas where *Hygrophila* has been removed, but Eurasian Milfoil continues to fill in those areas as well. The large native SAV patches above both spillways continue to contribute to downstream expansion through fragmentation with visible increases in the Spring Lake Dam reach. *Hygrophila* maintenance in Spring Lake requires occasional sweeps using a combination of SCUBA divers, snorkelers, and kayakers, focusing on areas with recent regrowth. Effort is limited to the minimum amount necessary to prevent *Hygrophila* from becoming reestablished or spreading downstream.

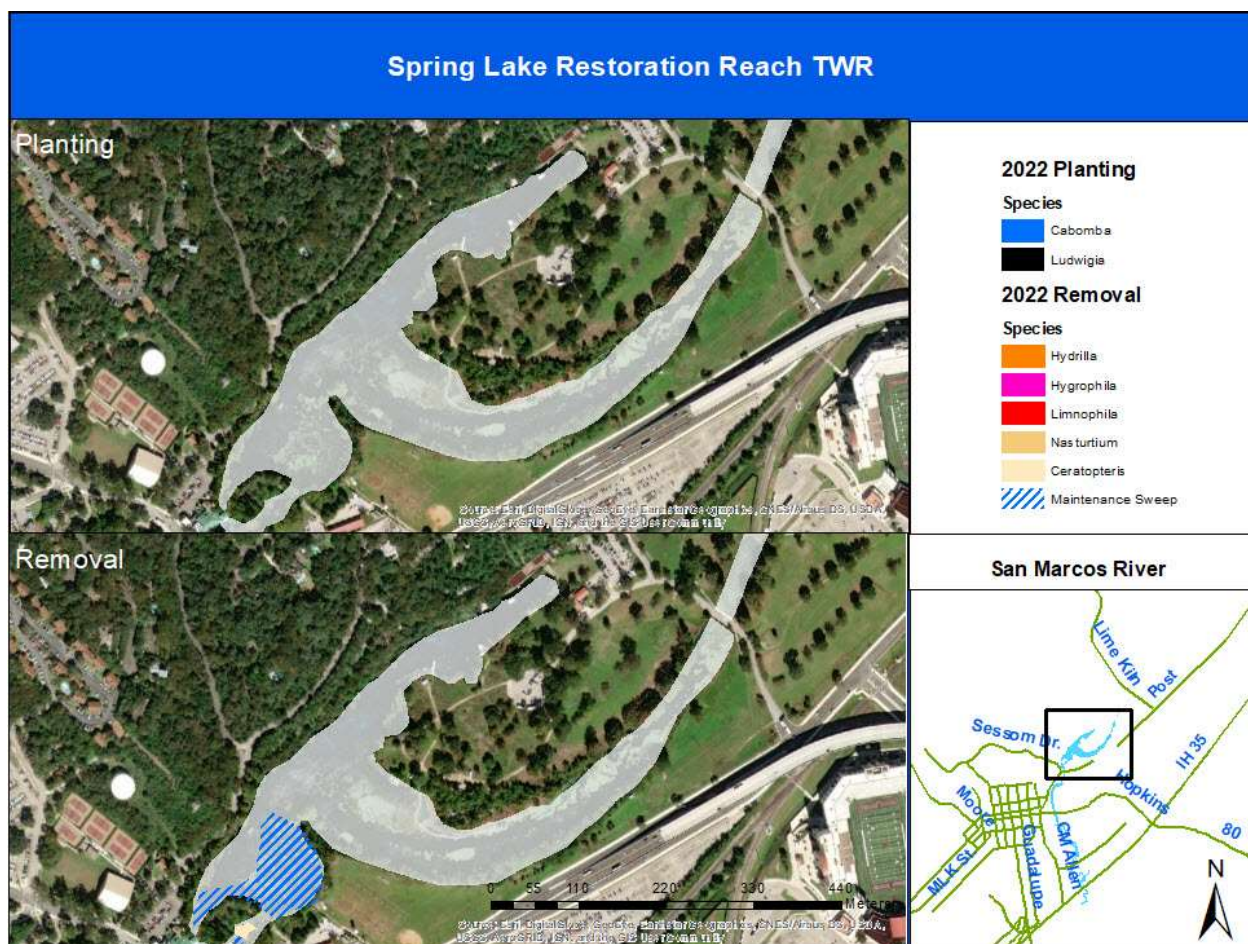


Figure 3. Locations of non-native vegetation removal and Texas wild-rice planting in Spring Lake restoration reach in 2022.

Spring Lake Dam LTBG Reach

Spring Lake Dam LTBG reach was designated as a Maintenance Zone for 2022 and required occasional maintenance to prevent non-native SAV regrowth. Vegetation treatment efforts occurred on 13 days during which approximately 24.4 m² of Hygrophila, 7.8 m² Nasturtium, and 9.0 m² of Ceratopteris were removed (**Figure 4**). No planting of native species occurred. Heavy recreation and low flows denuded large areas of Texas wild-rice along with other native plants and allowed non-native species to reinvade. Patches of Ludwigia, Cabomba and Sagittaria were observed throughout the reach but at reduced coverages. This reach will remain a Maintenance Zone in 2023.

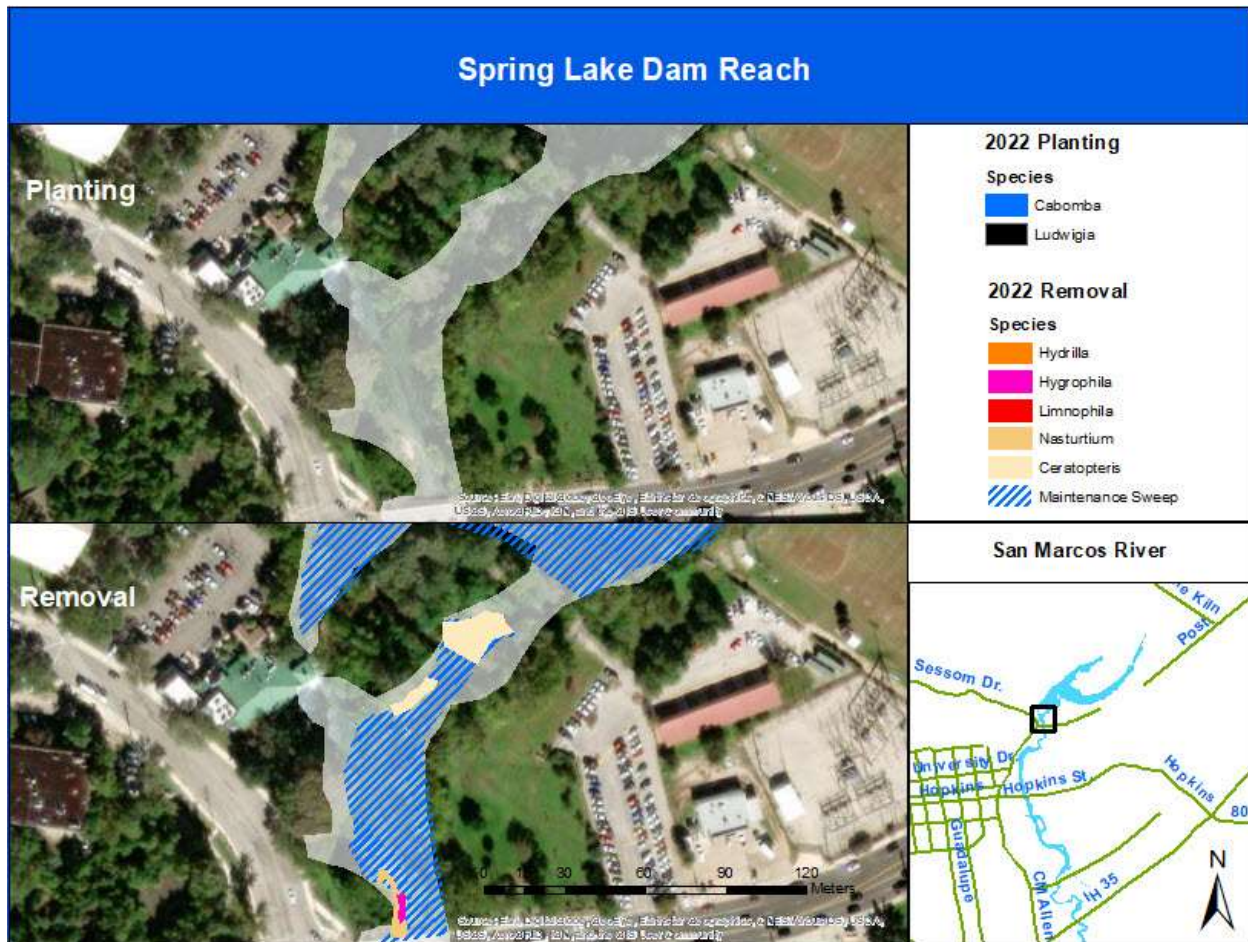


Figure 4. Locations of non-native vegetation removal in Spring Lake Dam LTBG reach in 2022.

Sewell Park Restoration Reach

The Sewell Park Restoration reach was designated as a Maintenance Zone in 2022 and required occasional maintenance to remove non-native vegetation growth within existing patches of native SAV. Non-native removal occurred on a total of 13 days during which approximately 0.4 m² of Hydrilla, 17.1 m² of Hygrophila, 90.4 m² of Nasturtium, and 35.6 m² of Ceratopteris were removed. Low flows during 2022 caused shallow areas of native SAV to be overtaken by other semi-aquatic species. Non-native floating vegetation also expanded during low flows. Planting effort to fill in gaps between Texas wild-rice plants consisted of 470 Ludwigia individuals. This reach will be a Maintenance Zone in 2023 and will continue to receive routine maintenance and limited non-Texas wild-rice SAV planting. **(Figure 5).**



Figure 5. Locations of non-native vegetation removal and native SAV planting in Sewell Park restoration reach in 2022.

Below Sewell Restoration Reach

The Below Sewell Restoration reach was designated as a Recovery Zone for 2022, having received heavy *Hygrophila* removal in 2021. Non-native removal was performed on a total of 26 days during with approximately 8.7 m² of *Hydrilla*, 19.4 m² of *Hygrophila*, 770.9 m² of *Nasturtium*, and 301.7 m² of *Ceratopteris* were removed. Low flows allowed for the significant expansion of non-native floating vegetation. *Nasturtium* and *Ceratopteris* denuded Texas wild-rice and other native species in shallow areas and required outside funding to control, which will continue into 2023. This reach will shift to a Maintenance Zone in 2023. (Figure 6).

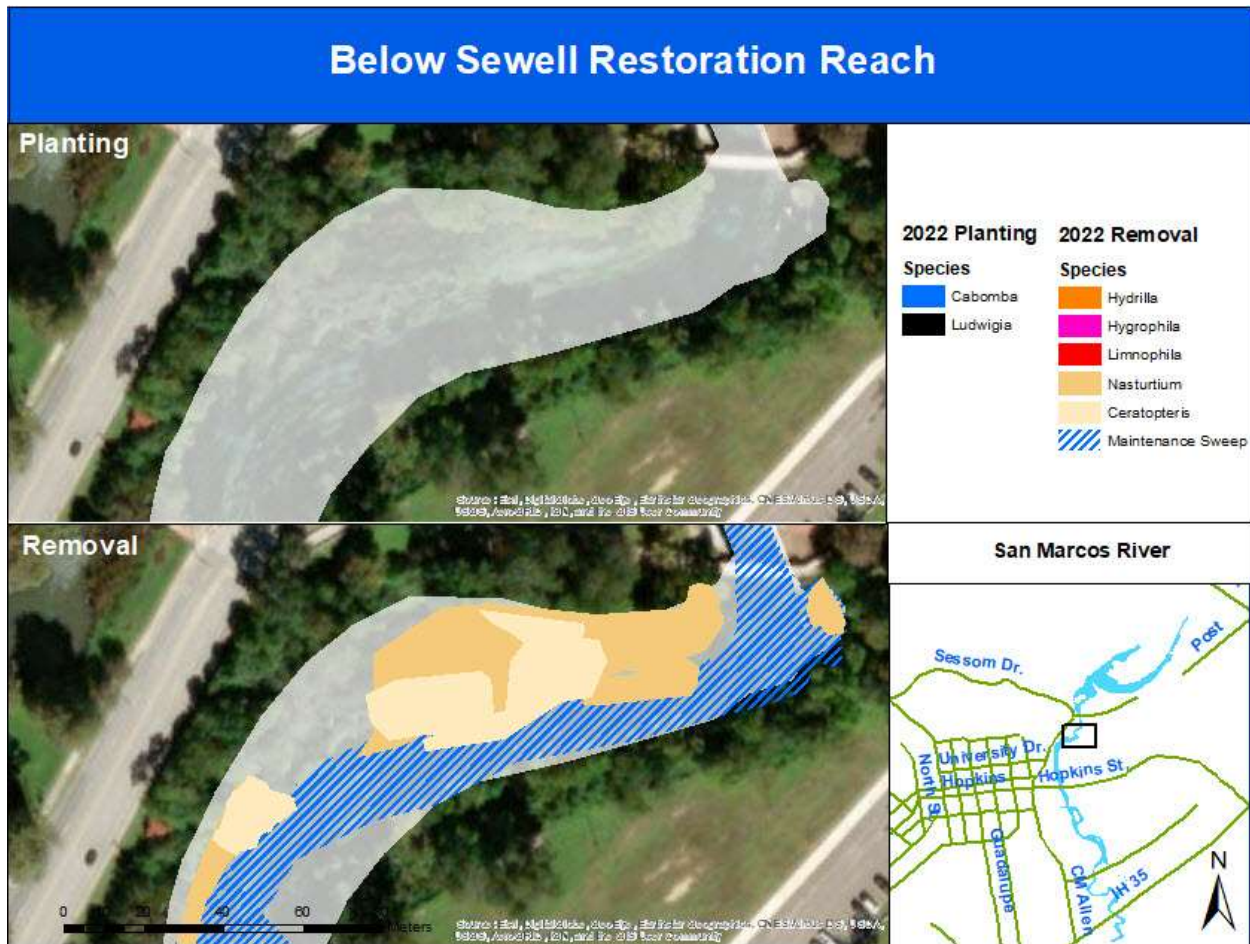


Figure 6. Locations of non-native vegetation removal and native SAV planting in Below Sewell restoration reach in 2022.

City Park LTBG Reach

The City Park LTBG reach was designated as a Recovery Zone for 2022, having received heavy *Hygrophila* removal in 2021. Non-native removal was performed on a total of 16 days during which approximately 2.3 m² of *Hydrilla*, 41.0 m² of *Hygrophila*, 48.8 m² of *Nasturtium*, and 15.2 m² of *Ceratopteris* were removed. Texas wild-rice was heavily denuded by recreation but is showing some recovery this Fall. Planting in the reach was done by non-HCP funded students focusing on the area just upstream of Dog Beach where native vegetation was lost during a construction event. Planting consisted of 1250 *Ludwigia* and 77 *Cabomba* individuals. This reach will be a Maintenance Zone in 2023. (Figure 7).

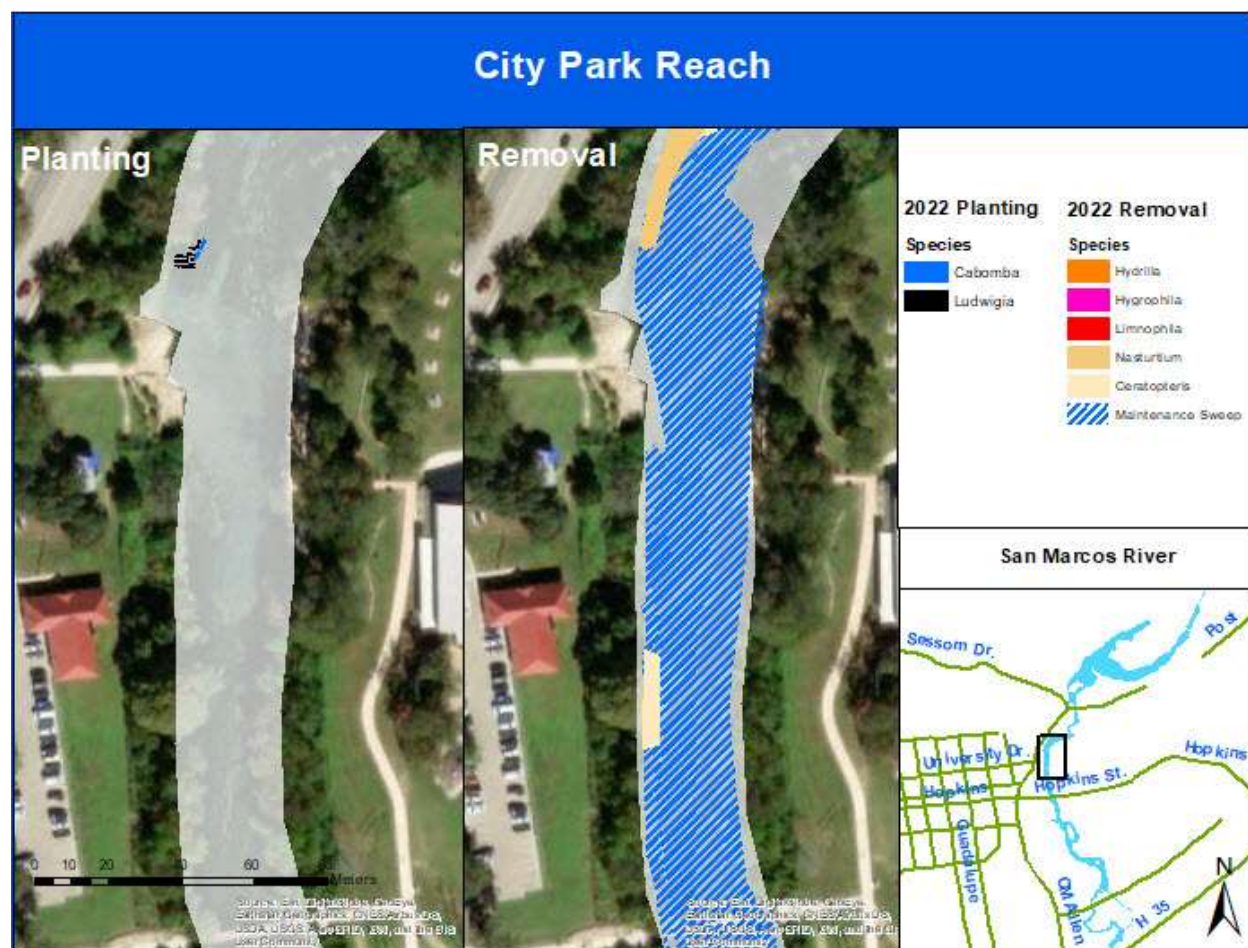


Figure 7. Locations of non-native vegetation removal and native SAV planting within City Park LTBG Reach in 2022.

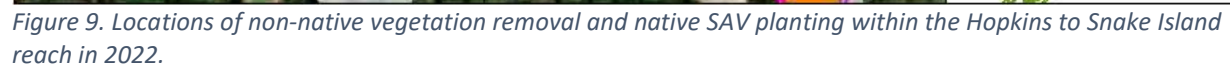
Below City to Hopkins

The Below City to Hopkins reach is a non-designated reach that was a Recovery Zone for 2022. Non-native removal was performed on a total of 27 days during which approximately 81.7 m² of Hydrilla, 87.9 m² of Hygrophila, 24.8 m² of Nasturtium, and 12.4 m² of Ceratopteris were removed. Planting effort focused on filling in areas where dense patches of Hygrophila were removed to promote SAV diversity. A total of 1040 Ludwigia individuals were planted. Texas wild-rice along with other native plants were denuded by heavy recreation but some recovery is expected from October to March. This reach will be a Maintenance Zone in 2023. **(Figure 8).**



Figure 8. Locations of non-native vegetation removal and native SAV planting within Below City to Hopkins reach in 2022.

The Hopkins to Snake Island restoration reach was designated as a Recovery Zone in 2022. Non-native removal was performed on a total of 57 days during which approximately 111.5 m² of Hydrilla, 456.2 m² of Hygrophila, and 4.9 m² of *Limnophila sessiliflora* (Limnophila) were removed. Total planting consisted of 4104 Ludwigia and 402 Cabomba individuals. Cabomba and Ludwigia have significantly expanded in the reach due to a combination of the plantings and natural expansion in areas cleared of Hydrilla and Hygrophila. The 2023 work plan will focus on continued recovery of the entire area and an increase in native SAV planting as necessary. This reach will switch to a Maintenance Zone in 2023. **(Figure 9).**



Bicentennial

The Bicentennial reach, a non-designated reach, was the primary Work Zone in 2022. SAV coverage in this reach was almost entirely Hydrilla. Bulk removal efforts began early in 2022 and were completed before the implementation of Condition M protocols. Non-native removal was performed on a total of 62 days during which approximately 3958.7 m² of Hydrilla, 728.5 m² of Hygrophila, and 10.3 of Limnophila were removed. Significant expansion of Cabomba and other native species have been observed in areas cleared of Hydrilla. No planting occurred in this reach for 2022. This section will become a Recovery Zone in 2023. (Figure 10).

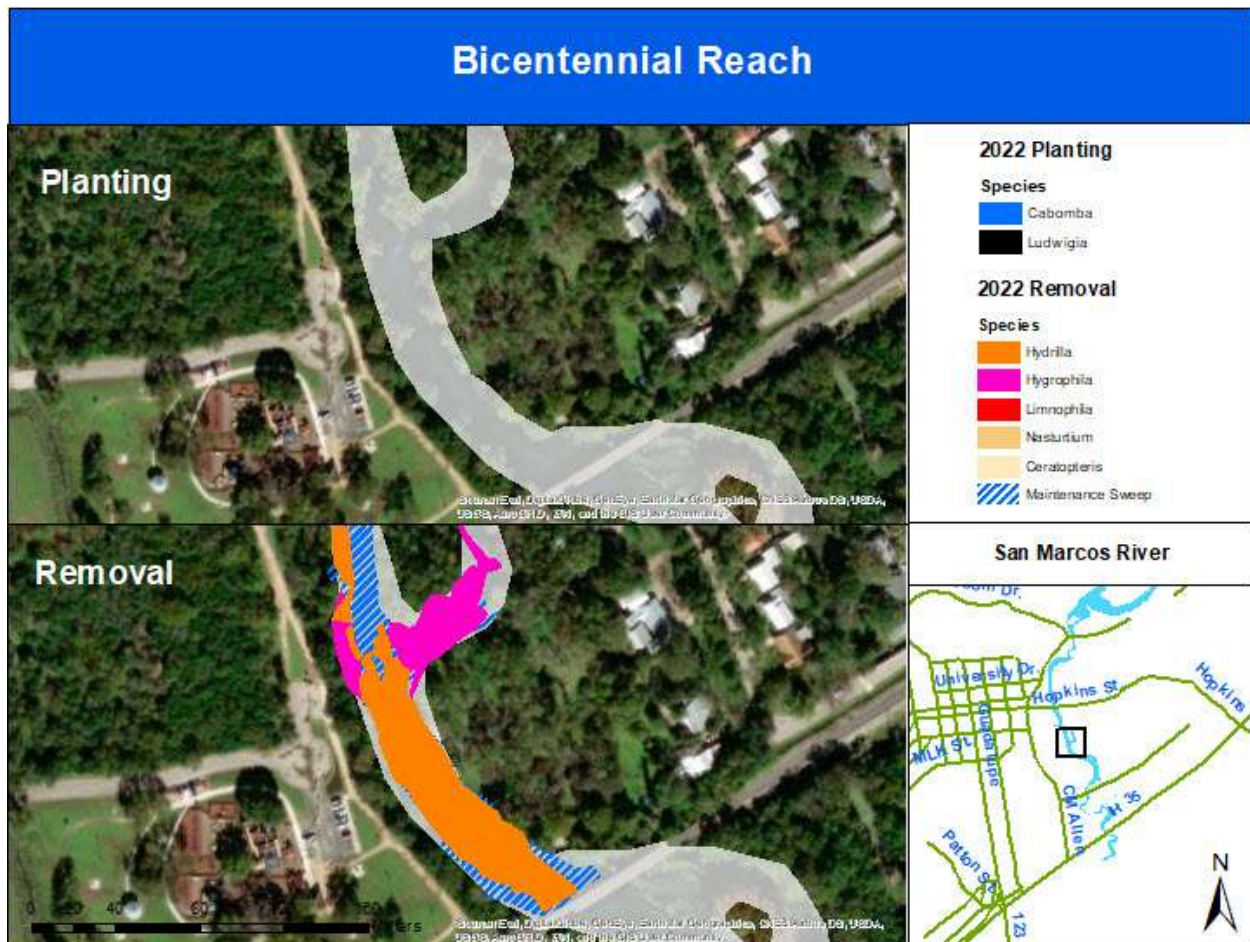


Figure 10. Locations of non-native vegetation removal and native SAV planting within the Bicentennial reach in 2022.

Cypress Island

Cypress Island reach is a restoration reach but will become a designated Work Zone in 2023. While no efforts were made to this section of the river during the 2022 work season, observations regarding native SAV were noted throughout this period. Hydrilla dominates the area but Texas wild-rice, *Heteranthera*, and *Cabomba* are present.

Rio Vista

The Rio Vista reach will be a designated Work Zone in 2023. No removal or planting effort took place within this reach 2022.

IH-35 Upper LTBG Reach

The IH-35 Upper LTBG reach will be a designated Work Zone in 2023. No removal or planting effort took place within this reach 2022. Texas wild-rice and other natives have been observed expanding in this reach.

IH-35 Expanded Restoration Reach

The IH-35 Expanded reach will be a designated Work Zone in 2023. No removal or planting effort took place within this reach 2022. Texas wild-rice and other natives have been observed expanding in this reach.

Below IH-35 Reach

No removal or planting effort took place within the Below IH-35 reach in 2022. This reach will be designated as a Recovery Zone in 2023 but effort will be focused on upstream progress before any work occurs in this reach.

Vegetation Mat Removal (EAHCP 5.3.3)

EAHCP Obligations:

The COSM will partner with Texas State University to develop and implement a floating vegetation mat removal program reaching from Spring Lake downstream to the city boundary. Floating vegetation mats will be removed primarily from Texas wild-rice stands to keep the mats from interfering with photosynthesis and slowing current velocity.

2022 Compliance Actions:

Vegetation Mat Removal

Vegetation mats were removed from Texas wild-rice stands from Spring Lake to Snake Island in 2022. Approximately 10,311.8 m² were removed from in and around Texas wild-rice over 31 days throughout 2022 (**Figure 11**). The areas of focus were the SSA's due to denser populations of Texas wild-rice collecting more vegetation mats. Observationally, Spring Lake operations, primarily harvester activities, directly influences the amount of effort required to remove vegetation mats. Vegetation mat accumulation was observed to decrease as flows dropped during 2022. Increased channelization or possibly a decreased harvesting effort may have contributed to this. Recreation and floating non-native vegetation denuded large areas of Texas wild-rice which may also have contributed to less vegetation mat build up on Texas wild-rice stands.

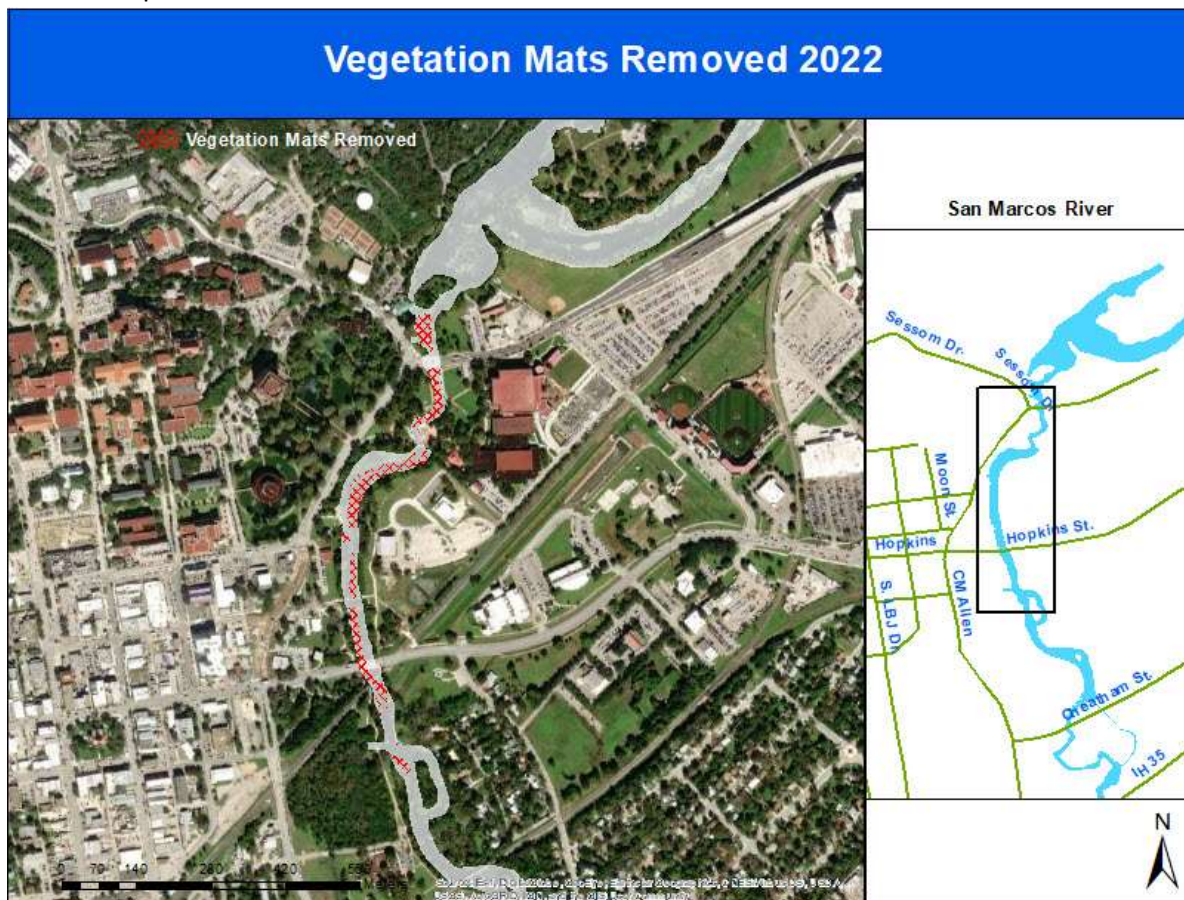


Figure 11. Vegetation mat removal in 2022.

2022 Summary

The top-down removal strategy continues to be successful and allows for focused effort and maintainable progress. Texas wild-rice and other native species have expanded in areas where Hydrilla and Hygrophila have been removed, and only require planting in large, denuded areas (**Figure 12**). Regular maintenance of treated areas is essential to this expansion, and with continued downstream progress, the amount of maintenance effort required increases each year with the continual addition of Work Zones. Upper reaches that have already reached this level of maintenance require removal sweeps approximately once a month with some focus areas requiring a few additional days per month. The additional stress imposed by low flows and increased recreation has allowed for non-native SAV species to become re-established in areas previously cleared of these species. Some areas have remained clear for years, but due to these increased stresses on the native SAV, non-natives have begun to move in or regrow from buried tubers.

Recreation, floating non-native species, and low flows contributed to losses of Texas wild-rice and other native SAV. Areas less affected by recreation saw expansion of native species especially in between Hopkins Street and Snake Island (**Figure 12**). A combination of non-native maintenance and native planting was very successful in the reach.

Hydrilla removal occurred in the Bicentennial reach in 2022. This reach consisted of a large, dense area of non-native vegetation that was removed on an expedited timeline. Low flows, resulting in the implementation of Condition M protocols, were expected so increased effort was made to finish bulk removal efforts while flows were still above Condition M levels. This resulted in a large, denuded area of approximately 2,100 m² that contained a significant amount of Hydrilla tubers, requiring regular sweep dives every few days to prevent regrowth. Even though maintenance is still ongoing in this area, native plants have begun to expand. Texas wild-rice and Cabomba are expanding in the Bicentennial reach but Ludwigia, Heteranthera, and Sagittaria are also becoming established to a lesser degree (**Figure 13 & 14**). Planting in this reach will commence when Condition M protocols end.

Vegetation mat removal efforts continue to be focused on SSA's and the large, dense stands of Texas wild-rice in Spring Lake Dam, Sewell Park, and Below Sewell reaches. The amount of vegetation mat buildup depends on the activities in Spring Lake and how much Ceratophyllum is discharged during those activities. There has been a notable increase in other floating vegetation, mostly Nasturtium and Ceratopteris, building up on those same Texas wild-rice stands, mainly Below Sewell Park. Both plants tend to form dense mats that harm Texas wild-rice and restrict flows. Outside funding was needed and likely will continue to be necessary to suppress Nasturtium and Ceratopteris in the upper sections of the river. Without an effort to control the source populations of these species, an increase in effort will be required to prevent negative impacts to Texas wild-rice.

Our crew continues to utilize Texas State University students paid through a federal work-study program along with volunteers. This allows for a larger crew size making large scale removal more efficient and expands the area that can be covered during maintenance sweeps. These students are also primarily responsible for maintaining the supply of native SAV plants at FAB for planting in Recovery Zones.



Figure 12. Hopkins Street to Snake Island restoration reach removal and planting progress in 2022. Before treatment (left, 2020), after treatment and initial planting, and progress of native SAV expansion (right, Nov 2022).



Figure 13. Expansion of Texas wild-rice and Cabomba in the right channel adjacent to Snake Island (left, Feb 2022, right, Nov. 2022).



Figure 14. An aerial view of the 2022 work zone (left, pretreatment, right, Nov. 2022).

Proposed Activities for 2023

For 2023, the aquatic vegetation treatment work plan continues the strategy of top-down removal for non-native SAV. Effort will focus on maintaining the upper reaches, removing regrowth from the 2022 work zone, and planting within the 2022 work zone. Secondly, bulk removal within the 2023 Work Zone will occur on days where weather and crew size allow, as it requires both SCUBA divers removing large areas of Hydrilla along with several crew members pulling the Hydrilla out downstream at the Cypress Island bridge or Rio Vista Dam. Sections of 400-600 m² will be removed at a time allowing for several subsequent days to remove roots and regrowth before moving downstream. All disturbance will be tracked and be limited to the permitted amount. Control of Nasturtium and Ceratopteris will continue to be an extra task and outside funding will again be necessary for this work. Condition M protocols are still in place and will determine what efforts we will be allowed to focus on during 2023.



Appendix I2 | **Management of Recreation in Key Areas**

EAHCP Management of Public Recreation (EAHCP Section 5.3.2/ 5.4.2)

2022 Overview and Summary of Activities

City of San Marcos/ Texas State University

Management activities associated with public recreation in the San Marcos River system per EAHCP Sections 5.3.2 & 5.4.2 is conducted to help minimize impacts to threatened and endangered species and their habitat in the river. In 2022, management of river recreation included the following activities:

Conservation Crew

In 2022, the City of San Marcos (CoSM), through Texas State University (TXST), hired part-time staff to patrol and monitor the upper San Marcos River, assist with EAHCP-related activities, educate river visitors of the EAHCP and promote good stewardship of the San Marcos River.

In 2022, nine part-time staff worked during the peak recreation season (May-Aug) and between 2-5 staff during the off-season. On average each staff person worked approximately 15/ hrs. per week with a total of approximately 3,900 hours worked in 2022. An orientation is provided to the Conservation Crew to familiarize them with the EAHCP, park rules and daily duties. The Conservation Crew utilizes a Daily Checklist (**Attachment 1**) to guide their daily activities as they patrol the main recreation area of the portion of the river between Sewell Park and IH-35. COSM staff manages the Conservation Crew and coordinates scheduling.

The conservation crew engages with river visitors and provides them with information on the EAHCP, threatened and endangered species, park rules and good river stewardship practices. A focus of the education is on protection of Texas Wild-Rice (TWR) and aquatic vegetation in the river and why visitors should strive to avoid or minimize disturbance of aquatic vegetation. The Conservation Crew tracks the number of conservations held with river visitors and in 2022 a total of 2,403 conversations were held.

The Conservation Crew routinely collects litter from the river and adjacent parks as they patrol the river. In 2022, the Conservation Crew collected a total of 3,162 ft³ of litter from the river, that includes the volume of litter emptied from “litter collection boats”, and 1,353 ft³ of litter from City Parks.

The Conservation Crew also assists with native riparian plantings and with the set-up, monitoring, and maintenance of TWR exclusion barriers.

Signage

In November 2022, the Edwards Aquifer Authority (EAA) and the COSM, in coordination with TXST & Texas Parks and Wildlife Department, installed regulatory signage that effectively restricts access to the Eastern Spillway of the San Marcos River below Spring Lake Dam for the protection of vulnerable flora and fauna. The signage includes one large sign that cites applicable state law and three smaller signs that depict the threatened San Marcos salamander, the endangered

fountain darter and endangered TWR. **Figure 1** shows the installed signage in the Eastern Spillway area.

The 31 Texas Administrative Code 57.910 grants the ability to restrict access to certain portions of the San Marcos River when flows are under 120 cubic feet per second (cfs) in order to protect flora and fauna during these low-flow periods when vulnerable species are more susceptible to recreational impacts. Exclusion barriers and signage have previously been placed in the upper San Marcos River to help protect Texas wild-rice and can also be used to protect vulnerable wildlife species such as the federally-protected endangered fountain darter fish and San Marcos salamander.



Figure 1. Signage installed within the Eastern Spillway area of the San Marcos River

In coordination with the EAA, CoSM installed EAHCP educational signage at City river parks that include Ramon Lucio Park (1), Rio Vista Park (2), Bicentennial Park (2) and City Park (1). The signage helps to inform river and park visitors of the EAHCP, threatened/ endangered species and protection initiatives. **Figure 2** shows an example of the education signage installed in 2022.



Figure 2. Example of EAHCP signage installed in 2022. This sign was installed in Bicentennial Park and informs park visitors of EAHCP riparian restoration work and the importance of a healthy riparian zone buffer.

Installation of enclosures around defined State Scientific Areas

In July 2022, as San Marcos River flow decreased below 120 cfs, the Conservation Crew installed the TWR exclosures and buoys around the defined State Scientific Areas that have been established to protect TWR stands during low-flow periods. **Figure 3** shows the location of the TWR protection zones, and **Figure 4** shows examples of the installed protection zones. The Conservation Crew routinely monitored and maintained the exclosures throughout 2022. The exclosures remained in place from July-December 2022 and will remain in place until river flow increases above 120cfs.

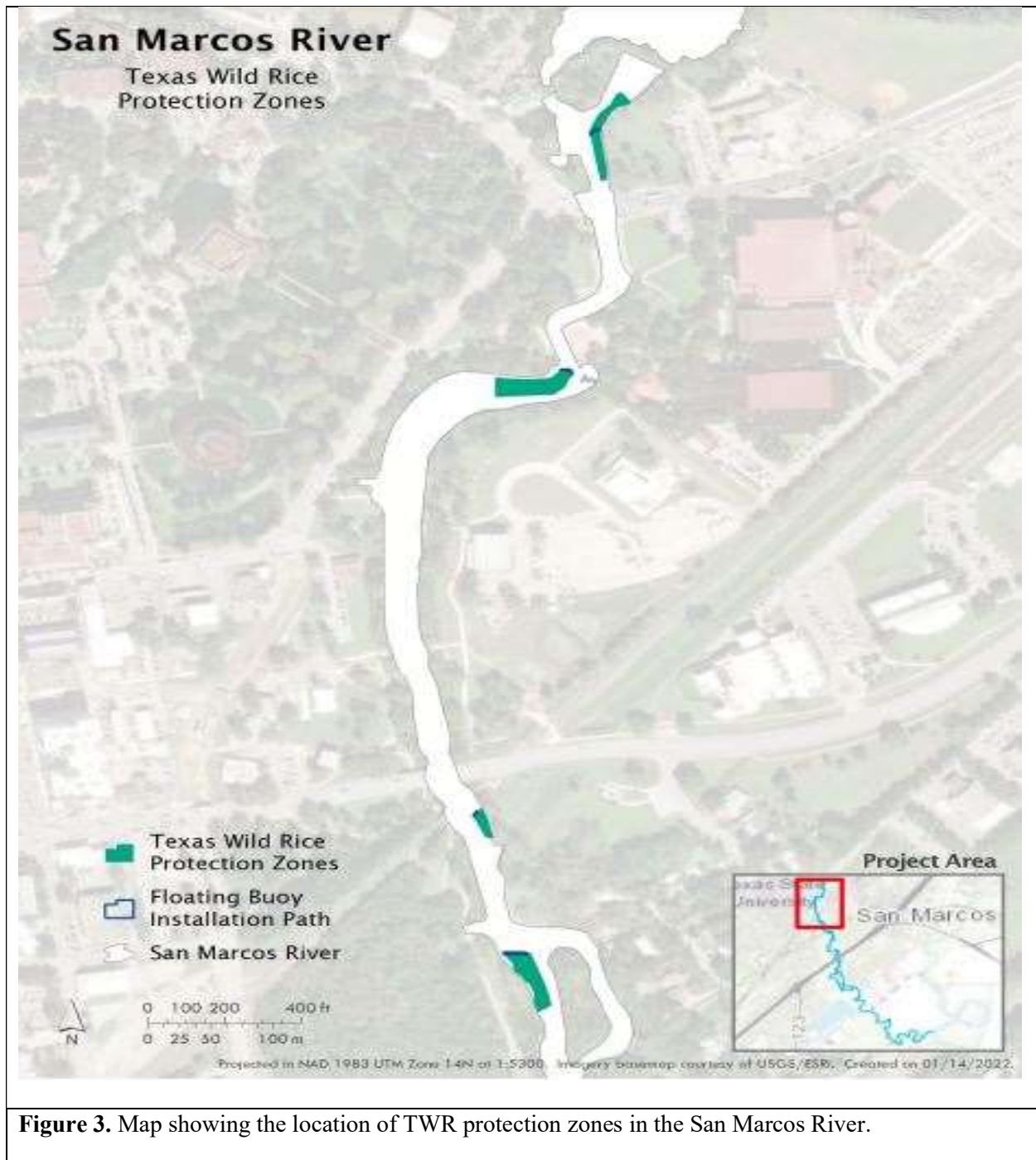


Figure 3. Map showing the location of TWR protection zones in the San Marcos River.



Figure 4. Photos showing the buoys, signage and exclosures that were installed to denote the TWR protection zones in the San Marcos River. The photo on the upper left is in the river immediately downstream of the Hopkins St. bridge, photo on the right is immediately downstream of Sewell Park, photo on bottom left is at Bicentennial Park and photo on bottom right is the Conservation Crew installing the exclosure and buoys.

Attachment A: EAHCP Conservation Crew Daily Task Report/ Checklist

Daily Tasks - Monitoring the River 2022

*Inform and educate the public - i.e. endangered species that inhabit the river (focus on TWR)

*Give park information and directions when needed



<input type="checkbox"/>	Report any suspicious activity to SMPD and Park Rangers (or Kat/Tiffani/Eric)
<input type="checkbox"/>	Pick up litter and trash along trails
<input type="checkbox"/>	Remove/push along any floating vegetative mats
<input type="checkbox"/>	Remove any accessible floating litter from the river
<input type="checkbox"/>	Inspect the fences/barriers: report holes, tears, and/or any structural issues <u>Notes:</u> _____
<input type="checkbox"/>	Report any people behind the fence/barriers <u>Notes:</u> _____
<input type="checkbox"/>	Inspect HCP signs - remove and report graffiti <u>Notes:</u> _____
<input type="checkbox"/>	Empty out trash boats every shift <u>Notes:</u> _____
<input type="checkbox"/>	Make note of any problem areas along the river* <u>Notes:</u> _____
<input type="checkbox"/>	Survey the TWR population – impacts and document people or dogs in TWR stands <u>Notes:</u> _____
<input type="checkbox"/>	Survey and maintain SSA's - keep clear of vegetative mats and build up <u>Notes:</u> _____
<input type="checkbox"/>	<u>Comments:</u> _____

LITTER COUNTS:

of bags from river: _____

of conversations: _____

of bags from parks: _____



Appendix I3 | Litter Removal

City of San Marcos & Texas State University EAHCP Litter Management Summary (EAHCP Sections 5.3.3 & 5.4.3)

2022

Litter is collected from within the San Marcos River from Spring Lake to Stokes Park on a year-round basis. Although litter collection activities occur year-round, efforts are focused during the river recreation season (approx. May-Sept). The entire portion of the river from Spring Lake to Stokes Park is cleaned once per month during the non-recreation season and weekly during the recreation season. Funding for litter collection efforts comes from both the EAHCP program and the City of San Marcos. The volume of litter collected in 2022 is summarized below in **Table 1** and **Figure 1**.

Table 1. Volume of litter collected, per reach, from the San Marcos River in 2022.

2022 Litter Removed (ft³)				
	Clear Springs to City Park	City Park to IH35	IH35 to Stokes	Grand Total
January	0.00	0.00	0.00	0.00
February	0.27	6.70	5.36	12.33
March	0.67	2.68	10.72	14.07
April	0.54	5.36	2.68	8.58
May	0.80	17.42	9.38	27.60
June	0.27	24.12	24.12	48.51
July	0.27	25.46	21.44	47.17
August	0.00	25.46	29.48	54.94
September	0.80	12.06	42.88	55.74
October	0.54	2.68	2.68	5.90
November	0.00	8.04	8.04	16.08
December	0.27	24.12	21.44	45.83
Total	4.42	154.10	178.22	336.74

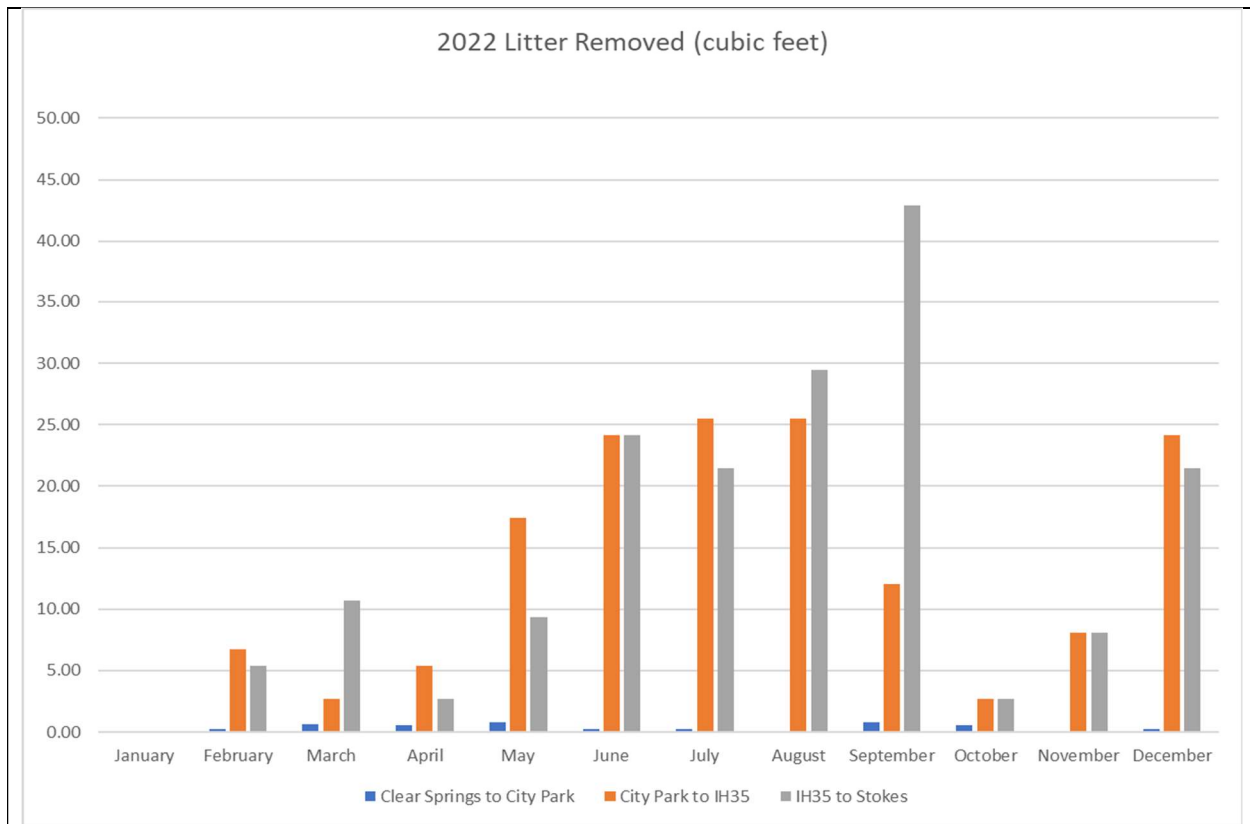


Figure 1. Volume of litter collected, per month, from the San Marcos River in 2022.



Appendix I4 | **Non-Native Littoral Plant Removal**

EAHCP Non-Native Littoral & Riparian Vegetation Management

EAHCP Section 5.3.8

2022 Annual Report – EBR Enterprises

In 2022, non-native riparian/ littoral vegetation removal efforts consisted of treatment of invasive, exotic vegetation along the San Marcos River from above Bert Brown Road (upstream of Spring Lake) to IH-35. Removed non-native species included: Brazilian Vervain, Caribbean Lantana (and hybrids), Cat's Claw Vine, Chinaberry, Chinese Elm, Chinese Privet, Chinese Tallow, Eleagnus sp., Elephant Ears, English Ivy, Japanese Honeysuckle, Johnson Grass, Ligustrum, Limnophila, Nandina, Parrot's Feather, Periwinkle, Purple Trailing Lantana, Umbrella Sedge, Vasey Grass, Water Hyacinth, and Wisteria. While non-native treatment occurred throughout the San Marcos River from Sink Creek to IH-35, focus areas included locations around Spring Lake & in lower Sink Creek (**Figure 1**).



Figure 1. 2022 Non-native littoral vegetation management focus areas

Elephant Ears are still in a maintenance state from above Bert Brown Street to I-35. Two maintenance runs were performed on the water from Sewell Park to Ramon Lucio Park and one partial run in the Snake Island area in 2022. Numerous patrols were performed on foot, along the banks of the river in Crook Park, Ramon Lucio Park, Rio Vista Park, Bicentennial Park, Veramendi Park, City Park, and Sewell Park. Other invasive, exotic plant species that were encountered in these areas were targeted as well. Elephant Ears and Parrot's Feather were also treated in the lower section of Purgatory Creek. Elephant Ears were treated on Spillway Island just below Spring Lake. Lower numbers of Elephant Ears were treated in the Wetland Boardwalk area of the Spring Lake slough arm and very scattered areas of Sink Creek and Spring Lake.

A first pass run on the Cypress Point area of Spring Lake was finally completed in 2022. This had been one of the worst remaining seed sources for Ligustrum, Chinese Tallow, and Chinaberry. Two completely hidden stands of Elephant Ears were also found and treated. The massive amount of cut debris here and from work on the Hillside Trails area sparked some requests for removal. This was understandable as those areas had huge specimen trees and shrubs to remove, and no one had ever addressed these spots. A number of days in 2022 were spent on loading trailers and taking the cut debris to be recycled. Now, the debris removal is part of the work when dispersal is not enough or possible.

This did slow down some progress on the Hillside Trails area of the Meadows Center, but efforts resumed throughout the latter part of 2022. Cat's Claw Vine, Nandina, Periwinkle, and Purple Trailing Lantana were targeted with several runs through infested areas. It is now thought that this area may be the seed source for the Cat's Claw Vine plants that can be found in small numbers downstream. This is really important to remove as it does smother trees and prevents new tree and shrub seedlings from sprouting and growing.

Enough effort was spent in 2022 to finally create a decent buffer of restored habitat in Upper Sink Creek. The area of Upper Sink Creek near Bert Brown Street has been long known to be one of the worst seed sources in San Marcos for invasive, exotic plants. In the early years of the EAHCP work, Elephant Ears existed here in huge numbers. Those are now down to 1 or 2 found every once in a while. Chinese Tallow, Japanese Honeysuckle, and Ligustrum have also been greatly reduced. This was the removal of mostly seedlings and saplings, but many large, seed producing specimens have been cut and treated. This is already reducing the number of seedlings to be found in more critical habitat at the Meadows Center.

Chemicals (herbicides) were applied with a 1- or 2-gallon pump-up sprayer, set on a steady stream for a more precise target hit, to minimize leaching and non-target plant damage. The sides of stumps and root flares of woody plants were scarred up with a machete or other blade to expose more of the cambium layer and then treated with herbicide.

The herbicide mixtures applied to non-native vegetation in 2022, and to be used in 2023, include:

Tree and Shrub Mix: Vastlan at 5 oz per gallon, mixed with Aquastar at 5 oz per gallon. Aqua King Plus Surfactant at 1 oz per gallon, and Turf Mark Blue, blue dye, at 1 oz per gallon. This mix can be used anywhere as both herbicides can be applied in wetland or upland areas.

Sensitive Mixes: These are basically weaker versions of the Tree and Shrub Mix. Vastlan at 1-2.5 oz per gallon, Aquastar at 2.5 oz per gallon, Aqua King Plus Surfactant at 1 oz per gallon, and Turf Mark Blue, blue dye at 1 oz per gallon. This can be applied in wetland or upland areas.

Aquatic Mix: Clearcast at 6 oz per gallon, mixed with Aqua King Plus Surfactant at 1 oz per gallon, and Turf Mark Blue, blue dye, at 1 oz per gallon.

Five “new” areas are proposed to be targeted in 2023: An island in the river at I-35, Snake Island, Upper Sewell Park, Freeman Aquatic Center Ponds, and Spillway Island. All five of these areas have many invasive, exotic plants of several species and remain as seed sources for potential recolonization of other work areas.

In addition to maintenance runs throughout the entire system, EBR Enterprises will continue to reduce the populations of Cat’s Claw Vine and Purple Trailing Lantana within the Hillside Trails area of Spring Lake. A heavy mop up run is slated for most of Sink Creek, with the main focus being the Cypress Point area. Japanese Honeysuckle will also be targeted again along the creek. A smaller amount of effort will be used to maintain and enlarge our Upper Sink Creek work areas. Known remaining seed source, specimen trees on University Property will be addressed or discussed.

Remaining San Marcos River headwater areas to be treated after 2022 removal efforts.

Blue – Cat's Claw Vine (Hillside Trails Area), Chinaberry, Chinese Tallow, Ligustrum and/or other invasive, exotic, woody species. **Purple** – Possible Future Expansion

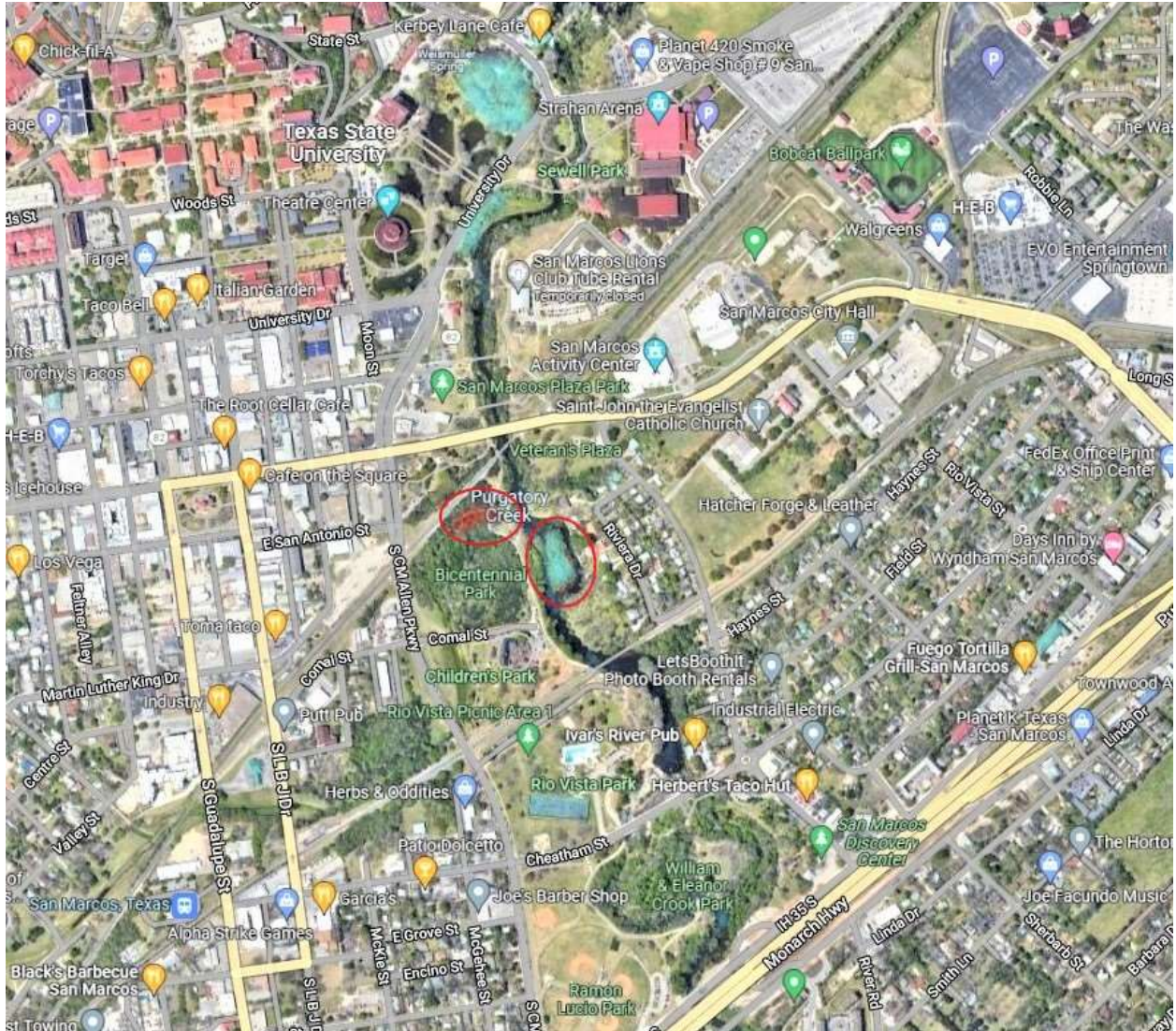
Red – Areas that Were Worked on in 2022 (other than maintenance runs)



Remaining San Marcos River areas to be treated after 2022 removal efforts.

Blue- Chinaberry, Chinese Tallow, Ligustrum and/or other invasive, exotic, woody species.

Red – Principal Areas of Focus in 2022 – Please Note: Other Than Regular Maintenance Runs, Our Activities in These Areas Were More Limited Due to the USACOE Project





Appendix I5 | **Control of Non-Native Animal Species**

EAHCP Control of Non-Native & Predator Species (EAHCP Sections 5.3.9 & 5.4.13)

2022 Overview and Summary of Activities

City of San Marcos/ Texas State University

Summary

In 2022, non-native fish and aquatic species were managed in the San Marcos River system in order to minimize direct and indirect impacts to threatened and endangered species. As in previous years, the species targeted for removal included tilapia, suckermouth armored catfish, sailfin catfish and non-native snails.

Removal of these species was conducted primarily by polespearing and spearfishing with the addition of limited bowfishing. Spearfishing was conducted regularly throughout the year in various locations throughout the river system including river segments from Spring Lake Dam to Rion Vista Falls and from Capes Dam to Stokes Park. Spearfishing was also conducted in Spring Lake.

Non-native removal efforts were supported by polespear tournaments in which the general public was invited to participate by competing with other participants to remove as many tilapia and suckermouth armored catfish as possible over a two-week period. Two polespear tournaments were held in 2022.

Results

A total of 1,548 suckermouth armored catfish, 4 sailfin catfish and 372 tilapia were removed from the San Marcos River system in 2022. This equated to the removal of 1,734 lbs of biomass from the river system.

All removals were from the portion of the river system between Spring Lake and Stokes Park. Most of the tilapia were removed from Spring Lake and catfishes from the river. The February polespear tournament yielded removal of 404 suckermouth armored catfish, 1 sailfin catfish and 12 tilapia. The November polespear tournament yielded the removal of 460 suckermouth armored catfish, 1 sailfin catfish and 13 tilapia. All other removals were a results of routine spearfishing efforts. The total number of hours spent on non-native removal efforts was approximately 650 hours.

Detailed non-native removal data for 2022 is included in **Attachment 1**.

Attachment 1. 2022 Non-Native Species Removal Data

Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
1/1-31/2022	Office	59.2105263	Tournament Programming						
1/9/2022	Spring Lake Dam to Rio Vista Falls	1	Bounty	12	8.34				
1/11/2022	Spring Lake	8	Spearfishing					18	68.27
1/17/2022	Bounty	1	Bounty	10	6.45			1	0.63
1/17/2022	Rio Vista Falls to Capes Dam	1	Bounty	19	6.66				
1/17/2022	Rio Vista Falls to Capes Dam	1	Bounty	7	3.32				
1/17/2022	Spring Lake	8	Spearfishing					6	18.76
1/21/2022	Rio Vista Falls to Capes Dam	1.5	Bounty	27	9.24				
1/21/2022	Rio Vista Falls to Capes Dam	1	Bounty						
1/21/2022	Spring Lake	8	Spearfishing			1	4.44	16	31.19
1/27/2022	Spring Lake Dam to Rio Vista Falls	0.5	Bounty						
1/27/2022	Spring Lake	8	Spearfishing					8	30.95
Jan Totals		98.2105263		75	34.01	1	4.44	49	149.8
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
2/11/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	16	7.24				
2/11/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	22	10.95			1	0.31
2/11/2022	Capes Dam to Stokes Park	0.3	Tournament Programming	33	8.572				
2/11/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	1	0.13				
2/11/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	2	0.69				
2/12/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	1	0.94				
2/12/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	2	0.88				
2/12/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	2	1.38				
2/13/2022	Capes Dam to Stokes Park	0.3	Tournament Programming	42	13.114				
2/13/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	21	5.75				
2/13/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	15	5.27	1	2.88	1	0.024
2/13/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	2	0.06				
2/14/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	4	0.76				
2/14/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	6	1.63				
2/14/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming					1	2.44
2/15/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	7	2.57				
2/15/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	14	8.45			1	1.44
2/15/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	5	1.31				
2/15/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	17	5.52				
2/16/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	1	0.006			4	10.01
2/16/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	8	4.39				
2/17/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	3	0.63				
2/17/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	15	4.65				
2/17/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	1	1.13				
2/18/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	4	1.19				
2/18/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	22	12.878				
2/18/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	2	1.25				
2/18/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	2	0.69				
2/18/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	2	2				
2/19/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	9	2.7				
2/19/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	10	4.39				
2/19/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	7	4.19				
2/19/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	8	2.56				
2/19/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	2	1.56				
2/20/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	9	3.21				
2/21/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	12	4.902			1	1.38
2/21/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	14	5.39				
2/22/2022	Capes Dam to Stokes Park	0.25	Tournament Programming	1	0.31				
2/22/2022	Capes Dam to Stokes Park	0.25	Tournament Programming					3	6.94
2/22/2022	Spring Lake Dam to Rio Vista Falls	0.25	Tournament Programming	9	6.12				
2/26/2022	Capes Dam to Stokes Park	0.5	Tournament Programming	51	19.032				
2/4/2022	Spring Lake	8	Spearfishing					15	43.27
2/7/2022	Spring Lake	8	Spearfishing					5	9.88
2/8/2022	Rio Vista Falls to Purgatory Creek	5	Spearfishing	2	1.25			5	10.63
2/14/2022	Spring Lake	8	Spearfishing			1	3.94	8	14.14
2/20/2022	Spring Lake	8	Spearfishing					8	32.51
2/21/2022	Capes Dam to 35	4.4	Spearfishing	10	3.45				
2/25/2022	Spring Lake	8	Spearfishing					11	36.25
2/27/2022	Spring Lake	8	Spearfishing					19	55.61
		60	Tournament Programming						
Feb Totals		128		416	163.094	2	6.82	83	224.834
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
3/1/2022	Spring Lake Dam to Rio Vista Falls	0.25	Bounty	9	8.64				
3/2/2022	Spring Lake	12	Spearfishing/Bowfishing					11	29.58
3/4/2022	Spring Lake Dam to Rio Vista Falls	0.25	Bounty	14	5.86				
3/7/2022	Spring Lake	8	Spearfishing					16	50.39
3/12/2022	Spring Lake	8	Spearfishing					8	30.2
3/17/2022	Spring Lake Dam to Rio Vista Falls	4	Spearfishing	8	2			3	5.81
3/18/2022	Rio Vista Falls to Capes Dam	0.25	Bounty	18	7.39				
3/28/2022	Spring Lake	12	pearfishing/Bowfishing/Gill Net					42	140.01
3/30/2022	Spring Lake	6.5263158	Bowfishing					4	14.51
3/31/2022	Rio Vista Falls to Capes Dam	4	Spearfishing	12	4.84			1	1.63
3/1-31/22	Office	10	Tournament Programming						
Mar Totals		65.2763158		61	28.73	0	0	85	272.13
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
4/10/2022	Stokes	0.25	Bounty	25	10.67				
4/14/2022	Spring Lake Dam to Rio Vista Falls	12.75	Spearfishing/Gill Net	10	3.57			14	31.54
4/18/2022	Spring Lake	16	pearfishing/Bowfishing/Gill Net					81	251.59
Apr Totals		29		35	14.24	0	0	95	283.13
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
5/13/2022	Rio Vista to 35	5.35	Spearfishing	36	17.42				
5/17/2022	Spring Lake Dam to Rio Vista Falls	0.3	Bounty	3	1.13				
5/19/2022	Rio Vista to Hopkins	2	Spearfishing	1	0.56			1	0.5
5/26/2022	Rio Vista to 35	5.35	Spearfishing	23	9.09				

5/26/2022	Spring Lake	13	pearfishing/Bowfishing/Gill Net					17	45.91
May Totals		26		63	28.2			18	46.41
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
6/1/2022	Stokes Park	4	Spearfishing	4	1.31				
6/3/2022	Spring Lake Dam to Rio Vista Falls	4	Spearfishing	7	3.02				
6/4/2022	Rio Vista to 35	0.25	Bounty	9	3.69				
6/6/2022	Rio Vista to 35	5.5	Spearfishing	15	7.95				
6/9/2022	Rio Vista Falls	0.25	Bounty	3	1.21				
6/9/2022	Capes Dam to Stokes Park	4	Spearfishing	3	0.82				
6/13/2022	Spring Lake Dam to Rio Vista Falls	4	Spearfishing	5	2.88				
6/16/2022	Capes Dam to Stokes Park	4	Spearfishing	6	1.47				
6/21/2022	Spring Lake Dam to Rio Vista Falls	8	Spearfishing	60	29.04				
6/27/2022	Spring Lake Dam to Rio Vista Falls	4	Spearfishing	3	2.94				
6/30/2022	Rio Vista to 35	6	Spearfishing	33	14.88			1	0.31
June Totals		44		148	69.21	0	0	1	0.31
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
7/8/2022	Rio Vista to 35	5	Spearfishing	10	5.01				
7/11/2022	Capes Dam to 35	5	Spearfishing	12	4.7				
7/14/2022	Spring Lake Dam to Rio Vista Falls	0.25	Bounty	9	4.5				
7/18/2022	Spring Lake Dam to Rio Vista Falls	4.75	Spearfishing	9	3.7				
7/20/2022	Capes Dam to Stokes Park	3	Spearfishing	2	0.32				
7/27/2022	Spring Lake Dam to Rio Vista Falls	5	Spearfishing	6	2.63			2	5.56
July Totals		23		48	20.86	0	0	2	5.56
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
8/1/2022	Rio Vista to 35	5	Spearfishing	34	18.62				
8/8/2022	Rio Vista Falls	4	Spearfishing	13	8.33				
8/9/2022	Spring Lake Dam to Rio Vista Falls	4	Spearfishing	11	3.26				
8/10/2022	Capes to Rio	3	Spearfishing	6	2.75				
8/18/2022	Rio Vista Falls Upstream	3	Spearfishing	6	4.01			3	2.25
8/22/2022	Spring Lake Dam to Rio Vista Falls	3	Spearfishing						
8/30/2022	Stokes	2	Spearfishing	2	1.75				
8/31/2022	Rio Vista Falls	3	Spearfishing	8	3.82				
Aug Totals		27		80	42.54	0	0	3	2.25
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
9/2/2022	Spring Lake Dam to Rio Vista Falls	3	Spearfishing	7	1.88				
9/7/2022	Rio Vista to City Park	3	Spearfishing	2	1.75			1	2.69
9/8/2022	Capes Dam to Stokes Park	3	Spearfishing	11	2.57				
9/18/2022	Rio Vista to 35	4	Spearfishing	24	6.37				
9/20/2022	Capes Dam to Stokes Park	4	Spearfishing	29	5.15				
9/26/2022	Spring Lake Dam to Rio Vista Falls	3	Spearfishing	8	3.51			1	3.25
9/27/2022	Capes to Rio	3	Spearfishing	11	3.01				
Sept Totals		23		92	24.24			2	5.94
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
10/4/2022	Spring Lake Dam to Rio Vista Falls	5	Spearfishing	2	1.38			1	3.75
10/24/2022	Capes Dam to Stokes Park	5	Spearfishing	10	5.96				
10/1-31/22	Office	40	Tournament Programming						
Oct Totals		50		12	7.34			1	3.75
Dates	Location	Hours	Type of Work	Plecos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
11/1-30/22	Office	90	Tournament Programming						
11/1/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	14	8.82				
11/1/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	18	11.74				
11/1/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	4	1.76				
11/1/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	5	2.41				
11/1/2022	Capes Dam to Stokes Park	0.3	Tournament	7	3.13				
11/1/2022	Capes Dam to Stokes Park	0.6	Tournament	40	16.48				
11/1/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	5	1.44				
11/1/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	31	10.89				
11/1/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	9	6.38				
11/2/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	9	5.82				
11/2/2022	Capes Dam to Stokes Park	0.3	Tournament	3	0.57				
11/2/2022	Capes Dam to Stokes Park	0.6	Tournament	27	7.9				
11/2/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	19	12.08				
11/2/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	9	4.89			1	2.63
11/3/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	4	2.38				
11/3/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	5	2.32				
11/3/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	4	0.81				
11/6/2022	Capes Dam to Stokes Park	0.4	Tournament	27	7.28				
11/6/2022	Capes Dam to Stokes Park	0.3	Tournament	6	0.72				
11/6/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	14	7.08				
11/6/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	18	8.29				
11/7/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	9	4.07				
11/7/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	3	1.88				
11/7/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	11	5.32				
11/7/2022	Rio Vista Falls to Capes Dam	0.5	Tournament	50	20.17				
11/7/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	2	0.75			1	3.69
11/8/2022	Rio Vista Falls to Capes Dam	0.4	Tournament	19	12.34				
11/9/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	6	1.87				
11/9/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	9	4.33				
11/9/2022	Capes Dam to Stokes Park	0.4	Tournament	26	8.04				
11/9/2022	Capes Dam to Stokes Park	0.3	Tournament	3	0.66			1	2.69
11/9/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	7	4.76				
11/10/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	1	1.25				
11/10/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	3	1.63			2	0.75
11/10/2022	Capes Dam to Stokes Park	0.3	Tournament	1	0.38				
11/10/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	1	1.044				
11/13/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	6	2.43				
11/14/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	1	1.13				
11/14/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament					2	4.06
11/16/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament					6	13.46
11/17/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	2	0.82				
11/17/2022	Spring Lake Dam to Rio Vista Falls	0.3	Tournament	1	1.81				

11/17/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	1	0.31				
11/17/2022	Rio Vista Falls to Capes Dam	0.3	Tournament	2	0.88				
11/18/2022	Capes Dam to Stokes Park	0.4	Tournament	16	6.56	1	1.88		
11/18/2022	Capes Dam to Stokes Park	0.3	Tournament	2	0.56				
11/18/2022	Spring Lake	8	Spearfishing					8	8.33
Nov Totals		113		460	206.184	1	1.88	21	35.61
Dates	Location	Hours	Type of Work	Plecocos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
12/1/31/22	Office	14.5							
12/1/2022	Spring Lake	5	Spearfishing					7	14.52
12/2/2022	Spring Lake Dam to Rio Vista Falls	0.2236842	Bounty					1	1.25
12/13/2022	Capes Dam to Stokes Park	4	Spearfishing	11	2.76				
12/15/2022	Spring Lake Dam to Rio Vista Falls	4	Spearfishing	5	3.31			1	1.13
12/16/2022	Spring Lake Dam to Rio Vista Falls	4	Spearfishing	13	12.63			2	5.44
12/17/2022	Rio Vista Falls to Capes Dam	4	Spearfishing	11	3.95				
12/22/2022	Spring Lake	5	Spearfishing					1	0.06
12/30/2022	Rio Vista Falls to Capes Dam	4	Spearfishing	18	7.69				
Dec Totals		44.7236842		58	30.34	0	0	12	22.4
2022 Totals		Hours		Plecocos Caught	Total Pleco Weight	Sailfins Caught	Total Sailfin Weight	Tilapia Caught	Tilapia Total Weight
		671.2		1548.0	669.0	4.0	13.1	372.0	1052.1
		Total non-native fish removed in 2022:			1924.0				



Appendix I6 | **Native Riparian Habitat**

EAHCP Native Riparian Restoration (EAHCP Sections 5.7.1)

2022 Overview and Summary of Activities

City of San Marcos/ Texas State University

Summary

In 2022, riparian restoration efforts were focused on the removal of non-native, invasive vegetation within the riparian zone of the upper San Marcos River. Target non-native species included, but not limited to, Privet (*Ligustrum* sp), Chinese Tallow (*Triadica sebifera*), Chinaberry (*Melia azedarach*) and Paper Mulberry (*Broussonetia papyrifera*).

Work included the initial removal of non-native trees in focused areas as well as treatment of re-emergent non-native vegetation within the established riparian zone along the river. Focus areas in 2022 for initial non-native vegetation removal included Sewell Park and Bicentennial Park (at Purgatory Creek/ San Marcos River confluence area) (**Figures 1 & 2**). The removal of non-native trees included cutting of the tree near the base and applying herbicide to help prevent re-growth. Slash material from cut non-native trees was used to form sediment control berms in the area where vegetation was removed (**Figure 3**).

Native vegetation was planted along the San Marcos River in 2022 by City staff and the EAHCP Conservation Crew. This planting consisted of:

- Planting of little bluestem, Turk's cap, Emory's sedge, and Inland Sea Oats along the riverbank next to the shared use pathway on the Children's Park side of the railroad bridge.
- Planting of switchgrass and native plants seeding on slope adjacent to the railroad bridge between Rio Vista and Children's Park.
- Planting of big muhly, mealy blue, and flameleaf sumac along shared use pathway in both Rio Vista and Children's Park on both sides of the railroad bridge (to prevent erosion on park side of trail from washing sediment across trail into river).

In addition, City of San Marcos and Texas State University (TXST) coordinated a volunteer planting event in the Upper Sewell Park area along the San Marcos River immediately downstream of the Kerbey Lane Café on river-right (**Figure 4**). This planting included planting of over 100 native plants that included Montezuma Cypress, Sycamore, Turk's Cap, Inland Sea Oats, Mountain laurel, Texas Redbud, Fragrant Mimosa, Agarita, Switchgrass, American Beautyberry & Corralbean. Native plants were purchased and provided by TXST. Approximately 30 volunteers participated in the planting event. Photos are included in **Figure 5**.

Figures

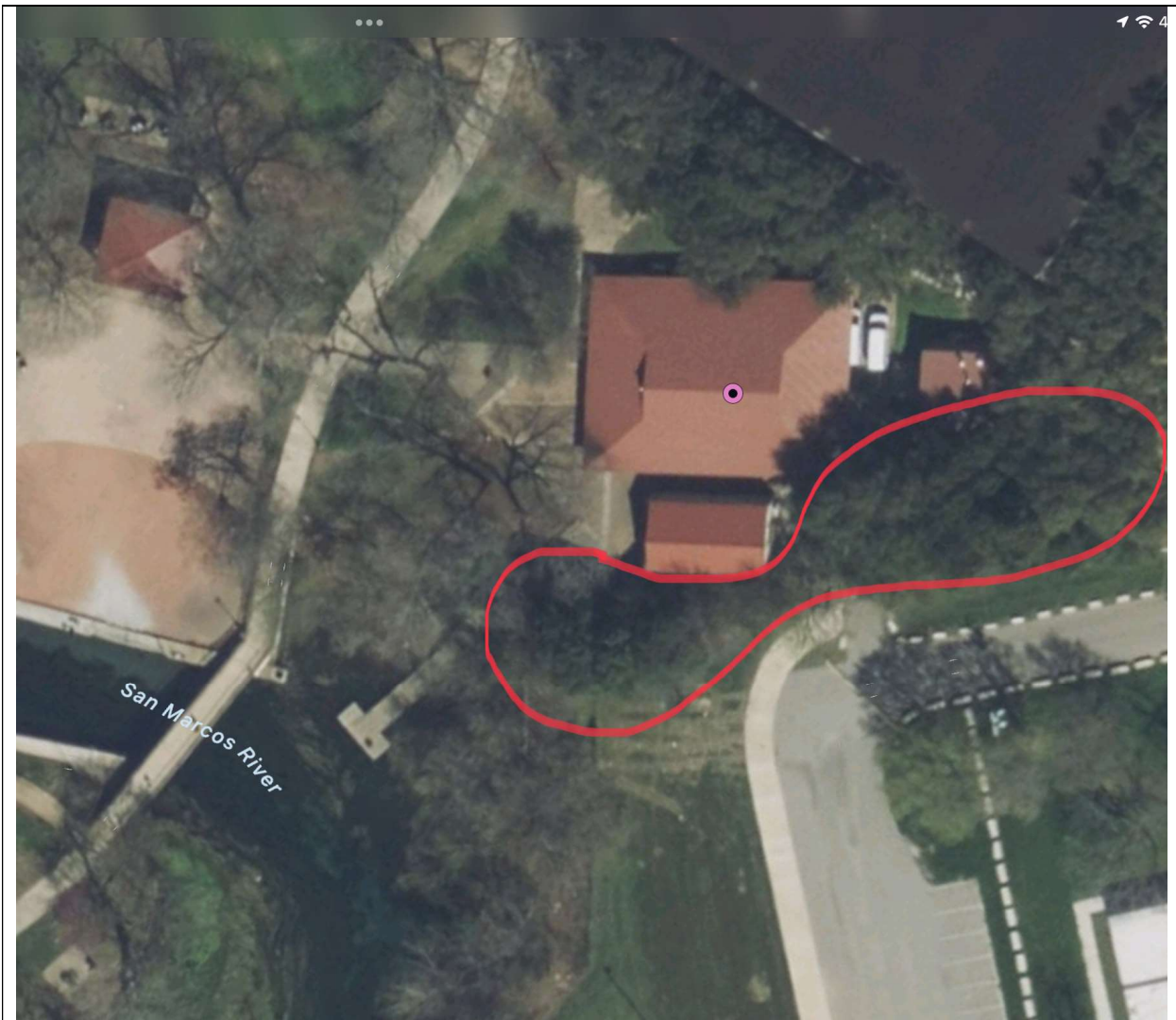


Figure 1. Location of where non-native vegetation was removed in Sewell Park adjacent to the TXST Outdoor Center boat storage area. Ligustrum was the dominant non-native species targeted for removal at this location.



Figure 2. Location of non-native vegetation removal along Purgatory Creek near its confluence with the San Marcos River as denoted with yellow circle.



Figure 3. Photo showing cut and treated Ligustrum & brush berms constructed using slash material from cut trees.

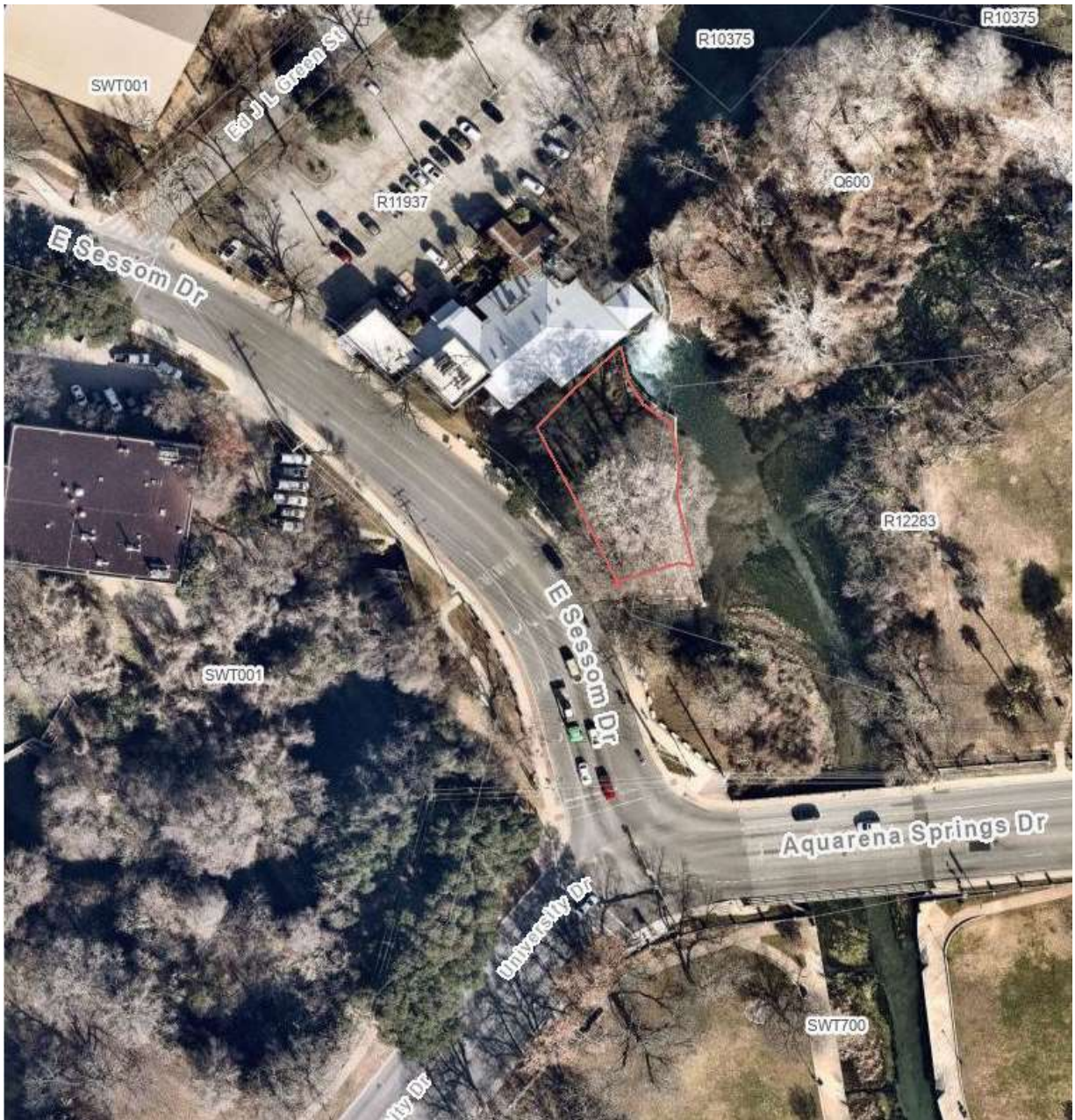


Figure 4. Upper Sewell Park Riparian Planting Area. Planting area denoted by red outline.



Figure 5. Upper Sewell Park Volunteer Planting Event Photos (Dec 2022).



Appendix I7 | **Household Hazardous Waste Collection**

City of San Marcos Household Hazardous Waste Management Summary – 2022

EAHCP Section 5.7.5

The City of San Marcos Household Hazardous Waste (HHW) collection program is available free of charge for all Hays County residents. Visitors can drop off household chemicals and paint that are hazardous for the environment. This facility also operates a reuse program for items that are in good condition. Labor for the facility is contracted to Green Guy Recycling. HHW is open to the public every Tuesday and Friday from 12:00 p.m. to 3:30 p.m. It is located at 630 E. Hopkins, San Marcos, TX 78666.

Most participants come from the cities of San Marcos, Kyle, Wimberley, and areas outside of the city limits. These areas are home to environmentally sensitive watersheds and the Edwards Aquifer Contributing and Recharge Zones. Offering a safe alternative to improper or illegal dumping of hazardous household chemicals is paramount to improving water quality and regional sustainability.

HHW Drop-Off Center Participation

The primary function of the HHW program is the drop-off center. Residents drive into the unloading area, where they are met by an HHW worker. The participants remain in their vehicle as the worker unloads the containers onto a cart. Each participant fills out a survey and provides their address. From these surveys, monthly participation rates are tracked for each community. The average number of participants for 2022 was 207 per month and the total amount of HHW dropped-off at the center was 198,627 lbs.

The HHW facility is open to all residents of Hays County. Most of the residents come from the COSM and areas outside of municipal jurisdictions. The San Marcos region is an environmentally sensitive area for the San Marcos River. Preventing illegal dumping and pollution in this region makes great strides towards protecting water quality.

Reuse Program Participation

The reuse program supports the drop-off center by attracting residents and diverting reusable items from the disposal stream. When chemicals are unloaded, the worker segregates new and slightly used containers that are ready for use. Many visitors with items eligible for reuse are in the moving process. Rather than moving all their cleaning supplies, they have the option to deliver them to the HHW. These items are taken to the reuse building and are sorted on shelves. This building is open to the public during regular operating hours. Reuse participants fill out a form documenting the materials they pick up. This form explains that unused items are to be returned to HHW and not to be thrown into the regular waste stream. Participation for the reuse program has grown over time. The program also serves to educate the public about safe disposal and alternatives to harmful chemicals.

This program received many compliments from visitors. Participants save money by collecting reuse items at no cost and the HHW program saves money by reducing disposal expenses. The annual outreach goal for HHW is 1400 total participants.

The Chemicals

The household hazardous materials accepted by HHW include a wide range of common chemicals and waste products. After the household waste is unloaded from the vehicle, the material is sorted and weighed. Each item is sorted based on chemical type. HHW facility workers collaborate with the chemical disposal

company to evaluate the waste stream and finding storage and shipping options that reduce the expense. For example, oil based and latex paint, liquid flammables, used motor oil, cooking oil, and anti-freeze are bulked into 55-gallon drums. The remaining chemicals are sorted into either 55-gallon drums or lined gaylord boxes. Each container is stored in a chemical building or under cover until they are shipped to recycling facilities and a chemical landfill.

HHW collected and disposed of approximately 198,627 pounds of HHW in 2022. Without this program, much of this waste would have been improperly disposed of in the municipal waste stream or illegally dumped. Drop-off disposal weights for 2022 averaged 16,552 per month.



Appendix I8 | **Spring Lake Activities**

Approved Spring Lake Access Activities 2022					
Name	Department /Agency	Duration		Description	Impact +/-
Andes, Chelsea	Leroi Productions-Atlas Obscura_ Promo travel Film	7/18/2022	7/8/2022	Travel Texas Tourism and Visit San Marcos to produce a series of articles and videos	Minimal
Bauer, Scott	Texas Water Safari	6/11/2022	6/11/2022	Photography for TX Water Safari; scuba and on land	Minimal
Cochran, Jerry	Texas Water Safari	6/10/2022	6/11/2022	59th annual canoe race	Minimal
Davis, Allison	UT Depart. of Integrative Biology	6/14/2018	Still Active	Sailfin/Amazon mollie, gambusia, Surviving without sex: use of phenotypic variation in an asexual fish.	Minimal
Esquelin, Robert	EAA	5/23/2022	5/31/2022	Site clearing/maintenance at the Edwards Aquifer Authority monitoring well, LR-67-01-814	Minimal
Forstner, Mike	TXST- Biology Dept	6/1/2022	5/11/2030	Resuming work conducted by Dr. F. Rose_ pop. parameters of turtles inhabiting the headwaters of the San Marcos River	Minimal
Gabor, Caitlin	TXST- Biology Dept	11/18/2021	12/1/2021	Bio 1331 students- Field exercise capture and id of small fishes	Minimal
Gibson, Randy	US Fish and Wildlife Service	10/12/2021	10/12/2021	targeting undescribed species previously collected as part of TXST M.S thesis (Worsham)_ Aquatic annelid fauna	Minimal
Griffin, Kent	TXST- Campus Recreation	11/18/2021	11/22/2021	Spring Lake Outdoor Education Project	Minimal
Hendrix, Ashley	TXST- Aquatic Biology	5/4/2022	5/4/2024	Continuing Laboratory Reseach Collections ;Drop net catching sailfin mollies	Minimal
Kollaus, Kristy	EAA	1/11/2022	12/13/2022	Water quality collection at Hotel Spring as part of the Edwards Aquifer Water Quality Monitoring Program	Minimal
Krause, Samantha	TXST- Geography	3/12/2021	3/21/2021	Classroom Instruction: Qualitative methods, water quality testing, river mapping	Minimal
Lemke, David	TXST-Biology	09/0/2021	8/31/2022	Class demonstrations; plant collections for identification/analysis	Minimal
Marinez, Carli	TXST-Biology	3/25/2022	7/8/2022	Birding surveys using binoculars; Setting up motion capture cameras;placement of hanging bird feeder	Minimal
Minning, Brittany	TXST- Geography and Environmental Studies	11/11/2021	5/31/2022	observing beaver and otter presence on the San Marcos River; using trail cameras and surveys	Minimal
Moses, Amber	Individual	none	none	Hold a mini baptism for 20 month old son; minister and immediate family only to view on the side of Spring Lake	Denied
Navarro, Aspen	Meadows Center/ San Marcos River Foundation	4/21/2021	3/21/2026	Invasive removal volunteer days; (SMRF) and volunteers to remove invasive plant species from Sink Creek	Minimal
Oborney, Ed	BioWest	7/1/2012	Still Active	EAHCP biological monitoring _COMPREHENSIVE AND CRITICAL PERIOD MONITORING PROGRAM;	Minimal
Pietsch, Lucy	TXST- Student; FCS, Fashion Merchandising	4/6/2022	4/6/2022	Filming for FMA Fashion Show	Minimal
Plye, Austin	Indigenous Cultures Institute Pow Wow	9/30/2022	10/2/2022	2022 ICI Powwow; Approximately 4,500 event staff and attendees	Minimal
Roosth, Rachel	TXST- Fashion and Merchandising Program	4/4/2022	4/4/2022	Texas State fashion show — getting clips & pictures using site and Hillside for backdrop for photo shoot	Minimal
Rose, Francis	Biology Dept. TXST	1/1/2012	9/30/2022	Continued Research: investigating pop. parameters of turtles inhabiting the headwaters of the San Marcos River	Minimal
Ruckstuhl, Eric	EBR Enterprises EAHCP contractor	1/1/2013	Still Active	Herbicide treatments and removal of riparian invasive plants	Minimal
Simons, Evan	TXST- Biology Dept	6/12/2022	12/31/2022	Research: Stem sampling for stable isotope analysis & determining plant water potential w/ a Scholander press chamber	Minimal
Smith, Heather	TXST - Anthropology	2/21/2022	4/20/2022	Classroom Instruction - outdoor lab practical: Archaeological survey and excavation methods in mock scenarios	Minimal
Smith, Heather	TXST- Anthropology	10/22/2021	10/22/2021	Classroom Instruction-Verbal instruction and lecture for the group of students; Field Trip	Minimal
Wait, Miranda; Charlee Cervantez	Alumni Relations	12/2/2021	12/4/2021	TXST-Ring Ceremony- Alumni Relations staff, bookstore staff, balfour staff, ring celebration participants and their guests	Minimal
Walker, Jenna; Navarro, Aspen	Meadows Center/ San Marcos River Rangers	8/20/2020	still active	Texas Stream Team volunteer water quality citizen scientists	Minimal
Walter, Scott	TXST- Bio Department - Wildlife	2/15/2022	4/28/2022	Classroom/outdoor lab pratical; data collections, bird surveys; small mammal, reptile, amphibian captures	Minimal
Warner, Joel	PadlMe LLC	5/23/2022	5/22/2023	Development of a geospatial water quality sensor collection platform.	Minimal
Warner, Luke	Nogrod Solutions / PadlMe.com	4/3/2022	4/3/2022	video shoot for paddle board rental system.	Denied
Wassenich, DianneA12:F34E3A13:F34E	San Marcos River Foundation/HCMN	11/28/2020	still active	Garten Beds/Grounds Maint. 4th Sat each Month_ Volunteers	Minimal