

**San Marcos Aquatic Resources Center
STAFF NOTES
June 2014**

Aquatic Species Conservation and Management: Refugium Activities

San Marcos Salamander- As of 26 June, four San Marcos salamanders were collected. The salamanders were returned immediately to Spring Lake given that the SMARC refugium is at capacity for this species (Table 1). Ten salamander mortalities were observed in the refugium population this month. As of 26 June, wild stock San Marcos salamanders oviposited 96 eggs while their offspring did not oviposit any during June. (CSF 7.12.5.4)

Table 1.- Four-month summary of the number of salamanders held in and number of eggs produced for the refugia at the San Marcos Aquatic Resources Center. Abbreviations are as follows: RWS= refugium wild stock, WS=wild stock (specimens in quarantine), FX=offspring, JA=juveniles/adults, OV=ovipositions, and EG=eggs.

Species		March 2014			April 2014			May 2014			May 2014		
		JA	OV	EG	JA	OV	EG	JA	OV	EG	JA	OV	EG
San Marcos salamander	RWS	356	1	15	350	2	55	341	4	132	331	2	96
	FX	63	0	0	59	0	0	58	0	0	50	0	0
Quarantine	WS	0	-	-	0	-	-	0	-	-	0	-	-
Texas blind salamander	RWS	104	0	0	106	3	67	117	3	83	115	0	0
	FX	54	3	42	54	1	16	53	1	16	52	0	0
Quarantine	WS	5	-	-	7	-	-	0	-	-	0	-	-
Texas (Comal) salamander	RWS	1	0	0	1	0	0	1	0	0	1	0	0
	FX	0	0	0	0	0	0	0	0	0	0	0	0
Quarantine	WS	0	-	-	0	-	-	0	-	-	0	-	-
Barton Springs salamander	RWS	42	0	0	40	0	0	40	0	0	40	0	0
	FX	642	2	69	642	1	23	641	0	0	639	0	0

Texas Blind Salamander- As of 26 June, SMARC staff did not collect any Texas blind salamanders and none were incorporated from quarantine into the refugia population (Table 1). The SMARC refugia lost two wild stock adult salamanders this month. As of 26 June, wild stock Texas blind salamanders and their offspring did not oviposit eggs. (CSF 7.12.5.4)

Barton Springs Salamander- No salamanders were collected from Barton Springs in June (Table 1). As of 26 June, wild stock Barton Springs salamanders and their offspring did not oviposit eggs. No wild stock salamander mortalities were observed this month. The Texas A&M University health team has provided the SMARC with a preliminary disease treatment in the event of a disease outbreak and it is being considered by the Dexter SNARRC Fish Health Unit. (CSF 7.12.5.4)

Comal Springs Salamander- In June, no Comal Springs salamanders were collected from Comal Springs and one salamander was maintained in refugium (Table 1). (CSF 7.12.5.4)

Fountain Darter- In June, fountain darters held in quarantine were incorporated into the refugia populations after being cleared by the Dexter SNARRC Fish Health Unit. As a result, 702 wild stock fountain darters were in the SMARC refugia on 30 June. Thirty one mortalities were recovered during June. These fish were from the San Marcos (Upper = 4, Middle = 14, and Lower = 7) and Comal (Landa Lake = 2, Comal River =4) stocks. (CSF 7.12.5.4)

Devils River Minnow- The SMARC is maintaining two stocks of wild caught Devils River minnows (DRM) in refugia, one from San Felipe Creek (N = 196) and another from Pinto Creek (N = 85). The SMARC is also maintaining F1 (N ≈ 1,500) offspring. No Devils River minnows were collected from Pinto Creek in June. Approximately 100 Pinto Creek offspring were produced during June. The three minnows collected during May were taken out of quarantine and added to the Pinto Creek refugia population in June. All wild stock Pinto creek minnows were measured, weighed, and tail clipped for future genetic analysis. Some fish at the SMARC are being maintained in an outdoor raceway to evaluate if this is a less labor intensive method of producing genetically diverse fish for restocking purposes. The genetic analysis of wild stock San Felipe Creek and Pinto Creek DRM is ongoing at the Dexter SNARRC. As the genetic information becomes available, it will be incorporated into a propagation/genetic management plan for DRM. On April 21, ten Devils River Minnow (Pinto Creek stock) fry were sent to the Dexter SNARRC Fish Health Unit for disease and parasite examination. The fry were sent because they appear to stop eating at around 2 to 3 months of age. Patricia Echo-Hawk suggested the possible use of flubendazole to treat fry until their examination is complete and is consulting with veterinarians regarding this potential treatment. Results from the Dexter SNARRC Fish Health Unit did not find any known pathogens during their diagnostic examination. (CSF 7.12.5.4)

Comal Springs Riffle Beetle- Approximately, 110 adult wild stock Comal Springs riffle beetles, six F1 adult offspring, and 295 larvae are being maintained at the SMARC. During June, 61 beetles were collected during low flow monitoring by BIO-WEST, Inc. and Zara Environmental, LLC (consulting firms funded by the Edwards Aquifer Authority (EAA)) and transferred to the SMARC to be held in refugium. (CSF 7.12.5.4)

Peck's Cave Amphipod- Approximately, 121 adult Peck's cave amphipods and 100 *Stygobromus* juveniles are being maintained at the SMARC. During June, 66 amphipods were collected during low flow monitoring by SMARC staff and transferred to the refugium. In order to overcome cannibalism and track individual growth and development, 22 juvenile amphipods are being maintained in individual growth chambers. Evaluation of the growth chambers is ongoing. (CSF 7.12.5.4)

Texas Wild Rice- The 2014 number of Texas wild rice seeds stored at the SMARC totals 19,618 (N₂₀₀₉ = 390, N₂₀₁₀ = 585, and N₂₀₁₁ = 1,941, N₂₀₁₂ = 10,152, N₂₀₁₃ = 6,550) (Table 3). No additional seeds have been collected since November 2013 for storage. Although seeds have not been collected for storage, 2,520 seeds were collected from refugium plants and potted in raceways to provide Texas wild rice for restoration efforts in the San Marcos River from May through June. (CSF 7.12.5.4)

Table 3.- Number of Texas wild rice seeds stored at the SMARC. Seeds are stored by month and year.

Month	2009	2010	2011	2012	2013	Total
Jan					491	491
Feb						
Mar						
Apr						
May					264	264
June			433		2,307	2,740
July			650		1,172	1,822
Aug					2,316	2,316
Sept				3,428		3,428
Oct		325	273	1,785		2,383
Nov	390	260	585	3,267		4,502
Dec				1,672		1,672
Total	390	585	1,941	10,152	6,550	19,618

Research and Restoration Activities

Fountain Darter- Kenneth Ostrand is working collaboratively with BioWest Inc. on a fountain darter mark and recapture study to determine how movement is affected by habitat and temperature changes under low flow conditions. In April, 857 fountain darters were uniquely marked with visual implant elastomer (VIE) at two locations in both the Upper Spring Run of the Comal River (N = 540) and Blieders Creek (N = 317). In May, an additional 757 darters were marked in the Comal River. These areas are known to experience extreme abiotic conditions and are typically the first river reaches to be negatively affected by low spring flows. By marking fountain darters in these stream reaches we hope to determine when aquatic vegetation is rendered unsuitable habitat and darters seek other habitat types; and, how far will fountain darters move to find usable habitat. The field mark and recapture study will be augmented by manipulative trials in an experimental pond to address the effects of specific factors on fountain darter movement. Fountain darters will continued to be marked throughout the year and sampled for recaptures. Thirty marked fish have been observed during snorkeling efforts, or recaptured when dip netting. All of the recaptured fish were collected close to their release site, excluding one fish that was marked in Blieders Creek but observed in the Comal River during snorkeling. (CSF 7.12.5.4)

Devils River Minnow- Patricia Echo-Hawk, beginning her second year of graduate school at Texas A&M University, has submitted a proposal for a project titled “Growth and survival of Devils River minnow fry fed different diets”. The project’s primary goal is to increase minnow survival during early life history stages by feeding them four different diets. (CSF 5.3.7)

Comal Springs riffle beetle- Randy Gibson is collaborating with Professors Benjamin Schwartz and Weston Nowlin (TSU) on an EAA funded project determining the limitations of Comal Springs riffle beetles to lowered dissolved oxygen and elevated temperature levels. During June, SMARC and TSU collected up to 400 *Heterelmis glabra*, surrogates for the Comal Springs riffle beetle, from springs of the upper Devils River (Texas Parks and Wildlife State Natural Area and The Nature Conservancy's Dolan Falls Preserve) and set lures for retrieval in July. The surrogates will be used to develop sidebars (maximum and minimum testing limits) and to validate the aquatic system and equipment used for the Comal Springs riffle beetle study.

Texas wild rice- During January 2014, a study was initiated to evaluate the effects of varying flow rates on the phenology of Texas wild rice. Growth rates of Texas wild rice will be measured every 2 weeks, and the plants monitored for flowering, seed production, tiller formation, and senescence. This study is on-going and currently flowering characteristics are being measured weekly. To date, the mean total lengths of plants were 10.7 m when grown in water with no flow, 23.2 to 21.2 m for those grown in low to medium flow and 38.8 m for high flow. A single plant grown in high flow grew up to 80 m in total length during the first 14 weeks. Since flowering has begun, pistil and stamen growth, seed production and flower senescence is being recorded weekly. Senescence of flowers was documented in June and some stem senescence was also recorded. Seeds from the experimental plants are collected 2-3 times per week and monitored for germination. As of June 27, a total of 6,897 seeds have been collected, potted, and monitored for germination rates for this study. (CSF 7.12.5.4)

SMARC staff have reviewed and commented on the results of the genetic analysis of Texas wild rice comparing wild, refugia, and historical stands of Texas wild rice analyzed by Wade Wilson (Dexter SNARRC). Wade Wilson has made final edits to the document, and the report has been sent out for review. All the reviewers' comments have been returned and final edits are being made by Wade. Wade plans to work on the manuscript in July-August and upon completion will forward it to SMARC staff. Once all comments have been considered and incorporated, the report will be formatted and submitted to a journal. (CSF 7.12.5.4)

Jeff Hutchinson has initiated a study to evaluate several Texas wild rice planting patterns in the San Marcos River with individual and groups of Texas wild rice. Five plots were set up in the San Marcos River on 19 May to evaluate planting methods of Texas wild rice tillers, seedlings, and mature plants. The plots will be monitored monthly for 6 months and, if successful, supplemental planting will occur in each plot and every 6 months thereafter. The goal is to develop a method to establish Texas wild rice in lower sections of the San Marcos River where it is uncommon. A 4-inch rainfall event on 25 May resulted in a 7 to 8 foot rise in water level that caused the loss of 10% of the newly planted TWR. On May 29, all Texas wild rice plants that were scoured out during the May 25 flood were replaced. Two additional plots of Texas wild rice were established in the same general area on June 12 by Jeff Hutchinson and Josh Roberts. In these plots, 25 and 20 TWR seedling ca. 3 months old and 0.75 m in length were planted in a 0.25 m² clump. During monitoring on June 21, all the Texas wild rice, regardless of planting pattern, in each of the seven plots was intact and looked robust. (CSF 7.12.5.4)

A study to examine the potential for Texas wild rice propagation from stem tissue nodes using

auxin was initiated 5 May. The study evaluates four common commercially available products, Hormodin 1, Hormodin 2, Hormodin 3, and Dip-N-Grow, in which the nodes of Texas wild rice were dipped in the solution or powder for 5 seconds and then potted in soil. At two weeks, root development and some new leaf tissue was observed. During June, about 60-70 of the treated nodes had developed roots, indicating that auxin compounds may be a successful tool for cloning Texas wild rice for genetic purposes. In July, all the plants will be examined and repotted. (CSF 7.12.5.4)

Jeff Hutchinson is co-advising Michelle Crawford (Ph.D. student at Texas State University) on a project that is examining the effects of light attenuation and siltation on Texas wild rice at Uvalde NFH. A field component was added to her dissertation that will be conducted in the San Marcos River and use Texas wild rice plants produced at the SMARC. She had her first committee meeting in February. The committee approved her experimental design and draft proposal. Texas wild rice seeds (N = 400) were potted on April 28 and were re-potted as individuals in May. On 29 May, Michele planted 75 of the plants in the San Marcos for an 8 week study on growth rates during periods of heavy recreation. Michele will begin the greenhouse portion of her Ph.D. work in July or August at Uvalde NFH once the seeds she potted have germinated and reach ca. 0.5 in length. (CSF 7.12.5.4)

Native Aquatic Plants - Native aquatic and terrestrial plants currently are being propagated and maintained in the SMARC greenhouse in fiberglass tanks and under outdoor irrigation systems. To maintain genetic diversity of the plants at the SMARC, additional plants of each species will be collected from wild populations throughout the year. As the plants grow and send out new shoots, they will be divided, repotted, and moved into outdoor raceways. Currently, SMARC has a full stock of aquatic, riparian, and terrestrial plants available to contractors with the City of San Marcos. (CSF 7.12.5.4)

To meet the restoration goals outlined in the Edwards Aquifer Habitat Conservation Plan, native plant production is needed. The SMARC has been contracted by the City of San Marcos to produce native aquatic plants for their restoration efforts. Plant transfers to the City of San Marcos began in March 2013. From January to April 2014, the SMARC provided a total of 3,019 aquatic and terrestrial plants to the City of San Marcos (Table 4). No plants were provided in May because low spring flows triggered a suspension of all planting activities under the City's 10(a)(1)(B) permit. In June, the City of San Marcos was given permission to resume planting activities. During June, the SMARC provided 1,048 aquatic and terrestrial plants to the City of San Marcos. The staff at SMARC will continue to provide plants for the restoration work in the upper section of the San Marcos River through 2019. Two terrestrial tree planting days organized by the City of San Marcos and SMARC were held on March 8 and 22, and the SMARC provided plants for these events. Additional planting events are planned for late summer, early fall 2014. On June 14, Jeff Hutchinson and Randy Gibson participated in and provided 487 terrestrial plants for a volunteer planting day on the banks of the San Marcos River in areas where non-native wild taro and Ligustrum trees had been removed. Approximately 18 people participated in the event including six members of the City of San Marcos Conservation Crew. (CSF 7.12.5.4)

Table 4.- List of plants species, common name, and number of plants provided from January to June of 2014 for aquatic and terrestrial restoration work in the San Marcos River.

Plant Species	Common Name	Number of Plants
Aquatic		
<i>Sagittaria platyphylla</i>	Arrowhead	174
<i>Ludwigia repens</i>	Creeping primrose willow	1484
<i>Heteranthera liebmannii</i>	Water stargrass	923
<i>Zizania texana</i>	Texas wild rice	695
		Σ aquatic = 3,276
Terrestrial		
<i>Berberis trifoliolata</i>	Agarito	1
<i>Bouteloua gracilis</i>	Blue grama	8
<i>Sambucus canadensis</i>	Elderberry	42
<i>Taxodium distichum</i>	Bald cypress	18
<i>Salix nigra</i>	Black willow	20
<i>Acer negundo</i>	Box elder	2
<i>Cyperus setigerus</i>	Lean flatsedge	2
<i>Equisetum hyemale</i>	Horsetail	37
<i>Pluchea odorata</i>	Purple pluchea	10
<i>Panicum virgatum</i>	Switchgrass	44
<i>Morus rubra</i>	Red mulberry	19
<i>Marsilea macropoda</i>	Water clover	11
<i>Carex emoryi</i>	Emory's sedge	83
<i>Chasmanthium latifolium</i>	Inland sea oats	54
<i>Platanus occidentalis</i>	Sycamore	5
<i>Justicia americana</i>	American water willow	200
<i>Eleocharis montevidensis</i>	Sand spikerush	12
<i>Bacopa caroliniana</i>	Water hyssop	55
<i>Leersia oryzoides</i>	Rice cut grass	44
<i>Carex crus-corvi</i>	Crow-foot caric sedge	6
<i>Ulmus crassifolia</i>	Cedar elm	5
<i>Populus deltoides</i>	Cottonwood	1
<i>Hydrocotyle umbellata</i>	Water- pennywort	40
		Σ terrestrial = 719
		$\Sigma\Sigma$ Total = 3,995

Threatened freshwater mussels - Patricia Echo-Hawk and Christopher Braun (USGS) are working collaboratively on a report titled “Relative Abundance and Frequency of Host Fish Species and Glochidia, Central and Southeast Texas, 2012–13”. This study is determining the primary and secondary fish hosts for five species of mussels (Texas Fatmucket, Golden Orb, Smooth Pimpleback, Texas Pimpleback, and Texas Fawnsfoot). On 23-24 August 2012, 62

potential mussel host fishes were brought on station by USGS personnel. These first fishes were a trial run to evaluate our holding tanks and mussel larvae collection system. Patricia Echo-Hawk designed and directed the construction of the system. She collected dislodged glochidia and mussel larvae in October 2012 and found 11 mussel larvae. The results of these initial 11 larvae were 10 *Corbicula* larvae and 1 non-candidate mussel larvae (*Anodonta*). The second phase of this project began on 1 April 2013 with two sampling events occurring in April and one in May. During April, 84 glochidia/mussel larvae were collected from various fish species that comprise the native fish assemblage. The second spring sampling event ended on 17 May, with a collection of 19 possible larvae. The collected glochidia and mussel larvae have been sent to USGS for species identification using DNA analysis. An additional third spring sampling event ended on 22 June, with a collection of 115 possible glochidia/mussel larvae. These samples were sent off for genetic analyses on 25 June. *Utterbackia imbecillis*, *Quadrula petrina*, *Q. houstonensis*, *Q. aurea*, *Toxolasma texasense*, *Lampsilis bracteata*, *L. hydiana*, *Amblema plicata* were among the species identified. Data analyses and composition of a manuscript co-authored with Nathan Johnson (USGS) regarding the DNA typing and identification of mussel larvae is ongoing. (CSF 5.3.7)

Aquatic Nuisance Species-Randy Gibson is a committee member for McLean Worsham, a Master's degree student at TSU. His thesis project is expected to determine the definite host for a San Marcos Springs endemic parasite, *Huffanella huffanni*. During November, McLean and Randy stocked the experimental setup in the Holding House with uninfected sunfish from the SMARC. Since November McLean has been collecting invertebrates and centrarchid fishes from the headwaters of the San Marcos River. *Huffanella huffanni* eggs have been collected from infected centrarchid fishes and fed to other centrarchids and to invertebrates. Both the centrarchids and the invertebrates are being monitored for parasite transmission. (CSF 12.2.4)

Drew Davis, a former TSU graduate student working under Dr. Caitlin Gabor, used SMARC tanks to test responses of salamanders to non-native predators such as the Rio Grande cichlid. He defended his thesis on 22 March 2012 and one of two experiments of his thesis was submitted for publication on 17 April 2012. The manuscript titled "Predator generalization and stress hormones in response to introduced predators" was published in *Ethology* during September 2012. A second experiment titled "Behavioral and physiological stress of the San Marcos salamander, *Eurycea nana*, in response to chemical stimuli from predatory fish" was submitted to the journal *Hormones and Behavior* during 2013. The article was rejected, rewritten, retitled as "Behavioral and physiological anti predator responses of the San Marcos salamander, *Eurycea nana*," and submitted to the journal *Physiology and Behavior* during 2014. (CSF 7.12.5.4)

Leadership in Science and Technology: Publications, extension activities/meetings, and presentations

During June, all SMARC biological staff were involved with data analysis and manuscript preparation or revision. So far this fiscal year, seven articles have been published by peer-reviewed journals, three other articles have been accepted for publication and five articles have

been submitted but not yet accepted. (CSF 5.3.7)

Publications- Daniel Huston has composed a manuscript title “Infection of fishes, including threatened and endangered species by the trematode parasite *Haplorchis pumilio* (Looss, 1896) (Trematoda: Heterophyidae)” co-authored with Kenneth Ostrand. The manuscript details the first North American report for this parasite in fish and the location of infections for various species. The manuscript was submitted to the journal of Bioinvasion Records during March. The manuscript was published online 30 June (Volume 3, Issue 3). (CSF 5.3.7)

Patricia Echo-Hawk, Valentine Cantu, Florence Oxley (Austin Community College) and Kenneth Ostrand submitted a manuscript titled “Integrated management of an invasive macrophyte”. The manuscript was accepted for publication in the Journal of Aquatic Plant Management on 25 November. Corrected proofs were submitted on June 4th and publication is set for the July Issue Volume 52. (CSF 5.3.7)

Jeff Hutchinson during June 2014 submitted a manuscript entitled “Response of Old World Climbing Fern and Native Vegetation to Repeated Ground Herbicide Treatments” from his dissertation to the Journal of Aquatic Plant Management. (CSF 5.3.7)

Presentations- On 06 June 2014, Valentin Cantu and Justin Crow presented a research project titled “A comparison of two methods to spawn *Eurycea sosorum* (Plethodontidae)” at the annual Eurycea Alliance Conference. Organizations represented at the conference included the Nature Conservancy, Travis County Natural Resources, City of Austin, Texas Parks and Wildlife Department, Austin Ecological Services, Zara Environmental LLC., University of Texas - Arlington, Southwestern University, TSU, and the SMARC. (CSF 5.3.7)

Extension activities/meetings- During June, SMARC staff (R. Gibson, D. Huston, and J. Hutchinson) in conjunction with RavenStar (outdoor education nonprofit organization) assisted in two weekend canoe tours of the upper San Marcos River. The canoe trips were given to Master Naturalists and emphasized introduced and endangered species, restoration efforts, and water quality.

In June, Teresa Lewis visited the SMARC and was updated with recent findings made by the A&M University Veterinary Health Team concerning infections in Barton Springs salamanders. Teresa plans to work with Texas A&M and SMARC to help resolve future disease issues.

In June, Teresa Lewis began preliminary examinations of San Marcos salamander offspring (N = 5) from the SMARC refugia to determine if they are free of diseases. If the offspring are certified as healthy, Valentin Cantu will ship the salamanders to the Uvalde NFH and will train staff to maintain and spawn them.

Valentin Cantu and Randy Gibson continue to work with Texas Parks and Wildlife (Andy Gluesenkamp) and EAA (Gary Schindel and David Gregory) to gain access to additional EAA sampling sites in Hays (SWT Farms, Crystal Clear, San Marcos Baptist Academy, and the SM Bad Water Line wells) and Comal (Garden Ridge, Bracken, HWY 306, Loop 337, Panther

Canyon, and Mission Valley wells) counties. During June, SMARC staff continued trapping at Panther Canyon and Mission Valley wells after a series of heavy rains in May.

On 12 June Valentine Cantu and Dr. Schwartz (TSU) met with Patrick Connor (Austin ES) in San Marcos to discuss the installation of drift nets over several spring orifices in Sessom's Creek. This June meeting was in response to TSU and SMARC efforts to collect Texas blind salamanders and troglobitic invertebrates. Dr. Schwartz has proposed adding permanently mounted PVC fittings over the spring openings to facilitate the attachment and removal of drift nets and to prevent nets from washing away during flood events.

Personnel development: Training

Patricia Echo-Hawk and Valentin Cantu completed the course 2014 Federal Information Systems Security Awareness and Role Based Security Training in June.

Four SMARC staff members completed safety Agricultural Tractor and Skid Steering Training on 23 June and 24 June.

Facilities and equipment

During June, Mark Orton and Art Tourjee visited the SMARC to discuss a number of deferred maintenance projects.

During June, Century Link completed the telephone and computer line upgrades at the SMARC.

Randy Gibson is working with Dr. Glenn Longley (TSU), the Edwards Aquifer Research and Data Center (EARDC) and a graduate student, Laura McCalla, to monitor the SMARC water wells and other water wells upstream and downstream of the site of the Paso Robles housing development and golf course. This large-scale development will occur near two wells that supply all the water for the SMARC. Although initial land clearing was planned to start in December 2010, the project has been delayed, allowing us to obtain baseline information on water quality prior to any development. It is unknown what effects the development and subsequent chemical usage (herbicides, pesticides, reuse water) by the golf course and home owners will have on the water quality of the aquifer and on listed aquatic species held at the SMARC. Water quality sampling began during February 2011. Water samples from Hunter well collected during March, June, and September 2011 contained relatively high levels of total coliform. This may indicate the influence of nearby recharge features that needs further investigation. The last samples for this project were taken on 19 July 2012. During August, all sample analyses were completed. Laura McCalla's thesis was completed in December 2012. The SMARC continues to constantly (every 15 min.) monitor temperature and conductivity in both wells. Monitoring has not detected any substantial changes that could represent possible pollution events. The EARDC has received funding from TCEQ-SEP program to continue periodic monitoring of SMARC and City of San Marcos wells for two years. During 2-9 June, water quality sampling took place in SMARC and city of San Marcos wells. (CSF 7.12.5.4)

During June, Randy Gibson continued to manage computer software and troubleshoot computer

operating issues at the SMARC.

In June, Valentin Cantu led a crew of ten CSR (Community Service Restitution) volunteers to trim and cut grass at the SMARC. In addition the volunteers dug and transferred about 2 cubic yards of black clay soil from the bottom of the Clayton Valve concrete box (L12' X W12' X H6') up to the surface and distributed the soil around the box.

During June, a contractor to trim trees on the SMARC water pipeline easement was awarded and the company began work.

Visitors

On 10 June, Valentin Cantu provided a tour to ten children attending the Primrose Summer Camp.

On 11 June, Valentin Cantu provided a tour to two adults and one teenager.

On 13 June, Randy Gibson conducted a tour for an adult and child.

On 20 June, Professor Benjamin Schwartz (TSU) visited SMARC with cave amphipod specimens for Randy Gibson to identify and was given instructions and examples to help him with future identifications.

On 24 June, Teresa Lewis, Marlene Rodarte, and Ashlie Rademacher (Dexter SNARRC Fish Health Unit), visited the SMARC to discuss biosecurity of the facility as well as to conduct a wild fish health survey of the Comal River.

On 25 June, Valentin Cantu provided a tour to five adults and two teenagers.

SMARC staff gave the City of San Marcos Conservation Crew a tour of the facility on June 25. The Conservation Crew was given 20-30 minutes briefs on the listed invertebrates, fishes, salamanders, and Texas wild rice. The Conservation Crew works in the San Marcos River during May to August to inform the public on conservation measures.