WATER QUALITY / VARIABLE FLOW STUDY
SUMMARY OF
FALL QUARTERLY SAMPLING
SAN MARCOS RIVER, SAN MARCOS, TEXAS
OCTOBER 24 – NOVEMBER 2, 2000

PBS&J

WATER QUALITY / VARIABLE FLOW STUDY

SUMMARY OF
FALL QUARTERLY SAMPLING
SAN MARCOS RIVER, SAN MARCOS, TEXAS
OCTOBER 24 – NOVEMBER 2, 2000

Prepared for:

Edwards Aquifer Authority
1615 N. St. Mary's Street
San Antonio, Texas 78215

Prepared by:

The PBS&J Project Team
206 Wild Basin Road, Suite 300
Austin, Texas 78746

January 2001

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES / FIELD DATA SHEETS

EXECUTIVE SUMMARY

This Annual Summary Report serves only to highlight the sampling activities that were conducted with respect to the Fall Quarterly Sampling (Comprehensive Monitoring Effort) on the San Marcos River. The report presents the sampling activities, brief summary of methodologies, sample locations, and raw data. The report also serves to satisfy the requirements of the Federal Fish and Wildlife Permit # TE820022-2. The data reduction and analysis component of the project will be presented in the final report to be issued to the Edwards Aquifer Authority in February 2003.

The PBS&J project team conducted the Fall Quarterly Sampling from 24 October to 2 November 2000 with the flows at San Marcos reporting 117 cfs on 27 October 2000, and 151 cfs on 2 November 2000. The sampling effort consisted of:

EVENT	DATE	LOCATION
Water Quality sampling	30 October	9 sites
Thermister placement	30 October - 1 November	
Aquatic Vegetation mapping	30-31 October	2 reaches
Fountain Darter sampling		
Drop nets	31 October - 1 November	2 reaches
Dip nets	5, 30 October	3 reaches
Visual observations	1 - 2 November	Spring Lake
Salamander observations	1 - 2 November	Spring Lake, Clear Springs Apartments
Exotic / Predation study	1 - 2 November	Spring Lake

Observations

Although the San Marcos River never reached the 100 cfs trigger level for critical period monitoring, it came very close. The 120 cfs trigger level was reached initiating specific Texas wild-rice observations. A critical period trip was initiated on 5 October when the flows had declined to 106 cfs. Dip netting activities were conducted on 5 October 2000. Several inches of rain fell over the weekend pushing the flows back up to approximately 114 cfs, thus cancelling the critical period trip. After that time, the flows at San Marcos stayed fairly stable until the completion of the Fall Quarterly Event. On the final day of sampling another round of heavy rainfall boosted the levels in the aquifer and thus increased the flows in the San Marcos system. However, the Fall Quarterly Event was conducted prior to this rainfall and represented fairly low-flow conditions.

Water quality was measured for the system during this effort with all parameters measured being suitable for the biological communities. Aquatic vegetation was abundant and provided suitable habitat for biological communities. Within the two reaches sampled for fountain darters via the drop net

methodology, suitable habitat for the darter was observed. Drop net sampling in both reaches produced fountain darters within the suitable aquatic vegetation types. In addition, dip net sampling was conducted in the Spring Lake Reach, City Park Reach, and I-35 Reach. Using dip nets, fountain darters were collected from all reaches. Suitable habitat for the San Marcos salamander was also noted in the four specific salamander sampling areas with salamanders observed in each area.

During the September and October Texas wild-rice efforts, floating mats of vegetation were evident in certain reaches. These mats of vegetation were subsequently flushed out by the heavy rainfalls that occurred post-sampling. The gill parasite that has been reported for the fountain darter in the Comal system was not visually evident in fountain darters collected from the San Marcos River.

As noted for the Comal system, the San Marcos Fall Quarterly Sampling provided a strong confirmation that the study design appears well suited to address the concerns of variable flow and water quality on the biological resources in the San Marcos system. **It must continue to be emphasized that additional sampling in variable flow conditions to compare back to this fall quarterly sampling effort and future efforts remains critically important in order to best define and understand the system.**

1.0 CRITICAL PERIOD SAMPLING

1.1 WATER QUALITY

The water quality component of the study includes water sampling and laboratory analyses, standard parameter measurement, and thermister deployment and retrieval. Dr. Alan Groeger of Southwest Texas State University (SWT) supervised all aspects of the water quality component of this study. The chemical analyses for Fall Quarterly Sampling were conducted in Dr. Groeger's laboratory at SWT.

On 30 October and 1 November 2000, the project team deployed thermisters at select water quality stations along the San Marcos River. The thermisters were set to record temperature data every five minutes. The station locations will not be described in detail as to prevent tampering with the equipment in the field.

On 30 October 2000, the project team performed a water quality evaluation on the San Marcos River (Figure 1). Sample sites were placed throughout the river as depicted in Figure 2 with descriptions in Table 1. At each water quality site, standard parameters, including temperature, dissolved oxygen, pH, and conductivity were measured using a Hydrolab multi-parameter probe provided by SWT. Whenever depths allowed, standard parameters were taken at the surface, mid-depth, and bottom. The depth of the site in meters was also recorded. Water samples were taken at each site that consisted of grab samples from just below the water surface. The water samples were labeled and stored in ice chests cooled with crushed ice until transport to SWT.

The standard parameter and water chemistry results are presented in Table 2.

1.2 AQUATIC VEGETATION MAPPING

The aquatic vegetation mapping effort consisted of mapping all of the vegetation within the City Park Reach and I-35 Reach as depicted on Figure 1. The mapping was conducted using a Trimble Pro-XRS GPS unit with real-time differential correction that can provide sub-meter accuracy. The GPS unit was linked to a Fujitsu Stylistic 2300 lap top computer with Aspen software to display real-time differentially corrected field data. The GPS unit and computer were placed in a 10-foot Perception Swifty kayak with the GPS unit antenna mounted on the bow. The aquatic vegetation was identified and mapped by maneuvering the kayak around the perimeter of each vegetation type at the water's surface. Vegetation stands that measured between 1.0 and 0.5 meters in diameter were mapped by recording a single point. Vegetation stands less that 0.5 meter in diameter were not mapped.

The aquatic vegetation maps created for both reaches are presented in sequence in the Figures section at the end of this section.

1.2.1 Texas Wild-rice Physical Observations

Surveys were conducted in the upper reach of the San Marcos River to identify, map and record any stands of Texas wild-rice that may be considered to be in vulnerable areas. Preliminary investigations were conducted along the San Marcos River from Spring Lake Dam to the confluence with the Blanco River to evaluate the general condition of all stands of Texas wild-rice. Texas wild-rice stands were considered to be in vulnerable areas if they possess one or more of the following: 1) occur in shallow water 2) reveal extreme root exposure due to scouring of substrate, or 3) appear to be in poor condition. For this study, a stand of Texas wild-rice is defined as a contiguous group of plants that are growing no closer than 1.5 feet from any other stand(s) of Texas wild-rice. After discussions with Dr. Robert Doyle of the University of North Texas and Ms. Paula Power of the U.S. Fish and Wildlife Service National Fish Hatchery and Technology Center it was concluded that in addition to evaluating stands in vulnerable areas, reference stands in suitable conditions should also be monitored. Therefore, all future efforts will include these reference sites.

Measurements were taken at each stand of Texas wild-rice that was considered to be in vulnerable areas. These measurements included a maximum length and a maximum width of each stand. The length was taken at the surface parallel to the stream current and extended from the base of the roots to the tip of the longest leaf. The width was measured the same way only perpendicular to the stream current and usually did not include roots. The area of each stand was calculated by a method used by Texas Parks and Wildlife Department (TPWD) (Poole, pers. comm.). An imaginary rectangle was created over the stand using the maximum length and maximum width. From this, the percent cover of Texas wild-rice was calculated to give estimated area.

At each stand of Texas wild-rice evaluated, flow measurements were taken at the upstream edge of each stand along with a minimum and maximum water depth. In addition to recording the flow and water depth at each stand, a cross-section of the river was also taken. This cross-section measured flow, depth and substrate at 1-meter intervals across the entire width of the river. Other anomalies that were observed and noted during field efforts include stands that: show signs of extreme predation on the foliage, appear to shaded out by other floating vegetation, reveal abundant algae build up on foliage or were currently in bloom. Notes were also taken on any adverse impacts to the Texas wild-rice due to recreation or predators. It should be noted that the Texas wild-rice stands that the project team has identified as "vulnerable areas" does not necessarily mean that under continuing low-flow conditions the plant would die.

On 7 September 2000, the project team floated the San Marcos River to Cummings dam to evaluate the condition of Texas wild-rice stands throughout their range. The flow reported at the USGS gage on that date was 114 cfs. On 20 and 21 September 2000, 19 representative stands of Texas wild-rice identified by the project team as being in vulnerable areas were selected for further study. During this investigation, the flow reported at the USGS gage ranged from 110-108 cfs. Eight of the stands occurred within the Sewell Park reach of the San Marcos River. These stands occurred in minimum depths of water with roots exposed at the surface to 10.8 inches in depth. The particular stand that occurred at 10.8 inches exhibited signs of root exposure. Stands that occur within this stretch were mapped with a Trimble Pro-XRS GPS unit with real-time differential correction.

Eight stands were observed in the reach from Rio Vista Dam to I-35. These stands occurred in minimum depths of water of 6.0 inches to 12 inches. Although some these plants occur at greater depths, abundant algae growth and sediment deposits on the leaves merit these stands status of being in vulnerable areas. Due to significant canopy cover and adverse weather conditions, these stands were not mapped with a GPS.

Three additional stands of Texas wild-rice evaluated occur in the stretch from Cape's Dam to the sewage treatment plant. These stands occur in minimum depths from 4.8 inches to 10.8 inches. The stand that occurs in a minimum depth of 10.8 inches occurs on the inside of a river bend with the outside channel reaching depths of 39.6 inches. Due to significant canopy cover and adverse weather conditions, these stands were not mapped with a GPS.

On 5-6 October, a preliminary investigation to evaluate Texas wild-rice conditions throughout the reach and the 19 identified stands was conducted. The flows reported at the USGS gage on these dates ranged from 106-108 cfs.

1.3 HABITAT QUALITY INDEX / PHOTO DOCUMENTATION

During the water quality collection effort, the project team provided an ecologist to conduct habitat evaluations and fixed station photography. A habitat quality index has been developed for this project and was utilized for the critical period sampling effort. A defined ranking method for the HQI categories is being finalized by the project team and thus, the HQI field sheets are not included in this report.

In addition, fixed photographs, which included an upstream, across-stream, and downstream location were taken at each HQI site. The list of fixed photographs is presented in Table 3.

1.4 FOUNTAIN DARTER SAMPLING

Drop Nets

On 31 October 2000 and 01 November 2000, the project team performed drop net sampling at the City Park Reach and I-35 Reach as depicted in Figure 1. The two reaches for aquatic vegetation mapping and fountain darter sampling by drop net are listed below with the number of drop net samples taken from each reach:

City Park Reach	8 drop net samples	31 October
I-35 Reach	8 drop net samples	1 November

Within each reach, drop nets were placed in specific aquatic vegetation types that had been selected through stratified random methods. As previously described, the aquatic vegetation was mapped in these reaches prior to drop net sampling. The drop net sampled a $2m^2$ area using a rectangular drop net structure. Fifteen sweeps through the drop net area were completed with a specially constructed dip net. At each location, vegetation type, vegetation height and areal coverage, substrate type, mean column velocity and velocity at 15cm above the bottom, water temperature, conductivity, pH, and dissolved oxygen were recorded. Vegetation type, height, areal coverage, and substrate were also noted for all adjacent 3m cell areas. Darters were identified, enumerated, measured, and returned to the river at the point of collection. Other fish species were identified, measured and released, or preserved for identification at the PBS&J nekton laboratory. The total number per species and the standard length for fish were recorded for drop net samples. All live ramshorn snails were counted, measured, and destroyed. In addition, crayfish and grass shrimp were identified and enumerated. The exotic Asian snails (*Melanoides tuberculata* and *Thiara granifera*) and Asian clam (*Corbicula* sp.) were identified and a general abundance recorded (i.e., none, slight, moderate, or heavy).

The drop net sites are depicted on the aquatic vegetation maps for the respective reaches. The data sheets for the drop net sampling are presented in the Tables section by reach and specific site, respectively.

Dip nets

In addition, dip net collections were conducted to record presence/absence information throughout the system and to provide fountain darters for refugia. Dip netting for fountain darters was conducted for predetermined length of time for each of the reaches: Hotel Reach (1 hour), City Park Reach (1 hour), and the I-35 Reach (1 hour) (Figure 1). Fountain darters were identified, enumerated, measured, and returned to the river at the point of collection. The areas of fountain darter collection were marked on a base map. The number of exotic snails was visually observed and abundance's estimated. Fountain

darters were also collected for refugia purposes under the discretion of Dr. Thomas Brandt (U.S. Fish and Wildlife Service National Fish Hatchery and Technology Center).

Dip netting activities occurred on the San Marcos River on both 5 October and 30 October 2000. As previously mentioned, a critical period event was initiated on 5 October that started with a round of dip net sampling. Heavy rainfall over the weekend caused the termination of the critical period event. The second dip netting effort was conducted in conjunction with the Fall Quarterly Event. The dip net results are presented in Table 4.

Minnow Traps

This component of the monitoring plan consists of deploying Gee minnow traps in potential fountain darter habitat for the collection of darters. This non-destructive method will be evaluated during this project with respect to potential long-term monitoring opportunities. As with the other collection techniques, once identified, enumerated, and measured, all fountain darters will be returned to the water at the point of collection. Other fish species collected will be identified and enumerated, prior to release.

As a factor of the mixed results from the second critical period monitoring on the Comal system, it was determined by the project team that some trap modification and subsequent laboratory investigation needed to take place before additional usage of the minnow traps. Thus, no minnow traps were deployed during the Fall Quarterly Sampling on the San Marcos River.

Visual Observations of fountain darters via SCUBA

Visual aquatic surveys were conducted using SCUBA in Spring Lake to identify fountain darters and salamanders at depths deeper than conventional sampling methods allow. Areas were surveyed to define what may be considered potential deeper water habitat. A time-constraint survey was conducted with observations of all fish species while focusing on species on the bottom. Larger rocks were overturned at the substrate surface to expose any fountain darters or salamanders. All fountain darters and salamanders were noted. A second focus of the visual observations was to identify suitable habitat areas for both the darters and salamanders and subsequently set gill nets in these areas for the predation component of the study.

This survey revealed the presence of both fountain darters and salamanders in Spring Lake. Fountain darters were observed throughout the sample areas around larger rocks associated with filamentous algae. Salamanders were observed around portions of the springs, under rocks.

Gill parasite evaluation

A small number of darters from specific size categories were collected by Dr. Brandt and returned to the National Fish Hatchery and Technology Center for gill parasite evaluation. The results of that evaluation were not present at the time of this report.

1.5 SALAMANDER VISUAL OBSERVATIONS

The project team performed surveys for the San Marcos salamanders in three areas in Spring Lake and one area below Spring Lake dam adjacent to Clear Springs Apartments. Underwater surveys were conducted using SCUBA at spring locations at the bottom of Spring Lake to record and estimate populations of the San Marcos salamander. Salamander surveys were conducted below Spring Lake dam using a mask and snorkel. Sample locations were selected from areas previously surveyed by Nelson (1993). Sample site areas were defined as spring locations void of macrophytic vegetation with a rock substrate. Sample methodology followed Nelson (1993).

Salamander surveys were conducted at locations 2, 11, and 14 as defined in Nelson (1993). Sample site 2 occurs near the Aquarena Springs Hotel, Sample site 11 occurs near the bank across from the Aquarena Springs Show Area and Sample site 14 occurs across from the Cutter Boat Dock in the Big Riverbed. Sample site 21 is located just below Spring Lake Dam and is divided into four smaller areas. This subdivision of Sample site 21 was created in order to sample several smaller areas within dense vegetation below the dam. Salamander densities for the smaller areas were averaged. At each sample site, flagging tape was used to delineate the sample area, which consisted of bare substrate void of macrophytic vegetation or silt within a spring location.

A 5-minute time-constraint survey was conducted at each sample site to determine the number and/or presence of salamanders. During the 5-minute survey, rocks were turned over to reveal any salamanders that were present. The number of rocks turned over and the number of salamanders observed under the rocks were recorded. Rock densities for each sample site were determined using a quarter-meter square constructed out of steel rod. The sample square was randomly thrown within each sample site and the number of rocks that may potentially harbor salamanders were counted. This procedure was repeated three times and then averaged.

The area of each sample site was then determined using two sets of ropes connected 60cm apart by steel rods. One rod was fixed at the end of the ropes while the other rod had loops that allowed the rod to slide up and down the ropes keeping them parallel. Marks were placed every 60cm on each rope in order to determine the placing of the sliding rod. One set of rods and 60cm parallel ropes were placed lengthwise across the sample area while another set of rods and rope were place perpendicular to the first at the 60 cm marks. While the first set of rods and rope remained stationary lengthwise, the

second set was flipped at each 60cm interval over the entire sample area. At every flip of the rods and rope, the number of squares were counted, along with a percentage cover in each square that extended into the vegetation or silt. This method allowed for a 60cm square grid to be established across the sample site in order to determine the area.

Data recorded during the aforementioned procedures were used to calculate estimated salamander populations within each sample area presented below.

Salamander Survey Results, San Marcos, Texas

Sample Site	Area (ft^2)	No. Rocks in Area	No. Rocks / Salamander	Estimated No. Salamanders in Area
2	476.64	2066.47	2.41	857.20
11	89.13	66.24	5.40	12.27
14	713.01	529.93	2.33	227.11
21	92.04	211.93	11.42	47.35

Survey methods revealed that the Sample site 2 area is approximately 476.6 ft^2. It was determined that approximately 2,067 rocks occur within this area with one salamander occurring under every 2.41 rocks. The survey results give an estimated salamander population in Sample site 2 of 857.2 salamanders. The area of Sample site 11 is estimated to be 89.1 ft^2. It was determined that 66 rocks occur within this area with one salamander occurring under every 5.4 rocks. The population estimation for Sample site 11 is 12.27 salamanders. Sample site 14 is measured to be 713.0 ft^2 with 529 rocks. It was determined that one salamander occurs under every 2.3 rocks. The survey results give an estimated population of 227.11 salamanders in Sample site 14.

Sample site 21 was divided into four areas. These four areas range in size from 77.5 ft^2 to 278.4 ft^2. Due to the small size of these areas, each was measured separately and was averaged. The average size of Sample site 21 is estimated at 92.0 ft^2. The average number of rocks in these areas are 211.9 with one salamander occurring under every 11.4 rocks. The total population in Sample site 21 is estimated to be 47.35 salamanders.

These estimates will be used as an index for the San Marcos salamander population within these sample sites over this study. Due to limited sampling efforts, this data is not recommended to determine any population trends when compared to Nelson (1993). More sampling efforts will occur throughout the study.

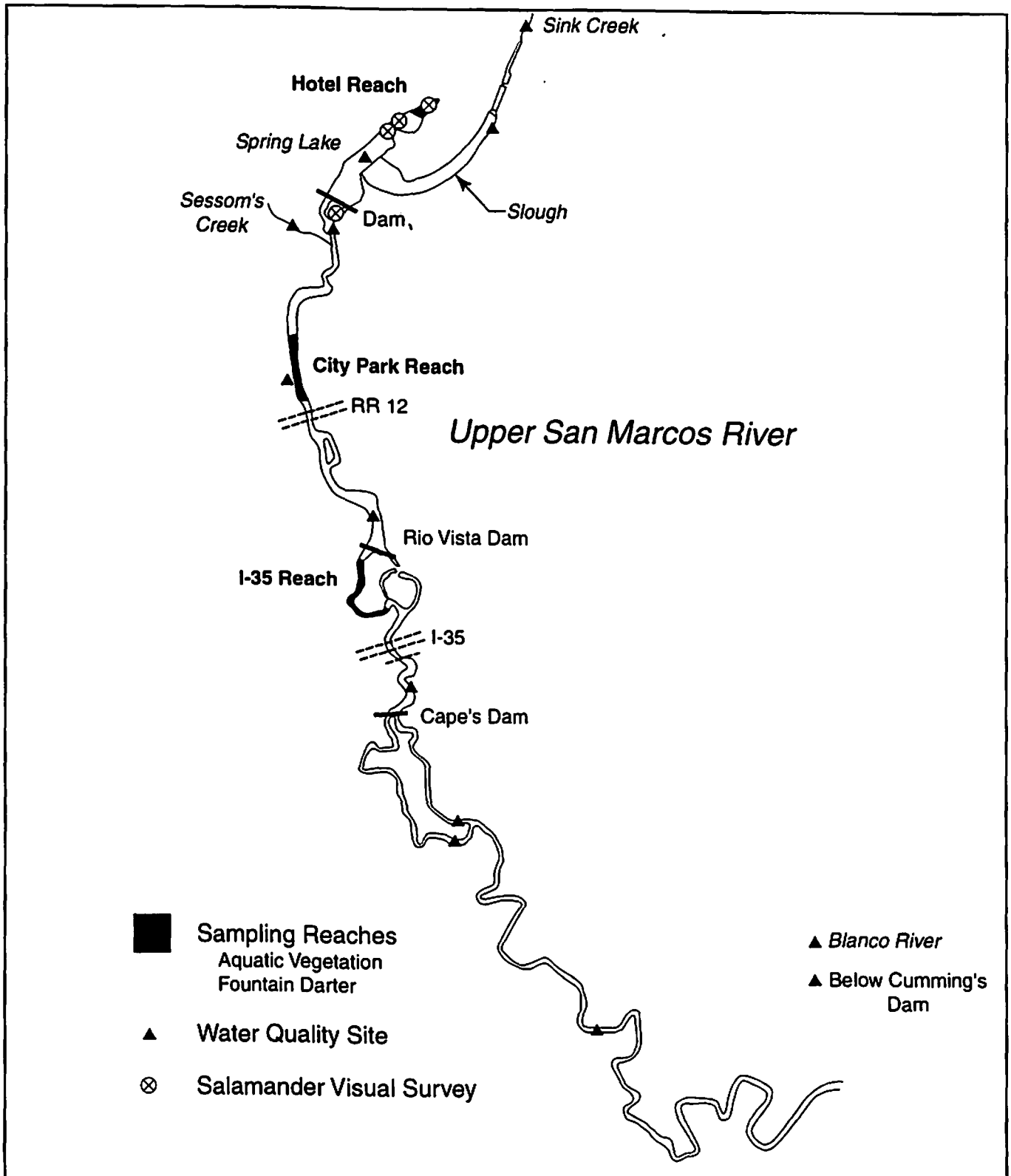
1.6 EXOTICS / PREDATION STUDY

A 150 ft experimental gill net with mesh sizes ranging from ¾ to 3 inches was placed in Spring Lake to collect nekton of various species and sizes. The gill net evaluation was conducted for a preliminary

examination of exotic fish concentrations in Spring Lake and for stomach content analyses with respect to predation of endangered species. The gill net was placed in the area documented as supporting fountain darters and salamanders through previously described SCUBA activities. All fish collected in the gill net were identified, enumerated, weighed and measured. A number of representative fish were taken from different species and different size classes within species for stomach content analyses. The fish were stored on crushed ice until transferred to the PBS&J Nekton Laboratory where the stomach was removed and contents examined. The focus is on predation of fountain darters and/or salamanders by the various species and size classes.

The gill net data along with stomach contents is presented in Table 6. The information is highlighted by the detection of a San Marcos salamander in the stomach of a largemouth bass.

FIGURES

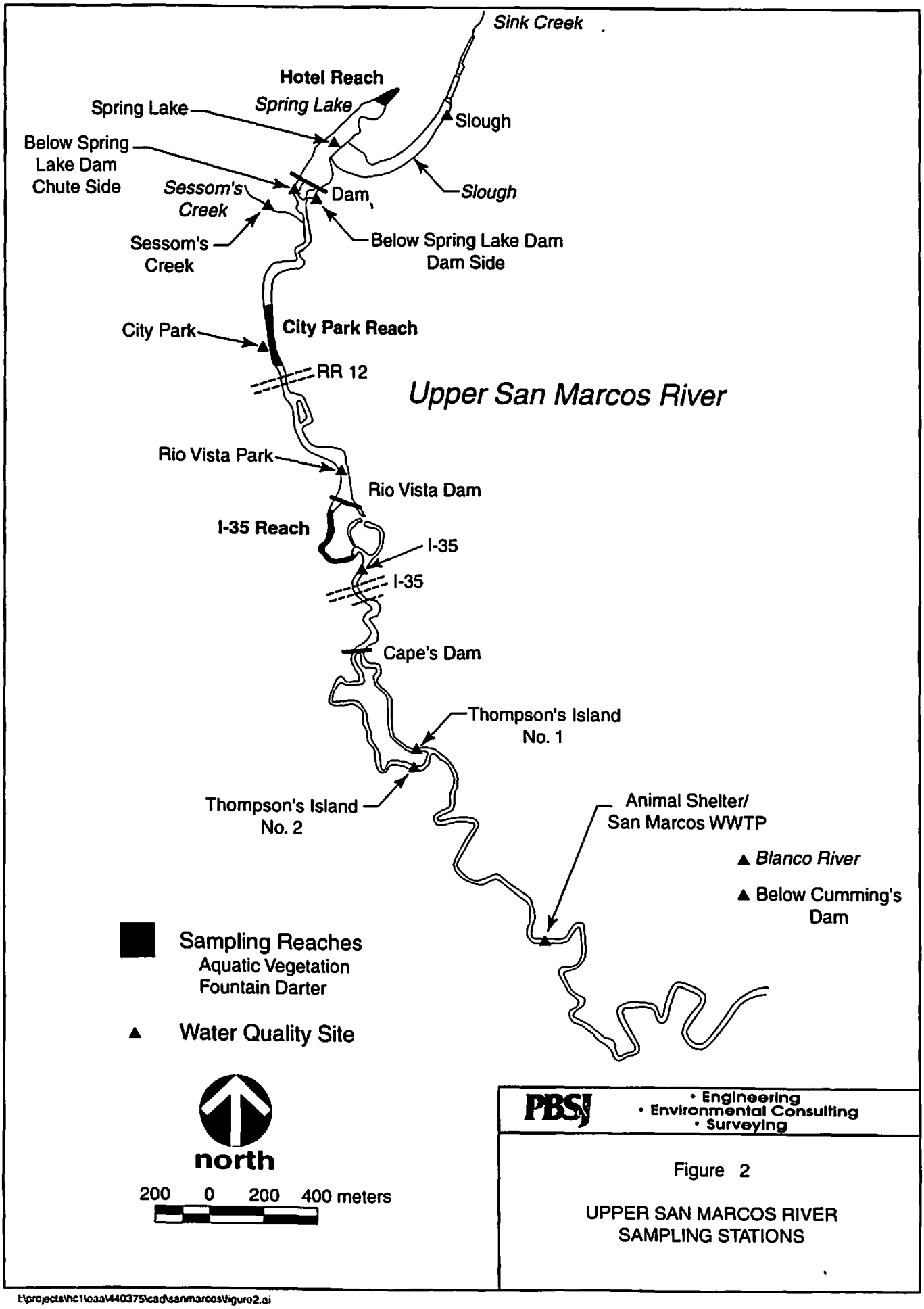


PBSJ • Engineering • Environmental Consulting • Surveying

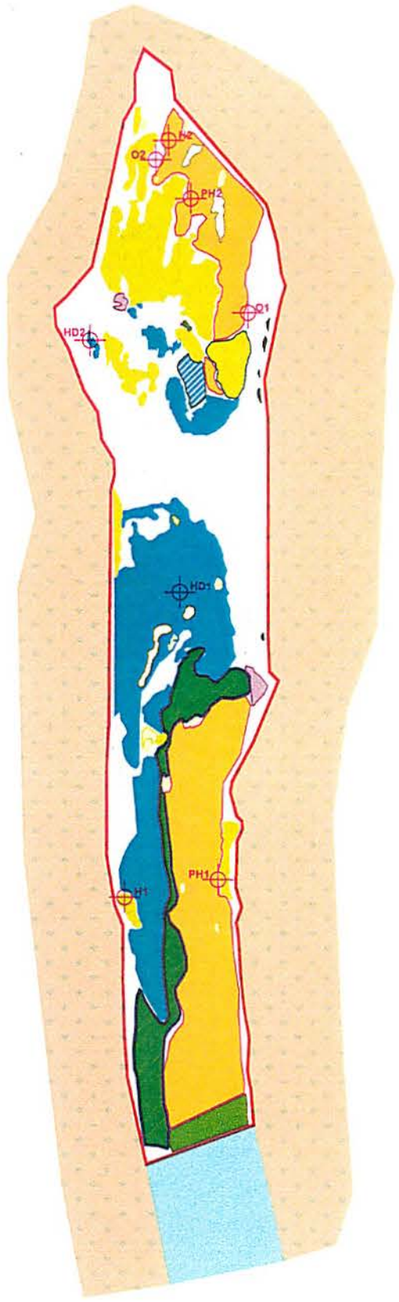
Figure 1

UPPER SAN MARCOS RIVER
WATER QUALITY AND
BIOLOGICAL SAMPLING AREAS

I:\projects\hc1\eaa\440375\cad\sanmarcos\figure1.ai



t:\projects\hc1\caa\440375\cad\sanmarcos\figure2.ai



north

Scale: 1" = 100'

EDWARDS AQUIFER
AUTHORITY

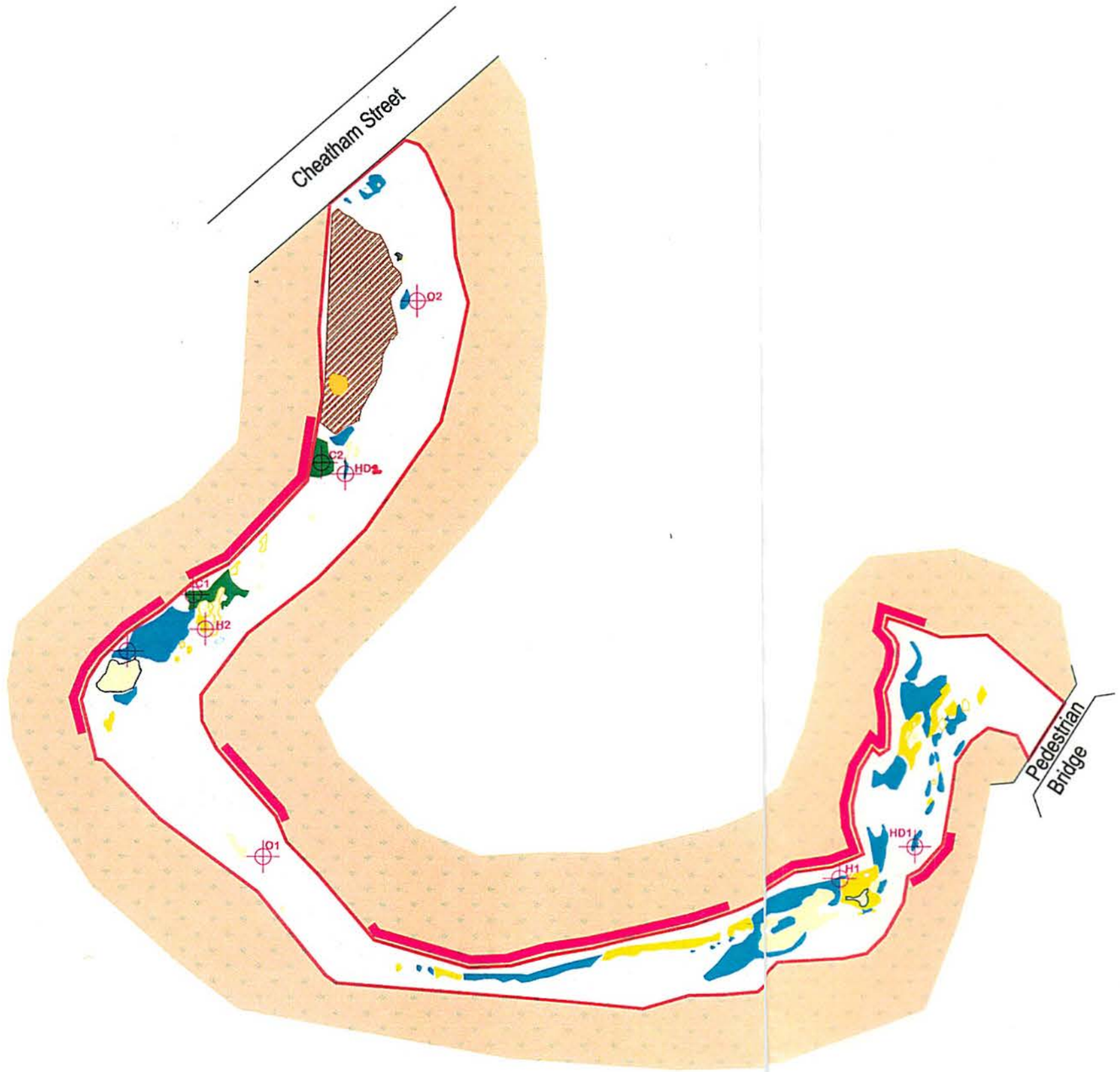
San Marcos River Aquatic Vegetation
City Park Reach
October 30, 2000

Legend

	Acres
- Study Area	1.5101
- Vallisneria	0.0055
- Potamogeton	0.0205
- Potamogeton / Hydrilla	0.0090
- Potamogeton / Hygrophila	0.3376
- Potamogeton / Hygrophila / Sagittaria	0.0182
- Potamogeton / Hydrilla / Hygrophila	0.0933
- Zizania	0.0063
- Hygrophila	0.1291
- Heteranthera / Hygrophila	0.0001
- Heteranthera	0.0001
- Hydrilla	0.2766
- Ludwigia	0.0001
- Bare Substrate	0.6137
- Shoreline / Island	
- San Marcos River	
- Drop Net Sample Sites	

PBS&J

JAN 22, 2001-4:06 PM TM13075 PATH:D:\Projects\440375 EAA\EAA San Marcos\SanMarcos.dwg



EDWARDS AQUIFER
AUTHORITY

San Marcos River Aquatic Vegetation
I-35 Reach
October 31, 2000

Legend

	Acres
- Study Area	1.3305
- Cabomba / Hygrophila / Ceratopteris	0.0071
- Nuphar / Justicia	0.1020
- Colocasia	
- Sagittaria / Hygrophila / Cabomba	0.0025
- Sagittaria	0.0103
- Eichhornia	0.0029
- Zizania	0.0199
- Hygrophila	0.0333
- Hydrilla / Hygrophila	0.0276
- Heteranthera	0.0003
- Hydrilla	0.0685
- Ludwigia	0.0045
- Bare Substrate	1.0516
- Shoreline / Island	
- San Marcos River	
- Drop Net Sample Sites	

north

Scale: 1" = 80'

PBS&J

JAN 22, 2001-10:27 AM TM13075 PATH:D:\Projects\440375 EAA\EAA San Marcos\SanMarcos.dwg

TABLES

TABLE 1
WATER QUALITY SITES - STATION ABBREVIATIONS

Reach	Abbreviation
Thompson's Island # 1	TI-1
Thompson's Island # 2	TI-2
Animal Shelter/SMWWTP	AS/WWTP
I-35	I-35
Rio Vista Park	RVP
City Park	CP
Below Spring Lake Dam - Dam Side	SLD
Below Spring Lake Dam - Chute Side	SLC
Sessom's Creek	SC

TABLE 2
WATER QUALITY STANDARD PARAMETERS
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING
OCTOBER 30, 2000

Reach	Time	Depth (m)	Standard Parameters											
			Surface				Mid				Bottom			
			Temp. (°C)	DO (mg/L)	pH	Cond. (umhos/cm)	Temp. (°C)	DO (mg/L)	pH	Cond. (umhos/cm)	Temp. (°C)	DO (mg/L)	pH	Cond. (umhos/cm)
Thompson's Island # 1	0850	2.4	22.57	8.37	7.67	580	22.51	8.15	7.62	580	22.51	8.28	7.63	580
Thompson's Island # 2	0913	0.46	--	--	--	--	22.5	9.80	7.74	579	--	--	--	--
Animal Shelter/SMWWTP	1015	0.3	--	--	--	--	22.62	10.39	7.78	575	--	--	--	--
I-35	1045	0.61	--	--	--	--	22.64	10.88	7.67	576	--	--	--	--
Rio Vista Park	1115	2	22.85	11.68	7.57	579	22.83	11.47	5.57	578	22.85	11.04	7.59	579
City Park Reach	1318	1.5	23.28	11.6	7.66	575	--	--	--	--	23.26	11.57	7.61	578
Below Spring Lake Dam - Dam Side	1402	0.76	--	--	--	--	23.34	10.91	7.52	574	--	--	--	--
Below Spring Lake Dam - Chute Side	1402	0.91	--	--	--	--	23.01	10.61	7.47	578	--	--	--	--
Sessom's Creek	1420	0.11	--	--	--	--	23.33	8.63	7.42	607	--	--	--	--

TABLE 2 (Concluded)
WATER QUALITY RESULTS
SAN MARCOS RIVER - FALLL QUARTERLY SAMPLING
OCTOBER 30, 2000

Reach	Turbidity (NTU)	Alkalinity (meq/L)	SRP (ugP/l)	TP (ug/l)	NH3-N (mg/L)	N03-N (mg/L)	TN-N (mg/L)	TSS (mg/L)
Thompson's Island # 1	3.8	4.61	4.44	9.21	0.046	1.012	1.147	0.0036
	3.3	4.67	3.90	9.55	0.046	1.132	1.192	0.0040
Thompson's Island # 2	3.7	4.65	3.92	11.62	0.021	1.050	1.378	0.0036
Animal Shelter/SMWWTP	4.6	4.36	4.62	18.52	0.057	1.203	1.604	0.0078
I-35	2.3	4.50	5.49	10.93	0.127	1.447	1.121	0.0016
Rio Vista Park	2.1	4.57	3.97	9.55	0.127	1.390	2.824	0.0014
	1.9	4.77	4.23	9.90	0.157	1.419	2.406	0.0010
City Park Reach	1.9	5.25	4.96	12.31	0.116	1.236	1.534	0.0018
Below Spring Lake Dam - Dam Side	1.3	4.76	4.09	3.34	0.032	1.203	2.332	0.0008
Below Spring Lake Dam - Chute Side	1.1	5.21	4.79	7.83	0.043	1.157	1.183	0.0004
Sessom's Creek	2.2	4.61	4.44	18.17	0.105	1.349	1.089	0.0020

TABLE 3
LIST OF FIXED PHOTOGRAPHS
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Reach	Upstream	Across-Stream	Downstream
Thompson's Island # 1	x	x	x
Thompson's Island # 2	x	x	x
Animal Shelter/SMWWTP	x	x	x
I-35	x	x	x
Rio Vista Park	x	x	x
City Park	x	x	x
Below Spring Lake Dam - Dam Side	x	x	x
Below Spring Lake Dam - Chute Side	x	x	x
Sessom's Creek	x	x	x

DROP NET – FIELD DATA SHEETS

CITY PARK REACH

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach): City Park		**Site:** H1 - Site 1	
Date: 10/31/00	**Time:** 0826-0940	**Observer(s):** LV, EO, DT, MH	
Vegetation:	Type: *Hygrophila*		
	Height: 0.58 m		
	Areal Coverage: 100%		
	GPS location: 29° 53' 07.9"N ; 97° 56' 09.3"W		
Substrate Type:	Clay, silt		
Mean Column Velocity: 60% - 0.16 m/s	Surface - 0.22 m/s	Velocity at 15cm above the bottom: 0.03 m/s	
Standard Parameters: 0939	Surface	Mid	Bottom
Temperature (C°)	22.36	--	22.35
Dissolved Oxygen (mg/l)	8.08	--	7.91
pH	7.64	--	7.64
Conductivity	589.0	--	599.0
Secchi depth (cm)	Clear to bottom		
Depth (fixed) (meters): 0.82 m			
Adjacent 3m cell areas:			
Vegetation type:	*Hygrophila / Hydrilla /* bare channel bottom		
Vegetation height:	0.85 m / 0.73 m		
Areal coverage:	10% / 60% / on edge / 30%		
Substrate type:	Clay, silt		
Sample Label:	**Preservative:**		
Snails: *Melanoides tuberculata* - sparse / *Thiara granifera* - sparse / *Elimia comalensis* - sparse			
Sample Label:	**Preservative:**		
Number of live Ramshorn snails	Average Size (mm)		
1	N/A		

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		Site:
City Park		H1 Site 1
Date:	**Time:**	**Observer(s):**
10/31/00	0826-0940	LV, EO, DT, MH

Overall	Species	Number	Avg. Length (mm)
2	*Ambloplites rupestris*	2	38.5
sparse	*Corbicula* sp.		--
sparse	*Elimia comalensis*		--
7	*Etheostoma fonticola*	7	26.7
184	*Gambusia* sp.	55	19.1
1	*Lepomis megalotis*		--
1	*Marisa cornuarietis*		--
sparse	*Melanoides tuberculata*		--
28	*Palaemonetes* sp.		--
5	*Procambarus* sp.		--
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Elimia comalensis*	sparse	
	Gambusia sp.	26	23,20,14,23,17,21,14,15, 18,16,18,13,14,17,15,21, 17,24,14,17,21,18,22,22, 16,14
	Palaemonetes sp.	7	
	Procambarus sp.	1	
2	*Etheostoma fonticola*	1	30
	Gambusia sp.	39	18,24,13,12,14,27,30,23, 27,31,27,15,16,17,21,22, 23,23,24,12,30,24,15,21 13,14,15,16,20
	Palaemonetes sp.	14	
	Procambarus sp.	1	
3	*Gambusia* sp.	40	
	Palaemonetes sp.	2	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Dip net sweep	Species	Number	Length (mm)
4	*Ambloplites rupestris*	1	37
	Corbicula sp.	1	
	Elimia comalensis	sparse	
	Etheostoma fonticola	2	31,24
	Gambusia sp.	11	
	Marisa cornuarietis	1	
	Melanoides tuberculata	9	
	Palaemonetes sp.	2	
	Procambarus sp.	2	
	Thiara granifera	4	
5	*Etheostoma fonticola*	1	19
	Gambusia sp.	6	
	Procambarus sp.	1	
	Thiara granifera	2	
6	*Ambloplites rupestris*	1	40
	Etheostoma fonticola	2	32,27
	Gambusia sp.	19	
	Lepomis megalotis	1	
	Melanoides tuberculata	3	
	Palaemonetes sp.	1	
7	*Corbicula* sp.	1	
	Gambusia sp.	9	
	Melanoides tuberculata	1	
8	*Etheostoma fonticola*	1	27
	Gambusia sp.	3	
	Palaemonetes sp.	1	
9	*Gambusia* sp.	4	
	Procambarus sp.	2	
10	*Corbicula* sp.	1	
	Gambusia sp.	7	
11	*Gambusia* sp.	5	
12	*Gambusia* sp.	3	
13	*Gambusia* sp.	11	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Dip net sweep	Species	Number	Length (mm)
14	No fish or crustaceans collected		
15	*Corbicula* sp.	sparse	
	Gambusia sp.	1	

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach): City Park		**Site:** PH1 - Site 2	
Date: 10/31/00	**Time:** 0945-1043	**Observer(s):** LV, DT, EO, MH	
Vegetation:	Type:	*Potamogeton / Hygrophila*	
	Height:	Surface / 10 cm	
	Areal Coverage:	50% / 50%	
	GPS location:	29° 53' 07.9"N ; 97° 56' 08.6"W	
Substrate Type:	Clay, mud, silt with some sand (sank to knees at this station)		
Mean Column Velocity: 60% - 0.1 m/s		Velocity at 15cm above the bottom: 0.08 m/s	

Standard Parameters: 1036	Surface	Mid	Bottom
Temperature (C°)	22.46	--	22.44
Dissolved Oxygen (mg/l)	8.00	--	7.89
pH	7.62	--	7.60
Conductivity	598.0	--	599.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters): 0.39 m

Adjacent 3m cell areas:

Vegetation type:	*Potamogeton / Hygrophila* / Bare channel bottom
Vegetation height:	Surface / 10 cm / N/A
Areal coverage:	40% / 50% / 10%
Substrate type:	Clay, mud, silt with some sand

Sample Label:	**Preservative:**

Snails: *Thiara granifera* - sparse / *Elimia comalensis* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	--

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		Site:
City Park		PH1 - Site 2
Date:	**Time:**	**Observer(s):**
10/31/00	0945-1043	LV, EO, DT, MH

Overall	Species	Number	Avg. Length (mm)
sparse	*Elimia comalensis*		--
14	*Etheostoma fonticola*	14	27.3
234	*Gambusia* sp.	25	20.7
1	*Lepomis macrochirus*	1	48.0
4	*Palaemonetes* sp.		--
2	*Poecilia latipinna*	1	27.0
8	*Procambarus* sp.		--
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Elimia comalensis*	sparse	
	Gambusia sp.	73	17,27,18,23,22,23,24,17, 32,24,27,17,19,25,17,18, 26,16,14,17,23,25,18,16, 12
	Palaemonetes sp.	1	
	Poecilia latipinna	1	
	Procambarus sp.	2	
	Thiara granifera	6	
2	*Etheostoma fonticola*	2	29,27
	Gambusia sp.	36	
	Thiara granifera	1	
3	*Etheostoma fonticola*	3	26,22,21
	Gambusia sp.	31	
	Lepomis macrochirus	1	48
	Palaemonetes sp.	1	
	Poecilia latipinna	1	27
	Procambarus sp.	2	
	Thiara granifera	1	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Dip net sweep	Species	Number	Length (mm)
4	*Elimia comalensis*	sparse	
	Etheostoma fonticola	3	33,27,26
	Gambusia sp.	21	
	Palaemonetes sp.	2	
	Thiara granifera	12	
5	*Etheostoma fonticola*	2	25,26
	Gambusia sp.	40	
	Thiara granifera	8	
6	*Etheostoma fonticola*	1	27
	Gambusia sp.	10	
	Procambarus sp.	2	
	Thiara granifera	3	
7	*Etheostoma fonticola*	1	31
	Gambusia sp.	7	
	Thiara granifera	1	
8	*Etheostoma fonticola*	2	32,30
	Gambusia sp.	3	
	Thiara granifera	1	
9	*Gambusia* sp.	2	
	Procambarus sp.	1	
	Thiara granifera	1	
10	*Gambusia* sp.	1	
11	*Gambusia* sp.	5	
	Procambarus sp.	1	
	Thiara granifera	1	
12	*Gambusia* sp.	2	
13	*Gambusia* sp.	1	
14	*Gambusia* sp.	1	
15	*Gambusia* sp.	1	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach): City Park		**Site:** HD1 - Site 3	
Date: 10/31/00	**Time:** 1053-1149	**Observer(s):** LV, EO, DT, MH	
Vegetation:	Type:	*Hydrilla* / Bare channel bottom	
	Height:	0.64 m / N/A	
	Areal Coverage:	60% / 40%	
	GPS location:	29° 53' 09.8"N ; 97° 56' 08.8"W	
Substrate Type:	Silt on top of gravel		
Mean Column Velocity: 60% - 0.01 m/s		Velocity at 15cm above the bottom: 0.01 m/s	

Standard Parameters: 1143	Surface	Mid	Bottom
Temperature (C°)	23.19	--	22.81
Dissolved Oxygen (mg/l)	9.09	--	5.53
pH	7.72	--	7.31
Conductivity	599.0	--	599.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters): 1.0 m

Adjacent 3m cell areas:

Vegetation type:	*Hydrilla* / Bare channel bottom
Vegetation height:	0.61 m to the surface / N/A
Areal coverage:	80% / 20%
Substrate type:	Silt on top of gravel

Sample Label:	**Preservative:**

Snails: *Thiara granifera* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	--

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		Site:
City Park		HD1 - Site 3
Date:	**Time:**	**Observer(s):**
10/31/00	1053-1149	LV, EO, DT, MH

Overall	Species	Number	Avg. Length (mm)
16	*Etheostoma fonticola*	16	26.2
620	*Gambusia* sp.	25	18.2
1	*Lepomis auritus*	1	124.0
1	*Palaemonetes* sp.		--
9	*Procambarus* sp.		--
7	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Etheostoma fonticola*	5	22,33,21,26,21
	Gambusia sp.	24	14,20,18,11,23,24,16,14 23,24,23,15,15,17,13,17 21,22,15,14,12,21,14,15
	Lepomis auritus	1	124
	Thiara granifera	1	
2	*Gambusia* sp.	64	33
	Procambarus sp.	2	
	Thiara granifera	1	
3	*Etheostoma fonticola*	1	38
	Gambusia sp.	187	
	Procambarus sp.	2	
4	*Etheostoma fonticola*	2	23,23
	Gambusia sp.	39	
	Procambarus sp.	2	
5	*Etheostoma fonticola*	3	30,22,28
	Gambusia sp.	96	
	Thiara granifera	1	
6	*Gambusia* sp.	20	
	Procambarus sp.	1	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Dip net sweep	Species	Number	Length (mm)
7	*Etheostoma fonticola*	1	25
	Gambusia sp.	92	
	Thiara granifera	1	
8	*Etheostoma fonticola*	1	28
	Gambusia sp.	35	
	Thiara granifera	1	
9	*Gambusia* sp.	8	
	Palaemonetes sp.	1	
	Thiara granifera	1	
10	*Etheostoma fonticola*	1	24
	Gambusia sp.	25	
	Procambarus sp.	1	
11	*Etheostoma fonticola*	1	28
	Gambusia sp.	10	
	Procambarus sp.	1	
12	*Gambusia* sp.	5	
	Thiara granifera	1	
13	*Etheostoma fonticola*	1	27
	Gambusia sp.	8	
14	*Gambusia* sp.	5	
15	*Gambusia* sp.	10	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		**Site:**
City Park		HD2 - Site 4
Date:	**Time:**	**Observer(s):**
10/31/00	1157-1243	LV, DT, EO, MH

Vegetation:	Type:	*Hydrilla* / Bare channel bottom
	Height:	Surface
	Areal Coverage:	95% - 5%
	GPS location:	29° 53' 11.5"N ; 97° 56' 09.3"W
Substrate Type:	Cobble and silt	

Mean Column Velocity:	Velocity at 15cm above the bottom:
60% - 0.02 m/s	0.02 m/s

Standard Parameters: 1236	Surface	Mid	Bottom
Temperature (C°)	23.25	–	23.02
Dissolved Oxygen (mg/l)	8.24	–	8.39
pH	7.63	–	7.58
Conductivity	594.0	–	597.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters):

0.49 m

Adjacent 3m cell areas:

Vegetation type:	*Hydrilla* / Bare channel bottom
Vegetation height:	Surface / N/A
Areal coverage:	50% / 50%
Substrate type:	Cobble and silt

Sample Label:	**Preservative:**

Snails: *Thiara granifera* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	–

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		Site:
City Park		HD2 - Site 4
Date:	**Time:**	**Observer(s):**
10/31/00	1157-1243	LV, DT, EO, MH

Overall	Species	Number	Avg. Length (mm)
1	*Ambloplites rupestris*	1	222.0
1	*Dionda episcopa*		--
12	*Etheostoma fonticola*	12	28.0
216	*Gambusia* sp.	25	20.3
1	*Palaemonetes* sp.		--
7	*Procambarus* sp.		--
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Ambloplites rupestris*	1	222
	Etheostoma fonticola	2	27,26
	Gambusia sp.	28	23,16,19,22,24,27,14,24, 27,16,19,24,13,15,23.15, 16,23,18,27,16,11,33,27, 16
	Palaemonetes sp.	1	
	Procambarus sp.	1	
	Thiara granifera	sparse	
2	*Etheostoma fonticola*	3	32,28,27
	Gambusia sp.	19	
	Procambarus sp.	1	
3	*Gambusia* sp.	14	
4	*Gambusia* sp.	13	
5	*Dionda episcopa*	1	
	Gambusia sp.	19	
	Thiara granifera	sparse	
6	*Gambusia* sp.	26	
	Procambarus sp.	1	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Dip net sweep	Species	Number	Length (mm)
7	*Etheostoma fonticola*	1	37
	Gambusia sp.	20	
	Procambarus sp.	2	
	Thiara granifera	sparse	
8	*Gambusia* sp.	12	
	Thiara granifera	sparse	
9	*Etheostoma fonticola*	2	31,13
	Gambusia sp.	5	
10	*Etheostoma fonticola*	2	26,31
	Gambusia sp.	10	
11	*Gambusia* sp.	3	
	Thiara granifera	sparse	
12	*Etheostoma fonticola*	1	31
	Gambusia sp.	12	
	Thiara granifera	sparse	
13	*Etheostoma fonticola*	1	27
	Gambusia sp.	20	
	Procambarus sp.	1	
14	*Gambusia* sp.	8	
	Procambarus sp.	1	
15	*Gambusia* sp.	7	

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach): City Park		**Site:** O1 - Site 5	
Date: 10/31/00	**Time:** 1250-1306	**Observer(s):** LV, EO, DT, MH	
Vegetation:	Type: Bare channel bottom		
	Height: N/A		
	Areal Coverage: 100%		
	GPS location: 29° 53' 11.6"N ; 97° 56' 08.3"W		
Substrate Type:	Cobble, gravel, some silt and clay		
Mean Column Velocity: 60% - 0.13 m/s		Velocity at 15cm above the bottom: 0.08 m/s	

Standard Parameters: 1302	Surface	Mid	Bottom
Temperature (C°)	22.95	--	22.91
Dissolved Oxygen (mg/l)	8.51	--	8.55
pH	7.62	--	7.61
Conductivity	597.0	--	598.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters): 1.07 m

Adjacent 3m cell areas:

Vegetation type:	Bare channel bottom / *Potamogeton* / *Hygrophila*
Vegetation height:	N/A / Surface / 0.37 m
Areal coverage:	85% / 10% / 5%
Substrate type:	Cobble, grave., some silt and clay

Sample Label:	**Preservative:**

Snails: *Thiara granifera* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	--

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		Site:
City Park		O1 - Site 5
Date:	**Time:**	**Observer(s):**
10/31/00	1250-1306	LV, EO, DT, MH

Overall	Species	Number	Avg. Length (mm)
1	*Gambusia* sp.	1	8.0
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Thiara granifera*	sparse	
2	*Gambusia* sp.	1	8
3	*Thiara granifera*		
4	No fish or crustaceans collected		
5	No fish or crustaceans collected		
6	No fish or crustaceans collected		
7	No fish or crustaceans collected		
8	No fish or crustaceans collected		
9	No fish or crustaceans collected		
10	*Thiara granifera*	sparse	
11	No fish or crustaceans collected		
12	*Thiara granifera*	sparse	
13	No fish or crustaceans collected		
14	No fish or crustaceans collected		
15	No fish or crustaceans collected		

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		**Site:**
City Park		PH2 - Site 6
Date:	**Time:**	**Observer(s):**
10/31/00	1330-1420	LV, EO, DT, MH

Vegetation:	Type:	*Potamogeton / Hygrophila*
	Height:	Surface / 0.24 m
	Areal Coverage:	25% / 75%
	GPS location:	29° 53' 12.4"N ; 97° 56' 08.7"W
Substrate Type:	Silt and clay	

Mean Column Velocity:	Velocity at 15cm above the bottom:
60% - 0.12 m/s	0.01 m/s

Standard Parameters: 1421	Surface	Mid	Bottom
Temperature (C°)	23.04	--	23.03
Dissolved Oxygen (mg/l)	8.65	--	8.52
pH	7.63	--	7.62
Conductivity	599.0	--	599.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters):

0.64 m

Adjacent 3m cell areas:

Vegetation type:	*Potamogeton / Hygrophila*
Vegetation height:	Surface / 0.24 m
Areal coverage:	25% / 75%
Substrate type:	Silt and clay

Sample Label:	**Preservative:**

Snails: *Melanoides tuberculata* - sparse / *Thiara granifera* - abundant / *Elimia comalensis* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	--

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		Site:
City Park		PH2 - Site 6
Date:	**Time:**	**Observer(s):**
10/31/00	1330-1420	LV, EO, DT, MH

Overall	Species	Number	Avg. Length (mm)
1	*Elimia comalensis*		--
39	*Etheostoma fonticola*	39	25.5
136	*Gambusia* sp.	25	19.4
sparse	*Melanoides tuberculata*		--
56	*Palaemonetes* sp.		--
23	*Procambarus* sp.		--
abundant	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Etheostoma fonticola*	14	32,27,28,31,26,36,28,27, 17,6,22,26,24,18
	Gambusia sp.	35	17,24,16,20,28,19,19,15, 22,21,24,22,16,14,22,16, 15,15,24,24,22,17,13,23, 16
	Palaemonetes sp.	38	
	Procambarus sp.	14	
	Thiara granifera	abundant	
2	*Etheostoma fonticola*	2	30,22
	Gambusia sp.	8	
	Palaemonetes sp.	4	
	Procambarus sp.	2	
	Thiara granifera	abundant	
3	*Etheostoma fonticola*	10	29,27,15,28,31,29,22,27, 14,27
	Gambusia sp.	22	
	Palaemonetes sp.	5	
	Procambarus sp.	1	
4	*Etheostoma fonticola*	1	27
	Gambusia sp.	20	
	Palaemonetes sp.	5	
	Thiara granifera	abundant	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY TRIP

Dip net sweep	Species	Number	Length (mm)
5	*Etheostoma fonticola*	1	27
	Gambusia sp.	2	
	Procambarus sp.	4	
	Thiara granifera	abundant	
6	*Etheostoma fonticola*	4	28,31,27,13
	Gambusia sp.	2	
	Melanoides tuberculata	sparse	
	Procambarus sp.	1	
	Thiara granifera	abundant	
7	*Etheostoma fonticola*	2	30,23
	Gambusia sp.	5	
	Palaemonetes sp.	1	
	Thiara granifera	abundant	
8	*Gambusia* sp.	5	
	Palaemonetes sp.	1	
	Procambarus sp.	1	
	Thiara granifera	abundant	
9	*Elimia comalensis*	1	
	Gambusia sp.	10	
10	*Etheostoma fonticola*	2	31,15
	Gambusia sp.	3	
	Thiara granifera	abundant	
11	*Gambusia* sp.	2	
	Palaemonetes sp.	1	
	Thiara granifera	abundant	
12	*Gambusia* sp.	12	
	Palaemonetes sp.	1	
	Thiara granifera	abundant	
13	*Etheostoma fonticola*	3	31,32,30
	Gambusia sp.	10	
14	No fish or crustaceans collected		
15	*Thiara granifera*	abundant	

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		**Site:**
City Park		O2 - Site 7
Date:	**Time:**	**Observer(s):**
10/31/00	1430-1447	LV, EO, DT, MH, DM

Vegetation:	Type:	Bare channel bottom / *Potamogeton*
	Height:	N/A / Surface
	Areal Coverage:	>95% / <5%
	GPS location:	29° 53' 12.7"N ; 97° 56' 08.9"W

Substrate Type:	Silt and clay

Mean Column Velocity:	Velocity at 15cm above the bottom:
60% - 0.26 m/s	0.24 m/s

Standard Parameters: 1446	Surface	Mid	Bottom
Temperature (C°)	23.05	--	23.05
Dissolved Oxygen (mg/l)	8.76	--	8.47
pH	7.69	--	7.68
Conductivity	599.0	--	599.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters):
0.67 m

Adjacent 3m cell areas:

Vegetation type:	Bare channel bottom / *Potamogeton* / *Hygrophila*
Vegetation height:	N/A / Surface / almost to surface
Areal coverage:	90% / 5% / 5%
Substrate type:	Silt and clay

Sample Label:	**Preservative:**

Snails: *Thiara granifera* - slight/moderate

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	--

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		Site:
City Park		O2 - Site 7
Date:	**Time:**	**Observer(s):**
10/31/00	1430-1447	LV, EO, DT, MH

Overall	Species	Number	Avg. Length (mm)
slight/moderate	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Thiara granifera*	slight/moderate	
2	No fish or crustaceans collected		
3	No fish or crustaceans collected		
4	No fish or crustaceans collected		
5	*Thiara granifera*	slight/moderate	
6	No fish or crustaceans collected		
7	*Thiara granifera*	slight/moderate	
8	No fish or crustaceans collected		
9	*Thiara granifera*	slight/moderate	
10	No fish or crustaceans collected		

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		**Site:**
City Park		H2 - Site 8
Date:	**Time:**	**Observer(s):**
10/31/00	1455-1556	LV, EO, DT, MH, DM

Vegetation:	Type:	*Hygrophila* / Bare channel bottom
	Height:	0.24 m / N/A
	Areal Coverage:	70% / 30%
	GPS location:	29° 53' 13.0"N ; 97° 56' 08.3"W
Substrate Type:	Silt and clay*	

Mean Column Velocity:	Velocity at 15cm above the bottom:
60% - 0.02 m/s	0.02 m/s

Standard Parameters: 1527	Surface	Mid	Bottom
Temperature (C°)	22.87	--	--
Dissolved Oxygen (mg/l)	8.11	--	--
pH	7.67	--	--
Conductivity	598.0	--	--
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters):
0.3 m

Adjacent 3m cell areas:	
Vegetation type:	*Hygrophila* / *Potamogeton* / Bare channel bottom
Vegetation height:	0.27 m / Surface / N/A
Areal coverage:	60% / 10% / 30%
Substrate type:	Silt and clay*

Sample Label:	**Preservative:**

Snails: *Thiara granifera* - sparse / *Elimia comalensis* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	--

* Heavy detrital accumulation observed at this site.

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Location (Reach):		Site:
City Park		H2 - Site 8
Date:	**Time:**	**Observer(s):**
10/31/00	1455-1556	LV, EO, DT, MH

Overall	Species	Number	Avg. Length (mm)
sparse	*Elimia comalensis*		--
5	*Etheostoma fonticola*	5	21.6
90	*Gambusia* sp.	25	20.4
13	*Palaemonetes* sp.		--
2	*Procambarus* sp.		--
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Etheostoma fonticola*	2	28,13
	Gambusia sp.	27	22,22,13,16,27,19,27,17,13,6,20,29,27,29,23,13,21,14,16,29,17,23,26,28,13
	Palaemonetes sp.	9	
2	*Elimia comalensis*	sparse	
	Etheostoma fonticola	1	28
	Gambusia sp.	8	
	Palaemonetes sp.	3	
	Procambarus sp.	1	
	Thiara granifera	sparse	
3	*Gambusia* sp.	24	
4	No fish or crustaceans collected		
5	*Gambusia* sp.	10	
	Thiara granifera	sparse	
6	*Gambusia* sp.	8	
7	*Etheostoma fonticola*	1	26
	Procambarus sp.	1	
8	*Gambusia* sp.	4	
9	*Gambusia* sp.	1	
10	*Gambusia* sp.	7	

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY TRIP

Dip net sweep	Species	Number	Length (mm)
11	*Etheostoma fonticola*	1	13
	Gambusia sp.	1	
	Palaemonetes sp.	1	
12	No fish or crustaceans collected		
13	No fish or crustaceans collected		
14	No fish or crustaceans collected		
15	No fish or crustaceans collected		

IH-35 REACH

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach): IH - 35		**Site:** HD1 Site 1	
Date: 11/1/00	**Time:** 0815-0838	**Observer(s):** DT, MH, CN, DM	
Vegetation:	Type: *Hydrilla / Hygrophila*		
	Height: 20 cm / 50 cm		
	Areal Coverage: 95% / 5%		
	GPS location: 29° 52' 34.7"N ; 97° 55' 55.7"W		
Substrate Type:	Soft silt clayey mud with gravel		
Mean Column Velocity: 20% - 0.35 m/s ; 80% - 0.37 m/s		Velocity at 15cm above the bottom: 0.22 m/s	
Standard Parameters: 0837	Surface	Mid	Bottom
Temperature (C°)	22.01	--	22.01
Dissolved Oxygen (mg/l)	6.87	--	6.85
pH	7.84	--	7.84
Conductivity	602.0	--	602.0
Secchi depth (cm)	Clear to bottom		
Depth (fixed) (meters): 1.13 m			
Adjacent 3m cell areas:			
Vegetation type:	*Hydrilla / Hygrophila / Sagittaria*		
Vegetation height:	20 cm / 50 cm / N/A		
Areal coverage:	50% / N/A / N/A		
Substrate type:	Soft silt clayey mud with gravel		
Sample Label:	**Preservative:**		
Snails: *Elimia comalensis* - sparse / *Thiara granifera* - sparse			
Sample Label:	**Preservative:**		
Number of live Ramshorn snails	Average Size (mm)		
0			

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach):		Site:
IH - 35		HD1 Site 1
Date:	**Time:**	**Observer(s):**
11/1/00	0815-0838	DT, MH, CN, DM

Overall	Species	Number	Avg. Length (mm)
1	*Ambloplites rupestris*	1	142.0
sparse	*Corbicula* sp.		--
sparse	*Elimia comalensis*		--
1	*Lepomis auritus*	1	90.0
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Lepomis auritus*	1	90
2	No fish or crustaceans collected		
3	*Ambloplites rupestris*	1	142
	Corbicula sp.	sparse	
4	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Thiara granifera	sparse	
5	No fish or crustaceans collected		
6	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Thiara granifera	sparse	
7	*Corbicula* sp.	sparse	
	Thiara granifera	sparse	
8	No fish or crustaceans collected		
9	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
10	No fish or crustaceans collected		
11	No fish or crustaceans collected		

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Dip net sweep	Species	Number	Length (mm)
12	No fish or crustaceans collected		
13	No fish or crustaceans collected		
14	No fish or crustaceans collected		
15	No fish or crustaceans collected		

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach): IH - 35		**Site:** H1 Site 2	
Date: 11/1/00	**Time:** 0735-0810	**Observer(s):** DT, MH, CN, DM	
Vegetation:	Type:	*Hygrophila* / Bare channel bottom	
	Height:	18 cm / N/A	
	Areal Coverage:	60% / 40%	
	GPS location:	29° 52' 35.0"N ; 97° 55' 55.9"W	
Substrate Type:	Silt and clayey mud with gravel		
Mean Column Velocity: 60% - 0.20 m/s		Velocity at 15cm above the bottom: 0.23 m/s	

Standard Parameters: 0809	Surface	Mid	Bottom
Temperature (C°)	21.99	--	21.99
Dissolved Oxygen (mg/l)	6.89	--	6.80
pH	7.85	--	7.85
Conductivity	601.0	--	601.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters): 0.37 m

Adjacent 3m cell areas:

Vegetation type:	*Hygrophila / Hydrilla / Colocasia / Zizania*
Vegetation height:	20 cm / 20 cm / emergent / surface
Areal coverage:	40% / 40% / 5% / 15%
Substrate type:	Silt and clayey mud with gravel

Sample Label:	**Preservative:**

Snails: *Elimia comalensis* - sparse / *Thiara granifera* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
2	34.5

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach):		Site:
IH - 35		H1 Site 2
Date:	**Time:**	**Observer(s):**
11/1/2000	0735-0810	DT, MH, CN, DM

Overall	Species	Number	Avg. Length (mm)
sparse	*Corbicula* sp.		--
sparse	*Elimia comalensis*		--
7	*Gambusia* sp.	7	23.6
2	*Marisa cornuarietis*	2	34.5
1	*Notropis amabilis*	1	30.0
5	*Palaemonetes* sp.		--
13	*Procambarus* sp.		--
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Gambusia* sp.	3	22, 19, 17
	Notropis amabilis	1	30
	Palaemonetes sp.	3	
	Procambarus sp.	6	
	Thiara granifera	sparse	
2	*Gambusia* sp.	1	22
	Thiara granifera	sparse	
3	*Palaemonetes* sp.	1	
	Procambarus sp.	2	
4	*Gambusia* sp.	1	34
	Procambarus sp.	2	
	Thiara granifera	sparse	
5	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Gambusia sp.	1	30
	Procambarus sp.	1	
	Thiara granifera	sparse	
6	*Elimia comalensis*	sparse	
	Procambarus sp.	1	
	Thiara granifera	sparse	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Dip net sweep	Species	Number	Length (mm)
7	*Corbicula* sp.	sparse	
	Marisa cornuarietis	1	
8	*Corbicula* sp.	sparse	
	Gambusia sp.	1	21
	Thiara granifera	sparse	
9	*Thiara granifera*	sparse	
10	*Palaemonetes* sp.	1	
11	*Procambarus* sp.	1	
12	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Thiara granifera	sparse	
13	*Corbicula* sp.	sparse	
	Thiara granifera	sparse	
14	*Corbicula* sp.	sparse	
	Thiara granifera	sparse	
15	*Corbicula* sp.	sparse	
	Marisa cornuarietis	1	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach): IH - 35		**Site:** O1 Site 3	
Date: 11/1/00	**Time:** 0842-0900	**Observer(s):** DT, MH, CN, DM	
Vegetation:	Type:	Bare channel bottom	
	Height:	N/A	
	Areal Coverage:	100%	
	GPS location:	29° 52' 35.2"N ; 97° 56' 00.0"W	
Substrate Type:	Assorted sized gravel and cobble		
Mean Column Velocity: 60% - 0.68 m/s		Velocity at 15cm above the bottom: 0.64 m/s	

Standard Parameters: 0859	Surface	Mid	Bottom
Temperature (C°)	22.04	--	22.04
Dissolved Oxygen (mg/l)	7.27	--	7.03
pH	7.86	--	7.85
Conductivity	601.0	--	601.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters): 0.64 m

Adjacent 3m cell areas:

Vegetation type:	Bare channel bottom / *Zizania*
Vegetation height:	N/A / 10 cm
Areal coverage:	90% /10%
Substrate type:	Assorted sized gravel and cobble

Sample Label:	**Preservative:**

Snails: *Elimia comalensis* - sparse / *Thiara granifera* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach):		Site:	
IH - 35		O1 Site 3	
Date:	**Time:**	**Observer(s):**	
11/1/00	0842-0900	DT, MH, CN, DM	
Overall	**Species**	**Number**	**Avg. Length (mm)**
sparse	*Elimia comalensis*		--
1	*Procambarus* sp.		--
sparse	*Thiara granifera*		--
Dip net sweep	**Species**	**Number**	**Length (mm)**
1	No fish or crustaceans collected		
2	No fish or crustaceans collected		
3	*Elimia comalensis*	sparse	
	Procambarus sp.	1	
	Thiara granifera	sparse	
4	No fish or crustaceans collected		
5	*Thiara granifera*	sparse	
6	*Thiara granifera*	sparse	
7	*Thiara granifera*	sparse	
8	No fish or crustaceans collected		
9	No fish or crustaceans collected		
10	*Elimia comalensis*	sparse	
11	No fish or crustaceans collected		
12	No fish or crustaceans collected		
13	No fish or crustaceans collected		

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach): IH - 35		**Site:** C1 Site 4	
Date: 11/1/00	**Time:** 0912-1006	**Observer(s):** DT, MH, CN, DM	
Vegetation:	Type: *Cabomba*		
	Height: Water surface		
	Areal Coverage: 100%		
	GPS location: 29° 52' 36.5"N ; 97° 56' 01.0"W		
Substrate Type:	Soft silty and clayey mud		
Mean Column Velocity: 20% / 0.00; 80% / 0.00		Velocity at 15cm above the bottom: 0.00 m/s	
Standard Parameters: 1006	Surface	Mid	Bottom
Temperature (C°)	22.19	--	22.19
Dissolved Oxygen (mg/l)	7.38	--	6.78
pH	7.85	--	7.81
Conductivity	599.0	--	599.0
Secchi depth (cm)	Clear to bottom		
Depth (fixed) (meters): 0.49 m			
Adjacent 3m cell areas:			
Vegetation type:	*Cabomba / Sagittaria / Colocasia*		
Vegetation height:	Surface / N/A / Emergent		
Areal coverage:	25% / 25% / 50%		
Substrate type:	Soft silty and clayey mud		
Sample Label:	**Preservative:**		
Snails: *Elimia comalensis* - sparse / *Melanoides tuberculata* - sparse / *Thiara granifera* - sparse			
Sample Label:	**Preservative:**		
Number of live Ramshorn snails	Average Size (mm)		
2	--		

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach):		Site:
IH - 35		C1 Site 4
Date:	**Time:**	**Observer(s):**
11/1/00	0912-1006	DT, MH, CN, DM

Overall	Species	Number	Avg. Length (mm)
4	*Ambloplites rupestris*	4	69.0
sparse	*Corbicula* sp.		–
sparse	*Elimia comalensis*		–
3	*Etheostoma fonticola*	3	21.3
155	*Gambusia* sp.	155	21.5
1	*Lepomis cyanellus*	1	93.0
9	*Lepomis megalotis*	9	36.2
2	*Marisa cornuarietis*		–
sparse	*Melanoides tuberculata*		–
13	*Palaemonetes* sp.		–
17	*Poecilia latipinna*	17	25.4
5	*Procambarus* sp.		–
sparse	*Thiara granifera*		–

Dip net sweep	Species	Number	Length (mm)
1	*Ambloplites rupestris*	3	10, 20, 34
	Elimia comalensis	sparse	
	Etheostoma fonticola	1	20
	Gambusia sp.	27	25,12,23,22,22,17,13,21, 23,18,20,22,16,21,18,27, 18,25,29,22,23,27,22,27, 24,24,20
	Lepomis megalotis	4	68, 37, 48, 22
	Palaemonetes sp.	9	
	Poecilia latipinna	4	26, 26, 23, 24
	Thiara granifera	sparse	
2	*Elimia comalensis*	sparse	
	Gambusia sp.	4	
	Lepomis megalotis	1	26
	Melanoides tuberculata	1	
	Palaemonetes sp.	1	
	Poecilia latipinna	2	25, 21
	Thiara granifera	sparse	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Dip net sweep	Species	Number	Length (mm)
3	*Corbicula* sp.	3	
	Etheostoma fonticola	2	20, 24
	Gambusia sp.	21	
	Lepomis megalotis	1	31
	Melanoides tuberculata	1	
	Palaemonetes sp.	1	
	Poecilia latipinna	2	21, 25
	Thiara granifera	sparse	
4	*Gambusia* sp.	32	
	Lepomis megalotis	2	34, 35
	Poecilia latipinna	5	
	Procambarus sp.	2	
5	*Elimia comalensis*	1	
	Palaemonetes sp.	2	
	Thiara granifera	sparse	
6	*Corbicula* sp.	sparse	
	Gambusia sp.	15	
	Lepomis cyanellus	1	93
	Poecilia latipinna	2	29, 28
	Thiara granifera	sparse	
7	*Ambloplites rupestris*	1	74
	Corbicula sp.	sparse	
	Gambusia sp.	28	
	Poecilia latipinna	1	27
	Procambarus sp.	2	
	Thiara granifera	sparse	
8	*Corbicula* sp.	1	
	Gambusia sp.	10	
	Marisa cornuarietis	1	
9	*Gambusia* sp.	12	
	Thiara granifera	sparse	
10	*Corbicula* sp.	sparse	
	Gambusia sp.	5	
	Procambarus sp.	1	
	Thiara granifera	sparse	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Dip net sweep	Species	Number	Length (mm)
11	*Corbicula* sp.	sparse	
	Elimia comalensis	1	
	Gambusia sp.	2	
	Thiara granifera	sparse	
12	*Lepomis megalotis*	1	25
	Thiara granifera	sparse	
13	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Gambusia sp.	10	
	Poecilia latipinna	1	30
14	*Gambusia* sp.	10	
15	*Marisa cornuarietis*	1	
	Thiara granifera	sparse	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach): IH - 35		**Site:** H2 Site 5	
Date: 11/1/00	**Time:** 1019-1111	**Observer(s):** DT, MH, CN, DM	
Vegetation:	Type:	*Hygrophila / Hydrilla / Ludwigia / Cabomba*	
	Height:	25 cm / 20 cm / 25 cm / Surface	
	Areal Coverage:	60% / 10% / 20% / 10%	
	GPS location:	29° 52' 36.6"N ; 97° 56' 00.4"W	
Substrate Type:	Soft silty and clayey mud		
Mean Column Velocity: 20% - 0.00 m/s; 80% - 0.00 m/s		Velocity at 15cm above the bottom: 0.00 m/s	

Standard Parameters: 1110	Surface	Mid	Bottom
Temperature (C°)	22.40	--	22.34
Dissolved Oxygen (mg/l)	7.63	--	7.36
pH	7.89	--	7.88
Conductivity	599.0	--	599.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters): 0.85 m

Adjacent 3m cell areas:

Vegetation type:	*Hygrophila / Hydrilla / Ludwigia / Cabomba*
Vegetation height:	25 cm / 20 cm / 25 cm / Surface
Areal coverage:	70% / 5% / 20% / 5%
Substrate type:	Soft silty and clayey mud

Sample Label:	**Preservative:**

Snails: *Elimia comalensis* - sparse / *Thiara granifera* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach):		Site:
IH - 35		H2 Site 5
Date:	**Time:**	**Observer(s):**
11/1/00	1019-1111	DT, MH, CN, DM

Overall	Species	Number	Avg. Length (mm)
2	*Ambloplites rupestris*	2	66.0
sparse	*Corbicula* sp.		--
sparse	*Elimia comalensis*		--
7	*Etheostoma fonticola*	7	20.9
18	*Gambusia* sp.		--
5	*Lepomis megalotis*	5	42.2
2	*Palaemonetes* sp.		--
1	*Procambarus* sp.		--
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Ambloplites rupestris*	1	62
	Corbicula sp.	sparse	
	Elimia comalensis	sparse	
	Etheostoma fonticola	1	26
	Gambusia sp.	4	14, 16, 17, 12
	Lepomis megalotis	3	32, 28, 28
	Thiara granifera	sparse	
2	*Ambloplites rupestris*	1	70
	Procambarus sp.	1	
3	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Etheostoma fonticola	3	13, 17, 24
	Gambusia sp.	4	20, 25, 15, 14
	Thiara granifera	sparse	
4	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Etheostoma fonticola	2	19, 23
	Gambusia sp.	6	17, 18, 17, 19, 20, 17
	Thiara granifera	sparse	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Dip net sweep	Species	Number	Length (mm)
5	*Elimia comalensis*	sparse	
	Gambusia sp.	1	24
	Thiara granifera	sparse	
6	*Etheostoma fonticola*	1	24
	Gambusia sp.	2	17, 14
	Lepomis megalotis	1	18
7	*Corbicula* sp.	sparse	
	Thiara granifera	sparse	
8	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Palaemonetes sp.	1	
	Thiara granifera	sparse	
9	*Elimia comalensis*	sparse	
	Gambusia sp.	1	16
	Thiara granifera	sparse	
10	*Lepomis megalotis*	1	105
11	*Corbicula* sp.	sparse	
	Palaemonetes sp.	1	
	Thiara granifera	sparse	
12	No fish or crustaceans collected		
13	*Corbicula* sp.	sparse	
	Thiara granifera	sparse	
14	No fish or crustaceans collected		
15	*Corbicula* sp.	sparse	
	Thiara granifera	sparse	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach): IH - 35		**Site:** HD2 Site 6	
Date: 11/1/00	**Time:** 1212-1251	**Observer(s):** DT, MH, DM	
Vegetation:	Type:	*Hydrilla* / Bare channel bottom	
	Height:	20 cm / N/A	
	Areal Coverage:	30% / 70%	
	GPS location:	29° 52' 37.5"N ; 97° 55' 59.5"W	
Substrate Type:	Assorted sized gravel		
Mean Column Velocity: 60% - 0.08 m/s		Velocity at 15cm above the bottom: 0.02 m/s	

Standard Parameters: 1250	Surface	Mid	Bottom
Temperature (C°)	22.68	--	22.67
Dissolved Oxygen (mg/l)	8.41	--	8.35
pH	7.95	--	7.92
Conductivity	598.0	--	598.0
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters):	
0.55 m	Oily sheen on water surface observed

Adjacent 3m cell areas:

Vegetation type:	*Hydrilla* / *Hygrophila* / *Sagittaria* / Bare channel bottom
Vegetation height:	20 cm / N/A / Emergent / N/A
Areal coverage:	30% / 30% / 30% / 10%
Substrate type:	Assorted sized gravel

Sample Label:	**Preservative:**

Snails: *Elimia comalensis* - sparse / *Thiara granifera* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach):		Site:
IH - 35		HD2 Site 6
Date:	**Time:**	**Observer(s):**
11/1/00	1212-1251	DT, MH, DM

Overall	Species	Number	Avg. Length (mm)
sparse	*Corbicula* sp.		--
sparse	*Elimia comalensis*		--
1	*Etheostoma fonticola*	1	27.0
34	*Gambusia* sp.	34	18.3
1	*Lepomis gulosus*	1	52.0
1	*Procambarus sp.*		--
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Gambusia* sp.	2	16, 18
2	*Gambusia* sp.	3	13, 18, 17
3	*Lepomis gulosus*	1	52
	Gambusia sp.	8	20, 18, 17, 18, 18, 22, 12, 13, 52
4	*Gambusia* sp.	3	17, 22, 11
5	*Elimia comalensis*	sparse	
	Gambusia sp.	2	
	Procambarus sp.	1	
	Thiara granifera	sparse	
6	*Corbicula* sp.	sparse	
	Gambusia sp.	3	28, 15, 22
	Thiara granifera	sparse	
7	*Etheostoma fonticola*	1	27
	Gambusia sp.	4	21, 17, 17, 15
8	*Gambusia* sp.	1	
9	No fish or crustaceans collected		

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Dip net sweep	Species	Number	Length (mm)
10	*Gambusia* sp.	1	
11	No fish or crustaceans collected		
12	*Gambusia* sp.	2	
13	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Gambusia sp.	2	
	Thiara granifera	sparse	
14	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Thiara granifera	sparse	
15	*Gambusia* sp.	1	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach): IH - 35		**Site:** C2 Site 7	
Date: 11/1/00	**Time:** 1118-1209	**Observer(s):** DT, MH, DM	
Vegetation:	Type:	*Cabomba / Ceratophyllum*	
	Height:	25 cm / N/A	
	Areal Coverage:	95% / 5%	
	GPS location:	29° 52' 37.6"N ; 97° 55' 59.6"W	
Substrate Type:	Soft clayey mud with patches of gravel		
Mean Column Velocity: 60% - 0.00 m/s		Velocity at 15cm above the bottom: 0.00 m/s	

Standard Parameters: 1208	Surface	Mid	Bottom
Temperature (C°)	23.51	--	--
Dissolved Oxygen (mg/l)	8.42	--	--
pH	7.99	--	--
Conductivity	624.0	--	--
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters): 0.37 m

Adjacent 3m cell areas:

Vegetation type:	*Cabomba / Ceratophyllum / Hydrilla /* Bare channel bottom
Vegetation height:	N/A / N/A / N/A / N/A
Areal coverage:	30% / 30% / 30% / 10%
Substrate type:	Soft clayey mud with patches of gravel

Sample Label:	**Preservative:**

Snails: *Elimia comalensis* - sparse / *Thiara granifera* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach):		Site:
IH - 35		C2 Site7
Date:	**Time:**	**Observer(s):**
11/1/00	1118-1209	DT, MH, DM

Overall	Species	Number	Avg. Length (mm)
moderate	*Corbicula* sp.		--
sparse	*Elimia comalensis*		--
7	*Etheostoma fonticola*	7	23.4
121	*Gambusia* sp.	121	24.0
1	*Lepomis gulosus*	1	47.0
1	*Lepomis megalotis*	1	50.0
1	*Lepomis punctatus*	1	62.0
sparse	*Elimia comalensis*		--
4	*Palaemonetes* sp.		--
3	*Poecilia latipinna*	3	21.0
2	*Procambarus sp.*		--
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Corbicula* sp.	moderate	
	Elimia comalensis	sparse	
	Etheostoma fonticola	5	31, 22, 13, 20, 27
	Gambusia sp.	72	22, 28,22,20,21,22,21,21, 19,37,25,25,25,25,35,24 27,30,20,20,20,24,21,22, 25
	Lepomis gulosus	1	47
	Elimia comalensis	sparse	
	Palaemonetes sp.	1	
	Poecilia latipinna	2	18, 19
2	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Gambusia sp.	34	
	Palaemonetes sp.	1	
	Thiara granifera	sparse	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Dip net sweep	Species	Number	Length (mm)
3	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Gambusia sp.	10	
	Procambarus sp.	1	
	Thiara granifera	sparse	
4	*Ambloplites rupestris*	1	68
	Corbicula sp.	sparse	
	Gambusia sp.	20	
	Thiara granifera	sparse	
5	*Gambusia* sp.	30	
	Lepomis punctatus	1	62
6	*Corbicula* sp.	sparse	
	Elimia comalensis	sparse	
	Poecilia latipinna	1	26
	Thiara granifera	sparse	
7	*Corbicula* sp.	sparse	
	Gambusia affinis	5	21
8	*Elimia comalensis*	sparse	
9	*Corbicula* sp.	sparse	
	Gambusia sp.	3	
10	*Corbicula* sp.	sparse	
	Etheostoma fonticola	2	30, 21
	Lepomis megalotis	1	50
	Palaemonetes sp.	1	
	Procambarus sp.	1	
11	No fish or crustaceans collected		
12	No fish or crustaceans collected		
13	*Gambusia* sp.	10	
14	*Palaemonetes* sp.	1	
15	*Elimia comalensis*	1	
	Gambusia sp.	2	

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach): IH - 35		**Site:** O2 Site 8
Date: 11/1/00	**Time:** 1255-1311	**Observer(s):** DT, MH, DM

Vegetation:	Type:	Bare channel bottom
	Height:	N/A
	Areal Coverage:	100%
	GPS location:	29° 52' 38.6"N ; 97° 55' 58.9"W
Substrate Type:	Assorted sized gravel	

Mean Column Velocity: N/A	Velocity at 15cm above the bottom: 0.27 m/s

Standard Parameters: 1310	Surface	Mid	Bottom
Temperature (C°)	24.82	--	--
Dissolved Oxygen (mg/l)	7.69	--	--
pH	7.58	--	--
Conductivity	549.0	--	--
Secchi depth (cm)	Clear to bottom		

Depth (fixed) (meters): 0.2 m

Adjacent 3m cell areas:

Vegetation type:	Bare channel bottom / *Hydrilla*
Vegetation height:	N/A / 10 cm
Areal coverage:	75% / 25%
Substrate type:	Assorted sized gravel

Sample Label:	**Preservative:**

Snails: *Elimia comalensis* - sparse / *Thiara granifera* - sparse

Sample Label:	**Preservative:**
Number of live Ramshorn snails	Average Size (mm)
0	

DROP NET - FIELD DATA SHEETS
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Location (Reach):		Site:
IH - 35		O2 Site 8
Date:	**Time:**	**Observer(s):**
11/1/00	1255-1311	DT, MH, DM

Overall	Species	Number	Avg. Length (mm)
sparse	*Elimia comalensis*		--
1	*Etheostoma fonticola*	1	25.0
115	*Gambusia* sp.	24	16.1
sparse	*Thiara granifera*		--

Dip net sweep	Species	Number	Length (mm)
1	*Gambusia* sp.	20	19,15,17,31,27,27,25,20, 27,20,17,26,15,22,17,18, 27,16,19
2	*Gambusia* sp.	30	23,18,25,21,24
3	*Gambusia* sp.	12	
	Thiara granifera	sparse	
4	*Elimia comalensis*	sparse	
	Thiara granifera	sparse	
5	*Gambusia* sp.	3	
6	*Gambusia* sp.	4	
7	*Gambusia* sp.	2	
8	*Gambusia* sp.	2	
	Thiara granifera	sparse	
9	*Gambusia* sp.	2	
10	*Gambusia* sp.	3	
	Thiara granifera	sparse	
11	*Gambusia* sp.	3	

DROP NET - FIELD DATA SHEETS

SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

Dip net sweep	Species	Number	Length (mm)
12	*Elimia comalensis*	sparse	
	Gambusia sp.	1	
13	*Etheostoma fonticola*	1	25
	Gambusia sp.	15	
14	*Gambusia* sp.	15	
15	*Elimia comalensis*	sparse	
	Gambusia sp.	3	
	Thiara granifera	sparse	

DIP NET RESULTS

TABLE 4
DIP NET DATA
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING
OCTOBER 5, 2000

River Section	Date	Number of Darters	Length (mm)
Hotel Reach (Section 1)	10/5/2000	1	12
		2	14
		6	15
		1	16
		6	18
		4	19
		1	20
		3	21
		4	22
		4	23
		4	24
		6	25
		4	26
		1	27
		4	28
		2	29
		2	30
	Total Number:	**55**	
City Park Reach (Section 4)	10/5/2000	3	16
		1	18
		1	19
		1	20
		1	21
		1	22
		2	23
		1	24
		5	25
		1	27
		5	28
		1	29
		4	30
		8	31
		8	32
		4	33
		1	34
		2	35
		2	36
	Total Number:	**52**	

TABLE 4
DIP NET DATA
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

River Section	Date	Number of Darters	Length (mm)
IH - 35 Reach (Section 7)	10/5/2000	1	15
		1	17
		2	18
		1	19
		2	20
		1	23
		2	24
		3	26
		1	27
		1	28
		5	29
		1	30
		7	31
		5	32
		3	33
		4	34
		4	35
		3	36
		2	37
		3	38
		1	39
	Total Number:	**53**	

TABLE 4
DIP NET DATA
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING
OCTOBER 30, 2000

River Section	Date	Number of Darters	Length (mm)
Hotel Reach (Section 1)	10/30/2000	1	11
		1	12
		2	13
		2	14
		3	15
		4	16
		12	17
		2	18
		5	19
		4	20
		6	22
		3	23
		2	24
		5	25
		3	26
		5	27
		4	28
		1	29
		1	30
		1	31
		1	33
	Total Number:	**68**	
City Park Reach (Section 4)	10/30/2000	3	15
		1	16
		1	17
		3	21
		8	22
		1	23
		1	24
		2	25
		2	26
		2	28
		4	30
		1	31
		1	32
		2	34
		3	35
		1	36
		1	37
	Total Number:	**37**	

TABLE 4
DIP NET DATA
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING

River Section	Date	Number of Darters	Length (mm)
IH - 35 Reach (Section 7)	10/30/2000	1	18
		1	22
		2	24
		1	25
		3	32
		4	33
		4	34
		1	35
		1	36
		2	38
		1	42
	Total Number:	**21**	

GILL NET RESULTS

TABLE 5
SPRING LAKE GILL NET DATA
SAN MARCOS RIVER - FALL QUARTERLY SAMPLING
NOVEMBER 1-2, 2000

Species	Total Length (mm)	Total Weight (gr)	Stomach Contents
Lepisosteus oculatus	740	1630.1	Empty
	590	815.0	Empty
	680	1313.1	Empty
	760	1901.8	Empty
	600	1041.4	Empty
Total Number 5			
Lepomis gulosus	237	215.3	Empty
	210	189.7	Empty
	105	26.9	Undigested crayfish ~13 mm
	210	174.2	Empty
Total Number 4			
Lepomis punctatus	197	113.0	Empty
	152	66.0	Full: insect parts & amphipods
	157	62.4	Empty
	95	17.8	Empty
	95	18.1	Empty; Gravid
	100	26.7	Empty
	159	67.7	Vegetative material
	80	16.9	Empty
Total Number 8			
Lepomis megalotis	213	196.1	Partially digested crayfish
	185	134.0	Empty
	212	175.1	Assorted insect parts
Total Number 3			
Micropterus salmoides	217	189.5	Empty
	208	109.2	Yellow unidentifiable mush
	229	137.1	Salamander; few small rocks
	391	827.4	♂ Empty
	218	111.0	♀ Partially digested crayfish
	218	120.5	Yellow unidentifiable mush
	301	357.6	♀ Large unidentifiable fish
	197	83.1	Unidentifiable mush
	211	117.0	Unidentifiable mush
	320	387.0	♂ Unidentifiable mush
	302	353.2	♂ Unidentifiable mush
	315	399.6	♀ Unidentifiable mush
	180	65.7	Empty
	211	107.4	Unidentifiable mush
Total Number 14			