

**EL CORONADO RANCH HABITAT CONSERVATION PLAN 2007  
FISH MONITORING REPORT**



Big Tank, El Coronado Ranch

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*Yaqui chub*



*Yaqui catfish*



*Mexican stoneroller*



*longfin dace*

## INTRODUCTION

In 1998, El Coronado Ranch owners Josiah and Valer Austin entered into Arizona's first Habitat Conservation Plan (HCP), which allowed cattle ranch operations to continue while at the same time instituting conservation measures for the federally endangered Yaqui chub *Gila purpurea*. The El Coronado Ranch HCP and Implementation Agreement (USFWS 1998a; 1998b) require that monitoring and reporting on the success of conservation measures occur annually for the first five years of the permit. Coleman (2002) provided a thorough review of the biogeography of Rio Yaqui fishes in Arizona and the HCP study area (Figure 1), along with recent management efforts and results of fish monitoring conducted in 2000 and 2001. In 2003, the Arizona National Fish and Wildlife Conservation Office (previously Fishery Resources Office) assumed responsibility to coordinate HCP fish monitoring efforts with the San Bernardino National Wildlife Refuge, and reports (Brouder 2003, 2004, 2006; Voeltz 2006) summarizing these activities were provided to all interested parties. This report summarizes results of the 2007 El Coronado Ranch HCP fish monitoring effort that continued to follow procedures outlined in the finalized El Coronado Ranch HCP Monitoring Plan (Coleman and Minckley 2003). Appendix A provides a summary table comparing this year's results with past monitoring results (Brouder 2005, 2006; Voeltz 06).

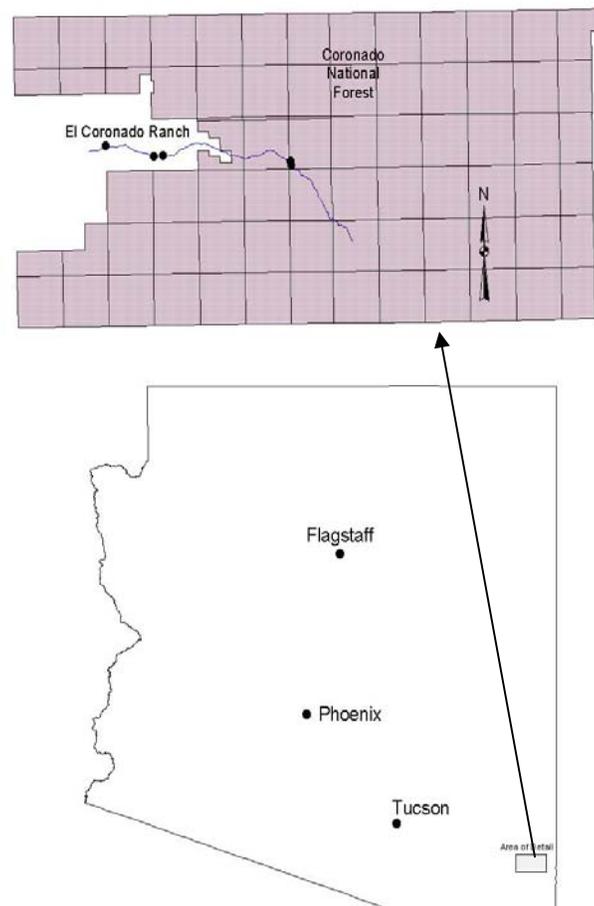


Figure 1. General location of El Coronado Ranch and West Turkey Creek, AZ.

## EL CORONADO RANCH POND SURVEY

### Big Tank

#### Methods

Five 20-m and two 50-m trammel nets, two large hoop nets, 13 mini-hoop nets, and 20 baited minnow traps were fished for approximately 16 hours each (1700 to 0900) on the evening of October 9, 2007. Yaqui catfish *Ictalurus pricei* captured were measured for total length (TL; mm) and weighed (g). Catch per unit effort (CPUE) was calculated as the number of fish/ total hours of netting. Yaqui catfish captured were also scanned for the presence of a Passive Integrated Transponder (PIT) tag. Genetic samples were taken by San Bernardino National Wildlife Refuge staff to determine if these fish are pure Yaqui catfish.

#### Results

Yaqui catfish were caught only in trammel nets. Three Yaqui catfish were collected during approximately 112 hours of total effort, resulting in a CPUE of 0.03 fish/hour. The three Yaqui catfish collected had a total length of 370, 405, and 411 mm, respectively, and weighed 466, 629, and 681 g, respectively. All the Yaqui catfish collected were recaptures (Tables 1, 2, 3). Over 100 bullfrog tadpoles were also collected.

Table 1. Mark-recapture history of Yaqui catfish PIT tag # 442B3C5349 captured during El Coronado Ranch HCP monitoring in October 2007.

Date	Location	Mark(M)/ Recapture (R)	TL (mm)	WT (g)
Previous history could not be located				
10-10-07	Big Tank	R	370	470

Table 2. Mark-recapture history of Yaqui catfish PIT tag # 5326642B7C captured during El Coronado Ranch HCP monitoring in October 2007.

Date	Location	Mark(M)/ Recapture (R)	TL (mm)	WT (g)
10/26/1999	Lisa Tank	M	368	540
10/14/2000	Lisa Tank	R	379	964
10/10/07	Big Tank	R	405	630

Table 3. Mark-recapture history of Yaqui catfish PIT tag # 53210A7720(2) captured during El Coronado Ranch HCP monitoring in October 2007.

Date	Location	Mark(M)/ Recapture (R)	TL (mm)	WT (g)
10/26/1999	Lisa Tank	M	352	420
10/14/2000	Lisa Tank	R	371	907
10-10-07	Big Tank	R	411	680

### *Discussion*

In September 2000, 48 longfin dace *Agosia chrysogaster*, from Pond H were transplanted into Big Tank along with 254 Yaqui catfish from Lisa Tank in October of 2000 (Coleman 2002). These two transplants represent the baseline for which subsequent monitoring efforts of Big Tank are compared. Since the initial stocking of Big Tank, a total of only 17 Yaqui catfish (including this year's October results) have been recaptured (Table 4), all of which have been adults. The low number of recaptures and the lack of recruitment are somewhat of a concern, although spawning aggregations and nesting behavior were observed in August 2001 (Coleman 2002). One female ripe with eggs was collected in June 2007 during an informal sampling trip where a total of eight catfish (Table 5) were collected in trammel nets (Figure 2). Three spawning structures were constructed and placed in Big Tank in June 2007 to provide additional spawning habitat and hopefully promote spawning (Figure 3).

A few black crappie may still present in Big Tank which may be contributing to the lack of reproduction, recruitment, and survival of Yaqui fishes that were stocked into this pond, although other factors, (i.e., lack of spawning substrate, cover, water temperature, lack of flow to trigger spawning, etc.) may also be possible. On May 31, 2006 approximately 287 Yaqui chub and 500 longfin dace were relocated to Big Tank from Lodge Pond (Voeltz 2006). No longfin dace have been collected since the initial stocking in 2000 and no Yaqui chub have been collected following salvage efforts. Although not desirable, the presence of black crappie may provide a food source for adult Yaqui catfish.



Figure 2. Yaqui catfish collected in a trammel net from Big Tank in June 2007.



Figure 3. Marty Underwood and Jeremy Voeltz constructing “catfish condos” to provide spawning habitat in June 2007.

Table 4. Numbers of fish collected between 2000 and 2007 from Big Tank.

Year	<u>Yaqui catfish</u>		<u>Black crappie</u>		<u>Grass</u>
	Juvenile	Adult	Juvenile	Adult	<u>carp</u> Adult
2001	0	6	100+	1	0
2003	0	2	20	0	1
2004	0	1	0	11	0
2005	0	2	0	0	0
2006	0	3	0	5	0
2007	0	3, 8*	0	1*	0

\* collected during an informal sampling trip in early June 2007, only length and weight data was collected on Yaqui catfish.

Table 5. Length and weight data from Yaqui catfish in Big Tank collected in trammel nets during an informal sampling trip in June 2007.

Total length (mm)	Weight (g)
438	830
393	570
368	600
445	600
429	790
417	700
366	610
413	820

### Upper Guesthouse Pond

#### *Methods*

Twelve minnow traps were set on October 9, 2007 and fished for approximately 16 hours each (1615 to 0800) for a total effort of 189 hours.

#### *Results*

Zero fish were collected. Four tiger salamanders were caught and removed.

#### *Discussion*

Yaqui chub and longfin dace were previously collected in Upper Guesthouse Pond (Table 6). In 2006, 880 Yaqui chub and eight longfin dace were salvaged from the pond due to reduced water quality and quantity. A high flow event in August 2007 (Figure 4) may have washed any fish that had recolonized Upper Guesthouse Pond following the 2006 drought into Lower Guesthouse Pond. In the past minnow traps and seines were used to sample Upper Guesthouse Pond. For consistency minnow traps should be used in the future.

Table 6. Numbers of fish collected between 2000 and 2007 from Upper Guesthouse Pond.

Year	Longfin dace		Yaqui chub	
	Juvenile	Adult	Juvenile	Adult
2000	0	0	0	109
2001	0	0	0	0
2003	0	0	0	1
2004	0	0	0	0
2005	7	4	167	73
2006	110	0	0	0
2007	0	0	0	0

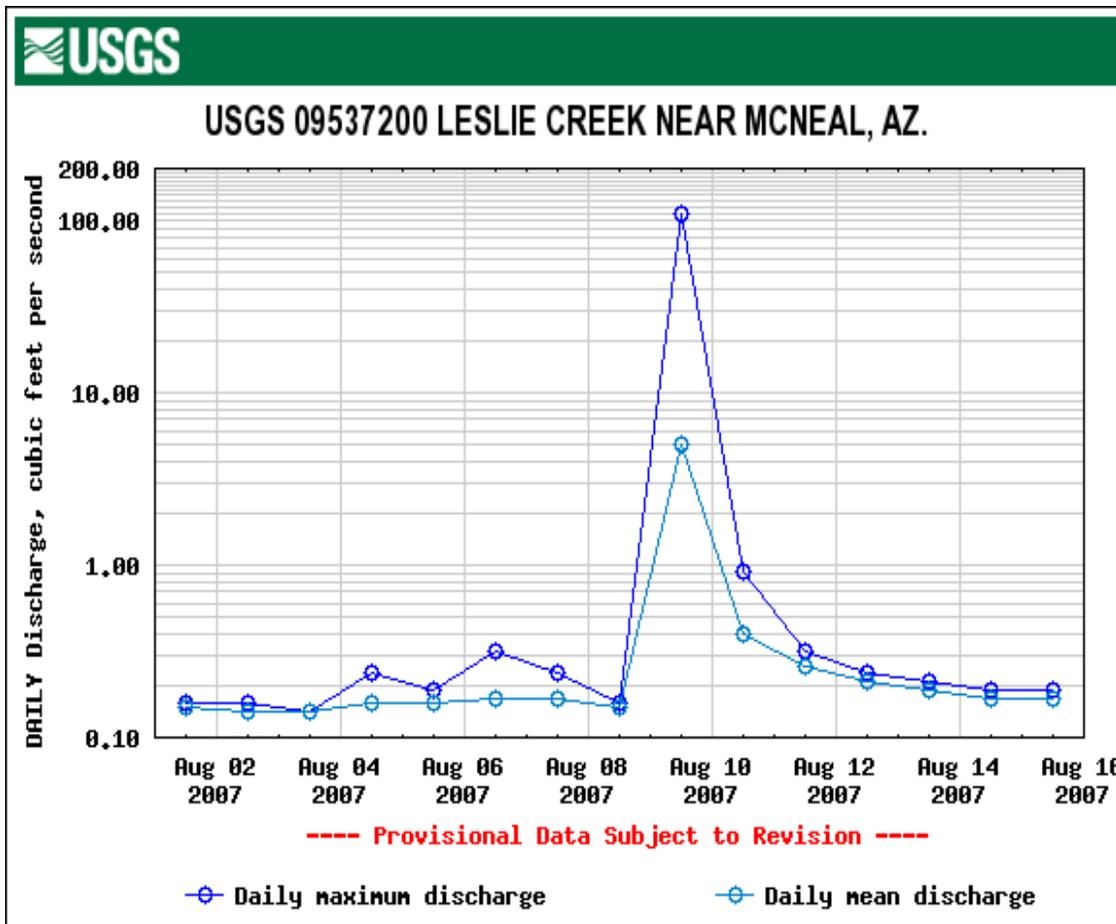


Figure 4. Daily discharge of Leslie Creek, (approximately 20 miles southwest of El Coronado Ranch) between August 1<sup>st</sup> and 15<sup>th</sup> 2007 (source: <http://waterdata.usgs.gov/nwis/uv?09537200>).

### Lower Guesthouse Pond

#### Methods

Eleven minnow traps were set on October 9, 2007 and fished for approximately 16 hours each (1630 to 0815) for a total effort of 173.25 hours.

#### Results

A total of 2 longfin dace and 68 Yaqui chub were collected during this effort. Mean CPUE of longfin dace and Yaqui chub were 0.01 fish/hour and 0.39 fish/hour, respectively. All longfin dace collected were characterized as adults (>50 mm). Seventeen Yaqui chub were characterized as juvenile (<50 mm) and 49 as adults (Figure 5). All Yaqui chub collected were moved to Tennis Court Pond. Seven bullfrog tadpoles and one sub-adult bullfrog were also collected.

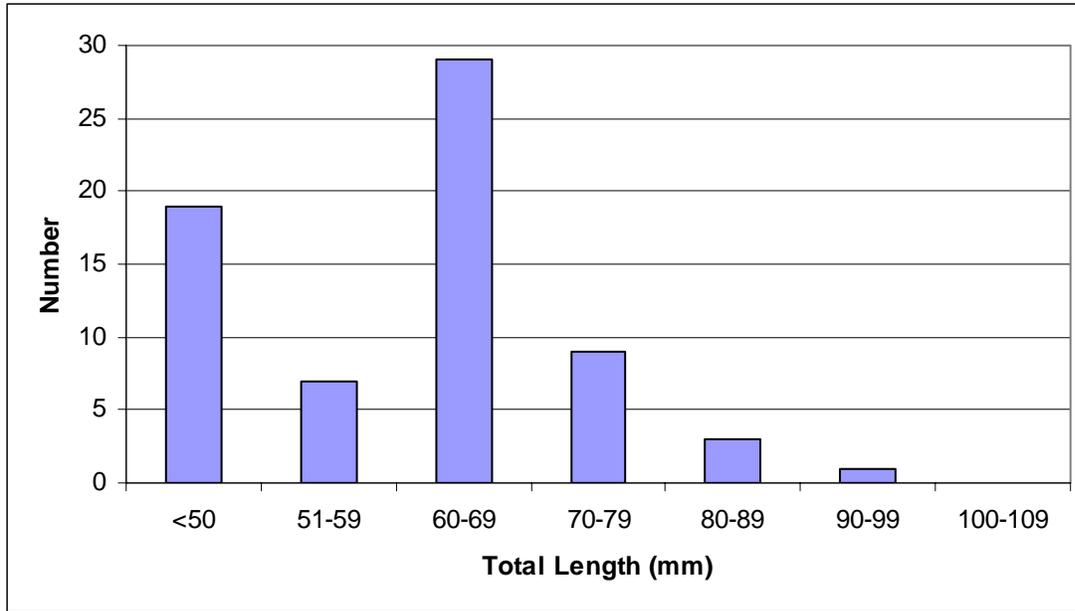


Figure 5. Length frequency histogram of Yaqui chub collected in Lower Guesthouse pond during El Coronado Ranch HCP monitoring in October 2007.

*Discussion*

Historically, Lower Guesthouse Pond has never been stocked with either Yaqui chub or longfin dace, and the presence of both in 2005 represents the first collection since monitoring began in 2000 (Table 7). As with Upper Guesthouse Pond, salvage efforts were needed in 2006 due to the drought. On April 18, 2006, 166 Yaqui chub and 5 longfin dace were salvaged from Lower Guest House Pond (B. Radke, pers. comm.). Brouder (2006) suggested fish may be able to move between Upper and Lower Guesthouse Ponds when water levels are high enough to connect the two, which may have occurred in August 2007. In the past minnow traps and seines were used to sample Lower Guesthouse Pond. For consistency minnow traps should be used in the future.

Table 7. Numbers of fish collected between 2000 and 2007 from Lower Guesthouse Pond.

Year	<u>Longfin dace</u>		<u>Yaqui chub</u>	
	Juvenile	Adult	Juvenile	Adult
2000	0	0	0	0
2001	0	0	0	0
2003	Not Sampled			
2004	0	0	0	0
2005	27	0	14	5
2006	11	0	0	0
2007	0	2	17	49

## Tennis Court Pond

### *Methods*

Twelve minnow traps were set on October 9, 2006 and fished for approximately 16.5 hours each (1500 to 0730) for a total of 198 hours.

### *Results*

Zero fish were collected. Sixty-eight Yaqui chub were relocated to Tennis Court Pond from Lower Guesthouse Pond on October 10, 2007.

### *Discussion*

Tennis Court Pond historically had high numbers of Yaqui chub (Table 8). On April 18, 2006, five Yaqui chub were removed prior to Tennis Court Pond becoming dry. Because the pond dried up in 2006 no fish have been collected. In October 2007, 68 Yaqui chub were relocated from Lower Guesthouse Pond in an effort to re-establish the population. If introductions of Yaqui chub into other ponds on the Ranch are of interest, Tennis Court Pond would likely be the source for those fish once reestablished.

Table 8. Numbers of fish collected between 2000 and 2007 from Tennis Court Pond.

Year	<u>Longfin dace</u>		<u>Yaqui chub</u>	
	Juvenile	Adult	Juvenile	Adult
2000	2	20	0	0
2001		Not sampled		
2003	0	0	441	358
2004	0	0	44	369
2005	0	0	363	0
2006	0	0	0	0
2007	0	0	0	0

## Lodge Pond

### *Methods*

Twelve minnow traps were set on October 9, 2007 and fished for approximately 16.5 hours each (1515 to 0745) for a total of 198 hours.

### *Results*

Four Yaqui chub were collected during this effort with a CPUE of 0.02 fish/hour. The fish were collected near the walking bridge by the pond inflow. Total lengths ranged from 81 to 83 mm. Two sub-adult bullfrogs were also collected. Twenty-five adult and 18 young-of-year Yaqui chub were stocked into Lodge Pond from El Coronado Ranch Site #1 (ECR-1 on West Turkey Creek) and Coal Pit Pit, respectively.

### *Discussion*

Although not a standard sampling site, Lodge Pond was monitored in October 2007 due to salvage efforts that occurred on May 31, 2006. Due to drought conditions, 287 Yaqui chub, 500 longfin dace, and 3 grass carp *Ctenopharyngodon idella* were salvaged from Lodge Pond. Most of the chub and dace were immediately relocated to Big Tank on El

Coronado Ranch, as this was the largest body of water existing in the area. (B. Radke, pers. comm.). On November 7, 2006, 42 of the salvaged Yaqui chub were restocked into the Lodge Pond. The four fish collected in may have survived from the November 2006 stocking or may have washed in from the creek inflow. Monitoring should continue to evaluate the success of the 2007 stocking.

## **Coal Pit Pit**

### *Methods*

Coal Pit Pit was sampled via visual observation, and thus no fish were collected, measured, or weighed on October 11, 2007. A Smith-Root, Inc. Model 12B backpack shocker was used to sample small pools downstream of Coal Pit Pit.

### *Results*

Coal Pit Pit contained 20+ adult Yaqui chub as well as adult bullfrogs. Eighteen young-of-year Yaqui chub were collected in small isolated pools downstream of the pit. These fish were stocked into Lodge Pond.

### *Discussion*

Coal Pit Pit had not been previously sampled. Josiah Austin requested we sample this site because he had seen fish in the pit previously. It is approximately 12 feet by 8 feet with a depth of around 6 feet that has not gone dry during the drought (J. Austin, pers. comm.). The depth prevented effective use of the backpack shocker. Minnow traps would likely be a more successful method and should be used in future monitoring and fish collected in the ephemeral reach downstream of the pit should be relocated to other areas of the ranch.

## **Turkey Pen Canyon Cistern**

### *Methods*

A Smith-Root, Inc. Model 12B backpack shocker was used to sample Turkey Pen Canyon cistern and a pool directly below on October 11, 2007.

### *Results*

Fourteen adult Yaqui chub were collected in the cistern pool and downstream of the cistern in 97 seconds of effort resulting in a CPUE of 8.66 fish/60 seconds.

### *Discussion*

Yaqui chub continue to persist in Turkey Pen Canyon cistern (Table 8). During the salvage efforts on April 18, 2006, six Yaqui chub were removed from the cistern. Although usually only a very small (~1m dia), shallow (0.75 m) "pool", this site does sustain a small "population" of Yaqui chub and should continue to be monitored in the future. Unlike past years, the creek containing Turkey Pen cistern was connected and flowing during the survey period, and the cistern was not a small, isolated body of water. The cistern was filled with sand and sediment in 2006; however, in 2007 there was abundant aquatic vegetation growing in the pool below the cistern.

Table 8. Numbers of Yaqui chub collected between 2000 and 2007 from Turkey Pen Canyon cistern.

Year	Yaqui chub	
	Juvenile	Adult
2000	0	0
2001	0	0
2003	15	0
2004	0	11
2005 <sup>+</sup>	+	+
2006 <sup>+</sup>	4	1
2007	0	14

<sup>+</sup> based on visual observation

## WEST TURKEY CREEK SURVEY

### *Methods*

A Smith-Root, Inc. Model 12B backpack shocker was used to sample all three standard monitoring sites of West Turkey Creek and one random site on the El Coronado Ranch property and three standard sites on the Forest Service on October 10, 2007 (Appendix B). Each site was 100-m long and was shocked from downstream to upstream. All fish captured were identified to species, categorized as either adult or juvenile, and native fish returned alive to West Turkey Creek (nonnatives were removed). Water quality parameters were measured at each site (Table 10).

Table 10. Water quality data collected from West Clear Creek on October 10, 2007.

Site	Temp (°F)	pH	Conductivity (µS)
ECR-1	65	7.8	150
ECR-2	70	7.9	146
ECR-3	77	8.7	144
ECR-R	71	7.7	118
USFS-1	63	7.7	75
USFS-2	65	7.8	85
USFS-3	66	7.6	90

## El Coronado Ranch Site 1

### *Results*

A total of 25 Yaqui chub, 7 Mexican stoneroller, and 55 longfin dace were collected during 759 seconds of effort at ECR-1. Yaqui chub, Mexican stoneroller, and longfin dace CPUE at this site was 1.98/60 seconds, 0.55 fish/60 seconds, and 4.34/60 seconds of shocking, respectively. All Yaqui chub and Mexican stoneroller collected were characterized as adults (<50 mm) (Figure 6). Longfin dace were counted and not measured. All Yaqui chub were moved to Lodge Pond.

### Discussion

The continued capture of Yaqui chub and longfin dace at site ECR-1 is very encouraging (Table 10), especially given the ongoing drought conditions. The collection of longfin dace at this site during this year's effort represents the fourth and largest collection since longfin dace were introduced at this site in June 2000. In June 2007 Mexican stoneroller *Campostoma ornatum* were collected from Rucker Canyon, Arizona and stocked into seven sites on and near the El Coronado Ranch (Appendix B) (Kline 2007). Twenty-nine stonerollers were released into a plunge pool above ECR-1. Stonerollers collected in October 2007 appeared healthy and to be acclimating well to their new environment.

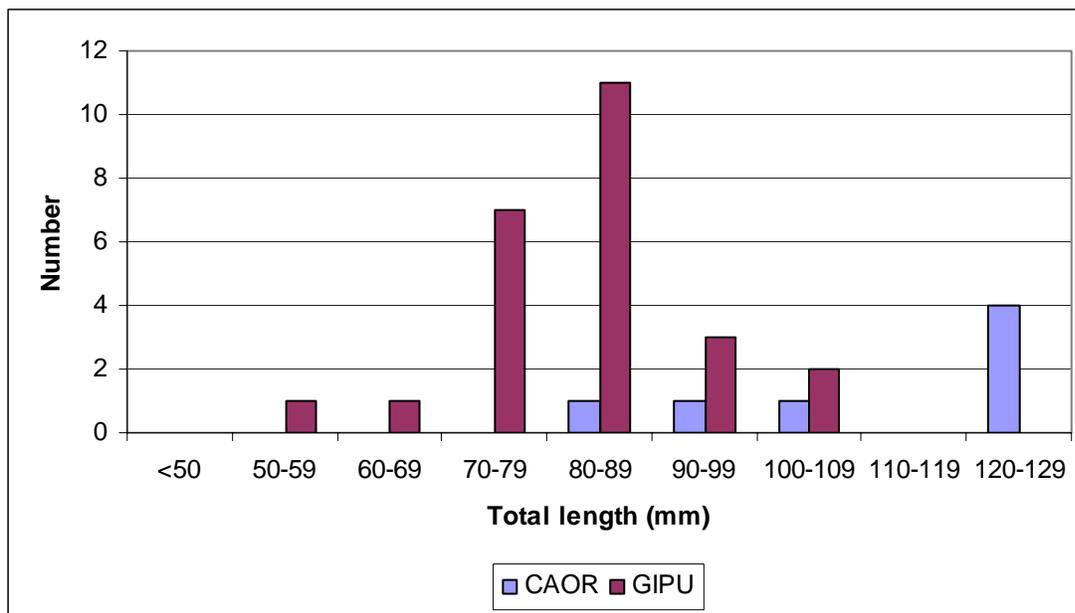


Figure 6. Length frequency histogram of Yaqui chub and Mexican stoneroller collected in ECR-1 during El Coronado Ranch HCP monitoring in October 2007.

Table 10. Numbers of fish collected between 2001 and 2007 from ECR-1.

Year	<u>longfin dace</u>		<u>Yaqui chub</u>		<u>Mexican stoneroller</u>	
	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult
2001	0	0	0	0	-	-
2003	0	0	7	12	-	-
2004	0	1	18	7	-	-
2005	0	12	0	32	-	-
2006	0	1	1	11	-	-
2007	55		0	25	0	7

## El Coronado Ranch Site 2

### *Results*

A total of 32 longfin dace and one Mexican stoneroller (108 mm) were collected during 510 seconds of effort at ECR-2, resulting in a CPUE of 3.76 fish/60 seconds and 0.12 fish/60 seconds, respectively.

### *Discussion*

Since renovation in 1999, varying numbers of longfin dace have been collected at this site (Table 11). It appears that longfin dace have recolonized this site since last year. In 2004 Yaqui chub were collected for the first time since renovation and have not been collected since. Quality habitat may be lacking in this reach of stream, because they are doing well upstream at ECR-1.

Table 11. Numbers of fish collected between 2000 and 2007 from ECR-2.

Year	<u>longfin dace</u>		<u>Yaqui chub</u>		<u>Mexican stoneroller</u>	
	Juvenile	Adult	Juvenile	Adult	Juvenile	Adult
2000		30	0	0	-	-
2001	0	4	0	0	-	-
2003	0	2	0	0	-	-
2004	1	2	3	2	-	-
2005	42	3	0	0	-	-
2006	0	0	0	0	-	-
2007		32	0	0	0	1

## El Coronado Ranch Site 3

### *Results*

A total of 78 longfin dace, eight green sunfish (*Lepomis cyanellus*), and one juvenile Yaqui chub (47 mm) were captured during 673 seconds of effort at ECR-3. CPUE of longfin dace, green sunfish and Yaqui chub was 6.95 fish/60 seconds, 0.71 fish/60 seconds, and 0.09 fish/60 seconds of effort, respectively.

### *Discussion*

The collection of Yaqui chub during this year's monitoring effort represents the fourth time Yaqui chub have been captured at this site since renovation in 1999, although never in large numbers (Table 12). This year also represents the fifth consecutive year that non-native green sunfish were captured at this site, although in reduced numbers compared to 2004 and 2005. The high flow event in early August may have connected the stream with other downstream areas containing green sunfish, resulting in a higher collection compared to 2006.

Table 12. Numbers of fish collected between 2001 and 2007 from ECR-3.

Year	<u>longfin dace</u>		<u>Yaqui chub</u>		<u>green sunfish</u>
	Juvenile	Adult	Juvenile	Adult	
2001	0	0	0	0	0
2003	109	25	0	0	1
2004	8	23	1	0	22
2005	257	64	0	5	13
2006	0	0	0	1	3
2007	78		1	0	8

### **El Coronado Ranch Random Site**

[(ECR-R), Chapel Pool]

#### *Results*

Thirty-six longfin dace and one Mexican stoneroller (85 mm) were collected in 342 seconds of effort at ECR-R. Longfin dace and Mexican stoneroller CPUE was 3.21 fish/60 seconds and 0.09 fish/60 seconds, respectively.

#### *Discussion*

Since renovation in 1999, this is the first survey of this reach of West Turkey Creek and therefore, these data should serve as baseline for comparisons with future surveys, especially with the introduction of the Mexican stoneroller. In June 2007, 20 Mexican stonerollers were released into Chapel Pool upstream from ECR-R.

### **U.S. Forest Service Site 1**

[(USFS-1) – Dispersed Campsite]

#### *Results*

Zero fish were collected in 213 seconds of effort.

#### *Discussion*

This site has regularly held at least a few Yaqui chub and an occasional longfin over the past several years, even though drought conditions have persisted in the area. Brouder (2003) collected one adult Yaqui chub and two juvenile longfin dace in 2003. Coleman (2002) collected a total of six adult Yaqui chub and one adult longfin dace in two sampling trips in 2001. Lack of habitat due to low flows continues to be an issue. This site should be considered as a future reintroduction site if fish, and water, are available.

### **U.S. Forest Service Site 2**

[(USFS-2) – Upper Sycamore Campground]

#### *Results*

Two juvenile longfin dace were collected in 305 seconds of effort, resulting in a CPUE of 0.40 fish/60 seconds.

### *Discussion*

This collection represents the first collection of longfin dace at this site, although it is likely longfin dace and Yaqui chub have inhabited this area previously because they have been collected both upstream and downstream of this site. Coleman (2002) collected no fish in 2001 and Brouder (2003) was unable to sample the site due to lack of water in 2003.

### **U.S. Forest Service Site 3**

[(USFS-3) – Lower Sycamore Campground]

### *Results*

Zero fish were collected in 382 seconds of effort.

### *Discussion*

Even though no fish were collected at this site during this monitoring effort or in 2003 (Brouder 2003), Yaqui chub and longfin dace have been collected at this site in the past (Coleman 2002). Low water levels, few isolated pools and lack of flow within this reach of West Turkey Creek make it difficult for fishes to persist for any length of time.

## **FUTURE MONITORING AND MANAGEMENT RECOMMENDATIONS**

### *Monitoring*

- During annual monitoring efforts (October), if sufficient numbers of fish are available, translocate Yaqui chub, longfin dace and Mexican stoneroller ( $n = 25-50$ ; each) from either West Turkey Creek or El Coronado Ranch ponds to West Turkey Creek on Forest Service lands, upstream of El Coronado Ranch boundary.
- In addition to sampling the 3 fixed monitoring sites on West Turkey Creek, continue sampling the entire reach of West Turkey Creek (as identified in Brouder [2006]) from the lower El Coronado Ranch boundary to at least the Ranch entrance bridge, if not to the upper Ranch boundary.
- Continue to record each sampling gear and more importantly the number of each species collected in that gear separately. This is needed so that a mean CPUE, variance, and confidence intervals can be generated for each gear type and species. Mean CPUEs and confidence intervals are needed in order to detect changes in population trends. CPUEs generated from “pooled” data (i.e., 10 traps catching 10 fish over a period of 10 hours equaling a CPUE of 10fish/100 hours) do not allow for means, variances, and confidence intervals to be calculated.
- Minnow traps should be used in all ponds for consistency and to allow for comparisons. When minnow trapping is not feasible seining could be used and effort for seine hauls should continue to be recorded in  $m^2$  and not number of seine hauls. Multiplying the length of the seine haul by the width of the seine generates a seine haul effort in  $m^2$ .

- Measure and record total length of all native fishes collected (< 100 individuals) to allow for the development and interpretation of length frequency histograms. Length frequency histograms will also reduce biologist subjectivity with regards to categorizing fish as either juvenile or adult.
- Multiple hoop nets, fyke nets, experimental gill nets, and/or trammel nets should continue to be set overnight in Big Tank to sample for Yaqui catfish.
- All Yaqui catfish captured should be measured for total length, weighed, and scanned for the presence of a PIT tag. All “unmarked” catfish should have a PIT tag inserted and PIT tag number recorded. Genetic samples should be taken once from each captured fish.
- Standardized data collection sheets for netting/trapping/seining and backpack electrofishing should be developed and adopted, as well as the development of an El Coronado Ranch HCP fish sampling database.
- Continue implementing HACCP policy of disinfecting sampling gear used at one site prior to the use at another site in an effort to reduce inadvertent introductions of parasites/pathogens into uninfected waters. To date, Asian fish tapeworm has not been documented from any fish collected from West Turkey Creek or El Coronado Ranch waters!
- Begin to sub-sample (n<60) Yaqui chub and longfin dace from each pond containing them from both species collected in West Turkey Creek to examine for the presence of Asian fish tapeworm. However, instead of sacrificing them, “treat” them in a Praziquantel bath for 24 h. This practice could easily be implemented during annual monitoring efforts and will reduce the need to sacrifice fish. Once fish are “bathed” they can be returned back into the pond/creek.

### *Management*

- During June, July, and August 2008, intensively sample Big Tank using baited hoop nets, fyke nets, experimental gill nets, or trammel nets to assess the current status of Yaqui catfish in these ponds. This recommended timeframe for sampling is based on results presented in Coleman (2002), who observed spawning aggregates, concentrations of fish, and highest catch rates of catfish during this time of year. Sampling in June 2007 also supports this timeframe.
- Attempt to “drive” Yaqui catfish into gill nets or trammel nets by using an electrofishing boat or raft.
- Install more “catfish condos” or other suitable structures in Big Tank to improve the chances that Yaqui catfish will reproduce in the future.

- Introduce Yaqui topminnow *Poeciliopsis occidentalis sonoriensis* into ponds with appropriate habitat. Preferred habitats are warm, shallow water and areas with dense mats of algae and debris along margins (USFWS 1994).

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Appendix A. El Coronado Ranch HCP fish monitoring 2007 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2006 (Brouder 2005, 2006, Voeltz 2006). Values presented are number of fish caught. A = adult, J = juvenile. Sampling methods: ES=backpack electroshocking; DN=dip net; VO = visual observation; MT=minnow trap; TN=trammel net; GN=experimental gill net; S=seining; HN=hoop net, MHN = mini-hoop net.

Site	Year	Method	Total effort	Yaqui chub		longfin dace		Yaqui catfish		black crappie		green sunfish		Mexican stoneroller	
				A	J	A	J	A	J	A	J	A	J	A	J
ECR-1	2004	ES	1800 s	7	18	1	-	-	-	-	-	-	-	-	-
	2005	ES	390 s	32	-	12	-	-	-	-	-	-	-	-	-
	2006	ES	791 s	11	1	1	-	-	-	-	-	-	-	-	-
	2007	ES	759 s	25	-	55		-	-	-	-	-	-	7	-
ECR-2	2004	ES	827 s	2	3	2	1	-	-	-	-	-	-	-	-
	2005	ES	-	-	-	3	42	-	-	-	-	-	-	-	-
	2006	ES	486 s	-	-	-	-	-	-	-	-	-	-	-	-
	2007	ES	510 s	-	-	32		-	-	-	-	-	-	1	-
ECR-3	2004	ES	928 s	-	1	23	8	-	-	-	-	22		-	-
	2005	ES	1405 s	5	-	3	42	-	-	-	-	13		-	-
	2006	ES	569 s	1	-	-	-	-	-	-	-	3	-	-	-
	2007	ES	673 s	-	1	78		-	-	-	-	8		-	-
Turkey Pen	2004	DN	4 sweeps	11	-	-	-	-	-	-	-	-	-	-	-
	2005	VO	-	+	+	-	-	-	-	-	-	-	-	-	-
	2006	VO	-	1	4	-	-	-	-	-	-	-	-	-	-
	2007	ES	97s	14	1	-	-	-	-	-	-	-	-	-	-
Lower Guest House Pond	2004	HN	45.0 h	-	-	-	-	-	-	-	-	-	-	-	-
	2005	S	180 m <sup>2</sup>	5	14	-	27	-	-	-	-	-	-	-	-
	2006	S	230 m <sup>2</sup>	-	-	-	11	-	-	-	-	-	-	-	-
	2007	MT	173.3 h	49	17	2	-	-	-	-	-	-	-	-	-

Appendix A continued.

				Yaqui chub		longfin dace		Yaqui catfish		black crappie		green sunfish		Mexican stoneroller	
				A	J	A	J	A	J	A	J	A	J	A	J
Big Tank	2004	GN	10.5 h	-	-	-	-	-	-	-	-	-	-	-	-
		HN	14.0 h	-	-	-	-	-	-	-	-	-	-	-	-
		MT	24.5 h	-	-	-	-	-	-	-	-	-	-	-	-
		TN	3.25 h	-	-	-	-	1	-	11	-	-	-	-	-
	2005	TN	22.0 h	-	-	-	-	2	-	-	-	-	-	-	
	2006	TN	32.0 h	-	-	-	-	3	-	-	-	-	-	-	-
		HN	80.0 h	-	-	-	-	-	-	5	-	-	-	-	-
		MT	48.0 h	-	-	-	-	-	-	-	-	-	-	-	-
	2007	TN	112.0 h	-	-	-	-	3	-	-	-	-	-	-	-
		HN	32.0 h	-	-	-	-	-	-	-	-	-	-	-	-
MHN		208.0 h	-	-	-	-	-	-	-	-	-	-	-	-	
MT		320.0 h	-	-	-	-	-	-	-	-	-	-	-	-	
Tennis Court Pond	2004	HN	32.0 h	-	-	-	-	-	-	-	-	-	-	-	-
		MT	96.0 h	369	44	-	-	-	-	-	-	-	-	-	-
	2005	MT	177.0 h	-	363	-	-	-	-	-	-	-	-	-	-
	2006	MT	216.0 h	-	-	-	-	-	-	-	-	-	-	-	-
	2007	MT	198.0 h	-	-	-	-	-	-	-	-	-	-	-	-
Dale's Pond	2004	HN	34.0 h	-	-	-	-	-	-	-	-	-	-	-	-
		MT	85.0 h	-	-	-	-	-	-	-	-	-	-	-	-
	2005	MT	90.0 h	74	-	-	-	-	-	-	-	-	-	-	-
	2006	MT	114.0 h	-	-	-	-	-	-	-	-	-	-	-	-
Upper Guest House Pond	2004	HN	42.0 h	-	-	-	-	-	-	-	-	-	-	-	-
		MT	84.0 h	-	-	-	-	-	-	-	-	-	-	-	-
	2005	S	702 m <sup>2</sup>	73	167	4	7	-	-	-	-	-	-	-	-
	2006	S	600 m <sup>2</sup>	-	-	-	110	-	-	-	-	-	-	-	-
	2007	MT	189.0 h	-	-	-	-	-	-	-	-	-	-	-	-

Appendix B. Locations of monitoring sites on the El Coronado Ranch.

**Big Tank.** Drive through the lower-most iron pipe gate on the north side of Turkey Creek road. Follow road to the tank.

**Upper Guesthouse Pond.** Located next to the guesthouses across the street from the El Coronado Ranch driveway. The upper pond is at the end of the circular driveway and has a stone dock.

**Coal Pit Pit.** UTM (NAD83/WGS84) 3526009 N 654006 E

**Turkey Pen Canyon Cistern.** UTM (NAD83/WGS84) 3527593 N 654311 E.

**El Coronado Ranch Site 1.** (ECR-1) Drive to the El Coronado Ranch guest houses. Follow the road through the turnaround by the last two houses, you will see the Upper Guesthouse pond. The road continues along the pasture fence where you will see the lower guesthouse pond. After the pasture, the road turns sharply to the left.

Approximately 50m after the turn you will see another road on the right, turn right onto the orchard road. It will go down a hill, past an open field and a stock tank on the left. As you pass the western embankment of the stock tank the road will slope downward. Stop there. There will be a low point where a small outflow from the tank crosses the road. Follow the outflow NW until it meets West Turkey Creek. Start in the creek at a cutbank pool river left, shocking downstream for 100m. UTM (NAD83/WGS84) 3526655 N 652757 E.

**El Coronado Ranch Site 2.** [(ECR-2) – below Big Tank diversion] Begin below Big Tank infiltration intake (diversion). This site can be reached two different ways. First, is to drive down the orchard road past the ECR-1 site, and turning right before the road crosses the Cold Pit drainage. The road will cross West Turkey Creek just above the diversion. Second, drive down Turkey Creek road from the Austin's driveway to the first cattle guard. Go through a Texas gate (barbed wire gate) on the south side of the road before the cattle guard and follow the two-track road to the diversion site. UTM (NAD83/WGS84) 3526638 N 652468 E.

**El Coronado Ranch Site 3.** [(ECR-3) – Big Tank outflow barrier to lower boundary] Lowest barrier. Park at the very first cattle guard as you drive onto the El Coronado Ranch from Turkey Creek road, this is also the first cattle guard after Sander's house. There is a Texas gate (barb wire gate) on the north side of the road by the cattle guard. Go through the gate and walk down to the creek bottom. Follow the creek upstream until you reach the barrier. Electroshock from the barrier downstream for 100m. UTM (NAD83/WGS84) 3526932 N 651015 E

**U.S. Forest Service Site 1.** [(USFS-1) – Dispersed Campsite] This sample site is approximately 0.40 miles from the end of West Turkey Creek road, below the junction of Morse Canyon and West Turkey Creek. The area was a small campsite that is being restored by USFS. It has sediment barrier fencing and has been seeded. UTM (NAD83/WGS84) 3525431 N 658180 E.

**U.S. Forest Service Site 2.** [(USFS-2) – Upper Sycamore Campground] Sycamore Campground upper waterfall. Park in Sycamore Campground and walk east until you reach West Turkey Creek. Follow the creek upstream to the base of the uppermost waterfall continuing downstream. UTM (NAD83/WGS84) 3526021N 657749 E.

**U.S. Forest Service Site 3.** [(USFS-3) – Lower Sycamore Campground] Sycamore Campground lower waterfall. From Sycamore Campground, follow the creek downstream until you reach a rock face (river left) along the stream below campground. Show downstream from that point. UTM (NAD83/WGS84) 3526254 N 657399 E.

