EL CORONADO RANCH HABITAT CONSERVATION PLAN 2008
FISH MONITORING REPORT

A Full Moon Rises Over the El Coronado Ranch

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ACKNOWLEDGEMENTS

The completion of the 2008 El Coronado Ranch Habitat Conservation Plan fish monitoring could not have been accomplished without the cooperation and assistance from the following HCP partners and volunteers: Josiah and Valer Austin (El Coronado Ranch), Bill Radke and Chris Lohrengel (USFWS – San Bernardino National Wildlife Refuge), Marty Underwood (USFWS – Arizona Fish and Wildlife Conservation Office), and Jason Kline (Arizona Game and Fish Department).

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 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; Johnson 2007) summarizing these activities were provided to all interested parties. This report summarizes results of the 2008 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 2006, Johnson 2007).

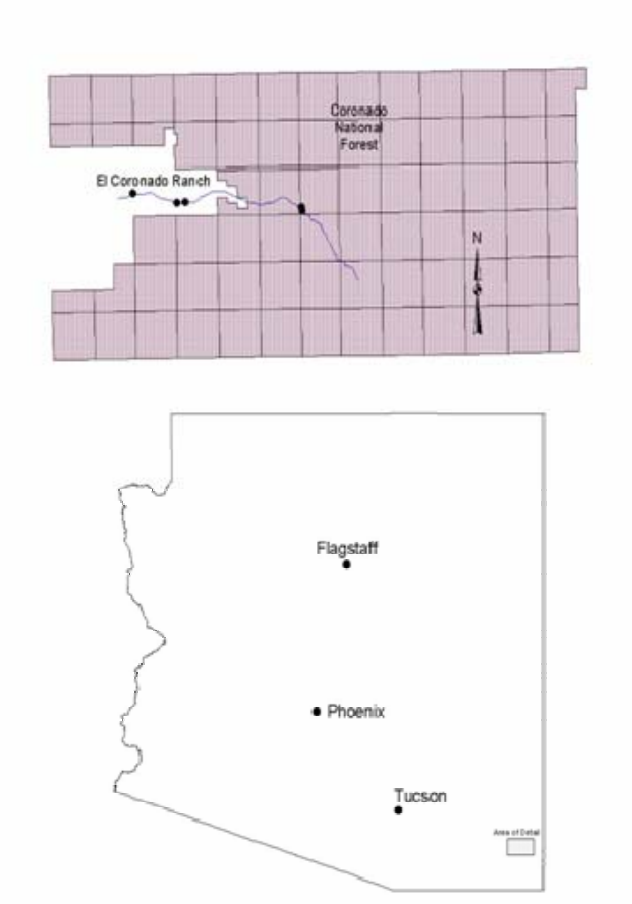

Figure 1. General location of El Coronado Ranch.

EL CORONADO RANCH PONDS SURVEY

Big Tank

Methods

Three 20-m trammel nets were fished for approximately 30 hours each (15 hours a night: 1700-hr to 0800-hr) on the evenings of October 13 and 14, 2008. Twelve baited (chicken livers and hot dogs) hoop nets (four sets of three nets tied in linear fashion) were fished for approximately 39 hours each (1700-hr on October 13th to 0800-hr on October 15th), but checked three times (morning and evening of October 14th, and morning of October 15th). Yaqui catfish *Ictalurus pricei* captured were measured for total length (TL; mm), weighed (g), and anal and pectoral rays counted. Yaqui catfish captured were also scanned for the presence of a Passive Integrated Transponder (PIT) tag and fin clipped for genetic analysis. Black crappie *Pomoxis nigromaculatus* and green sunfish *Lepomis cyanellus* were counted and removed permanently.

Results

Only two Yaqui catfish were caught (both in trammel nets after the first night of netting). The Yaqui catfish collected had a total length of 390 and 425 mm, respectively, and weighed 585, and 810 g, respectively. Both the Yaqui catfish collected were recaptures (Tables 1 and 2), although previous history on the PIT tag data for the Table 1 fish could not be located.

Table 1. Mark-recapture history of Yaqui catfish PIT tag # 532640672B captured during El Coronado Ranch HCP monitoring in October 2008.

Date	Location	Mark(M)/ Recapture (R)	TL (mm)	WT (g)
Previous history could not be located				
10-14-08	Big Tank	R	390	585

Table 2. Mark-recapture history of Yaqui catfish PIT tag # 53255C7F5E captured during El Coronado Ranch HCP monitoring in October 2008.

Date	Location	Mark(M)/ Recapture (R)	TL (mm)	WT (g)
10-26-99	Lisa Tank	M	252	140
10-14-00	Lisa Tank	R	292	652
10-14-08	Big Tank	R	425	810

Discussion

Yaqui catfish captures continue to be low; but recaptured fish over the years tend to be unique (meaning, with the exception of one fish, we are not recapturing fish that have previously been captured in Big Tank). However, because recaptured fish from Big Tank are rarely encountered, it is difficult to get a population estimate to determine how many of the original 254 Yaqui catfish that were stocked remain, or if any reproduction

has occurred (several catfish have been caught over the years without PIT-tags – either they shed their tags or were a result of reproduction as all 254 stocked fish were tagged). Because the fish were from the 1996 year class from the hatchery, they are now ~12 years old, which is near the reported maximum life-span for the related channel catfish *Ictalurus punctatus*, which sometimes lives more than 10 years, but typically does not exceed six or seven years (Pflieger 1997).

The collection of three adult green sunfish in Big Tank (the first record anywhere on El Coronado Ranch above the fish barrier since the renovation) is alarming and should be cause for discussion among the HCP cooperators. At a minimum, Big Tank should be electroshocked with a boat or raft to: 1) collect as many Yaqui catfish as possible to develop a population estimate and attempt to document recruitment, 2) determine the population size and structure of black crappie, 3) attempt to capture any longfin dace *Agosia chrysogaster* or Yaqui chub that have been stocked several times, yet never recaptured, and 4) to determine the extent of the green sunfish population.

Table 3. Numbers of fish collected between 2003 and 2008 from Fall Monitoring at Big Tank.

Year	Yaqui catfish	Black crappie	Grass carp	Green sunfish
2003	2	20	1	0
2004	1	11	0	0
2005	2	0	0	0
2006	3	5	0	0
2007	3	0	0	0
2008	2	15	0	3

Tennis Court Pond

Methods

Twelve minnow traps were fished overnight (1530-hr to 0900-hr) on October 14, 2008 in the Tennis Court Pond. All chub captured were measured for total length (mm; TL) and immediately released back into Tennis Court Pond. Catch per unit effort (CPUE) was calculated as the number of fish/total hours of netting.

Results

A total of 70 Yaqui chub were collected in approximately 17.5 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 0.33 fish/hour. Mean total length of Yaqui chub measured was 60.7 mm and ranged in size from 34 to 105 mm. Length-frequency distribution of Yaqui chub indicates that at least three size classes of fish were present in Tennis Court Pond (Figure 2), although the majority of fish collected were of the <50 mm modal length class.

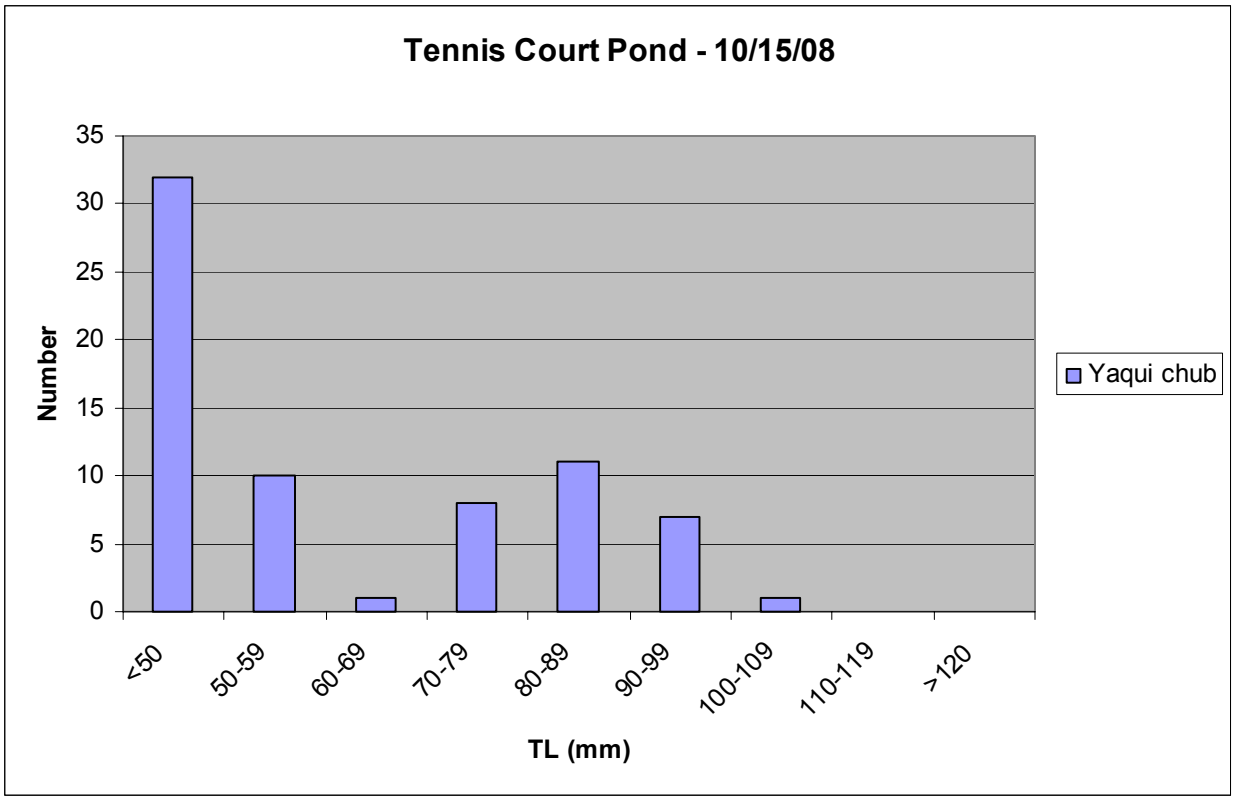

Figure 2. Length-frequency histogram of Yaqui chub collected in Tennis Court Pond during El Coronado Ranch HCP monitoring in October 2008.

Discussion

Tennis Court Pond historically had high numbers of Yaqui chub (Table 4). On April 18, 2006, five Yaqui chub were salvaged before Tennis Court Pond dried. Because the pond dried in 2006, no fish were collected in 2007. In October 2007 (following the fall monitoring effort), 68 Yaqui chub were relocated from Lower Guesthouse Pond to re-establish the population in Tennis Court Pond. Once the population is large enough, Yaqui chub from Tennis Court Pond can be used as the source population for re-establishments or augmentations in other areas of the ranch.

Table 4. Numbers of fish collected between 2003 and 2008 from Tennis Court Pond.

Year	Longfin dace	Yaqui chub
2003	0	799
2004	0	413
2005	0	363
2006	0	0
2007	0	0
2008	0	70

Lodge Pond

Methods
Twelve minnow traps were fished overnight (1530-hr to 0930-hr) on October 14, 2008 in the Lodge Pond. All fish captured >50 mm TL were measured (fish <50 mm TL were counted but not measured) and immediately released back into Lodge Pond, except for any Mexican stonerollers which were released into West Turkey Creek near Lodge pond. CPUE was calculated as the number of fish/total hours of netting.

Results
A total of 238 fish representing two species (Yaqui chub [n=237] and Mexican stoneroller *Campostoma ornatum* [n=1]) were collected in approximately 18 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 1.10 fish/hour. Ninety-three Yaqui chubs <50 mm were not measured, therefore no mean length can be generated. Length-frequency distribution of Yaqui chub indicates that at least three size classes of fish were present in Lodge Pond (Figure 3), although the majority of fish collected were of the <50 mm modal length class. The one Mexican stoneroller (50 mm) was released into West Turkey Creek near the Chapel.

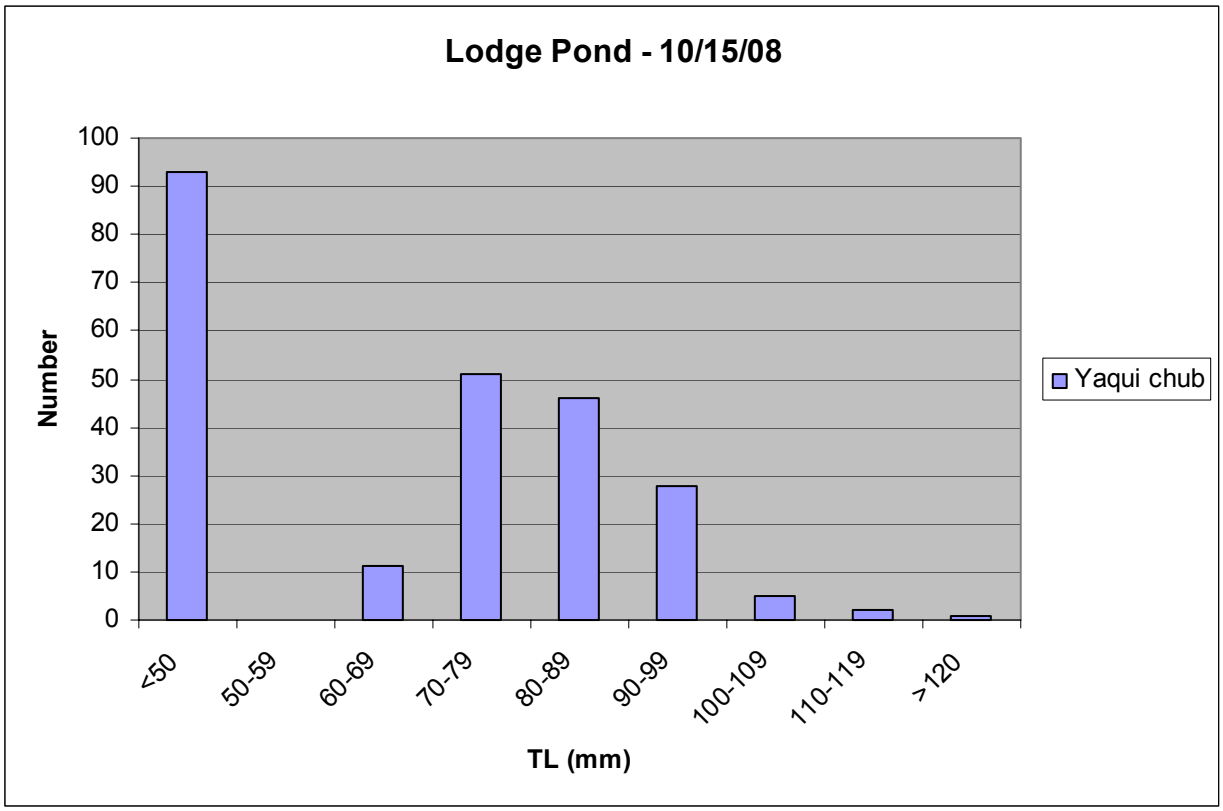

Figure 3. Length-frequency histogram of Yaqui chub collected in Lodge Pond during El Coronado Ranch HCP monitoring in October 2008.

Discussion
Although not a traditional standard sampling site, Lodge Pond was monitored in October 2006, 2007, and 2008 (Table 5) due to salvage efforts that occurred on May 31, 2006 (Voeltz 2006, Johnson 2007) and the restocking of 42 Yaqui chub on November 7, 2006 (Johnson 2007). Lodge Pond should be sampled every year from now on, and fish used for re-establishment throughout the ranch, as needed. In addition, Yaqui topminnow should be stocked under the AGFD's (Arizona Game and Fish Department) Safe Harbor Agreement for topminnows and pupfish in Arizona (AGFD 2007).

Table 5. Numbers of fish collected between 2006 and 2008 from Lodge Pond.

Year	Longfin dace	Yaqui chub	Mexican stoneroller
2006	0	0	-
2007	0	4	0
2008	0	237	1

Upper Guesthouse Pond

Methods
Twelve minnow traps were fished overnight (1600-hr to 1000-hr) on October 14, 2008 in the Upper Guesthouse Pond. All Yaqui chub captured were measured for total length (mm; TL) and immediately released back into Upper Guesthouse Pond. CPUE was calculated as the number of fish/total hours of netting.

Results
A total of 52 Yaqui chub were collected in approximately 18 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 0.24 fish/hour. Mean total length of Yaqui chub measured was 67.5 mm and ranged in size from 43 to 101 mm. Length-frequency distribution of Yaqui chub indicates that at least three size classes of fish were present in Upper Guesthouse Pond (Figure 4), although the majority of fish collected were of the 70-79 mm modal length class.

Discussion
The re-appearance of Yaqui chub in Upper Guesthouse Pond is encouraging, as no chub had been collected in Upper Guesthouse Pond during fall monitoring since 2005 (Table 6). The chubs most likely dispersed from upstream habitats during higher flows. Before 2007, Upper Guesthouse pond was sampled using seines; however, to make future data comparable between the ponds on the ranch, the decision was made in 2007 to sample with minnow traps.

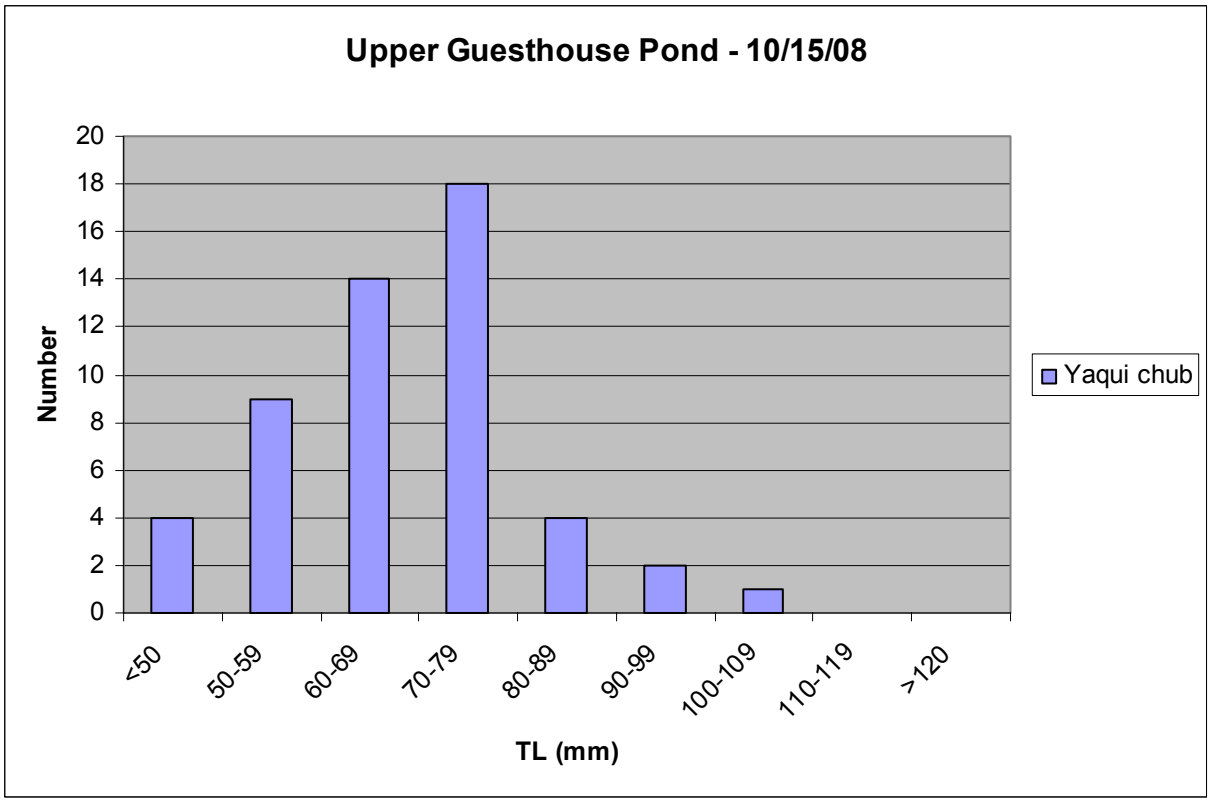

Figure 4. Length-frequency histogram of Yaqui chub collected in Upper Guesthouse Pond during El Coronado Ranch HCP monitoring in October 2008.

Table 6. Numbers of fish collected between 2003 and 2008 from Upper Guesthouse Pond.

Year	Longfin dace	Yaqui chub
2003	0	1
2004	0	0
2005	11	240
2006	110	0
2007	0	0
2008	0	52

Lower Guesthouse Pond

Methods
Twelve minnow traps were fished overnight (1600-hr to 1030-hr) on October 14, 2008 in the Lower Guesthouse Pond. All Yaqui chub captured were measured for total length (mm; TL) and immediately released back into Upper Guesthouse Pond. All longfin dace were counted and released. CPUE was calculated as the number of fish/total hours of netting.

Results
A total of 167 fish representing two species (Yaqui chub [n=132] and longfin dace [n=35]) were collected in about 18.5 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 0.59 fish/hour. Mean CPUE of longfin dace collected in minnow traps was 0.16 fish/hour. Mean total length of Yaqui chub was 68.8 mm and ranged in size from 46 to 90 mm and although not individually measured, all of the longfin dace were <50 mm (Figure 5).

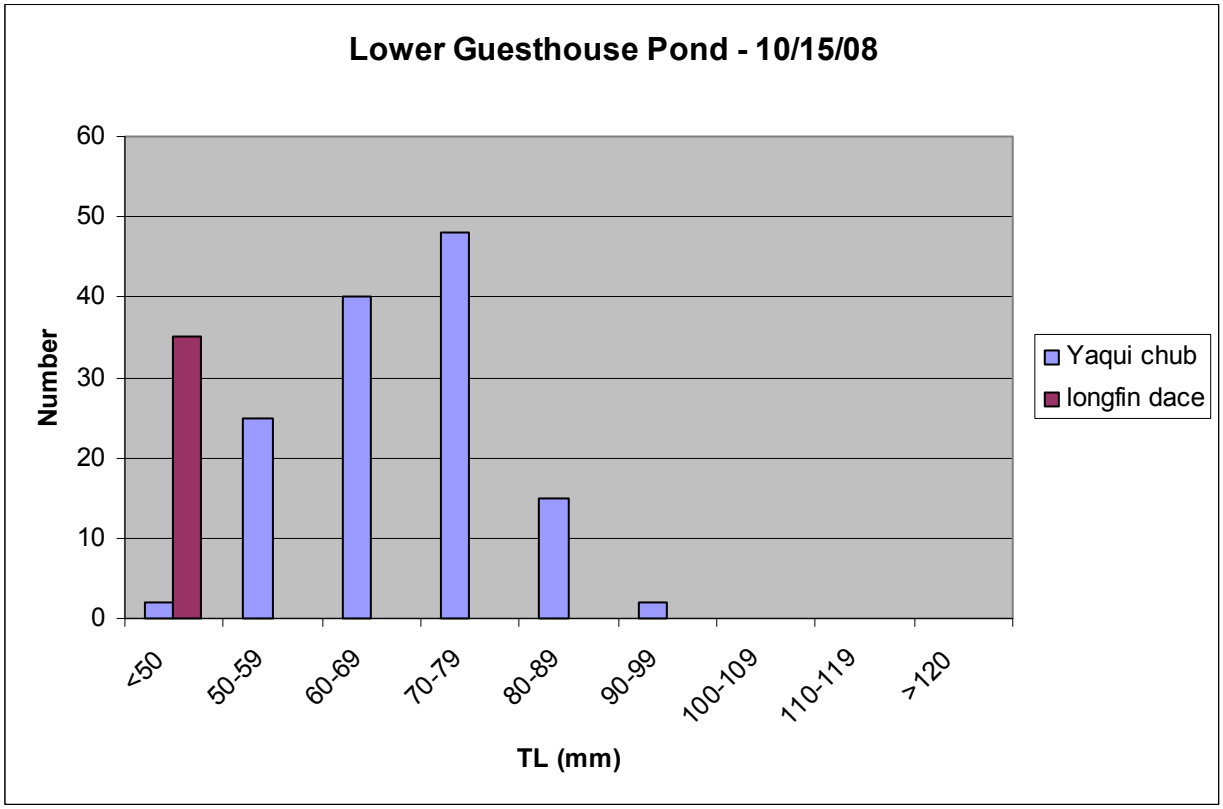

Figure 5. Length-frequency histogram of Yaqui chub collected in Lower Guesthouse Pond during El Coronado Ranch HCP monitoring in October 2008.

Discussion
Historically, Lower Guesthouse Pond has never been stocked with either Yaqui chub or longfin dace, and their presence is the result of natural dispersal from upstream habitats on the ranch. Before 2007, Lower Guesthouse pond was sampled using seines;

however, to make future data comparable between the ponds on the ranch, the decision was made in 2007 to sample with minnow traps.

Table 7. Numbers of fish collected between 2003 and 2008 from Lower Guesthouse Pond.

Year	Longfin dace	Yaqui chub
2003	Not Sampled	
2004	0	0
2005	27	19
2006	11	0
2007	2	66
2008	35	132

Ponds Summary

Following the severe drought conditions that dried, or nearly dried, all of the ponds on the ranch in 2006, the Yaqui chub populations have rebounded in all four regularly sampled ponds in 2008 (Figure 6). This was a result of restocking Tennis Court and Lodge ponds in 2007, and natural dispersal to Upper and Lower Guesthouse ponds. The length-frequency of chubs from all four ponds in 2008 shows a balanced population of young fish (likely spawned early 2008) and breeding-sized adults (Figure 7). In addition, the percentage of fish in each size class is well balanced in all four ponds, showing effective reproduction and recruitment into the adult population (Figure 8).

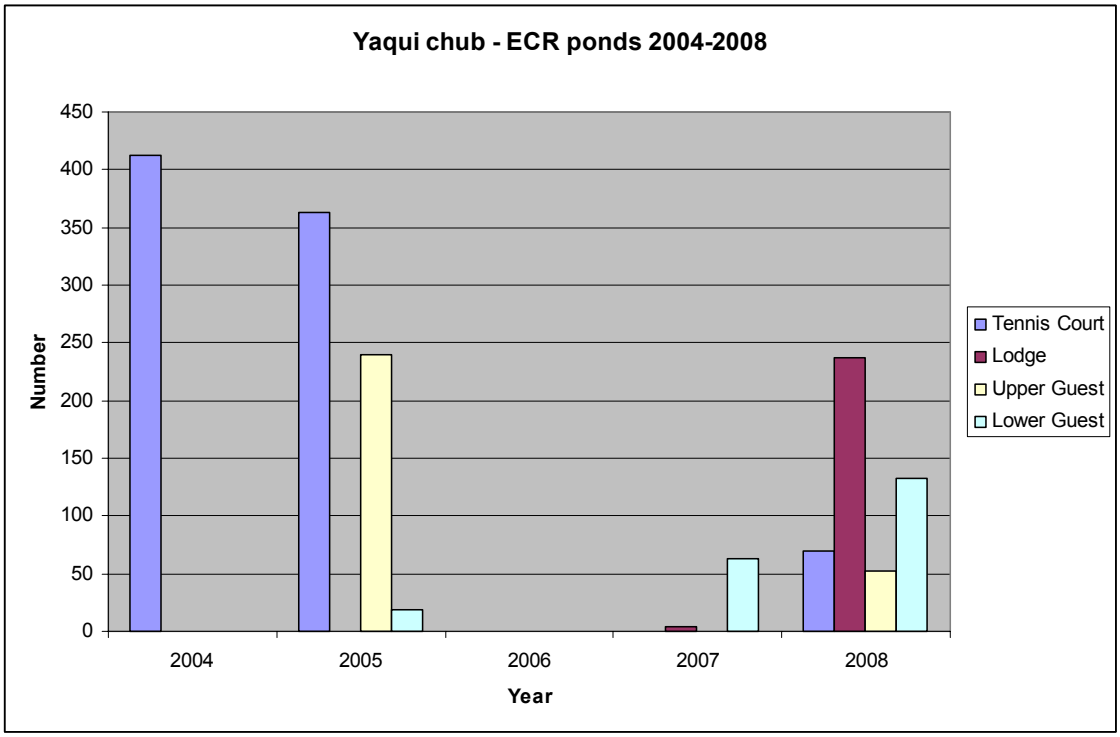

Figure 6. Total numbers of Yaqui chub collected from four ponds during El Coronado Ranch HCP monitoring in October 2004 - 2008.

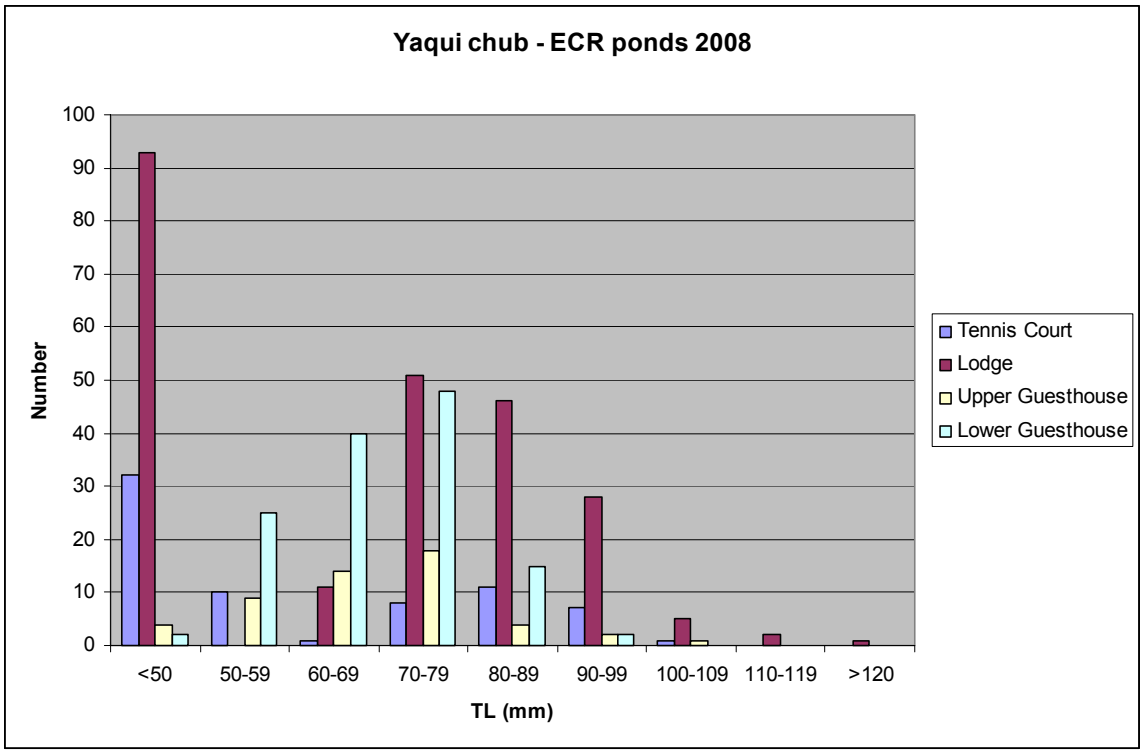

Figure 7. Length-frequency histogram of Yaqui chub collected from four ponds during El Coronado Ranch HCP monitoring in October 2008.

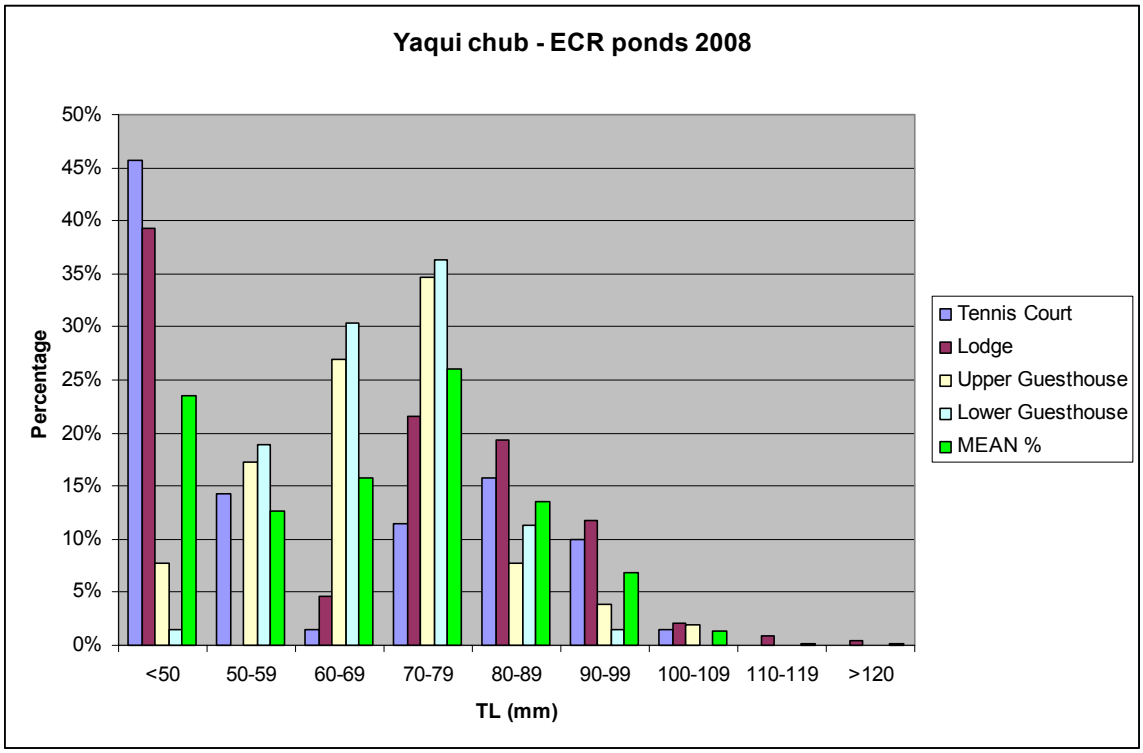

Figure 8. Length-percentage frequency histogram of Yaqui chub collected from four ponds during El Coronado Ranch HCP monitoring in October 2008.

WEST TURKEY CREEK SURVEY

Methods
A Smith-Root, Inc. Model LR-24 backpack electrofishing unit (settings: 150-200 volts, 30 Hz, output ~0.4 amps) was used to sample all three standard monitoring sites of West Turkey Creek, two random sites on the El Coronado Ranch property, and all three standard sites on the USFS (U.S. Forest Service) lands on October 14, 2008 (Appendix B). Each standard site was 100-m long and was shocked from downstream to upstream, with actual shocking seconds recorded. All fish captured were identified to species, measured (longfin dace and green sunfish were just counted), and native fish returned alive to West Turkey Creek (green sunfish were removed). CPUE was calculated as the number of fish/minute of shocking.

U.S. Forest Service Site 1
[(USFS-1) – Dispersed Campsite]

Results
Zero fish were collected in 281 seconds of effort.

Discussion
This site has not contained suitable fish habitat the last two fall monitoring trips due to drought conditions. 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 reestablishment site if fish, and when water, are available.

U.S. Forest Service Site 2
[(USFS-2) – Upper Sycamore Campground]

Results
One Mexican stoneroller was collected in 301 seconds of effort, resulting in a CPUE of 0.20 fish/min.

Discussion
Current 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, with the exception of the plunge pool below the waterfall.

U.S. Forest Service Site 3
[(USFS-3) – Lower Sycamore Campground]

Results
One Mexican stoneroller was collected in 246 seconds of effort, resulting in a CPUE of 0.24 fish/min.

Discussion
Current 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, with the exception of the plunge pool below the waterfall. The one stoneroller collected was moved upstream to USFS-2 to be with his friend in the plunge pool.

El Coronado Ranch Site 1

Results
A total of 72 longfin dace, 36 Mexican stoneroller, and 16 Yaqui chub were collected during 605 seconds of effort at ECR-1. Longfin dace, Mexican stoneroller, and Yaqui chub CPUE at this site was 7.14 fish/min., 3.57 fish/min., and 1.59 fish/min., respectively. Mean total length of Mexican stoneroller was 63.9 mm and ranged in size from 47 to 109 mm. Mean total length of Yaqui chub was 77.3 mm and ranged in size from 42 to 111 mm.

Discussion
The capture of nine Mexican stonerollers <50 mm is encouraging, as it means that reproduction occurred following the 2007 stocking (Kline 2007). In addition, the increase of longfin dace and multiple age classes of Yaqui chub is a positive sign that the populations are recovering following the 2006 drought.

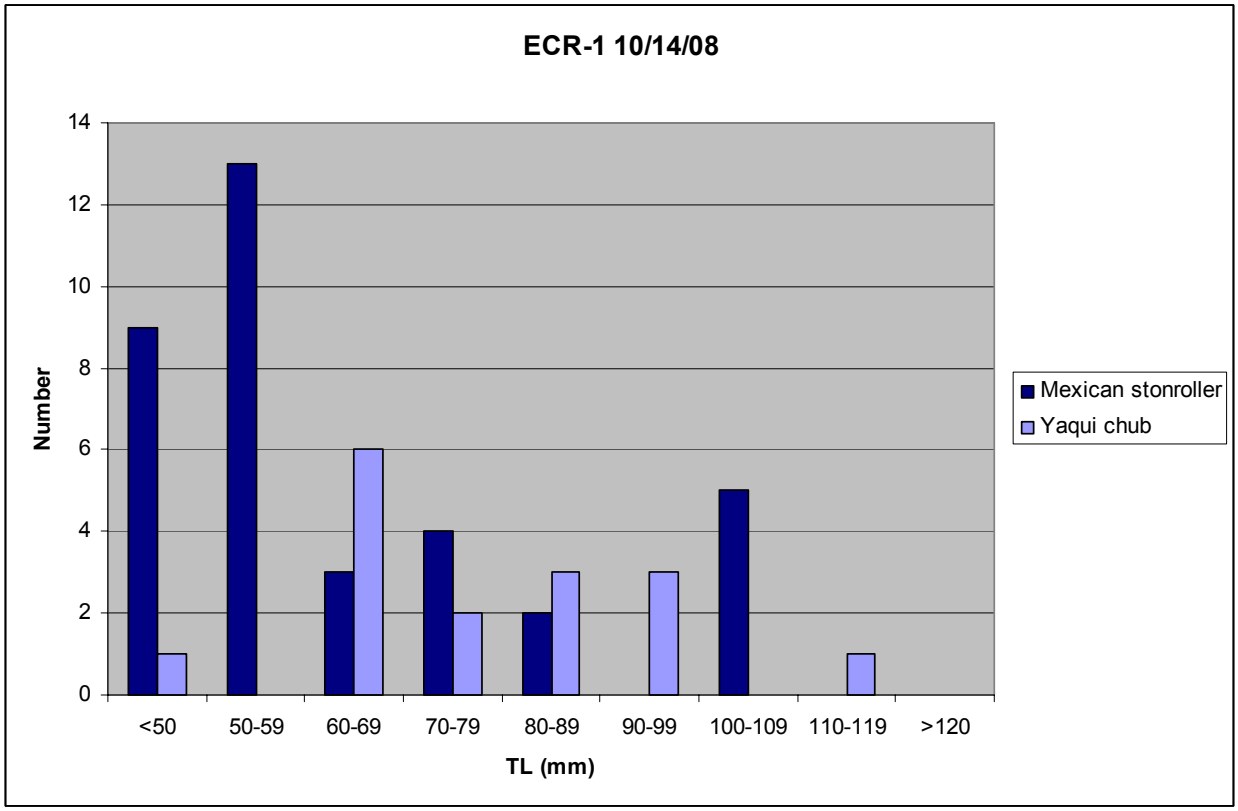

Figure 9. Length frequency histogram of Yaqui chub and Mexican stoneroller collected from ECR-1 during El Coronado Ranch HCP monitoring in October 2008.

Table 8. Numbers of fish collected between 2003 and 2008 from ECR-1.

Year	longfin dace	Yaqui chub	Mexican stoneroller
2003	0	19	-
2004	1	25	-
2005	12	32	-
2006	1	12	-
2007	55	25	7
2008	72	16	36

El Coronado Ranch Site 2

Results

A total of 47 longfin dace, 31 Mexican stoneroller, and 17 Yaqui chub were collected during 605 seconds of effort at ECR-2. Longfin dace, Mexican stoneroller, and Yaqui chub CPUE at this site was 5.06 fish/min., 3.34 fish/min., and 1.83 fish/min., respectively. Mean total length of Mexican stoneroller was 80.4 mm and ranged in size from 47 to 125 mm. Mean total length of Yaqui chub was 78.7 mm and ranged in size from 57 to 101 mm.

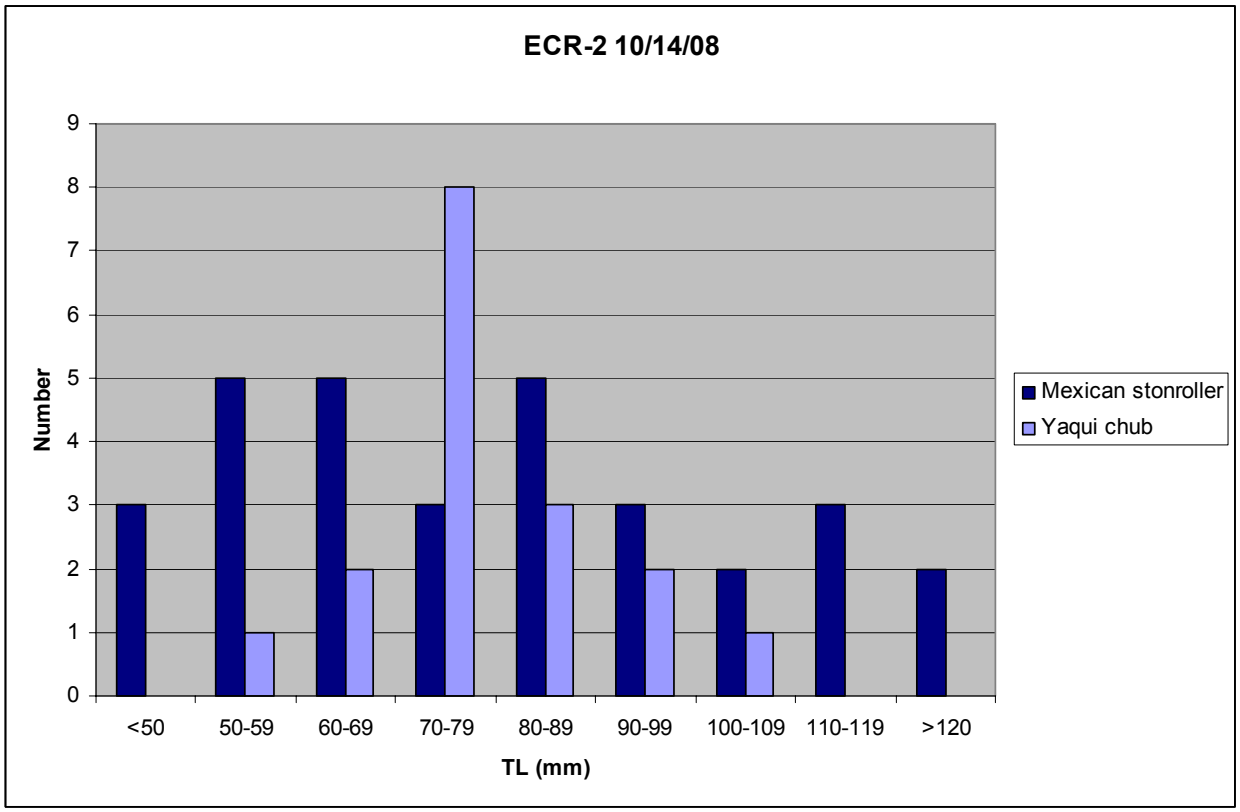

Figure 10. Length frequency histogram of Yaqui chub and Mexican stoneroller collected from ECR-2 during El Coronado Ranch HCP monitoring in October 2008.

Discussion
The collection of Yaqui chub, the first since 2004 at this site is encouraging as the species seems to be recolonizing available habitats after the 2006 drought. Yaqui chub are usually found in association with cover, such as root wads and undercut banks – it may be valuable to anchor additional woody debris in several locations in West Turkey Creek.

Table 9. Numbers of fish collected between 2003 and 2008 from ECR-2.

Year	longfin dace	Yaqui chub	Mexican stoneroller
2003	2	0	-
2004	3	5	-
2005	45	0	-
2006	0	0	-
2007	32	0	1
2008	47	17	31

El Coronado Ranch Random Site 2.5
[above fish barrier to 200-m upstream]

Results
Twelve juvenile longfin dace were collected in 379 seconds of effort for a CPUE of 1.90 fish/min.

Discussion
This reach appears to be intermittent during the year, based on shallow water, lack of aquatic vegetation, and presence of a braided, alluvial channel. If this reach dries during the year, it serves as an extra level of protection against re-invasion of nonnative fishes from downstream.

El Coronado Ranch Site 3

Results
A total of 362 longfin dace, seven Mexican stoneroller, one Yaqui chub, and two green sunfish were collected during 961 seconds of effort at ECR-3. Longfin dace, Mexican stoneroller, and Yaqui chub CPUE at this site was 22.60 fish/min., 0.44 fish/min., and 0.06 fish/min., respectively. Mean total length of Mexican stoneroller was 116.1 mm and ranged in size from 73 to 125 mm. The total length of the one Yaqui chub was 73.0 mm.

Discussion
Small numbers of green sunfish continue to be collected (and removed) in this reach; indicating the species is still present in the creek below the fish barrier. The presence of both Yaqui chub and Mexican stoneroller, and abundance of longfin dace this year, is a good sign that the populations of native fish are recovering following the drought. In the

future, any Yaqui chub and Mexican stoneroller collected below the barrier should be translocated above the barrier following the monitoring.

Table 10. Numbers of fish collected between 2003 and 2008 from ECR-3.

Year	longfin dace	Yaqui chub	green sunfish	Mexican stoneroller
2003	134	0	1	-
2004	31	1	22	-
2005	321	0	18	-
2006	0	0	4	-
2007	78	1	8	0
2008	362	1	2	7

El Coronado Ranch Random Site 3.5
[200-m below ECR-3 to lower boundary of ECR-3]

Results
A total of 121 longfin dace and eight Mexican stoneroller were collected in 1276 seconds of effort for a CPUE of 5.69 fish/min. and 0.38 fish/min., respectively.

Discussion
In the future it is recommended to move any stonerollers and chubs collected in this reach to habitats above the fish barrier. This reach may go dry at times, and the continued presence of green sunfish could be a threat to the persistence of native fish in this reach.

FUTURE MONITORING AND MANAGEMENT RECOMMENDATIONS

Monitoring

- In addition to sampling the six fixed monitoring sites on West Turkey Creek, continue sampling random sites to document the expansion/contraction of fish populations and to detect any new species that may not be found in the fixed sites.

- 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 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.

- Measure and record total length of all native fishes collected 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. Having multiple measuring boards and data books will allow for quicker processing as well.

- 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 continue to 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.

- Continue implementing HACCP policy of disinfecting sampling gear used at one site before the use at another site in an effort to reduce inadvertent introductions of parasites or 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.

Management

- During annual monitoring efforts (if sufficient numbers of fish are available and suitable habitat present) 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.

- During annual monitoring efforts, translocate any Mexican stoneroller and Yaqui chub from below the fish barrier to above the fish barrier.

- During summer 2009 intensively sample Big Tank to try and 1) determine a population estimate and attempt to document any recruitment for Yaqui catfish, 2) determine the population size and structure of black crappie, 3) attempt to document persistence of any longfin dace or Yaqui chub that have been stocked several times, yet never recaptured, and 4) to determine the extent of the green sunfish population.

- Discuss options for removing green sunfish from Big Tank, and preferably the likely downstream source populations.

- Yaqui topminnow should be stocked into at least Lodge Pond under AGFD's Safe Harbor Agreement for topminnows and pupfish in Arizona (AGFD 2007).

- Explore adding and anchoring woody debris in areas of West Turkey Creek to increase pool habitat favored by Yaqui chub.

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Appendix A. El Coronado Ranch HCP fish monitoring 2008 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2007 (Brouder 2005, 2006, Voeltz 2006, Johnson 2007). 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; DNS = did not sample.

Site	Year	Method	Total effort	Yaqui chub	longfin dace	Yaqui catfish	black crappie	green sunfish	Mexican stoneroller
ECR-1	2004	ES	1800 s	25	1	-	-	-	-
	2005	ES	390 s	32	12	-	-	-	-
	2006	ES	791 s	12	1	-	-	-	-
	2007	ES	759 s	25	55	-	-	-	7
	2008	ES	605 s	16	72	-	-	-	36
ECR-2	2004	ES	827 s	5	3	-	-	-	-
	2005	ES	-	-	45	-	-	-	-
	2006	ES	486 s	-	-	-	-	-	-
	2007	ES	510 s	-	32	-	-	-	1
	2008	ES	557 s	17	47				31
ECR-3	2004	ES	928 s	1	31	-	-	22	-
	2005	ES	1405 s	5	45	-	-	13	-
	2006	ES	569 s	1	-	-	-	3	-
	2007	ES	673 s	1	78	-	-	8	-
	2008	ES	951 s	1	362	-	-	2	7
Turkey Pen Cistern	2004	DN	-	11	-	-	-	-	-
	2005	VO	-	+	-	-	-	-	-
	2006	VO	-	5	-	-	-	-	-
	2007	ES	97s	15	-	-	-	-	-
	2008	DNS	-	-	-	-	-	-	-

Appendix A (continued). El Coronado Ranch HCP fish monitoring 2008 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2007 (Brouder 2005, 2006, Voeltz 2006, Johnson 2007). 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; DNS = did not sample.

Site	Year	Method	Total effort	Yaqui chub	longfin dace	Yaqui catfish	black crappie	green sunfish	Mexican stoneroller
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	-	-	-	-	-	-
	2008	TN	90.0 h	-	-	2	7	3	-
		HN	468.0 h	-	-	-	8	-	-

Appendix A (continued). El Coronado Ranch HCP fish monitoring 2008 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2007 (Brouder 2005, 2006, Voeltz 2006, Johnson 2007). 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; DNS = did not sample.

Site	Year	Method	Total effort	Yaqui chub	longfin dace	Yaqui catfish	black crappie	green sunfish	Mexican stoneroller
Tennis Court Pond	2004	HN	32.0 h	-	-	-	-	-	-
		MT	96.0 h	413	-	-	-	-	-
	2005	MT	177.0 h	363	-	-	-	-	-
	2006	MT	216.0 h	-	-	-	-	-	-
	2007	MT	198.0 h	-	-	-	-	-	-
	2008	MT	210.0 h	70	-	-	-	-	-
Lodge Pond	2004	DNS	-	-	-	-	-	-	-
	2005	DNS	-	-	-	-	-	-	-
	2006	MT	100.2 h	-	-	-	-	-	-
	2007	MT	198.0 h	4	-	-	-	-	-
	2008	MT	216.0 h	237	-	-	-	-	1
Upper Guest House Pond	2004	HN	42.0 h	-	-	-	-	-	-
		MT	84.0 h	-	-	-	-	-	-
	2005	S	702 m^2	240	11	-	-	-	-
	2006	S	600 m^2	-	110	-	-	-	-
	2007	MT	189.0 h	-	-	-	-	-	-
	2008	MT	216.0 h	52	-	-	-	-	-
Lower Guest House Pond	2004	HN	45.0 h	-	-	-	-	-	-
	2005	S	180 m^2	19	27	-	-	-	-
	2006	S	230 m^2	-	11	-	-	-	-
	2007	MT	173.3 h	66	2	-	-	-	-
	2008	MT	222.0 h	132	35	-	-	-	-

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

Tennis Court Pond. Located upstream of the Austin's office. Drive east along the road past the basketball court and tennis court. UTM (NAD83/WGS84) 3526947 N 654567 E

Lodge Pond. Located at the Austin's main building. UTM (NAD83/WGS84) 3527020 N 654387 E

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. UTM (NAD83/WGS84) 3526867 N 653518 E

Lower Guesthouse Pond. Located immediately downstream of Upper Guesthouse Pond. UTM (NAD83/WGS84) 3526816 N 653405 E

Big Tank. Drive through the lower-most iron pipe gate on the north side of Turkey Creek road. Follow road to the tank. UTM (NAD83/WGS84) 3527188 N 651093 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. This is the upper point of the reach. Walk 100-m downstream and shock upstream. 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. Walk 100-m downstream and shock upstream. 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.