

**EL CORONADO RANCH HABITAT CONSERVATION PLAN 2012
FISH MONITORING REPORT**

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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 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; Voeltz 2009, Voeltz 2010) summarizing these activities were provided to all interested parties. In 2011 San Bernardino NWR assumed full responsibility of the HCP monitoring and associated report. This report summarizes results of the 2012 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; Voeltz 2009, Voeltz 2010, Lohrengel 2011).

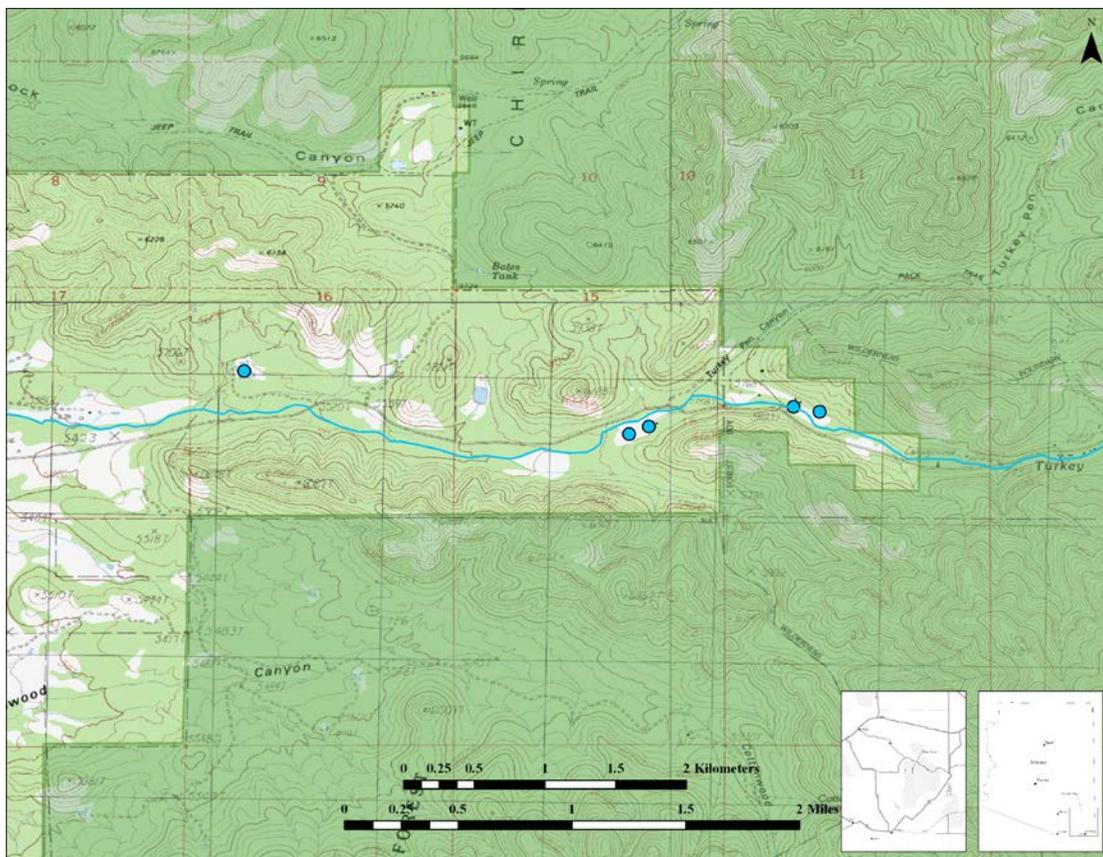


Figure 1. General locations of El Coronado Ranch and Its Impoundments.

WEATHER AND OTHER INFLUENCES DURING YEAR

El Coronado Ranch while recovering from the Horseshoe 2 fire and its lingering effects still has a ways to go before it will be back to normal. West Turkey Creek was the hardest hit by the post-fire floods last year, the last coming in December after a rapid snow melt, and still shows effects from those floods in the form of the various pools located in the drainage being filled in. While there were floods this season, they were not near as damaging as last year's floods. Some regrowth of vegetation on the upper slopes of the canyon helped to stabilize soils and slow run-off from monsoon rains, thereby reducing sediment loads in the creek and tanks fed directly by the creek.

The drought is still having an effect on water levels on the ranch with very little winter precipitation. While there was adequate precipitation during the monsoons, it was not as beneficial to water levels in the creek, since they were so low to start with. Because there was little run-off from winter precipitation to feed tanks or the creek, the owners had to divert available water into their tanks to ensure adequate water for their operations to get them to this year's monsoon. Then they had to continue the same practice to hold them over until next year's monsoon. The creek was the most affected by this water manipulation, with very little water available below the diversion dam for Big Tank.

EL CORONADO RANCH PONDS SURVEY

Big Tank

Methods

One 20-m trammel net and two 50-m trammel nets were fished for approximately 41 hours each on a continuous period from 4:00 pm, October 2 to 9:00 am, October 4. The nets were checked three times, once at approximately 8:30 am on the 3rd, then again at 3:30 pm that same afternoon and then again at 9:00 am on the 4th when they were pulled from Big Tank. In addition to the trammel nets, four hoop nets were set. The hoop nets were checked at the same time as the trammel nets with one hoop net being removed at 8:30 am on the 3rd due to the loss of the structure poles. The remaining three hoop nets were pulled at 3:30 pm on the afternoon of the 3rd. When Yaqui catfish (*Ictalurus pricei*) are captured they are measured for total length (TL; mm) and weighed (WT; g). Yaqui catfish captured are 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

No Yaqui catfish were caught during this year's effort. Of note a, dead Yaqui catfish was found on the bank of Big Tank in June. The catfish was a previously tagged individual that was part of the original stocking effort in Big Tank. Its PIT tag number was #5325577031. Also found were a few small dead fish that were identified by ranch personnel as juvenile Yaqui catfish, but this cannot be confirmed since no specimens were collected.

Discussion

Recaptured fish over the years tend to be unique (meaning, with the exception of two fish, we are not recapturing fish that have previously been captured in Big Tank). However, since re-encountered Big Tank fish are rare, 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). Since the fish were from the 1996 year class from the hatchery, they are now ~16 years old, which has exceeded 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).

Captures of green sunfish in Big Tank declined for the first time in four years, while black crappie continue to decrease. It was discussed after the 2009 monitoring effort to do a rehabilitation on Big Tank, mostly to; 1) collect as many Yaqui catfish as possible to develop a population estimate and attempt to document recruitment, 2) remove all non-natives, green sunfish and black crappie, 3) and attempt to capture any longfin dace *Agosia sp.* or Yaqui chub that have been stocked several times, yet never recaptured. The rehab was not carried out due to significant winter precipitation in the area leading to maximum capacity water levels in Big Tank. The restoration of Big Tank was discussed again this year, and it is still highly recommended that Big Tank be allowed to dry/be drawn down so that a restoration may be performed, but due to the ongoing drought and the need for ranchers to hold onto as much water as possible, it is unlikely to occur very soon.

Table 1. Numbers of fish collected between 2003 and 2012 from monitoring at Big Tank (effort and monitoring season is not the same for each year).

Year	<u>Yaqui catfish</u>	<u>Black crappie</u>	<u>Grass carp</u>	<u>Green sunfish</u>
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
2009	12	137	0	24
2010	5	*	*	*
2011	2	7	0	33
2012	0	1	0	14

*data unavailable

Tennis Court Pond

Methods

Eleven minnow traps were fished overnight (1430-hr to 0915-hr) on October 2-3, 2012 in the Tennis Court Pond.

Results

There were no captures in approximately 19 hours of sampling.

Table 2. Numbers of fish collected between 2003 and 2012 from Tennis Court Pond.

Year	<u>Longfin dace</u>	<u>Yaqui chub</u>
2003	0	799
2004	0	413
2005	0	363
2006	0	0
2007	0	0
2008	0	70
2009	0	1264
2010	0	1023
2011	0	0
2012	0	0

Discussion

Tennis Court Pond has high numbers of Yaqui chub when the pond consistently holds water (Table 2 above). However, the pond dried in 2006, and no fish were collected in 2006 or 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. The explosion in population size between 2008 and 2009 can be attributed to consistent water levels in the pond.

Last year the pond once again dried prior to the monsoon season. No fish were stocked into Tennis Court Pond from other locations on the ranch due to the effects of the Horseshoe II fire which, because of post-fire flooding, deposited large amounts of ash and sediment into the pond and also a general lack of sufficient numbers of Yaqui chub throughout the ranch. At the

completion of this year's monitoring 450 Yaqui chub were moved from Upper Guesthouse Pond to Tennis Court Pond.

Lodge Pond

Methods

Twelve minnow traps were fished overnight (1500-hr to 0930-hr) on October 2-3, 2012 in the Lodge Pond. A sub-sample of fish collected were measured and immediately released back into Lodge Pond. CPUE was calculated as the number of fish/total hours of trapping.

Results

A total of 391 Yaqui chub were collected in approximately 18.5 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 1.761 fish/hour. Mean total length of the sub-sample of Yaqui chub measured was 68.675 mm and ranged in size from 55 to 99 mm. 51% of fish in the measured sub-sample were of the 61-70 mm modal length class. There were no fish in the < 50 mm modal class length. (See Figure 2 below)

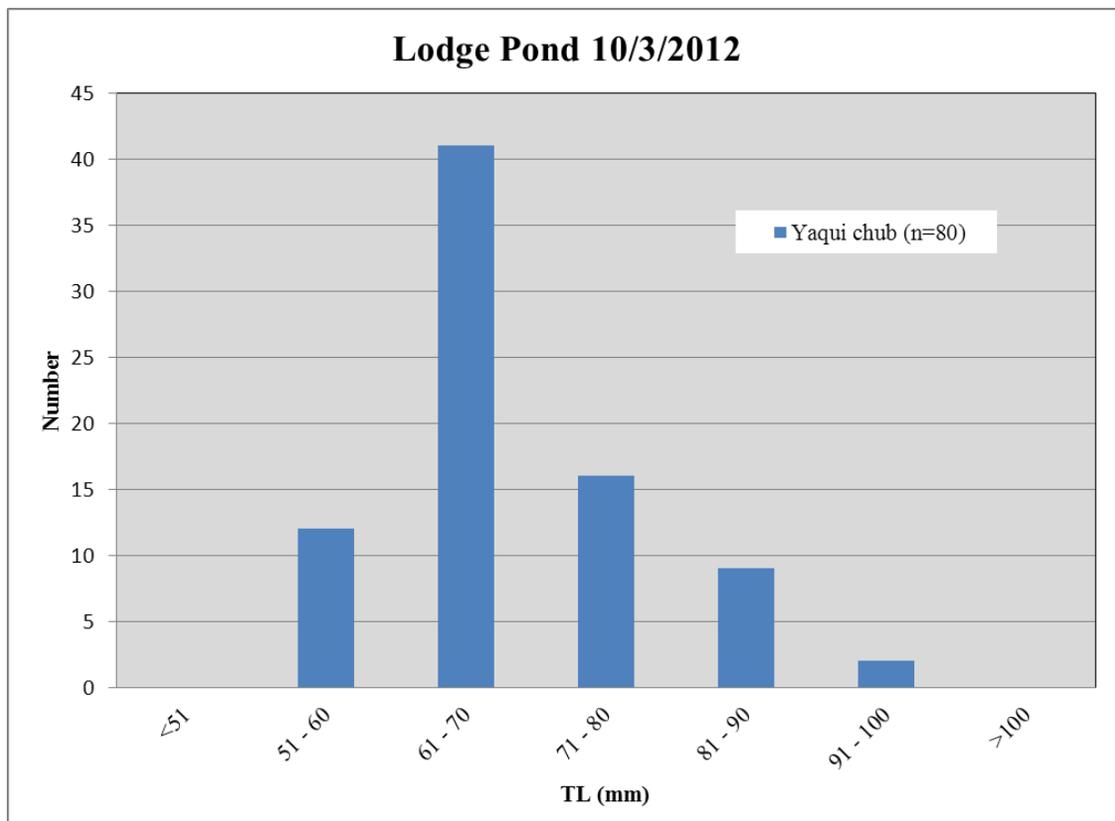


Figure 2. Length-frequency histogram of a sub-sample of Yaqui chub collected in Lodge Pond during El Coronado Ranch HCP monitoring in October 2012.

Discussion

Although not a traditional standard sampling site, Lodge Pond has been monitored every October since 2006 (Table 3 below) 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 continue to 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).

The increase in numbers since last year's monitoring is very positive, since no fish have been stocked into this location following the flooding from last year. In fact, during supplemental monitoring in June, sixty chub were removed and placed in Upper Guesthouse Pond.

Table 3. Numbers of fish collected between 2006 and 2012 from Lodge Pond.

Year	Longfin dace	Yaqui chub	Mexican stoneroller
2006	0	0	-
2007	0	4	0
2008	0	237	1
2009	0	1531	0
2010	0	862	0
2011	0	113	0
2012	0	391	0

Upper Guesthouse Pond

Methods

Twelve minnow traps were fished overnight (1530-hr to 0900-hr) on October 2-3, 2012 in the Upper Guesthouse Pond. A sub-sample of fish collected were measured and immediately released back into Lodge Pond. CPUE was calculated as the number of fish/total hours of trapping.

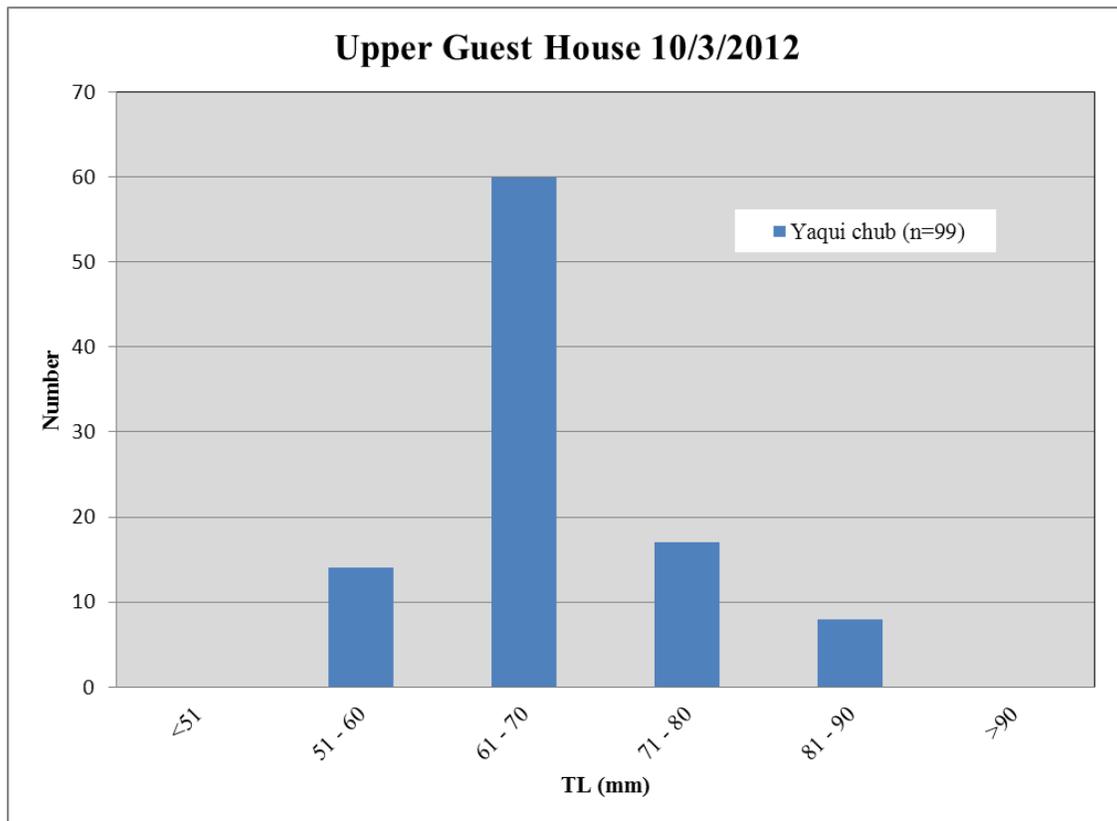


Figure 3. Length-frequency histogram of a sub-sample of Yaqui chub collected in Upper Guest House Pond during El Coronado Ranch HCP monitoring in October 2012.

Results

A total of 1,431 Yaqui chub were collected in approximately 17.5 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 6.814 fish/hour. Mean total length of the sub-sample of Yaqui chub measured was 67.657 mm and ranged in size from 54 to 90 mm. 60.6% of fish in the measured sub-sample were of the 61-70 mm modal length class. There were no fish in the < 50 mm modal class length. (See Figure 3 above)

Discussion

Upper Guesthouse Pond responded well to the fish stocked (350) into it after last year's monitoring with numbers above what was observed in 2010. This year 450 fish were removed from Upper Guesthouse Pond and stocked into Tennis Court Pond.

Table 4. Numbers of fish collected between 2003 and 2012 from Upper Guesthouse Pond.

Year	<u>Longfin dace</u>	<u>Yaqui chub</u>
2003	0	1
2004	0	0
2005	11	240
2006	110	0
2007	0	0
2008	0	52
2009	6	2151
2010	0	1131
2011	0	0
2012	0	1431

Lower Guesthouse Pond

Methods

Twelve minnow traps were fished overnight (1545-hr to 0930-hr) on October 2-3, 2012 in the Lower Guesthouse Pond. A sub-sample of fish collected were measured and immediately released back into Lodge Pond. CPUE was calculated as the number of fish/total hours of trapping.

Results

A total of 2 Yaqui chub were collected in about 17.75 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 4.502 fish/hour. The number of fish captured was too small to allow for any true statistical analysis of age structure. Mean total length of the sub-sample of Yaqui chub measured was 68.31 mm and ranged in size from 52 to 90 mm. 46% of fish in the measured sub-sample were of the 61-70 mm modal length class. There were no fish in the < 50 mm modal class length. (See Figure 4 below)

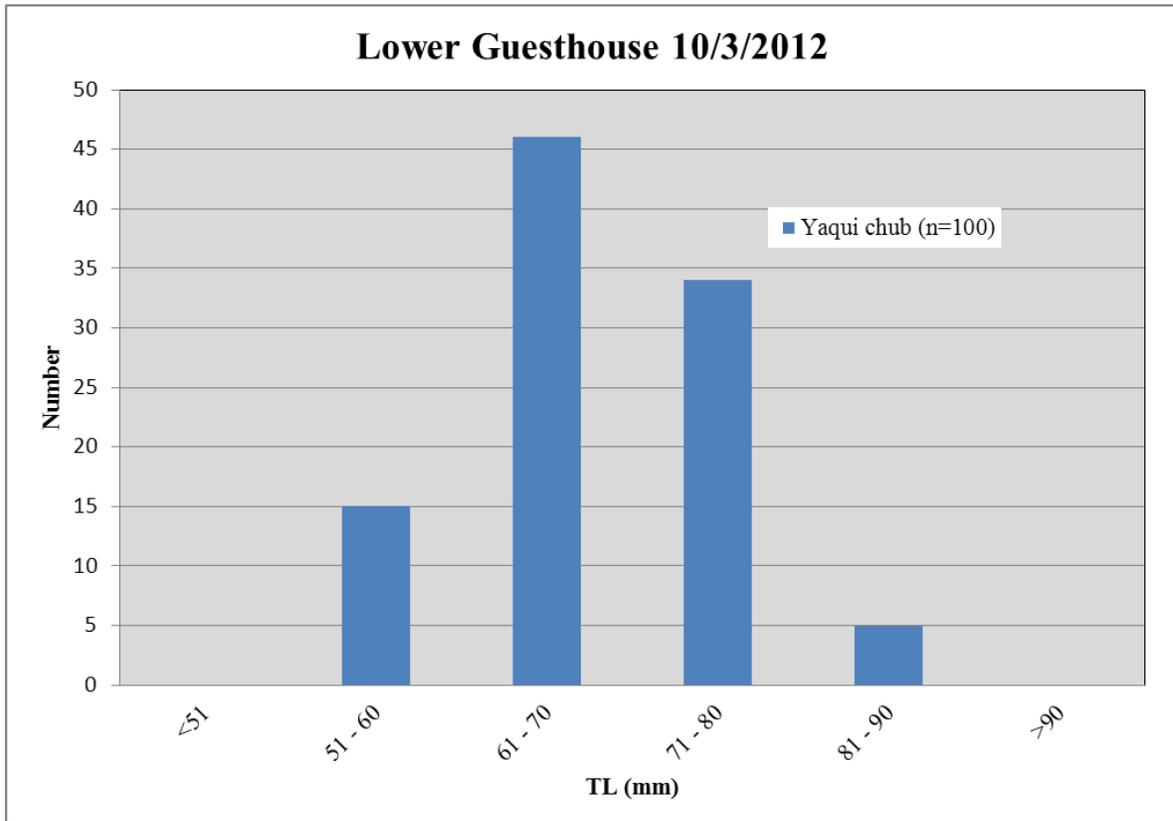


Figure 4. Length-frequency histogram of a sub-sample of Yaqui chub collected in Lower Guest House Pond during El Coronado Ranch HCP monitoring in October 2012.

Discussion

The recovery of numbers in Lower Guesthouse is surprising since no fish were stocked directly into it. However, fish were stocked into Dale’s Tank (100) after last year’s monitoring, which overflows into Lower guesthouse.

Table 5. Numbers of fish collected between 2004 and 2012 from Lower Guesthouse Pond.

Year	<u>Longfin dace</u>	<u>Yaqui chub</u>
2003	0	0
2004	0	0
2005	27	19
2006	11	0
2007	2	66
2008	35	132
2009	0	616
2010	0	1684
2011	0	2
2012	0	959

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 had rebounded in all four regularly sampled ponds by 2008 (Figure 5). This was a result of restocking Tennis Court and Lodge ponds in 2007, and natural dispersal to Upper and Lower Guesthouse ponds. Last year, because of the Horseshoe 2 Fire fish numbers were set back to 2006 levels. With fish being moved (last year's monitoring and this spring) to all ponds except Tennis Court, numbers have rebounded quite well, and with the stocking of fish into Tennis Court Pond this year and the predicted continued stabilization of the upper canyon soils, fish numbers should continue to climb.

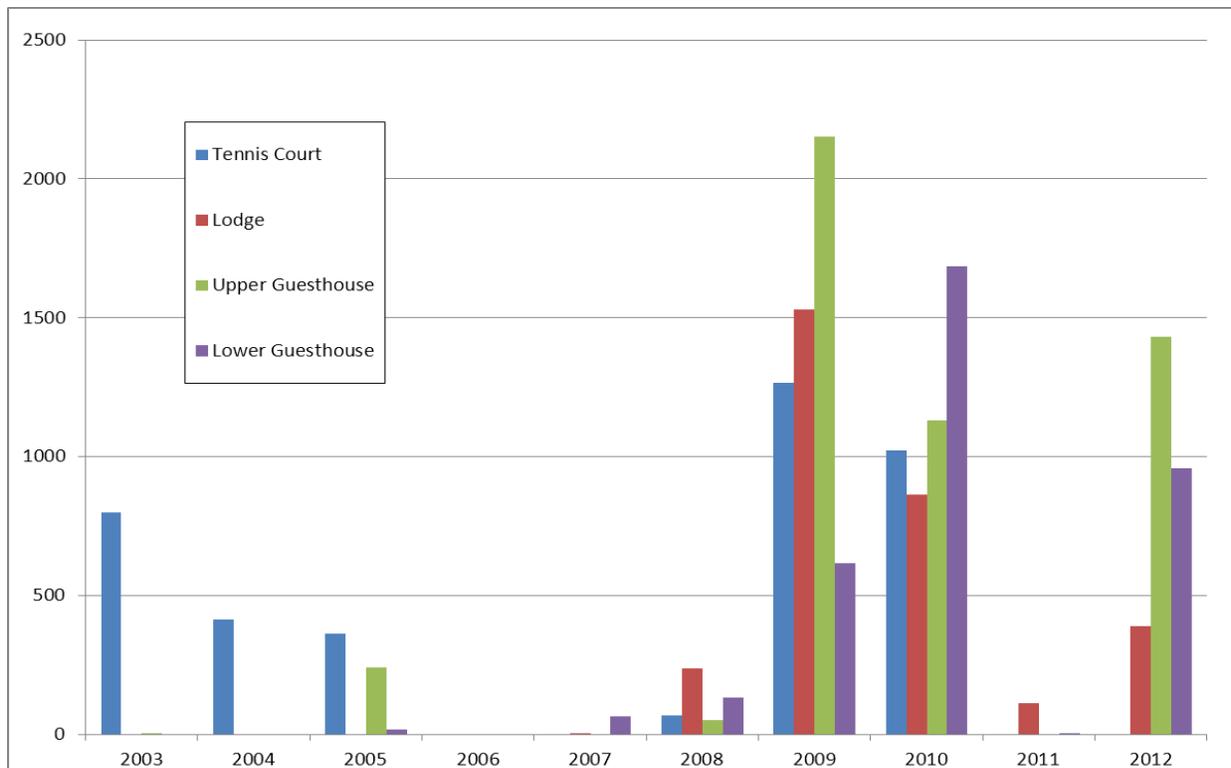


Figure 5. Total numbers of Yaqui chub collected from four ponds during El Coronado Ranch HCP monitoring in October 2003 - 2012.

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, and all three standard sites on the USFS (U.S. Forest Service) lands on October 13 and 14, 2009 (Appendix B). Each standard site is 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 Sites

[(USFS-1) – Dispersed Campsite]

[(USFS-2) – Upper Sycamore Campground]

[(USFS-3) – Lower Sycamore Campground]

Discussion

None of the Forest Service sites were shocked this year, but all were visually inspected. All sites appeared to be recovering nicely, with some pools that had been filled in during 2011 being scoured out during the floods this year. Also, invertebrate numbers appeared to be increasing.

El Coronado Ranch Site 1

Results

No fish were captured in 589 seconds of effort.

Discussion

The lack of captures, while a concern, is not unexpected. This site, as with all of the following sites in West Turkey Creek, experienced uncontrolled aggradation of sediment and ash from runoff of burned areas in the upper canyons above El Coronado Ranch. While the number of fish salvaged from West Turkey Creek prior to the monsoon floods of this year and last year is not a huge number, it will provide for a strong reseeding population. It has been proposed that all fish currently being held at the refuge headquarters be restocked into Turkey Creek this fall while conditions are favorable.

Table 6. Numbers of fish collected between 2003 and 2012 from ECR-1.

Year	<u>longfin dace</u>	<u>Yaqui chub</u>	<u>Mexican stoneroller</u>
2003	0	19	-
2004	1	25	-
2005	12	32	-
2006	1	12	-
2007	55	25	7
2008	72	16	36
2009	67	23	30
2010	11	36	76
2011	0	1	0
2012	0	0	0

El Coronado Ranch Site 2

Results

One longfin dace was captured in 558 seconds of effort, resulting in a CPUE of 0.1075 fish/min.

Discussion

See ECR-1. In addition to the Mexican stonerollers and Yaqui chub salvaged from West Turkey Creek, many of the Yaqui chub salvaged from the ponds can be stocked into upstream sections of West Turkey Creek which should act as stock for both the ponds and the creek.

Table 7. Numbers of fish collected between 2003 and 2012 from ECR-2.

Year	<u>longfin dace</u>	<u>Yaqui chub</u>	<u>Mexican stoneroller</u>
2003	2	0	-
2004	3	5	-
2005	45	0	-
2006	0	0	-
2007	32	0	1
2008	47	17	31
2009	37	0	19
2010	50	184	79
2011	0	0	0
2012	1	0	0

El Coronado Ranch Site 3

Results

A total of 30 longfin dace collected during 1100 seconds of effort at ECR-3. Longfin dace CPUE at this site was 1.6364 fish/min.

Discussion

Dace continue to occupy this reach even though they were not encountered at any of the other locations surveyed in the last two years. In addition to this, very few dace were salvaged from West Turkey Creek last year prior to the monsoon season and none were salvaged this year during the June salvage effort.

Table 8. Numbers of fish collected between 2003 and 2012 from ECR-3.

Year	<u>longfin dace</u>	<u>Yaqui chub</u>	<u>green sunfish</u>	<u>Mexican stoneroller</u>
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
2009	326	0	3	14
2010	568	122	2	2
2011	7	0	0	0
2012	30	0	5	0

El Coronado Ranch Random Site 1

Results

No fish were collected in 501 seconds of effort.

Discussion

The lack of captures is concerning, but expected since the majority of water above this reach was diverted into Big Tank. This site is located above the lowermost barrier on El Coronado Ranch. UTM (NAD83/WGS84) 3526934 N 650998 E

El Coronado Ranch Random Site 2

Results

In 366 seconds of effort 2 Yaqui chub were collected for a CPUE of 0.3278 fish/minute.

Discussion

Only two Yaqui chub were captured at this location. In survey efforts and salvage efforts this year, March and June respectively, this is the only location where fish were regularly found. In June of this year fifteen chub were captured during electrofishing and relocated to Upper Guesthouse Pond with the chub captured from Lodge Pond. This site is located in the pool below the chapel near the main house . UTM (NAD83/WGS84) 3527005 N 654407 E

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.
- Continue to 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.
- 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 suitable water levels, pump Big Tank dry. Salvage all Yaqui catfish during the project, and eliminate all green sunfish and black crappie. Depending on numbers of Yaqui catfish and the suitability of wetlands, translocate some to pond(s) on the Bar Boot Ranch, or return them to Big Tank when it fills.
- During annual monitoring efforts (if sufficient numbers of fish are available and suitable habitat is 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.
- Yaqui topminnow should be stocked into at least Lodge Pond under AGFD’s Safe Harbor Agreement for topminnows and pupfish in Arizona (AGFD 2007).
- When adequate water, quantity and quality, is present at El Coronado Ranch, collect Yaqui chub from Bar Boot Ranch and restock the ponds and West Turkey Creek.

- 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 2009 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2009 (Brouder 2005, 2006, Voeltz 2006, Johnson 2007, Voeltz 2009). Values presented are number of fish caught. 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	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
	2009	ES	242 s	23	67	-	30
	2010	ES	797 s	67	30	23	-
	2012	ES	589 s	-	-	-	-
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
	2009	ES	163 s	-	37	-	19
	2010	ES	1069 s	50	184	79	-
	2012	ES	558 s	-	1	-	-
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
	2009	ES	415 s	-	326	3	14
	2010	ES	2039 s	568	122	2	2
	2012	ES	1100	-	30	5	-

Appendix A (continued). El Coronado Ranch HCP fish monitoring 2012 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2009 (Brouder 2005, 2006, Voeltz 2006, Johnson 2007, Voeltz 2009). Values presented are number of fish caught. 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	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	-	-
	2009	MT	204.0 h	1264	-	-
	2010	MT	176.0 h	1023	-	-
	2011	MT	204.0 h	-	-	-
2012	MT	206.25 h	-	-	-	
Lodge Pond	2004	DNS	-	-	-	-
	2005	DNS	-	-	-	-
	2006	MT	100.2 h	-	-	-
	2007	MT	198.0 h	4	-	-
	2008	MT	216.0 h	237	-	1
	2009	MT	210.0 h	1531	-	-
	2010	MT	176.0 h	862	-	-
	2011	MT	204.0 h	113	-	-
	2012	MT	222.0 h	391	-	-
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	-	-
	2009	MT	222.0 h	2151	6	-
	2010	MT	192.0 h	1131	-	-
	2011	MT	198.0 h	-	-	-
2012	MT	210.0 h	1431	-	-	
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	-
	2009	MT	222.0 h	616	-	-
	2010	MT	192.0	1684	-	-
	2011	MT	198.0 h	2	-	-
2012	MT	207.0 h	959	-	-	

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. Shock downstream from that point. UTM (NAD83/WGS84) 3526254 N 657399 E.