

**2014**  
**EL CORONADO RANCH**  
**HABITAT CONSERVATION PLAN**  
**FISH MONITORING REPORT**



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*Yaqui chub*



*Yaqui catfish*



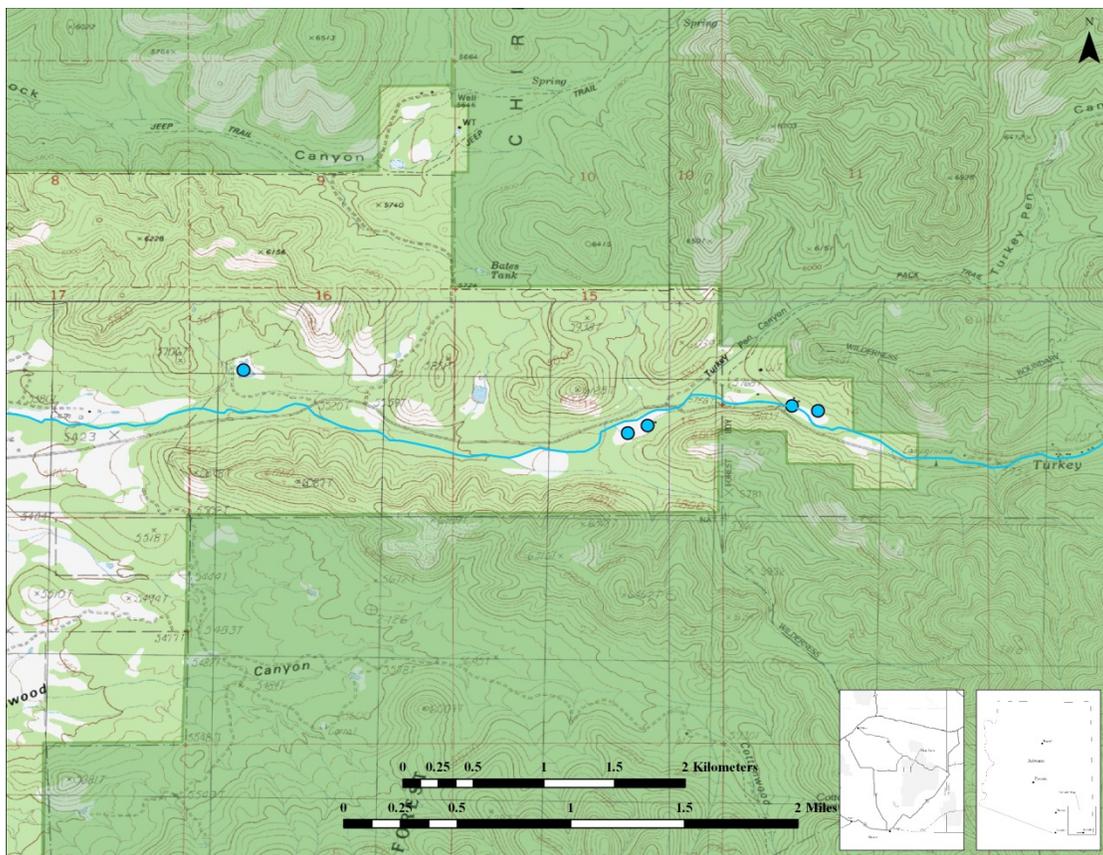
*Mexican stoneroller*



*Mexican 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, 2005, 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 2014 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; Johnson 2007; Voeltz 2006, 2008, 2009, 2010, Lohrengel 2011, 2012, 2013).



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

## WEATHER AND OTHER INFLUENCES DURING YEAR

Weather for the year followed the typical pattern for the region with the majority of precipitation coming during the summer monsoons. Winter precipitation was well below normal, causing the need to salvage fish from all but Horse Tank Pond. Lodge pond underwent a renovation during the spring, taking advantage of the low water levels present. Summer monsoons were above average, however not all ponds reflected this. Both Upper and Lower Guesthouse ponds were below capacity, as well as Tennis Court Pond. During the spring, all water from West Turkey Creek was being diverted to Big Tank. What little water remained in the creek between the diversion dam and the fish barrier was from underground seepage through the diversion dam. However, at the time of monitoring, very little, if any water was being diverted into Big Tank and West Turkey Creek flowed continuously from Forest Service Lands to well below the ranch boundary. .

## EL CORONADO RANCH PONDS SURVEY

### Big Tank

#### Methods

Yaqui catfish were sampled a two different times this year once in June, when fish were captured to try hormone treatment to promote reproduction, and then again at the standard time during October.

During June, 200 m of variable mesh gill net, 200 m of trammel nets, and 24 minnow traps deployed as a trotline were set on a continuous period from 3:00 pm June 2 through 6:00 am on June 4, when they were pulled. The nets were checked on the 3<sup>rd</sup> at 7:00 am, 2:00 pm, and 9:00 pm.

During October monitoring, 200 m of variable mesh gill net and 200 m of trammel nets were on a continuous period from 1:30 pm, October 6 to 9:00 am, October 8. The nets were checked three times, once at approximately 8:30 am on the 7th, then again at 2:00 pm that same afternoon and then at 9:00 am on the 8th when they were pulled from Big Tank.

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. Black crappie (*Pomoxis nigromaculatus*) and green sunfish (*Lepomis cyanellus*) were counted and removed permanently.

**Table 1.** Yaqui catfish captures in 2014

PIT #	Date	Location	TL	WT	Sex
530F0E184D	10/14/00	Lisa Tank	284	652.05	F
(died in net)	06/03/14	Big Tank	400	960	
442B3C5349	10/22/03	Big Tank	367	559	M
	10/10/07	Big Tank	370	470	
	06/25/09	Big Tank	371	425	
(died in net)	06/03/14	Big Tank	395	954	
53257C5316	10/07/00	Lisa Tank	322	765.45	F
(died in live car)	06/03/14	Big Tank	400	752	
532113607E	10/07/00	Lisa Tank	311	680.4	F
	04/27/10	Big Tank	416	620	
	06/03/14	Big Tank	438	972	
53202D1443	10/07/00	Lisa Tank	320	708.75	M
	06/03/14	Big Tank	397	780	
5321145850	10/14/00	Lisa Tank	286	652.05	F
	06/03/14	Big Tank	385	664	
5325520603	10/07/00	Big Tank	308	680.4	F
(died in live car)	06/04/14	Big Tank	410	872	
53262C1E0E	10/07/00	Lisa Tank	312	708.75	F
	06/04/14	Big Tank	483	1544	
442274741F	06/04/14	Big Tank	465	1160	M
53212E4667	10/14/00	Lisa Tank	346	793.8	F
	06/04/14	Big Tank	433	1018	

*Catfish from Lisa Tank were moved to Big Tank in October 2000*

### Results

A total of ten catfish were captured this year, all in June, six on the 3<sup>rd</sup> and four on the 4<sup>th</sup>. The table above shows the individual numbers and measurements for this years captured individuals, as well as their mark and recapture history. Two mortalities occurred, PIT #'s 530F0E184D and 442B3C5349. For the individual with PIT # 442274741F, no information from previous captures could be located.

### Discussion

Recaptured fish over the years tend to be unique (meaning, with the exception of three 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 252 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, although 8 tags are unknown). Since the fish were from the 1996 year class from the hatchery, they are now ~18 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).

An attempt to encourage reproduction was made with the catfish captured in June. In addition to standard monitoring procedures (length, mass, etc), all surviving catfish captured were anesthetized with MS-222 and their reproductive condition was determined by scanning them with a Sonosite M Turbo ultrasound (Brizendine, Ward, and Bonar, 2013). The fish were injected with Ovaprim®, and were separated into two groups. Group one included 4 females and 1 male; group two was 3 females and 1 male. Each group was put into floating live cars on 5 June. If ripe fish had been encountered they would have been dry spawned and the eggs incubated in the laboratory. (Minckley and Ward, 2014, full report available)

**Table 2.** Numbers of fish collected between 2003 and 2014 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
2013	11	14	0	5
2014	10	16	0	8

\*data unavailable

Captures of green sunfish and black crappie were similar to last year's numbers (see table above). However, their presence and the probable numbers, which are believed to be quite large based on other sampling done during the year, are likely having a serious effect on catfish

reproduction and/or recruitment. It is this threat from non-natives that led to discussions of completing a renovation of Big Tank in 2009. This renovation had three objectives: 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 Mexican longfin dace (*Agosia sp.*) or Yaqui chub that have been stocked several times, with only a single individual captured this summer. The rehab did not take place due to significant winter precipitation in the area leading to maximum capacity water levels in Big Tank. The renovation 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 renovation may be performed.

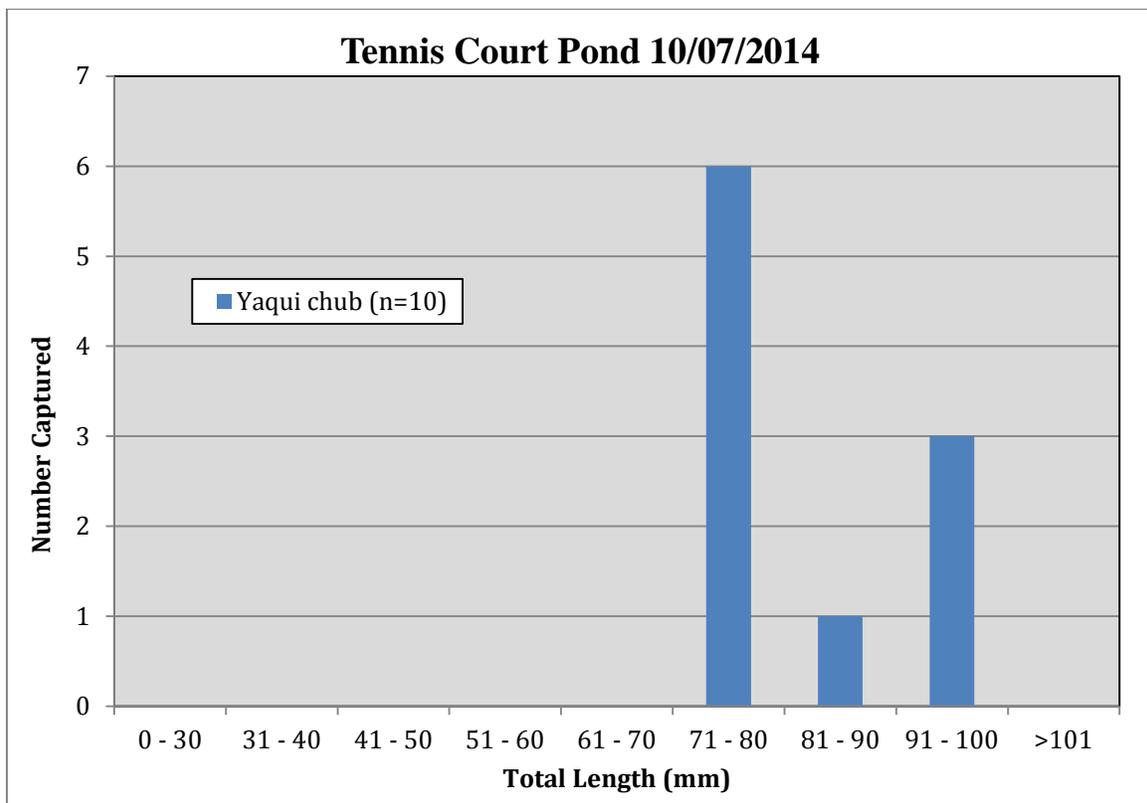
## Tennis Court Pond

### Methods

Twelve minnow traps were fished overnight (1100-hr to 0900-hr) on October 7-8, 2014 in the Tennis Court Pond. A sub-sample of fish collected were measured and immediately released back into Tennis Court Pond. CPUE was calculated as the number of fish/total hours (hours x # of traps) of trapping.

### Results

A total of 10 Yaqui chub were collected in approximately 22 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 0.037879 fish/hour. Mean total length of the sub-sample of Yaqui chub measured was 83.9 mm and ranged in size from 75-98 mm. 60% of fish in the measured sub-sample were of the 71-80 mm modal length class. The smallest individual encountered was in the 71-80 mm modal class length.



**Figure 2.** Length-frequency histogram of a sub-sample of Yaqui chub collected in Tennis Court Pond during El Coronado Ranch HCP monitoring in October 2014.

*Discussion*

Tennis Court Pond has high numbers of Yaqui chub when the pond consistently holds water (Table 3 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.

The pond dried again in 2011 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 that year 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 the 2012 monitoring, 450 Yaqui chub were moved from Upper Guesthouse Pond to Tennis Court Pond. The lack of captures this year can be attributed to drought effects and the drying of the pond. 190 chub were stocked from Horse Tank into Tennis Court Pond.

**Table 3.** Numbers of fish collected between 2003 and 2014 from Tennis Court Pond.

Year	<u>Mexican 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
2013	0	554
2014	0	10

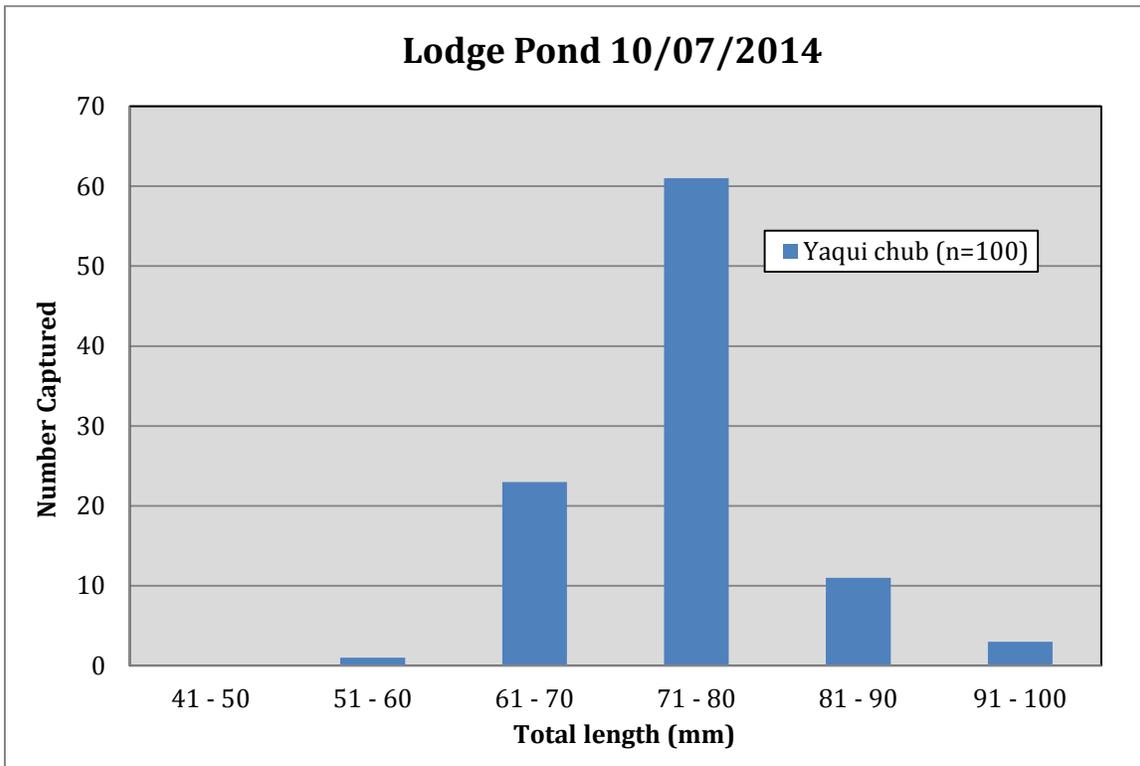
**Lodge Pond**

*Methods*

Twelve minnow traps were fished overnight (1130-hr to 0930-hr) on October 7-8, 2014 in the Lodge Pond. All fish collected were measured and immediately released back into Lodge Pond. CPUE was calculated as the number of fish/total hours of trapping.

*Results*

137 Yaqui chub were collected in approximately 22 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 0.518939 fish/hour. Mean total length of the sampled Yaqui chub measured was 75.3 mm and ranged in size from 60 to 104 mm. 61% of fish in the measured sample were of the 71-80 mm modal length class. There were no fish in the < 41-50 mm modal class length. (See Figure 3 below)



**Figure 3.** Length-frequency histogram of a sub-sample of Yaqui chub collected in Lodge Pond during El Coronado Ranch HCP monitoring in October 2014.

*Discussion*

Although not an original 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,

The decrease in numbers since last year’s monitoring is not of concern. There is an abundance of submerged vegetation in the pond and through experience conditions such as this tend to lead to fewer chub captures. During supplemental monitoring in June ninety-eight chub were captured.

**Table 4.** Numbers of fish collected between 2006 and 2014 from Lodge Pond.

Year	<u>Mexican longfin dace</u>	<u>Yaqui chub</u>	<u>Mexican stoneroller</u>
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
2013	0	56	0
2014	0	137	0

## Upper Guesthouse Pond

### *Methods*

Twelve minnow traps were fished overnight (1200-hr to 1150-hr) on October 6-7, 2014 in the Upper Guesthouse Pond. A sub-sample of fish collected are typically measured and immediately released back into the pond. CPUE is calculated as the number of fish/total hours of trapping.

### *Results*

No Yaqui chub were collected in approximately 23.5 hours of sampling.

### *Discussion*

Upper Guesthouse completely dried in June. Two salvage efforts were carried out prior to the pond drying. Approximately 1,200 fish were moved to Horse Tank, 300 on June 3 and 900 on June 20. It is planned to restock Upper Guesthouse Pond in the spring if adequate water is present, if there is not adequate water restocking will be held off until the arrival of the monsoons.

**Table 5.** Numbers of fish collected between 2003 and 2014 from Upper Guesthouse Pond.

Year	<u>Mexican 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
2013	0	1174
2014	0	0

## Lower Guesthouse Pond

### *Methods*

Twelve minnow traps were fished overnight (1230-hr to 1115-hr) on October 6-7, 2014 in the Lower Guesthouse Pond. A sub-sample of fish collected are typically measured and immediately released back into the pond. CPUE is calculated as the number of fish/total hours of trapping.

### *Results*

No Yaqui chub were collected in approximately 22.75 hours of sampling.

### *Discussion*

While Lower Guesthouse Pond did not dry this year, available water was very limited due to excess vegetation in the pond, parrot feather (*Myriophyllum aquaticum*). In June, a salvage effort was carried out in which approximately half of the surface area of the pond was dragged to remove vegetation to allow for the use of a seine net. There were no captures made over the course of three passes with the seine net. Refuge staff recommended to ranch personnel at the

time of the salvage they attempt to dredge or completely renovate the pond prior to the monsoons. However, this was not able to be completed and the vegetation was at or near the same cover percentage as it was prior to the salvage attempt, approximately 85%.

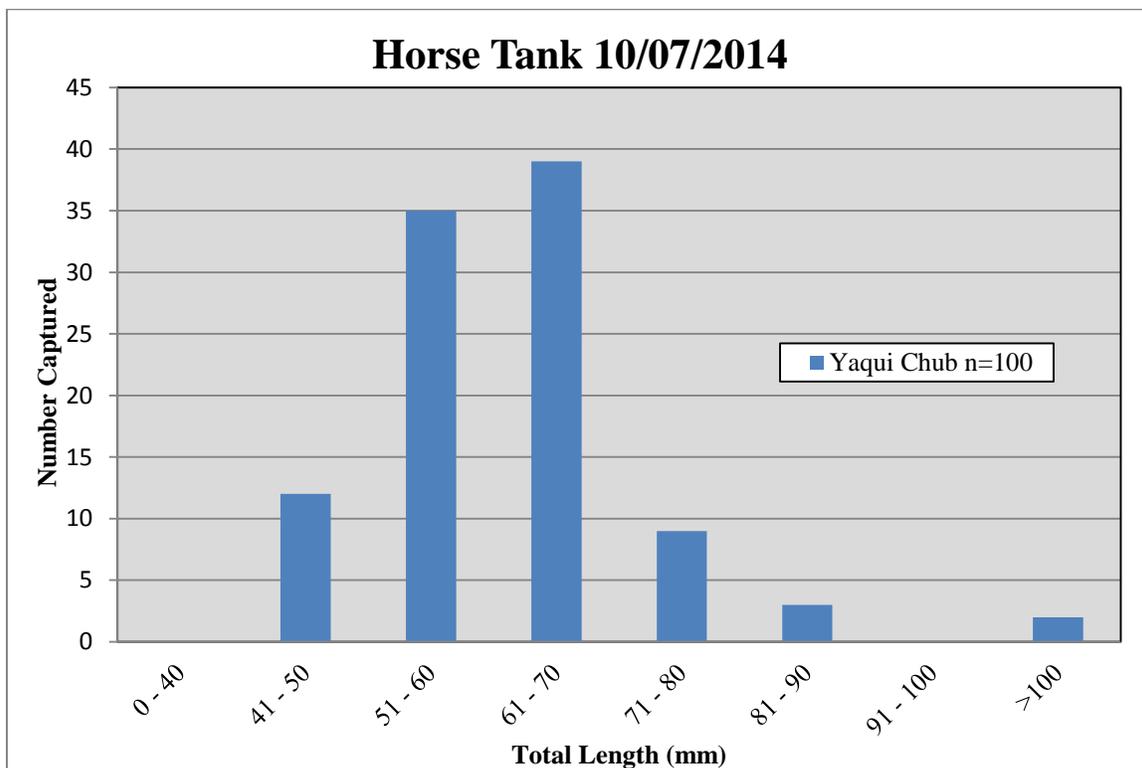
**Table 6.** Numbers of fish collected between 2004 and 2012 from Lower Guesthouse Pond.

Year	Mexican longfin dace	Yaqui chub
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
2013	0	298
2014	0	0

### Horse Tank

#### Methods

Twelve minnow traps were fished overnight (1145-hr to 1200-hr) on October 6-7, 2014 in Horse Tank. A sub-sample of fish collected were measured and immediately released back the pond. CPUE was calculated as the number of fish/total hours of trapping.



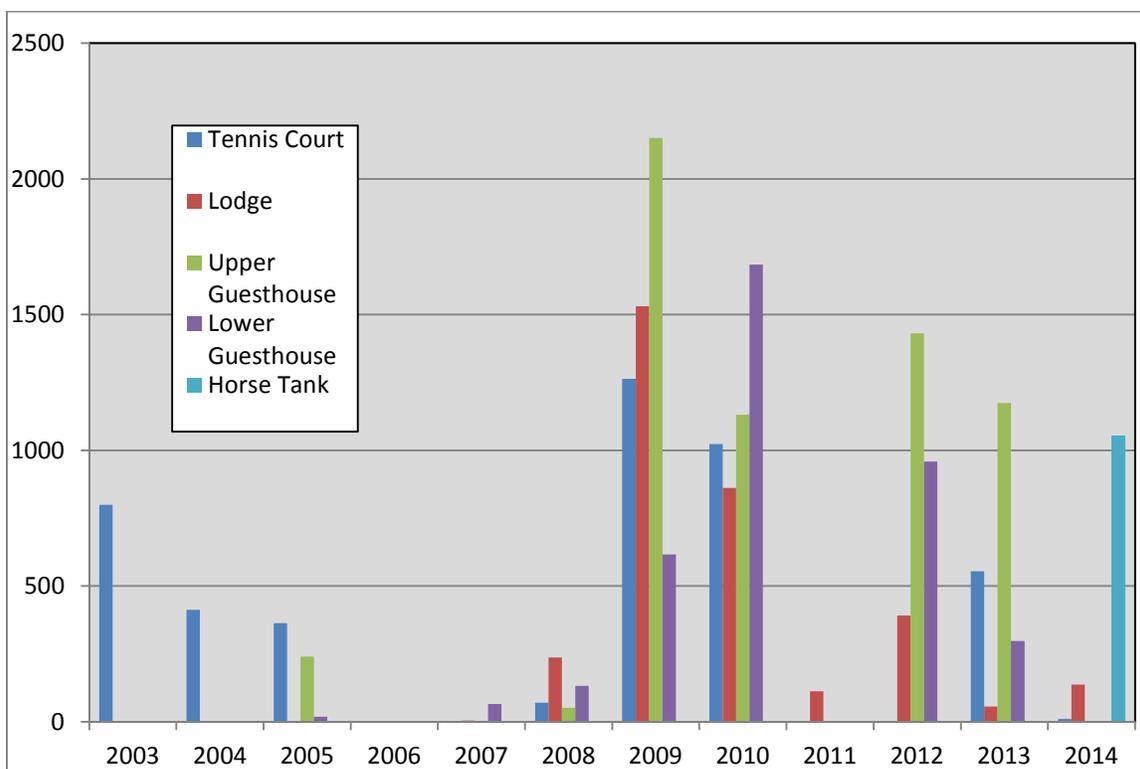
#### Results

1,054 Yaqui chub were collected in approximately 23.75 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps was 3.992424 fish/hour. Mean total length of the sampled Yaqui chub measured was 62.81 mm and ranged in size from 42 to 122 mm. 39% of fish in the measured sample were of the 61-70 mm modal length class, with 35% of fish sampled in the 51-60 mm modal class length. There were 12 fish in the 41-50 mm modal class length. (See Figure 3 above)

*Discussion*

This is the first year that Horse Tank has been included in the analysis for the HCP. It was deemed necessary since fish from several salvage efforts in the past few years have been released at this sight. It is also the only small “pond” that seems to permanently hold water. Horse Tank should continue to be sampled every year from now on, and fish from here used for re-establishment throughout the ranch, as needed.

**Ponds Summary**



**Figure 6.** Total numbers of Yaqui chub collected from four ponds during El Coronado Ranch HCP monitoring in October 2003 - 2014.

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 6). This was a result of restocking Tennis Court and Lodge ponds in 2007, and natural dispersal to Upper and Lower Guesthouse ponds. In 2011, because of the Horseshoe 2 Fire, fish numbers were set back to 2006 levels. Ponds had been recovering from effects of the Horseshoe Two Fire, and numbers of fish captured were returning to pre-fire levels. However this year due to drought, ponds dried and limited capture success during monitoring.

The drying of the ponds required ranch and refuge staff to salvage ponds and move fish to more permanent sources of water. Upper and Lower Guest House Ponds were salvaged and fish were

moved to Horse Tank, while Lodge Pond was renovated with fish moved into the house fountain, these fish were released into Lodge Pond at the conclusion of the renovation. Tennis Court dried without knowledge, so no salvage took place.

## WEST TURKEY CREEK SURVEY

### *Methods*

A Smith-Root, Inc. Model LR-24 backpack electrofishing unit (settings: 225 volts, 60 Hz, output ~0.4 amps) was used to sample all three standard monitoring sites of West Turkey Creek, and both random sites of West Turkey Creek on October 4, 2014 (Appendix B). All sites sampled this year were 100-m long and were shocked from downstream to upstream, with actual shocking seconds recorded. All fish captured were identified to species, measured (Mexican longfin dace and green sunfish were only 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 appear fully recovered, with most pools being scoured out that were filled in with sediment from floods following the 2011 Horseshoe 2 fire, and the vegetation has returned to pre-fire conditions along the banks of the streams. The vegetation in the upper canyons continues recover.

### **El Coronado Ranch Site 1**

### *Results*

Twelve fish were captured in 859 seconds of effort, resulting in a CPUE of 0.838118 fish/min.

### *Discussion*

While not as successful as last year's monitoring, this is still a good sign considering how badly the flow within the creek was reduced during May and June.. All fish captured were Yaqui chub and appeared healthy. Size range for the fish captured was 55-82 mm, with a mean length of 68.5 mm.

Water chemistry: pH – 8.18, dissolved oxygen – 37.74%, conductivity 104.5  $\mu$ S, and temperature – 17.7 °C. ExTech Instruments ExStik II DO600, for dissolved oxygen and the ExStikII EC500, for pH, conductivity, and temperature were used for water chemistry measurements at all sites.

**Table 7.** Numbers of fish collected between 2003 and 2014 from ECR-1.

Year	<u>Mexican 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
2013	0	43	0
2014	0	12	0

### El Coronado Ranch Site 2

#### Results

There were no fish captured in 559 seconds of effort, resulting in a CPUE of 0.0 fish/min.

#### Discussion

Lack of captures could be attributable to very little water available for fish habitat in this reach during the months of April through August, while surface water was being diverted to Big Tank.

Water chemistry: pH – 8.1, dissolved oxygen – 42.3 %, conductivity - 106.7  $\mu$ S, and temperature - 17.2 °C.

**Table 8.** Numbers of fish collected between 2003 and 2014 from ECR-2.

Year	<u>Mexican 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
2013	0	1	0
2014	0	0	0

### El Coronado Ranch Site 3

#### Results

A total of 36 Mexican longfin dace and one Yaqui chub collected during 625 seconds of effort at ECR-3. CPUE for all native fish at this site was 3.551999 fish/min. There were no non-natives captured in this reach.

**Table 9.** Numbers of fish collected between 2003 and 2014 from ECR-3.

Year	<u>Mexican 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
2013	323	2	74	0
2014	36	1	0	0

*Discussion*

Dace continue to occupy this reach. While this number is not near the total number captured last year, it is promising that dace are continuously captured in this reach of West Turkey Creek, despite water levels in other reaches within the creek. In addition, this is the first time since the Horseshoe Two Fire that dace were captured in a reach other than ECR Site 3 (see below).

Water chemistry: pH – 8.3, dissolved oxygen – 61.0 %, conductivity – 125.4  $\mu$ S, and temperature – 21.0 °C.

**El Coronado Ranch Random Site 1**

*Results*

Twenty-two Mexican longfin dace were captured in 545 seconds of effort. CPUE for this reach was 2.42202 fish/min. There were no non-natives captured.

*Discussion*

This is the first year that dace have been encountered outside of the reach immediately below the fish barrier, possibly indicating improved habitat downstream, allowing fish to disperse. This site is located below El Coronado Ranch Site #3. UTM (NAD83/WGS84) 3526933 N 650897 E

Water chemistry: pH – 8.1, dissolved oxygen – 38.7 %, conductivity – 131.1  $\mu$ S, and temperature – 22.0 °C.

**El Coronado Ranch Random Site 2**

*Results*

In 531 seconds of effort, 26 Yaqui chub were collected for a CPUE of 2.93785 fish/min. No other species were captured.

*Discussion*

Available habitat in this reach was restricted from April through June due to drought conditions. However, during monitoring there was abundant water available, with levels significantly higher than previous years. Size range for chub captured was 34 – 105 mm, with a mean size of 61.68 mm. This reach is located above the road crossing immediately above the Big Tank diversion dam. UTM (NAD83/WGS84) 3526643 N 652558 E

Water chemistry: pH – 8.0, dissolved oxygen – 46.2 %, conductivity - 107.7  $\mu$ S, and temperature - 17.1 °C.

## **Stream Sites Summary**

While fish were captured in more locations than in recent years, the lack of Mexican stoneroller captures in any reach of the creek continues to be of concern and should be addressed in the coming months so that stocking can occur this spring if water levels permit or at the onset the monsoons.

## 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.
- In addition to the four ponds monitored annually, Horse Tank and Dale’s Tank should be included in each year’s monitoring. Horse Tank has become a good source of fish to use for restocking purposes since it is spring fed and does not seem to dry as the other ponds on the ranch do. Dale’s Tank should be monitored annually since fish are regularly stocked into this location.

### *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, Mexican 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).
- Explore adding and anchoring woody debris in areas of West Turkey Creek to increase pool habitat favored by Yaqui chub.
- Partners should discuss the stocking or movement of fish into locations that regularly experience drying due to drought. While important to maintain multiple populations of fish, the regular salvaging of fish from some of these locations can pose a hardship to ranch and refuge personnel, which are already spread thin with other duties.
- Renovation of Lower Guesthouse Pond should take place to remove the invasive emergent parrot feather (*Myriophyllum aquaticum*), which is impeding accurate monitoring of the location and is limiting available habitat for fish.

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**Appendix A.** El Coronado Ranch HCP fish monitoring 2014 results compared with El Coronado Ranch HCP fish monitoring between 2004 and 2013 (Brouder 2005, 2006, Johnson 2007, Voeltz 2006, 2008, 2009, 2010, Lohrengel 2011, 2012, 2013). 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	Mexican 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	-
	2011	ES	511 s	1	-	-	-
	2012	ES	589 s	-	-	-	-
	2013	ES	589 s	43	-	-	-
	2014	ES	859 s	12	-	-	-
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	-
	2011	ES	383 s	-	-	-	-
	2012	ES	558 s	-	1	-	-
	2013	ES	298 s	1	-	-	-
	2014	ES	559 s	-	-	-	-
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
	2011	ES	665 s	-	7	-	-
	2012	ES	1100 s	-	30	5	-
	2013	ES	1299 s	2	323	74	-
	2014	ES	625 s	1	36	-	-

**Appendix A** (continued).

Site	Year	Method	Total effort	Yaqui chub	Mexican 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	-	-	-
	2013	MT	243.96 h	554	-	-
2014	MT	264.0 h	10	-	-	
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	-	-
	2013	MT	241.92 h	56	-	-
	2014	MT	264.0 h	137	-	-
Upper Guest House Pond	2004	HN	42.0 h	-	-	-
		MT	84.0 h	-	-	-
	2005	S	702 m <sup>2</sup>	240	11	-
	2006	S	600 m <sup>2</sup>	-	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	-	-
	2013	MT	222.96	1174	-	-
	2014	MT	286.0	-	-	-
Lower Guest House Pond	2004	HN	45.0 h	-	-	-
	2005	S	180 m <sup>2</sup>	19	27	-
	2006	S	230 m <sup>2</sup>	-	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	-	-
	2013	MT	225.0 h	298	-	-
2014	MT	273.0 h	-	-	-	

**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.