

# EL CORONADO RANCH HABITAT CONSERVATION PLAN

## 2003 FISH MONITORING REPORT



*Big Tank*

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November 2003

Document No.: USFWS-AZFRO-SC-04-001

## ACKNOWLEDGEMENTS

The completion of the 2003 annual El Coronado Ranch Habitat Conservation Plan (HCP) monitoring could not have been accomplished without the patience and assistance from the following HCP partners and volunteers: Josiah and Valer Austin (El Coronado Ranch), Nina King and Bill Radke (USFWS, San Bernardino NWR), Stephanie Coleman (USFWS, New Mexico Fishery Resources Office), Gary Helbing (USFS, Douglas Ranger District), Brenda Brouder (USFWS, Arizona Fishery Resources Office), and Scott Bonar and Sean Tackley (University of Arizona, Cooperative Fish and Wildlife Research Unit).



*HCP partners (USFWS, USFS, University of Arizona) sampling for rare and endangered Yaqui River fishes in West Turkey Creek, AZ*



*Yaqui chub*



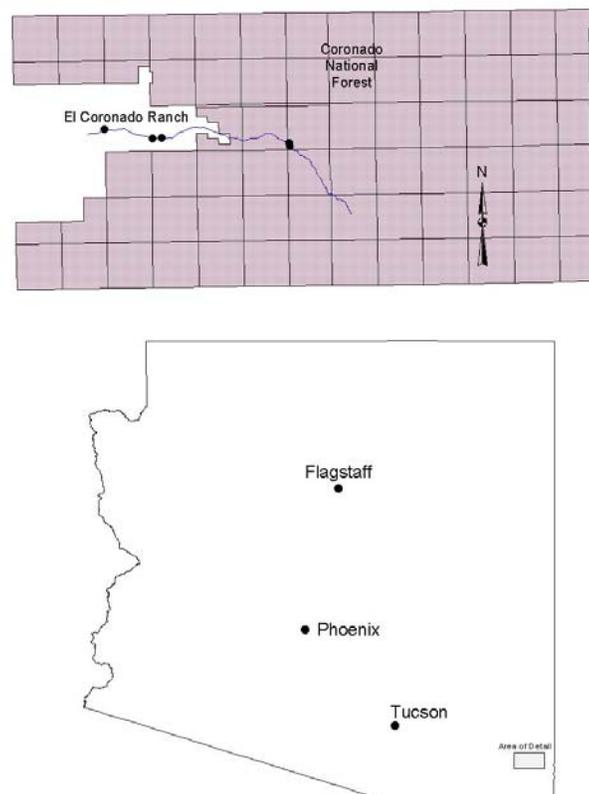
*Yaqui catfish*



*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. This report summarizes results of the 2003 El Coronado Ranch HCP fish monitoring effort that followed 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 monitoring results presented in Coleman (2002). In addition to following HCP Monitoring Plan fish sampling procedures, we implemented the Arizona Fishery Resources Office's Hazardous Analysis Critical Control Point (HACCP) draft policy, which calls for the disinfection of all sampling gear (i.e., boots, waders, seines, nets, traps, etc.) used at one site prior to the use at another, in an attempt to reduce the inadvertent introductions of parasites/pathogens into uninfected waters. Lastly, this report provides recommendations for future El Coronado Ranch HCP fish monitoring and management efforts.



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

## EL CORONADO RANCH POND SURVEY

### Big Tank

#### Methods

A combination of seven unbaited minnow traps [44.5 cm long, 22.8 cm dia, 2.54 cm opening, 6.3 mm ( $\frac{1}{4}$  in) mesh], four unbaited hoop nets [2 m in length, 3 hoops, 70 cm dia, 6.3 mm ( $\frac{1}{4}$  in) mesh and four experimental gill nets (45.7 m x 1.8 m; six panel, 1.27 cm to 7.62 cm mesh panels) were fished for approximately 2 hours (~0900 to 1100) in Big Tank on October 22, 2003. The short duration of initial sampling was intended to reduce potential mortality of and predation on native fishes by Sonora mud turtles *Kinosternon sonoriense*. After the initial 2 hours, all traps were checked for presence of fish and returned back into the water for an additional 4 hour set (~1100 to 1500), with the exception of hoop nets, which were pulled after the initial 2 hour set. Regardless of set, all fish captured were measured for total length (TL; mm) and weighed (g). Catch per unit effort (CPUE) was calculated as number of fish/hour of trapping/netting. Yaqui catfish *Ictalurus pricei*, captured were also scanned for the presence of a Passive Integrated Transponder (PIT) tag. PIT tags were inserted into all Yaqui catfish not already having one. All native fish were returned alive, whereas non-native fishes, with the exception of grass carp, were sacrificed, preserved in 95% ethanol, and examined (in the laboratory) for the presence of the Asian fish tapeworm *Bothriocephalus acheilognathi*. Water quality parameters were measured in the approximate center of Big Tank at the surface, middle, and bottom using a Hydrolab MiniSonde<sup>®</sup> and Surveyor<sup>®</sup> 4.

#### Results

A total of 23 fish representing three species was collected during approximately 6 hours of sampling. Black crappie *Pomoxis nigromaculatus*, comprised the majority of the catch at 87% (n = 20) followed by Yaqui catfish (9%; n = 2), and grass carp *Ctenopharyngodon idella*, (4%; n = 1). Black crappie were collected in both hoop nets and gill nets resulting in a mean CPUE of 1 and 0.5 fish/hour, respectively. Yaqui catfish were only caught in gill nets, resulting in a mean CPUE of 0.8 fish/hour. No fish were collected in minnow traps set in Big Tank.

Mean TL of black crappie collected was 76.2 mm and ranged in size from 61 to 95 mm, indicating that all fish collected represented the age 0 or young-of-year (YOY) size class; no adult black crappie were collected. The two Yaqui catfish collected had total lengths of 365 and 367 mm and weights of 487 and 559 g, respectively. One of the Yaqui catfish collected (365 mm, 487 g) was a recaptured fish (PIT tag # 53262E4963) that was transplanted into Big Tank from Lisa Tank in October 2000. The recaptured Yaqui catfish grew 8 mm in length over a period of approximately 3 years, but lost approximately 426 g during this same time frame (**Table 1**). The second Yaqui catfish collected was not a

recapture, or at least no PIT tag was found, and therefore, one was inserted into this fish (PIT tag # 442B3C5349).



USFWS biologist scans for and inserts a PIT tag into a Yaqui catfish.

**Table 1. Mark-recapture history of Yaqui catfish PIT tag # 53262E4963 captured during El Coronado Ranch HCP monitoring in October 2003.**

Date	Location	Mark(M)/ Recapture(R)	TL (mm)	WT (g)
10/26/99	Lisa Tank	M	340	420
10/07/00	Lisa Tank	R	357	907
10/22/03	Big Tank	R	365	487

In addition to fish sampling, water quality parameters were measured in the approximate center of the pond (**Table 2**) and based on readings, no values were considered lethal for resident fishes.

**Table 2. Water quality parameters measured in Big Tank during El Coronado Ranch HCP monitoring in October 2003.**

Depth	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductance (µS)
Surface	17.8	7.03	6.66	173.2
Middle	16.8	7.03	6.44	173.1
Bottom	16.7	7.04	6.11	172.9

The water level of Big Tank was below the high water mark, but of all ponds surveyed or visually inspected, Big Tank held the most water.



*Big Tank during El Coronado Ranch HCP monitoring in October 2003.*

Of the 20 black crappie collected and sacrificed for the examination for Asian fish tapeworm, zero were found to be infected.

### *Discussion*

In September of 2000, longfin dace from Pond H were transplanted into Big Tank along with 254 Yaqui catfish from Lisa Tank in October of 2000. These two transplants represent the baseline for which future monitoring efforts of Big Tank are to be compared to. In 2001, Big Tank was surveyed with experimental gill nets resulting in the capture of six adult Yaqui catfish, no longfin dace, and one adult (>200 mm) black crappie (**Appendix A**). Subsequent seine hauls resulted in the capture of an additional 100+ juvenile (< 30 mm) black crappie (Coleman 2002).

During this year's monitoring effort in Big Tank, only two adult Yaqui catfish were captured in gill nets and zero longfin dace were captured. Based on the recapture history of the one recaptured Yaqui catfish, the loss of 426 g (~1 lb) in weight since last being recaptured in October 2000 is somewhat interesting. Coleman (2002) had observed a significant increase in weight of Yaqui catfish stocked into Lisa Tank over the course of one year (1999 – 2000), which she hypothesized was attributed to catfish predation on the abundance of bullfrog *Rana caspiensis*, tadpoles and tiger salamander *Ambystoma tigrinum*, larvae. Therefore, the dramatic increase in weight of the recaptured catfish from 1999 to 2000 may in fact have been an anomaly and not representative of "normal" weight expected for catfish of that size (357 mm). Furthermore, the dramatic decrease in weight of this same fish from October 2000 to October 2003 may be representative of this fish returning to a "normal" weight for its size (365 mm). To

test this hypothesis, I generated a length-weight regression using lengths and weights measured from catfish originally stocked into Keith and Lisa tanks in 1999 and then, using this equation, predicted weight, based on length, of the recaptured catfish in 2000 (357 mm TL) and 2003 (365 mm TL). The predictive length-weight equation for Yaqui catfish originally stocked into El Coronado Ranch ponds in 1999 is:

$$\text{Log}_{10}\text{Wt} = -5.293 + 3.118(\text{log}_{10}\text{TL})$$

Based on this equation, the predicted weight of a Yaqui catfish 357 and 365 mm TL is 454 and 486 g, respectively. In comparing observed (907g) versus predicted (454 g) weight of this fish in 2000 and again in 2003 (observed 487g vs. predicted 486 g), it becomes readily apparent that the weight of a catfish in 2000 following a year of predation on an abundance of bullfrog tadpoles and tiger salamander larvae was well above what was to be expected. Conversely, in 2003, it is apparent that the weight of the recaptured Yaqui catfish, although 426 g less than in 2000, is what is to be expected for a fish of its size.

Big Tank was originally stocked with 254 catfish in 2000. Since then, a total of only eight have been recaptured, all of which have been adults. The low number of recaptures and the lack of recruitment are somewhat of a concern, although spawning aggregations and nesting behavior were observed in August 2001 (Coleman 2002).

This year also represents the second year YOY black crappie were collected in Big Tank; black crappie was first collected in 2001. The continued existence of black crappie in Big Tank may be contributing to the lack of reproduction/recruitment of Yaqui fishes that were historically stocked into this pond.

## **Upper Guesthouse Pond**

### *Methods*

Three seine (3 m x 10 m) hauls and no netting or trapping were conducted in Upper Guesthouse Pond on October 23, 2003 due to the extremely low water level of this pond. All fish collected were measured for total length (TL; mm) and all native fish were returned alive to the pond. Catch per unit effort (CPUE) was calculated as number of fish / 100 m<sup>2</sup>. Water quality parameters were measured in the middle of the water column at the deepest point (approximately 1.5 m) of Upper Guesthouse Pond using a Hydrolab MiniSonde<sup>®</sup> and Surveyor<sup>®</sup> 4.



USFWS biologists conduct a seine haul and measure water quality in Upper Guesthouse Pond during El Coronado Ranch HCP monitoring in October 2003.

**Results**

Yaqui chub *Gila purpurea*, was the only species of fish collected as a result of three seine hauls in Upper Guesthouse Pond. Only one Yaqui chub measuring 85 mm TL was collected resulting in a mean CPUE of 0.06 fish / 100 m<sup>2</sup>. In addition to one Yaqui chub, a total of 36 bullfrog tadpoles were also collected from Upper Guesthouse Pond.

Water quality parameters measured in Upper Guesthouse Pond, like those in Big Tank, were not considered lethal for resident fishes (**Table 3**). Based on visual inspection during this survey, Upper Guesthouse Pond was very shallow (< 2 m) and inundated with aquatic macrophytes.

**Table 3. Water quality parameters measured in Upper Guesthouse Pond during El Coronado Ranch HCP monitoring in October 2003.**

Depth	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductance (µS)
0.75 m	14.2	7.42	9.74	141.7

## Discussion

In the spring of 2000, 109 adult Yaqui chub were collected from Upper Guesthouse Pond. However, due to reduced water quantity and quality in the summer of 2000, salvage efforts commenced. Upon filling of ponds during the 2000 monsoon season, 25 adult and seven juvenile Yaqui chub were relocated into Upper Guesthouse Pond. During 2001 monitoring, zero Yaqui chub were collected in Upper Guesthouse Pond.

Although not identified as a long-term monitoring site in the HCP monitoring plan, it was decided to sample Upper Guesthouse Pond because of its ability to be completely seined due to low water levels. Unfortunately, only one Yaqui chub was collected. The low number of Yaqui chub collected during this and last years monitoring effort is likely due to the continued drought conditions and subsequent low water levels of this pond. The Yaqui chub population in Upper Guesthouse Pond appears to be all but non-existent. Future monitoring efforts in Upper Guesthouse Pond should be directed elsewhere until the water level substantially increases.

## Tennis Court Pond

### Methods

A combination of six unbaited minnow traps and two unbaited hoop nets were fished overnight (~1500 on 10/23/03 to ~0800 on 10/24/03) in the Tennis Court Pond. Hoop nets were set with the cod end slightly out of the water in the event of a capture of a Sonora mud turtle. The first 100 Yaqui chub captured were measured for total length (mm; TL) and the remainder were categorized as either juvenile or adult, counted, and returned to the pond alive, with the exception of 60, which were preserved in 95% ethanol, returned to the laboratory, and examined for the presence of Asian fish tapeworm.

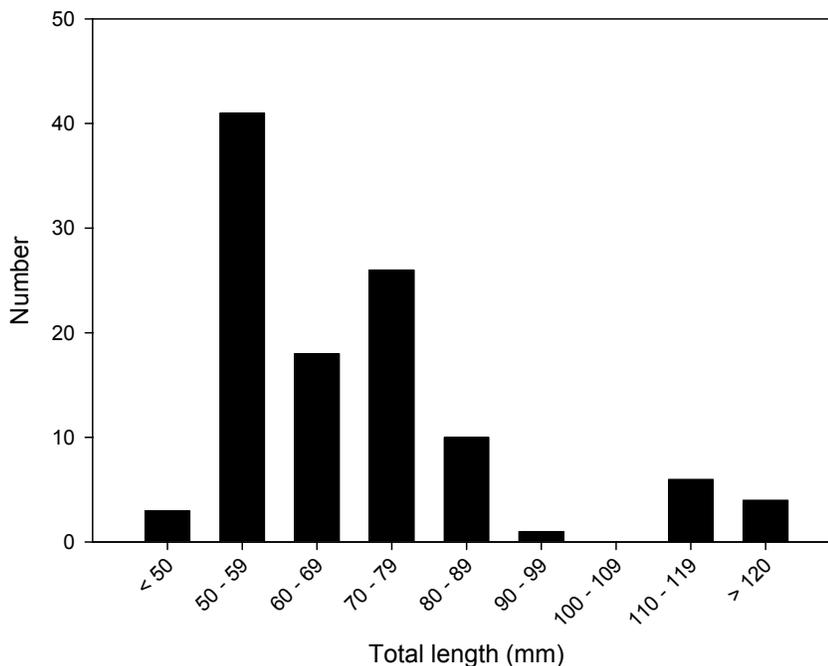


*Hoop net set with cod end slightly out of the water in the event a Sonora mud turtle was captured.*

Water quality parameters were measured at a point approximately 3 m from shore and approximately 0.75 m deep in the Tennis Court Pond using a Hydrolab MiniSonde<sup>®</sup> and Surveyor<sup>®</sup> 4.

## Results

A total of 799 fish representing only one species (Yaqui chub) was collected in approximately 17 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps and hoop nets was 5.4 fish / hour and 7.1 fish / hour, respectively. Mean total length of Yaqui chub measured was 69.5 mm and ranged in size from 44 to 125 mm TL. Length frequency distribution of Yaqui chub indicates that at least two, possibly three size classes of fish were present in Tennis Court Pond (**Figure 2**). The majority of fish collected were of the 50 - 59 mm modal length class. In addition to Yaqui chub, 12 bullfrog tadpoles were also collected in Tennis Court Pond.



**Figure 2. Length frequency histogram of Yaqui chub collected in Tennis Court Pond during El Coronado Ranch HCP monitoring in October 2003.**

Water quality parameters measured in Tennis Court Pond, like those in other ponds sampled on the ranch, were not considered lethal for resident fishes (**Table 4**). Based on visual inspection during this survey, the water level in Tennis Court Pond was very low compared to the high water mark (**Figure 3**).

**Table 4. Water quality parameters measured in Tennis Court Pond during El Coronado Ranch HCP monitoring in October 2003.**

Depth	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductance (µS)
0.75 m	11.7	7.29	8.03	118.5



**Figure 3. Tennis Court Pond during El Coronado Ranch HCP monitoring in October 2003.**

Of the 60 Yaqui chub that were sacrificed from Tennis Court Pond and examined for presence of Asian fish tapeworm, zero were infected.

### *Discussion*

In September 2000, 22 longfin dace and 112 Yaqui chub were collected from Tennis Court Pond. The collection of approximately 800 Yaqui chub during this monitoring effort is very encouraging, especially in the presence of ongoing drought conditions. More encouraging is the presence of several size classes indicating successful reproduction and recruitment. The absence of longfin dace during this year's monitoring efforts is likely a result of the drying of Pond H, which is connected to Tennis Court Pond via an approximate 2m wide canal when water levels in both ponds are high. Historically, Pond H contained larger populations of longfin dace than does Tennis Court Pond. The continued lack of Asian fish tapeworm in Yaqui chub collected from Tennis Court Pond is also encouraging.

## Pond H

As mentioned above, Pond H is connected to Tennis Court Pond when water levels in both ponds are high, which was not the case during this monitoring effort. In September 2000, 33 longfin dace and 44 Yaqui chub were collected from Pond H. Due to decreasing water levels in Pond H during the summer of 2000, approximately 275 longfin dace were removed and relocated into several other ponds located on the ranch. In January 2002, two longfin dace and 111 Yaqui chub were collected from Pond H. Unfortunately, Pond H was not sampled during this monitoring effort due to the absence of water.



*Pond H during El Coronado Ranch  
HCP monitoring in October 2003*

## Dale's Pond

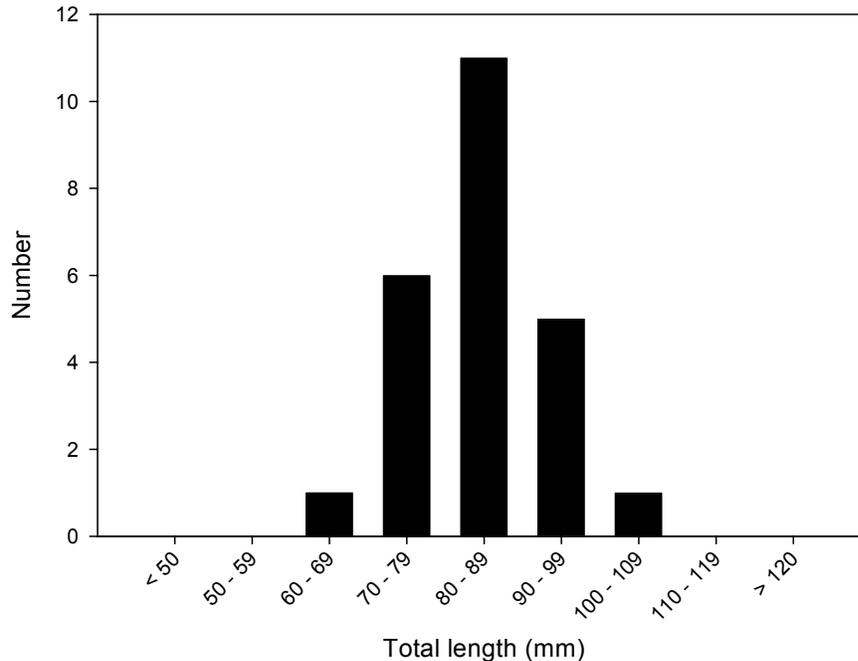
### *Methods*

A combination of six unbaited minnow traps and two unbaited hoop nets were fished overnight (~1500 on 10/23/03 to ~0800 on 10/24/03) in Dale's Pond. Similar to that in Tennis Court Pond, hoop nets were set with the cod end slightly out of the water in the event of a capture of a Sonora mud turtle. All fish collected were measured for total length (mm; TL) and returned to the pond alive. No fish were sacrificed from Dale's Pond for examination for presence of Asian fish tapeworm. Water quality parameters were measured at a point approximately 3 m from shore and approximately 0.75 m deep using a Hydrolab MiniSonde<sup>®</sup> and Surveyor<sup>®</sup> 4.

### *Results*

A total of 24 fish representing only one species (Yaqui chub) was collected in approximately 17 hours of sampling. Mean CPUE of Yaqui chub collected in minnow traps and hoop nets was 0.23 fish / hour and 0.03 fish / hour, respectively. Mean total length of Yaqui chub measured was 84.6 mm and ranged in size from 61 to 101 mm TL. Length frequency distribution of Yaqui

chub collected in Dale’s Pond indicates that only one size class of chub was present (**Figure 4**) with the majority of fish collected being of the 80 - 89 mm modal length class. In addition to Yaqui chub, 55 bullfrog tadpoles were also collected in Dale’s Pond.



**Figure 4. Length frequency histogram of Yaqui chub collected in Dale’s Pond during El Coronado Ranch HCP monitoring in October 2003.**

Water quality parameters measured in Dale’s Pond were not considered lethal for resident fishes (**Table 5**). Based on visual inspection during this survey, the water level in Dale’s Pond, like all other ponds on the Ranch, was very low compared to the high water mark (**Figure 5**).

**Table 5. Water quality parameters measured in Dale’s Pond during El Coronado Ranch HCP monitoring in October 2003.**

Depth	Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductance (µS)
0.75 m	12.6	7.28	9.35	188.6



**Figure 5. Dale's Pond during El Coronado Ranch HCP monitoring in October 2003.**

### *Discussion*

During spring 2000 monitoring efforts 16 adult and 40 juvenile Yaqui chub were collected from Dale's Pond. In September 2000, Dale's Pond received approximately 157 longfin dace from Pond H, which was going dry due to drought conditions. Dale's Pond was not surveyed in 2001 or 2002. The presence of Yaqui chub during this year's monitoring efforts, in light of the extremely low water level of this pond, is encouraging; however, successful reproduction and recruitment in 2003 does not appear to be present. In addition, the cause for the absence of longfin dace during this monitoring effort is uncertain, but may be a result of ongoing drought conditions.

### **Lower Guesthouse Pond**

Lower Guesthouse Pond was not sampled during this monitoring effort. However, upon visual examination of this pond, the water level was well below the high water line and "mats" of a non-native, invasive aquatic macrophyte known as parrot feather *Myriophyllum aquaticum*, were observed. Parrot feather, once indigenous to South America, has been introduced worldwide for use in indoor and outdoor aquaria. Parrot feather is a type of milfoil that forms "mats" on the surface of ponds, resulting in the lack of sunlight penetration to the bottom, anoxic conditions below the mats, and "super-saturation" of dissolved oxygen on the surface; conditions unsuitable for resident fishes. Unfortunately, control of this non-native plant is difficult, as chemical and mechanical removal methods are, for the most part, ineffective, and because of parrot feather's high tannin content, most grazers, including grass carp, find it unpalatable. Grass carp prefer soft plants, like *Elodea* sp. and the tough, woody parrot feather stems are not preferred.



*“Mats” of parrot feather in Lower Guesthouse Pond taken during El Coronado Ranch HCP monitoring in October 2003.*

## WEST TURKEY CREEK SURVEY

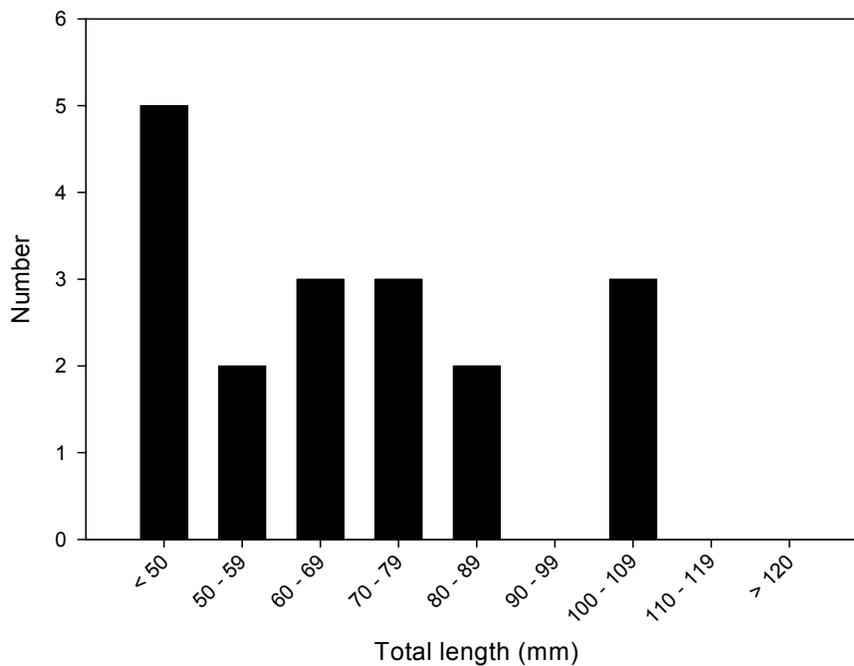
### El Coronado Ranch Site 1 (ECR-1)

#### Methods

A Smith-Root, Inc. Model 12B backpack shocker was used to sample West Turkey Creek on the El Coronado Ranch property on October 23, 2003. Backpack shocker settings at site ECR-1 were J - 5, 400 volts, with amps ranging from 0.4 – 0.6. All fish captured were measured for total length (mm; TL) and returned alive to West Turkey Creek at point of capture. Water quality parameters were measured at mid-depth of the deepest pool within the 100 m reach sampled using a Hydrolab MiniSonde<sup>®</sup> and Surveyor<sup>®</sup> 4.

#### Results

A total of 19 fish comprising only one species (Yaqui chub) was collected during 512 seconds of effort at ECR-1, resulting in a CPUE of 2.2 Yaqui chub / 60 seconds of shocking. Mean total length of Yaqui chub collected at ECR-1 was 62.3 mm with fish ranging from 23 to 105 mm TL. Based on the length frequency distribution generated from Yaqui chub collected at ECR-1, it appears that at least two, possibly three size classes were present (**Figure 6**), with evidence of successful reproduction in the presence of fish < 50 mm TL.



**Figure 6. Length frequency histogram of Yaqui chub collected in West Turkey Creek at ECR-1 during El Coronado Ranch HCP monitoring in October 2003.**

Water quality parameters measured in West Turkey Creek at ECR-1 were not considered lethal for resident fishes (**Table 6**). Based on visual inspection during this survey, flows in West Turkey Creek at ECR-1 were minimal resulting in this reach of stream being reduced to a few intermittent pools (**Figure 7**).

**Table 6. Water quality parameters measured in West Turkey Creek at ECR-1 during El Coronado Ranch HCP monitoring in October 2003.**

Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductance (µS)
9.8	7.34	9.23	191.8



**Figure 7. West Turkey Creek at ECR-1 during El Coronado Ranch HCP monitoring in October 2003.**



*Yaqui chub collected from West Turkey Creek at ECR-1*

### Discussion

The capture of 19 Yaqui chub comprising multiple size classes at site ECR-1 is very encouraging, especially the presence of successful reproduction. The number of fish collected during this monitoring effort is the most collected from this site since renovation, reintroduction, and monitoring began in West Turkey Creek. The last time this site was surveyed was in January 2002, when no fish were collected. Prior to that, the only known fishes to exist near this site were longfin dace planted in June 2000.

### El Coronado Ranch Site 2 [(ECR-2) – below Big Tank diversion]

#### Methods

A Smith-Root, Inc. Model 12B backpack shocker was used to sample West Turkey Creek on the El Coronado Ranch property on October 23, 2003. Backpack shocker settings at site ECR - 2 were J - 5, 400 volts, with amps ranging from 0.4 – 0.6. All fish captured were measured for total length (mm; TL) and returned alive to West Turkey Creek at point of capture. Water quality parameters were measured at mid-depth of the deepest pool within the 100 m reach sampled using a Hydrolab MiniSonde<sup>®</sup> and Surveyor<sup>®</sup> 4.

#### Results

A total of two fish comprising only one species (longfin dace) was collected during 478 seconds of effort at ECR-2, resulting in a CPUE of 0.25 longfin dace / 60 seconds of shocking. The total length of each longfin dace collected at ECR-2 was 67 and 74 mm, respectively, representing adult fish. Successful reproduction or recruitment of both Yaqui chub and longfin dace was not apparent at ECR-2 during this survey.

Water quality parameters measured in West Turkey Creek at ECR-2 were not considered lethal for resident fishes (**Table 7**). Based on visual inspection during this survey, flows in West Turkey Creek at ECR-2 were low resulting in this reach of stream being reduced to a few pools connected by very shallow riffles (**Figure 8**).

**Table 7. Water quality parameters measured in West Turkey Creek at ECR-2 during El Coronado Ranch HCP monitoring in October 2003.**

Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductance (µS)
14.8	7.45	7.14	154.0



**Figure 8. West Turkey Creek at ECR-2 during El Coronado Ranch HCP monitoring in October 2003.**

### *Discussion*

Since renovation, varying numbers of only longfin dace have been collected at this site. In 2000, approximately 30 longfin dace, comprising both adults and juveniles were collected, and in 2002, only 4 adult dace were collected at ECR-2. Even though not abundant during this monitoring effort, ECR-2 appears to have the potential of sustaining both longfin dace and Yaqui chub based on visual examination of the available habitat [shallow riffles and moderately deep (~1m) pools].

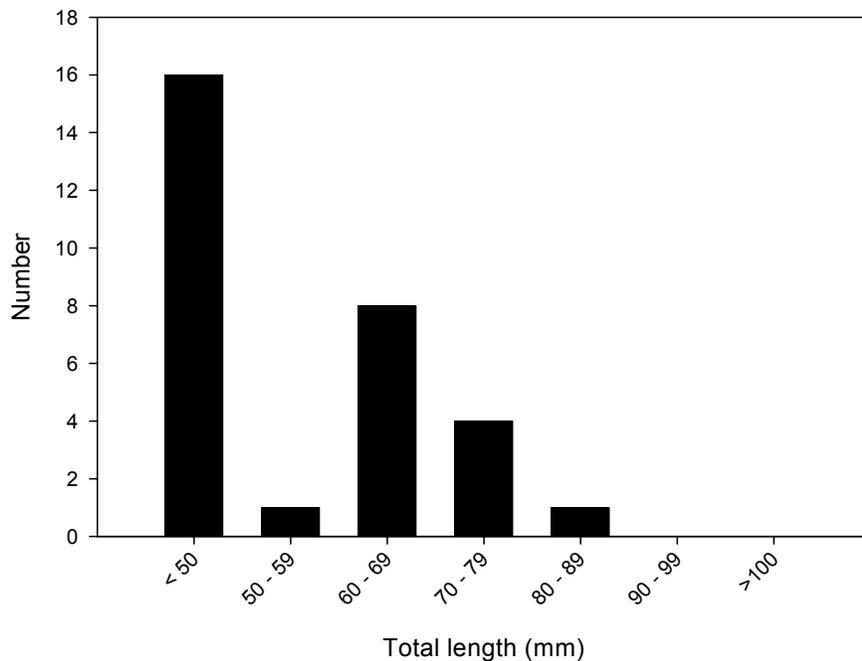
### **El Coronado Ranch Site 3 [(ECR-3) – Big Tank outflow barrier to lower boundary]**

#### *Methods*

A Smith-Root, Inc. Model 12B backpack shocker was used to sample West Turkey Creek on the El Coronado Ranch property on October 23, 2003. Backpack shocker settings at site ECR-3 were J - 5, 400 volts, with amps ranging from 0.4 – 0.6. Fish were measured for total length (mm; TL) and returned alive to West Turkey Creek at point of capture. Water quality parameters were measured at mid-depth of the deepest pool within the 100 m reach sampled using a Hydrolab MiniSonde<sup>®</sup> and Surveyor<sup>®</sup> 4.

## Results

A total of 135 fish comprising two species [longfin dace (n = 134) and green sunfish *Lepomis cyanellus* (n = 1)] was collected during 916 seconds of effort at ECR-3, resulting in a CPUE of 8.7 longfin dace / 60 seconds and 0.06 green sunfish / 60 seconds of shocking. Mean total length of longfin dace (n = 30) collected at ECR-3 was 45.5 mm with fish ranging from 22 to 83 mm. Based on the length frequency distribution generated from longfin dace collected at site ECR-3, two size classes were present (**Figure 9**); with evidence of reproduction in the abundance of fish < 50 mm TL. The green sunfish captured measured 151 mm TL and was sacrificed for examination of stomach contents; a few aquatic insects were present.



**Figure 9.** Length frequency histogram of longfin dace collected in West Turkey Creek at ECR-1 during El Coronado Ranch HCP monitoring in October 2003.

Water quality parameters measured in West Turkey Creek at site ECR-3 were not considered lethal for resident fishes (**Table 8**). Based on visual inspection during this survey, flow in West Turkey Creek at ECR-3 was low but continuous from below the barrier to the El Coronado Ranch boundary (**Figure 10**).

**Table 8. Water quality parameters measured in West Turkey Creek at ECR-3 during El Coronado Ranch HCP monitoring in October 2003.**

Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductance (µS)
16.1	7.59	8.25	185.2



**Figure 10. West Turkey Creek at ECR-3 during El Coronado Ranch HCP monitoring in October 2003.**

### *Discussion*

The presence and abundance of longfin dace at this site is a first since renovation and reintroduction was completed. In addition to the abundance of longfin dace throughout this reach, successful recruitment was evidenced by the capture and observation of many dace less than ~50 mm. Successful reproduction and recruitment at this site is likely the result of continuous, albeit low flow from the barrier down to the ranch boundary (i.e., increased availability of habitat). The only “bad news” to report from this site was the capture of a green sunfish. This is not uncommon, as this species has been collected from this site in the past. However, the presence and more importantly abundance of green sunfish at this site needs to be monitored to ensure that this prolific spawner does not “over run” this stretch of river causing the eradication of native longfin dace.

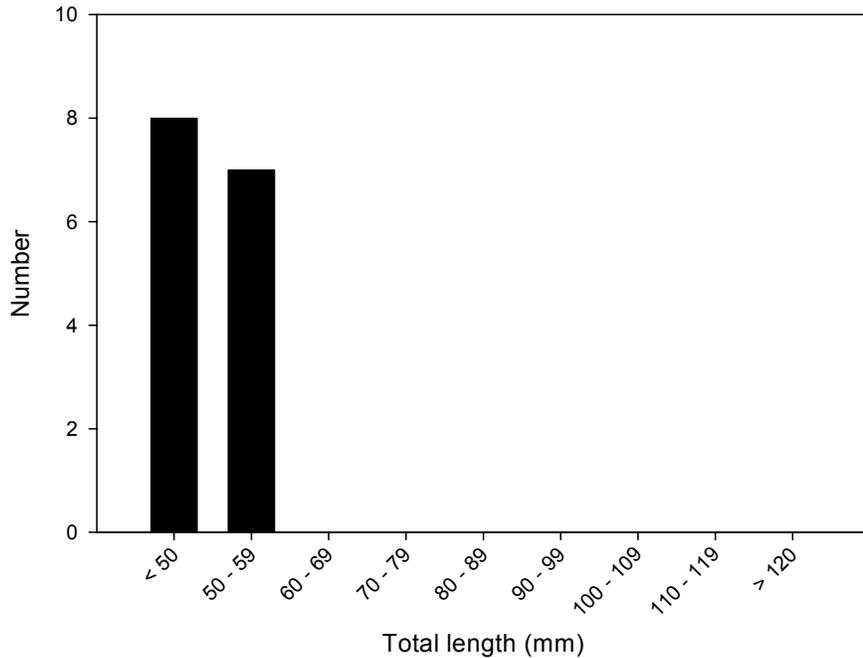
**El Coronado Ranch (Turkey Pen Canyon)**

*Methods*

Four “sweeps” with a trapezoidal shaped dip net (6 mm mesh) were conducted in the cement cistern located in Turkey Pen Canyon. All fish captured were measured for total length (mm; TL) and returned alive into the cistern. Catch per unit effort was calculated as # of fish / “sweep” of the dip net. Water quality was not measured in the cistern during this survey trip.

*Results*

A total of 15 Yaqui chub was captured from the cistern in Turkey Pen Canyon resulting in a mean CPUE of 3.75 Yaqui chub / “sweep” of the dip net. No other species of fish was captured. Mean total length of Yaqui chub was 48.5 mm with fish ranging in size from 40 to 56 mm TL. Based on the length frequency distribution generated from fish collected from the cistern in Turkey Pen Canyon, only one size class appears to be present (**Figure 11**).



**Figure 11. Length frequency histogram of Yaqui chub collected in in Turkey Pen Canyon during El Coronado Ranch HCP monitoring in October 2003.**

### *Discussion*

The cistern in Turkey Pen Canyon was not renovated, as non-native fishes never compromised this site. Turkey Pen Canyon was last sampled in January 2002, when no fish were captured. Although only a very small (~1m dia), shallow (0.75 m) “pool”, this site was home to small sized Yaqui chub during this monitoring effort and should continue to be monitored in the future.

### **US Forest Service Site 1 [(USFS-1) – Dispersed Campsite]**

Fish and water quality monitoring of West Turkey Creek on the Coronado National Forest was conducted by Gary Helbing (USFS, Douglas Ranger District) with assistance of personnel from the USFWS, Arizona Fishery Resources Office and San Bernardino NWR, and University of Arizona, Cooperative Fish and Wildlife Research Unit.

### *Methods*

A Smith-Root, Inc. Model 12B backpack shocker was used to sample West Turkey Creek on the Coronado National Forest on October 23, 2003. Backpack shocker settings at site USFS-1 were J - 5, 400 volts, with amps ranging from 0.4 – 0.6. Fish were measured for total length (mm; TL) and returned alive to West Turkey Creek at point of capture. Water quality parameters were measured at mid-depth of the deepest pool using handheld water quality meters.

### *Results*

One Yaqui chub measuring 86 mm TL was captured during 373 seconds of effort at USFS-1 resulting in a CPUE of 0.16 Yaqui chub / 60 seconds of shocking.

An additional 235 seconds of effort were expended upstream from USFS-1 long-term HCP monitoring site, resulting in two longfin dace being captured. These two fish measured 46 and 50 mm TL and were released alive at point of capture.

Water quality parameters measured in West Turkey Creek at USFS-1 were not considered lethal for resident fishes (**Table 9**). Based on visual inspection and personal communication with Gary Helbing (USFS Biologist) during this survey, flow in West Turkey Creek at site USFS-1 was “very” low, resulting in a small pool being the only available habitat to be sampled (**Figure 12**).

**Table 9. Water quality parameters measured in West Turkey Creek at USFS-1 during El Coronado Ranch HCP monitoring in October 2003.**

Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductance (µS)
11.0	8.1	-	130.0



**Figure 12. West Turkey Creek at USFS-1 during El Coronado Ranch HCP monitoring in October 2003.**

### *Discussion*

This site has regularly held at least a few ( $\leq 4$ ) Yaqui chub and an occasional longfin dace over the past several years, even though drought conditions have persisted in the area. During this past summer, USFS biologists constructed a “drip station” in the vicinity of this site to augment low water flows in an effort to maintain the few remaining chub at this site. At least one of those chub was collected during this effort. This site continues to remain a potential future reintroduction site if fish, and more importantly water, are available. Discussions regarding the potential of translocating fish into this site were held during this monitoring effort; however, even though chub were available from Tennis Court Pond, it was decided against translocating fish due to the uncertainty in longevity of the existing available habitat at this site.

### US Forest Service Site 2 [(USFS-2) – upper Sycamore Campground]

The USFS-2 site was not sampled during this monitoring effort due to the lack of water. Historically, both Yaqui chub and longfin dace were collected at this site.

### US Forest Service Site 3 [(USFS-3) – lower Sycamore Campground]

#### *Methods*

A Smith-Root, Inc. Model 12B backpack shocker was used to sample West Turkey Creek on the Coronado National Forest on October 23, 2003. Backpack shocker settings at site USFS-3 were J - 5, 400 volts, with amps ranging from 0.4 – 0.6. Water quality parameters were measured at mid-depth of the deepest pool using handheld water quality meters.

#### *Results*

No fish were captured during 274 seconds of effort at site USFS-3.

Water quality parameters measured in West Turkey Creek at USFS-3 were not considered lethal for resident fishes (**Table 10**). Based on visual inspection and personal communication with Gary Helbing (USFS Biologist) during this survey, flow in West Turkey Creek at site USFS-3 was “very” low, reducing this monitoring site to a single pool (**Figure 13**).

**Table 10. Water quality parameters measured in West Turkey Creek at USFS-3 during El Coronado Ranch HCP monitoring in October 2003.**

Temperature (°C)	pH	Dissolved Oxygen (mg/L)	Specific Conductance (µS)
11.5	7.8	-	110.0



**Figure 13. West Turkey Creek at USFS-3 during El Coronado Ranch HCP monitoring in October 2003.**

*Discussion*

Even though no fish were collected at this site during this monitoring effort, historically, both Yaqui chub and longfin dace were collected at this site. The extremely low water levels of the few isolated pools and lack of flow within this reach of West Turkey Creek make it almost impossible for fishes to persist for any length of time.

## **FUTURE MONITORING AND MANAGEMENT RECOMMENDATIONS**

### *Monitoring*

-Implement an “augmented random sampling” strategy for monitoring population trends of West Turkey Creek fishes, which entails augmenting the existing six sites on West Turkey Creek with at least six randomly chosen sites during each monitoring effort. Augmented random sampling, or a combination of fixed and randomly chosen sites, provides more power to detect change in West Turkey Creek fish populations than either all fixed or all randomly chosen sites.

-Record each sampling gear and more importantly the number of each species collected in that gear separately. This is needed so that a mean CPUE, variance, and confidence intervals can be generated for each gear type and species. Mean CPUEs and confidence intervals are needed in order to detect changes in population trends. CPUEs generated from “pooled” data (i.e., 10 traps catching 10 fish over a period of 10 hours equaling a CPUE of 10fish/100 hours), as has been done in the past, do not allow for means, variances, and confidence intervals to be calculated.

-Effort for seine hauls should be recorded in  $m^2$  and not number of seine hauls. Again, mean CPUE, variance, and confidence intervals cannot be calculated from pooled data (i.e., number of fish / number of seine hauls). Multiplying the length of the seine haul by the width of the net generates a seine haul effort in  $m^2$ .

-Measure and record total length of all native fishes collected ( $\leq 100$  individuals) to allow for the development and interpretation of length frequency histograms. Length frequency histograms will also reduce biologist subjectivity with regards to categorizing fish as either juvenile or adult. Also, the development of length frequency histograms, as demonstrated in Figures 1 & 5 of this report, allows for a potential 3<sup>rd</sup> year class to be identified, which would go unnoticed if these fishes were only categorized as juvenile or adult.

-Intensively sample (increase frequency) Big Tank in an effort to mechanically remove introduced, non-native black crappie using a variety of gear types (i.e., hoop net, fyke net, gill net, seine, electrofish, etc.).

-Hoop nets and experimental gill nets should be set overnight in Big Tank, Lisa Tank, and Keith Tank when sampling for Yaqui catfish. To reduce the likelihood of predation on native fishes by and/or mortality of Sonora mud turtles, it is recommended that nets be checked every 2 hours and that the cod end of hoop nets be left slightly out of the water, leaving an “air pocket”.

-All Yaqui catfish captured should be measured for total length, weighed, and scanned for the presence of a PIT tag. All “unmarked” catfish should have a PIT tag inserted and PIT tag number recorded.

-West Turkey Creek water quality parameters measured at sites on both the Coronado National Forest and El Coronado Ranch should be similar, with at least temperature (°C), dissolved oxygen (mg/L), pH, and specific conductance being measured and recorded.

-Standardized data collection sheets for netting/trapping/seining and backpack electrofishing be developed, reviewed by HCP partners, and adopted. USFWS, Arizona Fishery Resources Office is currently drafting data sheets. Upon completion, proposed data sheets will be forwarded to HCP partners for review.

-Continue implementing HACCP policy of disinfecting sampling gear used at one site prior to the use at another site in an effort to reduce inadvertent introductions of parasites/pathogens into uninfected waters. To date, Asian fish tapeworm has not been documented from any fish collected from West Turkey Creek or El Coronado Ranch waters!

### *Management*

-Spawning structure/substrate (clay tiles, culverts, pipes, gravel, rock, etc.) should be placed into all ponds containing Yaqui catfish in an effort to “stimulate” reproduction and recruitment of Yaqui catfish. Subsequent monitoring efforts of this side project should be conducted as frequently as possible pre- and post-spawning to determine the level of success in adding spawning structures/substrate.

-During spring 2004, conduct comprehensive surveys (e.g., gill netting, minnow trapping, seining, and hoop netting) of all ponds containing water located on the El Coronado Ranch.

-During spring 2004, conduct a comprehensive survey of available habitat and species composition of West Turkey Creek from the lower ranch boundary upstream to Morse Canyon (Coronado National Forest).

-Because of the large number of Yaqui chub collected in Tennis Court Pond, this pond should be considered a source population if the need arises for translocation of this species into additional ranch ponds or West Turkey Creek sites, assuming of course, habitat (water) is available.

-Reintroduction of Yaqui chub and longfin dace into West Turkey Creek at site ECR-2 in early-spring 2004 should be considered if water persists at this site throughout the 2003/2004 winter. Source of fish for this reintroduction exist in Tennis Court Pond (Yaqui chub) and West Turkey Creek site ECR-3 (longfin dace).

## **LITERATURE CITED**

- Coleman, S.M. 2002. El Coronado Ranch 2000 and 2001 Fish Monitoring Report. Final Report submitted to U.S. Fish and Wildlife Service, Ecological Services, Tucson, AZ. 31pp.
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**Appendix A. El Coronado Ranch HCP fish monitoring 2003 results compared with El Coronado Ranch HCP fish monitoring in 2001/2002 (Coleman 2002). Values presented are number of fish caught. A = adult, J = juvenile. Sampling methods: ES=backpack electroshocking; DN=dip net; MT=minnow trap; GN=experimental gill net; S=seining; HN=hoop net.**

Site	Year	Sampling Method	Effort	Yaqui chub		Longfin dace		Yaqui catfish		Black crappie	
				A	J	A	J	A	J	A	J
ECR-1	2001/2002	ES	345s	0	0	0	0	-	-	-	-
	2003	ES	512s	12	7	0	0	-	-	-	-
ECR-2	2001/2002	ES	62s	0	0	4	0	-	-	-	-
	2003	ES	478s	0	0	2	0	-	-	-	-
ECR-3	2001/2002	ES	431s	0	0	0	0	-	-	-	-
	2003	ES	916s	0	0	25	109	-	-	-	-
Turkey Pen	2001/2002	ES	32s	0	0	0	0	-	-	-	-
	2003	DN	3 sweeps	0	15	0	0	-	-	-	-
Big Tank	2001/2002	GN	10h	0	0	0	0	6	0	1	100+
	2003	GN	6h	0	0	0	0	2	0	0	12
		HN	2h	0	0	0	0	0	0	0	8
		MT	6h	0	0	0	0	0	0	0	0
Tennis Court Pond	2001/2002	-	-	-	-	-	-	-	-	-	-
	2003	HN	17h	83	159	0	0	-	-	-	-
		MT	17h	275	282	0	0	-	-	-	-
Dale's Pond	2001/2002	-	-	-	-	-	-	-	-	-	-
	2003	HN	17h	1	0	0	0	-	-	-	-
		MT	17h	23	0	0	0	-	-	-	-
Upper Guesthouse Pond	2001/2002	MT	31h	0	0	0	0	-	-	-	-
	2003	S	1,010 m <sup>2</sup>	1	0	0	0	-	-	-	-
USFS-1	2001/2002	ES	642s	4	0	1	0	-	-	-	-
	2003	ES	235s	1	0	0	0	-	-	-	-
USFS-2	2001/2002	ES	116s	0	0	0	0	-	-	-	-
	2003*	-	-	-	-	-	-	-	-	-	-
USFS-3	2001/2002	ES	-	2	0	1	0	-	-	-	-
	2003	ES	274s	0	0	0	0	-	-	-	-

\*Site was not sampled in 2003 due to no water being present.