

Bonita Creek Fish Monitoring September 16-19, 2013



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BONITA CREEK FISH MONITORING
September 16 – 19, 2013

Marsh & Associates (M&A) with assistance from Bureau of Land Management (BLM) visited lower Bonita Creek, Graham Co., Arizona to sample fishes September 16-19, 2013. This monitoring is part of a long-term program initiated by BLM to evaluate relationships between populations of native and non-native fishes.

Methods. Collections were made by hoop net (0.66 m diameter, 1.2 m long, two-hoop, single throat, 0.6 cm mesh), and minnow trap (standard "Gee," 25 cm diameter, 47 cm long, double throat, 0.6 or 0.3 cm mesh; or collapsible "Promar," 0.3 m diameter, 0.6 and 0.9 m long, double throat, 1.2 cm mesh). Effort during this trip was distributed between the 1st pool downstream of 7th road crossing and the 3rd pool downstream of 2nd road crossing, the observation pool (upstream from the 14th crossing), and the beaver pond (downstream of the 14th crossing) (Figures 1 & 2).

Approximate times of deployment and retrieval for nets and minnow traps were recorded, but effort was summarized as number of overnight sets regardless of actual time fished. All species were identified and enumerated; non-native fathead minnow *Pimephales promelas*, yellow bullhead *Ameiurus natalis*, western mosquitofish *Gambusia affinis*, and green sunfish *Lepomis cyanellus*, and native Sonora sucker *Catostomus insignis*, Gila chub *Gila intermedia*, Gila topminnow *Poeciliopsis occidentalis*, and Sonora mud turtle *Kinosternon sonoriense*. Species that attain relatively larger body size (all but fathead minnow and poeciliids) were further separated into size (age) classes, age-0 for primarily young-of-year smaller than about 5 cm total length, and age-1+ for subadults and adults longer than 5 cm. All non-native fishes were removed from the stream; native species were returned near the point of capture. By-catch of aquatic invertebrates (e.g., giant waterbug *Lethocerus* sp.) and non-native bullfrog *Lithobates catesbeianus* adults and tadpoles was not quantified.

Summary of results. Total effort was 209, 209, and 33 overnight sets for Gee, Promar, and hoop nets, respectively. Total catch (all methods combined) was 825 Gila chub, 341 Sonora sucker, 59 fathead minnow, 49 green sunfish, 14 yellow bullhead, 5 western mosquitofish and 10 Sonora mud turtle. Due to a flash flood event that occurred the evening of September 16, 2013 and peaked at 1320 cfs (Figure 3) a total of 7 Gee and 14 Promar were displaced out of water. These traps along with one additional Promar that was moved by an unknown animal were removed from our catch per unit effort (CPUE) calculations because they did not fish overnight. Total catch per unit effort was 3.0 fish per net set. Catch per unit effort for combined native fish species (Sonora sucker and Gila chub) was 2.7 per net set and CPUE for targeted nonnative fish species (yellow bullhead and green sunfish) was 0.1 fish per net set. A summary of catch by age group and gear type is included in Table 5.

Narrative accounts of sampling and other activities. Beginning at 13:17 on September 16, 2013, a series of 25 Gee, 25 Promar and two hoop nets was set in the 2nd pool downstream of the 3rd road crossing. The 1st pool downstream of the 3rd road crossing was set at 14:25 with 15 Gee and 15 Promar. By

approximately 15:30 the 3rd pool downstream of the 3rd crossing was set with 25 Gee and 25 Promar. All nets and traps were cleared of fishes by 09:30 on September 17, 2013 (Table 1).

Table 1. Total catch from all nets and traps, Bonita Creek, Graham Co., Arizona, September 16-17, 2013. LECY (green sunfish); GAAF (western mosquitofish); PIPR (fathead minnow); AMNA (yellow bullhead); CAIN (Sonora sucker); GIIN (Gila chub); KISO (Sonora mud turtle).

<i>Site (Pool)</i>	<i>Total Catch Per Species</i>					
	LECY	GAAF	PIPR	AMNA	CAIN	GIIN
2 nd Pool downstream 3 rd	9	1	2	2	5	26
1 st Pool downstream 3 rd	0	0	0	3	2	8
3 rd Pool downstream 3 rd	12	0	4	4	4	12
Total	21	1	6	9	11	46

At 14:30 on September 17, 2013, 25 Gee, 25 Promar, and two hoop nets were set in the 1st pool downstream of the 7th road crossing. By 15:30, a series of pools upstream of the 6th road crossing were set with 15 Gee and 15 Promar. All nets and traps were cleared of fishes by 08:30 on September 18, 2013 (Table 2).

Table 2. Total catch from all nets and traps, Bonita Creek, Graham Co., Arizona, September 17-18, 2013. See Table 1 for abbreviations.

<i>Site (Pool)</i>	<i>Total Catch Per Species</i>				
	LECY	PIPR	CAIN	GIIN	KISO
1st Pool downstream 7 th	13	1	114	159	2
Pools and Glides upstream 6 th	0	4	44	84	0
Total	13	5	158	243	2

Beginning at 08:30 on September 18, 2013, 24 Gee, 24 Promar, and two hoop nets were set at the 1st pool downstream of the 7th road crossing. The 1st pool downstream of the 6th crossing was set with 25 Gee and 25 Promar by approximately 10:00. By approximately 10:20, 10 Gee and 10 Promar were set at the 2nd pool downstream of the 6th road crossing. The pool and glide upstream of the 5th road crossing were set with 10 Gee and 10 Promar at 10:45. Then, at the observation pool there were 10 Gee and 10 Promar set at 12:50. At 13:30, 25 Gee, 25 Promar and two hoop nets were set at the beaver pond. At 14:30 two hoop nets were set at the 3rd pool downstream of the 3rd road crossing. The last pool set for the day was the 1st pool upstream of the 4th road crossing with two hoop nets at approximately 15:00. All traps and nets were removed from the creek on Friday, September 6, 2013 by 10:30 (Table 3).

Table 3. Total catch from all nets, Bonita Creek, Graham Co., Arizona, September 18-19, 2013. See Table 1 for abbreviations.

Site (Pool)	Total Catch Per Species						
	LECY	GAAF	PIPR	AMNA	CAIN	GIIN	KISO
1 st Pool downstream 7 th	4	2	2	0	44	142	1
1 st Pool downstream 6 th	4	0	18	1	11	54	2
2 nd Pool downstream 6 th	0	0	6	0	11	33	0
Pool and Glide upstream 5 th	1	1	5	0	6	57	0
Observation Pool	0	0	12	0	26	80	0
Beaver Pond	0	1	5	4	69	135	4
3 rd Pool downstream 3 rd	2	0	0	0	1	7	0
1 st Pool upstream 4 th	4	0	0	0	4	28	1
Total	15	4	48	5	172	536	8

Three-year data summary. Total Gee and Promar minnow trap and hoop net data were summarized for each of the two most abundant non-native (yellow bullhead and green sunfish) and native (Gila chub and Sonora sucker) fish species for each year (2011-2013) in three capture zones in Bonita Creek (Table 4). Zones, down- to upstream, were (1) fish barrier to 5th road crossing; (2) 5th to 10th road crossings; and (3) 10th to 15th road crossings (see Figs 1 & 2). Yellow bullhead catch generally increased while green sunfish catch decreased over the period. Our sampling strategy effectively depleted green sunfish in the upper reaches but to date has been relatively less effective on yellow bullhead. Changes across years in catch of native fishes is equivocal except in Zone 2 where both Gila chub and Sonora sucker catch increased year-to-year. This may be due in part to the initial high density of large green sunfish in this zone and subsequent substantial depletion there of this species in subsequent years. We believe these results generally support the efficacy of mechanical removal at least of green sunfish to the benefit of native fishes in Bonita Creek.

Recommendations. During the final sampling trip for 2013, catch of target non-native species (green sunfish and yellow bullhead) was less than catch of the two most common native species (Gila chub and Sonora sucker) by more than an order of magnitude. This result reverses the situation from the previous trip in early September, which suggested non-natives were more abundant than natives. However, these data sets are not directly relatable because different sites were sampled on different trips. Efforts during the first sampling trip were focused on pools between the 2nd and 3rd road crossings, while efforts during the most recent trip were directed more toward upstream reaches. Smaller catch of non-native species in those upper reaches suggests that sampling efforts over the past few years have been effective there in keeping non-native species numbers manageable. As the focus shifts downstream, we expect recruitment and numbers of non-native species will be reduced significantly in the lower reaches as well.

Table 4. Three-year catch per unit effort (number of fish per overnight trap set) data summary for the most abundant non-native and native (*) species in three zones of Bonita Creek, Graham Co. Arizona, 2011-2013. NA indicates no quantitative data are available. Effort and catch from minnow traps and hoop nets are combined.

Species	2011	2012	2013
Zone 1 - Barrier to 5th road crossing			
Yellow bullhead	NA	0.03	0.38
Green sunfish	1.74	0.23	0.64
Gila chub*	0.05	0.53	0.24
Sonora sucker*	0.05	0.21	0.07
Zone 2 - 5th road crossing to 10th road crossing			
Yellow bullhead	NA	0.01	0.35
Green sunfish	4.17	1.91	0.38
Gila chub*	0.63	0.71	2.19
Sonora sucker*	0.45	0.79	0.98
Zone 3 - 10th road crossing to 15th road crossing			
Yellow bullhead	NA	0.08	0.14
Green sunfish	NA	0.89	0.06
Gila chub*	NA	1.23	1.66
Sonora sucker*	NA	1.01	0.87

We recommend that effort be restricted at any given location to no more than three consecutive nights so as to not overly impact resident native fishes by repeated sampling. For the same reason, care should be taken to avoid temporal overlap in areas sampled by different entities (i.e., BLM and M&A). Small pools, runs, stagnant ponded areas, and isolated off-channel pools should not be overlooked because data indicate these habitats have potential to hold a great number of invasive fish. However, nets set in any stagnant or off-channel ponds should be checked regularly (i.e., every 2-4 hours) to limit fish mortality due to low dissolved oxygen levels.

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Table 5. Catch (number) by species and age in three gear types set in pools in Bonita Creek, Graham Co., Arizona, September 16-19, 2013.

Gear Type	Sonora sucker		Gila chub		Yellow bullhead		Green sunfish		Fathead minnow	Western mosquitofish	Sonora mud turtle
	0	1+	0	1+	0	1+	0	1+			
Hoop	1	15	15	98	1	0	1	12	2	0	1
Gee	10	5	142	214	0	0	10	8	56	5	0
Promar	28	282	75	281	5	8	5	13	1	0	9
Total	39	302	232	593	6	8	16	33	59	5	10

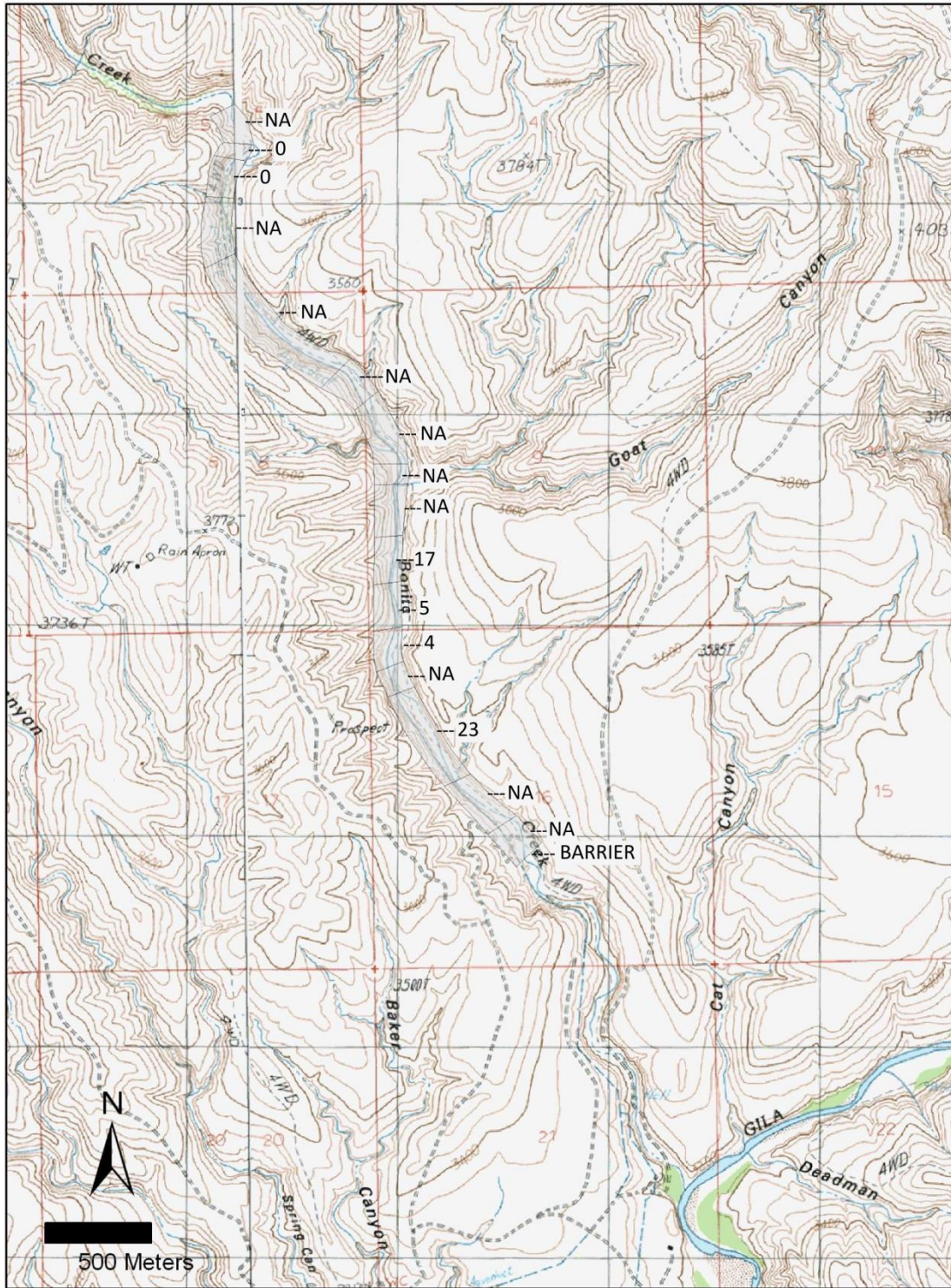


Figure 1. Green sunfish captures for Bonita Creek, Graham Co., Arizona, sampling September 16-19, 2013. Totals were divided among stream reaches bounded by road crossings between the fish barrier (BARRIER) and the known upper extent of green sunfish occupancy. Reaches without sampling effort are labeled 'NA.'

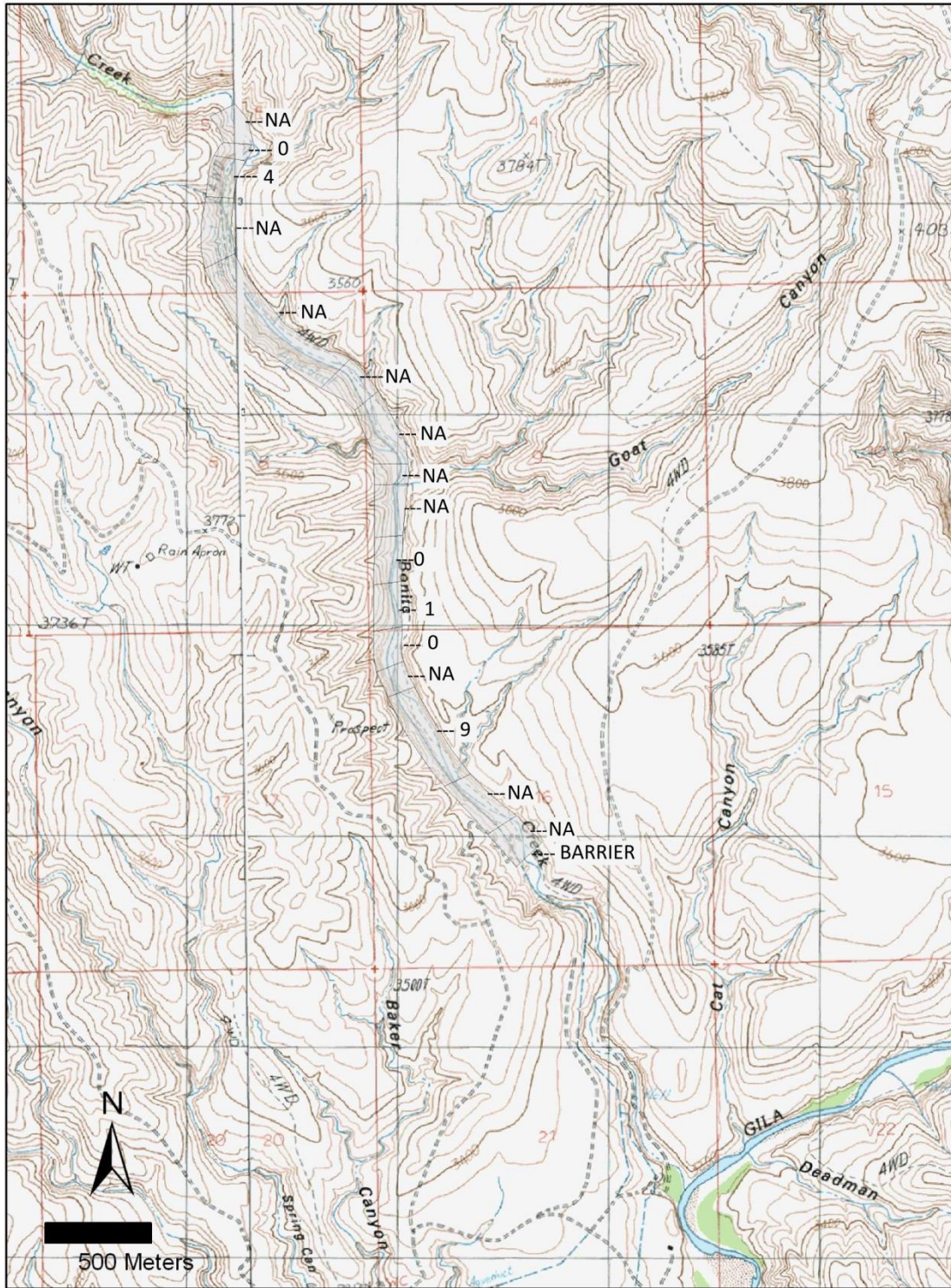


Figure 2. Yellow bullhead captures for Bonita Creek, Graham Co., Arizona, sampling September 16-19, 2013. Totals were divided among stream reaches bounded by road crossings between the fish barrier (BARRIER) and the known upper extent of green sunfish occupancy. Reaches without sampling effort are labeled 'NA.'



USGS 09447800 BONITA CREEK NEAR MORENCI, AZ.

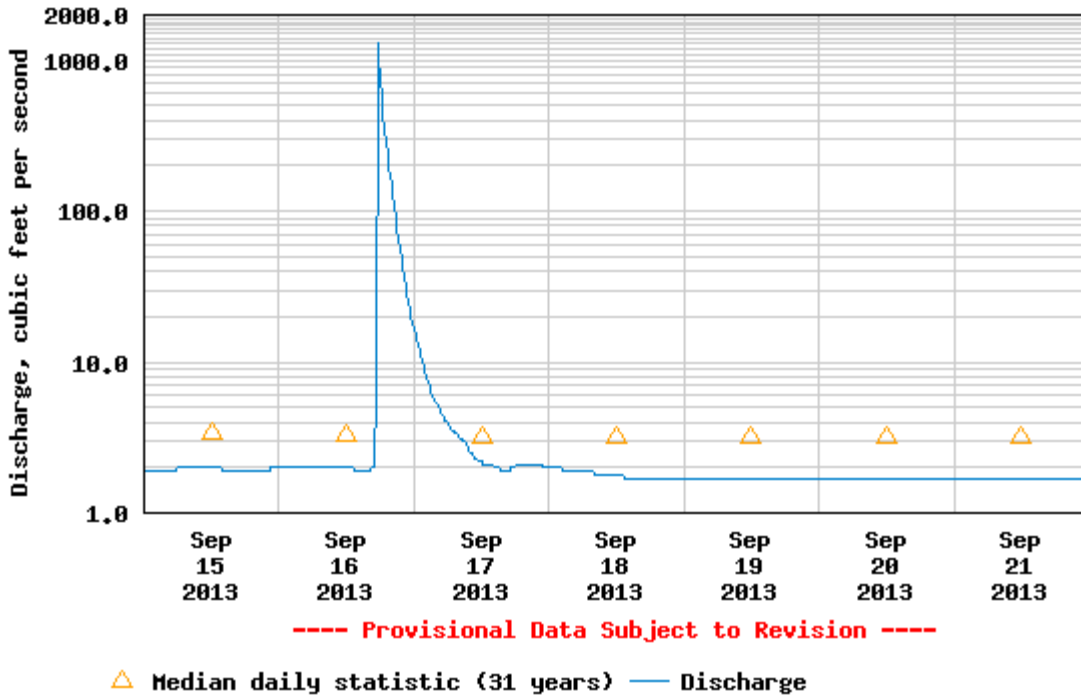


Figure 3. Discharge in Bonita Creek, Graham Co., Arizona for the period September 15-21, 2013. Peak discharge on September 16 was 1320 cfs. USGS (2013) accessed September 24, 2013: http://waterdata.usgs.gov/az/nwis/uv?cb_00060=on&format=gif_default&period=&begin_date=2013-09-15&end_date=2013-09-21&site_no=09447800