

CENTRAL ARIZONA PROJECT FISH MONITORING

FINAL

**SUMMARY OF SAMPLE YEAR 2001 FISH SURVEYS IN BEHALF OF A
LONG-TERM MONITORING PLAN FOR FISH POPULATIONS IN
SELECTED WATERS OF THE GILA RIVER BASIN, ARIZONA**

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Robert W. Clarkson
U.S. Bureau of Reclamation
Lower Colorado Region
Phoenix Area Office
P.O. Box 81169
Phoenix, Arizona 85069-1169

Submitted by

Paul C. Marsh
Chandler, Arizona 85224

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This report summarizes fish sampling by Arizona Game and Fish Department (AZGFD), Arizona State University (ASU) and U.S. Bureau of Reclamation (USBR) in behalf of a long-term monitoring program for fish populations in selected waters of the Gila River basin, Arizona, during sample year (SY) 2001 (period September 17, 2001 to January 24, 2002). Protocols implemented during this monitoring are detailed by Clarkson 1996 a-c.

Waters (stations) sampled during this monitoring were (1) San Pedro River (SanP) downstream from the U.S. and Mexico international boundary, (2) Gila River between Coolidge Dam and Ashurst-Hayden Diversion, (3) Salt River between Stewart Mountain Dam and Granite Reef Diversion, (4) Central Arizona Project (CAP) Canal at selected pump plants, (5) Salt River Project (SRP) Arizona (North) Canal (SRPn), and (6) Florence-Casa Grande (FCG) Canal (Table 1).

Comparisons are not made herein with monitoring data acquired during prior years as reported by Clarkson (1998) and Marsh (1999, 2004), or to earlier years (e.g., Marsh and Minckley 1982, Mueller 1996). The reader is referred to those documents for comparisons with prior years.

MONITORING OVERVIEW

A total of 26 taxa (excluding *Lepomis* hybrids but including undifferentiated cichlids) was captured during SY 2001 monitoring. Eight were taken in Salt River, nine in FCG Canal, 10 each in San Pedro River and CAP Canal, 11 in Gila River, and 16 in SRPn (Table 2). Three native species (12% of total taxa) were collected: longfin dace, Sonora sucker, and desert sucker. No stream contained all three, none was in CAP Canal, and 1 or 2 natives were encountered in other waters. No roundtail chub were collected although the species is known to persist in several streams monitored under the CAP program. The remaining 23 taxa were non-native, which among stations numbered between seven (Salt River) and 14 (SRPn). Natives comprised 13 to 20% of all species among stations, except in the CAP Canal where there were none.

Total number of fish varied widely among stations (Table 3), a reflection of differences in sampling effort and gear type as well as fish abundance and availability. Canal samples were not strictly comparable since those from SRPn and FCG were opportunistic and qualitative (except for samples above the electrical fish barriers on the SRP canals, which represented near-complete censuses). Native fishes overall accounted for 19.7% of 6,119 individuals captured at all Gila River basin stations during the sample year (Table 3). Proportion that native fishes comprised of total catch ranged from 0 (CAP Canal) to 75.2% (SRPn overall). San Pedro, Gila, and Salt rivers were 47.8, 2.3 and 8.3% natives, respectively, and FCG canal samples overall were 0.1% natives. SRPn and FCG samples were 5.2 and 0.3% native fishes above the electric fish barriers, respectively, and 67.7 and 0% natives below those structures (Table 3).

Community structure differed substantially among stations (Table 3). Native longfin dace was the most abundant species in combined samples from the San Pedro River (followed by mosquitofish and native desert sucker), and non-native red shiner predominated the Gila

River catch (followed by green sunfish and mosquitofish). Largemouth bass, carp, and green sunfish were the predominant species among relatively small samples from the Salt River. Redear sunfish, bluegill, and undetermined or hybrid *Lepomis* were the most abundant fishes in the CAP Canal, channel catfish (above the barrier) and Sonora sucker (below the barrier) predominated in SRPn, and mosquitofish (above and below the barrier) followed by carp (above) or channel catfish (below) were the most abundant species in FCG (Table 3).

Yellow perch from the Salt River Project North (Arizona) Canal represents the first record of this species for any CAP monitoring program station. The species occurs upstream in the Salt River reservoirs where has been stocked by AZGFD, and its presence in the SRP canal system is not remarkable. Largemouth bass is recorded for the first time from the San Pedro River at Hereford (station 1-1-1). The species is known from other sites along that stream, and is ubiquitous statewide as a result of widespread stocking and natural dispersal.

SAN PEDRO RIVER

Sampling Notes and Deviations from Protocol – Sampling was performed between 03 and 24 October 2001 (Table 1). Eight of 9 stations were sampled: station 1-2-3 (Gage Station) was not sampled. Backpack electrofishing used at all sites, augmented by seining at the three upper (reach 1) stations.

Species Richness and Distribution – Ten species were captured in the San Pedro River (Tables 4 and 5A). Seven were taken in the upper reach, five in the middle, and nine in the lower. Two natives were encountered (longfin dace and desert sucker), comprising one-fifth of total species. Longfin dace were found at all eight stations and had the broadest representation of any species, and desert sucker was at two stations, one in the upper and one in the lower reach.

Five non-natives were in the upper reach, four in the middle, and seven in the lower. Largemouth bass was only in the upper reach and carp, red shiner, and yellow bullhead were only in the lower. Fathead minnow, green sunfish, black bullhead, and mosquitofish were distributed among all reaches. Capture of largemouth bass at Hereford (station 1-1-1) represents the first record of the species at this stream/reach/station.

Assemblage Structure – Total catch from the San Pedro River was 2,070 individuals. Non-natives slightly outnumbered natives overall (52.2% of catch), and at middle and lower (but not upper) reaches (Tables 3 and 5A). Native longfin dace was the most abundant fish species overall (41% of total numbers), and in the lower reach (Table 5A). Desert sucker comprised slightly more than 6% of the overall catch and was the predominant species in the upper reach. Sonora sucker was not encountered.

Mosquitofish was the most abundant non-native and the second-most abundant species overall, making up 40% of the catch. Carp, red shiner, fathead minnow, green sunfish, and

yellow bullhead each contributed about 1% of total numbers, and largemouth bass and black bullhead each was less than 1% of the total.

GILA RIVER

Sampling Notes and Deviations from Protocol – Sampling was performed between 07 and 15 November 2001 (Table 1). Eleven stations were sampled. Backpack electrofishing was used at all sites, augmented by boat-mounted electrofishing (upper reach and station 2-2-1), seining (stations 2-2-2 and 2-2-3) and trammel netting in the upper-middle reach.

Species Richness and Distribution – Eighteen species (excluding undetermined *Lepomis* and hybrids) were captured in the Gila River (Tables 4 and 5B). Nine were taken in each of the upper two reaches, ten were in the lower-middle middle reach, and seven in the lower. Two natives were encountered (longfin dace and Sonora sucker), comprising slightly more than one-sixth of total species. Sonora suckers were found at six stations among all reaches, while longfin dace was only at one station in the lower-middle reach.

Eight non-native species were in each of the upper and two middle reaches, and six were taken from the lowermost reach. Red shiner was found at all stations, while carp, green sunfish, yellow bullhead, channel catfish, and mosquitofish were taken from all reaches but not all stations. Fathead minnow was at only one station in the lower-middle reach, largemouth bass was in upper and the two middle reaches, and flathead catfish was found at the upper and upper-middle reaches (Table 5B).

Assemblage Structure –The two native species combined comprised 2.4 percent of total catch of 2,269 individuals from the Gila River (Table 3). Longfin dace was represented by 26 specimens from the upper station of reach two, and 28 individual Sonora suckers were distributed among one or two stations in each reach. Neither native fish was abundant at any site; indeed both are characterized as uncommon.

Non-native red shiner was by far the most abundant species overall (71% of total catch) and predominated in the upper reach (followed by green sunfish) and upper-middle reach (followed by mosquitofish). It was the second most abundant fish the lower reach, where green sunfish was predominant. Mosquitofish was the most abundant species in the lower-middle reach, followed by yellow bullhead and red shiner. Carp, fathead minnow largemouth bass undetermined and hybrid *Lepomis*, channel catfish, and flathead catfish each contributed at most 2% to total catch, and were variously common, uncommon, or rare at stations where each was encountered.

SALT RIVER

Sampling Notes and Deviations from Protocol – Sampling was performed on 16 and 17 January 2002 (Table 1). Two of three stations were sampled; no collections were made at Blue Point RS. Boat-mounted electrofishing and trammel netting were used to sample fish.

Species Richness and Distribution – Eight fish species were taken from the Salt River; four were at the upper and seven at the lower station (Table 4). One (18%) the species was native (Sonora sucker) and seven were non-native. Only non-native carp, largemouth bass, and bluegill were at both stations; green sunfish was only at the upper station, and Sonora sucker, black crappie, rainbow trout and yellow bass were only at the lower station (Table 5C).

Assemblage Structure – Total catch from the Salt River was 84 individuals. Native fishes (Sonora sucker) comprised 8.3% of the total catch (Tables 3 and 5C) and ranked fourth in overall abundance. No roundtail chub, longfin dace, desert sucker, or hybrid sucker (*Catostomus insignis* x *Pantosteus clarki*) were encountered.

Largemouth bass was the most abundant species overall (32% of total catch) and the most abundant fish at the upper station, followed by carp and bluegill. Other non-native fishes each contributed less than 4% to total numbers: three green sunfish, one each black crappie and rainbow trout, and two yellow bass; all considered rare.

CENTRAL ARIZONA PROJECT CANAL

Sampling Notes and Deviations from Protocol – Sampling was performed upstream from Phoenix between 17 and 19 September 2001, and downstream from Phoenix between 26 and 28 November 2001 (Table 1). Station 4-2-1 (Salt-Gila) was not sampled. A variety of gears were consistently applied at all stations (hoop netting, trammel netting, minnow trapping [except at station 4-1-3; Hassayampa], electric seine, and trot lining), augmented with spin-cast angling at Station 4-3-3 (San Xavier). Boat-mounted electrofishing was not conducted at any of the CAP Canal stations during SY 2001.

Species Richness and Distribution – Ten taxa (exclusive of undetermined or hybrid *Lepomis*), all non-native, were captured from the CAP Canal. No new species were detected. Six were in the upper and nine from the lower reach (Tables 4 and 5D). Goldfish, bluegill, undetermined or hybrid *Lepomis*, and redear sunfish were absent from the upper reach, and red shiner was not taken in the lower reach. Other taxa were found in both reaches. No species was found at all stations.

Assemblage Structure – Total catch from the CAP Canal was 131 individuals. Centrarchids were predominant among samples (Table 5D). Redear sunfish was the most abundant overall (23% of total numbers), followed by bluegill (19%), and undetermined or hybrid *Lepomis* and channel catfish (14% each). Grass carp was 8%, largemouth bass 7%, and carp and green sunfish each 5% of total catch. Other species, goldfish, red shiner, and striped bass each contributed less than 3% to total numbers.

Channel catfish was the predominant fish in the upper reach, followed by grass carp. (Table 5D). Redear sunfish predominated in the lower reach, followed by bluegill, undetermined or hybrid *Lepomis*, and channel catfish. Channel catfish predominated at Bouse, undetermined or hybrid *Lepomis* at Little Harquahala, and grass carp at Hassayampa.

Largemouth bass (2 individuals) was the most abundant species at Brady, redear sunfish (7 specimens) was the most abundant fish at Red Rock, and bluegill predominated at San Xavier (Table 5D).

SRP NORTH (ARIZONA) CANAL

Sampling Notes and Deviations from Protocol – Sampling was performed on 14 and 24 January 2002 (Table 1). Four stations were sampled during routine monitoring: one above the electrical fish barrier at Granite Reef Dam, one immediately (0.5 km) below the barrier, one at Evergreen Drain (3.0 km), and one in the reach extending from Indian Bend Wash (km 14.7) upstream to the 101-Pima freeway overpass. The above barrier site was sampled with a bag seine after partial drainage, and the other samples were accomplished using seines, back-back electrofishing, and boat-mounted electrofisher.

Species Richness and Distribution – Sixteen species including undetermined (primarily young of year) cichlids, were captured from the SRPn Canal (Tables 2 and 4). Capture of yellow perch *Perca flavescens* (Percidae) represents a first record for this canal and for any CAP Monitoring stream. Two native species, desert sucker and Sonora sucker, were encountered. The canal was subdivided for into two reaches: “above” (one station) and “below” (three stations) the electrical fish barrier (Tables 5E), although these reaches were not designated in the monitoring protocol (Clarkson 1996a). Fifteen species were taken above the electric fish barrier and 11 were collected from downstream canal reaches. Red shiner, and threadfin shad were encountered below but not above the barrier, while smallmouth bass, black crappie, walleye, undetermined and hybrid Cichlids, and yellow bass were taken above but not below.

Below the fish barrier, four species (two native) were taken from the upper station, four (all non-native) from the middle station, and nine (two native) were from the lower (Table 4). Red shiner was at all three stations, largemouth bass was at the lower two, and channel catfish was at the upper two stations. Grass carp, carp, rainbow trout, and threadfin shad were only at the lower station, and flathead catfish was found only at the middle station.

Assemblage Structure – Native fishes collectively comprised 24.8 % of 622 total individuals taken from the SRPn Canal (Table 3). Desert sucker was 3% and Sonora sucker was 22% of the overall catch. Relative abundances of the two native suckers almost certainly were gross underestimates, as collectors tend to capture sub-samples of up to a few hundred individuals rather than all of the obviously large aggregations that are encountered throughout the canal. Roundtail chub was not encountered in SRPn during SY 2001.

Non-native channel catfish was the most abundant species overall (50% of total numbers), followed by Sonora sucker (22%), flathead catfish (5%), and red shiner and largemouth bass (4% each). Other species each contributed at less than 2% to the total numbers.

Ictalurid catfishes were overwhelmingly predominant above the electric fish barrier (74% of total fishes) but uncommon (4%) below (Table 5E). Next in order came flathead catfish,

largemouth bass, and Sonora sucker. Other species were uncommon-to-rare.

Below the fish barrier, native Sonora sucker was the most abundant fish overall (62%) and was predominant at the upper and lower stations. Desert sucker was the second most abundant species at the upper station, while carp was the most common species at the middle station and the second most abundant fish at the lower station.

SRP SOUTH CANAL

Sampling Notes and Deviations from Protocol – No fish sampling was conducted in SRPs during SY 2001 because no canal outage occurred during the period, and techniques to make safe and efficient collections at nominal flows have not been developed.

FLORENCE-CASA GRANDE CANAL

Sampling Notes and Deviations from Protocol – Sampling was performed on 28 October 2001 (Table 1). Four stations were sampled during routine monitoring. Three were above the electrical fish barrier at China Wash: one immediately below the canal headworks at Ashurst-Hayden Diversion Dam, and two others at 0.5 and 2.3 km downstream. The lowermost station was 2.6 km downstream from the diversion dam and immediately below the China Wash fish barrier. Sites further downstream (e.g., turnout at 14.5 km, Pima Lateral [15.2 km], Pima Lateral Turnout [15.3 km], and Pima Lateral Feeder Canal [15.3 km]) were desiccated and devoid of fish. The above barrier sites were sampled with seines or a backpack electrofisher, and the below China Wash station was sampled with a backpack electrofisher.

Species Richness and Distribution – Nine species including one native were taken from the Florence-Casa Grande Canal (Tables 2 and 4). Native Sonora sucker and non-native flathead catfish were found only above the electric fish barrier at China Wash, while green sunfish and threadfin shad occurred only below the barrier. Other fishes, all non-natives, were found both above and below the barrier.

Assemblage Structure – Native species were represented only by a single Sonora sucker, which comprised about 0.1% of 943 total specimens from the FCG Canal (Table 3). With this exception the entire catch was non-native fishes.

Among non-natives, mosquitofish was the predominant species above (50%) and below (50%) the electrical fish barrier, and overall (Table 5G, 50% of catch). Next in abundance were channel catfish (27%), red shiner and carp (each 9%), and black bullhead (6%). Yellow bullhead was represented by five individuals, and green sunfish and threadfin shad by one specimen each.

RECOMMENDATIONS

Continue to work toward improved communication between canal operators (SRP, SCID)

and those performing fish monitoring activities so that sampling can coincide with scheduled outages.

Explore potentials for development and implementation of safe, efficient techniques for sampling fishes from SRP canals during periods of nominal flow. Examples that could be considered include angling, boat-mounted electrofishing, drift netting, hoop netting, and minnow trapping.

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TABLE 1. Station, date, gear type, and lead entity for sampling activities conducted in behalf a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, for sample year 2001 (period September 17, 2001 to January 24, 2002). Stations are identified by 3-digit numeric codes that respectively indicate stream name, reach name, (1-up to 4-down-stream), and station name (1-3 for upper, middle, and lower) (see Clarkson 1996 a-c). Where station location and name have changed from Clarkson 1996 a-c, the corrected (new) name is given. Dates are given as month (01-12) day (01-31) and year (00 or 01). Abbreviations as follow: Stations: SRP = Salt River Project, FCG = Florence-Casa Grande Canal, and CAP = Central Arizona Project Canal; Gears: A = angling, Bp = backpack electrofisher, Es = electric seine, d = dip net, Ef = boat-mounted electrofisher, Tb = tote-barge mounted electrofisher, G = gill net, H = hoop net, M = minnow trap, S = seine, Sc = spin-cast, T = trammel net, and TI = trot line; and Lead: AZGFD = Arizona Game and Fish Department, ASU = Arizona State University, and BR = U.S. Bureau of Reclamation. CAP stations all are associated with pumping plants, which are named for each station, while FCG and SRP stations are given as approximate miles downstream from canal origin and/or a verbal location description.

Station	Date	Gear	Lead
San Pedro River			
1-1-1 Hereford	10 03 01	S, Bp	AZGFD
1-1-2 Lewis Springs	10 03 01	S, Bp	AZGFD
1-1-3 Charleston	10 03 01	S, Bp	AZGFD
1-2-1 Hughes Ranch	10 23 01	Bp	AZGFD
1-2-2 Soza Ranch	10 23 01	Bp	AZGFD
1-3-1 Aravaipa Creek	10 24 01	Bp	AZGFD
1-3-2 Swingle Wash	10 24 01	Bp	AZGFD
1-3-3 Mouth	10 24 01	Bp	AZGFD
Gila River			
2-1-1 Coolidge Dam	11 07 01	Bp, Ef	AZGFD
2-1-3 Hook & Line Ranch	11 07 01	Bp, Ef	AZGFD
2-2-1 Dripping Springs Wash	11 08 01	Bp, Ef, T	AZGFD
2-2-2 Christmas	11 08 01	Bp, S, T	AZGFD
2-2-3 O'Carrol Canyon	11 08 01	Bp, S, T	AZGFD
2-3-1 San Pedro River	11 14 01	Bp	AZGFD
2-3-2 Kearny	11 14 01	Bp	AZGFD
2-3-3 Kelvin	11 15 01	Bp	AZGFD
2-4-1 A-Diamond Ranch	11 15 01	Bp	AZGFD
2-4-2 Cochran	11 15 01	Bp	AZGFD
2-4-3 Box-O Wash	11 14 00	Bp	AZGFD

Table 1. Concluded.

Salt River

3-1-1	Stewart Mountain Dam	01 16 02	Ef, T	AZGFD
3-2-1	Blue Point RS	not sampled		
3-1-3	Granite Reef Dam	01 17 02	Ef, T	AZGFD

CAP Pumping Plants

4-1-1	Bouse	09 17 01	T, H, M, TI, Es	BR
4-1-2	Little Harquahala	09 18 01	T, H, M, TI, Es	BR
4-1-3	Hassayampa	09 19 01	T, H, TI, Es	BR
4-2-1	Salt-Gila	not sampled		
4-3-1	Brady	11 26 01	T, H, M, TI, Es	BR
4-3-2	Red Rock	11 27 01	T, H, M, TI, Es	BR
4-3-3	San Xavier	11 28 01	T, H, M, TI, Sc, Es	BR

SRP South Canal not sampled

SRP North (Arizona) Canal

6	0.0 Above fish barrier	01 14 02	S	AZGFD
	0.5 Below fish barrier	01 14 02	S	ASU
	3.0 Below fish barrier	01 14 02	Bp	ASU
	14.7 Indian Bend Wash	01 24 02	Ef	ASU

Florence-Casa Grande Canal

7	0.0 Below diversion dam	10 28 01	Bp	ASU
	0.5 above China Wash	10 28 01	S	ASU
	2.3 above China Wash	10 28 01	Bp	ASU
	2.6 below China Wash	10 28 01	Bp	ASU

TABLE 2. Common names and four letter codes for fish species captured during sampling activities conducted in behalf a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, during sample year 2001 (period September 17, 2001 to January 24, 2002). Native fishes indicated by asterisks. Abbreviations as in Clarkson 1996 a, but also see notes below. Numbers in parentheses refer to notes (1) through (5), which appear at the conclusion of the table.

Species		SanP	Gila	Salt	CAP	SRPn	FCG	All sites	
Fathead minnow	PIPR	X	X	0	0	0	0	X	
Goldfish	CAAU	0	0	0	X	0	0	X	
*Longfin dace	AGCH	X	X	0	0	0	0	X	
Grass carp	CTID	0	0	0	X	X	0	X	
Carp	CYCA	X	X	X	X	X	X	X	
Red shiner	CYLU	X	X	0	X	X	X	X	
*Sonora sucker	CAIN	0	X	X	0	X	X	X	
*Desert sucker	PACL	X	0	0	0	X	0	X	
Smallmouth bass	MIDO	0	0	0	0	X	0	X	
Largemouth bass	MISA	X	X	X	X	X	0	X	
Bluegill	LEMA	0	0	X	X	0	X	X	
Green sunfish	LECY	X	X	X	X	0	X	X	
Redear sunfish	LEMI	0	0	0	X	0	0	X	
Undetermined or hybrid sunfish (1)	LEPO	0	X	0	X	0	0	X	
Black crappie	PONI	0	0	X	0	X	0	X	
Black bullhead	AMME	X	0	0	0	0	X	X	
Yellow bullhead	AMNA	X	X	0	0	0	0	X	
Channel catfish	ICPU	0	X	0	X	X	X	X	
Flathead catfish	PYOL	0	X	0	0	X	X	X	
Mosquitofish	GAAF	X	X	0	0	0	X	X	
Rainbow trout	ONMY	0	0	X	0	X	0	X	
Yellow perch (2)	PEFL	0	0	0	0	X	0	X	
Walleye (3)	SAVI		0	0	0	0	X	0	X
Threadfin shad	DOPE	0	0	0	0	X	X	X	
Undetermined Cichlid (4)	TILA	0	0	0	0	X	0	X	
Yellow bass	MOMI	0	0	X	0	X	0	X	
Striped bass	MOSA	0	0	0	X	0	0	X	

TABLE 2. Concluded.

Stream	San P	Gila	Salt	CAP	SRPn	FCG	All sites
Total species (taxa) (5)	10	11	8	10	16	9	26
Native	2	2	1	0	2	1	3
Non-native	8	9	7	9	14	8	23
Percent native	20	18	13	0	13	11	12

Notes:

1. Undetermined or hybrid sunfish may include juveniles of all species of *Lepomis* plus juvenile and adult individuals that represent crosses among the several species of *Lepomis*, which are known to hybridize freely.
2. Yellow perch *Perca flavescens* (Percidae) is recorded for the first time at a CAP Monitoring site.
3. The scientific name for Walleye has recently been revised from *Stizostedion vitreum* to *Sander vitreus* (Nelson et al. 2004). The species code has been updated to reflect this update (i.e., from STVI to SAVI).
4. Undetermined Cichlids likely includes juvenile and adult Mozambique tilapia, *Tilapia (Oreochromis) mossambica*, and blue tilapia *Tilapia (Oreochromis) aurea* and their hybrids, plus juvenile Redbelly (Zill's) tilapia, *Tilapia zilli*.
5. Total species (taxa) includes undetermined Cichlids, but excludes undetermined or hybrid sunfishes, the latter of which are assumed to be subsumed into the individual parental species.

TABLE 3. Total numbers of fishes captured during sampling in behalf a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, during sample year 2001 (period September 17, 2001 to January 24, 2002). Native fishes indicated by asterisks. Abbreviations as in Clarkson (1996 a). Ab and Bb respectively indicate Above and Below electrical fish barriers on SRPn and FCG canals.

Species	SanP	Gila	Salt	CAP	SRPn		FCG		Total
					Ab	Bb	Ab	Bb	
Fathead minnow	71	4							75
Goldfish				1					1
*Longfin dace	859	26							885
Grass carp				10	3	6			19
Carp	43	19	20	6	5	6	74	8	181
Red shiner	29	1600		4		26	47	35	1741
*Sonora sucker		28	7		13	121	1		170
*Desert sucker	131				9	11			151
Smallmouth bass					1				1
Largemouth bass	1	22	32	9	18	7			89
Bluegill			18	25					43
Green sunfish	63	217	3	6				1	290
Redear sunfish				30					30
Undet or hybrid sunfish		2		18					20
Black crappie			1			3			4
Black bullhead	43						47	5	95
Yellow bullhead	4	77							81
Channel catfish		48		18	314	7	28	222	637
Flathead catfish		17			33	1	3		54
Mosquitofish	826	209					200	271	1506
Rainbow trout			1		8	1			10
Yellow perch					1				1
Walleye					1				1
Threadfin shad						6		1	7
Undet Cichlid					10				10
Yellow bass			2		11				13
Striped bass				4					4
Total	2070	2269	84	131	427	195	400	543	6119
Total native	990	54	7	0	22	132	1	0	1206
Total nonnative	1080	2215	77	131	405	63	399	543	4913
Percent native	47.8	2.4	8.3	0.0	5.2	67.7	0.3	0.0	19.7

TABLE 4. Fish species richness determined by sampling in behalf of a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, during sample year (SY) 2001 (period September 17, 2001 to January 24, 2002). Species counts include undetermined Cichlids but exclude undetermined plus hybrid *Lepomis* (see notes accompanying Table 1). Stations are identified by 2-digit numeric codes that respectively indicate reach name, (1-up to 4-down-stream), and station name (1-3 for upper, middle, and lower) (see Clarkson 1996 a-c). Distances between stations and reaches are relative. Totals for each reach (and for all reaches) followed by number of native and non-native (n/nn) species; NS indicates station not sampled during SY 2001; dash (--) indicates the designated reach or station does not exist or was not visited on that stream/canal. Reaches along SRPn and FGC canals are artificial; canal reaches 1 are above respective electrical fish barriers and reaches 2 are below. Abbreviations as in text; see also Clarkson (1996 a-c).

Reach/Station	SanP	Gila	Salt	CAP	SRPn	SRPs	FCG
1-1	6	6	4	3	15	NS	5
1-2	5	NS	NS	3	--	--	5
1-3	5	9	7	4	--	--	5
Total	7	9	8	6	15	NS	7
n/nn	2/5	1/8	1/7	0/6	2/13	NS	1/6
2-1	5	7	--	NS	4	NS	7
2-2	3	8	--	--	4	NS	--
2-3	--	6	--	--	9	NS	--
2-4	--	--	--	--	--	NS	7
Total	5	9	--	NS	11	NS	7
n/nn	1/4	1/8	--	NS	2/9	NS	0/7
3-1	7	8	--	4	--	--	--
3-2	5	6	--	4	--	--	--
3-3	4	5	--	5	--	--	--
Total	9	10	--	9	--	--	--
n/nn	2/7	2/8	--	0/9	--	--	--
4-1	--	4	--	--	--	--	--
4-2	--	5	--	--	--	--	--
4-3	--	4	--	--	--	--	--
Total	--	7	--	--	--	--	--
n/nn	--	1/6	--	--	--	--	--
all reaches	10	11	8	10	16	NS	9
n/nn	2/8	2/9	1/7	0/10	2/14	NS	1/8
percent native	20	18	13	0	13	NS	11

TABLE 5A. Fish catch at San Pedro River stations (see TABLE 1) during sampling in behalf a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, during sample year 2001 (period September 17, 2001 to January 24, 2002). Fish species listed alphabetically using standard abbreviations per Clarkson (1996), data are total fish or number of young-of-year (age-0) followed by number of older age classes (age ≥ 1), if specified; subtotals and total number are for each age class.

	AGCH	CYCA		CYLU	PIPR	PACL		MISA		LECY		AMME		AMNA		GAAF	no spp
		0	1			0	1	0	1	0	1	0	1	0	1		
1-1-1	53	0	0	0	24	0	0	0	1	18	2	12	0	0	0	16	6
1-1-2	14	0	0	0	10	0	0	0	0	3	0	5	2	0	0	21	5
1-1-3	21	0	0	0	1	83	46	0	0	4	0	1	0	0	0		5
subtotal	88	0	0	0	35	83	46	0	1	25	2	18	2	0	0	37	7
1-2-1	403	0	0	0	2	0	0	0	0	9	4	19	2	0	0	36	5
1-2-2	285	0	0	0	33	0	0	0	0	10	3	0	0	0	0	46	3
subtotal	688	0	0	0	35	0	0	0	0	19	7	19	2	0	0	82	5
1-3-1	42	40	1	23	1	1	1	0	0	7	0	0	0	4	0	0	7
1-3-2	37	0	2	5	0	0	0	0	0	1	1	1	1	0	0	0	5
1-3-3	4	0	0	1	0	0	0	0	0	0	1	0	0	0	0	19	4
subtotal	83	40	3	29	1	1	1	0	0	8	2	1	1	4		19	9
Total	859	40	3	29	71	84	47	0	1	52	11	38	5	4	0	138	10

Notes: MISA at 1-1-1 is a new record for that stream/reach/station

TABLE 5B. Fish catch at Gila River stations (see TABLE 1) during sampling in behalf a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, during sample year 2001 (period September 17, 2001 to January 24, 2002). Fish species listed alphabetically using standard abbreviations per Clarkson (1996); data are total fish or number of young-of-year (age-0) followed by number of older age classes (age ≥ 1), if specified; subtotals and total number are for each age class.

	AGCH		CYCA		CYLU	PIPR	CAIN		MISA		LECY		LEPO		AMNA		ICPU		PYOL		GAAF	No Spp
	0	1	0	1			0	1	0	1	0	1	0	1	0	1	0	1	0	1		
2-1-1	0	0	14	22	0	0	0	0	0	0	1	16	0	0	0	1	0	0	1	6	34	6
2-1-3	0	0	0	46	0	0	2	1	1	0	29	1	1	0	2	2	2	0	4	5	5	8
subtotal	0	0	14	68	0	0	2	1	1	0	45	1	1	0	3	2	2	1	10	39	39	9
2-2-1	0	1	2	51	0	0	0	8	9	0	13	0	0	2	1	10	14	4	0	0	0	7
2-2-2	0	0	0	1289	0	0	4	0	1	0	6	0	0	2	2	0	3	1	1	95	95	8
2-2-3	0	0	0	40	0	0	5	1	0	0	5	0	0	1	3	2	1	0	0	0	0	6
subtotal	0	1	2	1380	0	0	9	9	10	0	24	0	0	5	6	12	18	5	1	95	95	9
2-3-1	26	0	0	3	4	1	7	0	0	4	0	0	0	0	3	2	0	0	0	8	8	8
2-3-2	0	0	1	5	0	0	6	0	0	0	0	0	0	7	1	6	0	0	0	19	19	6
2-3-3	0	0	0	4	0	0	0	1	0	0	0	0	0	9	2	1	0	0	0	3	3	5
subtotal	26	0	1	12	4	1	13	1	0	4	0	0	0	16	6	9	0	0	0	30	30	10
2-4-1	0	0	0	122	0	0	3	0	0	0	0	0	0	0	1	1	0	0	0	0	0	4
2-4-2	0	0	1	5	0	0	0	0	0	0	0	0	0	22	15	3	0	0	0	42	42	5
2-4-3	0	0	0	13	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	3	3	4
subtotal	0	0	1	140	0	0	3	0	0	144	0	0	0	25	16	5	0	0	0	45	45	7
Total number	26	1	18	1600	4	1	27	11	11	148	69	1	1	46	31	28	20	6	11	209	209	11

TABLE 5C. Fish catch at Salt River stations (see TABLE 1) during sampling in behalf a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, during sample year 2001 (period September 17, 2001 to January 24, 2002). Fish species listed alphabetically using standard abbreviations per Clarkson (1996), data are total fish or number of young-of-year (age-0) followed by number of older age classes (age ≥ 1), if specified; total number is for each age class.

	CYCA		CAIN		MISA		LEMA		LECY		PONI		ONMY		MOMI		No spp
	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	
3-1-1	0	19	0	0	5	15	0	1	0	3	0	0	0	0	0	0	4
3-1-2																	no sample
3-1-3	0	1	0	7	0	12	0	17	0	0	0	1	0	1	0	2	7
Total number	0	20	0	7	5	27	0	18	0	3	0	1	0	1	0	2	8

TABLE 5D. Fish catch at Central Arizona Project (CAP) canal stations (see TABLE 1) during sampling in behalf a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, during sample year 2001 (period September 17, 2001 to January 24, 2002). Fish species listed alphabetically using standard abbreviations per Clarkson (1996); data are total fish or number of young-of-year (age-0) followed by number of older age classes (age ≥ 1), if specified; subtotals and total number are for each age class.

	CAAU		CTID		CYCA		CYLU	MISA		LEMA		LECY		LEMI		LEPO		ICPU		MOSA		No spp
	0	1	0	1	0	1		0	1	0	1	0	1	0	1	0	1	0	1	0	1	
4-1-1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	8	1	0	3	3
4-1-2	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	5	0	0	2	0	0	3
4-1-3	0	0	0	7	0	4	0	0	4	0	0	0	0	0	0	0	0	0	4	0	0	4
subtotal	0	0	0	7	0	5	4	0	6	0	0	0	0	0	0	5	0	8	7	0	3	6
4-2-1	no sample																					
4-3-1	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	4
4-3-2	0	0	0	0	0	0	0	0	1	0	0	1	0	0	7	0	0	0	3	0	0	4
4-3-3	0	1	0	2	0	0	0	0	0	3	22	0	5	4	19	3	10	0	0	0	0	5
subtotal	0	1	0	3	0	1	0	2	1	3	22	1	5	4	26	3	10	0	3	1	0	9
Total	0	1	0	10	0	6	4	2	7	3	22	1	5	4	26	8	10	8	10	1	3	10

TABLE 5E. Fish catch at Salt River Project (SRP) North (Arizona) Canal stations (see TABLE 1) during sampling in behalf a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, during sample year 2001 (period September 17, 2001 to January 24, 2002). Fish species listed alphabetically using standard abbreviations per Clarkson (1996), data are total fish or number of young-of-year (age-0) followed by number of older age classes (age ≥ 1), if specified; total number is for each age class. See Table 1 for sampling dates.

	CTID		CYCA		CYLU	CAIN		PACL		MIDO		MISA		PONI		ICPU		PYOL		ONMY		PEFL		SAVI		DOPE	TILA	MOMI		No spp
	0	1	0	1		0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	
Above barrier	0	3	0	5	0	0	13	0	9	0	1	5	13	0	3	285	29	4	29	0	8	0	1	0	1	0	10	0	11	15
Below barrier																														
0.5 below dam	0	0	0	0	1	0	42	0	7	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
3.0 below dam	0	0	0	0	12	0	0	0	0	0	0	3	0	0	0	6	0	0	1	0	0	0	0	0	0	0	0	0	0	4
14.7 below dam	0	6	0	1	13	0	79	0	4	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	6	0	0	0	9
subtotal below	0	6	0	1	26	0	121	0	11	0	0	5	2	0	0	7	0	0	1	0	1	0	1	0	0	6	0	0	0	11
Total	0	9	0	6	26	0	134	0	20	0	1	10	15	0	3	292	29	4	30	0	9	0	1	0	1	6	10	0	11	16

note: PEFL represents first record of yellow perch *Perca flavescens* in SRP-N Canal, and at any CAP Monitoring site

TABLE 5F. Fish catch at Florence-Casa Grande canal stations (see TABLE 1) during sampling in behalf a long-term monitoring plan for fish populations in selected waters of the Gila River basin, Arizona, during sample year 2001 (period September 17, 2001 to January 24, 2002). Fish species listed alphabetically within families using standard abbreviations per Clarkson (1996), data are total number of fish or number of young-of-year (age-0) followed by number of older age classes (age ≥ 1), if specified; total number is for each age class. See Table 1 for sampling dates.

	CYCA		CYLU	CAIN		LECY		AMNA		ICPU		PYOL		GAAF	DOPE	No spp
	0	1		0	1	0	1	0	1	0	1	0	1			
Above barrier																
0.2 km	1	4	2	0	0	0	0	23	0	16	0	0	0	7	0	5
0.5 km	20	3	45	0	0	0	0	3	0	4	0	0	0	12	0	5
2.3 km	1	45	0	0	1	0	0	21	0	0	8	3	0	0	0	5
subtotal above	22	52	47	0	1	0	0	47	0	20	8	3	0	200	0	7
Below barrier	1	7	35	0	0	1	0	5	0	220	2	0	0	271	1	7
Total number	23	59	82	0	1	1	0	52	0	240	10	3	0	471	1	9