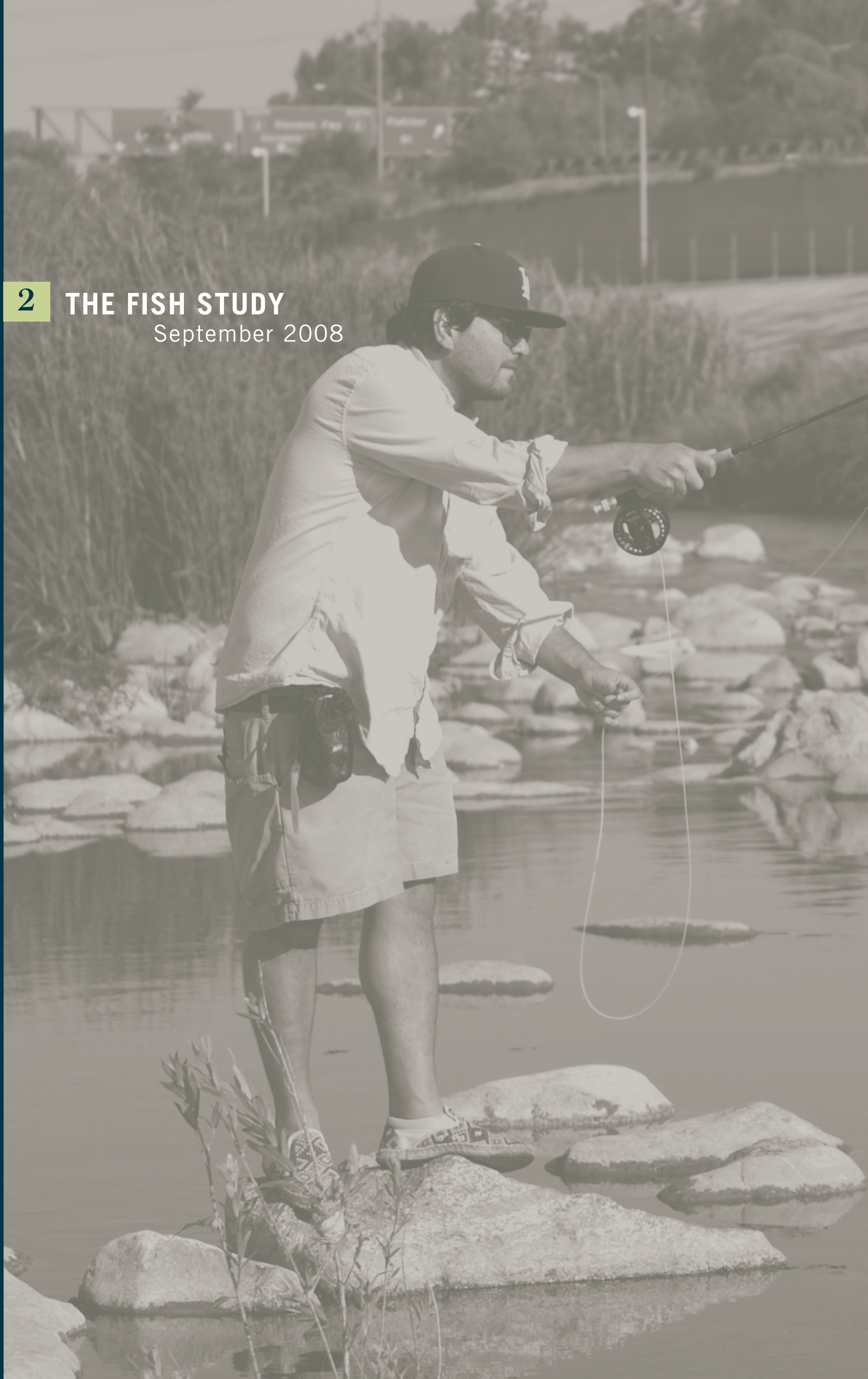
FRIENDS OF THE LOS ANGELES RIVER

STATE OF THE RIVER 2

THE FISH STUDY

September 2008



Many go fishing all their lives without knowing that it is not fish they are after.
— Henry David Thoreau

Acknowledgements

This study was funded by Supplemental Environmental Project (SEP) funds from the Los Angeles City Attorney's Office. FoLAR would like to thank the many individuals who generously gave their time and expertise to answering questions, providing information, and reviewing drafts. Special thanks go to Michelle Lyman, Environmental Justice Unit, Los Angeles City Attorney's Office; project leaders Camm Swift, Entrix, Inc. and fish biologist Dr. Sabrina Drill; Fish Forum participants Jim Edmondson, California Trout, Wendy Katagi, CDM, James Alamillo, Heal the Bay; Carmelo Gaeta for his fishing expertise and enthusiasm; Rich Gossett, CRG Laboratories; former FoLAR outreach director Joe Linton, for starting this project; Jonathan Brooks and, board members Lewis MacAdams, Alex Ward, Tammy Metzger. Printing supported by funds from the Annenberg Foundation.

Designed by Martha Crawford

Cover photo by William Preston Bowling

CONTENTS

Southern Steelhead Trout,
Oncorhynchus mykiss irideus

Family fishing in Glendale Narrows.
Photo by Peter Bennett

Atwater Village.
Photo by William Preston Bowling

Atwater Village.
Photo courtesy of Mark Lamonica

INTRODUCTION

When Pat Patterson, Roger Wong and I started Friends of the Los Angeles River in the mid-1980's, our first official act was to ignore the "No Trespassing/$500 Fine" signs and, using a pair of wire-cutters, cut a big hole in the chain-link fence that separated the River from the City; and declare the River open.

At first we saw our task as making the public argument that a healthy River was possible, even in its degraded state. We soon realized that first we had to convince people that there even was a Los Angeles River. From that point on, the sub-text of nearly everything we did, from the Great Los Angeles River CleanUp to our River Walks, to collaborations with dancers and painters and photographers and musicians and performance artists, to our River School outdoor education days, to the little kayak junkets we arranged for disbelieving journalists and politicians, was to create a constituency for the River by bringing people down to see it for themselves.

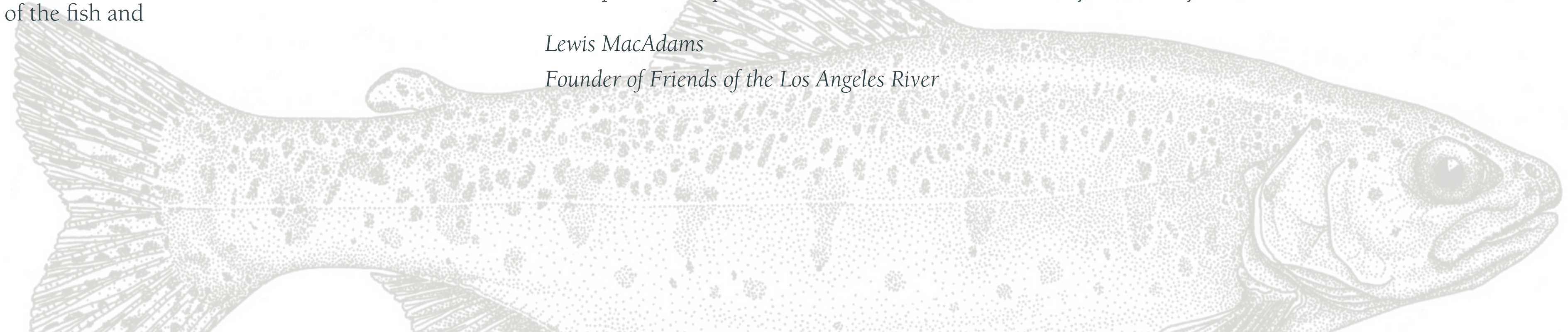
As the years went by, more and more agencies and cities and environmental groups joined FoLAR in advocating for the Los Angeles River, sponsoring planning charettes, organizing classes and sponsored studios, funding restoration plans, building smaller, then increasingly larger, local then regional River parks. But it was only FoLAR and its supporters who were and are willing to get our feet wet. We collaborated with the County Museum of Natural History on the first-ever biological inventory of the River. We published the first *State of the River* look at the River's water quality. We funded, organized and published the study you're reading right now, the first study of the fish and fishing along the Los Angeles.

In the last year or so, FoLAR's long-term goal of bringing people down to the River has begun to succeed. While the cities along the River, the County of Los Angeles, the State of California and the federal government continue to plan, people have begun to use the River in their own ways. Crewest Gallery and its friends sponsored the painting of a quarter-mile long "Meeting of Styles" mural at the confluence of the Hahamugna (the pre and post-European name for the Arroyo Seco) and the Los Angeles. Working with Jay Babcock's magazine Arthur, the band No Age produced a concert for their fans at the Sunnynook Foot Bridge in Atwater Village. This summer, a convoy of kayaks organized by George Wolfe descended the river from the headwaters in Canoga Park to the mouth of the River. There have even been a few baptisms. All of these naturally occurring events have been met with official condemnation, loitering tickets, and demands to wait for the formation of a joint powers agreement between the City and County of L.A. and the Corps of Engineers that will address recreational uses of the River.

Underscoring the habitat value of the river, in May 2008, the Glendale Narrows section was one of the field sites for Bioblitz – an annual National Geographic Society sponsored event to highlight the biodiversity found near US urban centers. The 2008 event crossed the Santa Monica Mountains, with sites from the ocean near Malibu, to the center of wildland areas in the SMM National Recreation Area, to Griffith Park and the LA River. FoLAR organized researchers, local community college students, and members of the public to come out and survey fish, invertebrates, and birds that make the LA River their home.

FoLAR hopes that The Fish Study will be an important contribution to the growing body of Los Angeles River science and scholarship. We also hope that it will encourage more people to visit the River. As FoLAR Board member James Rojas has said, the River ought to be as easily accessible as the beach or Griffith Park. Though policing, maintenance, and liability issues along the River remains a murk of poorly coordinated, if well-meaning, political agendas, bureaucratic paralysis cannot be allowed to impede scientific, educational, and recreational River use. Working with FoLAR, City Council President, Eric Garcetti is organizing a conference on River access, and we hope you will join us. In the meantime, we hope you'll be amazed by this report and inspired to become a FoLAR member. See you down by the River.

Lewis MacAdams
Founder of Friends of the Los Angeles River



STUDY OVERVIEW




PURPOSE OF STUDY

The 51 mile Los Angeles River is one of the largest sources of fresh water for the Southern California coast, flowing through an 834 sq. mile watershed. This study was aimed at surveying the current fish population in the Glendale Narrows area - an approximately eight mile stretch of natural bottom river that extends from Riverside Drive near Griffith Park to the Figueroa Bridge in Cypress Park- assessing their health, and interviewing area anglers practicing both catch-and-release and fishing for food. When funding becomes available we intend to look at the fish and fishing populations in both the Sepulveda Basin further upstream and the mouth of the River in Long Beach.



Photos Courtesy of Sabrina Drill

METHODS

Fish sampling was conducted with seines of three sizes:

- •30 X 6 foot, 3 eighths inch mesh
- •15 X 6 foot, three eighth inch mesh
- •10 X 4 foot, one eighth inch mesh

All were double weighted with a one ounce weight every six inches along the lead line. A dip net with a 16 X 12 inch opening and one eighth inch mesh with a four foot handle and Gee's minnow traps were also used. Gee's conical minnow traps are 9 inches in diameter and 17.5 inches long with square one quarter-inch galvanized wire mesh.

Generally one half to more than two hours was spent at a site directly sampling, making visual observation of fish and habitat, and occasionally obtaining fish from other anglers. Numbers of fish and other aquatic organisms were counted. Numbers were estimated in the case of large numbers or observations where individuals were not actually captured to be accurately counted and identified. Some large specimens were kept on ice for subsequent toxicity testing by CRG Laboratories in Torrance (see toxicity section). Some specimens were preserved as voucher specimens in the Section of Fishes, Natural History Museum of Los Angeles County, or for use as teaching aids in FoLAR educational programs.

General notes on habitat conditions were taken during the sampling and water temperature was measured one or a few times with a hand held thermometer. All fishes recorded were from visual observations and seine and dip net hauls in the River. Four traps baited with fish-flavored canned cat food were set for a couple of hours during the first sampling at the Newell Site. They captured no fish and were not utilized again.

DESCRIPTION OF THE AREA

We sampled on four occasions both before and after significant rainfall events in the late summer and fall of 2007. August sampling was before an unusually strong rainstorm in mid-September that greatly raised the River level and undoubtedly disrupted the aquatic community that usually develops during the low flow periods, typically from about April to November. During the low flow periods, the flow in the River is primarily from wastewater treatment plant outflows from both the Sepulveda Basin and Glendale Narrows areas.

The Los Angeles River is made up of nine distinct channel reaches that vary in geometry, width and stream flow. In the area of this study channel geometry changes several times and flow velocities range from 15-20 feet per second to up to 30 feet per second during storm events. Because of the extensive urban and suburban impervious surfaces, these peaks are much steeper and shorter than in more natural systems where infiltration and slowing of runoff lead to less rapid increases in flow known as “flashiness” as well as much longer trailing off of the decline in flows after the peak. The wetted channel is 60-100 meters wide with water depths to about two meters. The substrate is about 80% boulders, large rocks, and cobble, the remianing 20% is gravel and sand. Muddy substrate was restricted to a few backwater areas and close to shore at the base of vegetation. Small to large islands are common, and one side or the other often has sandy or rocky bars that provide terrestrial riparian habitat as well as a naturalized vegetated shoreline to the wetted channel. During major storm runoff, these islands were all low enough to be submerged for a period of time. Thus, during these brief high flows, only the sloping concrete bank provides shoreline.

The water was relatively clear with visibility to one meter or more and water temperatures ranged from 19 to 29°C. in August, September, and early October with the lower temperatures early in the day or later in the year. The November water temperatures were 14 to 15° C. (Table 1, pages11&12). Water was warmest in the afternoon at the downstream end of long concrete sections (Riverside site) where the shallow water flowed over concrete for miles in direct sunlight. The turbidity can increase greatly during high flows and visibility is much reduced.

AREA OF STUDY: GLENDALE NARROWS

Riverside Site

Glendale Site

Newell Site

Figueroa Site

Photos courtesy of Sabrina Drill

RIVERSIDE SITE: THIS SITE IS A SHORT SECTION WITH A NATURAL BOTTOM SEPARATED BY A CONCRETE-LINED REACH FROM THE MUCH LONGER NATURAL-BOTTOMED STRETCH DOWNSTREAM.

It lies just downstream of the entrance of the Burbank Western Channel that enters the River from the north. The flow from this latter channel was very clear and occupied about the northern one sixth of the River channel immediately downstream. It supported bright green algae that covered the concrete surface. The rest of the channel receiving flow from the main River was slightly turbid and supported a brownish algae surface. Some water quality difference is probably responsible for this dichotomy. The area sampled was up to 1.5 m deep and the substrate was 60% rocks and boulders, 20% concrete, and 20% sand. The shore was 40% boulders, 40% concrete, and 20% sand.

Only about 20% of the shore was vegetated in one deep channel where willows and *arundo donax* lined one side and the sloping concrete-lined the opposite shore of a narrow channel along the north side of the River bed.

GLENDALE SITE: 20-50 M UPSTREAM AND DOWNSTREAM FROM THE GLENDALE BOULEVARD BRIDGE

The wetted channel bottom is natural above and below this concrete. Upstream, a couple of backwaters are similar to above the concrete at the Figueroa Site and downstream is wide and rocky. Overall, the bottom was estimated to be 80% boulders and rocks and 20% sand. The shore was boulders and concrete and about 70% unvegetated. One backwater area along the west shore had clear water from local upwelling. It also had flow from a lateral storm drain, lacked current, and was largely shaded by trees. The seine sampling was divided between this backwater and fast flowing water among boulders and patches of sedges where the water flowed off the concrete into the natural channel area. The dipnetting was done along the east shore, upstream of the pipeline crossing. These habitats were downstream of Glendale Boulevard.

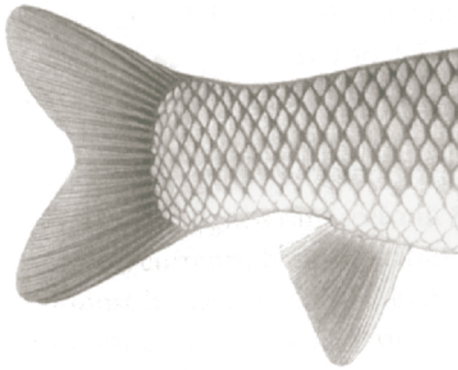
NEWELL SITE: UP TO 200 METERS DOWNSTREAM OF THE SOUTH END OF NEWELL STREET ON THE WEST BANK OF THE RIVER.

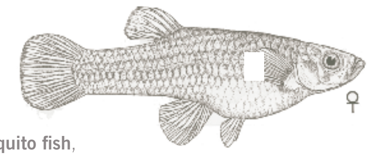
At this site the substrate was estimated to be 70% boulders and 30% sand with 30% of the bottom with patches of *Najas*, narrow-leaved *Potamogeton*, *Hydrocotyle*, *Nasturtium*, or *Polygonum*. The shores were about 50% sloping concrete and 50% vegetated. The vegetated portion was about half Arundo and half tules (Scirpus), low sedges, and willows (Salix). The water was up to 2 m deep but seining was done in up to 1.5 m of water. Most of the sampling was done in fast flowing areas and four minnow traps were placed in slower and shallower marginal areas with vegetation.

FIGUEROA SITE: THIS SITE IS JUST UPSTREAM OF THE FIGUEROA STREET BRIDGE OVER THE RIVER.

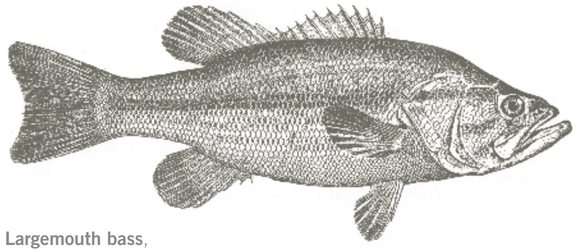
The natural bottom ends at a flat concrete bottom at this site and some sampling was done over each substrate. The main flow was against the northeast side and most of the sampling was done in extensive backwaters on the western 70% or so of the channel. These channels had recently received much larger overflows in mid-September storms, but were back to low flow levels during our sampling in September and November. A relatively wide wetted channel narrowed and shallowed into three separate backwater channels 50 to 100 meters upstream. The lower end was crossed by the flat concrete lip of the lined channel downstream. Upstream, all shorelines were covered with vegetation variously of tules, sedges, arundo, castor bean, and willows, many bent downstream by the recent high flows. The deepest water was up to 1.5 meters deep. All collecting was done in standing or very slowly flowing water in the backwater areas, mostly into marginal vegetation.

Flathead minnow, *Pimiphales promelas*

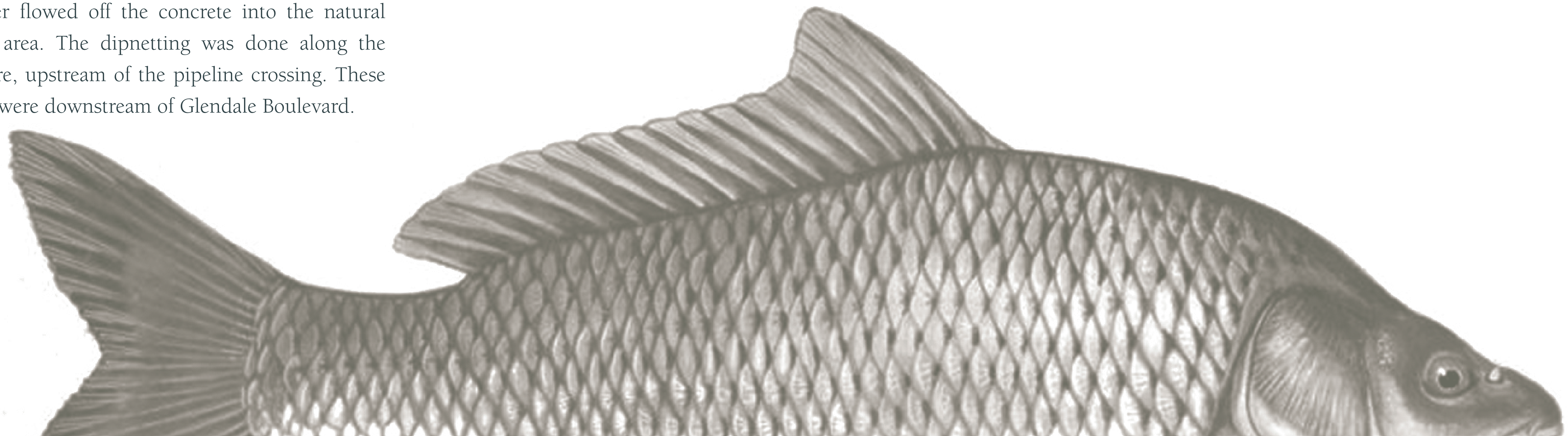




Mosquito fish, *Gambusia affinis*



Largemouth bass, *Micropterus salmoides*



FISH STUDY FINDINGS

The catches are tabulated in Table1 (page 13-14) and consisted of eight species of fishes, bullfrog larvae [tadpoles], *Rana catesbiana*, and red swamp crayfish, *Procambarus clarki*. The fish species and numbers taken were:

- **fathead minnow, *Pimephales promelas*** **(83)**

- **carp, *Cyprinus carpio*** **(58)**

- **black bullhead, *Ameiurus melas*** **(24)**

- **Amazon sailfin catfish, *Pteroplichthys pardalis*** **(7)**

- **mosquitofish, *Gambusia affinis*** **(668)**

- **green sunfish, *Lepomis cyanellus*** **(92)**

- **largemouth bass, *Micropterus salmoides*** **(1)**

- **tilapia, *Oreochromis sp*** **(271)**

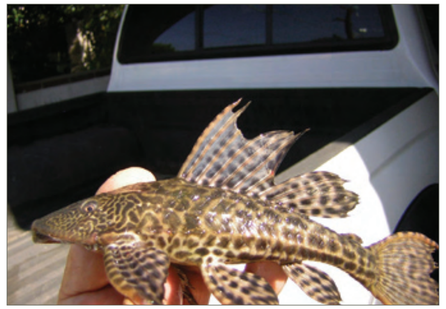
The total number of fishes captured was about 1214, with mosquitofish and tilapia being the most abundant. Many more of these two species were also observed during visual surveys not accompanied by actual capture of fishes. Carp, fathead minnow, and green sunfish were also common. Only a few carp smaller than about 30 cm long were captured or observed. Next in abundance were black bullhead (24), Amazon sailfin catfish (7), and largemouth bass (1). Only the Figueroa Site had all eight species of fishes, the Glendale Site had 6 (lacking carp and largemouth bass), the Riverside Site had four (lacking carp, black bullhead, sailfin catfish and largemouth bass), and the Newell Site had three (lacking green sunfish in addition to the four missing at Riverside). Carp have been frequently observed by members of the research team, and caught by recreational anglers, at the Glendale Site, though none were collected at our sampling event.

HAUL #	Fathead Minnow	Carp	Black Bullhead	Sailfin catfish	Green sunfish	Mosquito fish	Tilapia sp.	Largemouth Bass	Bullfrog larvae	Red swamp crayfish	TOTALS	NOTES
	SPECIES											
Newell Street and up to 200 m downstream, August 30, 2007												
1 to 30	0	40	0	0	200	0	0	5	0	0	245	15X6 foot, 3/8 in mesh seine
TOTAL	**0**	**40**	**0**	**0**	**200**	**0**	**0**	**5**	**0**	**0**	**245**	**water 22-25°**
Above Figueroa Street, September 28, 2007												
1	0	0	0	0	0	0	0	39	0	0	39	30X6 foot, 3/8 in mesh seine
2 to 23	51	14	20	4	93	18	0	0	0	3	203	15X6 foot, 1/8 in mesh seine
TOTAL	**51**	**14**	**20**	**4**	**93**	**18**	**0**	**39**	**0**	**3**	**242**	**water 19° C. all day**
Glendale Boulevard, October 05, 2007												
1 to 10	0	0	0	0	45	0	0	0	0	0	45	16X12 in, 1/8 in mesh dip net
11 to 14	0	0	0	0	10	0	0	3	0	0	13	15X6 foot, 3/8 in mesh seine
15	0	0	0	0	20	0	0	0	0	2	22	dip net (same)
16 to 27	25	0	2	3	30	13	0	7	1	9	90	15X6 foot, 3/8 in seine
TOTAL	**25**	**0**	**2**	**3**	**105**	**13**	**0**	**10**	**1**	**11**	**155**	**water 18° C., trib. 24°**
Upstream of Riverside Drive, below mouth Burbank Western Channel, October 5, 2007												
1 to 12	2	0	0	0	70	1	0	149	0	0	222	15X6 foot, 3/8 in mesh seine
TOTAL	**2**	**0**	**0**	**0**	**70**	**1**	**0**	**149**	**0**	**0**	**222**	**water 28-29° C.**
Figueroa Street, November 29, 2007												
1 to 25	5	4	2	0	200	60	1	40	0	10	322	**15X6, 3/8 in mesh seine** **10X4 foot, 1/8 in mesh**
TOTAL	**5**	**4**	**2**	**0**	**200**	**60**	**1**	**40**	**0**	**10**	**322**	**Water 14-15° C.**
GRAND Total August 30 to November 29, 2007												
TOTALS	**83**	**58**	**24**	**7**	**668**	**92**	**1**	**271**	**1**	**24**	**1214**	

Table 1. Fish Catches from middle Los Angeles River by FOLAR surveys, August 30 to November 29, 2007.

Steelhead trout crossing a road,
Oncorhynchus mykis

Common Carp, *Cyprinus carpio*
Photo courtesy of Cynthia Perry



Amazon sailfin catfish, *Pteroplichthys pardiglis*
Photo courtesy of Camm Swift

DISCUSSION

Both observations and captures in our nets showed tilapia and mosquitofish to be the most abundant fishes present in the River and they were taken at all stations.

They were represented by small juveniles up through adult fish and could often be observed in tens to hundreds in some areas. We saw hundreds of tilapia over the shallow concrete apron just below the natural-bottomed section at the Figueroa Site on August 30, 2007 as well as at the Riverside Site. These numbers were much lower at the Figueroa Site when we actually sampled on September 28, 2007 probably because of the intervening storm and high flows that would have washed many of them out. This reduction was not as dramatic at the Riverside Site when sampled on October 5th, 2007. The mosquitofish were near or in shallow marginal vegetation, away from the current and masses of tilapia were usually over flat concrete surfaces or other shallow open areas with little or no current.

The vast majority of the carp were large individuals over 30 cm long. Only one or two fish were taken that were smaller in size. This indicates that small carp are vulnerable to some kind of mortality and that the population is dominated by large individuals. For some reason many of the smaller fish are lost or are found in a habitat that we have not sampled. Observers on the River documented spawning activities in late February and March both in 2007 and 2008 near and downstream of the Glendale Site, with groups of individuals laying eggs among the boulders and over smooth concrete. It is uncertain whether spawning can be successful over the concrete, unless the eggs are attached to the algae or other materials. Usually, the eggs adhere to brush or other submerged vegetation and are not protected by the adults.

Black bullhead catfish, *Ameiurus melas*
Photo courtesy of Sabrina Drill

The few Amazon sailfin catfish we observed were all small juveniles. These armored catfishes (Family Loricariidae) often hide among rocks and logs and can burrow into earthen or clay banks. Thus, they are less likely to be sampled with our methods. However, it is known that larger individuals and a large population have existed in the outfall of the Tillman Treatment Plant in the Sepulveda Flood Control Basin since the mid-1990s (Steve Moe, Los Angeles City Sanitation District, personal communication, fall, 2007). They are concentrated in the Wildlife Pond northeast of Balboa Lake where water temperatures remain near or above 20°C throughout the year due to the warmth of the introduced wastewater effluent. The juveniles captured downstream in our surveys were probably recent arrivals from this upstream source. They should die off in most of the River when the water temperatures drop below 20 degrees in the fall and winter. The single specimen we observed at the Figueroa Site in September, 2007 may have been recently washed down by the mid-September storm flows as well.

Black bullheads, green sunfish, and largemouth bass are all very common in Southern California freshwater streams including the Big Tujunga Wash, upstream of the Glendale Narrows section. The black bullheads in our collections were large juveniles to adults and our catches are probably an underestimate of their numbers. Bullhead catfishes are nocturnal and often remain hidden during the day. Those we captured were dislodged by disturbing brush piles and overhanging masses of tules to drive them out. The presence of a wide variety of sizes, and thus ages, suggests a thriving population. As nocturnal predators, these catfish prey to some extent on native species in other areas. The green sunfishes were small juveniles to small adults, also suggesting a thriving population. Green sunfish also prey on native fishes and amphibians in places like Malibu Creek and Big Tujunga Wash. Green sunfish are probably continually washed down from Tujunga Wash and other upstream locations. The largemouth bass was observed only a single time in the Glendale Narrows area and possibly was a stray from lakes upstream where they are more common. Largemouth bass do not do well in strongly flowing streams where they are restricted to backwaters and slow moving pools. This microhabitat is uncommon in the Glendale Narrows area and probably explains the scarcity of largemouth bass. They also strongly prey on native

Green sunfish, *Lepomis cyanellus.*
Photo by Carmelo Gaeta

Green sunfish, *Lepomis cyanellus.*
Photo by Sabrina Drill

Tilapia, *Oreochromis sp*,
Photo by Sabrina Drill

species, thus, their scarcity can be considered to be beneficial. Many of the exotic species we observed are adapted to slower waters than are present in the Glendale Narrows area. This aspect could favor re-establishment of native fishes and other aquatic species.

Fathead minnows were common also, and have similar feeding ecology to arroyo chub. Fathead minnows are known to feed on larvae of other fishes elsewhere and may negatively impact native species. However, they generally inhabit slower waters than the native arroyo chub and breed later at warmer temperatures. These two minnow species occur together in many sites (San Juan Creek, Big Tujunga Wash) and should be able to co-exist in many situations (Feeney and Swift (2008).

Crayfish and bullfrog larvae were uncommon as were other invertebrates like insect larvae and clams. This was also true during the August collection before the mid-September flows that may have washed out many organisms. The bullfrog larvae usually transform into juveniles and leave the water in June, July, and August so many may have already left the water by the time we collected. However, bullfrogs usually spend two years as larvae in Southern California so the previous year's larvae should still have been present. Red swamp crayfish are typically abundant in late summer and fall also, but like largemouth bass prefer slow moving water. The crayfish were undoubtedly uncommon because this habitat is scarce, predators like green sunfish, black bullhead, and carp are abundant, and the system had been flushed out by unseasonable high flows in mid-September.

Our captures of the green sunfish, tilapias and fathead minnow reflect their abundance since many of them were small, occurred in backwaters, and were vulnerable to our seining methods. Many more large carp were observed than we captured because we did not use methods optimal for their capture. Gill nets, cast nets, or angling would be much better methods for obtaining representative samples of them in the deeper and faster areas over large boulders. The Amazon sailfin catfish were only taken during the first samplings in September 2007 and were small individuals, probably produced [hatched] within the previous 12 months. Their absence in later collections was likely due to the cooler water and the mid-September 2007 storm that flushed out many of the fishes. The numbers of tilapia observed at the Figueroa Site in September 2007 was much reduced compared to the observations made in August 2007 before the storm flows. We took seven of eight species in that first sample in September at the Figueroa Site and only took subsets of these species later on. The eighth species to be encountered, the one small largemouth bass, was also taken during the second sampling in November at the Figueroa Site.

Green sunfish, *Lepomis cyanellus.*
Photo by Sabrina Drill

All the fish taken, except for carp, protect their young in some way, which may help them survive in the small length of natural-bottomed stream of the Los Angeles River with its variable flows. The largemouth bass and green sunfish males build nests on the substrate and defend the eggs and newly hatched young against predators. The two species of catfish lay their eggs in burrows and crevices between rocks or in logs and also protect the newly hatched young. The tilapia excavate a depression in the substrate or are mouth brooders and the fathead minnow male defends a nest on the underside of a rock or log. The mosquitofish is a live-bearer and the young are born at a relatively large size. All of these fish, except carp, lack a small, planktonic larval phase that is vulnerable to being carried from the area before it settles down to live. This factor alone could explain the scarcity of small carp in the area as well as the absence of the native species. However, more information is needed about the interactions of the native and non-native species, particularly the exotic predators like green sunfish and black bullhead, as well as the actual habitat conditions, to discern the reasons for the lack of native species.

NATIVE SPECIES

None of the seven or eight native species of freshwater fishes known from this section of the Los Angeles River were collected during this study. Only one native, arroyo chub, *Gila orcuttii*, has been occasionally taken in the Sepulveda Dam area in the 1990s. Otherwise, native fish have not been taken in the vicinity since the early 1950s. Much of the information on the original distribution and biology of local native fishes is reviewed in Swift et al. (1993), Moyle (2002), Boughton et al. (2006), Dagit et al. (2005) Feeney and Swift (2008), and Swift and Howard (2008) as well as in several unpublished contract reports on the River's fishes (Swift and Seigel 1993; West 2004, Holland and Swift 2004, Swift and Holland 2000-2004).

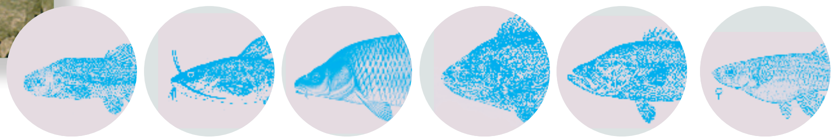
Additional marine and estuarine species that would invade the freshwaters of the lower River and nearby tidal and estuarine sections were reviewed by Swift and Franz (1981) for Ballona Marsh (once a mouth of the Los Angeles River) and by Allen et al. (2006) for California coastal estuaries and bays in general. These coastal and estuarine species will not be discussed further here, but will be present and of concern when work extends to the lower Los Angeles River. It is becoming increasingly apparent also that coastal lagoons in and near the mouths of central and Southern California rivers are very important to at least one of the two anadromous species known to have occurred in the Los Angeles River system, steelhead trout. Thus, they are also important to their ability to return, spawn, and establish a population (Boughton et al. 2006, Hayes et al. 2008).

Only three species of native fishes remain in the Los Angeles River drainage, namely the Santa Ana sucker, *Catostomus santaanae*, Santa Ana speckled dace, *Rhinichthys osculus sp.*, and arroyo chub. These are all endemic species to the Los Angeles Basin drainage and in the case of the arroyo chub, a few other nearby drainages. The only Los Angles River drainage populations of all three species exist together in Big Tujunga Wash above Hansen Dam and below Big Tujunga Dam No. 1. Sections of this stretch of stream go dry annually and the wetted channel varies in size and volume during the season, as well as from wet years to dry ones. Thus the extent of distribution of these fish varies accordingly. All begin to spawn in flowing waters in March or April and the sucker and dace appear to mostly breed for a month or two in the spring, while the chub breeds for several warm months often into November. By late spring or mid summer, large numbers are present and could possibly be washed downstream to colonize the Glendale Narrows section, if the habitat were suitable and non-native fish are not incompatible with the survival of the native species.

Two native species, the federally endangered southern steelhead, *Oncorhynchus mykiss*, and the possibly declining Pacific lamprey, *Lampetra (Entosphenus) tridentata*, are anadromous, meaning that they spend much of their adult life in the ocean, but enter freshwater streams to spawn and rear. Steelhead are the anadramous form of *O. mykiss*, and the species also includes the non-anadramous form known as rainbow trout. Only the anadramous form is considered endangered. In Los Angeles County, there are known populations of steelhead currently existing in several streams in the Santa Monica Mountains, and are historical records of them from several more (Dagit et al, 2005). Some tributaries of the Los Angeles River, such as upper Arroyo Seco above Pasadena and Big Tujunga Wash above Hansen Dam, currently support rainbow trout. In addition, populations are known from upstream areas within the neighboring San Gabriel River watershed. Currently, access to these areas is blocked by impassable barriers of various types. Active stocking of these areas with rainbow trout by the California Department of Fish and Game occurs each year, though there are many anecdotal observations of trout that do not behave like stocked trout, possess the adipose fins that are usually removed from stocked trout, or exhibit smolitification, in which they take on the anatomical features of fish getting ready to migrate to the ocean. Hence, there is some controversy as to whether some of the trout seen in these currently landlocked areas are descendants of anadramous native *O. mykiss*. Other tributaries flowing off the north side of the Santa Monica Mountains and off the south side into the Ballona Marsh area also may have supported trout and steelhead. Remains of rainbow trout definitely occurred in the Rancho La Brea deposits several thousand years ago (Swift 1989). The Rancho La Brea area drained toward the Los Angeles River when it flowed out towards the Ballona wetlands area. The Los Angeles River could be re-colonized by trout from known local populations in the Santa Monica Mountains, or from streams like the Santa Clara or Ventura Rivers further north. This would require an open migration corridor from the ocean up to the areas with appropriate habitat to support reproduction.

One native species, the Pacific brook *lamprey*, *Lampetra (Lampetra) pacifica ssp.*, is extinct and could only be replaced by bringing in another similar species from the San Francisco Bay drainages. One other native freshwater species would have to be re-introduced from local populations since they have no way to immigrate from adjacent drainages. This includes the sticklebacks that still occur both north and south of the Los Angeles Basin. The federally endangered unarmored threespine stickleback, *Gasterosteus aculeatus williamsoni*, occurred in the Los Angeles River in the Glendale Narrows area and now remains only in the upper Santa Clara River from the Valencia-Santa Clarita area upstream through Soledad Canyon. It's also possible a partially armored stickleback, *G. a. microcephalus*, also occurred in the lower Los Angeles River but was never recorded. It could be brought in from the north (lower Santa Clara River) or from the south (San Juan Creek). Any plans for reintroduction of native fishes to the Los Angeles River would need to account for the regional population genetic structure of the species.

1938. Herald Express photographer Coy Watson Jr. and reporter Fred Eldridge near Hyperion Ave. bridge. Los Angeles Public Library.

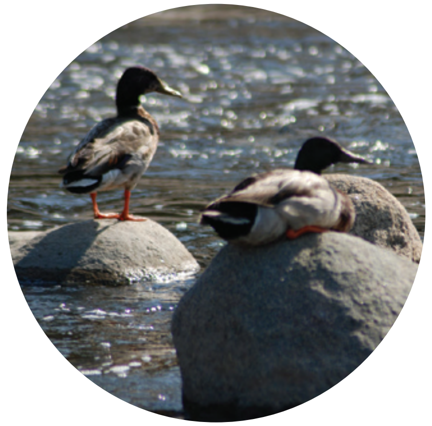


VALUE OF NON-NATIVE FISHES IN THE LOS ANGELES RIVER

In conducting this study, the project team and FoLAR staff and board members had several conversations about the value of the exotic fishery in the Los Angeles River. In natural systems, exotic fishes have been known to displace native fishes by competing with them for resources, preying upon one or several life stages, or by reducing habitat quality (such as by stirring up sediment and decreasing water clarity) (e.g. Moyle, 2002). Hence, in high quality systems that currently support native fishes, they are cause for concern. The Glendale Narrows section of the Los Angeles River, however, can at this point in time hardly be called natural Southern California stream habitat. In a system as highly altered as this by physical and hydrological modification, as well as chemical and thermal pollution, evidence of a moderately diverse, exotic dominated fishery can be seen as a sign that the River is at least capable of sustaining life. If restoration of a native fishery is a goal of recent efforts to revitalize, or even eventually ecologically restore, this section of the Los Angeles River, then control of exotic fishes will need to be addressed. It seems that there are far more pressing issues, however, such as restoring the natural hydrology and hydrograph, as well as functional connections between the upper watershed and the ocean, that would need to be addressed first. Currently, the exotic fishery serves to provide a food base to native terrestrial fauna, such as fishing birds, and enhance the value of the River as a recreational resource for neighboring human communities.

Camm Swift was an Associate Curator of Fishies at the Natural History Museum of Los Angeles County from 1970-93, and then a visiting professor at Loyola Marymount University from 1994-1998. During that time he also did intermittent consulting and transitioned to full-time consulting in 1999. Camm is currently a Senior Project Scientist for ENTRIX, Inc., Ventura, a major aquatic consulting firm.

Sabrina Drill is the Natural Resources Advisor for University of California Cooperative Extension in Los Angeles and Ventura Counties. She conducts research on the restoration of watersheds and aquatic habitats and the ecology of invasive species. Her past research experience includes investigating community-based fisheries management in East Africa and conservation genetics of fishes in the American Southwest.



REFERENCES

Allen, L. G., M. M. Yoklavich, G. M. Cailliet, and M. G. Horn. 2006. Bays and Estuaries, pp. 119-148. IN: Larry G. Allen, Daniel J. Pondella II, and Michael H. Horn (Editors), The Ecology of Marine Fishes. California and Adjacent waters. University of California Press, Berkeley, CA

Boughton, D. A., P. B. Adams, E. Anderson, C. Fusaro, E. A. Keller, E. Kelley, L. Lentsch, J. Neilsen, K. Perry, H. Regan, J. Smith, C. Swift, L. Thompson, and F. Watson. 2006. Steelhead of the south-central/southern California coast: Population characterization for recovery planning. NOAA Technical Memorandum, NMFS-SWFSC No. 394.

Dagit, R., S.L. Drill. and B. Meyer 2005. Historic Distribution of Southern Steelhead Trout in the Santa Monica Bay Region. Prepared for CDFG and NOAA, Pacific States Marine Fisheries Commission contracts AWIP-S-4 and COHO-SC-9.

Feeney, R. and C. C. Swift. 2008. Description and ecology of larvae and juveniles of three native cypriniforms of coastal southern California. Ichthyological Research, 55(1):65-77.

Hayes, S. A., M. H. Bond, C. V. Hanson, E. V. Freund, J. J. Smith, E. C. Anderson, A. J. Ammann, and R. B. MacFarlane. 2008. Steelhead growth in a small central California watershed: Upstream and estuarine rearing patterns. Transactions of the American Fisheries Society, 137(1):114-128.

Holland, D. C. and C. C. Swift 2004 (19 October). Big Tujunga Mitigation Project – Exotic Aquatic Species Control. Draft Final Report– Prepared by Dan Holland, Pismo Beach, CA, for: Chambers Group, Inc., Irvine, CA for L. A. County Department of Public Works. (Swift listed as co-author but was not involved in this final year of work, having done his last work in 2003 and earliest January 2004, see Swift and Holland).

Gary Lee Moore, P.E. City Engineer. The Los Angeles River Revitalization Masterplan, April 2007. City of Los Angeles, Department of Public Works, Bureau of Engineering.

Moyle, P. B. 2002. Inland fishes of California. Revised and enlarged. University of California Press, Berkeley, CA

Swift, C. C. 1989. Late Pleistocene freshwater fishes from the Rancho La Brea deposit, southern California. Bulletin of the Southern California Academy of Sciences, 83:93-102.

Swift, C. C. and G. Frantz. 1981. Estuarine fish communities of Ballona. Pp. F1-F31. IN: Ralph Scrieber (Editor), Biota of the Ballona Region Los Angeles County, Supplement I, Marine Del Rey/ Ballona Local Coastal Plan, Los Angeles County Museum Foundation, Los Angeles, CA

Swift, C. C. T. R. Haglund, M Ruiz, and R. N. Fisher. 1993. The status and distribution of the freshwater fishes of southern California. Bulletin of the Southern California Academy of Sciences, 92(3):101-167.

Swift, C. C. and D. Holland. 2000-2004. Multiple quarterly and final reports on Tujunga Wash and all titled Big Tujunga Mitigation Project-Exotic Aquatic Species Control. Draft Report, namely for 2nd Quarter; 2002(Nov. 10), for 3rd Quarter, 2003 (April 7); for 1st quarter, 2003(July 11); for 2nd Quarter, 2003 (12 August), for 3rd Quarter, 2003 (2004). By Camp Pendleton Amphibian and Reptile Survey, Fallbrook CA, to Chambers Group, Irvine, CA who treated these as final reports and forwarded them to L. A. County Public Works. (See also Holland and Swift for some of these)

Swift, C. C. and S. Howard. 2008. Status of Pacific lamprey, *Lampetra tridentata*, south of Pt. Conception. IN: Symposium Volume: Lampreys of the Pacific Coast of North America, American Fisheries Society, Bethesda, MD (Manuscript in review)

Swift, C. C. and J. Seigel. 1993. The past and present freshwater fish fauna of the Los Angeles River, southern California, with particular reference to the area of Griffith Park. 28 pp. IN: Kimball Garrett (editor), The biota of the Los Angeles River. An overview of the historical and present plant and animal life of the Los Angeles River drainage. Natural History Museum of Los Angeles County Foundation, Los Angeles, CA (California Department of Fish and Game Contract No. FG 0541)

West, T. 2004(October 11). Memorandum from Thomas West, CDM to William Van Wagoner, City of Los Angeles Department of Water and Power: Los Angeles River Flow evaluation Phase 2. Draft Technical Memorandum No. 3: Summer Fish Survey Results.

TOXICITY RESULTS

Since 2006, FoLAR has observed a surge in fishing activity along the banks of the Los Angeles River, especially throughout the Glendale Narrows section. The purpose of this study was twofold: to survey and identify fish populations in the River and to test fish for chemical and heavy metal toxins to determine whether these fish are safe to eat. While designing our study we found a significant amount of research and information on suggested consumption guidelines for marine fish (Heal the Bay) and for fish from other bodies of water (EPA, California Office for Environmental Health Hazard Assessment), but nothing on Los Angeles River fishes. We decided it was about time for such a study.

In FoLAR's toxicity study, samples of carp (5), tilapia (3), black bull-head catfish (8), and green sunfish (5) were taken to CRG Marine Laboratories and tested for PCBs (Polychlorinated biphenyls) and mercury (Hg). Tissue samples from the fillet and skin were tested. While mercury can be found in all parts of the fish including the fillet, other chemicals tend to accumulate in the fatty tissues of the skin, belly, head, guts, kidneys and liver. PCBs and mercury bio-accumulate or build up and become more concentrated over time as they are ingested by various fish up the food chain. While eating fish contaminated with PCBs and mercury once in a while doesn't pose much of a health risk, these toxins accumulate over time and may cause health problems depending on the quantity and frequency of consumption. (*1)

TOXICITY REPORT SPECIES MATRIX

SPECIES	DATE SAMPLED	TOTAL PCBS (PPB)	MERCURY (PPB)
bullhead catfish1-8	8/28/2007	1.0 up to 2.1	30
carp1-5	8/28/2007	9.4 up to 16.3	10 – 30
sunfish 1-5	11/29/2007	1.0 up to 4.5	20 – 50
tilapia 1-3	8/28/2007	<1.0 (undetectable)	10

Polychlorinated biphenyls (PCBs) are a man-made chemical (banned since 1977) with a very long half life. Historically, they came from dispersed sources such as electrical transformers, hydraulic fluids, paper, and plastic products. While PCBs were detectable in fish tissues of carp and sunfish, the concentrations were low and ranged from "not detectable," or less than <1.0 ppb, up to 17 ppb. These values are all below OEHHA threshold for guidelines for the consumption of fish. (2) Many of the fish were less than two to three years old which could account for the low toxicity levels. Another possible reason may be that toxicity levels are low in this natural bottom section of the Los Angeles River. In either case, further study is needed and we need to test older/larger fish and sediment to attain more accurate readings.

Mercury is a heavy metal present naturally but could also be released by coal burning power plants and other industrial processes. Once released, mercury ends up in the water where it changes into methylmercury and becomes ingested by aquatic insects and fish. Mercury levels in carp and sunfish FoLAR found were also low compared to detection limits used by the California Office for Environmental Health Hazard Assesment (OEHHA) who issue the following advisories for mercury and PCB levels.*(2)

For information on consumption recommendations for children and pregnant women please visit http://www.epa.gov/waterscience/fish/advice/

OEHHA ADVISORY TISSUE LEVELS (ATLS) FOR SELECTED FISH CONTAMINANTS

CONTAMINANT	THREE 8-OZ SERVINGS* A WEEK	TWO 8-OZ SERVINGS* A WEEK	ONE 8-OZ SERVINGS* A WEEK	NO CONSUMPTION
Methylmercury (Women aged 18-45 yearsand children aged 1-17 years) nc	≤70 ppb	>70-150 ppb	>150-440 ppb	>440 ppb
PCBs nc	≤21 ppb	>21-42 ppb	>42-120 ppb	>120 ppb

* Serving sizes are based on an average 160 lbs. person.nc ATLs are based on non cancer (undetectable)

SUMMARY

Further study of the Los Angeles River and its fishes is warranted, and the data gathered must be integrated into local, state and federal suggested consumption guidelines. More information must be gathered to determine whether consuming fish caught in the Los Angeles River may pose a risk to public health. This will require testing a larger sample that includes more adult fish. At the same time we need to continue surveying anglers to determine whether fish caught are being eaten, or whether catch-and-release fishing is more prevalent. We are seeking funding so that the next phase of the Los Angeles River Fish Study can begin. The insight we garner will be used to advocate for a swimmable, fishable, boatable Los Angeles River that we can all enjoy.

Contributors

Richard Gossett , Laboratory Manager, CRG Marine Laboratories. Mr. Gossett has more than 24 years of experience in environmental chemistry. He is responsible for the management of all laboratory activities including supervision of laboratory staff, quality control, project management, methods development and laboratory certifications. His project experience includes serving as Laboratory Coordinator for the EPA Environmental Monitoring and Assessment Program. Mr. Gossett is also founder and past president of the Southern California Environmental Chemists Society (SCECS).

Alicia Katano, Education Coordinator, Friends of the Los Angeles River

References

1. Eating fish from the Bay, Heal the Bay. Retrieved 09/09/08 from http://www.healthebay.org/stayhealthy/eatingfish/default.asp
2. Klasing, Susan Ph.D., Brodber, Robert, Ph.D., Development Of Fish Contaminant Goals And Advisory Tissue Levels For Common Contaminants In California Sport Fish: Chlordane, Ddts, Dieldrin, Methylmercury, Pcbs, Selenium, And Toxaphene, Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. June 2008. Pg. 61. Retrieved 09/09/09 from http://oehha.ca.gov/fish/gtlsv/pdf/FCGsATLs27June2008.pdf
3. What You Need to Know about Mercury in Fish and Shellfish, U.S. Food and Drug Administration U.S. Environmental Protection Agency. 2004. Retrieved 09/09/08 from http://www.epa.gov/waterscience/fish/advice/



Above photos by Mark Lamonica


Photo by Peter Bennett

LA RIVER WATER QUALITY MONITORING RESULTS

Friends of the Los Angeles River monitored the water quality of the Los Angeles River and its tributaries during 2003 and 2004. Twenty-two sites were monitored for water temperature, dissolved oxygen, turbidity, pH, nitrate, nitrites and total dissolved solids. The water quality objectives (WQO) used in this study were based on those found in the Los Angeles River Basin Plan. The term “failed” means results that failed to meet the WQO for “good” water quality.

pH is a measure of the relative acidity or alkalinity or water. The range of water suitable for most life in fresh-water environments is between 5 (acidic) and 9 (alkaline). Pure water has a pH of 7, acid rain is anything less than 5, sea water ranges from 7.7 to 8.3, which is slightly alkaline. However, it is important to note that individual flora and fauna have narrower limits within this broad range that supports some forms of life. So it is fluctuations in stream pH, even within the 5 to 9 range, that harm aquatic life.

Total Dissolved Solids (TDS), is a measure of minuscule particles that are dissolved in water, as molecular ions and colloids. Like temperature and pH, most organisms have a preferred TDS environment in which they thrive.

Dissolved Oxygen (DO) is measured in millilitres O2 per litre (ml/L). Virtually all aquatic life requires some level of oxygen dissolved in water to exist. Warm water holds less dissolved oxygen than cold water. Consistently high oxygen content allows a body of water to support greater numbers and variety of aquatic organisms.

Turbidity measures water cloudiness. In heavy rains, the river flows faster and appears muddy due to suspended particles which may not quickly settle out once the river empties into the ocean. Fish may experience difficulty breathing and eating in this turbid water, resulting in reduced growth rates and sometimes death in chronically turbid environments. However, some level of turbidity is desirable for species who hide in murky water. Historic turbidity levels may be a good objective if the goal is to restore native fauna.

Temperature is important because warmer water holds less oxygen, which, as discussed above, is crucial to life. The Los Angeles River was once one of the southernmost steelhead trout runs, but steelhead cannot survive in temperatures above 72°F (22° C.)

Nutrients such as nitrogen and phosphorus can degrade water quality. Plants need nitrates; however, concentrations in streams greater than 0.3 mg/L can cause excessive growth of algae and other plants, which reduces the dissolved oxygen and, subsequently, harms the fish populations (U.S. Geological Survey (USGS) study, http://pubs.usgs.gov/circ/circ1168/nawqa91.5.html). Animal manure, used as an agricultural fertilizer, is the main source of nitrate pollution.

Five of the sites we tested were in the natural bottom stretch of the Los Angeles River between the Los Feliz Blvd Bridge downstream to Oros Street, where all our fish sampling and all the fishing we’ve documented has occurred.

LOS FELIZ B LVD – 11 DAYS TESTED	3 DAYS FAILED
FLETCHER DRIV E – 6 DAYS TESTED	1 DAY FAILED
FLETCHER 2 - 5 DAYS TESTED	1 DAY FAILED
RIVERDALE AVE . – 8 DAYS TESTED	4 DAYS FAILED
OROS STREET – 8 DAYS TESTED	1 DAY FAILED

While some studies have focused on fish populations in the Los Angeles River Watershed, no other studies are focused on the River as both an ecosystem and a place for human interaction, recreation and solace. Through the Los Angeles River Fish Study we are collecting data on current fish populations as well as how people are using the River as it is now. Access to open space and recreation, along with fish toxicity and water quality data, is essential as revitalization efforts move forward. By continuing to work with scientific experts, while integrating hands-on science educational opportunities for young people throughout the region, FoLAR is dedicated to attaining a swimmable, fishable, boatable Los Angeles River for all of us to enjoy!

Carpe Diem: A Talk with a Los Angeles River Fisherman

Carmelo Gaeta, 35, is a "puro Angelino," born in the old French Hospital in Chinatown, and raised in Atwater Village. Two years ago, he and his wife returned from a long sojourn in New York City to discover that there were carp swimming in the Los Angeles River. As a long-time Eastern Sierra fisherman, Carmelo hauled out his Orvis Clearwater II 5-weight; tied a few flies; glanced through the standard text on the subject, *Carp on the Fly: A Fly Fishing Guide* by Barry Reynolds; and went carp fishing. As part of this, the first-ever study of fish and fishing on the Los Angeles River, we asked Carmelo to interview some of the L.A. River anglers. He spoke to 16 of them between November 2007 and January 2008, and this is what he learned.

The fishermen ranged in age from 28 to 82. They came from as far away as Palmdale, Huntington Beach, Valencia and Bakersfield, and from as close-by as Frogtown, Silver Lake and Glendale. Almost all the fish were caught in the Glendale Narrows, the longest natural bottom section of the River, between the Colorado Blvd. Bridge in Glendale and the Riverside Drive/Figueroa Street Bridge just north of downtown L.A. Most of the fly fishermen were Anglo, most of the subsistence fishermen, those who eat the fish, Latino.

The fly fishermen tended to gather at the north end of the stretch, between the Los Feliz Blvd. and Hyperion Blvd. bridges, drawn by the lack of overhanging trees. Since no trees have been allowed to grow through the trapezoidal concrete walls, the anglers' lines don't get caught up in the branches.

The subsistence fishermen were found mostly in the Frogtown area (Elysian Valley), especially in the calm water just downstream from the 2 Freeway Bridge. The largest carp Carmelo says he's caught in the River was 15 ½ pounds and 2 ½ to 3 feet long. No one seems to know how old they are. Other fishermen claim to have hauled in 20 pounders, but Carmelo has yet to see any that large.

The most popular fly that L.A. River anglers employ to catch carp is called a Glowbug. Yellow and white in color, it mimics the egg sac female fish lay. The sustenance fishermen use a hook and line with tortillas for bait. Basically, carp will eat anything. One fisherman practiced the decidedly old-school technique of "stun & grab," wading in among the fish and clobbering them with rocks.

Carmelo says his conversations reflect a greater preponderance of fly fishermen than there probably are, because the sustenance fishermen were less comfortable talking about what they're doing. Most of the fly fishermen practice catch-and-release. One subsistence fisherman told Carmelo "I'm fishing for meat." One guy said he sells his catch to "an old lady" in the Frogtown neighborhood, another said he sells the fish in Chinatown for fifty cents a pound.

The sustenance fishermen tend to be a hardier breed. Fly fishermen are less likely to be fishing when algae blooms, as it often does in the spring, because it fouls their lines. The sustenance fishermen fish more regularly. What time of day do people fish? "You can catch them all day long," Carmelo says. "Fly fishermen like to fish from early in the morning until noon. Subsistence fishermen tend to show up after work. "

One subsistence fisherman said he thought the fish were OK to eat because the water in the River is moving. How do people prepare L.A. River carp? One guy says he makes it into soup – which Carmelo does not recommend. Using the fillet of locally caught fish is advised when making stews or soups. This is because chemical substances tend to accumulate in fatty tissue found in the skin, head, guts, liver, belly and kidneys. Baking, broiling or grilling is the recommended preparation for locally caught fish as it allows the fat to drain. Another guy barbecues. Carmelo's cousin, who also fashions flutes out of L.A. River *arundo donax*, the wildly invasive bamboo-like plant that dominates some of the natural bottom sections of the River, smokes his catch using wood he gathers from the River. Carmelo thinks it's OK for adult males to eat River fish, but not pregnant women or children.

Where do the carp come from? Nobody knows yet. How long have they been here? Carmelo says carp were introduced into California waters in the 1870's. One fisherman claims to have been carp fishing the Los Angeles for four years. No one else had been fishing for more than two. Carmelo talked to an Atwater couple who'd been walking along the River for 35 years, and didn't know there were fish in there until Carmelo told them. Carp are able to survive in water bearing less oxygen than other breeds can stand.

In some spots along the natural bottom stretch of the River, the water can run three or four feet deep; but where bridges cross, the concrete at their bases forces the water to spread out and become much more shallow. Carmelo says the carp are able to navigate these shallows by "burst swimming, similar to what salmon do;" which he likens to "running up a hill or into a high wind."

I asked Carmelo why he thought there had suddenly been so much interest in fly-fishing the Los Angeles River. "It's because of the access. It's close. It runs through the heart of the city. There's the recreational aspect: fathers and sons fishing together, and fathers and daughters, aunts and uncles and nephews."

There's also the challenge of catching a carp on a fly rod. For American sports fishermen over the last few years, fishing for carp has become acceptable. "They're a quality game fish," says Carmelo. "It can be very difficult to catch them. The challenge is to put the fly right in front of the carp."

Finally, Carmelo had a question of his own. "Why can't we fish down there without being hassled by the LAPD, the Griffith Park Rangers and the Rangers from the MRCA? 40% of the fishermen have been hassled and asked to leave at one point or another," cited for violating an L.A. City code that forbids loitering along the River. So far every case that's come before a judge has been immediately thrown out. Something very fishy is going on along the River. Time and the River will eventually tell us what.

Lewis MacAdams

Carmelo Gaeta

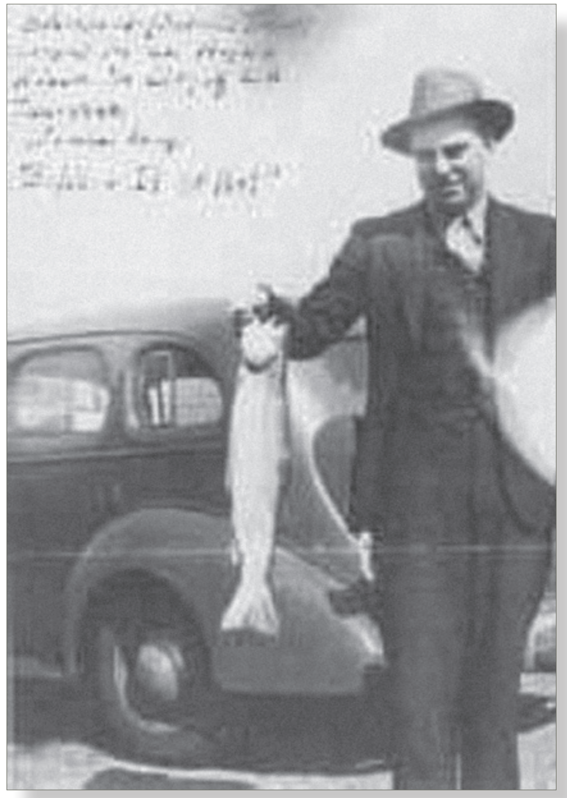
Interview with Jim Edmondson

From its inception, Friends of the Los Angeles River have worked to create a River ecosystem healthy enough for the return of several native species that were extirpated primarily by the paving of the River but also as a consequence of continuous development in the Greater Los Angeles Area that caused habitat to be lost throughout most of the Watershed. Some of the species that FOLAR would like to see returned to their native range include the yellow-billed cuckoo, the red legged frog, and the steelhead trout. For the last twenty years no one has been a more articulate advocate for the restoration of steelhead than Jim Edmonson, the former California manager of Cal-Trout, a 6,000 member organization based in San Francisco that works to protect salmonid species and their habitat. In Southern California, the steelhead is critically imperiled. Since the end of the 2nd World War, the Southern steelhead's population has declined from 55,000 to less than 500 in the wild, a drop of approximately 99%.

Some of the steelhead population that remains have adapted to survival in areas such as Malibu and Topanga Creeks. There are great hopes for the revival of the Malibu Creek run when Rindge Dam is finally removed; but the last known steelhead in the Los Angeles River was caught in 1940; and Edmondson says he hasn't heard of a L.A. River steelhead sighting in the twenty years he's worked at Cal-Trout. Nobody knows how big the Los Angeles River steelhead run was; but if the historical run in Malibu Creek was estimated at about 1,000 fish, Edmondson says, the Los Angeles River run must have numbered at least 30,000 individuals previous to channelization. Over the 10,000 years or so that steelhead thrived in Southern California, they have developed several powerful survival mechanisms. Most salmonid species swim upstream to spawn, and then die off, however steelhead has the ability to reproduce and return to the Ocean.

In addition the steelhead has been shown to travel further back to its natal stream than other related species, proving that the steelhead have an understanding that the waterways may not always have safe or reliable access. Edmondson argues that the steelhead are the ultimate indicators of a River's health, a modern day version of a canary in the coal mine. From the Headwaters down, changes will have to be made to accommodate the steelhead if their runs are to be restored. This alteration of ecosystem policy would benefit other forms of wildlife as well. Edmondson notes that 75% of all terrestrial wildlife in Western United States is adjacent to trout bearing streams. I asked Edmondson what sort of water quality changes the steelhead would require for their return. I learned that the any temperature about 22 degrees Celsius (around 72 degrees Fahrenheit) is too warm for the steelhead to survive. In regards to what needs to change for the steelhead Jim had this to say. "We don't go there," he replied. "The fish tells us if we're meeting the standards. A river can meet all the chemical standards, but if the fish can't get to the Head waters, you don't have a steelhead run." What then can we do? "Let the fish go home," he replies. What does this mean in terms of the River then? "We need to restore the channel. We have to remove enough of the concrete that the fish can make it to the headwaters." In your mind's eye, what would a healthy Los Angeles River look like? "It has pools, riffles, runs and clean gravel. It has a lush riparian forest of native vegetation and trees in multiple age classes and clean, cold water. It has a natural flow regime including high and low flows. And finally, it's free of man-made barriers, so that the fish can migrate throughout the watershed." The report you are holding in your hand is dedicated to the coming of that day.

Lewis MacAdams



Twenty-five inch steelhead trout caught in the river near Glendale in January 1940. Courtesy, family of Dr. Charles L. Hogue. From Blake Gumprechts' *The Los Angeles River: Its Life, Death and Possible Rebirth*. pg. 242 fig. 6.5

SUMMARY: WHERE DO WE GO FROM HERE?

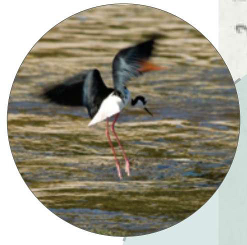
During the initial phase of the Los Angeles River Fish Study, we discovered that there is a diverse and bountiful fish population in the natural bottom stretch of the River between Atwater Village and Elysian Valley; but we have only begun to create a comprehensive portrait of the fish population throughout the River's length.

Much to our surprise and delight, toxicity reports show the fish to be free of mercury with extremely low levels of PCB's. Will these results hold true in the rest of the river? The Glendale Narrows is one of the cleanest sections of the river, probably because the natural river bottom cleans itself and because of the high quality of effluent coming out of the upstream water reclamation plants. Will there be significant differences in toxicity in fish from other stretches of the river? What other tests do we need to run to determine whether fish caught in the Los Angeles River are safe for human consumption? Can we prove that a "re-naturized" river itself is responsible for cleaning the fish to safe eating levels?

Our angler interviews provide anecdotal evidence that "catch-and-release" recreational fishing is, at the moment, much more popular than "subsistence" fishing in the Glendale Narrows. Would this be true the River's length? Are these results skewed by a reluctance of subsistence fishermen to acknowledge what they're doing? Will knowledge of the relative safety of the current fish population lead to overfishing? We have much more to learn about the numbers, make-up, origins, and life-cycles of the current population of fish. We need to learn how and where we can re-introduce native stock.

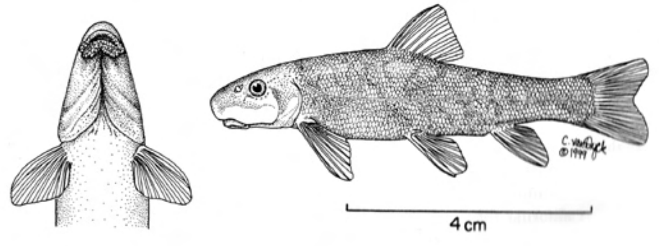
While a few other studies have looked at fish in the Los Angeles River watershed, no other studies have focused on the River as both an ecosystem and a place for human gathering and recreation. Through the Los Angeles River Fish Study we are not only collecting data on current fish populations but also on how people are using and enjoying the River as it is today. Access to open space and recreation, along with fish toxicity and water quality data is essential as revitalization efforts move toward a swimmable, fishable, boat-able River.

We look forward to working with scientists to create a comprehensive ecosystem monitoring program that provides accurate data to regulatory agencies, law and policy makers, and to members of the community if we are truly to transform the River. The Los Angeles River's compromised ecosystem effects public health throughout the region, and there are efforts underway to reduce the pollutants that wash in through storm drains from all across its vast watershed. Yet the River is teeming with life. The River can teach us much more, and we are eager to learn.



Fish profiles excerpted from: *Inland Fishes of California*, Peter B. Moyle, University of California Press, Berkeley, 2002.

{**Santa Ana Sucker**, *Catostomus santaanea*}



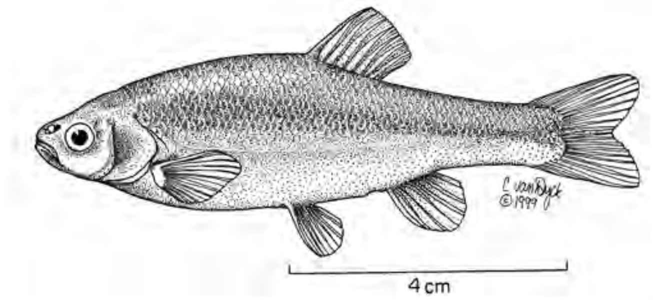
STATUS
Native species of the L.A. River that is threatened and/or endangered. Once widespread in the Los Angeles River, Santa Ana suckers have been found in recent years only in lower Big Tujunga Creek and below Big Tujunga Dam. The population appears to be hanging on, although it shows wide fluctuations in numbers. This species is likely to become extinct or extirpated in the near future (<25 years) unless steps are taken to save it. An endangered species is on a more rapid path to extinction than a threatened species. Most of these species are formally listed by either the State or the Federal government.

DESCRIPTION
Santa Ana Suckers live 2-3 years and usually don't grow larger than 6 inches. Color in living fish is silvery white on the belly and dark gray on the sides and back with irregular dorsal blotches on the sides and faint patterns of pigmentation arranged in lateral stripes.

DISTRIBUTION
Santa Ana Suckers are native to the Los Angeles, San Gabriel, and Santa Clara river systems of southern California. In the Los Angeles and San Gabriel Rivers they once occurred downstream to the mouths but are now restricted to the larger stream sections that still exist in the headwater areas.

ENVIRONMENT
These fish like cool (<71.6 degrees Fahrenheit), flowing water, with flows ranging from slight to swift. Like most mountain suckers, Santa Ana suckers feed mostly on algae and detritis, which they scrape fro rocks and other surfaces. Small numbers of aquatic insect larvae are also taken.

{**Arroyo Chub**, *Gila orcutti*}



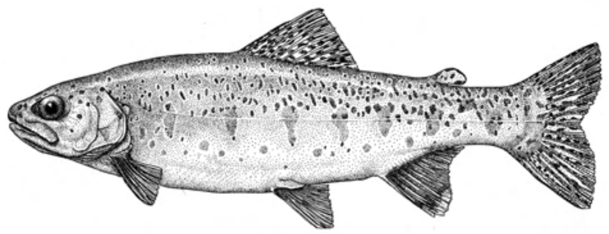
STATUS
Native species of California of special concern. The species is in decline or has a very limited distribution, so special management is needed to keep it from becoming threatened or endangered. Because of the uncertain status of most populations, annual surveys are needed for this species in its native range; these should be performed every five years at all known sites.

DESCRIPTION
Typical adult lengths range from 2.75 – 3.9 inches. Body color is silver or gray to olive green dorsally and white ventrally. They are named for the gullies and small canyons (arroyos) of their native southern California.

DISTRIBUTION
Native to Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita Rivers to Malibu and San Juan Creeks. They are now extirpated from much of their native range but remain abundant in the upper Santa Margarita River, Trabuco Creek, San Juan Creek, Malibu Creek, and the West fork of the upper San Gabriel River. They also occur (but are scarce) in Big Tujunga Canyon, Pacoima Creek, the Sepulveda Flood Control Basin, the Los Angeles River, and middle Santa Ana River tributaries between Riverside and Orange County.

ENVIRONMENT
They are most abundant in slow moving or backwater sections of water with muddy or sandy bottoms with temperatures ranging from 50-75.2 degrees Fahrenheit. But they are also found in fast-moving (velocities of 80cm/sec or more) sections. They are omnivorous, feeding on algae, insects, and small crustaceans.

{**Southern Steelhead Trout** or **Coastal rainbow trout**, *Oncorhynchus mykiss irideus*}



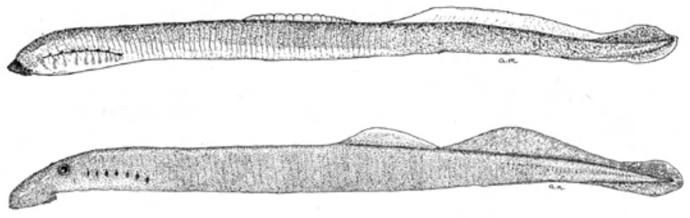
STATUS
Native species extirpated from the Los Angeles River. Southern steelhead were listed as Endangered by NMFS in 1997. Most streams and rivers have been dammed, diverted and urbanized to one degree or another. It is now absent from 39 of the 92 streams in which Southern steelhead historically spawned including all streams south of Ventura County, except Malibu Creek and San Mateo Creek. The total stream miles in which juveniles now rear amount to less than 1% of their historical number. Restoration is possible if adequate flows are provided, habitats are restored on a watershed scale, and access is provided to historical spawning and rearing areas.

DESCRIPTION
Southern steelheads are an anadromous species that spends most of its life in the ocean only returning to freshwater streams to spawn and rear. A member of the rainbow trout family which are highly variable in color, body shape, and characteristics, southern steelhead are silvery with numerous black spots on the tail, fins, and back, an iridescent pink to red lateral band and pinkish cheeks.

DISTRIBUTION
Originally native to the Pacific coast from Alaska down to streams in Baja in California, southern steelhead trout include populations south of Point Conception to Baja California. Its high genetic diversity may help to explain their remarkable capacity to persist in seemingly unfavorable environments.

ENVIRONMENT
Temperatures of 59-64.4 degrees Fahrenheit are optimal but many southern steelheads have escaped higher water temperatures in deep pools or fast running water where water temperature is lower. However, expended energy and low levels of dissolved oxygen are the trade off. They can survive oxygen concentrations as low as 1.5-2.0 mg/liter and their tolerance for varying chemical conditions is also very broad. They can survive pH values from 5.8-9.6.

{**Pacific Lamprey**, *Lampetra tridentate*}



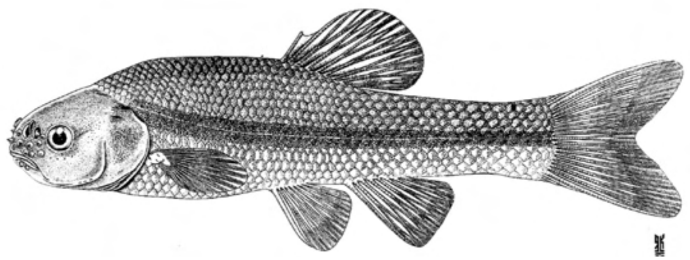
STATUS
Native species. The anadromous species is extirpated from the Los Angeles River and is on P.B. Moyle's Watch List for species in decline or with very limited distribution. Special management is needed to keep it from becoming threatened or endangered.

DESCRIPTION
The lamprey has a round, elongate, flexible cartilaginous body, and skin with no scales. They range from 11.8 to 29.9 inches in size, with dwarf, land-locked populations ranging from 5.9 to11.8 inches. Pacific lamprey are born in freshwater streams, migrate out to the ocean, and return to fresh water as mature adults to spawn and rear.

DISTRIBUTION
Malibu Creek seems to be the southernmost point of regular Lamprey occurrence in California. In general lampreys have a scattered distribution south of San Luis Obispo County with regular runs also found in the Santa Clarita River. In the ocean they have been captured from waters near Japan to Baja California.

ENVIRONMENT
Lamprey enter streams from July to October. They ascend rivers by swimming upstream briefly, then sucking to rocks and resting. Spawning takes place the following spring in sandy bottoms with water temperatures between 50 and 60 °F. Adults die within four days of spawning, after depositing about 10,000 to 100,000 small eggs in their nest. The young hatch in 2-3 weeks and swim to areas of low stream velocity where sediments are soft and rich in dead plant materials. They burrow into the muddy bottom where they filter the mud and water, eating microscopic plants (mostly diatoms) and animals. The juvenile lamprey will stay burrowed in the mud for 4 to 6 years, moving only rarely to new areas. After a two month metamorphosis, triggered by unknown factors, they emerge as adults averaging 4.5 inches long. Then during high water periods, in late winter or early spring the new adults migrate to the ocean. During its ocean phase of life the Pacific lamprey are scavengers on larger prey such as salmon and marine mammals. After 2 to 3 years in the ocean they will return to freshwater to spawn.

{**Fathead Minnow**, *Pimephales promelas*}



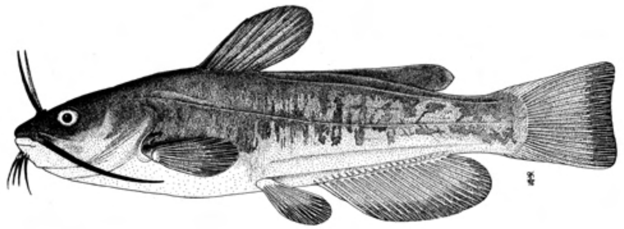
STATUS
Non-native species that is widespread and expanding. These fish are aggressive invaders that are still expanding their range to all suitable habitats in the state. 43 collected in FoLAR's L.A. River sample

DESCRIPTION
The fathead minnow in its wild form is generally dull olive-grey in appearance, with a dusky stripe extending along the back and side, and a lighter belly. Breeding males acquire a large, grey fleshy growth on the nape, as well as approximately 16 white breeding tubercles on the snout. They range in size from 2.16 – 3.34 inches.

DISTRIBUTION
Flathead minnows are native to most of the eastern and Midwestern United States. They have multiple origins and continue to be brought to California from other states. They first came to California as bait in the Colorado River in the early 1950s and were reared in central California by both commercial breeders and the California Department of Fish and Game (CDFG). A popular bait fish, most flathead minnows are said to have been introduced to new waterways by anglers who release their left over bait.

ENVIRONMENT
They can be expected in any watershed where there are small, muddy pools of warm water 73.4 degrees Fahrenheit. They can withstand alkalinities of more than 2,100 mg/liter and low levels of dissolved oxygen (<1mg/liter).

{**Black bullhead**, *Ameiurus melas*}



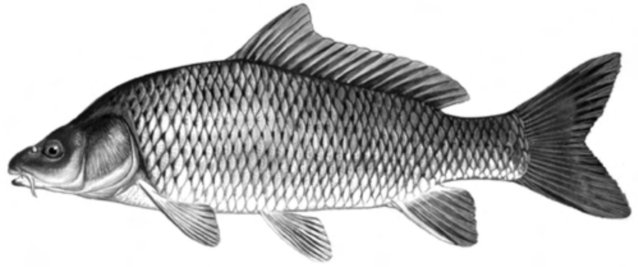
STATUS
Non-native species that is widespread and stable. Bullheads seem to be expanding their range in California and becoming increasingly abundant in highly disturbed lowland aquatic environments. Their impact on other species is not known. 24 collected in FoLAR's L.A. River sample

DESCRIPTION
Ameiurus translates as "without less tail," and presumably refers to the squared tail fin, and melas means black. Under optimal conditions with artificial feeding, bullheads can reach 11inches and 1-2 lbs in a year. In the wild, they would need 3-9 years to reach a similar size. They are omnivorous bottom feeders and are known to feed on aquatic insects, crustaceans, dead fish, amphipods, isopods, snails and other invertebrates. Adult black bullheads are nocturnal and prefer feeding at night while the young feed during the day

DISTRIBUTION
Black bullheads are native to much of the U.S. east of the Rocky Mountains except the eastern seaboard. Their range has been greatly filled in and expanded through introductions and now includes most Western states. Their introduction to California is not known because early introductions were recorded as "catfish" or "bullheads." The earliest confirmed record is from the Colorado River in 1942. Often mistaken for brown or yellow bullheads, the Black bullhead is now the most common bullhead catfish in California.

ENVIRONMENT
They are capable of surviving in water temperatures up to 95 degrees Fahrenheit, salinities as high as 13 ppt, and low dissolved oxygen levels 1-2 mg/liter.

{**Carp**, *Cyprinus carpio*}



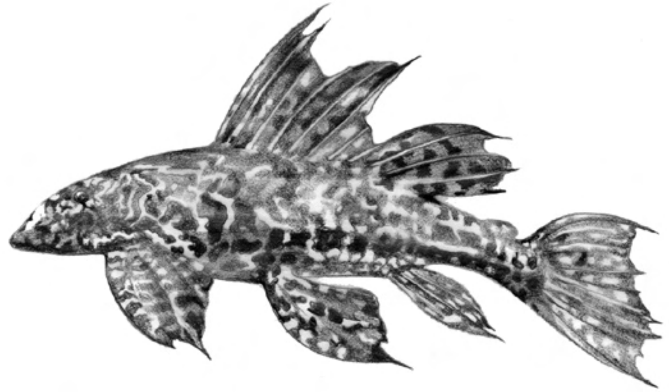
STATUS
Non-native species widespread and expanding. There are some who believe carp are not the creators of adverse conditions but rather moved into an area already disturbed. Their ecological role in California is poorly understood because they are found in disturbed and polluted habitats. 58 collected in FoLAR's L.A. River

DESCRIPTION
During their first summer they may average 5 inches and grow 3-4 inches per year until their fourth year when growth slows down. Wild carp are said to live 12-15 years and grow to around 31 inches and 9 lbs. The largest carp recorded in California was caught in Lake Nacimiento, San Luis Obispo County and weighed 58 lbs and there have been reports of 23 lb carp caught in the Glendale Narrows section of the Los Angeles River.

DISTRIBUTION
Common carp in California are descended from domesticated carp from Germany and Japan. They have survived in the West due to their ability to survive adverse conditions. They can withstand exceptionally high turbidity, sudden temperature changes, and low oxygen concentrations. They are omnivorous bottom feeders and their preferred foods are aquatic insect larvae and adults are known to feed on aquatic plants and algae. Usually living in deep turbid water, in clearer water, cover, such as submerged tree branches and beds of aquatic vegetation, becomes important.

ENVIRONMENT
Optimum water temperature for carp is around 75.2 degrees Fahrenheit and they can withstand exceptionally high turbidity, sudden temperature change, low oxygen concentrations (0.5-3.0 ppm), and salinities up to 16 ppt. Omnivorous feeders, diet consists of zooplankton, phytoplankton (algae), benthic insect larvae, invertebrates, and aquatic plants.

{**Amazon sailfin catfish,** *Pteroplinchthys pardalis*}



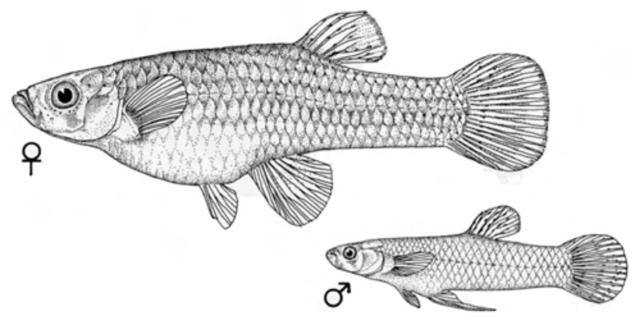
STATUS
Non-native species. 7 collected in FoLAR's L.A. River sample.

DESCRIPTION
Maximum size of these sucker mouth, armored catfish ranges from 15-16 inches. Their bodies have dark, leopard like spots of variable size with geometric patterns on the head.

DISTRIBUTION
South America: Lower, middle and Upper Amazon River basin. Introduced to countries outside its range. Popular and hardy aquarium fish, they may also be found in Freshwater environments in swift-flowing streams from lowlands up to 3,000 m.

ENVIRONMENT
These catfish are able to live in water with a pH range of 7.0-7.5 and temperature between 73.4 – 82.4 degrees Fahrenheit. Normally a bottom-dwelling fish, they have the ability to breathe air from the surface of the water during dry periods and those in which dissolved oxygen is too low.

{**Western Mosquitofish**, *Gambusia affinis*}



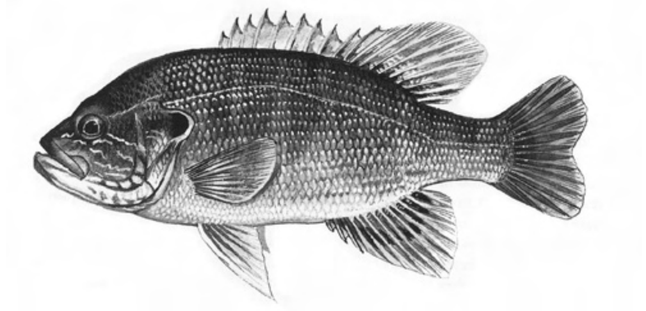
STATUS
Non-native species that is widespread and expanding. Western mosquito fish have been a popular mosquito control agent in California and they have been planted in warm waters throughout the state. They have been accused of eliminating smaller fish species as well as feeding on and reducing the number of eggs and larvae of endemic invertebrate and amphibians. In California they are said to have contributed to the decline of the Amargosa pupfish populations. However, other factors are important to consider such as destruction of habitat and introduction of other species. 668 collected in FoLAR's L.A. River sample.

DESCRIPTION
Females are approximately 2 inches and males 1.37 inches. When examined closely, they will often have a teardrop-like black streak below each eye and rows of speckles on the caudal and dorsal fins.

CHARACTERISTICS
They are omnivorous, opportunistic feeders that feed mainly during the day. Mosquito larvae and pupa form a substantial portion of their diet but they also are know to feed on what is abundant. Typically this will include algae, zooplankton, terrestrial insects, and miscellaneous aquatic invertebrates.

ENVIRONMENT
Western mosquito fish are well adapted for life in shallow, often stagnant waters with high temperatures. They are capable of withstanding water temperatures of 95 degrees Fahrenheit, pH ranges of 4.7-10.2, low oxygen levels (0.2 mg/liter), and salinity at 0-58ppt. High levels of selenium however impact reproductive rates and produce malformed young.

{**Green sunfish**, *Lepornis cyanelius*}



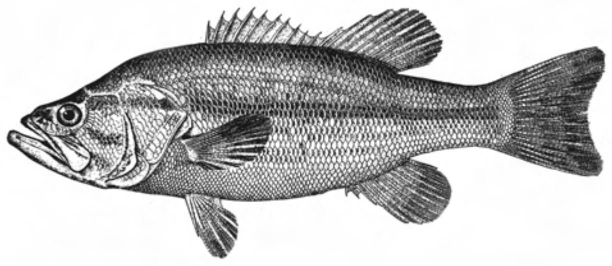
STATUS
Non-native species that is widespread and stable and/or expanding. This species is widely distributed and may be extending its range throughout California. Presumably such species are integrated into local ecosystems. 92 collected in FoLAR's L.A. River sample.

DESCRIPTION
Adults are dark olive on the back, becoming light on the sides with iridescent green flecks.

DISTRIBUTION
Originally native to most of the Mississippi drainage system including the Great Lakes, their original distribution has been obscured by widespread distribution. They are now present in virtually every state in the U.S. First introduced to San Diego, California in 1891 they have spread to other waterways throughout the state.

ENVIRONMENT
Inhabitants of small, warm streams with shallow weedy areas. In central California they are abundant in warm, turbid, muddy bottom pools containing beds of aquatic plants and populations of other introduced fish, such as largemouth bass and mosquito fish. They are also found to survive in high temperatures (>100 degrees Fahrenheit), low oxygen (<1mg/liter) and alkalinities up to 2,000 mg/liter.

{**Largemouth bass**, *Micropterus salmoides*}



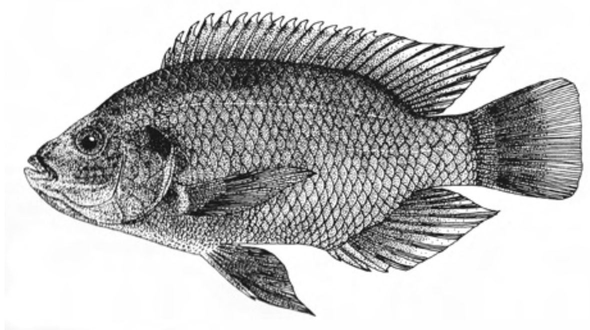
STATUS
Non-native species that is widespread and stable. The species is widely distributed but seems to have reached the limits of its range. Presumably such species are integrated into local ecosystems. 1 collected in FoLAR's L.A. River sample.

DESCRIPTION
Distinguished by their large mouth and heavy black stripe on each side, largemouth bass range in size from 1 inch – 4.9 inches. Their flexible foraging strategies and wide environmental tolerances have made them a keystone predator in many bodies of water. Juveniles feed mainly on rotifers and small crustaceans and then progress to aquatic insects and fish fry, including those of their own species, crayfish and tadpoles.

DISTRIBUTION
Historically these bass ranged from northeastern Mexico through much of the Mississippi. They have been introduced into all the continental United States (and Hawaii) and most provinces of Canada. In California, largemouth bass were brought from Illinois and planted in San Diego and Colusa County in 1891 They have since been spread statewide by anglers and agency biologists.

ENVIRONMENT
Warm shallow waters of moderate clarity and beds of aquatic plants are the usual habitat of largemouth bass. They like water temperatures between 96.8-98.6 degrees Fahrenheit with dissolved oxygen levels as low as 1 mg/liter and in California, have been found in water with salinities at 3 ppt.

{**Tilapia**, *Oreochromis sp*}



STATUS
Non-native species to California that is widespread and expanding. Mozambique tilapia (in reality a hybrid form) are now one of the most common fish in the Salton Sea, the lower Colorado River and the lower reaches of some southern California streams. 271 collected in FoLAR's L.A. River sample.

DESCRIPTION
Three species of Tilapia (Mozambique, Blue, and Nile) are documented in California along with hybrids of these species. All can not be identified in California with out using biochemical techniques.

DISTRIBUTION
Mozambique tilapia now in California evolved from southeast Africa, and brought to San Francisco through Hawaii where they were used for aquaculture. In 1953 the Steinhart Aquarium in San Francisco served as a distribution point for the mainland. In 1972 and 1973 Mozambique tilapia were deliberately introduced to the lower Santa Ana, San Gabriel, and Los Angeles Rivers.

ENVIRONMENT
The thermal tolerance zone for the Mozambique tilapia is 59-96.8 degrees Fahrenheit and they can also tolerate salinities of 69-120ppt. Preferred habitat includes warm, weedy canals and river backwaters. They are omnivorous feeders and feed on planktonic algae, aquatic plants and detritus. They can digest plant material because of the extreme acidity of their stomach fluids.

FOLAR

www.folar.org 323.223.0585

570 W. Ave. 26, Los Angeles, CA 90065

Printed on recycled paper with soy ink.