AZ-NM CHAPTER
AMERICAN FISHERIES SOCIETY

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**How time flies!**

Our annual meeting is past, spring surveys are completed, and summer is but a few days away -- finally a time to relax. Oh, how I wish this were true. As summer begins we find ourselves analyzing data, writing reports, scheduling more surveys, and of course there are vacations to plan for and take. Before you know it summer's over, fall surveys and spawns are in full swing, hunts are taking place, and we're starting to prep for the holidays. Sitting in your office - reminiscing about the recent holidays season – when "Ding" the message alarm sounds on your computer alerting you to an incoming email message. You lazily open the message and as you read the text you suddenly jump up. NO WAY!!! It can't be that time already. Yep, it's time for the annual meeting. Believe me, it'll be here before you know it. And the good news is, this year we get to plan the joint annual meeting. Yep it's that time. We need to start putting our heads together and again raise the bar just a little further. Let's plan a meeting the wild lifers won't soon forget. This means we need everybody's participation with the planning, implementing, and contributing to make sure this is another great meeting. I know it's early in the year and the annual meeting seems like it's a long way off, but it's not. It will be here before you know it. Give Andy a call and become involved.

Congratulations are in order for our very own (soon to be big daddy) Mark Brouder who was recently awarded the ***AFS Distinguished Service Award*** by the AFS parent society (the mother ship). WAY TO GO MARK!!!! It's good to see our folks recognized by the parent society for their hard work and dedication. Our chapter is extremely fortunate in that we have numerous folks just like Mark who are highly dedicated and motivated individuals. As the year progresses let's keep these folks in mind and when the time comes let's nominate these hard working individuals for the numerous awards available at both the chapter level and the parent society level.

Other ongoing business within the chapter is the addition of student sub-units. We're in the process of modifying our by-laws to include several student sub-units. Our first student unit was recently started at the University of Arizona. These students are highly motivated and should prove to be a great asset to our chapter. Plans are in the making for another student sub-unit. This one is in Mexico. This is a first in AFS history where a chapter was able to create a student sub-unit in another country. Again if anybody in the chapter is willing, we sure could use some help in bring these two sup-units into our chapter.

During our last business meeting we decided to move our continuing education class away from the annual meeting into mid summer. Well, block out August 16 and 17 on your schedules for this year's class on ***Investigation and Valuation of Fish and Mussel Kills.*** The class will be held in beautiful, cool, Silver City New Mexico so don't forget your cameras and jackets. Don't miss out on this great opportunity so register early.

**Thanks to everybody for all of your hard work throughout this year and I look forward to seeing everybody in Silver City. -- Casey --**

INSIDE THIS ISSUE: NATIVE FISH RESEARCH AND MANAGEMENT

## Searching for Suckers!

Since the project's start in January 2003, a field team from the Native Fish Lab[1] at Arizona State University has made monthly treks to the lower Colorado River in attempt to locate razorback suckers, *Xyrauchen texanus*, repatriated to this portion of their historical habitat. With the status of federally listed endangered species, a stocking program began several decades ago throughout the lower Colorado River basin. The species is extirpated from the majority of the basin and remaining wild populations of this long-lived fish have dwindled to only a few hundreds of individuals in a few places. Their decline is attributed to a combination of habitat modification (e.g., dams, agricultural diversion) and predation of early life stages by non-native fishes, both inhibiting recruitment. In an attempt to side step these threats, razorback suckers are artificially spawned in hatcheries and grown-out in protected environments until they reach a size relatively safe from predation by non-native fishes. To date, nearly 2.5 million razorback suckers have been stocked into the lower Colorado River downstream from Parker Dam.

The Native Fish Lab also maintains the mark/recapture database for razorback sucker and other native fishes in the lower basin. Statistical analysis of size-at-release data shows unequivocally that fish stocked at larger sizes have a much better chance of survival than fish of smaller size. For example, a fish stocked at 350 mm has more than twice the first-year survival probability as a fish stocked at 300 mm (26% and 10%, respectively). This information was incorporated into the stocking protocol in the late 1990's and since that time, fewer but larger fish have been stocked into the river (approximately 40,000). However, the question remained whether or not these fish were surviving.

With support from the Bureau of Reclamation and other federal and state resource management agencies, the Native Fish Lab developed a monitoring plan to gage the success of the stocking program. To do this, a field team performs monthly, 5-10 day surveys between Parker Dam and Laguna Dam specifically targeting the razorback sucker. The area comprises 149 miles (240 km) of river and nearly 300 off-channel bodies of water totaling about 34 square miles (8806 hectares). Primary survey methods are trammel netting and electro-fishing, which have yielded more than 20,000 fish comprising 20 species, including 2 native species. A total of 119 razorback suckers have been captured, accounting for less than 1% of the catch. This statistic is on the rise now that sampling has been intensified in locations where razorback suckers are locally abundant, which primarily is near and downstream from the single stocking site. At capture, all razorback suckers are implanted with a PIT tag, which when sample size is large enough, will enable population estimates based on mark/recapture analysis.

Thus far the sampling results have been positive (for example, Figure 1). Similar surveys (prior to the stocking program) failed to encounter razorback suckers. With the present stocking protocol, all fish are released at >250 mm total length, which takes about a year to attain. For the 119 fish captured, the mean total length was 397 mm (range 265 to 598 mm). Growth rate data suggest these fish were young, 3 years old at most and therefore from a recent stocking.

Figure 1. This 598 mm female was the first razorback sucker to be recaptured during the project. She grew 123 mm in 16 months and was recaptured in the same backwater as originally captured. Despite her large size is likely to be only 3 or 4 years old.

Some additional interesting observations have been made. For example, several small razorback suckers were captured 70 miles (112 km) downriver of the stocking site. These fish bypassed more than 150 backwaters directly accessible from the main channel and traveled downstream to be captured in the marina area of an RV park just above Imperial Dam. This is contrary to the general trend shown by the other 115 captures, which have occurred within 30 miles (48 km) downstream. In response to these distant captures, sampling has been intensified in the area, but has not yet yielded any further contacts with razorback suckers.

A portion of the razorback sucker captures have occurred in the "old river channel," which now is utilized as an irrigation drain for the Palo Verde Valley, CA. Conductivity and dissolved solids of water in the drain are twice that of the main channel. There also is an increased incidence of external parasites on razorback suckers found in the drain (Figure 2). Plans are in development to increase the flow of fresh river water through the drain to appease local concerns of water quality. It will be

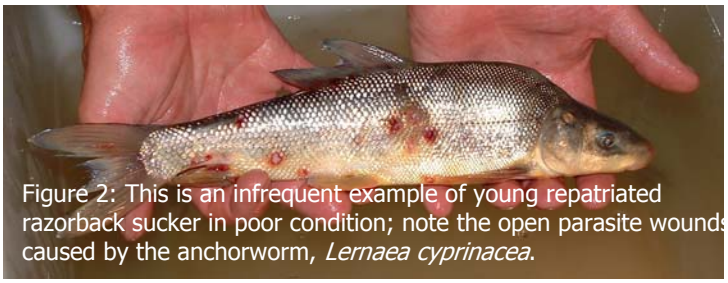


Figure 2: This is an infrequent example of young repatriated razorback sucker in poor condition; note the open parasite wounds caused by the anchorworm, *Lernaea cyprinacea*.

[1] The Native Fish Lab additionally includes Dr. Paul Marsh (Principal Investigator), Darren Thornbrugh (Field Team), Carol Pacey (Database Manager), and Brian Kesner (Statistician)

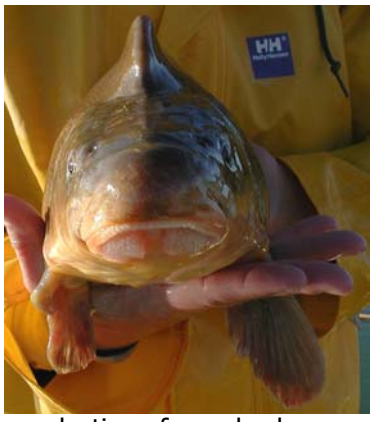
interesting to note the resulting effects if any on razorback sucker habitat use and parasitism.

The project will continue through 2007, with adaptive adjustments to the sampling strategy being made in response to new information on capture locations and local abundance. In the event that spawning activity is identified, larval collections will be incorporated into the sampling strategy. Until then, the Native Fish Lab will continue searching for suckers.

**~Jason Schooley, ASU, School of Life Sciences, Native Fish Lab: jschooley@asu.edu**

## Status of Razorback Suckers in Senator Wash Reservoir, CA: Preliminary Results

The razorback sucker *Xyrauchen texanus* is an endangered southwestern fish in the Colorado River system. Razorback suckers have suffered severe population declines due to habitat alteration and destruction, change in water quality, and competition with and predation by non-native fishes.



Recovery efforts have been in effect for over 20 years, and while there is some evidence of reproduction of razorback suckers in the wild, substantial recruitment has not been documented. In 2001, USFWS reported that information on recruitment events is critical to future management of razorback suckers.

Senator Wash Reservoir is located on the California side of the Colorado River near Yuma Arizona. Senator Wash Reservoir is a back pump storage reservoir which was completed in 1966 and currently has a surface area of approximately 470 acres.

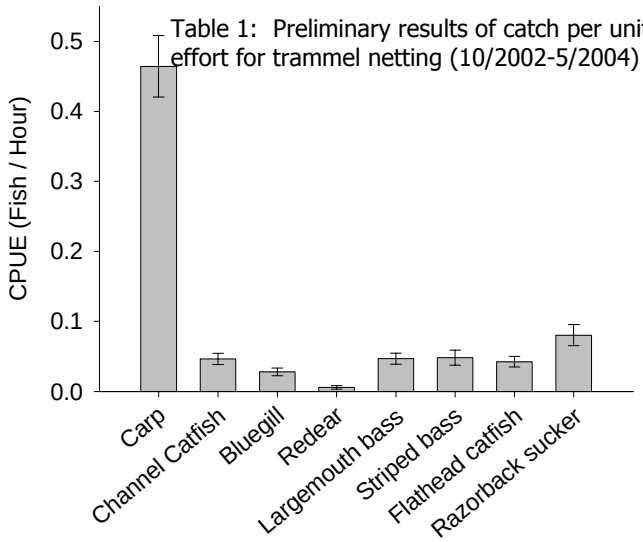
Razorback suckers were first documented in Senator Wash in 1973. These razorbacks were likely trapped within the reservoir following completion and filling of the reservoir. This population was first studied in the 1980s by Ulmer et al., who estimated the population to consist of 54 (95% C.I. 32 to 76) adult razorback suckers. They also conducted telemetry studies, documented spawning, and initiated stocking of razorbacks into Senator Wash. From 1987-1990 approximately 4700 razorback suckers were stocked into Senator Wash Reservoir.

Larval razorbacks were collected 1999 and 2001 (Scott Gurtin, AGFD personal communication), indicating that either the adult razorback population sampled by Ulmer et al. (1985) and stocked by CAFG was still reproducing or, some recruitment was achieved from previous spawning events. In either case, we are presently unaware of current population levels and have no documentation of recruitment that may have taken place since the Ulmer et al. study.

As a result, the Bureau of Reclamation funded a study through the Arizona Game and Fish Department to 1) determine population status of razorback suckers in Senator Wash Reservoir, California; 2) determine size (and/or age) structure of the razorback sucker population; 3) monitor and quantify razorback sucker reproduction and growth; 4) determine structure and population dynamics of entire fish community and correlate changes in community structure/population dynamics to razorback reproduction; 5) determine survivability of stocked razorback suckers in Senator Wash Reservoir.

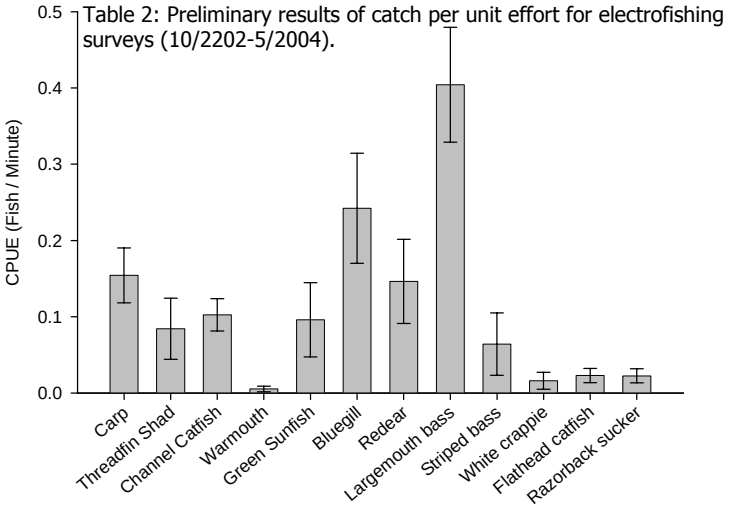
To meet these objectives, we have been conducting monthly trammel netting surveys, quarterly electrofishing surveys, and larval light trapping surveys since October of 2002. To date we have captured 172 adult razorback suckers (TL=445-679), 119 of which we have PIT tagged for mark recapture population estimates and growth estimates. To date we have recaptured 33 marked razorback suckers. Using a mark recapture population estimate for a closed population, our estimated population size is 352 adult razorback suckers (95% C.I. 247 to 544). To date we have not documented the presence or larval razorback suckers or recruitment of razorback suckers.

Table 1: Preliminary results of catch per unit effort for trammel netting (10/2002-5/2004)



Based on our preliminary catch per unit effort (CPUE) data from trammel netting surveys (Table 1),

Table 2: Preliminary results of catch per unit effort for electrofishing surveys (10/2202-5/2004).




razorback suckers are fairly common in Senator Wash when compared to the other fishes species aside from carp, which were the most abundant species. Our CPUE from electrofishing surveys (Table 2) have yielded information about the rest of the fish community. Electrofishing is not the most effective gear for capturing razorback suckers in Senator Wash, selecting primarily for centrachids and other near shore fish communities.

Our project is scheduled to be completed in September 2005 and we are continuing with our monthly trammel netting survey's and quarterly electrofishing survey's to yield information of fish community structure and size as well as to conduct mark recapture population estimates on razorback suckers. We will also be determining recruitment based on published growth data for razorback suckers. And we will be quantifying reproduction of razorback suckers using larval light traps.

**~Laura Leslie, Research Branch, Arizona Game and Fish Department jslaughter@gf.state.az.us**

## Influence of Species, Size Class, Environment and Season on Introduced Fish Predation on Native Fishes in the Verde River System

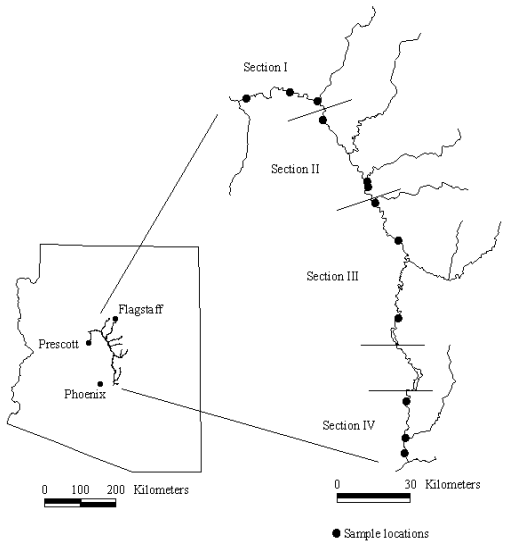
Nonnative fishes were introduced throughout the Western United States for sport, food and biological control primarily in the early part of the last century and in the late 19th century. Unfortunately, introduced fish have also been implicated in declines of native fish assemblages in many western rivers, along with water diversion and habitat loss. Because of these declines, many native species of western rivers are listed as threatened and endangered under the U.S. Endangered Species Act.

Previous research projects determined that non-native species can affect native fish by predation in Arizona river systems; however, there is much less information about exactly where and when impacts occur, and which introduced species are responsible for a majority of the impact. Knowledge of where and when specific bottlenecks occur which limit native fish production is useful to managers when designing introduced species control programs. Introduced species control programs can then be focused in habitats, at times of year, and on specific introduced species to maximize their efficacy, with the least impact to valuable sport fisheries. The primary goal of our study was to examine the impacts of total populations of introduced fishes (predation rates of introduced fish species x population size) and size groups within these populations to identify where control programs might be targeted in the Verde River system for maximum benefit.

In addition, much still remains to be learned about the basic ecology of desert fishes. The density and standing crop that fishes can obtain in various environment types are basic measures of productivity commonly used to manage species and understand their ecology. Estimates of fish densities and standing crops have been made for various lakes, reservoirs, and rivers throughout the world, but there is little information available regarding the densities and standing crops achieved by fishes in Southwestern desert rivers. A secondary goal of our study was to provide information on the basic biology of native and nonnative fishes in the Verde River such as their distribution, standing crops and densities.

**Methods**

We conducted our study from the upstream reaches of the Verde River to its confluence with the Salt River



(Figure 1). We surveyed the river once per month from March 2002 to January 2003. First, we subdivided the Verde River into the 4 divisions corresponding to those outlined in Rinne et al. (1997) Then, within each division, we randomly chose 3 sampling sections that contained riffle, run and pool environment types for a total of 12 sampling sections across the river overall. On each sampling trip, each environment type was first enclosed by block nets. Fish in the environment type were then captured using a raft electrofishing boat to sample midwater sites and deep pools, and backpack electrofishing units to sample shallow areas. Environment types were electrofished in the same manner for three or more passes until depletion to obtain population estimates by removal method. Environment types where fish were captured (pool, riffle, run) were recorded, as well as water temperatures in each environment type. Captured fish were anesthetized and stomach contents of introduced fish were obtained using gastric lavage techniques or by sacrificing those fish without true stomachs. Area of each environment type was measured for density estimates.

Stomach contents were preserved with ethanol and transported back to the laboratory. Contents were then separated into fish, insects, zooplankton, crayfish, and amphibian categories and wet weight was obtained for each proportion. Fish prey were identified to species using diagnostic bones when possible. Diagnostic bone keys were prepared from hatchery and field-collected specimens of the fish species found in the Verde River. Growth rates of predators were estimated by examining movement of length-frequency modes for particular age classes and by following growth of tagged fishes. Water temperatures were measured at the time and in locations of fish capture.

The proportion of native fish in predator diet, growth rates of the predators and water temperatures recorded at field sites were entered into the Wisconsin bioenergetics model to estimate the feeding rates in grams per hour of each predator. The Wisconsin bioenergetics model was chosen because of its close approximation to standard field estimates of fish predation in numerous studies. Consumption rates were calculated by predator species and size group in each of the three environment types (riffle, run, pool) and by season. Feeding rates in grams of native fish per hour were converted to number of native fish consumed per hour by using length-weight regressions developed for each native species.

Number of native fish per hour consumed per predator was multiplied by the removal population estimate of each predator species at each site to estimate impact of each fish species and size group. Impact estimates were also subdivided by environment type, and season.

**Summary of Results**

Over 30,700 fish were collected, comprising 6 native species and 13 nonnative species. Only three native species, desert sucker *Catostomus clarki*, Sonora sucker *C. insignis*, and roundtail chub *Gila robusta* were found throughout the river. Colorado pikeminnow and razorback sucker were only found in Sections II and III respectively, where they were being repatriated. Longfin dace *Agosia chrysogaster* were only caught in Section IV.

The degree of piscivory varied considerably among introduced fish species. Tilapia *Tilapia spp.*, common carp *Cyprinus carpio*, red shiner *Cyprinella lutrensis*, mosquitofish *Gambusia affinis*, and threadfin shad *Dorosoma petenense* were primarily herbivores and/or insectivores (diet < 0.5% fish). Bluegill *Lepomis macrochirus*, rainbow trout *Oncorhynchus mykiss*, and green sunfish *L. cyanellus* were primarily insectivores and less than four percent of their diet consisted of fish. Largemouth bass *Micropterus salmoides*, flathead catfish *Pylodictis olivaris*, channel catfish *Ictalurus punctatus*, smallmouth bass *M. dolomieui*, and yellow bullhead *Ameriurus natalis* contained the highest percentage of fish in their diets.

Native fish were found in the diets of largemouth bass, flathead catfish, channel catfish, and yellow bullhead only below Bartlett Dam and in the diet of smallmouth bass in the headwaters of the Verde River.

The percentage of native fish in the diets of piscivores was highest in spring and summer in pools and riffles. Sonora and desert suckers primarily occurred in the diet of primary piscivores in pools, and longfin dace occurred in their diets in riffles. Overall, largemouth bass had the highest percentage of fish and native fish in their diet (16.7%, and 8.3% respectively); four times that of any other piscivore in the Verde River.

Rates of consumption of both native fish and total fish also varied considerably among different introduced species. Largemouth bass had the highest overall daily ration of fish and native fish, more than twice that of any other species. The daily ration of fish consumed by largemouth bass was highest below Bartlett Dam where native fish densities were the highest and when native fishes were spawning (spring and summer). Finally, daily ration of juvenile largemouth bass (< age 1) was higher than other juvenile nonnative fishes, which corresponds with overlap in use of habitat with age 0 native fishes.

Although fish were a small percentage of the diet of rainbow trout, they had the second highest daily ration of fish (exclusively nonnative), while all other species had similar lower daily rations of fish and native fish.

The diet of rainbow trout consisted of only a small percentage (3.83%) of fish. However, individual rainbow trout exhibited a high average consumption rate of fish, probably due to the high metabolic demands of the rainbow trout in the warm waters of the Verde River. Our sample size of rainbow trout was small (n=32), so it was difficult to make conclusions about the impact of this species. Future studies directed specifically at piscivory of rainbow trout in the Verde River are needed to better define their impact.

Nonnative fishes were approximately 2.6 times (95% C. I. 2.2 to 3.1 times) denser per 100m$^2$ of river than native fishes, and their standing crop was approximately 2.8 times (95% C. I. 2.0 to 4.0 times) that of native fishes per 100m$^2$ of river. Native fishes were most dense in Sections I and IV (highest and lowest elevations), while their standing crop was greatest in Section I. Nonnative fishes were most dense in Section I, and had the greatest standing crop in Sections I and II. The highest standing crops of native fish were in pools and runs, and of nonnative fish in pools. There was no difference in native fish densities by environment type, but nonnative fishes were most dense in riffles. The ranges of estimated annual standing crops of fish in this desert river were similar to those of other temperate and tropical rivers around the world.

Some researchers have speculated that small abundant species such as bluegill, green sunfish, red shiner, and mosquito fish may have the largest predation impact on native desert fishes through their sheer numbers. Because of extremely low piscivory (red shiner, green sunfish, and mosquito fish) or low densities (bluegill), we did not find this to be true in our study. Traditional piscivores such as black basses had the greatest impact.

Largemouth bass, the predator with the highest percentage of fish in their diet and the highest consumption rate of native and total fish, also had the largest impact. We estimated that largemouth bass *Micropterus salmoides* caught in pools and runs in Section IV consumed the most native fish, with an average 582.3 mg of native prey fish eaten/ 100m$^2$ of pools/ day (SE = 111.7) and 238.7 mg of native prey fish eaten/ 100m$^2$ of runs/ day (SE = 52.6). Age 1 and 2+ largemouth bass consumed more total prey fish than age 0 largemouth bass. Smallmouth bass was the only predator observed to consume native prey fish in Section I.

Largemouth bass were concentrated in pools and runs. We found no differences in smallmouth bass densities among environment types.

To focus efforts on those predators currently consuming the most native fishes in the Verde River, managers should target control efforts at age 1 and 2+ largemouth bass in Section IV, and at smallmouth bass in Section I.

**~Scott Bonar sbonar@ag.arizona.edu, Laura Leslie llleslie@aol.com, and Cristina Velez Cristina_Velez@partner.nps.gov , University of Arizona.**
**Please contact us for .PDF version of final report.**

## Temperature Tolerance Determination of Southwestern Fish Species

As in-stream flows in Arizona are decreasing, maximum stream temperatures are rising, and the amplitude of daily temperature fluctuations are increasing. Despite the fact that rising stream temperatures have been documented in Arizona since the early 1900's, the effects of these temperature changes on native fish species remains relatively unknown. A study is being conducted by the University of Arizona to examine the thermal tolerance of two federally threatened species native to the Gila Basin, loach minnow (*Tiaroga cobitis*) and spikedace (*Meda fulgida*). In the past, field data has been collected and rough estimations have been made concerning the upper lethal tolerance of several native fish species. This study, however, is unique as it utilizes three well-tested methodologies to develop an estimate of the upper thermal tolerance for *T. cobitis* and *M. fulgida* and more importantly documents the sub-lethal effects of altered temperature regimes on these species.

Of the three methodologies being utilized in this study, the critical thermal methodology (referred to as CTM) is by far the most well-known and most published method for temperature tolerance determination. This


Tanks for thermal tolerance tests at the University of Arizona's Environmental Research Laboratory

method is popular as it is less time consuming (about two hours) and requires fewer fish than other methods. After an acclimation period at 25°C or 30°C for a minimum of two weeks, the test species are exposed to a linear increase in temperature until a predefined endpoint is reached. Depending on the purpose of the study tests can be run until loss of equilibrium is experienced or until death. Rate of change for this test is extremely critical in order to accurately estimate the upper lethal limit. The

rate of change depends on the size of the fish, as it must be slow enough to allow body temperature to track water temperature without being so slow that fish can acclimate to the changing water temperature. For the purpose of this study 0.3°C/min was chosen as the rate of change. Because the rate of change is unnaturally fast, it is relatively unknown how CTM values apply to the field.

To date eight native species and six nonnative species have been tested using this method. Literature on the thermal tolerance of a few of these species does exist however the testing procedures have been variable, which has made comparisons among species difficult. This study will allow us to compare, with confidence, the upper thermal tolerance of many of our native and nonnative species.

The second method being used in this study is the acclimated chronic exposure method (referred to as the ACE method), which involves a slow increase in temperature (1°C per day) until a test temperature is reached. Fish remain at this test temperature for a total of 30 days and lethal and sub-lethal effects are recorded. Using the ACE method, we can see how length of exposure affects temperature tolerance. This method is slightly more challenging as it requires a large laboratory facility to conduct tests. The construction of this lab has been a great feat, however it is now complete and working! Chronic exposure tests have been conducted on both *T. cobitis* and *M. fulgida*, at temperatures ranging from 25- 36°C. We determined a 30-day LT50 (temperature at which 50% of fish die after 30 days of exposure) and also found that fish grew slower at sub-lethal temperatures when compared to the controls at 25°C.

However, constant high temperatures do not normally occur in the natural habitat of *T. cobitis* or *M. fulgida*, making the ACE tests somewhat unnatural. Arizona streams do however experience wide swings in temperature, and the literature suggests that fish can survive repeated short-term exposure to temperatures above their LT50. Tests are now being conducted using a third method: the ACE method with fluctuating temperatures. The 24hr fluctuations range from 4°C to 10°C in size with the upper lethal temperature determined in the previous experiment acting as the upper limit for these tests. This method mimics natural stream temperatures far better than the 2 previous methods and the results will be more relevant to stream management. The combination of these three methods will enable us to accurately determine the thermal requirements for these two species. We will be presenting the results of these experiments in Fall 2004 at the Desert Fishes Council meeting. See you in Tucson!!!

**~ Ann Widmer, ann_widmer@yahoo.com, and Corissa Carveth, ccarveth@ag.arizona.edu, University of Arizona**

## Roundtail Chub

Roundtail chub (*Gila robusta*) are a unique native fish in Arizona because they are a sport fish and a Species of Special Concern. The roundtail chub is a member of the minnow family and is characterized by a small flat head, followed by a thick, yet streamlined body ending in a deeply forked tail. Coloration includes a dark mottled olive gray back, silvery sides, and a creamy white belly. Breeding males and females typically exhibit reddish-

orange coloration on the their cheeks and a patchwork of orange blotches along their sides and on their fins. Individuals average 10 to 12 inches, but can grow as large as 19 inches and weigh over 3 pounds. The world record roundtail chub, measuring 18.5 inches and weighing 3 pounds 14 ounces, was caught in 1983 from the lower Salt River in Arizona. Recent sampling in the Gila River basin by Arizona Game and Fish biologists has revealed numerous individuals of record size. The next world record is out there, just waiting to be caught.

Roundtail chub occur in cool to warm water, mid-elevation streams and rivers, often occupying open areas of deep pools and eddies. Holding lies are typically associated with some form of cover, such as large boulders, tree root wads, submerged large trees and branches, undercut cliff walls, or deep water. Smaller chubs are generally located in shallower, low velocity water adjacent to overhead bank cover.

This species is essentially a carnivorous opportunistic feeder, consuming terrestrial and aquatic insects, especially chironomids, mayflies, and caddiflies, crustaceans, other fish, and sometimes filamentous algae. In some systems, roundtail chub are the top carnivore preying on larvae and juveniles of other fish species.

Spawning occurs in spring and late summer as spring runoff subsides. Females broadcast about 2,000 tiny sticky eggs over stream bottoms consisting of gravel or cobble. Transparent larvae hatch in 5 days and grow to about 3 inches in their first year.

Roundtail chub historically occurred throughout large tributaries of the Colorado River basin from Wyoming south to Arizona and New Mexico, as well as, northwestern Mexico. Unfortunately, the distribution and abundance of roundtail chub is declining throughout its' historic range. As with many native fish, reductions in range and numbers are likely the result of habitat loss, as well as competition with, and predation by, non-native fishes. Habitat destruction is related to livestock grazing,

water withdrawal, dams and urban and agricultural development. In the Colorado River basin, roundtail chub occupy only 18% of their historical range. Roundtail chub are currently being considered for threatened and endangered listing by the U.S. Fish and Wildlife Service.

Three management needs have been identified for this species: (1) watershed and stream flow protection; (2) research to determine the mechanisms of disappearance of the species; and (3) actions to reduce or eliminate the negative effects of non-native fishes.

**~Matt Hyatt, Arizona Game and Fish Department, Research Branch**

## Recent Research Indicates that Native Species are just as Effective at Mosquito Control as the Nonnative Mosquitofish.

The Gila topminnow's battle for survival began during the early 1900s. Technological advances began pumping groundwater to the surface for agriculture, mining, and residential uses. Groundwater pumping resulted in lowered water tables, dry stream bottoms, and dry springs. Extensive overgrazing of the range resulted in increased erosion and arroyo cutting, causing additional decreases in water tables (Minckley and Deacon 1991). Mosquitofish became more abundant and widespread, resulting in serious impacts on topminnow populations through predation and competition. When these factors were combined, they caused the drastic decline in distribution and abundance of Gila topminnow. The decline of the topminnow resulted in its listing under the Endangered Species Protection Act of 1966 and later under the Endangered Species Act of 1973. By the early 1980s, the Gila topminnow was reduced to approximately 10 geographically isolated populations in the Gila River basin.

Gila topminnow populations are primarily replaced by mosquitofish through direct predation on larvae and juveniles and through increased incidence of disease in adult topminnow due to attacks and fin shredding by mosquitofish. The use of mosquitofish in Arizona should be discouraged in most cases and should not be used anywhere there is potential for them to escape into the natural environment and negatively affect our native species.

Recent studies have indicated that, "Topminnow appear to be as effective as mosquitofish at mosquito control, under most environmental conditions. Topminnow are desirable for use as a biological control agent in Arizona because they are native to the region and, historically, were widely distributed. In addition, topminnow are listed as endangered, and their use as a biocontrol agent would result in the establishment of more refugia populations, while reducing the need for continued introduction of exotic mosquitofish……. so, in the interest of species conservation and recovery, Arizona Game and Fish Department recommends use of (this) species for future mosquito control." (Childs 2001, "*Comparison of Gila Topminnow and Mosquitofish as Biological Control Agents of Mosquitoes*").

The long-term goal for the recovery of Gila topminnow is to remove it from the endangered species list. The short-term goal is to re-establish sufficient populations making down-listing from endangered to threatened possible. The Arizona Game and Fish Department (AGFD) coordinates an intensive reintroduction and monitoring program to prevent extinction and promote recovery of Gila topminnow. The AGFD Native Fish Program monitors and protects habitats that are occupied by natural and long-lived reestablished populations, establishes refugia populations, and develops partnerships with federal, state, tribal, and private entities. Refugia, or man made habitats, help to preserve unique lineages or species. These populations can be used to restock and/or reintroduce populations into wild sites or provide genetic exchange between refugia populations. Captive populations also serve to increase public awareness and understanding of the status, ecology, and uniqueness of this endangered fish.

We are currently developing a statewide Safe Harbor Agreement (SHA) in coordination with the U.S. Fish and Wildlife Service, which will enable organizations and private landowners to assist in the recovery efforts by harboring refugia populations. The SHA would allow private organizations and individuals the ability to use native listed fishes such as the Gila topminnow on their properties in wetlands and ponds. This would serve two purposes: first to assist in the control of mosquitoes, and second to provide additional populations to aid in topminnow recovery.

Other cooperators in these ongoing activities include the Arizona State Land and State Parks departments, Bureau of Land Management, Forest Service, Fish and Wildlife Service, Bureau of Reclamation, The Nature Conservancy, numerous private landowners, school groups, and municipal water treatment operators.

We have the responsibility to conserve species that have existed for thousands of years before our time. All species, including humans, are interconnected to create healthy ecological communities.

**~Native Fish Program, Arizona Game and Fish Department, Phoenix, Arizona**

## Volunteers Needed!

Fossil Creek restoration is scheduled to begin in Fall 2004 and volunteers are needed to assist with fish salvage and renovation. Contact Kirk Young, AZGFD, Fisheries Program at 602-789-3259, kyoung@gf.state.az.us for details!

# Updates from Excom!

**Report from the Education Committee!**

As most of you are aware, it was decided during our last business meeting to conduct our continuing education class separate from the annual meeting, preferably during mid summer. Well its mid summer and the course is scheduled. This year's class is titled **Investigation and Valuation of Fish and Mussel Kills**. One of the instructors has over 20 years of experience while the other actually wrote the book on the subject. This two-day course will provide practical information and knowledge regarding the investigation of fish/mussel kills in freshwater environment. New economic values of fish kills have been developed and a new protocol and values have been developed for the investigation of freshwater mussel kills (AFS Special Publication 30). This course is designed for field personnel who are responsible for the investigation of such incidents however, supervisors are also highly encouraged to attend, as they will also benefit by gaining knowledge of the techniques used for reviewing reports prepared for such incidents.

**Instructor:** Wayne L. Davis, Rob Southwick, Marc Dahlberg, and Shawn Denny
**Location:** Santa Clara Armory, Silver City, New Mexico
**Day & Time:** August 16th & 17th 8am-5pm
**Tuition:** $25 for members, $50 for non-members

**~Casey Harthorn, Continuing Education Chair, 505-522-9796, charthorn@state.nm.us**

# Announcements!

Visitors to the Southeast Area Department of Game and Fish office in Roswell have a new treat in store. They can watch bass, bluegill and catfish cruise around in our 120 gallon aquarium. Special thanks to Jim and Paula Thompson, and the AZ-NM Chapter of the American Fisheries Society for their support on this project. By the way, it is a special occasion in the office when it comes time to feed the fish. It is amazing to see how fast the bass and bluegills devour the minnows that are dumped into the tank.

## New Books!

**Common and Scientific Names of Fishes from the United States, Canada, and Mexico, Sixth Edition**
~Joseph S. Nelson, Edwin J. Crossman, Héctor Espinosa-Pérez, Lloyd T. Findley, Carter R. Gilbert, Robert N. Lea, and James D. Williams.

This long-awaited authoritative reference provides an accurate, up-to-date checklist of common and scientific names for all described and taxonomically valid fish species living in fresh and marine waters of North America.

This edition contains 1,271 additional species and reflects numerous taxonomic changes that have occurred since 1991. Includes 3,699 species, 262 families, 52 established exotics, 13 named hybrids, the rationale and methodology for common name allocation, history of changes from previous edition, and extensive references. Also includes Spanish and French names. Includes a companion CD-ROM.

Book and CD: 395 pages, hardbound
List price: $60 AFS member price: $42

## Upcoming Meetings!

Jul 11-14—**Watershed 2004**, Dearborn, MI. See. www.wef.org/pdffiles/Watershed04Call.pdf.

Jul 11-15—**Association for Conservation Information: Channels of Communication,** New Orleans, LA. See www.aci-net.org/conf04. Contact 225/765-2925.

Jul 25-28—**Fish Health Section Annual Meeting,** Kearneysville, WV. See www.fisheries.org/fhs/meeting.htm.

Aug 1-4—**VI International Congress on the Biology of Fishes**, Manaus, Amazonas, Brazil. See www.fishbiologycongress.com.br/index.htm. Contact Chris Kennedy, ckennedy@sfu.ca, 604/291-5640.

Aug 21-26—**134th Annual Meeting: The Gathering: Leopold's Legacy for Fisheries**, Madison, WI. Contact Betsy Fritz, bfritz@fisheries.org, 301/897-8616, ext. 212

Sep 20-22—**Wild Trout VIII Symposium: Working Together to Ensure the Future of Wild Trout**, Yellowstone National Park, WY. See www.wildtrout8.org. Contact Robert Carline, rcarline@psu.edu, 814/865-4511.

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## Letters to the Editor!

**Dear Editor and Fisheries colleagues of the Arizona-New Mexico Chapter,**

I write to extend a personal invitation to members of your chapter to visit the fair city of Madison, Wisconsin this summer for the 134th Annual Meeting of the American Fisheries Society. As recent hosts of the meeting, you will certainly enjoy sitting back with no worries in Madison, and should feel free to snicker at the plight of those of us on the current planning committee. The Wisconsinites who attended the 2001 meeting have fond memories of Arizona, and most have recovered from their sunburns. I sit in a Wisconsin DNR office that honestly displays more memorabilia from that meeting than any other, and it seems only right to reciprocate your hospitality.

The meeting theme, "The Gathering: Leopold's Legacy For Fisheries" highlights a unique connection between our states. While Aldo Leopold is deeply associated with Wisconsin for his work at the University of Wisconsin and "A Sand County Almanac," one must recall that he spent the first 15 years of his career in New Mexico and Arizona. Much of the foundation for his later ideology was laid during his years in the Southwest, and his love for the area is evident in his direct and passionate writing about the region.

*The Land Ethic*, Leopold's magnum opus, was written in Wisconsin but born in your Apache, Gila, and Carson National Forests. Indeed, "The Land Ethic," stems from a keynote lecture delivered in 1933 to the Southwestern Division of the American Association for the Advancement of Science. The principles he espoused, the balance between recreation and wilderness, the inter-connectivity of land and living things, and above all responsible and ethical land and water use, are as applicable in water-rich Wisconsin as in the arid Southwest. These principles are as applicable in 2004 as in 1938, and perhaps today it is even more critical that they be employed. A collection of Leopold's writing, "The River of the Mother of God and Other Essays," (1991 University of Wisconsin Press), provides a fascinating portrait of the Southwest in the time he worked there, from scathing reports on the problems of erosion to salient essays on game management. Some may wonder what a forester has to do with fisheries, but fisheries absolutely cannot be managed effectively without an understanding of how land use affects the aquatic ecosystem.

We face shrinking travel budgets and growing restrictions in many of the agencies we represent, but I hold that as one is given fewer resources to do one's job, it becomes more critical that person be as informed as possible. In that regard, attending the AFS meeting is more beneficial than ever, to energize and galvanize us, to educate and prepare us to make the best resource management decisions possible.

If you weren't planning on coming, please reconsider. The scientific program (dealing largely with freshwater fisheries), the food, and the camaraderie will be fabulous, and August in Madison is something like Phoenix in April, with an added touch of humidity. If you've never been to America's only city on an isthmus, it's a wonderful time to visit. The first round of "local flavor" is on me for anyone in your chapter who makes the trip- hope to see you this summer!

**~Joe Hennessy Joseph.Hennessy@dnr.state.wi.us , Local Arrangements Chairman, 2004 AFS Annual Meeting, Madison President-Elect, Wisconsin Chapter American Fisheries Society**

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## Notes From the Editor…

The theme for the next edition will be Sport Fish Research and Management. Please consider submitting an article, we especially need more representation from the New Mexico area! The newsletter will be out mid October. If anyone would like to contribute an article please submit them to Anne Kretschmann by September 15, 2004.

Anne Kretschmann will be taking over the role as primary Editor for the next newsletter due to Laura Leslie accepting a regional Fisheries Biologist Position in Havre, MT and Teresa Hunt taking a fisheries position in Cody, WY.

Laura Leslie
LLeslie@gf.state.az.us
Anne Kretschmann
AKretschmann@gf.state.az.us
Marianne Meding
MMeding@gf.state.az.us
Teresa Hunt
THunt@gf.state.az.us

## AFS Arizona-New Mexico Chapter Officers

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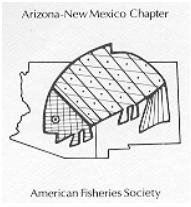
| **President** (2003-04) | Casey Harthorn<br>New Mexico Game & Fish<br>566 N. Telshor<br>Las Cruces, NM 88011<br>(505) 522-9796<br>charthorn@state.nm.us |
| **President-Elect** (2003-05) | Scott Bryan<br>Arizona Game and Fish<br>2221 W. Greenway Road<br>Phoenix, AZ 85023<br>(602) 789-3250<br>sbryan@gf.state.az.us |
| **Secretary /Treasure** | Shawn Denny<br>New Mexico Game & Fish<br>1912 W. 2nd St.<br>Roswell, NM 88201<br>(505) 624-6135<br>sdenny@state.nm.us |
| **Past President (2002-03)** | Mark Brouder<br>U.S. Fish & Wildlife<br>AZFRO - San Carlos<br>PO Box 710<br>Peridot, AZ 85542<br>(928) 475-2554<br>Mark_Brouder@fws.gov |




**Laura Leslie**
**Primary Newsletter Editor**
AFS AZ/NM Chapter
Arizona Game & Fish
2221 W. Greenway Rd.
Phoenix, AZ 85023