

Havasus Creek

**By Dan Wilson, Brent Campos, Rene Henery,
Sabra Purdy and Dave Epstein**

Havasus Creek was the most majestic tributary we saw on our trip down the Grand Canyon in March of 2005. Where the turquoise water of Havasus Creek met the turbid water of the Colorado River, a distinct color break was formed as the waters struggled to mix (figure two). The creek was lined by the towering sandy colored Muav Limestone which painted the creek with dark shadows. It was in these dark shadows that we observed approximately 70 spawning flannelmouth suckers (figure 1).

All of the Grand Canyon's native fish depend on tributaries for successful spawning. Clear water tributaries, like Havasus, provide crucial spawning habitat for native fishes (Henery 2005, this volume). Flannelmouth suckers, and the largely extirpated razorback sucker have both been observed spawning in Havasus Creek, and aggregations of flannelmouth suckers have been linked with flows in Havasus Creek though not with those in the Colorado River (Douglas and Douglas 2000).

While snorkeling through Havasus Creek, we observed two very large carp upstream from the spawning suckers. The presence of common carp near spawning native fishes is very disturbing. Carp are known to be a successful omnivore worldwide. Originating from Asia, carp were introduced into the Lower Colorado River system in the late 1890s. Since then, carp, along with other alien fishes, have contributed to the demise of native fishes. Much like what we observed in Havasus Creek, Hayden (1992) describes several documented events in which carp have been found near spawning native fishes. It was speculated that the carp were feeding on the eggs and larval stages of native fishes. We, too, suspect that the carp we observed in Havasus Creek were feeding on the eggs of the flannelmouth suckers.



Figure 1. Flannelmouth sucker caught using hook-and-line sampling from Havasu Creek. We caught a total of 3 flannelmouth suckers of similar size while at Havasu.

We also caught a small 10-inch rainbow trout in Havasu's clearwater mouth, within five feet of the tributary-mainstem water breakline (figure 2). This trout was likely using the mouth of the tributary as refuge from mainstream disturbance and could possibly have been displaced downstream by the November, 2004 test flood. Rainbow trout have been known to prey upon native fishes in the tributaries of the Colorado River (Marsh and Douglas 1997), and this fish was in a good position to do the same. We suspect that native fish eggs, larvae and juveniles may be a portion of the rainbow trout diet near the mouth of Havasu Creek. To reduce predation pressure on the endangered juvenile and larval humpback chub as they move down from the Little Colorado River, mechanical removal of rainbow trout and brown trout near the Little Colorado River confluence has been implemented. Perhaps the native fish using Havasu Creek as spawning grounds would benefit from mechanical removal near Havasu Creek's mouth as well.



Figure 2: Mouth of Havasu Creek. The small rainbow trout was caught near the break line of the turbid mainstem and Clearwater of Havasu.

The presence of both trout and carp in Havasu Creek during flannelmouth sucker spawning reinforces the idea that colonization of the clear water tributaries by invasive residents of the mainstem poses a threat to native fishes that rely on clear water tributaries for spawning and rearing habitat (Henery 2005, this volume; Wilson 2005 this volume). Additionally, the presence of trout at the Havasu Creek Colorado River confluence supports the hypothesis that high flows such as those from the 2004 managed flood, may be displacing trout further downstream. Consequently trout are subject to

conditions of increased turbidity in the mainstem and must seek refuge in the less disturbed more productive clear water tributaries (Henery 2005, this volume).

Our observations at Havasu Creek concluded its importance to native fishes as flannelmouth suckers were observed preparing to spawn. Further, non-native species such as common carp and rainbow trout use the creek for foraging and refuge from the mainstem. Havasu Creek was nearly devoid of invertebrates at the time we sampled. Thick coatings of calcium carbonate cover all of the substrate of the creek including leaf matter and detritus. We believe that the extremely basic chemistry and heavy precipitation may be affecting invertebrate recruitment. We found only Simuliidae (Diptera) present in Havasu. They are extremely tolerant of difficult conditions, which is not true of the Ephemeroptera and Trichoptera that were prevalent in the other tributaries. The simuliids were generally associated with shallow rocks with a trickle of water flowing over them and mats of *Oscillatoria* (cyanobacteria), which grew well on the rocky substrate. Havasu Creek appears to be of great importance to the fishes of the Colorado River and further research should be done on the system.

Our observations at Havasu Creek not only shows how important tributaries are to native fishes but also provides evidence that alien fishes invade the tributaries which likely poses a threat to native fishes. The observations we made lead us to believe that more studies should be focused in the tributaries with respect to their uses by not only native fishes but also alien fishes.

REFERENCES

- Douglas MR, and Douglas, ME. 2000. Late Season Reproduction by Big River Catostomidae in Grand Canyon (Arizona). *Copeia* 1:238-244
- Haden, Allen. 1992. Nonnative fishes of the Grand Canyon: A review with regards to their effects on native fishes. Glen Canyon Environmental Studies
- Marsh, P.C. and M.E. Douglas. 1997. Predation by Introduced Fishes on Endangered Humpback Chub and Other Native Species in the Little Colorado River, Arizona *Transactions of the American Fisheries Society*, 126: 343-346