

# 2010 Convention Teaser: The Nevadan Desert and Ash Meadows

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**T**he 2010 NANFA convention is going to be someplace different — the western deserts of North America. The term desert is not something you might associate with fishes. However, even in the driest deserts, water is often present. So, too, are various kinds of fishes — usually with a suite of fascinating traits that allow them to survive in small and often harsh environments.

North America has a diverse range of desert environments, typically classified into the Sonoran, Mohave, Great Basin and Chihuahuan deserts. The center of Convention activities will be in Ash Meadows, part of the Death Valley system, or Amargosa River. It sits on the eastern edge of the Mohave Desert, approximately 70 miles northwest of Las Vegas. This is the driest and hottest region in North America! (A follow-up article will describe the fishes from the places we'll visit during the extended portion of the convention for the keen souls who want more.)

The Death Valley system comprises the Amargosa River, which rises north of Beatty, Nevada, and flows for 185 miles to Lake Badwater in Death Valley. Within this large river system there are only a few pockets of permanent water that are inhabited by fishes including: Beatty, Ash Meadows, Shoshone, Tecopa, Saratoga Springs, Salt Creek and Cottonball Marsh. Except for Beatty, all of these locations have different species or subspecies of pupfish (*Cyprinodon*), while Speckled Dace (*Rhinichthys osculus*) are found in three locations. A killifish known as the Ash Meadows Poolfish (*Empetrichthys merriami*) was endemic to Ash Meadows, but was extinct by the 1960s.

Despite being in an area that receives only two inches of rain a year, Ash Meadows has the highest number of endemic species for its given area than any other place in the USA. This is largely due to fossil water that fell as rain around 10,000 years ago, that now emanates from a variety of springs fed by a vast aquifer. Most of these springs are much

smaller than a typical backyard swimming pool, but they teem with unique fishes and invertebrates. Imagine these springs as islands in a sea of desolate desert. This is one aspect that makes them such fascinating places because many of these different spring systems have been isolated for thousands of years, even though they may only be less than a couple of miles apart. Molecular work suggests the pupfishes all likely mixed during the last glacial/pluvial cycle 10,000 years ago when habitats were more interconnected and Lake Manly in Death Valley was 80 miles long and up to 800 feet deep! However, the Speckled Dace at Beatty appear to have been isolated from lower populations of their species for around two million years.

One of the most special environments within Ash Meadows is Devils Hole, home of the Devils Hole Pupfish (*Cyprinodon diabolis*). This fish lives in one of the most incredible aquatic habitats in the world — essentially an eye into the aquifer that formed when the ceiling of the aquifer collapsed around 60,000 years ago. The current pool is around 12 feet wide and 70 feet long, situated deep inside the opening, making it the smallest habitat of any vertebrate species in the world. No one really knows how the fish came to be in the hole as the pool has never overflowed nor been inundated. The water in the hole is a fairly constant 92°F for 99% of the time. It is one of the most stable aquatic environments in the world. The main two perturbations are local rainfall events, which wash lots of debris into the hole, and earthquakes. Essentially, Devils Hole acts as a seismology gauge, as earthquakes as far away as Alaska result in large swells of water. These swells can rise up to at least several tens of feet above and below the normal water level. Another aspect that makes Devils Hole extremely harsh is that it only gets four hours of direct sunlight in summer, and none in winter. With only limited inputs of other sources of energy and nutrients into the system, primary productivity is therefore quite low.

By definition, water is a valuable commodity in deserts. This has rather unfortunate consequences for many aquatic inhabitants. Most desert fishes have been harmed by human utilization of this scarce water supply, irrespective of where they occur in the world. Not all human impacts on desert aquatic habitats necessarily cause extinctions, but extensive modification to these habitats, coupled with the introduction of non-native species, usually has a debilitating effect that is difficult to reverse. Ash Meadows, and specifically the Devils Hole Pupfish, turned into a massive battle between conservationists and developers that is still going on today, and will continue well into the future.

Initial development at Ash Meadows was relatively minor. Spring channels were diverted for irrigation by local ranchers, but only on a small scale. This all changed in the 1960s as developers started buying tracts of land for growing alfalfa to supply a large cattle feedlot. This required vast amounts of groundwater pumping, as well as the excavation of spring pools and diversion of outflows into concrete canals. A groundswell of concerned biologists formed the Desert Fishes Council in 1969 to fight for the conservation of these fishes, leading to a 1976 Supreme Court ruling that protected the Devils Hole Pupfish from excessive groundwater extraction. This action made intensive farming operations in the

area unfeasible. Conservationists thought they had won the battle, but the U.S. Fish and Wildlife Service (FWS) turned down the opportunity to buy Ash Meadows and it was ultimately purchased by a housing developer with plans for a city of 10,000 people! Finally, in 1983, the land was purchased by The Nature Conservancy and turned over to the FWS in 1984. It has since become a National Wildlife Refuge, one of the few specifically established for fish and invertebrate conservation. Despite extensive federal protection, the area is still under continued threat. This threat initially came from the development of Yucca Mountain, with the threat of groundwater contamination from radioactive material, and now from thirsty Las Vegas, which is making massive land and water right grabs across Nevada to feed its urge for growth at any cost. If they are successful, it will spell the end for many aquatic habitats in Nevada. This is because most are reliant on groundwater flow, which will undoubtedly be impacted by the scale and extent of proposed groundwater withdrawals.

Thus, you'd better come and visit this special and unique region before it is too late. And what better time to do it than during the 2010 NANFA convention! See <http://www.nanfa.org/convention/2010.shtml> for all the details and updates.



**2010 NANFA Convention**  
**When: mid-October 2010 (14-19th)**  
**Where: Southern Nevada (Ash Meadows area)**

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