

**ARIZONA GAME AND FISH DEPARTMENT  
HERITAGE DATA MANAGEMENT SYSTEM**

**Animal Abstract**

**Element Code:** AFCHA02070

**Data Sensitivity:** No

**CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE**

**NAME:** *Oncorhynchus apache*

**COMMON NAME:** Apache Trout

**SYNONYMS:** *Salmo pleuriticus*, *Salmo mykiss leuriticus*, *Salmo gilae*, *Salmo* sp., *Salmo apache*, *Oncorhynchus gilae apache*

**FAMILY:** Salmonidae

**AUTHOR, PLACE OF PUBLICATION:** Miller, R.R. 1972. Copeia 1972:401-422.

**TYPE LOCALITY:** East Fork of White River, White Mountain Apache Indian Reservation, Apache County, Arizona, at Kinney Lookout Trail to 3 km upstream, T5N R25E, Secs. 4-6 and 32 of T6N.

**TYPE SPECIMEN:** University of Michigan Museum of Zoology 162769, Miller R.R. and H.E. Winn, 17 May 1950.

**TAXONOMIC UNIQUENESS:** Ten species of *Oncorhynchus* occur in North America. Two are native to Arizona, *O. apache* and *O. gilae*. Behnke (1992) classified Apache trout as *O.g. apache* and Gila trout as *O.g. gilae*.

**DESCRIPTION:** Apache trout rarely exceed 25.0 cm (9.8 in.) in the small stream conditions to which they are now restricted. However, they can reach over 40.0 cm (15.7 in.) in lakes and hatcheries (Rinne, 1990). The body is deeply compressed. Head length less than 28.5 percent of the standard length and head width averages 13.7 percent of the standard length (Minckley 1973). Dorsal fin is large. "Pelvic fins long, 14.5 to 17.0 percent of standard length, average 16.0. Adipose dorsal fin short, 8.5 to 11.5 percent of standard length. Pyloric caecae 22 to 40, usually near 30. Scales in the lateral series 136 to 172, usually more than 145. Scales above lateral line 32 to 40, usually more than 35" (Minckley 1973). Vertebrae number 58 to 61, and approximately 5% of some populations have basibranchial teeth (Minckley 1973 and Behnke 1992).

The body coloration is golden-yellow or olive yellow, with a golden belly. Parr marks persist into adults, but disappear in large individuals. Spotting pattern is an even distribution of pronounced, moderate-sized, rounded or oval black spots on the sides of the body and on top of the head. The adipose fin is usually bordered with black. The dorsal, pelvic, and anal fins are tipped with a white to orange color, and an orange to yellow cutthroat mark is present under the jaw. A diploid number of 56 chromosomes and an arm number of 106 in both

Apache trout and Gila trout differentiates them from all other western trout (Minckley 1973, Behnke 1992).

**AIDS TO IDENTIFICATION:** The Apache trout can be distinguished from Gila trout, *Oncorhynchus gilae*, and rainbow trout, *Oncorhynchus mykiss*, by the absence of a red or pink lateral band on the body. It has the largest dorsal fin of all western trout. It also has a distinct horizontal band of dark pigment across the iris (Behnke 1992).

**ILLUSTRATIONS:** Color drawing (Behnke 1992:213)  
B&W drawing (Behnke 1992:213)  
B&W photo (Minckley 1973:64)  
Color photo (Rinne and Minckley 1991:8)

**TOTAL RANGE:** "Native to the White Mountains of Arizona, in headwaters of the Little Colorado, Black and White Rivers" (Rinne and Minckley 1991). Restricted to headwater streams of the Salt (Black and White rivers), Little Colorado, and Blue rivers in the White Mountains of eastern-central, Arizona. Introduced and established outside of natural range in several streams in the Pinaleno Mountains, Coronado N.F. (Grant and Ash creeks) and Kaibab N.F. (North Canyon Creek).

Thought to have historically occupied headwaters of the Salt, San Francisco, and Little Colorado rivers. (AGFD 1996 in prep).

**RANGE WITHIN ARIZONA:** See "Total Range."

## **SPECIES BIOLOGY AND POPULATION TRENDS**

**BIOLOGY:** Native fish historically occurring with Apache trout include speckled dace, *Rhinichthys osculus*, and desert sucker, *Pantosteus clarki*. Harper (1978) found that large fish, greater than 17.0 cm (6.7 in.), made up 21% of the population and 50% of the biomass. Apache trout were found to have the same critical thermal maximum as Gila, rainbow, brown (*Salmo trutta*), and brook trout (*Salvelinus fontinalis*), 29.5° C (85.1° F) (Lee and Rinne 1980).

**REPRODUCTION:** Spawning occurs from March through mid-June, but varies with elevation. Redd construction occurs at the downstream end of pools in a variety of gravel compositions, depths, and velocities, only after water temperatures reached 8° C (46.4° F). Maturity was found to occur in three years at a size of approximately 13 cm (5.1 in.). Fecundity increases with size, ranging from 72 to 240 eggs in 13.1 to 19.1 cm (5.2 to 7.5 in.) fish and from 646 to 1,083 eggs in 29.8 to 34.9 cm (11.7 to 13.7 in.) fish. Fry hatch in 30 days and emerge from redds after another 30 days, then exhibit nocturnal downstream movements (Harper 1978; USDI, FWS, 1983; Rinne 1990).

**FOOD HABITS:** Diet primarily consists of aquatic and terrestrial insects. Feeding habits depend on fish size and season. Generally, Trichopteran larvae were most numerous in stomach analysis of all sizes of Apache trout. Terrestrial insects were numerous in all sizes, while Ephemeropteran and Dipteran larvae were utilized more by trout in a 6.0 to 9.0 cm (2.4 to 3.5 in.) size class (Harper 1978).

**HABITAT:** Prefers cool, clear, high elevation streams and rivers. Rinne and Minckley (1991) state that Apache trout "formerly ranged downslope into larger streams." "Large individuals live in pools, while smaller ones remain near obstructions or other cover such as overhanging trees or brush in runs and riffles" (Rinne and Minckley 1991).

**ELEVATION:** Restricted to elevations of approximately 1,763 m (5,780 ft.) and up.

**PLANT COMMUNITY:** Woody streamside vegetation is dominated by Douglas fir (*Pseudotsuga menziesii*), white fir (*Abies concolor*), white pine (*Pinus ayacahuite*), ponderosa pine (*Pinus ponderosa*), and quaking aspen (*Populus tremuloides*). Streams are also lined by willow (*Salix* sp.) and Arizona alder (*Alnus oblongifolia*) in many places (Harper 1978).

**POPULATION TRENDS:** The Apache trout is the only trout native within its range in the Black, White, Little Colorado, and Blue River drainages. The introduction of nonnative salmonids, as well as, habitat degradation and loss have greatly reduced the range of Apache trout. The reduction in range has been to approximately 48 km of small headwater tributaries from an estimated distribution of about 965 km of stream habitat. Currently there are 20 pure and 6 reintroduced populations in the state (AGFD Native Fish Diversity Review 1995). Natural pure populations of Apache trout were found to persist in East Fork of White River (White Mountain Apache Reservation [WMAR]), Hurricane Creek (WMAR), Flash Creek (WMAR), Crooked Creek (WMAR), Deep Creek (WMAR), Boggy Creek (WMAR), Firebox Creek (WMAR), Elk Canyon Creek (WMAR), Loafer Creek (WMAR), Soldier Creek (Apache-Sitgreaves National Forest [ASNF]) (Carmichael et al., 1993) and Big Bonita Creek (WMAR) and Squaw Creek (WMAR) (USFWS, draft Recovery-Management Plan). Introduced pure populations exist in Mineral Creek (ASNF), Mamie Creek (ASNF), Lee Valley Creek (ASNF), Coyote Creek (ASNF), Hayground Creek (ASNF), and Wildcat Creek (ASNF). The population in Bonita Creek on the Apache Reservation, is having problems according to Jim Novy (AGFD Native Fish Diversity Review 1995).

## **SPECIES PROTECTION AND CONSERVATION**

**ENDANGERED SPECIES ACT STATUS:** LT (USDI, FWS 1975)  
**STATE STATUS:** 1A (AGFD SWAP 2012)  
 [WSC, AGFD, WSCA in prep]  
 [State Threatened AGFD, TNW 1988]  
**OTHER STATUS:** Not Forest Service Sensitive (USDA, FS  
 Region 3, 2007  
 [Forest Service Sensitive, USDA, A-S

**MANAGEMENT FACTORS:** Interactions with nonnative trout are the most serious threats to the Apache trout. Hybridization with rainbow trout, and historically with cutthroat trout (*Oncorhynchus clarki*), threatens the genetic purity of Apache trout. Brook and brown trout, along with other non-native fish, threaten population sizes with competition for space and food. Brown trout are also included in a group of nonnatives which reduce Apache trout numbers through predation. Habitat loss and degradation from cattle grazing, logging, damming, and water diversion also threaten the existence of the Apache trout (USDI, FWS 1983; Rinne 1990; Rinne and Minckley 1991).

**Threats:** erosion; sedimentation; drought; predation by and competition and hybridization with nonnative fishes. **Management needs:** delineate specific management waters; maintain and/or enhance habitats; ameliorate effects of nonnative fishes from Apache trout waters; and, reintroduce into suitable habitats.

**PROTECTIVE MEASURES TAKEN:** In 1955, all streams containing known populations of Apache trout were closed to fishing by the Fort Apache Indian Tribe. The Apache trout was listed as endangered when the Endangered Species Act (ESA) was passed in 1973 and was downlisted to threatened in 1975 to allow recreational fishing into the management scheme. An Apache trout Recovery Team was established in 1975, and a recovery plan was written in 1979, then revised in 1983 (USDI, FWS 1983). The goal of the management and recovery plans is to obtain 30 self sustaining populations of Apache trout. When this goal is reached, the Apache trout will be down-listed to a non-threatened status under the ESA (USDI, FWS 1983; Draft Recovery-Management Plan).

The reclamation of streams is ongoing, involving chemically removing undesired salmonids, building barriers to prevent reinvasion and restocking with pure Apache trout. Reclamation is combined with genetic analysis of Apache trout populations to determine purity. A large-scale hatchery propagation program is in existence on the White Mountain Apache Reservation to provide fish for reintroductions and replacement of sport fish stockings of rainbow trout.

**SUGGESTED PROJECTS:** As outlined in the Apache Trout Recovery Plan (USDI, FWS 1983): Survey and enhance waters containing pure Apache trout (include genetic analysis to determine purity); Survey and enhance candidate waters within historic range (include construction of physical barriers if necessary, chemical removal of undesired salmonids, and restock with appropriate strain of Apache trout); maintain hatchery brood stock; study ecology of Apache trout; survey and manage populations outside of historic range; provide habitat protection through land management practices, programs, and acquisitions; provide adequate enforcement of all federal, state, and tribal laws and regulations concerning Apache trout and habitat; develop public support of the Apache trout through information and education programs.

**LAND MANAGEMENT/OWNERSHIP:** All populations of Apache trout exist on USDA Forest Service (Apache-Sitgreaves N.F. and introduced populations on Coronado and Kaibab National Forests), Fort Apache Reservation, AGFD Black River Lands, and Private lands.

## SOURCES OF FURTHER INFORMATION

### REFERENCES:

- Arizona Game and Fish Department. 1988. Threatened Native Wildlife in Arizona. p. 7.
- Arizona Game and Fish Department. In prep. Wildlife of special concern in Arizona. Arizona Game and Fish Department Publication. Phoenix, Arizona. 32 pp.
- Arizona Game and Fish Department Native Fish Diversity Review. 1995. Tempe, Arizona.
- Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan 2012-2022. Phoenix, AZ.
- Behnke, R.J. 1992. Native trout of Western North America. American Fisheries Society Monograph 6. pp. 209-211, 213, 217-220.
- Carmichael, G.J., J.N. Hanson, M.E. Schmidt, and D.C. Morizot. 1993. Introgression among Apache, cutthroat, and rainbow trout in Arizona. Transactions of the American Fisheries Society 122(1):121-130.
- Davidson, T. and J. Ward, 1997. Apache Trout stream survey report Hannagan, Centerfire and Boggy Creeks. Final Report, AGFD Heritage Grant # I96009. pp18.
- Davidson, T and J. Ward, 1997. Apache Trout stream survey report Lee Valley, Coyote and Mamie Creeks. Final Report, AGFD Heritage Grant # I95018. pp23.
- Clarkson, R.W. and R.J. Dreyer, 1992. Investigation of techniques to establish and maintain Arctic Grayling and Apache Trout lake fisheries. AGFD Research Technical Report #12. pp 71.
- Harper, K.C. 1978. Biology of a southwestern salmonid, *Salmo apache* (Miller 1972). pp. 99-111 in J.R. Morning, editor. Proceedings of the wild trout-catchable trout symposium. Oregon Department of Fish and Wildlife, Corvallis.
- Lee, R.M. and J.N. Rinne. 1980. Critical thermal maxima of five trout species in the southwestern United States. Transactions of the American Fisheries Society 109:632-635.
- Miller, R.R. 1972. Classification of the native trouts of Arizona with the description of a new species, *Salmo apache*. Copeia 1972:401-422.
- Minckley, W.L. 1973. Fishes of Arizona. Arizona Game and Fish Department, Phoenix. pp. 64-67.
- Rinne, J.N. and W.L. Minckley. 1991. Native fishes of arid lands: a dwindling resource of the desert southwest. U.S. Department of Agriculture, Forest Service, General Technical Report RM-206. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. pp. 7-11.
- Rinne, J.N. 1990. Status, distribution, biology, and conservation of two rare southwestern (U.S.A.) salmonids, the Apache trout, *Oncorhynchus apache* Miller, and the Gila trout, *O. gilae* Miller. Journal of Fish Biology 37(1990):189-191.
- USDA, Forest Service Region 3. 1988. Regional Forester's Sensitive Species List.
- USDA, Forest Service. 2000. Apache-Sitgreaves National Forests Sensitive Species List.
- USDA, Forest Service. 2007. Apache-Sitgreaves National Forests Sensitive Species List.

**AGFD Animal Abstract**

**-6-**

***Oncorhynchus apache***

USDI, Fish and Wildlife Service. 1975. "Threatened" status for three species of trout. Federal Register 40(137):29863-29864.

USDI, Fish and Wildlife Service. 1983. Arizona Trout Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

USDI, Fish and Wildlife Service. Draft Apache Trout Recovery-Management-Plan. U.S. Fish and Wildlife Service.

**MAJOR KNOWLEDGEABLE INDIVIDUALS:**

Robert J. Behnke - Colorado State University, Fort Collins

Mike Lopez - Arizona Game and Fish Department, Pinetop, Arizona

John N. Rinne - USDA, Forest Service Rocky Mountain Forest and Range Experiment Station, Fort Collins

**ADDITIONAL INFORMATION:** The Apache trout is the state fish of Arizona. The current world sport fishing record is 2.71 kg (5.9 lbs.) and 60.96 cm (24.0 in.) long, from Hurricane Lake on the White Mountain Apache Reservation.

**Revised:** 1994-09-14 (MAL)

1994-09-19 (MHH)

2001-10-15 (SMS)

To the user of this abstract: you may use this entire abstract or any part of it. We do request, however, that if you make use of this abstract in plans, reports, publications, etc. that you credit the Arizona Game and Fish Department. Please use the following citation:

Arizona Game and Fish Department. 20XX (= **year of last revision as indicated at end of abstract**). X...X (= **taxon of animal or plant**). Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ. X pp.