ARIZONA GAME AND FISH DEPARTMENT
HERITAGE DATA MANAGEMENT SYSTEM

Animal Abstract **Element Code:** AFCHA02102

Data Sensitivity: Yes

CLASSIFICATION, NOMENCLATURE, DESCRIPTION, RANGE

NAME: *Oncorhynchus apache*
COMMON NAME: Apache Trout

SYNONYMS: *Oncorhynchus gilae apache*
Salmo pleuriticus
Salmo mykiss leuriticus
Salmo gilae
Salmo 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: Eighteen species in the genus *Oncorhynchus* (Integrated Taxonomic Information System 2024, Page et al. 2023), fourteen of which occur in North America (Page et al. 2023). Two are native to Arizona, *O. apach*e and *O. gilae* (Gila Trout) (Arizona Game and Fish Department 2022). Behnke (1992) classified Apache Trout as *O. g. apache* and Gila Trout as *O. g. gilae*. Recognized as a species (*O. apache*) by Williams et al. (1989), Robins et al. (1991), Utter and Allendorf (1994), Schmidt (1996), Nielsen et al (1998), and Page et al. (2013, 2023) but treated as a subspecies of *O. gilae* by Nelson et al. (2004) based on Behnke (1992) and Stearley and Smith (1993). Formerly included in the genus *Salmo* (Miller 1972, Minckley 1973).

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, Behnke 1992).

The body coloration is golden-yellow or olive yellow, with a golden belly. Parr marks persist into adult lifestage, 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 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: The Apache Trout is endemic to the White Mountains of Arizona, and historically occupied headwaters of the Little Colorado, Black and White Rivers (Rinne and Minckley 1991, U.S. Fish and Wildlife Service 2022). Thought to have historically occupied headwaters of the San Francisco River, it was determined that Gila Trout (*O. gilae*) most likely occupied that drainage (U.S. Fish and Wildlife Service 2022). Restricted to headwater streams of the Salt (Black and White rivers) and Little Colorado 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).

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 Trout, Rainbow Trout, Brown Trout *(Salmo trutta*), and Brook Trout (*Salvelinus fontinalis*), 29.5º C (85.1° F) (Lee and Rinne 1980). Information on age and growth of Apache Trout is limited, though rates

of growth for putative trout appear to be greater in the Pinaleno Mountains than in White Mountain populations (Porath et al. 2010).

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 8º C (46.4° F). Egg production is positively related to fish size, and females may deposit eggs in several redds during a single spawning season (U.S. Fish and Wildlife Service 2009). 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, U.S. Fish and Wildlife Service 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). Clarkson and Dreyer (1996) found that Apache Trout stocked in Lee Valley Reservoir consumed zooplankton, crustaceans, snails, leeches, nematodes, and fish found at both the bottom and surface of the lake in addition to insects.

HABITAT: Prefers cool, clear, high elevation streams and rivers; Apache Trout generally require water temperatures below 25° C (77° F) along with sufficient stream flow and shading to prevent lethal temperatures (U.S. Fish and Wildlife Service 2009). 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). Petre and Bonar (2016) found that all age classes of Apache Trout use relatively deep (0.15–0.47 m) pools with slow stream velocities (0.00–0.22m/s), gravel or smaller substrate, and overhead and instream cover.

ELEVATION: Pure populations of Apache Trout are typically above 2,100 m elevation and often above natural barriers (waterfalls) that prohibit invasion of nonnative trout into those habitats. Researchers considered the historical range to be streams above 1,800–2,100 m in elevation, although the precise nature of historical occupancy is unknown. (U.S. Fish and Wildlife Service 2022)

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, and Little Colorado River drainages. The introduction of nonnative salmonids, as well as habitat degradation and loss, led to a significantly reduced range over the twentieth

century. The Apache Trout declined from an estimated historical distribution of at least 965 km of stream habitat to just 48 km by the mid-1900s (Harper 1978). Currently there are 30 known genetically pure populations across the historical range with approximately 282 km (175 mi) of stream habitat, meeting the recovery objective of 30 self-sustaining discrete, pure populations within historical range (U.S. Fish and Wildlife Service 2022, 2024). Twenty-eight of these populations were identified in the 2009 recovery plan, including five "new" populations at Marshall Butte, Sun, Moon, Rock, and Little Diamond Creeks (Carlson and Culver 2009). There are an additional eight hybrid populations occupying 60.6 km of stream habitat (U.S. Fish and Wildlife Service 2022). Hatchery propagated Apache Trout are produced at the Williams Creek National Fish Hatchery (WCNFH) and AZGFD Silver Creek Fish Hatchery to stock streams and lakes on Tribal, State, and Federal lands for put-and-take and put-grow-take fisheries only, however these waters are not considered in recovery analysis (U.S. Fish and Wildlife Service 2009).

Natural pure populations of Apache Trout are found in Big Bonito Creek, Boggy and Lofer creeks, Coyote Creek, Crooked Creek, Deep Creek, East Fork White River, Elk Canyon Creek, Firebox Creek, Flash Creek, Little Bonito Creek, Marshall Butte Creek (referred to as DP Creek in the Past) Ord Creek, Smith Creek, and Soldier Springs Creek. Most of these populations are protected by natural (waterfalls) or constructed barriers. Introduced pure populations exist in Bear Wallow Creek, East Fork Little Colorado River, Mineral Creek, Moon Creek, Paradise Creek, South Fork Little Colorado River, Squaw Creek, Sun Creek, Thompson Creek, West Fork Black River, West Fork Little Colorado River, and Wohlenberg Creek. No natural relict populations of Apache Trout remain in the Little Colorado River drainage (U.S. Fish and Wildlife Service 2022).

SPECIES PROTECTION AND CONSERVATION

Status definitions: https://bit.ly/hdms-status-definitions
Heritage Network Conservation Status Rank definitions: https://bit.ly/hdms-rank-definitions

ENDANGERED SPECIES ACT STATUS:	Delisted (USDI, FWS 2024)
STATE STATUS:	1 (AZGFD, AWCS 2022)
HERITAGE NETWORK STATUS:	G3 S2
OTHER STATUS:	Not Forest Service Sensitive (USDA, FS Region 3 1999, 2007, 2013)

PREVIOUS STATUS

ENDANGERED SPECIES ACT STATUS:	LT,PDL (USDI, FWS 1975a, 2023) PT (USDI, FWS 1975b) LE (USDI, FWS 1970) LE (USDI, FWS 1967)

STATE STATUS: 1A (AZGFD, SWAP 2012)]
WSC (AZGFD, WSCA 1996 in prep)
Threatened (AZGFD, TNW 1988)

OTHER STATUS : Forest Service Sensitive, as *Salmo apache* (USDA, FS Region 3 1988)

MANAGEMENT FACTORS: Interactions with nonnative trout are the most serious threats to the Apache Trout. Hybridization with rainbow trout, and historically with Cutthroat Trout (*O. 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 livestock grazing, logging, damming, agriculture, road construction, drought, and water diversion also threaten the existence of the Apache Trout (U.S. Fish and Wildlife Service 1983, Rinne 1990, Rinne and Minckley 1991). Increasing stream temperatures driven by global climate change, loss of riparian cover, livestock grazing, and reduction of stream flow also threaten the recovery of the species.

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 (U.S. Fish and Wildlife Service 1983). The goal of the management and recovery plans was 30 self-sustaining populations of Apache Trout. On 7 October 2024, the U.S. Fish and Wildlife Service delisted the Apache Trout due to recovery, removing from the List of Endangered and Threatened Wildlife (U.S. Fish and Wildlife Service 2024). Strict fishing regulations, the removal of nonnative salmonids from areas containing genetically pure populations, as well as captive breeding programs have all aided the recovery of the Apache Trout.

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. Forest Management Plans have incorporated minimal stream standards for Apache Trout and other salmonids and Allotment Management Plans (AMPs) have been modified to reduce deterioration of Apache Trout habitat. Habitat protection will continuously be afforded through implementation of land management practices, programs, and acquisitions in cooperation with all Federal, State, and Tribal partners (U.S. Fish and Wildlife Service 2009).

SUGGESTED PROJECTS: As outlined in the Apache Trout Recovery Plan Second Revision (U.S. Fish and Wildlife Service 2009): 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; salvage and provide refuges for populations of Apache Trout that are affected by wildfire, drought, barrier failures, or other natural or human induced threats; monitor for presence of diseases and/or causative agents, parasites, and pathogens through wild fish health surveys; develop public support of the Apache Trout through information and education programs. Planting of native vegetation and in stream and in riparian areas may increase suitable habitat (Cantrell et al. 2004).

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

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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)
2021-05-12 (CRB)
2023-01-09 (MBL)
2023-08-11 (MSB)
2024-09-30 (CPS)