Chapter 8 SALT RIVER WATERSHED

Upper Salt River Sub-Watershed

List of Figures

List of Tables

Salt River Watershed

BLACK RIVER SUB-WATERSHED

Physical geographic description

The Black River sub-watershed is located in east central Arizona, south of the Little Colorado River watershed and west and north of the Gila River watershed (Figure 1 and Figure 2). Along with the White River, the Black River comprises the headwaters of the Salt River watershed. The Black River rises from a network of perennial creeks supported by springs and snowmelt in the White Mountains in Apache, Gila, and Greenlee Counties. The total drainage area is 1,256 square miles. Elevations within the sub-watershed range from over 10,000 feet near the headwaters in the White Mountains to 4,350 feet near the confluence with the White River, where the two rivers become the Salt River.

The headwaters portion of the Black River sub-watershed contains numerous perennial tributary streams and several small lakes. The Black River itself has two main branches; the East and West Forks. Other significant tributaries include Centerfire Creek, Beaver Creek, Fish Creek, Snake Creek, Conklin Creek, Reservation Creek, Bear Wallow Creek, Paddy Creek and Big Bonito Creek. Lakes in the drainage were all created by man and include Ackre Lake, Big Lake, Crescent Lake, Reservation Lake, Hurricane Lake, Drift Fence Lake, Pacheta Lake, Tonto Lake, and Sierra Blanca Lake.

The Black River sub-watershed is on the Apache National Forest, Fort Apache Indian Reservation, San Carlos Indian Reservation, and a small amount of private land is found as inholdings in the Forest.

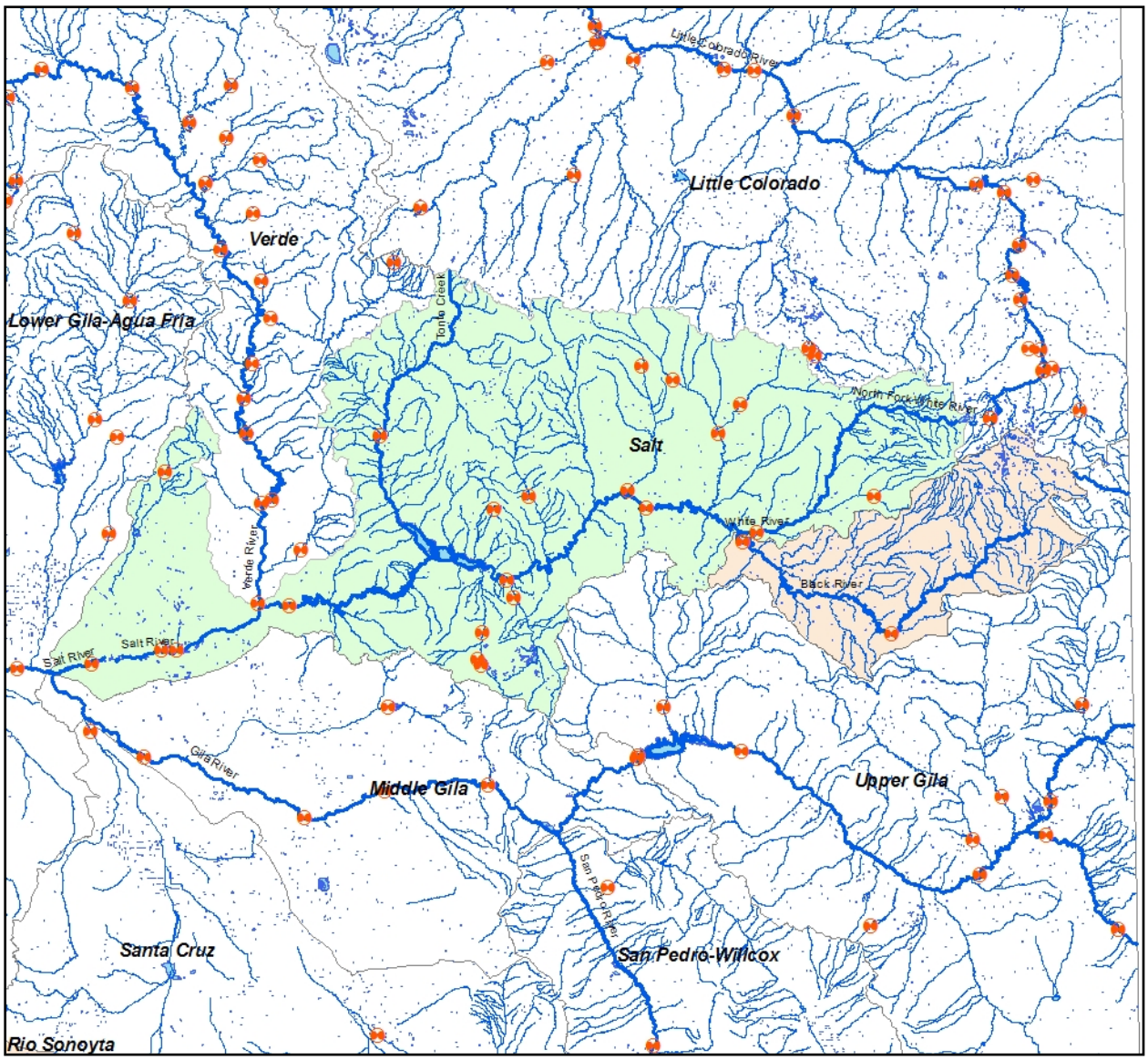

Figure 1. Black River sub-watershed location (pink shade) within the Salt River watershed (green shade) with USGS gauging stations (orange circles).

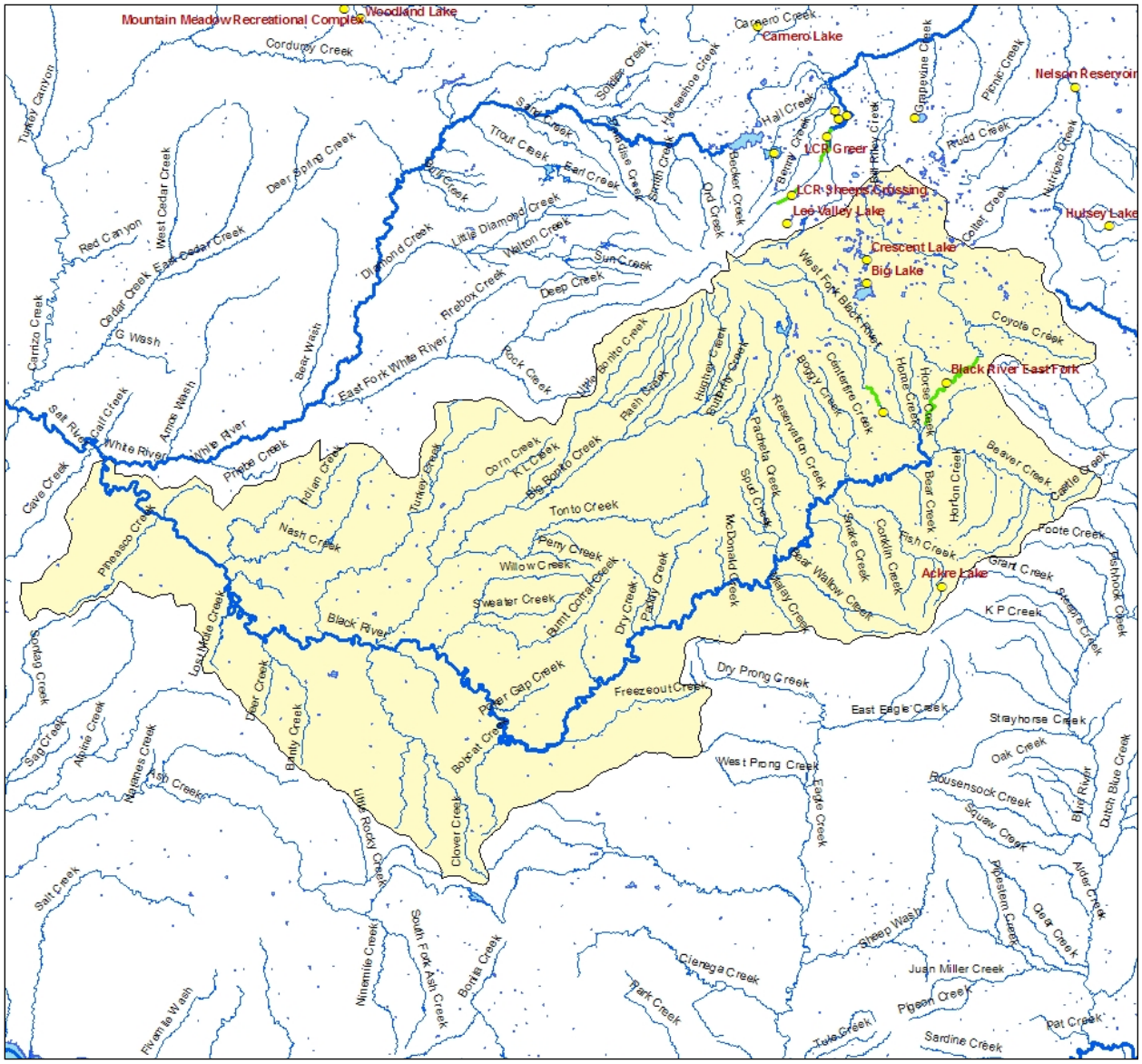

Figure 2. Black River sub-watershed with stocking locations.

BLACK RIVER COMPLEX

Stocking site descriptions

There are five stocking sites in the Black River sub-watershed; Crescent and Big lakes, located on an unnamed tributary to the North Fork of the East Fork of the Black River, the East and West forks of the Black River, and Ackre Lake, located in the headwaters of Fish Creek which flows into the Black River (Figure 3). Big Lake and Crescent Lake are both very near the top of the North Fork of the East Fork of the Black River, and are connected to it by an ephemeral channel. It is about 4.5 miles from Big Lake to the North Fork of the East Fork of the Black River, from that point, it is over 9 miles to the Three Forks area where several tributaries come together to form the East Fork. (13.8 miles from Big Lake to Three Forks). It is about 0.7 miles from

Crescent Lake to the same ephemeral tributary coming from Big Lake, then approximately 4.4 miles to the North Fork of the East Fork of the Black River, and from that point, it is over 9 miles to the Three Forks area (14.3 miles from Crescent Lake to Three Forks). The East Fork stocking area is approximately 4.5 miles below Three Forks. The West Fork stocking area is 3.3 miles above the confluence with the East Fork along FR68A. Fish Creek is a tributary to the Black River located 9.9 miles below the confluence of the East Fork and West Fork of the Black River; the headwaters of Fish Creek contain Ackre Lake, approximately 12.1 miles upstream from the Black River.

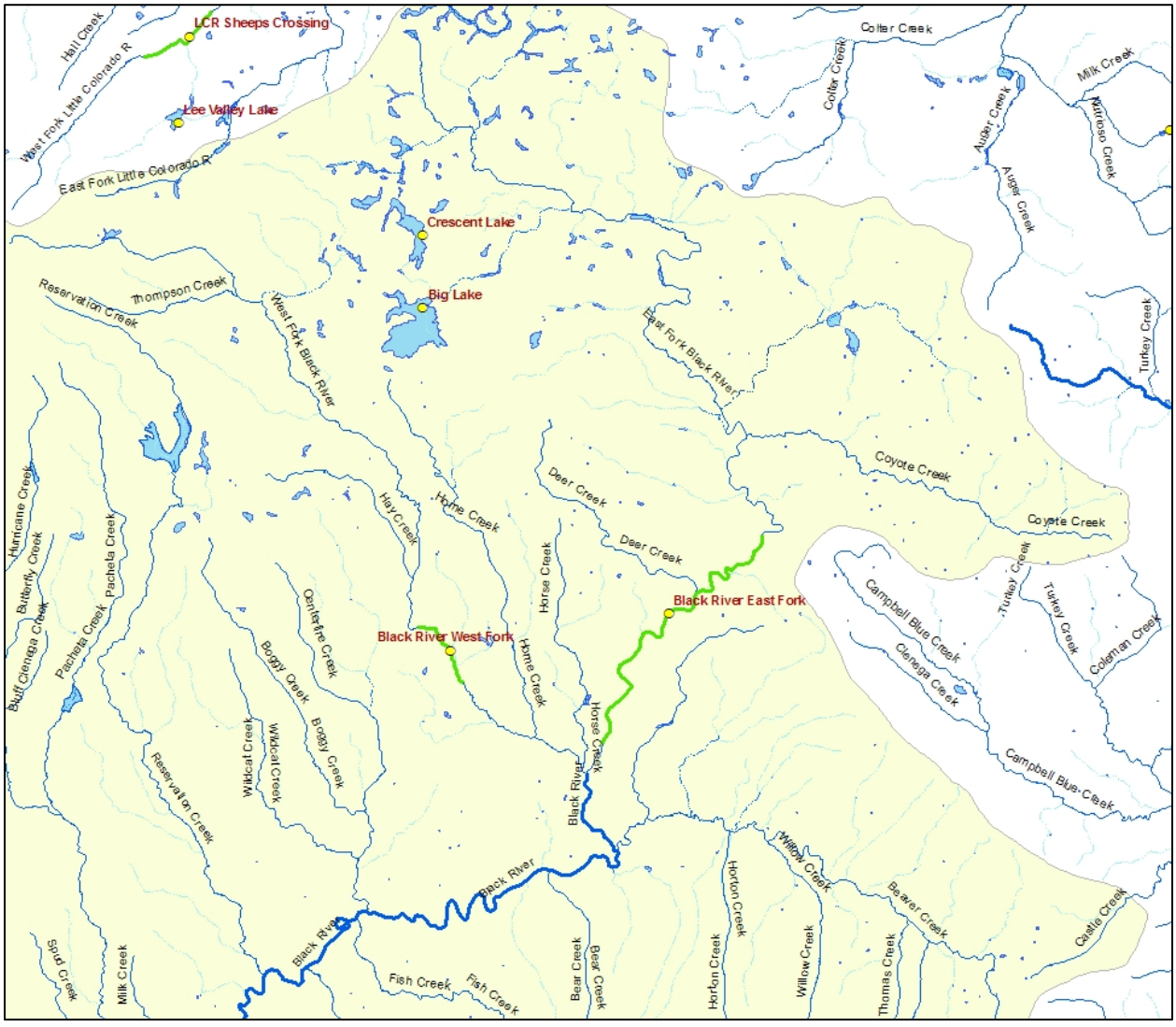

Figure 3. Black River Complex (stocking reaches shaded green) within the Black River sub-watershed.

Crescent Lake

Site Description

Crescent Lake is a 100-acre impoundment on an intermittent unnamed tributary of the headwaters of the North Fork of the East Fork of the Black River (Figure 4 and Figure 5). The Crescent Lake dam was constructed in 1934 on the Apache-Sitgreaves National Forest at an elevation of 9043 feet. Crescent Lake is located near the top of the Black River complex, approximately 21 miles southwest of Springerville.

Figure 4. Photo of Crescent Lake with knoll in upper right corner (southeast side of lake) containing a bald eagle nest site.

Management of Water Body

The primary fishery is a put-grow-and-take coldwater fishery with rainbow and brook trout. Fingerling, sub-catchable, and catchable size trout are stocked multiple times during the stocking season, primarily in spring and early summer, but occasionally in the fall. Numbers and sizes vary depending upon over winter survival and fish kill occurrences. The fishery is intensive use in spring through fall, with light winter ice-fishing use. Past stocking history is shown in Table 1.

Figure 5. Crescent Lake dam, showing Hwy 273 crossing over dam with no spillway.

Table 1. Stocking History for Crescent Lake

Species	First Year	Last Year	Num of Stockings	Number Stocked
Brook trout	1973	2009	113	1,742,597
Cutthroat trout	1945	1953	4	180,000
Rainbow trout	1940	2009	210	4,856,981
Total			327	7,081,578

Historically, Crescent Lake was stocked primarily with fingerling trout in the spring and fall, utilizing the productivity of the lake to grow stocked trout to catchable size. The lake freezes over in the winter and the frequent winterkills, and occasional summer kills, have created problems with this management approach, because trout were not surviving long enough to reach catchable size. Table 2 outlines the fish kill history at Crescent Lake from 1990 to 2009. Crescent Lake is fairly shallow, averaging 10 feet deep and less when the water level is low due to drought. Combined with a heavy nutrient load, Crescent Lake experiences heavy aquatic weed growth, blue-green algae blooms, high pH levels, leading to frequent fish kills both in late summer and the winter. The Department attempts to harvest aquatic weeds to thin the aggressive weed growth during the summer, but the launch ramps are often not deep enough during low water levels to launch the large harvesters. Currently, a winterkill study is being conducted on Crescent (and Lee Valley Lake and Carnero Lake) to gather baseline information that would

assist in making management recommendations for reducing the frequency of fish kills. The stocking approach at Crescent has gradually changed to stocking primarily subcatchables and catchables, allowing stocked trout to reach catchable size in less time. If the winterkill project is successful, the Department desires the flexibility to stock fingerling trout again.

Table 2. Winter and summer kill history of the Crescent Lake fishery from 1990 to 2009.

Year	Winter kill	Summer kill
1990	Partial	-
1991	Total	-
1992	Total	-
1993	-	-
1994	-	-
1995	Partial	-
1996	-	-
1997	-	-
1998	Partial	-
1999	-	-
2000	-	Partial
2001	Total	-
2002	Total	-
2003	Total	-
2004	Total	Partial
2005	Total	-
2006	-	Partial
2007	-	Partial
2008	Partial	-
2009	Partial	-

The recreational facilities around the lake are managed by the U.S. Forest Service, maintaining the restroom facilities, ramadas/picnic benches, boat docks and fishing piers, and boat ramps at three locations on the lake. These locations are: dam area at north end of lake, south end of lake, and mid-lake on west side. The Forest also administers the special use permit for the concession store, which sells tackle, snacks and rents boats. Camping is not allowed at the lake, however, campgrounds at Big Lake are located only a few miles away. Powerboats are restricted to a single electric motor or a single gasoline engine not exceeding 10 horsepower.

Crescent Lake is accessed by a maintained all-weather road (Hwy 273) or paved state highway (Hwy 261) and has a concession, ramadas/picnic benches, and 3 boat launch ramps. Hwy 273 is in the process of being paved. The lake and concessions are typically accessible from April to

November. The lake does receive some ice fishing use during the winter by anglers accessing the lake by snowmobile. The concession has not operated much in the last 12 years because of the poor fishing conditions at Crescent Lake during this long-term drought cycle.

Angler access is highest at the dam, the south and west boat ramps, and additional parking/restroom facility on the west side. The east shoreline receives the least use, but anglers can walk anywhere around the lake since it is so small. The only use data is on angler use, collected by on-site angler creel surveys in 1980 (25,276 AUD), 1986 (13,506 AUD), 2000 (13,564 AUD), 2004 (4,450 AUD), and 2005 (11,099 AUD), and by mail-out survey in 2001 (19,981 AUD) (Pringle 2004). Angler use dropped dramatically in 2004 due to a large summer fish kill that year.

Proposed action

The Department proposes to stock rainbow trout and brook trout into Crescent Lake for the period covered by this consultation.

Fingerling, sub-catchable, and catchable rainbow trout will be stocked multiple times from April to October annually; numbers of rainbow trout stocked may range from 0 to 75,000 trout annually.

Fingerling, sub-catchable, and catchable brook trout will be stocked multiple times from April to October annually; numbers of brook trout stocked may range from 0 to 35,000 trout annually.

Water Distribution / Connectivity

Crescent Lake has no permanent inflow stream and the watershed is extremely small, normally just enough to offset evaporation. Winter precipitation contributes most of the Crescent Lake water input, with summer monsoons having little effect on water levels.

Information from long time residents in Springerville indicate that Crescent Lake does spill; however, it does not appear to spill often and it is has been 15 years or more since it last spilled. Rick Law, concessionaire at the Big Lake and Crescent Lake stores for many years, thought the lake may have spilled in the early 1990s, but was unable to recall with any certainty. Biologists in the area have never seen it spill, or even knew that it was able to spill until recently upon hearing comments from long time residents of the area. The lake was originally thought to not spill because the spillway area is inconspicuous and no current employees, or persons previously questioned, had seen it spill or knew it would spill. This spill history information was recently obtained during a fish management planning process for Crescent and other lakes in the area, which involved interested local residents and businesses

A diversion ditch was constructed between Crescent Lake and Big Lake after Big Lake was impounded. The diversion was used to fill Big Lake and has not been used since. Water does not run through the diversion ditch to Big Lake at anytime during the year.

When full, the lake would spill from the southern end into a different drainage than the drainage that was dammed to create the lake (Figure 6). No water is released from the dam. The spillway area is not well defined and no channel is present near the spillway. The spill apparently flows wide and shallow overland through grassland until it reaches an obvious drainage ¼ mile away. .

Once in the obvious drainage, spill water would flow for 0.4 miles to an unnamed tributary of the North Fork of the East Fork of the Black River, approximately 0.1 mile downstream of the Big Lake spillway. From this point, the spill would flow in the same manner as spill from Big Lake would flow, approximately 4.4 miles to the North Fork of the East Fork of the Black River, then 9.2 miles down the North Fork to Three Forks, then down 12.2 miles of the East Fork of the Black River to the confluence with the West Fork of the Black River.

The obvious drainage down to the Big Lake tributary is intermittent, running only during spring snowmelt runoff, and only flows with water from Crescent Lake when the lake spills (Figure 7). When the lake does spill again, it is assumed that it would spill only during the spring during snowmelt runoff, and then drop down below the spillway level as the runoff subsides.

The natural drainage downstream of the dam travels 2.2 miles from Crescent Lake to the North Fork of the East Fork of Black River and is normally dry. It runs with water only during spring runoff or extreme monsoon events. These flows do not come from Crescent Lake. Dipping Vat Reservoir, a shallow 40-acre waterfowl water is located on this drainage approximately half way between Crescent Lake and the North Fork. The North Fork of the East Fork of the Black River is also normally dry at the confluence with this ephemeral tributary, running only during spring runoff and extreme monsoon events. Permanent flow begins not far downstream in the North Fork of the East Fork of the Black River, just downstream of State Highway 261.

See the Big Lake analysis for detailed description of water distribution and connectivity from the Big Lake tributary downstream.

Figure 6. Aerial image of Crescent Lake (2009 World Imagery, ESRI).

Crescent Lake Dam is located at the north end of the lake, however if the lake spills, water escapement occurs at the south end of the lake over a grassy area and towards downstream of Big Lake.

Figure 7. Topo map of the water/runoff spill path should Crescent Lake spill (red line; pers. com Mike Lopez).

Fish Movement

Stocked trout in Crescent Lake cannot escape the reservoir unless it spills, which has not happened in the last 15 years. There are no water releases through the dam. If the lake does spill, trout would leave to the south into a wide and shallow low gradient channel that flows through mostly terrestrial grassland until it reaches an obvious drainage ¼ mile away. It is likely these channel conditions prevent trout from reaching the unnamed drainage. However, if they did reach the unnamed drainage coming from Crescent Lake, they would usually die because it dries entirely every year as soon as snowmelt ends. In very rare circumstances, trout might make it into the upper end of the North Fork of the East Fork of the Black River and perennial flow. A survey of the unnamed tributary downstream of Big Lake did not detect any stocked fish species

(see Big Lake Community Description). Because water does not spill at the dam at the north end of the lake, fish will not escape to move north of the lake into Dipping Vat Reservoir, which permanently holds water but is not known to support fish. A visual and dip net survey was conducted at Dipping Vat in 1990 and no fish were observed or found.

For fish movement downstream of the Big Lake tributary, refer to the Big Lake analysis below.

Community Description
Rainbow trout, brook trout, fathead minnow, crayfish and tiger salamander are found in Crescent Lake. Results of the last five years of survey history are listed in Table 3 with the catch composed of the stocked species, rainbow trout and brook trout. No fish were found in the 2004 and 2005 surveys because of winterkill.

Table 3. Five year fish survey history for Crescent Lake using experimental gillnets.

Year	Sample Period	Species	Number Caught	Size Range
2009	April	Brook trout	31	294-362
2008	April	Rainbow trout	1	423
2007	April	Rainbow trout Brook trout	48 5	262-514 279-382
2005	April	-	0	-
2004	April	-	0	-

The drainage from Crescent Lake to the Big Lake tributary does not contain fish and it dries up every year.

The Big Lake tributary from the Big Lake dam downstream to the North Fork of the East Fork of the Black River contains speckled dace, Sonora sucker, fathead minnow and crayfish. See the Big Lake analysis below for details on the surveys of that tributary.

The North Fork of East Fork of Black River just below the confluence with the ephemeral tributary from Big Lake contained speckled dace, fathead minnow, and numerous crayfish. Desert sucker, Sonora sucker, speckled dace, fathead minnow, brown trout, rainbow trout, hybrid trout, and numerous crayfish were found in other areas of the North Fork of the East Fork. California floater (*Anadonta californiensis*) was found near Crosby Crossing on the North Fork, and further down at Three Forks. See the Big Lake analysis below for details of the surveys.

Loach minnow occupy the North Fork of East Fork of Black River approximately 13.2 miles below Crescent Lake. The Three Forks springsnail occupies a spring at Three Forks

approximately 14.2 miles below Crescent, and a spring complex at the head of Boneyard Creek approximately 18.5 miles from Crescent.

Bald eagles nest on a knoll near Crescent Lake and there are Mexican spotted owls within 5 miles; the lake is located outside the bald eagle DPS. New Mexico meadow jumping mice were historically found in the vicinity of Crescent Lake. Narrow-headed garter snakes are found throughout much of the East Fork (see Black River complex analysis).

Consultation Species or Critical Habitat
Potential impacts to Chiricahua and northern leopard frogs are addressed below. Should stocked rainbow or brook trout escape Crescent lake and move downstream, potential impacts to Apache trout, narrow-headed and northern Mexican garter snakes, loach minnow and critical habitat, roundtail chub and three forks springsnail downstream of Big Lake are addressed in the Black River Complex analysis.

Chiricahua and Northern leopard frogs are analyzed at a local site and broad scale level due to the movement potential into the stocked area and fish movement potential up or downstream into areas where frogs may occur.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Chiricahua leopard frog
Local Analysis: Crescent Lake and the Black River buffered stocking complex are within the historical range of the Chiricahua leopard frog and the likelihood that frogs could be exposed to fish stocked in Crescent Lake is low. However, the likelihood that frogs could be exposed to fish stocked in other sites within the complex is high. There are no historical records for Chiricahua leopard frogs from Crescent Lake itself; though, there are historical records for Chiricahua leopard frogs from 6 sites within the buffered stocking complex: Crabtree Creek (1988), Deer Creek (2001), East Fork Black River (Buffalo Crossing footbridge) (1974), East Fork Black River (Three Forks) (2008), Concho Bill Spring (2009), and Lake Sierra Blanca (2008) (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys

taking place between 1990 and 2009 (Figure 8; HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Subsequent surveys have found that Chiricahua leopard frogs occupy the area within the Black River buffered stocking complex. In addition, this area, including 3 of the sites mentioned above, is part of ongoing recovery activities for the Chiricahua leopard frog. However, it is not likely that stocked fish in Crescent Lake are able to disperse to occupied Chiricahua leopard frog sites because spills happen infrequently and it is likely that trout would perish before they reached deep enough drainages to move further downstream.

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing stocked fish from Crescent Lake or the Black River buffered stocking complex is low. The lake spills infrequently and it is likely that trout would perish before they reached deep enough drainages to move further downstream. In addition, there are no historical records for Chiricahua leopard frogs outside of the buffered stocking complex where stocked fish may be able to disperse.

Northern Leopard Frog

Local Analysis: Crescent Lake and the Black River buffered stocking complex are within the historical range of the northern leopard frog and the likelihood that frogs could be exposed to fish stocked in Crescent Lake or other stocking sites within the complex is low. There is one historical record for northern leopard frogs from one site in the complex: East Fork Black River (Three Forks) from 1979 (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys taking place between 1990 and 2009 (Figure 8, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs have not been observed at East Fork Black River (Three Forks) during several subsequent surveys or from other sites surveyed in the Black River buffered stocking complex. Due to the extensive surveying of this area and the lack of northern leopard frog observations, it is likely that northern leopard frogs no longer occupy this area.

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing stocked fish from Crescent Lake or the Black River buffered stocking complex is low. There are no historical records for northern leopard frogs where stocked fish are able to disperse outside of the buffered stocking complex. In addition, the lake spills infrequently and it is likely that trout would perish before they reached deep enough drainages to move further downstream.

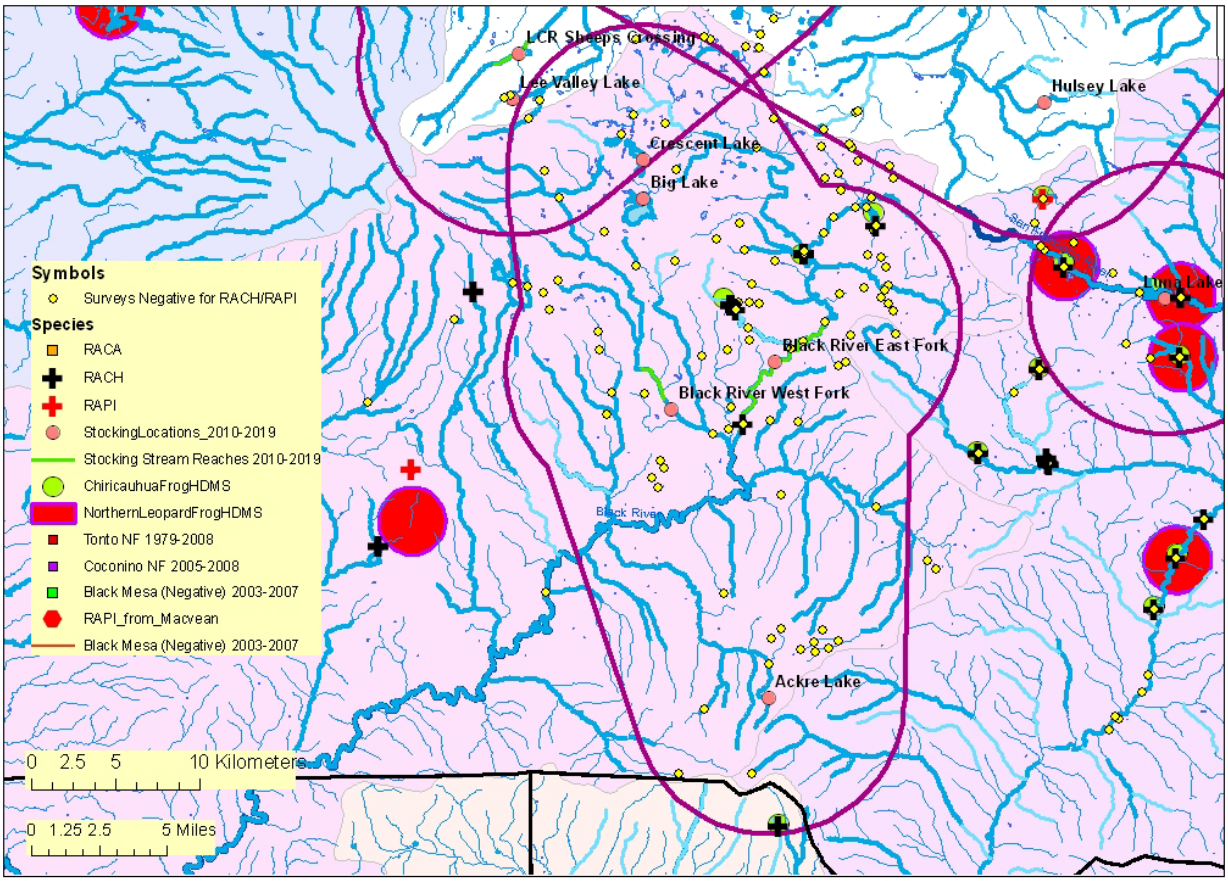

Figure 8. Map of Black River buffered stocking complex:

The purple line illustrates the 5 mile buffer surrounding a stocking site, stocking reach, or a group of stocking sites. Blue lines symbolize streams and rivers (both perennial and intermittent). A black line represents a Chiricahua leopard frog Recovery Unit boundary. The background color represents the 8 digit Hydrologic Unit Code. Other data are described in the legend. (Note: HDMS data appear as buffered points and may appear larger than site records for other surveys).

Big Lake

Site Description

Big Lake is a 532-acre impoundment located on an ephemeral tributary of the headwaters of the North Fork of the East Fork of the Black River on the Apache-Sitgreaves National Forest. Big Lake is located at 8985 feet elevation approximately 18 miles southwest of Springerville. The dam at Big Lake was constructed in the 1930s and the lake was originally managed primarily as habitat for waterfowl until the dam was raised 10 feet in 1953. Since that time, Big Lake has been the premier trout fishing lake in the White Mountains and Arizona.

Management of Water Body

Big Lake is managed as an intensive use put-grow-and-take cold water fishery. Fingerling, sub-catchable, and catchable rainbow, cutthroat, brook, and Apache trout are stocked multiple times during the stocking season from May through October (Table 4). The fishery is intensively used in spring through fall, with light winter ice-fishing use. Multiple trout species are stocked to provide a diversity of opportunity while maintaining high catch rates. Apache trout are stocked sparingly into Big Lake only when a surplus of hatchery Apache trout occurs combined with unsuitable stocking conditions in regular Apache trout stocking sites. Apache trout stocked in the past had poor return to creel rates, thus are not a major objective at Big Lake. The primary management approach is stocking fingerling and subcatchable rainbow, brook, and cutthroat trout, and allowing the productivity of the lake to grow trout to catchable size. Catchable trout and Apache trout are stocked sparingly.

Table 4. Stocking history for Big Lake.

Species	First Year	Last Year	Num of years stocked	Number Stocked
Apache trout	1999	2003	5	28,733
Arctic grayling	1940	1970	30	3,941,800
Brook trout	1936	2008	72	3,310,446
Brown trout	1942	1942	1	402
Cutthroat trout	1940	2008	68	7,859,340
“Native” trout	1936	1939	4	178,400
Rainbow trout	1936	2008	72	4,723,990
Tadpole	1968	1968	1	575
Total				20,043,686

Big Lake had been stocked exclusively with fingerling trout in the spring and fall for many years. Inconsistencies in the survival and return to creel of the fall fingerlings have triggered a change to stocking spring fingerlings at a certain size and switching to subcatchables for the cutthroat trout and fall rainbow trout stockings. This approach appears to be having better results (higher catch rates and higher return to creel), and angler creel surveys have been scheduled in the near future to determine actual results. The lake is popular with all types of anglers because of the good trout fishing. Bank anglers can be very successful, with high catch rates in the spring and fall. Good water quality year around also keeps the catch rates higher than surrounding waters through the summer months, plus there are no excessive weed problems that interfere with boat anglers. This lake is popular with fishermen because it consistently produces full bag

limits, but is also popular with fly fishermen that come for the species diversity and occasional large rainbow and cutthroat trout.

Big Lake is accessed by paved state highways (Hwy 261 and 273) and several all weather roads, and has a concession, ramadas/picnic benches, and 3 boat launch ramps. Bank anglers have access to the entire shoreline (Figure 9), but typically concentrate around parking areas around the lake (Figure 10). The lake and concession are typically accessible from April to November, with the lake freezing over during the winter months. The concession rents boats and boat angling is popular on Big Lake. The lake does receive ice fishing use during the winter by anglers accessing the lake by snowmobile. The Forest Service maintains several campgrounds, boat ramps, boat docks, and picnic areas at Big Lake. The Forest Service also administers a special use permit for the concession.

Figure 9. Photo of Big Lake anglers.

Angler use data consists of on-site angler creel surveys in 1980 (75,851 AUD), 1986 (41,635 AUD), 2000 (94,062 AUD), 2004 (46,482 AUD), and 2005 (66,669 AUD) and by mail out survey in 2001 (124,576 AUD; Pringle 2004). Big Lake is ranked as the highest use water in the state for trout fishing, as determined by angler use days for trout species (Pringle 2004), and

brings in over 19% of the total angler use in the Pinetop Region/White Mountains area. It is an extremely important fishery in this area, and the total angler use is expected to increase. State Highway 273, the main route for visitors coming from the Phoenix and Tucson metro areas, recently underwent major reconstruction in 2007-2008, and was paved in 2009. The US Forest Service also recently expanded the campgrounds at Big Lake in anticipation of the highway improvements. Starting in 2010, it will be much easier to get to Big Lake, with expanded campgrounds that will keep more people at the lake.

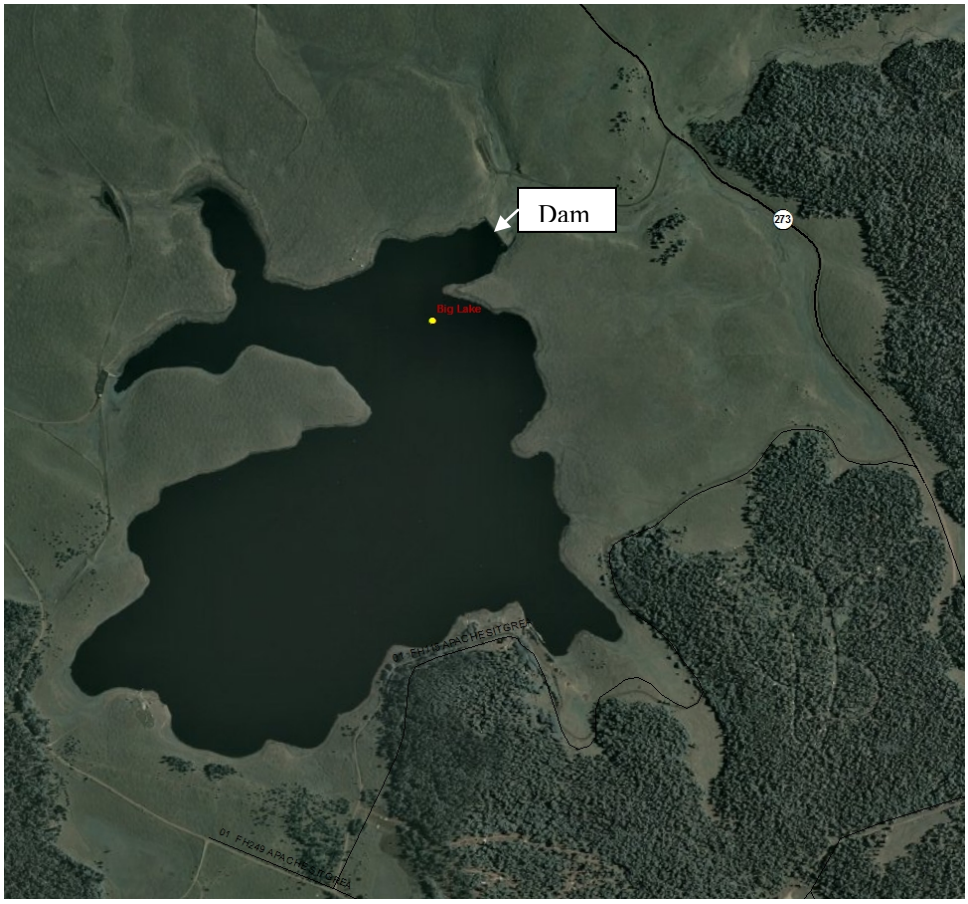

Figure 10. Aerial image of Big Lake (2009 World Imagery, ESRI). The dam is located at the north east end of the lake, and there are two access points from Hwy 273.

A stocking evaluation was conducted at Big Lake in 2004 and 2005 (Meyer et al 2006), outlining stocking recommendations and trout management at Big Lake. A lake management plan is currently being developed for Big Lake, as part of a geographical lake management plan. The stocking evaluation and draft management plan are consistent with this proposal.

Proposed Action

The Department proposes to stock rainbow trout, cutthroat trout, brook trout, and Apache trout in Big Lake for the period covered by this consultation.

Fingerling, sub-catchable, and catchable trout will be stocked multiple times from April to October annually; numbers of rainbow trout stocked may be from 0 to 300,000 trout; 0 to 130,000 cutthroat trout; 0 to 130,000 brook trout; and 0 to 5,000 Apache trout annually.

Water Distribution / Connectivity

Big Lake has no permanent inflow stream and the watershed is extremely small, normally just enough to offset evaporation. The tributary from Big Lake to the North Fork of the East Fork of Black River is approximately 4.5 miles in length and normally does not maintain constant flow throughout. This tributary maintains permanent pools but most are not connected during the summer months. A comprehensive stream habitat survey in 2000 found 76 out of 120 aquatic habitats transects to be dry. Only 35 transects were found to have continuous water, and 11 transects fell on isolated pools. Big Lake has spilled to the North Fork in the past, but not since AGFD records have been kept, starting in 1996. A remote gauge was installed within the last five years to record lake levels which will assist further with maintaining spill records into the future. According to Rick Law, concessionaire for many years at Big Lake, the last spill at Big Lake occurred in the early 1990s.

No water is released from Big Lake for irrigation or other downstream uses. When the lake does spill (very infrequently), it will flow 4.5 miles down the intermittent unnamed tributary (with some permanent isolated pools) to the North Fork of the East Fork of the Black River. The spill from Crescent Lake enters the unnamed tributary approximately 0.1 mile downstream of the Big Lake dam. The North Fork perennial water flows downstream for 9.2 miles to Three Forks, where the North Fork at Boneyard Creek and another unnamed tributary come together to form the East Fork. Ground water inputs via a series of springs including the Head of the Black River Springs support the perennial flows in the North Fork beginning approximately 3.8 miles upstream of the confluence. A small tributary with some permanent flow at Chambers Draw also enters into the North Fork 0.4 mile downstream of the tributary from Big Lake.

From Three Forks, the East Fork flow is perennial for 12.2 miles to the confluence with the West Fork of Black River, where they form the mainstem. Several intermittent tributaries, which contain some permanent water, enter into the East Fork between Three Forks and the confluence, including Coyote Creek, Open Draw, and Deer Creek, 1.2 miles, 2.9 miles, and 7.2 miles downstream of Three Forks, respectively.

The Black River flow is perennial for 113.7 miles to the confluence with the White River, where they form the Salt River. A number of perennial tributaries enter into the Black River, including Beaver Creek, Bear Creek, Centerfire Creek, Fish Creek, Conklin Creek, Reservation Creek, Snake Creek, Pacheta Creek, Bear Wallow Creek, Paddy Creek, and Big Bonito Creek.

Fish Movement

Stocked trout in Big Lake cannot escape the lake unless the lake spills, which has not occurred since the early 1990s. When it does spill, trout do have the ability to escape down the unnamed tributary and into the North Fork of East Fork of Black River. An escaped trout would likely not survive long in the unnamed tributary, since most of it dries in the summer months, and the pools may not support trout for long (see Aquatic Community description of Big Lake tributary). Once in the North Fork, an escaped trout could swim upstream or downstream towards Three Forks. A trout could persist in the North Fork, as it is perennial and suitable trout habitat.

At Three Forks, an escaped trout could swim upstream in Boneyard Creek for 4.0 miles to the dam at Sierra Blanca Lake and/or the Boneyard Springs Bog. Boneyard Creek is perennial and suitable trout habitat, where a trout could persist. Boneyard Springs flows into a marshy bog area that is the headwaters of Boneyard Creek; however, it is unlikely an escaped trout would travel through the bog and into the springs itself, because of the very low flow of the springs. A trout could potentially swim up the unnamed tributary that enters the Three Forks area from the west, but likely would do so only during high flows, since the flow in this tributary is very low. The Three Forks Spring flows into this tributary a short distance up from its confluence with the North Fork, but an escaped trout would likely not swim up into this spring because of its very low flows (and not subject to high flows like the tributary).

From Three Forks, an escaped trout could also swim downstream in the East Fork of Black River down to the confluence with the West Fork Black River. The East Fork is perennial and suitable trout habitat, so a trout could persist here also. An escaped trout could also swim up into Coyote Creek, Open Draw, and/or Deer Creek, but likely only during high flows because of the very low flow of these tributaries.

For movement downstream of the East Fork, see the East Fork Black River analysis.

Community Description

Rainbow trout, cutthroat trout, brook trout, fathead minnow, crayfish, and tiger salamander are currently found in Big Lake (Table 5). Apache trout were last stocked in 2003 and are not considered to be currently present in the lake. Annual gillnetting surveys in Big Lake have not caught Apache trout since 2003. They were either caught out quickly or did not persist amongst the competition with other trout in the lake; most likely the latter since creel surveys have shown poor return to creel by Apache trout in Big Lake. One unidentified sucker was collected in 2008 and another in 2003; however, these are considered to be isolated records, as no suckers have been recorded in Big Lake before or after these collections, despite annual surveys with gillnets (and some trap nets) since 1960.

Table 5. Five Year Survey History for Big Lake using experimental gillnets.

Year	Sample Period	Species	Number Caught	Size range (mm TL)
2009	May	Rainbow trout Cutthroat trout Brook trout	118 21 2	167-590 236-508 312-379
2008	May	Rainbow trout Brook trout Cutthroat trout Unidentified sucker	66 45 28 1	220-421 240-421 220-498 500
2007	May	Rainbow trout Brook trout Cutthroat trout	35 21 7	208-467 220-272 375-564
2006	April	Rainbow trout Cutthroat trout	23 34	235-378 215-362
2005	May	Rainbow trout Cutthroat trout Brook trout	81 76 20	220-419 222-530 116-443

The tributary from Big Lake to the North Fork of the East Fork Black River contains speckled dace, fathead minnow, Sonora sucker, and crayfish as detected in a 2000 fish survey (Table 6). An earlier survey conducted in June 1995 found one rainbow trout and 33 brown trout (Marsh 1997), but no trout were found during the 2000 survey (3-pass depletion), indicating that they are so uncommon that they were not detected, or do not persist in this tributary. The brown trout likely came upstream into the tributary from the North Fork where they are numerous; brown trout are not stocked into Big Lake or Crescent Lake. It is possible the one rainbow trout escaped from Big Lake or Crescent Lake during a spill event in the early 1990s, or could have also come up from the North Fork.

Table 6. Summary of fish surveys of 24 sites on the tributary from Big Lake to North Fork of the East Fork Black River, 2000.

The survey sites were 50 meters long and spaced at regular intervals throughout the stream. A backpack electroshocker was used to complete a 3-pass depletion sampling at each site, when water was present.

Species Collected	Number Collected	Size Range (mm TL)
Speckled dace	460	23-89
Sonora sucker	18	136-302
Fathead minnow	576	23-75

Table 7 indicates the stocking history for the North Fork of the East Fork of the Black River. The North Fork of the East Fork at the confluence with the tributary from Big Lake contained speckled dace, desert sucker, fathead minnow, and crayfish, as detected in a 2001 survey, and speckled dace, desert sucker, Sonora sucker, loach minnow, fathead minnow, brown trout, and hybrid rainbow x apache (hybrid) trout throughout the North Fork as detected in surveys in 2000 and 2001 (Table 8).

Hybrid rainbow x Apache trout are wild and self sustaining in the North Fork, likely originating from historic Apache trout populations in the drainage and rainbow trout that were historically stocked into the North Fork as far back as 1936. Some trout escaping from Big Lake and Crescent Lake when they spill may also have reproduced with native Apache trout. Hybrids have been documented in the North Fork prior to hatchery Apache trout stocked into either Big Lake or in the East Fork Black River. Marsh (1997) also reported hybrid rainbow-Apache trout in the North Fork in 1989 prior to stocking of hatchery Apache trout in the East Fork (1996).

Table 7. AGFD Stocking History for the North Fork of the East Fork of the Black River.

Species	First Year	Last Year	Num of Stockings	Number Stocked
Arctic grayling	1969	1969	2	10,000
Brook trout	1933	1963	2	30,501
Brown trout	1938	1959	11	48,515
Rainbow trout	1936	1986	174	143,541
Total				232,557

Chambers Draw, a small tributary to the North Fork between the tributary from Big Lake and Crosby Crossing contains hybrid rainbow-Apache trout. This population is very small, although likely contributes hybrid trout into the North Fork.

Loach minnow are considered to occupy the North Fork of the East Fork, approximately 12.8 miles downstream of Big Lake. Loach minnow occupied range is considered to extend from 0.9 miles upstream of Three Forks, as found in 2000, downstream into the East Fork of Black River,

approximately 0.5 miles upstream of Open Draw (Marsh 1997). From the confluence of the unnamed tributary downstream of Big Lake with the North Fork of the East Fork of the Black, it is approximately 8.3 miles downstream to occupied loach minnow habitat and another 0.9 miles to Three Forks (13.7 miles total from Big Lake to Three Forks).

Anadonta mussels are present in the North Fork around Crosby Crossing, and at one time were present at Three Forks, and are present in Boneyard Creek. Three Forks springsnails are present at an offchannel springhead at Three Forks, and also at a spring bog at the head of Boneyard Creek.

Table 8. North Fork of East Fork of Black River 2000 and 2001 survey at 47 survey site:

Surveys sites were regularly spaced throughout the stream. The lower portion of the North Fork was surveyed in 2000 and the upper portion was surveyed in. In 2000, surveys were started at the Three Forks area and surveyors worked upstream; however, due to the intensity of the surveys, the anticipated number and extend of stream length was not completed. As such, 2001 surveys began where the 2000 surveys left off. A backpack electroshocker was used to complete 3 depletion passes through 50 meters at each site.

Species Collected	Number Collected
Speckled dace	15,497
Loach minnow	28
Desert sucker	1,839
Sonora sucker	162
Brown trout	34
Hybrid trout	15
Fathead minnow	1,915

Recent surveys in the Three Forks area in 2007, 2008, and 2009 have not found loach minnow, but have found speckled dace, desert sucker, Sonora sucker, rainbow trout, Apache trout, cutthroat trout, and brown trout in the North Fork (Carter 2007; Robinson et al 2008; Robinson et al 2009: Table 9). The one cutthroat trout reported in 2008 at Boneyard Creek is likely a misidentified hatchery Apache trout based on reviews of a photo of the fish (M. Lopez, pers. comm.). This fish is assumed to come from either the East Fork or Big Lake.

For recent survey results of all of the East Fork Black River and further downstream, refer to the East Fork Black River analysis below.

Table 9. Surveys in the North Fork East Fork Black River, upper East Fork Black River, Boneyard Creek, and Coyote Creek in 2007, 2008, 2009.

Stream	**Species Collected**	**Number Collected by Year**

		2007	2008	2009
North Fork East Fork Black River	Speckled dace	286	753	886
	Desert sucker	92	39	13
	Sonora sucker	1	-	-
	Brown trout	8	48	56
	Rainbow trout	-	6	-
	Unidentified sucker	-	2	2
East Fork Black River	Speckled dace	204	241	251
	Desert sucker	37	17	15
	Sonora sucker	1	1	-
	Brown trout	30	28	73
Bonyard Creek	Speckled dace	68	459	104
	Desert sucker	7	16	1
	Sonora sucker	1	1	-
	Brown trout	25	48	28
	Brook trout	-	5	9
	Apache trout	-	1	-
	Cutthroat trout*	-	1	-
	Unidentified sucker	-	8	-
Coyote Creek	Speckled dace	not surveyed	105	20
	Desert sucker		-	4
	Unidentified sucker		-	1

* Likely a misidentified hatchery Apache trout based on reviews of a photo of the fish (M. Lopez, pers. comm.)

Chiricahua leopard frogs are located in Sierra Blanca Lake at the head of Boneyard Creek, and may be present at Three Forks. Narrow-headed garter snakes have been documented recently downstream of Three Forks in 2004 (M. Lopez, pers. comm.), and in the Black River below Forest Road 25 bridge in 2009 (Brennan and Rosen 2009). Northern Mexican garter snakes may occur downstream in the Black River with the closest known population at the confluence with Paddy Creek. Refer to the East Fork Black River analysis for species composition in the East Fork and further downstream in the Black River that may be impacted.

Bald eagles nest on a knoll near Crescent Lake, approximately 1.3 miles from Big Lake and may use the lake for foraging; Big Lake is outside the bald eagle DPS. There are Mexican spotted owls within five miles. New Mexico meadow jumping mice have historical records from the nearby vicinity.

Consultation species and Critical Habitat
Potential impacts to Apache trout (stocked at Big Lake), Chiricahua and northern leopard frogs are addressed below. Should stocked Apache or rainbow trout escape Big Lake and move downstream, potential impacts to Apache trout, narrow-headed and northern Mexican garter snakes, loach minnow and critical habitat, roundtail chub and three forks springsnail downstream of Big Lake are addressed in the Black River Complex analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Chiricahua and Northern leopard frogs are analyzed at a local site and broad scale level due to the movement potential into the stocked area and fish movement potential up or downstream into areas where frogs may occur.

Apache trout
Hatchery reared Apache trout are occasionally stocked into Big Lake to provide sport fishing opportunities. Hatchery Apache trout are also stocked downstream of Big Lake in the East Fork Black River and lower West Fork Black River. Pure populations of recovery population Apache trout are present downstream of Big Lake in the headwaters of the West Fork Black River, Stinky Creek and Hayground Creek (tributaries of West Fork), Fish Creek, Conklin Creek, and Bear Wallow Creek (tributaries of Black River). All recovery populations are isolated from non-native fishes by constructed fish barriers, 2 each on upper West Fork and Bear Wallow, and one each on Stinky, Hayground, Fish, and Conklin creeks.

Potential Impacts

Stocked Apache trout co-stocked with other species:

Apache trout stocked from the hatcheries are for the specific purpose of providing fishing opportunities. Recovery streams are managed for self-sustaining Apache trout populations and regular stocking is not part of that management except with wild trout to initiate and augment the population as needed until it becomes self-sustaining. Apache trout stocked for recreational purposes are considered excess to the survival and recovery of the species. Take of these stocked fish via harvest by anglers is allowed under the section 4(d) rule contained in the designation of

the Apache trout as a Threatened species. That rule allows take of Apache trout if such take is in accordance with State law; in this case through possession of a valid Arizona fishing license and trout stamp.

Impacts to stocked Apache trout from co-stocked sport fish species may include predation, competition, and/or hybridization with stocked trout. A detailed discussion of these impacts is found in Apache trout interactions section (Chapter 4).

Stocked sport fishes moving above failed barriers or moving into recovery reaches:

Impacts to recovery Apache trout are not expected occur because recovery populations are located above constructed barriers, which prevent upstream movement of all fish. Should barrier failure occur, the Forest Service and Department would attempt to repair the barrier and if necessary retreat the reach to remove non-native fish. During this period of time, if stocked fish move above the failed barrier, predation, hybridization with other trout and/or competition with Apache trout could occur.

Impacts from wild populations on stocked Apache trout:

The action of stocking Apache trout is considered a conservation action in furtherance of the Endangered Species Act whereby a special 4(d) rule is in place. AGFD may take any federally listed threatened fish or wildlife for conservation purposes that are consistent with the purposes of the Act and the Section 6 Cooperative Agreement between USFWS and AGFD and therefore take of Apache trout from the proposed stocking of Apache trout is legally permitted.

Impacts to stocked Apache trout from species of fish currently existing as wild, self reproducing populations at or in proximity to proposed stocking locations may include predation, hybridization with other trout and/or competition.

Chiricahua leopard frog

Local Analysis: Big Lake and the Black River buffered stocking complex are within the historical range of the Chiricahua leopard frog and the likelihood that frogs could be exposed to fish stocked in Big Lake is low. However, the likelihood that frogs could be exposed to fish stocked in other sites within the complex is high. There are no historical records for Chiricahua leopard frogs from Big Lake itself; though there are historical records for Chiricahua leopard frogs from 6 sites within the complex: Crabtree Creek (1988), Deer Creek (2001), East Fork Black River (Buffalo Crossing footbridge) (1974), East Fork Black River (Three Forks) (2008), Concho Bill Spring (2009), and Lake Sierra Blanca (2008) (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys taking place between 1990 and 2009 (Figure 8, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Subsequent surveys have found that Chiricahua leopard frogs occupy the area

within the Black River buffered stocking complex. In addition, this area, including 3 of the sites mentioned above, is part of ongoing recovery activities for the Chiricahua leopard frog. However, it is not likely that stocked fish in Big Lake are able to disperse to occupied Chiricahua leopard frog sites, stocked fish at other sites within the complex may.

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing stocked fish from Big Lake or the Black River buffered stocking complex is low. There are no historical records for Chiricahua leopard frogs where stocked fish are able to disperse outside of the buffered stocking complex.

Northern Leopard Frog

Local Analysis: Big Lake and the Black River buffered stocking complex are within the historical range of the northern leopard frog and the likelihood that frogs could be exposed to fish stocked in Big Lake or other stocking sites within the complex is low. There is 1 historical record for northern leopard frogs from 1 site in the complex: East Fork Black River (Three Forks) from 1979 (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys taking place between 1990 and 2009 (Figure 8, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs have not been observed at East Fork Black River (Three Forks) during many subsequent surveys or from other sites surveyed in the Black River buffered stocking complex. Due to the extensive surveying of this area and the lack of northern leopard frog observations, it is likely that northern leopard frogs no longer occupy this area.

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing stocked fish from Big Lake or the Black River buffered stocking complex is low. There are no historical records for northern leopard frogs where stocked fish are able to disperse outside of the buffered stocking complex.

East Fork Black River

Site Description

The stocking site is a series of stocking sites within a 6.75-mile reach on the lower end of the East Fork of the Black River (Figure 3). The stocking reach extends from approximately at the Buffalo Crossing Campground (Figure 11) upstream to the Diamond Rock Campground (Figure 12), approximately 4.5 miles below Three Forks. The East Fork of the Black River is a perennial stream fed by springs, snowmelt, rainfall events, and groundwater contributions. The entire East Fork Black River is located on the Apache-Sitgreaves National Forest, and the stocking reach is approximately 9 miles west of Alpine. The East Fork Black River stocking site is located downstream of Big Lake and Crescent Lake. The East Fork meets with the West Fork Black River a short distance downstream of the stocking reach to form the Black River. Other stocking

sites in the complex are located in the West Fork, and in Ackre Lake which drains into the Black River.

Figure 11. East Fork Black River stocking reach at Buffalo Crossing.

Management of Water Body

The primary fishery in the stocked reach from Buffalo Crossing upstream to Diamond Rock is a cold water intensive use Apache trout put-and-take fishery (Table 10). Catchable size trout are stocked weekly from May through September. Rainbow trout had been primarily stocked from 1933 to 1996, although brown trout were also stocked numerous times from 1935-1981. The species stocked into the East Fork was changed in 1996 to Apache trout, and only Apache trout have been stocked since 1997 because of concerns for native fishes and other sensitive aquatic organisms in the drainage.

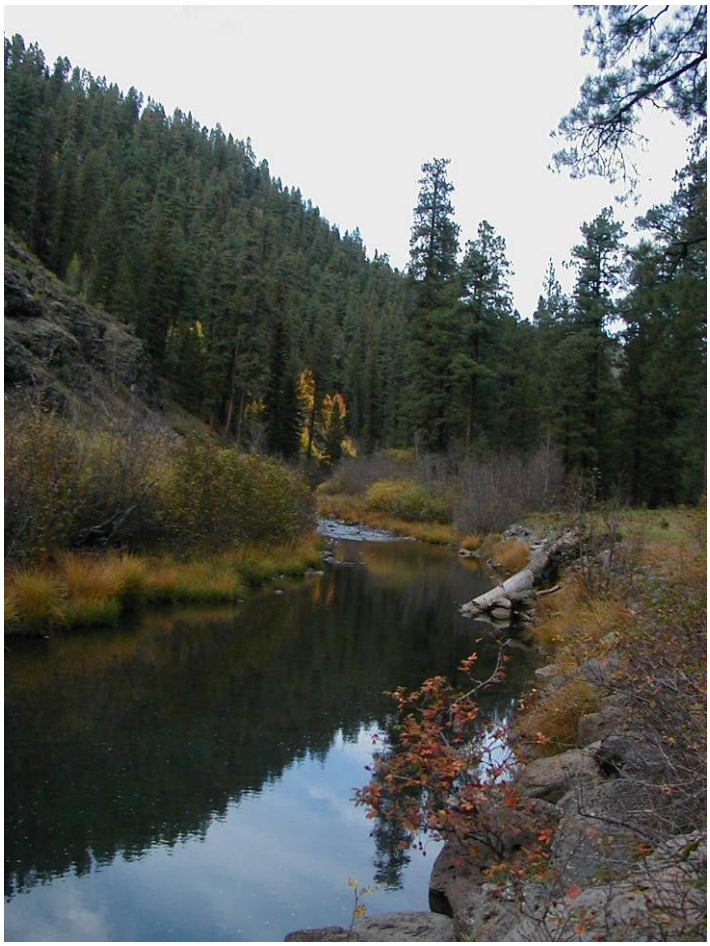

Figure 12. East Fork Black River stocking reach near Diamond Rock.

Table 10. Stocking history for East Fork Black River.

Species	First Year	Last Year	Number of Stockings	Number Stocked
Apache trout	1996	2009	232	286,264
Arctic grayling	1969	1969	1	10,000
Brook trout	1933	1940	6	48,620
Brown trout	1935	1981	52	291,131
Native trout*	1933	1937	6	59,410
Rainbow trout	1933	2008	739	1,499,207
Total				2,194,632

The east fork is accessed by all weather gravel Forest Road 276, a maintained dirt road that parallels the river throughout the stocking reach (Figure 13). There are four Forest Service campgrounds along the stocking reach.

Anglers can easily access the river all along Forest Road 276, but usually concentrate at larger pool habitats in the stocking reach where the trout are stocked. Angler use data were collected by on-site angler creel surveys in 1982 (17,262 AUD), 1987 (14,461 AUD), 1995 (13,389 AUD), 1996 (8,379), and 1997 (13,517 AUD), and by mail out survey in 2001 (33,334 AUD; Pringle 2004). Angler use in 1996 was depressed because of Forest closures in mid-summer that year. The East Fork of Black River is typically accessible from March through November, and receives very little winter use, depending upon the severity of the winter. A fisheries management plan is currently being developed by the Forest Service for the East Fork Black River as part of a wide scale plan for the Apache National Forest area.

The East Fork Black River is currently stocked entirely with Apache trout, which has mostly met the needs of anglers. All Apache trout stocked into the East Fork come from one hatchery and occasionally circumstances result in problems stocking Apache trout. When higher than expected mortalities at Silver Creek Hatchery reduces available Apache trout, reductions in the number of fish stocked is necessary. The occasional use of rainbow trout to fill in gaps in Apache trout numbers would help maintain a more consistent fishery. This is not likely to increase impacts on sensitive species, since the total numbers of fish stocked would not increase (only use rainbows when hatchery is short on Apache trout), rainbow trout are easier to catch and exhibit higher catch rates, and likely function in the stream much the same way an Apache trout would despite being nonnative while Apache trout are native.

Figure 13. East Fork Black River stocking reach along Forest Road 276.

Proposed action
The Department proposes to stock Apache trout and rainbow trout into the East Fork Black River for the period covered by this consultation.

Catchable Apache trout and rainbow trout would be stocked weekly from May through September. Total numbers of trout stocked may be from 0 to 40,000 trout annually. Stocking Apache trout would be the preferred objective, however, rainbow trout may be substituted when hatchery supply of Apache trout are not sufficient to stock the river at the desired rates. The addition of rainbow trout for the next ten years is a change from the previous stocking plan.

Water Distribution / Connectivity
The entire East Fork Black River is perennial and is fed by the perennial North Fork East Fork Black River (see Big Lake analysis for water distribution in the North Fork) and perennial Boneyard Creek. Boneyard Creek begins at the Boneyard Bog Springs, and then flows for 4.3 miles to meet the North Fork and another unnamed tributary at Three Forks to form the East Fork Black River. Sierra Blanca Lake is located at the headwaters of Boneyard Creek, although it is connected but off channel from the main channel of Boneyard Creek.

The unnamed tributary at Three Forks that flows in the East Fork of the Black from the northwest is small and does not contribute much water, although the Three Forks Spring is off channel and flows into this tributary just upstream of its confluence with the East Fork. A small natural pond is also connected to this tributary just upstream of the confluence.

Coyote Creek is another small tributary that enters the East Fork Black River approximately 1.2 miles downstream of Three Forks. This stream occasionally dries through much of its length, although it does maintain permanent pools. Open Draw is another small tributary that enters the East Fork Black River approximately 2.9 miles downstream of Three Forks. The permanency of this stream is unknown, although it is very small. Deer Creek is another small tributary that enters the East Fork Black River approximately 7.2 miles downstream of Three Forks. Concho Bill Springs is located in upper Deer Creek, approximately 3.6 miles upstream of the East Fork.

The East Fork Black River meets with the West Fork Black River to form the mainstem Black River. The Black River continues to flow south, then west for 113 miles into the Fort Apache Indian Reservation and San Carlos Indian Reservation, where it meets with the White River to form the Salt River. The Black River is also perennial throughout its entire course.

Permanent tributaries enter into the Black River on the Apache National Forest, including Beaver Creek (1.9 miles downstream of the confluence of the East Fork and West Fork of Black Rivers), Bear Creek (3.9 miles), Centerfire Creek (9.3 miles), Fish Creek (9.6 miles), Conklin Creek (11.6 miles), Reservation Creek (12.8 miles), and Snake Creek (14.8 miles). Other major tributaries that enter the Black River on the reservations include Pacheta Creek, Bear Wallow Creek, Paddy Creek, and Big Bonito Creek.

Fish Movement

Trout stocked into the East Fork Black River can move upstream in perennial water to Three Forks, and into the North Fork of the East Fork of Black River or into Boneyard Creek. Fish are unlikely to move upstream through Boneyard Creek into Sierra Blanca Lake since there is a dam on the lake. Stocked trout could not reach the Boneyard Bog Spring area because the bog is really heavily vegetated and there are no perennial flows entering Sierra Blanca. The Lake probably spills every year, but only during spring run-off events. Movement into tributaries of the North Fork is likely restricted to high flow seasons, such as spring runoff, because of low flows and often dry reaches in tributaries other than Boneyard Creek. Movement into tributaries of the East Fork Black River is also likely restricted to high flow seasons, such as spring runoff, because of low flows and often dry reaches in the tributaries.

It is possible for stocked trout to move downstream in perennial water to the confluence with the West Fork Black River. At this point, a stocked trout could move upstream into the West Fork unimpeded until it reached a constructed fish barrier 13.5 miles above the confluence (Figure 14). A second constructed fish barrier is located 0.3 miles upstream of the lower barrier (Figure 15). Several tributaries to the West Fork Black River enter downstream of these fish barriers. A dispersing fish could enter the lower portion of these tributaries until they reach constructed fish barriers on all three tributaries. Home Creek is located 1.2 miles upstream of the East Fork and West Fork confluence, with constructed fish barriers at 1.3 miles and 1.7 miles upstream of the West Fork (Figure 16). Hayground Creek is located 6.6 miles upstream of the East Fork and West Fork confluence, with a constructed fish barrier 0.1 mile above the West Fork (Figure 17). Stinky Creek is located 11.6 miles upstream of the East Fork and West Fork confluence, with a constructed fish barrier 0.2 miles above the West Fork (Figure 18).

It is also possible for a stocked trout to continue down into the Black River. All of the Black River on the National Forest is suitable trout habitat and may support dispersing trout, but at some point downstream on the reservations, the river reaches an elevation where the river becomes too warm to support trout. Dispersing trout may also swim up into the tributary streams, but would likely do so mainly during high flows because of the normal low flows in these streams, despite being perennial. A dispersing trout moving up into tributaries, could go no further than constructed fish barriers on Centerfire Creek (1.5 miles above the Black; Figure 19), Fish Creek (0.6 miles; Figure 20), Conklin Creek (1.4 miles; Figure 21), and Snake Creek (0.1 miles; Figure 22). A trout could move some distance up Reservation Creek, but can only get into a very small stretch of lower Soldier Creek until it reached a natural waterfall (Figure 23). Constructed fish barriers also exist on Bear Wallow Creek (Figure 24 and Figure 25) and Big Bonito Creek.

Figure 14. West Fork Black River lower fish barrier (located above West Fork Black stocking reach).

Figure 15. West Fork Black River upper fish barrier.

Figure 16. Home Creek upper fish barrier.

Figure 17. Hayground Creek fish barrier.

Figure 18. Stinky Creek fish barrier.

Figure 19. Centerfire Creek fish barrier.

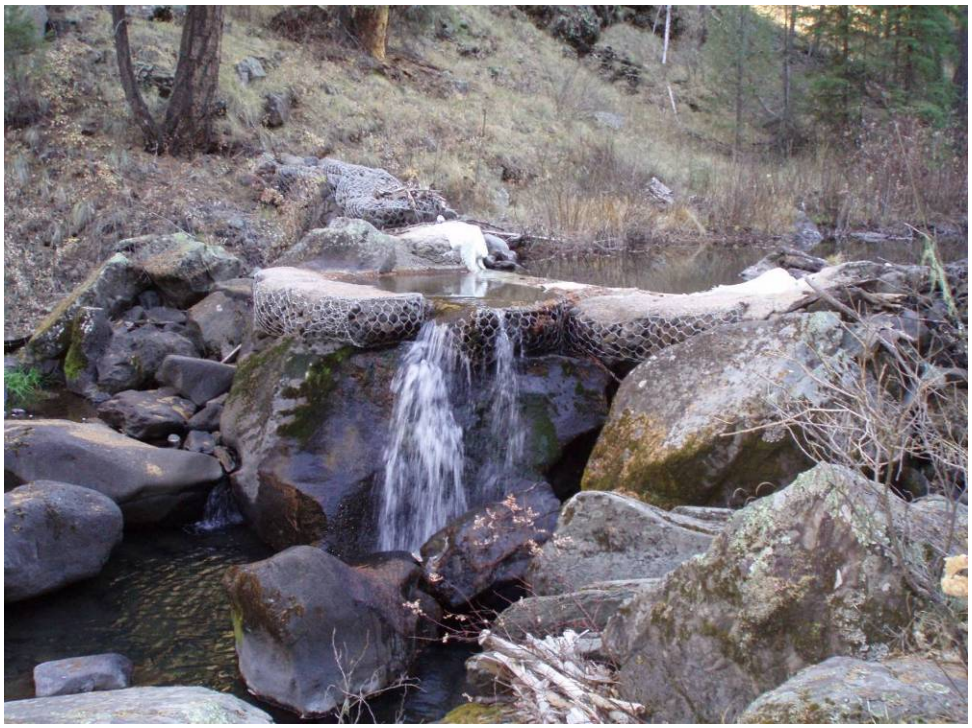

Figure 20. Fish Creek fish barrier.

Figure 21. Conklin Creek fish barrier.

Figure 22. Snake Creek fish barrier.

Figure 23. Soldier Creek waterfalls (fish barrier).

Figure 24. Bear Wallow lower fish barrier on San Carlos Reservation.

Figure 25. Bear Wallow upper fish barrier on Apache-Sitgreaves National Forest.

All waters in the Black River watershed are suitable trout habitat, except for some very small tributaries because of extremely low flows, plus the lower portion of the Black River on the reservations, where the water becomes too warm in these lower elevations to support trout.

Community Description

The stocked reach on the East Fork currently contains wild brown trout, stocked Apache trout, desert sucker, Sonora sucker, speckled dace, and numerous crayfish. These species were collected in the stocking reach during surveys in 1988 and 1996, as shown in Table 11. These sites were originally surveyed in July-August 1988, and were repeated in 1996. The 1988 survey was conducted during the stocking season and rainbow trout were collected within the stocking reach, since rainbows were being stocked at that time, up to 1996. In 1988, no rainbow trout were collected below the stocking reach or above the stocking reach Table 12). Apache trout stockings began in 1996; 90% of the trout stocked in the East Fork that year were Apache trout. Only Apache trout have been stocked starting in 1997. The 1996 survey looking for stocked trout was conducted in October-November, after the stocking season ended in September. No hatchery trout were collected at any station in the East Fork during these surveys, in the stocking reach, or above or below illustrating that stocked trout do not remain in the system following the stocking season. The 1988 survey documented no movement of stocked trout out of the stocking reach, since hatchery rainbow trout were collected only in the stocking reach. The 1996 survey documented no persistence of hatchery Apache trout approximately 2 months after the stocking season.

Table 11. East Fork Black River surveys within the stocking site in 1988 and 1996. Survey sites 2-5 through 3-7are located within the stocking reach.

Stations 1-1 through 2-4 are located below the stocking reach. The permanent stations established on the East Fork Black River in 1988 were 100 meters in length, and were sampled with 3 depletion passes with a backpack electroshocker (Novy and Lopez 1991b).

Survey Site	**Species**	**Year**	
		1988	**1996**
1-1	Speckled dace	26	76
	Desert sucker	52	13
	Sonora sucker	20	4
	Brown trout	5	12
1-2*	Speckled dace	49	37
	Desert sucker	52	29
	Sonora sucker	15	7
	Brown trout	7	18
2-3*	Speckled dace	458	177

Survey Site	Species	Year	
		1988	1996
	Desert sucker	24	36
	Sonora sucker	11	7
	Brown trout	5	12
2-4*	Speckled dace	19	21
	Sonora sucker	14	5
	Brown trout	7	2
	Brown trout	-	24
2-5**	Speckled dace	29	50
	Desert sucker	17	20
	Sonora sucker	9	6
	Brown trout	4	32
3-6**	Speckled dace	127	11
	Desert sucker	104	11
	Sonora sucker	21	14
	Brown trout	35	37
	Rainbow trout	2	-
3-7**	Speckled dace	187	54
	Desert sucker	381	26
	Sonora sucker	12	3
	Brown trout	8	31
	Rainbow trout	2	-

** Survey sites are located below the stocking reach*

***survey sites are located within the stocking reach*

Loach minnow occupied habitat is 2.1 miles upstream from the uppermost stocking site in this reach. Surveys conducted in the East Fork Black River upstream of the stocking site also detected speckled dace, desert sucker, Sonora sucker, and brown trout in 1988 and 1996 (Table 12). Survey sites 3-8 through 4-11 are all located above the stocking reach. Loach minnow were collected at sites 3-9, 4-10 and 4-11 in 1996, but were not documented in 1988. Loach minnow were first identified in the East Fork in 1996 and loach minnow may have been collected in 1988 but misidentified as speckled dace since crews were not looking for loach minnow (M. Lopez, pers. comm.). No hatchery trout were collected in the sites above the stocking reach in 1988 or in 1996.

Table 12. East Fork Black River surveys upstream of stocking site in 1988 and 1996.

The permanent stations established on the East Fork Black River in 1988 were 100 meters in length, and were sampled with 3 depletion passes with a backpack electroshocker (Novy and Lopez 1991b).

Survey site	Species	Year	
		1988	1996
3-8	Speckled dace Desert sucker Sonora sucker Brown trout	318 89 3 4	Not surveyed
3-9	Speckled dace Desert sucker Sonora sucker Brown trout Loach minnow	155 378 9 3 -	738 128 11 - 33
4-10	Speckled dace Desert sucker Sonora sucker Brown trout Loach minnow	293 357 30 3 -	786 188 16 2 3
4-11	Speckled dace Desert sucker Sonora sucker Brown trout Loach minnow	175 249 9 3 -	633 62 20 3 1

The permanent sites on the East Fork Black River were re-surveyed 3 times in 2009, once in the spring prior to stocking season, once in July during the stocking season and once again in November after the stocking season (Table 13). These surveys followed the methods originally used by Novy and Lopez (1991b) in 1988, and repeated in 1996.

Table 13. East Fork Black River surveys at permanent GAWS sites in 2009.

Sites 1-1 through 2-4 are located below the stocking reach; sites 2-5 through 3-7 are located within the stocking reach; sites 3-7.2 through 4-11 are located above the stocking reach. Sites 3-6.5, 7.1 and 7.2 were newly added in 2009 and were not surveyed in 1988 or 1996. The stations were 100 meters in length, and were sampled with 2- 4 depletion passes with a backpack electroshocker (Novy and Lopez 1991b).

Survey Site	Species Collected	Survey date		
		Spring (pre stocking)	Summer (stocking)	Fall (post stocking)

Survey Site	Species Collected	Survey date		
		Spring (pre stocking)	Summer (stocking)	Fall (post stocking)
1-1	Brown trout	58	36	37
	Speckled dace	-	412	-
	Desert sucker	-	4	-
1-2	Brown trout	Not surveyed	89	49
	Apache trout		2	-
	Speckled dace		554	-
	Desert sucker		67	-
	Sonora sucker		3	-
2-3	Brown trout	21	66	73
	Apache trout	-	-	1
	Speckled dace	-	489	-
	Desert sucker	-	7	-
2-4	Brown trout	23	40	38
	Speckled dace	-	236	-
	Desert sucker	-	1	-
	Sonora sucker	-	14	-
3-5	Brown trout	43	237	68
	Apache trout	-	1	-
	Speckled dace	-	517	-
	Desert sucker	-	5	-
	Sonora sucker	-	4	-
3-6	Brown trout	60	55	74
	Apache trout	-	1	-
	Speckled dace	-	127	-
	Desert sucker	-	7	-
	Sonora sucker	-	6	-
3-6.5	Brown trout	Not surveyed	66	25
	Apache trout		2	-
	Speckled dace		116	-
	Desert sucker		4	-
	Sonora sucker		1	-
3-7	Brown trout	70	184	128
	Apache trout	-	1	-
	Speckled dace	-	39	-
	Desert sucker	-	17	-
3-7.1	Brown trout	31	79	Not surveyed
	Speckled dace	-	4	

Survey Site	Species Collected	Survey date		
		Spring (pre stocking)	Summer (stocking)	Fall (post stocking)
	Desert sucker	-	79	
	Sonora sucker	-	3	
3-7.2	Brown trout	22	35	Not surveyed
	Speckled dace	-	24	
	Desert sucker	-	67	
	Sonora sucker	-	3	
3-8	Brown trout	15	26	139*
	Speckled dace	-	291	
	Desert sucker	-	12	
	Sonora sucker	-	1	
3-9	Brown trout	Not surveyed	53	
	Speckled dace		182	
	Desert sucker		25	
	Sonora sucker		1	
4-10	Brown trout	Not surveyed	68	
	Brook trout		1	
	Speckled dace		416	
	Desert sucker		20	
4-11	Brown trout	Not surveyed	70	35
	Speckled dace		310	
	Desert sucker		8	
	Fathead minnow		1	

* During the Fall surveys, survey crews completed the 100 m sites closest to the upstream end of the stocking reach to try to document any movement upstream of stocked fish. From sites 3-8 through 4-10 the crews did not survey 100 m sites, rather they walked upstream and electrofished every pool in attempt to evaluate whether there are pools that could harbor fish between survey stations. This was an effort to be more thorough in trying to detect possible stocked trout that moved upstream; in total 130 brown trout were collected.

The 2009 surveys were conducted in an attempt to determine if stocked trout are moving out of the stocking reach or persisting after stocking. The spring and fall surveys collected only trout, although other native species were present. Sites 3-9 through 4-11 were not surveyed in the spring to minimize potential impacts on loach minnow. A full survey of all species was conducted in the summer survey. The spring surveys documented no carryover hatchery trout from the 2008 stocking season at any of the stations. The only trout found in the spring were wild brown trout. The summer surveys found some hatchery Apache trout in the stocking reach (n=5), compared to 542 wild brown trout in the same sites. The summer surveys also

documented 2 hatchery Apache trout that had moved downstream of the stocking reach, into station 1-2 (2.3 miles below the stocking reach). The summer surveys also documented another trout, 1 brook trout in station 4-10. This brook trout likely came downstream from a wild population of brook trout that exist in Boneyard Creek. Station 4-10 is located approximately 0.5 miles downstream of the Boneyard Creek confluence. Only 1 Apache trout was documented to persist after the stocking season ended. This trout was found at station 2-3, which is downstream of the stocking reach, thus it had dispersed out of the stocking reach. No hatchery trout were found upstream of the stocking reach in any of the 3 surveys. Stations 3-8, 3-9 and 4-10 were not surveyed in the fall survey, however, a crew electrofished each major pool (where catchable size trout would most likely be located) from site 3-8 to just below 4-11. Only wild brown trout were found, except for the 1 wild brook trout in the summer survey. Robinson et al (2008) documented at least 1 hatchery Apache trout in Boneyard Creek (see Table 9 above), illustrating that stocked trout do move upstream as well. These data illustrate several things

Hatchery trout stocked into the East Fork Black River do disperse out of the stocking reach, both upstream and downstream, but do so in very low numbers.

Hatchery trout do persist for a short period (at least 2 months) after the stocking season has ended, but do not persist long-term. The 1996 survey and 2009 spring survey show that hatchery trout did not persist (enough to be detected) from the 1996 stocking season and 2008 stocking season, respectively. Also, the total number of hatchery trout collected is very low in all surveys, even during the stocking season, illustrating that most trout are likely caught out quickly, within days of a stocking event.

Wild brown trout are increasing in numbers from 1988 through 2009, speckled dace are maintaining populations, and suckers are decreasing. Population estimates show a statistically significant increase in brown trout from 1988 to 1996, and also from 1996 to 2009 (Table 14). The sum of fish collected in multiple depletion passes and may not fully illustrate the change.

Table 14. Population estimates (SE) for trout, suckers, speckled dace and loach minnow in the East Fork Black River for 1988, 1996 and 2009.

Estimates are the average of population estimates in 100 meter survey stations on the East Fork Black River. All trout in these population estimates were brown trout, except for 1988 which includes 0.4 rainbow trout per station.

Date	Trout	Desert sucker	Sonora sucker	Speckled dace	Loach minnow
July 1988	9.4 (3.8)	236 (82)	18.4 (3.5)	224 (67)	
Oct-Nov 1996	19.9 (5.3)^	68 (25)^	9.9 (2.1)^	298 (111)	4.9 (4.3)
May 2009	45.6 (8.7)^				

^Statistically significant differences (90% CI)

Recent surveys in the upper East Fork Black River in 2007, 2008, and 2009 (Carter 2007, Robinson et al. 2008, Robinson et al. 2009), upstream of the stocking reach, detected speckled dace, desert sucker, Sonora sucker, and brown trout as shown in Table 9, above.

Tributary Coyote Creek contains loach minnow, speckled dace, desert sucker, Sonora sucker, fathead minnow, and brown trout (Table 15); surveys in Coyote Creek were conducted in 2000. One loach minnow was collected at station 1-3, 564 meters upstream of the East Fork Black River.

Tributary Open Draw contains speckled dace and fathead minnow, with both species documented in surveys in 1988 and 1996 (Marsh 1997 and Table 16).

Table 15. Survey of Coyote Creek in 2000. Twenty-four 50-meter stations were established throughout the stream and electrofished with 3 depletion passes.

Species Collected	**Number Collected**
Loach minnow	1
Speckled dace	3,501
Desert sucker	329
Sonora sucker	3
Fathead minnow	14
Brown trout	5

Table 16. Surveys of Open Draw in 1988 and 1996, from Forest Road 582 downstream for 1 mile (Marsh 1997).

Survey Date	**Species Collected**	**Number Collected**
June 1988	Speckled dace Fathead minnow	1032 26
August 1996	Speckled dace Fathead minnow	8 77

Tributary Deer Creek was determined to be fishless in surveys conducted in 1996 and 1999. In 1996, surveys were conducted on the stream near Concho Bill Spring without finding fish (Marsh 1997). In 1999, a pool at Concho Bill Spring was seined and electrofished by Department personnel, plus a length of stream below the pool was electrofished, without finding fish. A conservation population of Chiricahua leopard frogs was established at Concho Bill Spring, located at the head of Deer Creek approximately 3.6 miles up from the East Fork Black River.

Smallmouth bass and roundtail chub occur a short distance downstream in the mainstem Black River but have not been documented in the East Fork. A recent survey in the Black River downstream of the stocking site also detected speckled dace, desert sucker, Sonora sucker, fathead minnow, and rainbow X apache trout hybrids in 2005 (Table 17). McKell documented both smallmouth bass and roundtail chub in the Black River at the confluence with Bear Creek, approximately 6.7 miles downstream of the stocking reach on the East Fork Black River. Voeltz (2007) also documented brown trout, roundtail chub, smallmouth bass, desert sucker, Sonora sucker, and speckled dace in the Black River at Wildcat Crossing.

There are historical and recent records of narrow-headed garter snakes above, within and downstream of the East Fork Black River stocking reach, and above and below the West Fork Black River stocking reaches (see complex analysis for details). The entire Black River stocking complex is out of the distributional range of northern Mexican garter snakes (see complex analysis for details).

Table 17. Species and numbers of fish collected in the 2005 Black River survey (McKell 2005a).

Species	Method	
	Hoop nets*	**Electroshocking****
Sonora sucker	2	13
Roundtail chub	199	98
Desert sucker	1	33
Speckled dace	25	428
Smallmouth bass	-	6
Hybrid trout	-	14
Brown trout	-	23
Fathead minnow	-	1
Unidentified sucker	-	6

**Effort = 261.95 hours*

*** Effort = 197.6 minutes*

Beaver Creek, tributary to the Black River approximately 4.7 miles downstream of the East Fork stocking reach, contains speckled dace, desert sucker and brown trout, as documented in a survey conducted in 2008 (Weiss and Lopez 2008 and Table 18).

Table 18. Survey in Beaver Creek in 2008 (Weiss and Lopez 2008)

Species Collected	Number Collected
Speckled dace	158
Desert sucker	49
Brown trout	14

Hannagan Creek, a headwater tributary to Beaver Creek, contains Apache trout, brown trout, and speckled dace according to a survey conducted in 1990 (Novy and Lopez 1991 and Table 19). Some pure Apache trout are present above a road culvert barrier in Hannagan Creek; however, Carmichael et al (1993) report that many of the trout are rainbow-Apache hybrids.

Table 19. Species, numbers and size range of fish collected in a 1990 survey of Hannagan Creek (Novy and Lopez 1991).

In this table, Apache trout includes pure Apache trout and hybrid rainbow-Apache trout.

Reach	Species Collected	Number Collected	Size Range (mm TL)
1	Speckled dace	78	24-63
2	Apache trout	4	77-96
3	Apache trout Brown trout	54 1	71-167 126
4	Apache trout	43	67-156

Bear Creek, tributary to the Black River approximately 6.7 miles downstream of the stocking reach on the East Fork, contains brown trout and rainbow trout, as documented by Marsh (1997) in 1996 (Table 20).

Table 20. Species and numbers of fish collected in a 1996 survey of Bear Creek (Marsh 1997).

Species Collected	Number collected
Brown trout	67
Rainbow trout	1

Centerfire Creek, tributary to the Black River approximately 12.0 miles downstream of the stocking reach on the East Fork, contained Apache trout, brown trout and speckled dace, as documented by Novy and Lopez (1991) in 1988 (Table 21). Some pure Apache trout are present in Centerfire Creek; however, Carmichael et al (1993) reported that the stream also contains mostly rainbow-Apache hybrids. A visual survey of much of the stream in 2007 during extremely low flow observed no fish above a constructed fish barrier located at the confluence with Wildcat Creek (Lopez 2008; Figure 19).

Table 21. Species, numbers and size range of fish collected in Centerfire Creek in 1988 (Novy and Lopez 1991).

Reach	Species Collected	Number Collected	Size Range (mm TL)
1	Brown trout	58	101-341

	Apache trout	51	39-214
	Speckled dace	262	26-121
2	Brown trout	54	103-290
	Apache trout	45	86-198
	Speckled dace	51	33-125
3	Brown trout	13	128-352
	Apache trout	65	81-211
	Speckled dace	61	49-112

Fish Creek, tributary to the Black River approximately 12.3 miles downstream of the stocking reach on the East Fork, contains pure Apache trout and speckled dace upstream of a constructed fish barrier (Lopez et al 2007; Figure 26). Prior to chemical treatment to remove non-native fish species, Fish Creek contained Apache trout, rainbow-Apache hybrids, brown trout, fathead minnow and speckled dace (Carmichael et al 1993, Lopez and Meyer 2006). See the Ackre Lake analysis for additional details on Fish Creek and Ackre Lake (located at the headwaters of Fish Creek), and for species composition on the Black River and tributaries downstream of Fish Creek.

The Mexican spotted owl is in the vicinity of the stocking site.

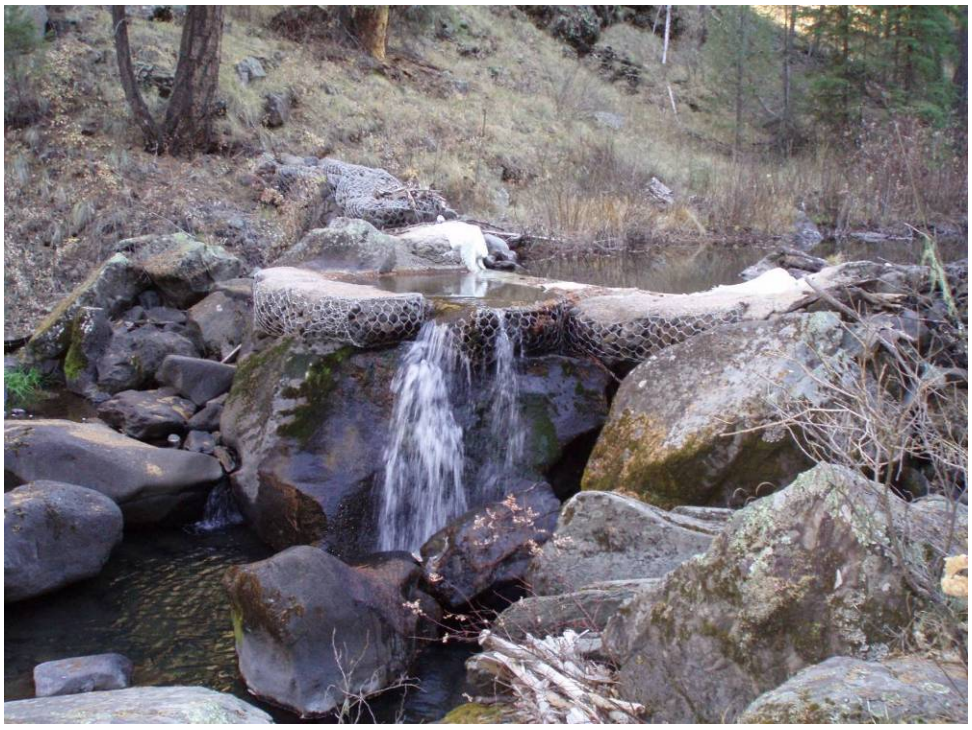

Figure 26. Fish Creek fish barrier.

Consultation Species or Critical Habitat
Potential impacts to Apache trout stocked in the East fork of the Black River, Chiricahua and northern leopard frogs and Mexican spotted owl are addressed below. Should stocked Apache or rainbow trout move upstream or downstream from the stocking reach, potential impacts to Apache trout, narrow-headed and northern Mexican garter snakes, loach minnow and critical habitat, roundtail chub and three forks springsnail downstream of Big Lake are addressed in the Black River Complex analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Chiricahua and Northern leopard frogs are analyzed at a local site and broad scale level due to the movement potential into the stocked area and fish movement potential up or downstream into areas where frogs may occur.

Apache Trout
Hatchery Apache trout are stocked into the East Fork and the West Fork of the Black River to provide fishing opportunities. Recovery populations of Apache trout are also located in upper West Fork Black River, as well as in tributaries of the West Fork (Hayground Creek and Stinky Creek). Apache trout established in Home Creek, tributary to the West Fork, are considered to have perished when the stream dried entirely in 2002. Recovery populations of Apache trout are also located in tributaries of the Black River, including Fish Creek, Soldier Creek (tributary to Reservation Creek, which is tributary to Black River), Bear Wallow Creek, and Big Bonito Creek.

While at large in the East Fork, stocked Apache trout may compete with wild brown trout, and, if stocked, rainbow trout for food and space. However, Wang and White (1994) found that hatchery cutthroat trout had a significant competitive disadvantage in the presence of wild brown trout and Apache trout would also likely have the same disadvantage. Apache trout may be able to reproduce in the East Fork, however, likely do not persist long enough to spawn. Large brown trout may prey on stocked Apache trout as well as any Apache trout eggs or larval and juvenile. The presence of rainbow x Apache trout hybrids in the North Fork of East Fork of Black River is not necessarily proof that hatchery Apache trout have been spawning. These hybrids have been

documented in the North Fork prior to hatchery Apache trout being stocked in the East Fork or in Big Lake. Marsh (1997) documents hybrid rainbow-Apache trout in the North Fork in 1990, and Department surveys document hybrids existing decades ago. The Apache contribution to those hybrids was likely the original native population in the drainage, with non-native rainbow trout stocked on top of them. The pure hatchery Apache trout stocked since 1996 do not persist long in the stream (see Community Description in this section). The results documented by surveys in the East Fork that show stocked trout moving very little from the stocking location and persisting only short term, is consistent with other studies of stocked trout. Fay and Pardue (1986) showed that heavily domesticated trout do not last more than four to eight weeks in a stream environment. Apache trout might be expected to persist longer since they are from a wilder genetic stock (not domesticated as long as rainbow trout). Meyer (1995) found that stocked Apache trout did persist longer than domesticated rainbow trout as reported by Heimer et al (1985). Meyer (1995) found 34% of the Apache trout stocked persisted three months after stocking, but only 3% persisted nine months after stocking. The results from the current surveys in 2009 suggest that Apache trout are becoming more domesticated in the hatchery and their survival after stocking in stream habitat is similar to rainbow trout.

There are two sources for lack of persistence of stocked trout in a stream habitat, angler mortality and natural mortality. Angler mortality includes both harvest of the fish caught, plus hooking mortality of released trout. Hooking mortality is becoming more of a factor on streams in Arizona because a higher percent of anglers release trout even when the regulations do not require it. A recent angler creel survey in the East Fork Black River found more trout were released (7,000 trout) than were harvested (4,300 trout). Sources of natural mortality are predation by raccoons, brown trout, and blue herons, and osprey. Very large brown trout exist in the stocking area in the East Fork and likely feed on stocked trout.

Probably the biggest factor in natural mortality is starvation. Domesticated trout stocked into stream habitat are not acclimated to living in a natural stream environment, which can cause fish to expend more energy than they take in and starve to death. Elliot (1975) found that some hatchery trout never learned how to feed on natural items. In addition, it is known that drift feeding trout need to pick optimum sites to maximize growth and survival (Fausch 1984). Bachman (1984) postulated that the main cause of high mortality for stocked trout is energy inefficient behavior, including moving more frequently, not picking optimum feeding sites, and excessive dominance displays. Include the fact that they are stocked at relatively large sizes which increase metabolic costs and they feed less than wild trout (Bachman 1984). Wang and White (1994) found that hatchery cutthroat trout stocked into areas containing healthy populations of brown trout did not feed well and were at a significant competitive disadvantage. Hatchery trout stocked into streams that are devoid of wild trout or other top-of-the-food-chain predators likely persist longer because they do not face high levels of competition or risk of predation, however, the East Fork Black River contains a very healthy population of wild brown

trout, which is expanding. Many of the hatchery trout stocked each week in the East Fork are quickly caught out by anglers, some persist for short periods (weeks) and others succumb to natural mortality, thus are not in the system very long.

Trout stocked in Crescent Lake (rainbow trout, brook trout) and Big Lake (rainbow trout, cutthroat trout, brook trout; Apache trout) could affect stocked Apache trout in the East Fork if trout from the lakes were to escape during a spill event and move downstream into occupied habitats. This escapement is expected to be infrequent, since Big Lake (and Crescent Lake) have not spilled since the early 1990s. Without spilling, there is no way for stocked trout to escape these reservoirs. A survey of the tributary downstream from Big Lake conducted in June 1995 found one rainbow trout and 33 brown trout (Marsh 1997), but no trout were found during the 2000 survey (3-pass depletion), indicating that they are so uncommon that they were not detected, or do not persist in this tributary. The brown trout likely came upstream into the tributary from the North Fork where they are numerous; brown trout are not stocked into Big Lake or Crescent Lake. It is possible the one rainbow trout escaped from Big Lake or Crescent Lake during a spill event in the early 1990s, or could have also come up from the North Fork.

When the reservoirs do spill in the future, trout have the potential to move downstream towards Three Forks. Stocked rainbow, cutthroat, and brook trout may augment the existing nonnative fish community, but in extremely low numbers that do not persist. Fish surveys in 2000, 2001, 2007, and 2009 have found no hatchery trout in the North Fork, Boneyard Creek, or in the upper several miles of the East Fork, documenting only brown trout, rainbow-Apache hybrids, and brook trout during these surveys. The brown trout in this watershed are all wild, with the last brown trout stocked in the East Fork in 1981 (246 subcatchable brown trout were also stocked into the West Fork Black in 1994). The hybrid rainbow x Apache trout are wild and self sustaining in the North Fork, likely originating from historic Apache trout populations in the drainage and rainbow trout that were historically stocked into the North Fork as far back as 1936. Some trout escaping from Big Lake and Crescent Lake when they spill may also have reproduced with native Apache trout. Hybrids have been documented in the North Fork prior to hatchery Apache trout stocked into either Big Lake or in the East Fork Black River. Marsh (1997) also reported hybrid rainbow-Apache trout in the North Fork prior (1989) to stocking hatchery Apache trout in the East Fork (1996). One brook trout was collected in Boneyard Creek in 2009, which are known to be wild and self-sustaining in Boneyard Creek, likely originating from brook trout first stocked in the stream in 1933. Surveys in 2008 found 6 rainbow trout, 5 brook trout, 1 Apache trout, and 1 cutthroat trout, in addition to numerous brown trout, in the Three Forks area (Robinson et al 2008). Four of the rainbow trout were found in the North Fork and 2 in Boneyard Creek. It is not known if these rainbow trout were hatchery fish or wild rainbow-Apache hybrids since that level of identification was not used. It is likely they were wild hybrid trout because rainbow trout have not been stocked in the East Fork Black since 1996 and Big and Crescent lakes have not spilled since the early 1990s. The 5 brook trout were all

collected in Boneyard Creek, likely part of the self-sustaining population in that stream. The 1 cutthroat trout was likely a mis-identification of an Apache trout, since no other cutthroat trout have been documented from these streams, Big Lake where they are currently stocked has not spilled in over 15 years, and photos of fish obtained from the surveyors indicate that the fish was instead a hatchery Apache trout (Mike Lopez pers com). The 1 Apache trout collected in Boneyard Creek was also a hatchery Apache trout, most likely from the East Fork Black River stocking area. Hatchery Apache trout were also stocked into Big Lake from 1999 to 2003, however, that lake has not spilled since the early 1990s and there is no way for those stocked fish to have escaped.

Potential Impacts

Stocked Apache trout co-stocked with other species:

Apache trout stocked from the hatcheries are for the specific purpose of providing fishing opportunities. Recovery streams are managed for self-sustaining Apache trout populations and regular stocking is not part of that management except with wild trout to initiate and augment the population as needed until it becomes self-sustaining. Apache trout stocked for recreational purposes are considered excess to the survival and recovery of the species. Take of these stocked fish via harvest by anglers is allowed under the section 4(d) rule contained in the designation of the Apache trout as a Threatened species. That rule allows take of Apache trout if such take is in accordance with State law; in this case through possession of a valid Arizona fishing license and trout stamp.

Impacts to stocked Apache trout from co-stocked sport fish species may include predation, competition, and/or hybridization with stocked trout. A detailed discussion of these impacts is found in Apache trout interactions section (Chapter 4).

Apache trout escapement from recovery areas and exposure to stocked sport fish:

If recovery Apache trout were to move out of designated recovery areas to areas where stocked Apache trout or other stocked species may be present, they would be considered assimilated into the existing Apache trout population and subject to the special 4(d) rule. They would no longer be distinguishable from the stocked Apache trout, and would no longer contribute towards recovery. Impacts to these individuals would be assessed in the same manner as for stocked Apache trout in non-recovery areas.

Stocked sport fishes moving above failed barriers or moving into recovery reaches:

Impacts to recovery Apache trout are not expected occur because recovery populations are located above constructed barriers, which prevent upstream movement of all fish. Should barrier failure occur, the Forest Service and Department would attempt to repair the barrier and if necessary retreat the reach to remove non-native fish. During this period of time, if stocked fish

move above the failed barrier, predation, hybridization with other trout and/or competition with Apache trout could occur.

Impacts from wild populations on stocked Apache trout:

The action of stocking Apache trout is considered a conservation action in furtherance of the Endangered Species Act whereby a special 4(d) rule is in place. AGFD may take any federally listed threatened fish or wildlife for conservation purposes that are consistent with the purposes of the Act and the Section 6 Cooperative Agreement between USFWS and AGFD and therefore take of Apache trout from the proposed stocking of Apache trout is legally permitted.

Impacts to stocked Apache trout from species of fish currently existing as wild, self reproducing populations at or in proximity to proposed stocking locations may include predation, hybridization with other trout and/or competition.

Chiricahua Leopard Frog

Local Analysis: East Fork Black River and the Black River buffered stocking complex are within the historical range of the Chiricahua leopard frog and the likelihood that frogs could be exposed to fish stocked in East Fork Black River and in some of the other sites in the Black River buffered stocking complex is high. There are records for Chiricahua leopard frogs for East Fork Black River (Buffalo Crossing footbridge) (1974) and East Fork Black River (Three Forks) (2008). There are records for Chiricahua leopard frogs from 4 other sites within the complex: Concho Bill Spring (2009), Crabtree Creek (1988), Deer Creek (2001), and Lake Sierra Blanca (2008) (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys taking place between 1990 and 2009 (Figure 8, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Subsequent surveys have found that Chiricahua leopard frogs occupy the area within the Black River buffered stocking complex and likely occupy an area of East Fork Black River. In addition, this area, including 3 of the sites mentioned above, is part of ongoing recovery activities for the Chiricahua leopard frog. Stocked fish may move up tributaries to other areas occupied by Chiricahua leopard frogs as well.

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing stocked fish from East Fork Black River or the Black River buffered stocking complex is low. There are no historical records for Chiricahua leopard frogs where stocked fish are able to disperse outside of the buffered stocking complex.

Northern Leopard Frog

Local Analysis: East Fork Black River and the Black River buffered stocking complex are within the historical range of the northern leopard frog and the likelihood that frogs could be exposed to fish stocked in East Fork Black River or other stocking sites within the complex is low. There is 1 historical record for northern leopard frogs from East Fork Black River (Three

Forks) from 1979 (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys taking place between 1990 and 2009 (Figure 8, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs have not been observed at East Fork Black River (Three Forks) during several subsequent surveys or from other sites surveyed in the Black River buffered stocking complex. Due to the extensive surveying of this area and the lack of northern leopard frog observations, it is likely that northern leopard frogs no longer occupy this area.

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing stocked fish from the East Fork Black River or the Black River buffered stocking complex is low. There are no historical records for northern leopard frogs where stocked fish are able to disperse outside of the buffered stocking complex.

Mexican Spotted Owl

The stocking reach of stream is within Mexican spotted owl (MSO) critical habitat (CH), and occurs within a buffer, with a PAC bordering the stream. The topography in the canyon at times is steep potentially limiting angler access at certain locations. There are other established locations along the stocking reach for access.

Potential Impacts

The stocking site, extended area for fish movements from the stocking site, and/or the area of potential angler access are within the 0.25 mile buffer around MSO PACs in the general vicinity of the site. No physical effects to MSO habitat in the PAC are anticipated, since anglers are not expected to be present in the PAC. There may be some disturbance to MSOs from human presence and associated noise if those owls are using the edge of the PAC or the buffer area for foraging or other normal activities. The disturbance effects do not occur in the PAC where nesting, roosting, and most foraging occur.

Indirect effects may include actions that can affect forest structure and maintenance of adequate prey species identified as PCEs or KHCs. These actions may include trampling of vegetation, soil compaction, removal of woody debris or other physical degradation potentially altering the productivity and succession/regeneration of the vegetation. In the designation of critical habitat (USFWS 2004) most recreational activities, including angling, were not identified as requiring restrictions to protect the PCE's of critical habitat from destruction or adverse modification. In making that statement, recreational activities, including angling were assumed to not contribute to significant habitat-affecting activities such as cutting large trees or snags, removal of large woody debris from the forest floor, altering the tree species diversity, or other large-scale changes to habitat structure. The act of a relatively small number of people walking through habitat is not likely to cause the kind of effects that would result in adverse effects to the PCEs/KHCs of MSO CH and/or restricted and protected habitats.

West Fork Black River

Site Description

The West Fork of Black River is a tributary to the Black River, which starts at the confluence with the East Fork Black River, and drains the southeast slope of Mt. Baldy (Figure 3). Portions of the West Fork and tributaries are important recovery habitat for Apache trout. The West Fork is perennial from its headwaters on Mt. Baldy downstream to the East Fork confluence, and the Black River is perennial downstream to the confluence with the White River.

The stocking reach on the lower West Fork of the Black River is 1.4 miles long from the crossing at Forest Road 68 (Figure 27) and the end of Forest Road 68A (near the West Fork Campground, Figure 28). The West Fork is a perennial stream fed by springs, snowmelt, rainfall events, and groundwater contributions. The stocking reach is located entirely on the Apache-Sitgreaves National Forest, about 16 miles west of Alpine.

Figure 27. West Fork Black River stocking site at Forest Road 68 crossing.

Figure 28. West Fork Black River stocking reach in West Fork campground.

Management of Water Body

The current primary objective is to manage for put-and-take intensive use coldwater fishery utilizing Apache trout in the stocking reach near the West Fork campground. However, a large lower West Fork fish barrier is scheduled to be built downstream of the stocking site with an anticipated completion of construction planned 2011 and renovation 2012/2013 with stocking. At that point, the primary objective will be recovery of Apache trout with naturally reproducing fish throughout the entire stream and tributaries upstream of the new barrier. A secondary objective would be management of a put-and-take intensive use coldwater fishery with hatchery Apache trout at the stocking site only to meet angler demand in the campground area. This arrangement will discourage anglers in the campground from illegally stocking non-native salmonids to maintain a better fishery than what wild fish could provide. Rainbow trout were once stocked regularly; however, the stockings were changed to Apache trout in1997 when a recovery population of Apache trout was established above 2 constructed fish barriers upstream of the stocking site (Table 22).

Table 22. Stocking history for West Fork Black River

Species	First Year	Last Year	Num of years stocked	Number Stocked
Apache trout	1995	2009	14	125,644
Rainbow trout	1934	1996	62	904,872
Arctic grayling	1970	1970	1	5,100
Brook trout	1935	1937	3	50,400

Brown trout	1938	1994	56	76,395
Native trout	1938	1938	1	6,100
Total				1,168,511

The West Fork stocking sites are in the perennial reaches of the stream and are connected to other reaches by the water-to-water connection. The confluence with the east fork is 3.48 miles downstream of the lower boundary of the stocking reach in West Fork. The upper West Fork Black River is currently designated as an Apache trout recovery stream with 2 barriers on the upper portion near the Forest Road 116 (more than 13.5 miles upstream from the confluence with the East Fork; Figure 14 and Figure 15 in East Fork Fish Movement section) to protect the Apache trout populations from non-native fish that are found in the lower river, 8.2 miles upstream of the stocking reach. Barriers also exist on tributary streams with Apache trout populations, including Home Creek, Hayground Creek, and Stinky Creek (Figure 16, Figure 17 and Figure 18in East Fork Fish Movement section).

The large fish barrier planned to be built for the lower West Fork Black River and a chemical treatment would remove all non-natives from the upper barrier downstream to the new barrier. Nearly the whole river and tributaries would be managed for a pure self sustaining population of Apache trout, and other suitable native fishes, after these projects are completed. At that time, this stocking site would be located within the recovery population, but would be considered to be compatible with the recovery population. The strain of wild Apache trout in the upper West Fork Black River is of a hatchery origin (East Fork White River strain) and hatchery stockings of East Fork White River strain would be compatible.

Anglers can easily access the river all along Forest Road 68A and the crossing at Forest Road 68, typically from April through November. The area is inaccessible during the winter months. There is one Forest Service campground within the reach. Small portions of private lands are downstream of the stocking site with Forest Service lands below that reach to the confluence with the east fork. Nearly all the land upstream of the stocking site, except for one small piece of private property at Thompson Ranch, and the very headwaters on the Fort Apache Indian Reservation, are on Forest Service land.

Angler use data were collected by on-site angler creel surveys in 1982 (7,325 AUD), 1987 (8,373 AUD), 1993 (4,484 AUD), 1995 (4,794 AUD), and 1996 (2,957 AUD), and by mail out survey in 2001 (20,546 AUD) (Pringle 2004). Angler use in 1996 was depressed due to Forest closures in mid-summer that year.

Proposed action

The Department proposes to stock Apache trout in the West Fork Black River for the period covered by this consultation.

Catchable Apache trout would be stocked weekly from May through September; numbers of Apache trout stocked may be from 0 to 20,000 trout annually.

Water Distribution / Connectivity
The headwaters of the West Fork of the Black River begin on Mt. Baldy on the Fort Apache Indian Reservation from seeps and springs. From the headwaters, the West Fork flows perennial for 20 miles to its confluence with the East Fork of the Black River, where the mainstem Black River is formed. The Black flows perennial to the White River, where the Salt River is formed.

Thompson Creek is a perennial tributary that enters the upper West Fork in the Thompson Ranch/meadow. Thompson Creek also originates on the reservation and flows onto the National Forest. Thompson Creek enters the West Fork approximately 1.1 miles downstream of the Reservation Boundary. Another tributary, Burro Creek, enters the West Fork (from the northeast) also in the Thompson Ranch/meadow, approximately 0.8 miles downstream of the Thompson Creek confluence. The two constructed fish barriers on the West Fork are located 0.9 and 1.2 miles downstream of the Burro Creek confluence (Figure 14 and Figure 15 in East Fork Fish Movement section).

Another perennial tributary, Stinky Creek, enters the West Fork approximately 1.9 miles downstream of the lower fish barrier on the West Fork. The next perennial tributary, Hayground Creek, enters the West Fork approximately 5.0 miles downstream of Stinky Creek.

The upper end of the stocking reach is 1.3 miles downstream of the Hayground Creek confluence. The stream flows through the West Fork campground, the main location for this stocking site for 1.4 miles to the bottom end of the stocking site. From the bottom of the stocking site, the West Fork flows for 3.8 miles to the confluence with the East Fork.

Tributary Home Creek enters the West Fork approximately 1.4 miles upstream of the confluence with the East Fork. Home Creek is frequently mostly dry, but does contain continuous flows during good precipitation years.

See the East Fork Black River analysis for water distribution/connectivity in the Black River and other downstream tributaries.

Fish Movement
Stocked trout could move upstream for 8.2 miles, but then could not get past one of 2 constructed fish barriers to protect Apache trout habitat from non-native brown trout in the lower reaches. A dispersing trout could also swim up into perennial tributaries Hayground Creek and Stinky Creek, but likely only during high flows because of the very low flows coming in from these tributaries. Even during high flows, a dispersing trout could not get past constructed fish barriers in the lower reach of each of these streams.

A dispersing trout could move downstream towards the confluence with the East Fork, from that point, upstream into the East Fork of the Black River and downstream into the Black River. It could move into tributary Home Creek, but only during high flows because the confluence is often dry or running extremely low water. During high flow events, a dispersing trout could not get past 1 of 2 constructed fish barriers located in the lower reach of Home Creek.

For movement up into the East Fork or downstream into the Black River, refer to the East Fork Black River analysis.

Community Description

The stocking site on the West Fork currently contains brown trout, stocked Apache trout, desert sucker, Sonora sucker, speckled dace and crayfish (Table 23). These same species are found upstream to the fish barriers approximately 8.2 miles upstream of the stocking location. One roundtail chub was found in the West Fork downstream of the stocking. A recovery population of Apache trout, plus speckled dace and desert sucker are present upstream of the fish barriers in upper West Fork Black River. In 1989, most rainbow trout stocked were found within the stocking reach, with only two trout found downstream at station 1-3. In 2002, stocked Apache trout were found within the stocked reach; with one found a short distance downstream at station 2-6. Numerous Apache trout found upstream of the stocking location were likely wild fish coming downstream from recovery populations in Hayground Creek (confluence between stations 4-28 and 4-30), in Stinky Creek (confluence between stations 6-41 and 6-43), and upper West Fork Black River (fish barrier between stations 6-50 and 7-51).

Table 23. Species and number of fish collected in West Fork Black River fish surveys in 1988 and 2002.

The stocking reach encompasses survey stations 2-13 through 3-21. The 1989 surveys consisted of 50-meter sites spaced regularly throughout the stream, then electrofished with 3 depletion passes (Novy and Lopez 1991c). The 2002 surveys replicated the same sites and methods. Surveys during both 1989 and 2002 occurred during the summer stocking season.

Station	Species	Number Collected	
		1989	2002
1-1	Speckled dace	83	82
	Desert sucker	79	25
	Sonora Sucker	32	4
	Roundtail chub	-	1
	Brown trout	7	2
1-3	Speckled dace	312	91
	Desert Sucker	132	4
	Sonora Sucker	5	-

Station	Species	Number Collected	
		1989	2002
	Brown trout	12	6
	Rainbow trout	2	-
1-5	Speckled dace	409	124
	Desert Sucker	146	14
	Sonora Sucker	4	-
	Brown trout	5	-
2-6	Speckled dace	321	83
	Desert Sucker	134	42
	Sonora Sucker	10	4
	Brown trout	18	3
	Apache trout	-	1
2-8	Speckled dace	Not surveyed	84
	Desert Sucker	-	6
	Brown trout	-	6
2-10	Speckled dace	Not surveyed	229
	Desert Sucker	-	9
	Sonora Sucker	-	4
	Brown trout	-	37
2-11	Speckled dace	278	205
	Desert Sucker	36	16
	Brown trout	6	18
2-13	Speckled dace	80	142
	Desert Sucker	25	17
	Sonora Sucker	12	3
	Brown trout	56	23
	Rainbow trout	6	-
2-15	Speckled dace	223	208
	Desert Sucker	15	11
	Brown trout	53	50
	Apache trout	-	1
3-16	Speckled dace	372	100
	Desert Sucker	13	5
	Sonora Sucker	1	-
	Brown trout	59	22
	Apache trout	-	21

Station	Species	Number Collected	
		1989	2002
	Rainbow trout	52	-
3-18	Speckled dace	91	86
	Desert Sucker	9	8
	Sonora Sucker	2	1
	Brown trout	55	43
	Apache trout	-	42
	Rainbow trout	29	-
3-20	Speckled dace	271	371
	Desert Sucker	3	-
	Brown trout	34	48
	Apache trout	-	14
	Rainbow trout	21	-
3-21	Speckled dace	154	114
	Desert Sucker	4	18
	Brown trout	47	30
	Apache trout	-	16
	Rainbow trout	2	-
3-23	Speckled dace	91	62
	Desert Sucker	16	1
	Brown trout	36	28
	Apache trout	-	3
	Rainbow trout	2	-
3-25	Speckled dace	293	142
	Desert Sucker	3	2
	Brown trout	53	47
	Apache trout	-	3
4-26	Speckled dace	186	198
	Desert Sucker	-	3
	Brown trout	92	22
4-28	Speckled dace	26	47
	Desert Sucker	2	4
	Sonora Sucker	1	-
	Brown trout	77	39
	Apache trout	-	4
4-30	Speckled dace	32	29

Station	Species	Number Collected	
		1989	2002
	Desert Sucker	-	4
	Brown trout	26	34
5-31	Speckled dace	5	22
	Desert Sucker	-	7
	Brown trout	30	19
5-33	Speckled dace	1	18
	Desert Sucker	12	5
	Brown trout	28	44
5-35	Desert Sucker	3	9
	Sonora Sucker	-	1
	Brown trout	27	38
5-36	Desert Sucker	4	2
	Brown trout	15	31
	Apache trout	-	3
5-38	Speckled dace	-	52
	Desert Sucker	-	2
	Brown trout	46	15
	Apache trout	-	1
6-41	Speckled dace	24	52
	Desert Sucker	2	2
	Brown trout	44	15
	Apache trout	-	1
6-43	Speckled dace	8	25
	Desert Sucker	19	12
	Brown trout	58	38
6-45	Desert Sucker	7	-
	Brown trout	51	34
	Apache trout	-	5
6-46	Speckled dace	-	1
	Brown trout	-	33
6-48	Speckled dace	3	1
	Desert Sucker	1	4
	Brown trout	78	18
	Apache trout	-	7
6-50	Speckled dace	-	61

Station	Species	Number Collected	
		1989	2002
	Brown trout	29	-
	Apache trout	-	16
7-51	Speckled dace	Not surveyed	65
	Apache trout	-	8
7-53	Speckled dace	79	1008
	Desert Sucker	2	8
	Brown trout	12	-
	Apache trout	-	8
7-55	Speckled dace	26	390
	Desert Sucker	-	5
	Brown trout	18	-
	Apache trout	-	7
7-56	Speckled dace	23	234
	Brown trout	26	-
	Apache trout	-	14
7-58	Speckled dace	-	85
	Brown trout	45	-
	Apache trout	-	14
7-60	Speckled dace	-	2
	Brown trout	64	-
	Apache trout	-	13
8-61	Brown trout	56	-
	Apache trout	-	37
8-63	Desert Sucker	-	3
	Brown trout	51	-
	Apache trout	-	38
8-65	Brown trout	60	-
	Apache trout	-	58
8-66	Brown trout	56	-
	Apache trout	-	37
8-68	Desert Sucker	-	1
	Brown trout	69	-
	Apache trout	-	69
8-70	Brown trout	44	-
	Apache trout	-	26

Tributary Home Creek is managed for a recovery population of Apache trout; however, an extremely dry year in 2002 may have dried the stream entirely. Surveys of the stream conditions were conducted by Novy and Lopez (1991), and more recently by the Department in 2003 (no were fish collected).

Tributary Hayground Creek is also managed for a recovery population of Apache trout. Original surveys were conducted in 1988 (Novy and Lopez 1991); however, the stream was chemically treated in 1988 to remove non-native trout and was restocked with pure Apache trout. Since then, brown trout had navigated around the ineffective barrier to reinvade the stream. The barrier has been improved in the past but needs additional improvements, and brown trout are present above the barrier. Once the lower West Fork barrier is completed, Hayground creek would be renovated to remove non-natives.

Tributary Stinky Creek is also managed for a recovery population of Apache trout. Original surveys were conducted in 1989 (Novy and Lopez 1991); however, the stream was chemically treated in 1995 to remove non-native trout and was restocked with pure Apache trout. Since then, brown trout had navigated around the ineffective barrier to reinvade the stream. The barrier was improved in 2009; however brown trout are still present above the barrier, a future renovation is anticipated to remove non-natives.

Brook trout have recently been located in the very headwaters of the Black River and Thompson Creek, both on the reservation, and plans are being made to remove those non-native fish. For species downstream of the stocking reach in the Black River, see the aquatic species assemblage information for the East Fork Black River.

Loach minnow have never been documented in the West Fork, but are found upstream on the East Fork Black River, with critical habitat designated in the East Fork down to the confluence with the West Fork.

There are historical and recent records of narrow-headed garter snakes upstream and downstream of the West Fork Black River stocking reach (see Black River complex analysis for details). The entire Black River stocking complex is out of the distributional range of northern Mexican garter snakes (see Black River complex analysis for details).

New Mexico meadow jumping mouse and Mexican spotted owl are in the vicinity of the stocking site.

Consultation Species or Critical Habitat

Potential impacts to Apache trout stocked in the West Fork of the Black River, Chiricahua and northern leopard frogs, Mexican spotted owl and New Mexico meadow jumping mouse are addressed below. Should stocked Apache move upstream or downstream from the stocking

reach, potential impacts to Apache trout, narrow-headed and northern Mexican garter snakes, loach minnow and critical habitat, roundtail chub and three forks springsnail downstream of Big Lake are addressed in the Black River Complex analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Chiricahua and Northern leopard frogs are analyzed at a local site and broad scale level due to the movement potential into the stocked area and fish movement potential up or downstream into areas where frogs may occur.

Apache Trout

Hatchery Apache trout are stocked into the West Fork and the East Fork of the Black River to provide fishing opportunities. Recovery populations of Apache trout are also located in upper West Fork Black River, as well as in tributaries of the West Fork (Hayground Creek and Stinky Creek). Apache trout established in Home Creek, tributary to the West Fork, are considered to have perished when the stream dried entirely in 2002. Recovery populations of Apache trout are also located in tributaries of the Black River, including Fish Creek, Soldier Creek (tributary to Reservation Creek, which is tributary to Black River), Bear Wallow Creek, and Big Bonito Creek.

Potential Impacts

Apache trout escapement from recovery areas and exposure to stocked sport fish:

If recovery Apache trout were to move out of designated recovery areas to areas where stocked Apache trout or other stocked species may be present, they would be considered assimilated into the existing Apache trout population and subject to the special 4(d) rule. They would no longer be distinguishable from the stocked Apache trout, and would no longer contribute towards recovery. Impacts to these individuals would be assessed in the same manner as for stocked Apache trout in non-recovery areas,

Impacts from wild populations on stocked Apache trout:

The action of stocking Apache trout is considered a conservation action in furtherance of the Endangered Species Act whereby a special 4(d) rule is in place. AGFD may take any federally listed threatened fish or wildlife for conservation purposes that are consistent with the purposes of the Act and the Section 6 Cooperative Agreement between USFWS and AGFD and therefore take of Apache trout from the proposed stocking of Apache trout is legally permitted.

Impacts to stocked Apache trout from species of fish currently existing as wild, self reproducing populations at or in proximity to proposed stocking locations may include predation, hybridization with other trout and/or competition. While at large in the West Fork, stocked Apache trout compete with brown trout for food and space. Large brown trout may prey on stocked Apache trout as well as any Apache trout eggs or larval and juvenile fish since Apache trout can reproduce in the West Fork or it would not be under consideration as a recovery stream. Angling and natural mortality eventually claim the stocked trout.

Stocked sport fishes moving above failed barriers or moving into recovery reaches:

Impacts to recovery Apache trout are not expected occur because recovery populations are located above constructed barriers, which prevent upstream movement of all fish. Should barrier failure occur, the Forest Service and Department would attempt to repair the barrier and if necessary retreat the reach to remove non-native fish. During this period of time, if stocked Apache trout move above the failed barrier they would be considered part of the recovery Apache trout.

Chiricahua leopard frog

Local Analysis: West Fork Black River and the Black River buffered stocking complex are within the historical range of the Chiricahua leopard frog and the likelihood that frogs could be exposed to fish stocked in West Fork Black River is high. There are no historical records for Chiricahua leopard frogs for West Fork Black River. There are historical records for Chiricahua leopard frogs from 6 sites within the complex: Crabtree Creek (1988), Deer Creek (2001), East Fork Black River (Buffalo Crossing footbridge) (1974), East Fork Black River (Three Forks) (2008), Concho Bill Spring (2009), and Lake Sierra Blanca (2008) (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys taking place between 1990 and 2009 (Figure 8, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Subsequent surveys have found that Chiricahua leopard frogs occupy the area within the Black River buffered stocking complex. In addition, this area, including 3 of the sites mentioned above, is part of ongoing recovery activities for the Chiricahua leopard frog. Stocked fish may move up tributaries to areas occupied by Chiricahua leopard frogs.

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing stocked fish from West Fork Black River or the Black River buffered stocking

complex is low. There are no historical records for Chiricahua leopard frogs where stocked fish are able to disperse outside of the buffered stocking complex.

Northern Leopard Frog

Local Analysis: West Fork Black River and the Black River buffered stocking complex are within the historical range of the northern leopard frog and the likelihood that frogs could be exposed to fish stocked in West Fork Black River or other stocking sites within the complex is low. There is 1 historical record for northern leopard frogs with the buffered stocking complex; East Fork Black River (Three Forks) from 1979 (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys taking place between 1990 and 2009 (Figure 8, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs have not been observed at East Fork Black River (Three Forks) during several subsequent surveys or from other sites surveyed in the Black River buffered stocking complex. Due to the extensive surveying of this area and the lack of northern leopard frog observations, it is likely that northern leopard frogs no longer occupy this area.

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing stocked fish from the West Fork Black River or the Black River buffered stocking complex is low. There are no historical records for northern leopard frogs where stocked fish are able to disperse outside of the buffered stocking complex.

Mexican Spotted Owl

The stream reach proposed for stocking is within Mexican spotted owl (MSO) critical habitat (CH).

Potential Impacts

The CH designation included most other protected and restricted habitats for the MSO. Indirect effects to CH may include actions that can affect forest structure and maintenance of adequate prey species identified as PCEs. These actions may include trampling of vegetation, soil compaction, removal of small woody debris or other physical degradation potentially altering the productivity and succession/regeneration of the vegetation. In the designation of critical habitat (USFWS 2004) most recreational activities, including angling, were not identified as requiring restrictions to protect the PCE's of critical habitat from destruction or adverse modification. In making that statement, recreational activities, including angling were assumed to not contribute to significant habitat-affecting activities such as cutting large trees or snags, removal of large woody debris from the forest floor, altering the tree species diversity, or other large-scale changes to habitat structure. The act of a relatively small number of people walking through habitat is not likely to cause the kind of effects that would result in adverse effects to the PCEs/KHCs of MSO CH and/or restricted and protected habitats.

New Mexico Meadow Jumping Mouse

New Mexico meadow jumping mice are found along the West Fork near the FR 68 crossing (Frey 2008). The population is within and beyond the stocking area and use by anglers is likely; occurrences at were documented within the stocked reach in 2008 (HDMS data).

Potential Impacts

New Mexico meadow jumping mice use moist, riparian areas adjacent to streams or lakes that support communities of beaked sedge and reed canarygrass (USFWS 2007). Nests are in dry soil areas adjacent to the riparian areas. The mouse is generally nocturnal and it is only active during the growing season of the grasses and forbs it feeds on. Recreationists, including anglers, may create trails through the sedge and canarygrass community to access the stream, thus fragmenting the habitat and possibly allowing better access to the habitat by predators. Since the mice are active at night when recreationists are not present, there is little to no actual disturbance of the mice from presence of people.

Human access to mouse habitat results in trampling of vegetation, fragmentation of habitat patches, and soil compaction that degrades or eliminates habitat for the mouse. Since the mouse has a limited active period, quality habitat for foraging must be available for the mouse to get sufficient food to rear young and survive hibernation (USFWS 2007). There is also an increased risk of predation if the mice must cross trails or other openings to reach habitat patches.

Effects to New Mexico meadow jumping mouse habitat are likely occurring on the West Fork, due to angler use that may be affecting habitat quality. These effects are ongoing and other recreation use contributes to the current conditions. The likelihood or extent of disturbance effects is currently unknown at this site.

Ackre Lake

Site Description

Fish Creek is a tributary to the Black River located 9.9 miles below the confluence of the East Fork and West Fork of the Black River. The Fish Creek drainage area includes two important tributaries, Double Cienega Creek and Corduroy Creek. These three streams are recovery streams for the Apache trout, with a constructed fish barrier located near the confluence of Fish Creek and the Black River. The headwaters of Fish Creek contain Ackre Lake, approximately 12.1 miles upstream from the Black River (Figure 2 in Black River Complex section above).

Ackre Lake is a 2-acre impoundment at approximately 8,600 feet elevation at the head of Fish Creek. It is located on the Apache-Sitgreaves National Forest, approximately 21 miles southwest of Alpine. The lake is fed from a small watershed with snowmelt, rainfall events and groundwater contributions. Nothing is known about the age of the dam. Ackre Lake flows into Fish Creek, which enters the Black River downstream of all other 4 waters in the Black River complex (Figure 29).

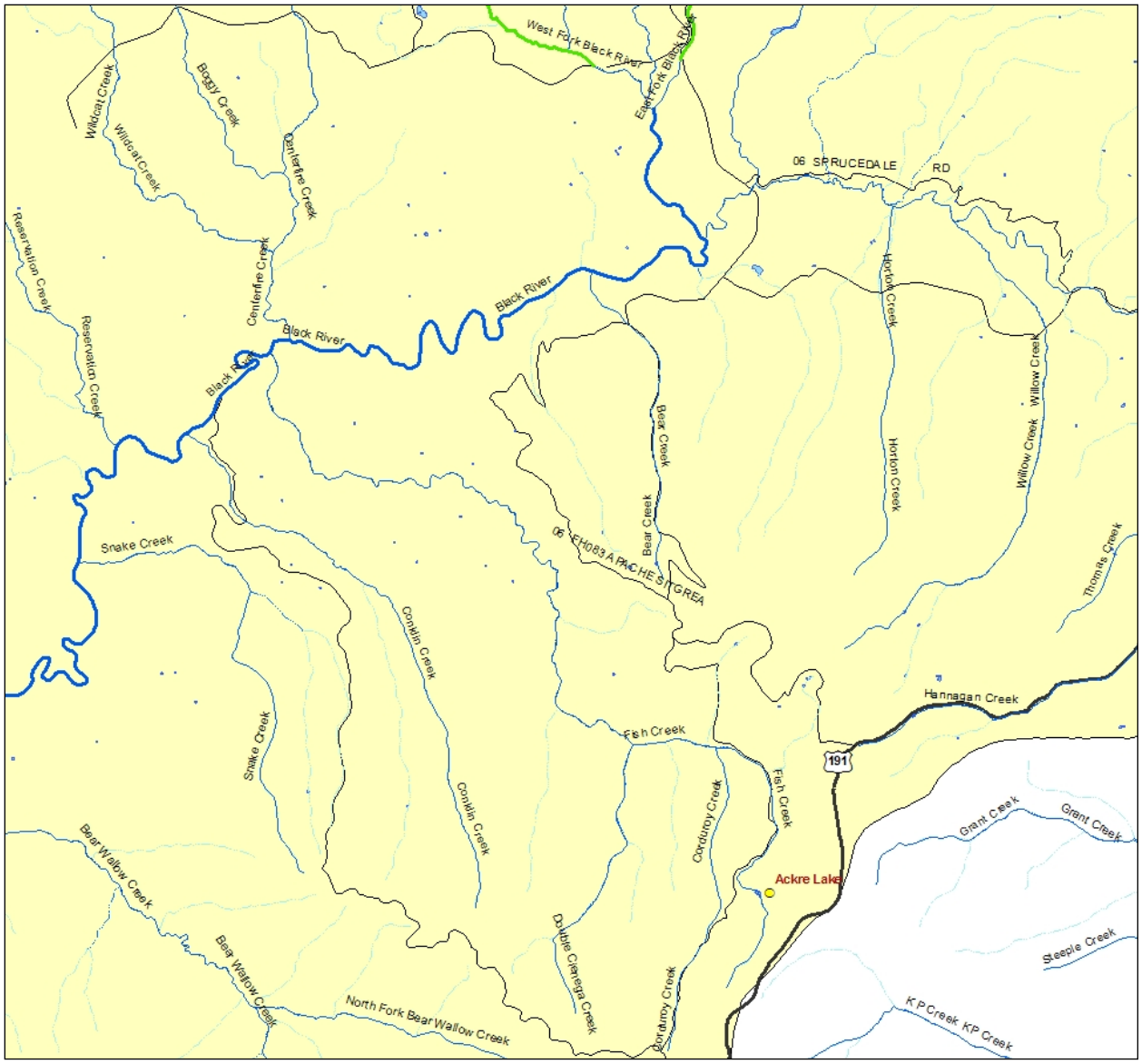

Figure 29. Map of Ackre Lake at the head waters of Fish Creek.

Management of Water Body

The primary fishery is cold water featured species, with Apache trout and Arctic grayling. The choice of these species was to assure the stocked species would be compatible with the wild recovery population of Apache trout downstream in Fish Creek (Table 24). The fishery is lightly used during the summer and fall, with no winter use. Prone to freezing during the winter, Ackre Lake winterkills regularly, requiring occasional restocking to maintain fish. The lake would be stocked up to several times per year with small numbers and fish will be maintained through the fishing season by catch-and-release regulations already in place on the lake.

Table 24. Stocking history for Ackre Lake.

Species	First Year	Last Year	Num of years stocked	Number Stocked
Apache trout	1997	2009	5	2,300
Arctic grayling	1987	2000	9	4,313
Brook trout	1976	1985	8	19,500
Total				25,213

Ackre Lake is accessed by an all-weather dirt road from May through November. There is a parking lot and primitive camping is allowed. Anglers have access to the entire shoreline of Ackre Lake. Boats are typically not used because of the small size of the lake. There are no boat ramps or restrooms. The lake is typically accessible from May through November. There have been no on-site angler creel surveys conducted on Ackre Lake, and anglers that were surveyed in the 2001 Statewide Survey of Arizona Anglers did not identify Ackre Lake as a location at which that they fished at that year (Pringle 2004). Ackre Lake likely receives no to very little ice fishing use because of the remote location, small size, and special regulations.

Fish Creek, along with tributaries Corduroy Creek and Double Cienega Creek, are being managed as a recovery population of Apache trout. A constructed fish barrier is located on the lower end of Fish Creek just above the confluence of the Black River to prevent non-native trout in the Black River from entering Apache trout habitat (Figure 20 in East Fork of the Black section). The stream was chemically treated several times in 2004 and 2005 to remove all non-native trout above the fish barrier prior to establishing a recovery population of Apache trout (Lopez and Meyer 2006). Ackre Lake was chemically treated at the same time to remove non-natives that might be in the lake, since it is directly connected to recovery habitat above the fish barrier.

Ackre Lake has catch and release fishing regulations with artificial lure and fly only gear requirements to maintain fish in the lake for anglers. Ackre Lake is a very long distance from the closest hatchery and it is not economical to stock it frequently. The lake is very small and would be fished out quickly if harvest were allowed. Stocking hatchery Apache trout and Arctic grayling are considered to be compatible with the recovery population of Apache trout downstream of the lake because arctic grayling are rarely picivorous, are short lived in Arizona and there is no chance of hybridization (J. Voeltz pers com; J. Carter pers com).

Anglers currently should not be fishing below the lake. Fish Creek is closed to fishing until the recently established recovery population of Apache trout can expand to meet established population criteria before opening the stream to angling.

Proposed action

The Department proposes to stock Apache trout and Arctic grayling into Ackre Lake for the period covered by this consultation.

Catchable Apache trout and catchable and sub-catchable Arctic grayling would be stocked several times per year; numbers of Apache trout stocked may be from 0 to 750 fish annually and numbers of Arctic grayling stocked may be from 0 to 750 fish annually.

Water Distribution / Connectivity

The lake is fed by a very short stream that dries during drought years. The lake is perennial and maintains a fairly consistent water level. The lake is shallow and subject to winterkills and occasional summer kills. There is no outlet structure on the dam and no water is released downstream for any uses. When the lake fills, it spills over a small spillway and into Fish Creek below the lake (Figure 30 and Figure 31). The lake spills regularly in the spring, but usually does not spill during the summer.

Below Ackre Lake on Fish Creek, the channel is intermittent or ephemeral for approximately 1 mile downstream, at which point the channel becomes perennial. Fish Creek is perennial for about 11 miles downstream to the Black River, with a fish barrier located just upstream from the confluence. Tributary Corduroy Creek enters Fish Creek approximately 2.6 miles downstream of Ackre Lake. Tributary Double Cienega Creek enters Fish Creek approximately 3.6 miles downstream of Ackre Lake. These tributaries are perennial, but usually have low flow and some dry portions in drought years.

Fish Creek enters the Black River 9.6 miles downstream of the confluence of the West Fork and the East Fork. From the Fish Creek confluence, the Black River runs for 104 miles to the confluence with the White River, where the Salt River is formed. The Black River is entirely perennial.

Tributaries entering the Black River downstream of Fish Creek include: Conklin Creek (2.0 miles downstream of Fish Creek confluence), Reservation Creek (3.2 miles downstream of Fish Creek confluence), Snake Creek (5.3 miles), then on the reservations, Paddy Creek, Bear Wallow Creek, and Big Bonito Creek.

For water distribution and connectivity in the Black River upstream of the Fish Creek confluence, refer to the East Fork and West Fork Black River sections.

Figure 30. Ackre Lake showing dam in foreground and small spillway area on left of dam.

Figure 31. Ackre Lake spillway in lower left corner.

Fish Movement

Stocked fish in Ackre Lake may persist; however, the lake is small and weedy and is subject to frequent winterkills and occasional summer kills. Fish may move upstream into the short feeder stream, but cannot go far since it is very short and fish will not persist, since it dries up frequently.

Stocked fish may move downstream of Ackre Lake by going over the spillway when the lake spills in the spring. When the lake is spilling, the upper portion of Fish Creek has continuous flow and fish potentially have access to all of Fish Creek, the tributaries, and even into the Black River.

Once in the Black River, dispersing fish can potentially move up to the East Fork Black River or West Fork Black River. In the West Fork Black River, fish can potentially move up through the West Fork stocking site, upstream, through the stocking reach and continue until reaching a constructed fish barrier in upper West Fork, or into several tributaries along the way (Home Creek, Hayground Creek, and Stinky Creek) only as far as constructed fish barriers on each of these streams. For more details of water distribution and fish movement in the West Fork, see the West Fork Black River analysis. In the East Fork, fish can potentially move up through the East Fork stocking site, into upper East Fork, Boneyard Creek, and the North Fork. For more details of water distribution and fish movement in the East Fork and above that, see the East Fork Black River analysis.

Community Description

Ackre Lake currently contains stocked Apache trout, possibly stocked Arctic grayling, and tiger salamander. Apache trout and speckled dace are present in Fish Creek, Corduroy Creek and Double Cienega Creek downstream of the lake. Since several chemical treatments in 2004 and 2005 of the creek and lake, these are the only fish that have been restocked (Lopez and Meyer 2006; Lopez et al 2007; Lopez 2008). A fish barrier is present on the lower reaches of Fish Creek to prevent movement of non-native species upstream but does not prevent Apache trout or Arctic grayling from leaving the creek and entering the Black River. Brown trout and hybrid trout also occur downstream of the fish barrier. Ackre Lake has not been surveyed since the entire drainage was chemically treated 3 times in 2004 and 2005 to remove non-native brown trout, hybrid trout and fathead minnow. Visual surveys have been conducted on the establishing Apache trout in Fish Creek and electrofishing surveys have been conducted in Fish Creek just above the fish barrier to ensure it is functioning (keeping non-native trout from coming upstream). During the electrofishing surveys in 2007, 2008, and 2009, no fish have been found immediately above the barrier (Lopez 2008; Terrill, in preparation). The wild Apache trout were stocked into Fish Creek in the upper reaches and are not expected to disperse into the lower reaches for several years. Pure Apache trout and speckled dace were restocked into Fish Creek and tributaries, while hatchery Apache trout and Arctic grayling have been stocked into Ackre Lake.

The Black River contains speckled dace, desert sucker, Sonora sucker, roundtail chub, fathead minnow, brown trout, rainbow X apache trout hybrids and smallmouth bass (McKell 2005a and Table 25). Voeltz (2007) also documented brown trout, roundtail chub, smallmouth bass, desert sucker, Sonora sucker, and speckled dace in the Black River at Wildcat Crossing. A recent survey in the Black River in 2009 also documented the same species (M. Lopez, pers. comm.). Roundtail chub in the Black River have been collected upstream and downstream of the Fish Creek confluence (McKell 2005a; Voeltz 2007), and are assumed to be at or very near the confluence.

Table 25. Species, capture method and number of fish collected in the 2005 Black River survey (McKell 2005a).

Species	Number Collected	
	Hoop nets	Electroshocking
Sonora sucker	2	13
Roundtail chub	199	98
Desert sucker	1	33
Speckled dace	25	428
Smallmouth bass	-	6
Hybrid trout	-	14
Brown trout	-	23
Fathead minnow	-	1
Unidentified sucker	-	6

Black River tributary Conklin Creek is currently fishless. The stream was chemically treated several times in 2006 to remove non-native trout (Lopez et al 2007). Improvements were made to the barrier and electrofishing surveys have removed the occasional hybrid trout that accessed the stream prior to improvements to the barrier (Terril, in preparation). Early surveys of the fish community and aquatic habitat in Conklin Creek were described by Novy and Lopez (1991).

Black River tributary Reservation Creek contains brown trout, rainbow trout, speckled dace, desert sucker, and Sonora sucker in the lower reaches on the Apache-Sitgreaves National Forest (Novy and Lopez 1991 and Table 26). Reservation Lake is located on Reservation Creek on the Fort Apache Indian Reservation; this lake is stocked with rainbow trout, brown trout, and brook trout.

Table 26. Species, number and size range of fish collected in a survey of lower Reservation Creek in 1989.

Species Collected	Number Collected	Size Range (mm TL)
Brown trout	561	66-449
Rainbow trout	37	61-265
Speckled dace	143	19-130
Desert sucker	46	116-386
Sonora sucker	5	342-479

Soldier Creek is a tributary to Reservation Creek and holds one of the 13 relict Apache trout populations (USFWS 1983; Figure 23– in East Fork section). It has a natural waterfall at the lower end, and contains only Apache trout above the falls. The stream was comprehensively surveyed in 1989 (Novy and Lopez 1991 and Table 27), finding Apache trout and brown trout, with the brown trout located below the waterfall. The stream has been surveyed numerous times since then, documenting Apache trout above the falls. This stream has been used to provide wild Apache trout to establish Apache trout populations in other streams on the Apache-Sitgreaves National Forest (Lopez and Meyer 2006; Lopez et al 2007; Lopez 2008).

Table 27. Species, number and size range of fish collected in a survey of Soldier Creek in 1989.

Brown trout were found only below the waterfall which serves as a barrier to upstream fish movement.

Species Collected	Number Collected	Size Range (mm TL)
Apache trout	185	39-210
Brown trout	13	73-275

Snake Creek is tributary to the Black River, and currently contains rainbow x Apache hybrid trout and brown trout (Lopez 2008).

Bear Wallow Creek is tributary to the Black River and currently contains Apache trout, rainbow x Apache hybrid trout, and speckled dace.

There are no records of narrow-headed garter snakes from Ackre Lake, and the habitat is unsuitable. There is a record for a narrow-headed garter snake on Fish Creek, downstream of Ackre Lake (see complex analysis for details). The entire Black River stocking complex is out of the distributional range of northern Mexican garter snakes (refer to complex analysis for details).

Mexican spotted owl critical habitat is present in the vicinity of the lake.

Consultation species or Critical Habitat
Potential impacts to Apache trout stocked in Ackre Lake, recovery Apache trout in Fish Creek, Chiricahua and northern leopard frogs and Mexican spotted owl are addressed below. Should stocked Apache move out of Ackre Lake downstream through Fish Creek and enter the Black River, potential impacts to three forks springsnail, northern Mexican and narrow headed garter snakes, loach minnow and critical habitat, recovery Apache trout, and roundtail chub are addressed in the Black River Complex Analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Chiricahua and Northern leopard frogs are analyzed at a local site and broad scale level due to the movement potential into the stocked area and fish movement potential up or downstream into areas where frogs may occur.

Apache Trout
Fish Creek below Ackre Lake is an Apache trout recovery stream. See the East Fork and West Fork sections for an overview of Apache trout distribution in the Black River.

Potential Impacts

Stocked Apache trout co-stocked with other species:

Apache trout stocked from the hatcheries are for the specific purpose of providing fishing opportunities. Recovery streams are managed for self-sustaining Apache trout populations and regular stocking is not part of that management except with wild trout to initiate and augment the population as needed until it becomes self-sustaining. Apache trout stocked for recreational purposes are considered excess to the survival and recovery of the species. Take of these stocked fish via harvest by anglers is allowed under the section 4(d) rule contained in the designation of the Apache trout as a Threatened species. That rule allows take of Apache trout if such take is in accordance with State law; in this case through possession of a valid Arizona fishing license and trout stamp.

Impacts to stocked Apache trout from co-stocked sport fish species may include predation, competition, and/or hybridization with stocked trout. A detailed discussion of these impacts is found in Apache trout interactions section (Chapter 4).

Stocked sport fishes moving above failed barriers or moving into recovery reaches:

Impacts to recovery Apache trout are not expected occur because recovery populations are located above constructed barriers, which prevent upstream movement of all fish. Should barrier failure occur, the Forest Service and Department would attempt to repair the barrier and if necessary retreat the reach to remove non-native fish. During this period of time, if stocked fish move above the failed barrier, predation, hybridization with other trout and/or competition with Apache trout could occur.

There are three stocking sites that are not separated by a barrier from a recovery Apache trout reach; they are: 1) Apache trout stocked for recreation into an Apache trout recovery stream will only occur at Sheep's Crossing on the Little Colorado River whereby Apache trout stocked into Lee Valley Lake, upstream of the recovery reach, could escape and move into the recovery population. Apache trout are also stocked directly into the recovery population at Sheeps Crossing (see #4 below), 2) a recovery population in the South Fork of the Little Colorado River. This recovery reach is located above a barrier; however, Mexican Hay Lake is located upstream of both the barrier and recovery reach. Apache trout stocked into Mexican Hay Lake may escape and reach the recovery population downstream, and 3) Ackre Lake, located in the headwaters of Fish Creek Fish Creek is a recovery stream, and Apache trout or Arctic grayling may escape Ackre lake and enter the recovery population downstream in Fish Creek. If stocked Apache trout move into Fish Creek, they would either perish, since hatchery trout usually do not persist well in stream environments (Elliot 1975; Bachman 1984; Fay and Pardue 1986; Heimer et al 1985; Meyer 1995) or assimilate into the recovery population. If Apache trout emigrate out of Fish Creek and enter the Black River, they would compete with brown trout for food and space and all size classes would also be at risk of predation by smallmouth bass and large brown trout. Angling and natural mortality eventually claim the stocked trout.

Impacts from wild populations on stocked Apache trout:

The action of stocking Apache trout is considered a conservation action in furtherance of the Endangered Species Act whereby a special 4(d) rule is in place. AGFD may take any federally listed threatened fish or wildlife for conservation purposes that are consistent with the purposes of the Act and the Section 6 Cooperative Agreement between USFWS and AGFD and therefore take of Apache trout from the proposed stocking of Apache trout is legally permitted.

Impacts to stocked Apache trout from species of fish currently existing as wild, self reproducing populations at or in proximity to proposed stocking locations may include predation, hybridization with other trout and/or competition. Arctic grayling are not piscivorous and would

not be expected to prey on the wild populations of Apache trout in Fish Creek. They may compete with the Apache trout for food and space while in Fish Creek, however, survey data indicates grayling do not persist long in the stream, are not know to reproduce in the stream as evidenced by lack of smaller size classes, and will not hybridize with Apache trout. The number of grayling that may reach Fish Creek is low and the extent of competition limited. Only two Arctic grayling have been documented in Fish Creek, one during an electrofishing survey in the late 1980s and one during a recent visual survey (J. Carter, pers. comm.), both found in the upper portion of Fish Creek, not far from the lake. However, grayling have not been found to persist, and numerous surveys in Fish Creek have failed to find Arctic grayling (Lopez 2008; Terrill, in preparation). Grayling were first stocked in Ackre Lake in 1987 and several chemical treatments in 2004 and 2005 resulted in essentially a total fish collection effort in Fish Creek and no grayling were found. No grayling have ever been documented in the Black River, East Fork Black River or West Fork Black River.

Chiricahua Leopard Frog

Local Analysis: Ackre Lake and the Black River buffered stocking complex are within the historical range of the Chiricahua leopard frog and the likelihood that frogs could be exposed to fish stocked in Ackre Lake is moderate. However, the likelihood that frogs could be exposed to fish stocked in other stocking sites within the complex is high. There are no historical records for Chiricahua leopard frogs for Ackre Lake. There are historical records for Chiricahua leopard frogs from 6 sites within the complex; Crabtree Creek (1988), Deer Creek (2001), East Fork Black River (Buffalo Crossing footbridge) (1974), East Fork Black River (Three Forks) (2008), Concho Bill Spring (2009), and Lake Sierra Blanca (2008) (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys taking place between 1990 and 2009 (Figure 8, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Subsequent surveys have found that Chiricahua leopard frogs occupy the area within the Black River buffered stocking complex. In addition, this area, including 3 of the sites mentioned above, is part of ongoing recovery activities for the Chiricahua leopard frog. Although it is only somewhat likely that stocked fish in Ackre Lake are able to disperse to occupied Chiricahua leopard frog sites, stocked fish at other sites within the complex may.

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing stocked fish from Ackre Lake or the Black River buffered stocking complex is low. There are no historical records for Chiricahua leopard frogs where stocked fish are able to disperse outside of the buffered stocking complex.

Northern Leopard Frog

Local Analysis: Ackre Lake and the Black River buffered stocking complex are within the historical range of the northern leopard frog and the likelihood that frogs could be exposed to fish stocked in Ackre Lake or other stocking sites within the complex is low. There is 1 historical

record for northern leopard frogs with the buffered stocking complex; East Fork Black River (Three Forks) from 1979 (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 182 surveys at 91 sites within the Black River buffered stocking complex from 1969 to 2009 with most surveys taking place between 1990 and 2009 (Figure 8, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs have not been observed at East Fork Black River (Three Forks) during several subsequent surveys or from other sites surveyed in the Black River buffered stocking complex. Due to the extensive surveying of this area and the lack of northern leopard frog observations, it is likely that northern leopard frogs no longer occupy this area.

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing stocked fish from Ackre Lake or the Black River buffered stocking complex is low. There are no historical records for northern leopard frogs where stocked fish are able to disperse outside of the buffered stocking complex.

Mexican Spotted Owl

This stocking location is within Mexican spotted owl (MSO) critical habitat (CH).

Potential Impacts

The CH designation included most other protected and restricted habitats for the MSO. Indirect effects to CH may include actions that can affect forest structure and maintenance of adequate prey species identified as PCEs. These actions may include trampling of vegetation, soil compaction, removal of small woody debris or other physical degradation potentially altering the productivity and succession/regeneration of the vegetation. In the designation of critical habitat (USFWS 2004) most recreational activities, including angling, were not identified as requiring restrictions to protect the PCE's of critical habitat from destruction or adverse modification. In making that statement, recreational activities, including angling were assumed to not contribute to significant habitat-affecting activities such as cutting large trees or snags, removal of large woody debris from the forest floor, altering the tree species diversity, or other large-scale changes to habitat structure. The act of a relatively small number of people walking through habitat is not likely to cause the kind of effects that would result in adverse effects to the PCEs/KHCs of MSO CH and/or restricted and protected habitats.

BLACK RIVER COMPLEX ANALYSIS

Water Distribution / Connectivity

No water is released from Big Lake or Crescent Lake for irrigation or other downstream uses. When the lakes do spill (very infrequently), it will flow 4.5 miles down the intermittent (with some permanent isolated pools) unnamed tributary to the North Fork of the East Fork of the Black River. The spill from Crescent Lake, when it infrequently spills, enters the unnamed tributary approximately 0.1 mile downstream of the Big Lake dam. The North Fork, perennial

water flows downstream for 9.2 miles to Three Forks, where the North Fork, Boneyard Creek, and another unnamed tributary come together to form the East Fork of Black River. Approximately 3.8 miles of the North Fork upstream of the tributary from Big Lake is perennial. A small tributary with some permanent flow, Chambers Draw, also enters into the North Fork 0.4 mile downstream of the tributary from Big Lake.

From Three Forks, the East Fork of Black River flows perennial for 12.2 miles to the confluence with the West Fork of Black River, where they form the mainstem Black River. Several intermittent tributaries which contain some permanent water enter into the East Fork between Three Forks and the confluence, including Coyote Creek, Open Draw, and Deer Creek, 1.2 miles, 2.9 miles, and 7.2 miles downstream of Three Forks, respectively.

The West Fork Black River has several perennial tributaries entering and includes the West Fork Black River stocking reach.

The Black River flow is perennial for 113.7 miles to the confluence with the White River, where they form the Salt River. A number of perennial tributaries enter into the Black River, including Beaver Creek, Bear Creek, Centerfire Creek, Fish Creek, Conklin Creek, Reservation Creek, Snake Creek, Pacheta Creek, Bear Wallow Creek, Paddy Creek, and Big Bonito Creek. The Fish Creek tributary includes the Ackre Lake stocking site that is located 12.3 miles up from the confluence with the Black River.

All of the North Fork, East Fork, West Fork, Black River, and nearly all of Fish Creek are perennial and continuous flow year around. Big Lake and Crescent Lake are connected to these waters only when they spill, which has not occurred since the early 1990s.

Fish Movement

Trout stocked into Big Lake and Crescent Lake can only escape when these lakes spill, which has not occurred since the early 1990s. When they do spill, it is possible for these fish to escape downstream into the Big Lake tributary, the North Fork Black River, Boneyard Creek, the East Fork Black River, much of the West Fork Black River (up to the constructed fish barrier), and the Black River. Stocked trout in the East Fork Black River and West Fork Black River also have access to the same streams, since they are all connected.

Apache trout recovery streams in the watershed have constructed fish barriers that exclude movement of dispersing fish from Big Lake Crescent Lake, East Fork Black River, and West Fork Black River. These Apache trout streams include the upper West Fork Black River, Stinky Creek, Hayground Creek, Home Creek, Hannagan Creek (on tributary Beaver Creek), Centerfire Creek, Fish Creek, Soldier Creek (has a natural waterfall on this tributary to Reservation Creek), Conklin Creek, Snake Creek, Bear Wallow Creek, and Big Bonito Creek.

Fish stocked into Ackre Lake have access to all of Fish Creek above the constructed fish barrier, then also to all the same connection of streams as the other stocking sites once fish exit into the Black River.

Community Description
Refer to previous descriptions of the Big Lake, Crescent Lake, East Fork Black River, West Fork Black River and Ackre Lake sections.

Consultation Species and Critical Habitat
Potential impacts to stocked and recovery Apache trout, loach minnow and critical habitat in the East Fork, northern Mexican and narrow headed garter snakes, roundtail chub and three forks springsnail and are addressed below. Chiricahua and northern leopard frogs and Mexican spotted owl were described in the site consultation species analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Northern Mexican garter snakes are analyzed on a complex and downstream scale due to the movement potential into the stocked area and fish movement potential up or downstream into areas where the snakes may occur.

Loach Minnow and Critical Habitat
Occupied loach minnow habitat occurs in the lower 0.9 miles of the North Fork of the East Fork Black River and upper 2.4 miles of the East Fork Black River, generally centered around Three Forks. The upper end of occupied habitat occurs about 12.8 miles downstream of Big Lake and 13.5 miles downstream of Crescent Lake. One loach minnow was also documented in the lower reach of Coyote Creek, a tributary to the East Fork 1.2 miles downstream of Three Forks. Loach minnow have not been documented in the West Fork Black River; the nearest occupied habitat is 13.5 from the West Fork stocking site (3.8 miles downstream in the West Fork and then 9.7 miles upstream in the East Fork of the Black River. Loach minnow have not been documented in Fish Creek or the Black River; the nearest occupied habitat is 31.7 miles from Ackre Lake, via Fish Creek, up the Black River, and up East Fork Black River.

Loach minnow critical habitat is designated in all 12.2 miles of the East Fork Black River from the confluence with the West Fork upstream through the Three Forks Area and upstream for 4.4 miles into the North Fork East Fork Black River. The lower 1.4 miles of lower Boneyard Creek, a tributary that comes in at Three Forks, is also designated critical habitat for loach minnow. The upstream end of critical habitat is about 9.3 miles downstream from Big Lake and 10.0 miles downstream of Crescent Lake. The stocking reach on the East Fork lies within designated critical habitat, but not in occupied critical habitat.

The status of the loach minnow population is unclear, since they are difficult to survey for, and the numbers captured in each effort have varied. Bagley et al (1997) reported all age classes were present in surveys from Three Forks to ¼ mile above Open Draw, establishing the population within at least 2.25 miles of river. Surveys conducted by AGFD in 2000 documented loach minnow in the North Fork approximately 0.9 miles upstream of Three Forks, expanding the upstream known range. One loach minnow was also collected in lower Coyote Creek (see Table 9). Marsh et al. (2003) reported loach minnow were found in the reach in every survey from 1997-2002. Numbers since 1996 have been low, with only three in 2004, one in 2005, and none in 2007 (Carter 2007), 2008 (Robinson et al 2008), and 2009 (Robinson et al 2009). It is possible that loach minnow no longer exist in the Three Forks area, but if they do, it is in extremely low densities to where they cannot be detected by intensive sampling. These extremely low densities were likely not caused by escaped stocked trout.

Potential Impacts

Stocking trout at Big Lake and Crescent Lake could affect loach minnow if trout from the lake were to escape during a spill event and move downstream into occupied habitats. This escapement is expected to be very infrequent, since both lakes have not spilled since the early 1990s. Without spilling, there is no way for stocked trout to escape these reservoirs. If the reservoirs spill in the next 10 years, stocked trout have the potential to move downstream towards Three Forks. Fish surveys in 2000, 2001, 2007, and 2009 have found no hatchery trout in the North Fork, Boneyard Creek, or in the upper several miles of the East Fork, documenting only brown trout, rainbow-Apache hybrids, and brook trout during these surveys. The brown trout in this watershed are all wild; with the last brown trout stocked in the East Fork in 1981 (246 subcatchable brown trout were also stocked into the West Fork Black in 1994).

The hybrid rainbow x Apache trout are wild and self sustaining in the North Fork, likely originating from historic Apache trout populations in the drainage and rainbow trout that were historically stocked into the North Fork as far back as 1936. Some trout escaping from Big Lake and Crescent Lake when they have spilled may also have reproduced with native Apache trout. Hybrids have been documented in the North Fork prior to hatchery Apache trout stocked into either Big Lake or in the East Fork Black River. Marsh (1997) also reported hybrid rainbow-Apache trout in the North Fork prior (1989) to stocking hatchery Apache trout in the East Fork

(1996). One brook trout was collected in Boneyard Creek in 2009, which are known to be wild and self-sustaining in Boneyard Creek, likely originating from brook trout first stocked in the stream in 1933. Surveys in 2008 found 6 rainbow trout, 5 brook trout, 1 Apache trout, in addition to numerous brown trout, in the Three Forks area (Robinson et al 2008). Four of the rainbow trout were found in the North Fork and 2 in Boneyard Creek. It is not known if these rainbow trout were hatchery fish or wild rainbow-Apache hybrids since that level of identification was not used. It is likely they were wild hybrid trout because rainbow trout have not been stocked in the East Fork Black since 1996 and Big and Crescent lakes has not spilled since the early 1990s. The 5 brook trout were all collected in Boneyard Creek, likely part of the self-sustaining population in that stream. The one cutthroat trout was likely a mis-identification, since no other cutthroat trout have been documented from these streams, since Big Lake where they are currently stocked has not spilled in over 15 years, and photos of fish obtained from the surveyors indicate that the fish was instead a hatchery Apache trout. The one Apache trout collected in Boneyard Creek was also a hatchery Apache trout, most likely from the East Fork Black River stocking area. Hatchery Apache trout were also stocked into Big Lake from 1999 to 2003, however, that lake has not spilled since the early 1990s and there is no way for those stocked fish to have escaped.

Cutthroat trout are not particularly piscivorous (Behnke 1992, Carlander 1969), nor is Apache trout (Behnke 2002, Clarkson and Dreyer 1996) although small fish may be eaten opportunistically. The fact that two species may have occurred in the same stream historically does not preclude the existence of competition between the two or predation by the native trout on the loach minnow. Brook trout are more piscivorous than rainbow trout. Rainbow trout have been documented feeding on loach minnow (Propst et al. 1998), and while in occupied habitat could prey on small loach minnow. However, Propst et al (1998) also reported that rainbow trout were primarily feeding on aquatic invertebrates, survival of stocked rainbow trout was low, and that stocked rainbow trout had low predation on native fishes. The rainbow trout in the Propst et al (1998) project were stocked immediately in the same habitat as loach minnow, thus would expect higher levels of predation because of high densities of loach minnow and stocked rainbow trout in the same habitat. There is no stocking proposed here in loach minnow occupied habitat, with stocking sites located 12.8 and 13.5 miles upstream (Big and Crescent lakes), and 2.2 miles downstream in the East Fork. Stocked trout would have to disperse to reach occupied habitat and thus would expect low numbers of stocked trout to get that far. The survey data shows a small number of stocked trout coming upstream from the East Fork Black River stocking site, but not persisting long. In addition, densities of loach minnow are extremely low (see below) and the probability of a very occasional stocked trout interacting with a loach minnow in this watershed is extremely low. The literature presents evidence that hatchery trout do not persist long in waters already occupied by wild trout. Elliot (1975) found that some hatchery trout never learned how to feed on natural items. In addition, it is known that drift feeding trout need to pick optimum sites to maximize growth and survival (Faush 1984). Bachman (1984) postulated that

the main cause of high mortality for stocked trout is energy inefficient behavior, including moving more frequently, not picking optimum feeding sites, and excessive dominance displays. Bachman (1984) also reported that stocked trout feed less than wild trout. Survey data in the East Fork Black in 1996 and 2009 show that stocked trout are not persisting long, even in the stocked reach.

While loach minnow are primarily considered to occupy turbulent, rocky, riffle habitats (USFWS 1991; Minckley 1973) and habitat overlap with trout may be minimal, loach minnow were found in relatively slow runs in the North Fork of the East Fork, and, in Pace Creek, in long pools (Marsh et al. 2003). These are areas where trout may encounter loach minnow.

There is some potential for stocked trout to impact loach minnow by predation since stocked trout do occasionally reach occupied habitat, although this potential may be further reduced by competition with wild resident trout. Montgomery and Bernstein (2008) and Raleigh (1984) state that rainbow trout are opportunistic feeders, feeding mainly on aquatic insects, but will also feed on zooplankton, terrestrial insects, and small fishes. However, Wang and White (1994) reported that wild brown trout were much more aggressive than hatchery stocked cutthroat trout, initiating 92% of the aggressive interactions, and thus concluding that stocked hatchery cutthroat trout were at a significant competitive disadvantage in the presence of wild brown trout. The occupied habitat for loach minnow in the North Fork, East Fork and potentially Boneyard Creek are dominated by wild brown trout. This also further explains the low persistence of stocked trout.

Competition for food may occur if dispersing trout reach occupied habitat. Montgomery and Bernstein (2008) and Raleigh (1984) state that rainbow trout are opportunistic feeders, feeding mainly on aquatic insects. USFWS (1991b) state that loach minnow are opportunistic, benthic insectivores, feeding primarily upon riffle-dwelling larval ephemeropterans, simuliid and chironomid dipterans, larvae of plecopterans, trichopterans, and occasionally pupae or emerging adults. USFWS also states that loach minnow are not known to swim in turbulent riffles other than for brief periods, instead actively seeking their food among bottom substrates, rather than pursuing animals entrained in the drift. Raleigh (1984) reports that terrestrial insects contribute significantly to a rainbow trout's diet during the summer months, thus potentially reducing the competition for food during this time. However, benthic fauna comprise nearly all of a rainbow trout's diet during the winter months. Thus, competition for food may occur year around, but is likely greater during winter months. Based on extensive surveys conducted in 1996 and 2009 (spring, summer, fall surveys) in which no hatchery Apache trout were shown to overwinter from the 2008 stocking, and the fall surveys indicate no persistence into the fall from the summer 2009 stocking season (Table 12;Table 13). Furthermore Apache trout are not even found to persist long into the fall, and do not do well in the presence of the strong population of brown trout.

Stocking rainbow trout and Apache trout in the East Fork may affect loach minnow in two ways. The first is when stocked trout move upstream into occupied habitats. The second is that the continual stocking into the reach augments the non-native fish population (if rainbow trout are approved) and reduces the opportunity for loach minnow to expand their population into the stocking reach. Robinson et al (2008) documented at least 1 hatchery Apache trout in Boneyard Creek, which likely came from the East Fork stocking location and swam through the Three Forks area. In the Black complex, hatchery Apache trout have been stocked for the purposes of providing angling recreation only in the East Fork Black, West Fork Black, Ackre Lake, and Big Lake. Big Lake has not spilled since Apache trout have been stocked there, thus they cannot have escaped. Trout stocked into the West Fork and Ackre Lake would have to come through the East Fork Black stocking site before reaching Three Forks and Boneyard Creek, thus the fish was more likely from the East Fork stocking.

Apache trout are not highly piscivorous (Behnke 2002, Clarkson and Dreyer 1996) although small fish may be eaten opportunistically. The fact that two species may have occurred in the same stream historically does not preclude the existence of competition between the two or predation by the native trout on the loach minnow. Stocked rainbow trout have been documented feeding on loach minnow (Propst et al. 1998), however, this was in an environment where the rainbow trout were stocked into an stream with very few resident trout. Hatchery trout stocked into a stream with a healthy population of wild brown trout are likely at a competitive disadvantage (Wang and White 1994), may never learn how to feed on natural items (Elliot 1975), or feed less than wild trout (Bachman 1984). Also, the rainbow trout in the Propst et al (1998) project were stocked immediately in the same habitat as loach minnow, thus one would expect higher levels of predation because of high densities of loach minnow and stocked rainbow trout in the same habitat. Apache and rainbow trout are not proposed to be stocked directly into occupied loach minnow habitat; rather the stocking site is located 2.2 miles downstream of the lowest documented loach minnow occurrence in the East Fork of the Black River. Stocked trout would have to disperse upstream to reach occupied habitat and only very low numbers of stocked trout are expected to move that far, or to not persist long if a trout did disperse. In addition, densities of loach minnow are extremely low and the probability of a very occasional stocked trout interacting with a loach minnow in this watershed is extremely low. See the discussion under the Apache trout potential impacts in the East Fork section for more explanation regarding dispersal of stocked trout from the East Fork stocking reach.

Trout are stocked in the East Fork reach during the period when loach minnow would be spawning, so there is opportunity for predation on loach minnow eggs or juveniles; however loach minnow eggs are typically deposited on the underside of rocks would be expected to minimize accessibility by trout for predation of eggs. While loach minnow are primarily considered to occupy riffle habitats (USFWS 1991b; Minckley 1973) and habitat overlap is likely low, loach minnow were also found in relatively slow runs in the North Fork of the East

Fork, and, in Pace Creek, in long pools (Marsh et al. 2003). These are areas where trout may encounter loach minnow.

There is some potential for stocked trout to impact loach minnow by predation since stocked trout could occasionally reach occupied habitat, although this potential may be further reduced by competition with wild resident trout. Montgomery and Bernstein (2008) and Raleigh (1984) state that rainbow trout are opportunistic feeders, feeding mainly on aquatic insects, but will also feed on zooplankton, terrestrial insects, and small fishes. However, Wang and White (1994) reported that wild brown trout were much more aggressive than hatchery stocked cutthroat trout, initiating 92% of the aggressive interactions, and thus concluding that stocked hatchery cutthroat trout were at a significant competitive disadvantage in the presence of wild brown trout. The occupied habitat for loach minnow in the North Fork, East Fork and potentially Boneyard Creek are dominated by wild brown trout. This also further explains the low persistence of stocked trout.

Stocked Apache trout in the West Fork would have to disperse downstream to the East Fork confluence, then up the East Fork Black through that stocking site and further on to occupied loach minnow habitat. The survey data in the West Fork show that some stocked trout can disperse short distances downstream, but the numbers of dispersing trout are low. See the East Fork Black River analysis for discussion on movement of stocked Apache trout, persistence in the stream, and potential impacts to loach minnow.

Stocked fish in Ackre Lake could potentially impact loach minnow in the Three Forks, but would have to escape Ackre Lake, disperse down the length of Fish Creek (12.3 miles), then up the Black River for 9.6 miles, then up the East Fork Black River for 9.8, including traversing through the East Fork Black River to reach occupied habitat. While this is possible since the stream to stream connection between these sites is continuous during high flows, it is unlikely. No grayling has ever been documented in the Black River or in the East Fork Black River. Hatchery Apache trout have been documented in the Three Forks area (Robinson et al 2008), however, these Apache trout likely originated at the East Fork Black stocking site, although it would be extremely difficult to verify the source location.

The main threats to loach minnow in the Three Forks area are primarily high densities of crayfish and wild brown trout. Carpenter and McIvor (1999) list possible impacts to endangered small fishes by non-native crayfish to include competition for cover, competition for food, direct predation on fish by crayfish, and reduction in macrophytes that native fish may need for cover, nursery habitat, and as a source of macroinvertebrates. Fernandez and Rosen (1996) reported impacts by crayfish to aquatic habitat, invertebrates, and frogs at Three Forks. Childs (1999) reported predation of crayfish on native speckled dace, plus a decreased use of cover by speckled dace in the presence of crayfish. White (1995) reported crayfish predation on eggs of Little

Colorado spinedace, and shifts in habitat use in the presence of crayfish. Crayfish are widely considered by biologists to be a serious threat to small bodied native fishes and their habitat.

Wild brown trout are considered to be more piscivorous and aggressive than other trout (Behnke 2002; Belica 2007; Dunham et al 2004; Wang and White 1994). Stocked trout do have the potential to be predators on small fishes such as loach minnow, but likely would not pose much of a threat in the presence of abundant wild brown trout. Montgomery and Bernstein (2008) and Raleigh (1984) state that rainbow trout are opportunistic feeders, feeding mainly on aquatic insects, but will also feed on zooplankton, terrestrial insects, and small fishes. Propst et al (1998) documented predation on loach minnow by stocked rainbow trout. However, Wang and White (1994) reported that wild brown trout were much more aggressive than hatchery stocked cutthroat trout, initiating 92% of the aggressive interactions, and thus concluding that stocked hatchery cutthroat trout were at a significant competitive disadvantage in the presence of wild brown trout. This competitive disadvantage combined with the very low density of hatchery trout, and the lack of persistence, makes any possible impact quite insignificant. The relative densities of wild brown trout in the Three Forks area during surveys over the last 3 years (2007-2009) dominate the trout present in the lower North Fork, Boneyard Creek, and the upper East Fork and comprise 94% of all trout collected. Wild brook trout make up about 4% of all trout collected. All others combined, including reported rainbow trout (could include wild rainbow-Apache hybrids), hatchery Apache trout, and reported cutthroat trout (assumed to be miss-identified and most likely a hatchery Apache trout) make up only 2% of all trout collected. Plus, the brown trout population is expanding in the East Fork Black River, thus posing an increasing threat. Therefore, a hatchery trout may occasionally disperse into occupied loach minnow habitat, most likely from the East Fork stocking area, and there is opportunity for adverse impacts. The number of times these interactions occur may be low due to the limited number of stocked trout that may access the loach minnow occupied habitat, but when they occur predation or completion may be the result. Other factors influencing the exposure include the competitive disadvantage that stocked trout have to wild brown trout, the short persistence, and extremely low densities of loach minnow.

Critical Habitat

In the designation of critical habitat (USFWS 2007), the North Fork of the East Fork, the East Fork Black River, and Boneyard Creek were acknowledged to support primary constituent elements (PCEs) related to habitat quality (sufficient flow velocities and appropriate gradients, substrates, depths, and habitat types [i.e. riffles, runs]). The suitability of these designated reaches to meet primary constituent element 4 was not specifically mentioned; however, a loach minnow population likely had existed for many years prior to its documentation in 1996 (Marsh et al. 2003), and surveys through 2005 continued to document the species (Robinson et al. 2008).

Loach minnow critical habitat Primary Constituent Element 3(d) specifies: streams that have an abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies. There is some evidence that the food base in the East Fork Black River has been limiting in the past. Old macroinvertebrate surveys in the East Fork found below-resident numbers of macroinvertebrates as described by Magnum (as discussed in Novy and Lopez 1991b). These low numbers were attributed to the sedimentation issues and stress on the habitat in this stream, based on the species of invertebrates present and the poor habitat/riparian conditions. Magnum also stated that these conditions were limiting the sportfishery potential in the stream, which was confirmed by moderately low numbers of brown trout in 1988. Since those surveys 20 years ago, aquatic habitat in the East Fork Black River has changed significantly (Meyer et al 2011b). Cattle grazing has been removed from most of the stream and the aquatic habitat and riparian has responded. This has likely led to an increase in the macroinvertebrate community. There is no data to support this assumption but it can be inferred from the significant increases in the resident brown trout population. The brown trout population in the East Fork is now dramatically greater than it was 20 years ago, and must be supported by a greater food base than existed 20 years ago and is likely no longer limiting. The growth of the brown trout population has occurred during consistent annual hatchery trout stocking. If hatchery stocked trout were significantly impacting the aquatic insect food base, significant increases in wild brown trout numbers would not be occurring. The decline of loach minnow and native suckers in the system are likely due to increased predation by wild brown trout and abundant crayfish; not due to prey limitation from hatchery trout. Studies conducted in 2009 (Meyer et al 2011a) in the Black River show that stocked trout do not persist long in the stream, some of the mortality is likely due to angler harvest, however much is likely due to poor survival of stocked trout in stream environments. Other studies support this same finding (High and Meyer 2009; Meyer et al 2011a - associated citations). Stocked trout have to learn to feed on natural foods after they are stocked. Some do, but most do not survive long enough to pick up those behaviors. The few stocked fish that do are likely the ones that do persist, however, this is a very small number and not likely to cause an impact in the food base that can be detected. A detailed discussion of stocked trout persistence can be found in Chapter 4.

When these PCEs were determined and critical habitat was designated, the Black River was identified as critical habitat despite the already ongoing trout stocking program, and at that time if PCE 3(d) was identified to be present for the Black River it was with a baseline accounting for the ongoing stocking program and therefore PCE 3(d) was considered to either be nonexistent in this critical habitat reach or to be met despite the ongoing trout stocking program. Any competition for resources is addressed under competition for resources in the Potential Impacts to loach minnow and the appropriate section in the interactions document.

Rainbow trout stocked into the East Fork Black River would be stocked directly into designated critical habitat. Rainbow trout, brook trout and cutthroat trout stocked into Big Lake and

Crescent Lake could disperse downstream but they have a low probability of reaching critical habitat as they cannot escape these lakes unless they spill, and they have not spilled since the early 1990s. It is unlikely Arctic grayling stocked into Ackre Lake would escape and disperse into the East Fork loach minnow critical habitat as no grayling have ever been documented in the Black River or the East Fork Black River (See Ackre Lake section which discusses the probability of grayling movement below the Fish Creek Barrier).Primary Constituent Element #4 (PCE4) specifies: habitat devoid of nonnative aquatic species or habitat in which nonnative aquatic species are at levels that allow persistence of loach minnow (USFWS 2007). Non-native brown trout have been established in the East Fork Black River for decades and are the dominant large body fish in the stream, and second in numbers only to speckled dace overall. Non-native crayfish are also very well established and present in incredibly high numbers. These two non-native species were present and numerous when critical habitat was designated constituting the baseline conditions and therefore the habitat was not devoid of non-native aquatic species and this portion of PCE 4 would not apply to the East Fork or North Fork.

The second portion of PCE 4 specifies: habitat in which non-native aquatic species are at levels that allow persistence of loach minnow. That may have been true for the East Fork in the mid 1990s or earlier, but is not true today nor when critical habitat was designated in 2007, thus, the entire PCE 4 does not apply to the East Fork and therefore cannot be impacted. A population estimate for wild brown trout in the East Fork in July 2009 was 15,500 fish, far outnumbering hatchery trout stocked into the stream. 1400 hatchery trout are stocked each week into the East Fork, numbers that are less than 10% of the resident trout. Survey data from 2009 show that the numbers of stocked trout in the system do not compound throughout the season and remain low at any given point (population estimate of 105 hatchery Apache trout in the East Fork in July – middle of the stocking season). Harvest, and more importantly, high mortality and very short persistence, keep numbers of hatchery trout very low. Also, non-native crayfish densities in the East Fork are incredibly high. Robinson et al (2009) found 4 times as many crayfish in the Three Forks area as fish. The levels of non-native aquatic species likely exceed that which can support loach minnow in the East Fork and North Fork of the Black River, but not due to stocked trout. The numbers of wild brown trout and crayfish are very high which are likely having an impact on loach minnow. The collection of loach minnow in this system was one individual in 2005. None have been caught in intensive survey efforts in 2007, 2008, and 2009. Loach minnow may be extirpated from the system and the data shows this is likely due to established (and increasing) wild brown trout and crayfish populations, and possibly also due in some part to habitat changes. As such, PCE4 was not present in the East Fork Black River when critical habitat was designated and therefore stocking non-native trout in the East Fork of the Black River and/or trout or Arctic grayling at Crescent Lake, Big Lake, or Ackre Lake over the next 10 years should not impact critical habitat.

No effects to critical habitat in the East Fork Black River would be possible from stocked Apache trout moving into the reach from the West Fork. The stocked species would not affect PCE 4 because the stocked species is native species.

LM Critical habitat **Federal Register** / Vol. 72, No. 54 / Wednesday, March 21, 2007 / Rules and Regulations

Loach Minnow PCE's

1. Permanent, flowing water with no or minimal pollutant levels, including:

   a. Living areas for adult loach minnow with moderate to swift flow velocities between 9.0 to 32.0 in/second (24 to 80 cm/second) in shallow water between approximately 1.0 to 30 inches (3 cm to 75 cm) in depth, with gravel, cobble, and rubble substrates;

   b. Living areas for juvenile loach minnow with moderate to swift flow velocities between 1.0 and 34 in/second (3.0 and 85.0 cm/second) in shallow water between approximately 1.0 to 30 inches (3 cm to 75 cm) in depth with sand, gravel, cobble, and rubble substrates;

   c. Living areas for larval loach minnow with slow to moderate velocities between 3.0 and 20.0 in/ second (9.0 to 50.0 cm/second) in shallow water with sand, gravel, and cobble substrates;

   d. Spawning areas with slow to swift flow velocities in shallow water where cobble and rubble and the spaces between them are not filled in by fine dirt or sand; and

   e. Water with dissolved oxygen levels greater than 3.5 cc/l and no or minimal pollutant levels for pollutants such as copper, arsenic, mercury, and cadmium; human and animal waste products; pesticides; suspended sediments; and gasoline or diesel fuels.

2. Sand, gravel, and cobble substrates with low or moderate amounts of fine sediment and substrate embeddedness. Suitable levels of embeddedness are generally maintained by a natural,unregulated hydrograph that allows for periodic flooding or, if flows are modified or regulated, a hydrograph that allows for adequate river functions, such as flows capable of transporting sediments.

3. Streams that have:

   a. Low gradients of less than approximately 2.5 percent;

   b. Water temperatures in the approximate range of 35 to 82 °F (1.7 to 27.8 °C) (with additional natural daily and seasonal variation);

   c. Pool, riffle, run, and backwater components; and

   d. An abundant aquatic insect food base consisting of mayflies, true flies, black flies, caddisflies, stoneflies, and dragonflies.

4. Habitat devoid of nonnative aquatic species or habitat in which nonnative aquatic species are at levels that allow persistence of loach minnow.

5. Areas within perennial, interrupted stream courses that are periodically dewatered but that serve as connective corridors between occupied or seasonally occupied habitat and through which the species may move when the habitat is wetted.

Chiricahua Leopard Frog
See **Local** and Broad Scale analyses under each stocking location.

Northern Leopard Frog
See Local and Broad Scale analyses under each stocking location.

Northern Mexican Garter Snake
Stocking complex analysis: Northern Mexican garter snakes are primarily known from middle-elevations in Arizona from approximately 1,700 – 6,700 feet. Although the status of northern Mexican garter snakes in the Black River remains uncertain, all of the Black River Complex stocking sites are above the known elevation limits of the species, and out of the known range. Therefore, the analysis does not include the potential for northern Mexican garter snakes to be exposed to stocked fishes at Big and Crescent lakes (*ca.* 9,000 feet elevation), Ackre Lake (8,900 feet) or the East or West forks of the Black River (7,500 – 7,900 feet and *ca.* 7,700 feet, respectively).

Downstream analysis: Downstream in the Black River watershed, northern Mexican garter snakes historically occurred in the Black River below the confluence with Paddy Creek (no date) on the boundary of the Fort Apache and San Carlos Indian reservations (USFWS 2008a). This area has not been systematically surveyed recently. Northern Mexican garter snakes have been reported from the Fort Apache Indian Reservation at two tributaries to the Black River: Willow Creek (1965) (HDMS), and Big Bonito Creek (1986) (Rosen and Schwalbe 1988), however none were found during garter snake surveys and trapping efforts at Big Bonito Creek in 2004 (Holycross et al. 2006). Crayfish and non-native fish, including smallmouth bass, occupy the Black River and its tributaries.

Although these areas downstream of the sub-watershed have not been systematically surveyed for garter snakes, and it is unknown if populations persist, trout stocked in the Black River complex have the potential to move downstream, and any northern Mexican garter snakes that persist along the Black River above the White River confluence has the potential of being exposed to those stocked fish.

Narrow-headed Garter Snake
Stocking complex analysis: Narrow-headed garter snakes occupy the Black River subwatershed; the Black River lies within the historical and current range of narrow-headed garter snakes and the species may be found throughout the Black River stocking complex, where there is suitable habitat. In addition to recent narrow-headed garter snake records from the Black River, there are recent records of narrow-headed garter snakes from several tributaries of the Black River, including lower Fish Creek (1994, 2004), Snake Creek (2007), Bear Wallow Creek (2003), and North Fork Bear Wallow Creek at Double Cienega (2004) (Arizona Game and Fish Riparian Herpetofauna Database, HDMS, M. Lopez, pers. comm.). Consequently, there is potential for narrow-headed garter snakes to be exposed to sport fish (brook trout, cutthroat trout,

rainbow trout, Apache trout, and Arctic grayling) stocked within the Black River complex. The Black River also supports an abundant crayfish community and non-native fishes such as smallmouth bass that make those habitats less suitable for narrow-headed garter snakes.

There are no records of narrow-headed garter snakes from Crescent or Big lakes, neither of which is appropriate habitat. There is a recent (2004) record from downstream of those stocking sites along the East Fork Black River, below Three Forks (M. Lopez, pers. comm.). Although narrow-headed garter snakes are unlikely to disperse into either of the lakes, if either of the lakes spills, which occurs infrequently, narrow-headed garter snakes could be exposed to stocked rainbow, brook, Apache, and cutthroat trout which escape into the East Fork Black River.

There are historical and recent records of narrow-headed garter snakes above, within and downstream of the East Fork Black River stocking reach, and above and below the West Fork Black River stocking reaches. Holycross et al. (2006) report a 1957 record from the [West Fork] Black River near Big Lake, and there is also a 1991 observation (HDMS) from the same vicinity, but there have been no recent surveys in that reach. Holycross et al (2006) thought narrow-headed garter snakes had been extirpated from the vicinity of Diamond Rock Campground (records from 1969, 1988) at the northern end of the East Fork stocking reach, which they sampled in August 2004. But, in July 2004 a narrow-headed garter snake was observed about 2.5 river miles upstream of the East Fork Black River stocking reach (M. Lopez, pers. comm.) indicating that a population continued to persist in that reach. Narrow-headed garter snakes have been collected (1988) at Buffalo Crossing about 0.25 river miles upstream of the southern end of the East Fork Black River stocking reach (Holycross et al. 2006). There are numerous recent records (1989-2009) of narrow-headed garter snakes along the Black River between the confluences of Fish Creek and Snake Creek (near Wildcat Crossing), about 11 river miles downstream of the East Fork and West Fork Black River stocking reaches (HDMS).

Narrow-headed garter snakes in the stocking reach, and up and downstream of the stocking reach, may be exposed to stocked fish if garter snakes or stocked fish disperse up or downstream in the Black River. There are no narrow-headed garter snake records from the West Fork Black River stocking reach, though there is a 1991 narrow-headed garter snake record from near Big Lake, that is mapped approximately 1.9 river miles upstream of the stocking reach (HDMS). Apache trout stocked in West Fork Black River may move upstream or downstream of the stocking reach and interact with narrow-headed garter snakes. Narrow-headed garter snakes may disperse into the stocking reach provided suitable habitat exists.

There are no narrow-headed garter snake records from Ackre Lake and the snakes are unlikely to disperse into the lake because it is not suitable habitat. Narrow-headed garter snakes would likely be exposed to stocked trout and Arctic grayling if Ackre Lake spills, which it does regularly in the spring, because the fish could move downstream to lower Fish Creek and the Black River.

Downstream analysis: There are records of historical and current narrow-headed garter snake populations from many sites downstream of the stocking complex. Below Big and Crescent lakes, records have been summarized above for the East Fork Black River. Below the East Fork and West Fork stocking sites, narrow-headed garter snakes have been reported and collected from the Black River below Wildcat Point (including lower Fish Creek downstream from Ackre Lake) over the past 20 years (1989, 1991, 1993, 1995, 2004, 2005, 2007, 2008) (HDMS, Fernandez and Rosen 1996, Holycross et al. 2006). Most recently, Brennan and Rosen (2009) studied a population of narrow-headed garter snakes in an approximately 4 mile stretch of the Black River below Wildcat Point. Although snakes persist in that reach, individuals apparently suffer from crayfish predation and predation attempts, something that was not seen in 1995 (Fernandez and Rosen 1996). Farther downstream, there are recent records from tributaries including Bear Wallow Creek and Snake Creek (2003, 2007, respectively) (HDMS, AGFD Riparian Herpetofauna Database). On the Fort Apache and San Carlos Indian reservations, there are records from the Black River near Paddy Creek (1967) and below Sharp Creek (1982), and from one tributary, Big Bonito Creek (1986) (Rosen and Schwalbe 1988). There are also at least four pre-1970 records from the White River (Rosen and Schwalbe 1988, Holycross et al. 2006, HDMS, AGFD Riparian Herpetofauna Database).

The condition of the Black River and its tributaries on the Fort Apache and San Carlos Indian reservations is largely unknown, and no systematic surveys for the species have been done in the last 20 years, so the status of those narrow-headed garter snake populations is also unknown. Nonetheless, narrow-headed garter snakes persisting downstream of the Black River stocking complex may be exposed if fish disperse downstream.

Roundtail Chub

Voeltz (2007) documented roundtail chub in the Black River at Wildcat Crossing. AGFD (M. Lopez, pers. comm.) documented roundtail chub in the same area at Wildcat Crossing as recently as 2009. There are historical records or roundtails being present at Three Forks and the East Fork Black River (Voeltz 2002), though no recent records. One roundtail chub was collected in the very lower West Fork of Black River in 2002.

Roundtail chub are not present in Crescent or Big lakes or immediately downstream, nor are they present in the East Fork of the Black River. The nearest occurrence of roundtail chub is in the Black River just downstream of the confluence with the East and West Forks of the Black (M. Lopez, pers. comm.), at least 25.9 miles downstream of Big Lake, and approximately 2.7 miles downstream of the East Fork stocking reach. McKell (2005a) documented roundtail chub in the Black River near the confluence with Bear Creek. Voeltz (2007) documented roundtail chub in the Black River at Wildcat Crossing. AGFD (M. Lopez, pers. comm.) documented roundtail chub in the same area at Wildcat Crossing as recently as 2009. One roundtail chub was collected in the very lower reach of the West Fork Black River in 2002 (Table 23); however, this is the first record of roundtail in the West Fork, it was collected about 100 meters upstream of the

Black River, and was likely an isolated fish swimming into the West Fork during an extreme drought year when water temperatures are likely to be higher. Roundtail chub are located in the Black River upstream and downstream of the Fish Creek confluence (McKell 2005a; Voeltz 2007), and are assumed to be at or very near the confluence.

Potential Impacts

It is not likely that a reproducing roundtail chub population exists in the North Fork of the East Fork or the East Fork Black River. Recent surveys in the North Fork in 2007, 2008 and 2009 found no roundtail chub (Table 9), and recent surveys in the East Fork in 2009 also found no roundtail chub (Table 13). Exposure to stocked trout that could escape from Big Lake or Crescent Lake would be to adult chub, and there are no recent records for this area, and extensive surveys have been completed. While there is a possibility that escaped fish from Big Lake or Crescent Lake may reach the Black River where roundtail chub are found, the combination of low risk of the lakes spilling and the distance the fish would have to travel, and the low likelihood of persistence if a trout were to disperse makes any potential impacts to roundtail chub unlikely. There would be a higher likelihood of impacts from Apache or rainbow trout stocked in the East Fork, or Apache trout stocked in the West fork. Detailed information regarding dispersal of trout stocked in from either reach can be found in the East and West fork sections. If stocked trout dispersed into occupied roundtail chub habitat in the Black River, they would compete with roundtail chub for food and space. Stocked trout may also prey on juvenile roundtail chub.

Apache trout and Arctic grayling leaving Ackre Lake and Fish Creek could encounter all age classes of roundtail chub in the Black River, if the escaped fish reach the Black River. While this is possible since the stream to stream connection between these sites is continuous during high flows, it is unlikely. No grayling has ever been documented in the Black River or in the East Fork Black River. The numbers of escaped fish reaching the Black River is expected to be extremely small and rare occurrence, thus any impact directly or indirectly to roundtail chub is expected to be very small. Apache trout in the Black river could be from stocked population in Ackre Lake, the recovery population in Fish Creek, any of the other recovery populations above barriers on tributaries to the Black, or from the stocking reaches on the East or West Forks of the Black River.

Stocked Apache or rainbow trout may prey on small roundtail chub and compete with other age classes for food and space. Arctic grayling may compete for food with very small roundtail chub and with all age classes for space, but this would be expected to be very short term, as grayling do not persist in stream environments in Arizona. The Conservation Team implementing the Arizona conservation agreement for the roundtail chub was comfortable with stocking rainbow trout and Apache trout in drainages containing roundtail chub as long as the stocking was not on top of the roundtail population (SCAS meeting notes, 3/6/08). Dispersal of stocked species to occupied roundtail chub habitats allows for the effects to occur even though the roundtail chub

are not in the stocking site. The main threats to roundtail chub in the Black River are from highly piscivorous brown trout and abundant crayfish. It is expected that stocked Apache trout and Arctic grayling in Ackre Lake will have an extremely low impact to roundtail chub in the Black River.

Three Forks Springsnail

Three Forks springsnails are found at Three Forks Springs, which is an off channel spring located at Three Forks (13.7 miles downstream of Big Lake and 4.6 miles upstream from the East Fork stocking reach), and Boneyard Bog Springs, which is located at the headwaters of Boneyard Creek (18.4 miles downstream of Big Lake and 8.9 miles upstream of the East Fork stocking site via Boneyard Creek). These springsnail sites are 34.1 and 38.4 miles, respectively, from Ackre Lake; a stocked fish would have to travel down Fish creek, and up the Black River, into the East Fork of the Black River, through the stocking reach in order to reach the Three Forks area. Nonnative crayfish (Myers 2001) have adversely affected the Three Forks Springs populations. The population at Three Forks has reduced dramatically in size and surveys since 2004 rarely find more than 2-6 springsnails at a time (pers com. J Sorenson).

Forest fire retardant drops during the Three Forks Fire did not land on any of the springs holding springsnails; but airborne residues may have drifted over the site (which would not require upstream flow). There was one drop that crossed a dry tributary to the North Fork and one that came close to the North Fork.

Potential Impacts

The small spring systems occupied by the Three Forks Springsnail are not accessible to large-bodied fish such as the stocked trout species. Even if the stocked species reached Three Forks or Boneyard Bog, it is unlikely they could reach occupied springsnail habitat. Trout stocking in the East Fork Black River is not expected to impact the Three Forks springsnail at either Three Forks or Boneyard Bog, because the extant springs that still support the snail are too shallow (especially near the springheads where snails are found) for trout to successfully forage (Figure 32, Figure 33, Figure 34). Trout have not been observed anywhere near the springheads that still have snail populations in all the years they have monitored that species since 2004 (pers com J. Sorenson).

The North Fork East Fork Black River is a popular area for public recreation, and recreation has been identified as a threat to the species (G051_I01 *Pyrgulopsis trivialis* species assessment and listing priority review, 2007). The Three Forks area is closed to public access by the Forest, and the Boneyard springs area has cattle fencing around it, and any vehicle access has been blocked by boulders; any recreational anglers would have to hike or 4x4 to the spring. Neither trampling nor habitat destruction from anglers is likely to occur since trout have are not likely to reach the springs because of the shallow, boggy nature of the stream, and have never been observed at

either Three Forks or Boneyard Springs, and as well, these areas are not suitable for angling (no open water areas conducive to angling), anglers are not expected to be present.

The concern related to the stocking program is the transmission of nonnative snails or mussels, particularly New Zealand mud snails (NZMS), via the water in stocking trucks that transport the fish from the hatchery. Nonnative snails can displace native species and with a species of extremely limited distribution, this could result in extirpation or extinction. However, this risk is extremely small. NZMS are not present at any hatcheries within Arizona, plus management plans to control or prevent snails or mussels from occupying hatcheries are in place. Many of the hatcheries use loaders that exclude organisms and water from the raceway, except for catchable size trout. Crescent Lake is stocked by the Canyon Creek, Tonto, and Sterling Springs state hatcheries. Big Lake is stocked by Canyon Creek, Page Springs and Sterling Springs hatcheries. The East Fork Black River is stocked almost exclusively by Silver Creek Hatchery. Canyon Creek Hatchery has a closed spring source that is piped the entire distance to the raceways. Tonto and Sterling Springs water sources are also piped into raceways. The fish loaders pick up fish and water from the water column of the raceway, not from the bottom, then sorts the larger catchable trout into the stocking truck while smaller fish, raceway water and any other organisms go back into the raceway. Water in the hatchery trucks are loaded directly from wells. Page Springs Hatchery has two water sources, one of which is secured (Pond Springs) and the other is partially secured (Cave Spring). It is unlikely that non target organism biota could become established due to the small area of exposed water before coming from the Cave Spring before it enters underground pipes. Moreover, the exposed portion of the Cave Spring is protected by a chain link fence, locked gate, and screened entrance. There are also metal screens that filter debris prior to entering the headbox and subsequent hatchery pipes. Introduction of non target organism biota via more natural means (transmission via mammals or birds) is unlikely due to fast moving water which largely precludes use of Cave Spring by mammals and birds. The Silver Creek Hatchery is scheduled to undergo a complete renovation in 2010, which will completely cover the spring, and pipe the springwater into an indoor facility. It is unlikely that NZMS would become established in these spring sources because of internal HACCP plans and hatchery procedural steps taken during day to day operation and maintenance, the remote locations of the springs, and also since the spring sources are not used by anglers that might transport NZMS on their wading gear.

The greatest threat to springsnails is crayfish. Carpenter and McIvor (1999) reported lower invertebrate diversity in sites at Three Forks that had higher densities of crayfish. Fernandez and Rosen (1996) reported significantly lower numbers and mass of invertebrates at sites with crayfish at Three Forks. The specific organisms that showed significant declines in the presence of crayfish during this study were caddisflies, snails, and a mussel (*Anadonta californiensis*).

Figure 32. Photo of Boneyard Bog Springs, taken in July 2003.

Figure 33. Photo of Boneyard Bog Springs.

Figure 34. Photo of Boneyard Bog Springs.

CANYON CREEK COMPLEX

Canyon Creek

Site Description

Canyon Creek is located approximately 25 km (16 mi) southwest of Heber and encompasses 822 km^2 (318 mi^2) of both Gila and Navajo Counties. The portion of Canyon Creek proposed for stocking is an 8 km (5 mi) reach from the spring source to the White Mountain Apache Reservation boundary (Figure 35). Canyon Creek flows over a substrate of primarily boulder, cobble, and bedrock, with enough gravel present to support the natural reproduction of brown trout. Riffle and run habitats dominate, but there are several pools up to 2 m (6 ft) deep. The creek is at the top of the watershed and lies entirely within the Tonto National Forest.

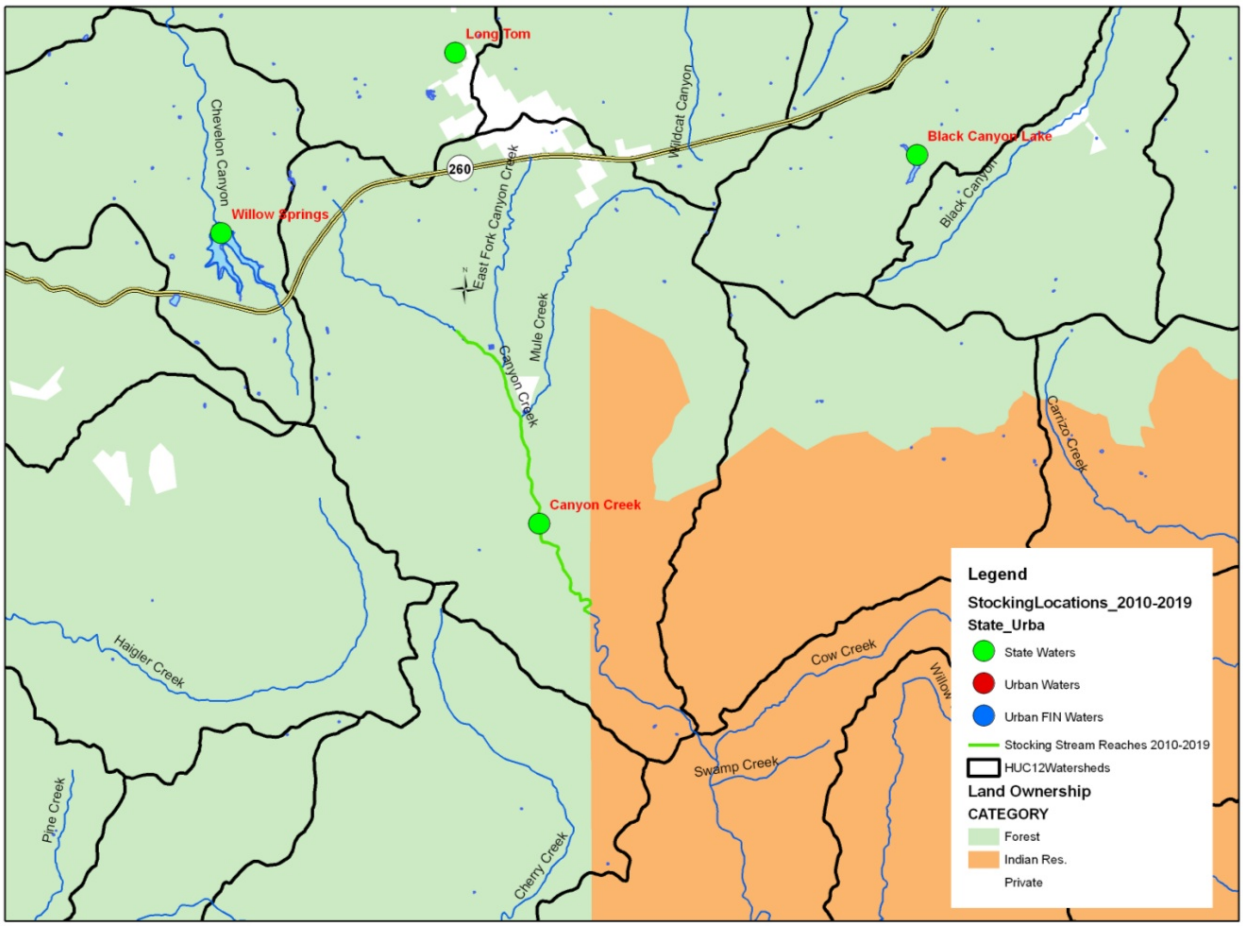

Figure 35. Overview map of the Canyon Creek stocking area.

Canyon Creek is managed by the Tonto National Forest for all types of recreation, including camping, picnicking, fishing, water activities, hunting, birding, and hiking. The upper portion of the creek is accessible from Forest Road 33 year round, except during extreme snow or rainfall. The lower portion of the proposed stocking reach is accessible by vehicle from Forest Road 188, which is closed seasonally from December 31 through March 31, at which time lower Canyon Creek can only be reached by hiking in to it. Canyon Creek Hatchery is located at the upper end of the stocking reach (Figure 36).

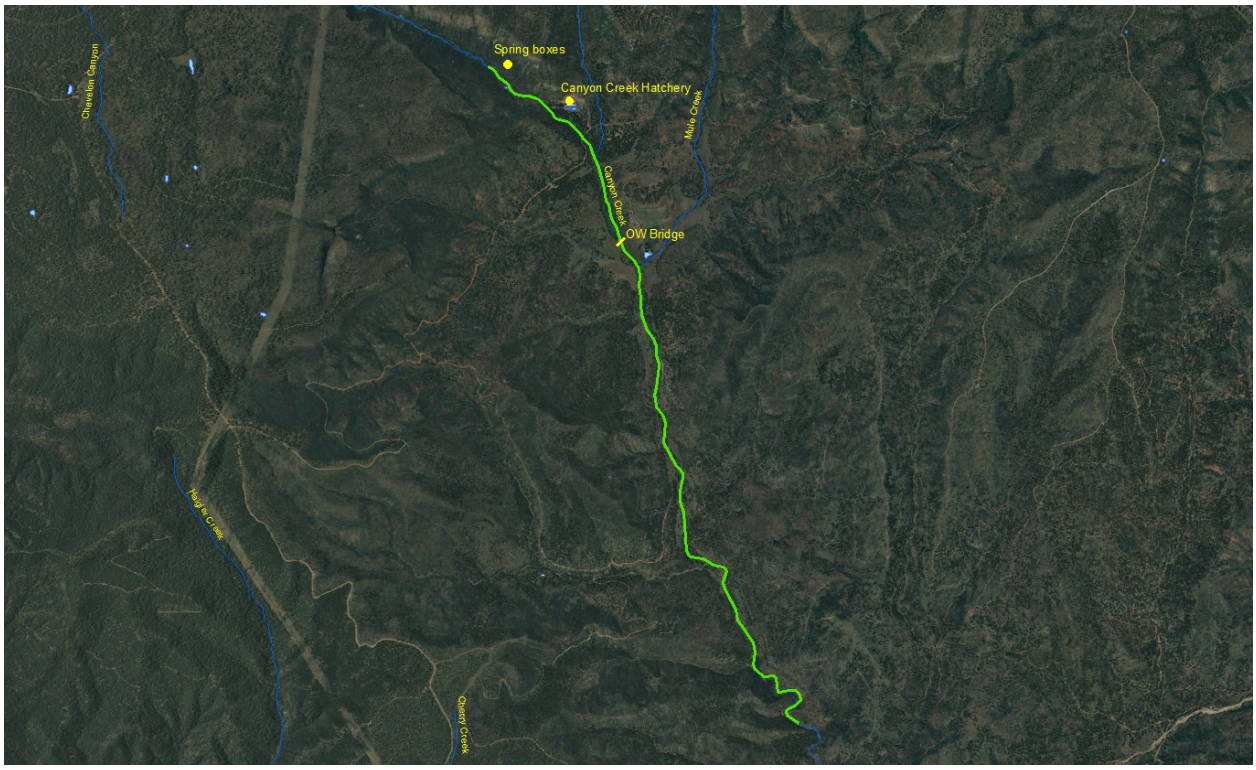

Figure 36. Location of Canyon Creek Hatchery and springs as well as the OW Bridge.

Management of Water Body

The proposed stocking site is broken into two distinct management sections. The section from spring source to OW Bridge is managed as a coldwater intensive use, put-and-take rainbow trout fishery throughout the spring, summer, and fall months. This section of Canyon Creek is stocked weekly from April through September with catchable rainbow trout.

The section of the creek downstream of the OW Bridge to the White Mountain Apache Reservation boundary is managed as a naturally reproducing coldwater rainbow trout and brown trout fishery. Supplemental stocking of this reach of stream has occurred over the years to augment or recover the fishery after events such as the Rodeo-Chediski fire in 2002 (Table 28). Brown trout and rainbow trout may be stocked in this portion of Canyon Creek to augment or recover the populations should a catastrophic event decimate fish populations, or as needed to maintain the fishery. This includes the stocking of sub-catchables and or fry/fingering in the late fall to allow for overwintering.

Mule Creek downstream of OW Bridge is the only tributary within the proposed stocking reach that supports fish. It is currently managed as a coldwater, intensive-use fishery for naturally reproducing rainbow and brown trout. Mule Creek has limited trout habitat; it is intermittent and generally flows less than 1 cfs for most the year. In 1982 it received a one-time stocking of 500 brown trout. Mule Creek is not proposed for future stockings due to its limited trout habitat.

Creel data collected by the Department's Region VI Fisheries Program in 2007 showed Canyon Creek had 3,166 angler use days, with anglers harvesting 4,247 trout. These data were not published nor reported in any technical or other report.

Table 28. Stocking History of Canyon Creek

Species	First Year	Last Year	Num. of years stocked	Num. Stocked
Brook trout	1935	1967	2	1,400
Brown trout	1948	2005	6	34,000
Colorado River pikeminnow	1986	1986	1	5,929
Native trout*	1935	1935	1	26,000
Rainbow trout	1933	2009	60	316,214
Razorback sucker	1987	1989	2	20,968
Total			571	401,043

Proposed Action

The proposed action is to stock rainbow trout and brown trout for the period covered by this consultation.

Catchable, sub-catchable, fry/fingerling rainbow trout would be stocked from April through September in Canyon Creek; numbers of trout stocked would be from 0 - 7,000 fish annually.

Sub-catchable brown trout may be stocked as needed at any time during the year to augment or to recover the fishery following catastrophic events such as a large flood event; numbers of brown trout would be from 0 – 800 fish annually.

Water Distribution / Connectivity

Canyon Creek originates at springs below the Mogollon Rim and is perennial for 59 km (37 mi) to its confluence with the Salt River. Riffle and run habitats dominate in Canyon Creek but there are several pools up to 2 m (6 ft) deep within the proposed stocking reach.

Mule Creek also originates from a spring below the Mogollon Rim and flows for just over 3km (2 mile) to its confluence with Canyon Creek. The confluence of these two streams is 400 m (1300 ft) downstream of the OW Bridge. Mule Creek has limited trout habitat, it is intermittent, and generally flows less than 1 cfs for most of the year. Other tributaries to Canyon Creek exist on the White Mountain Apache Reservation (Ellison, Oak, and Willow creeks); however, little information on their hydrology is available.

Fish Movement

There is a concrete road crossing roughly 500 m (1600 ft) downstream of the spring source; this road acts as a barrier to the upstream movement of fish. There are no other known barriers to upstream fish movement within the proposed stocking reach. Other barriers to upstream fish movement may exist on the White Mountain Apache Reservation, but no information is available. Rainbow trout are not currently stocked above this crossing. A naturally occurring population of brown trout exists from the spring source to the road crossing and during recent fish surveys only brown trout were collected upstream of the road crossing (C. Gill pers. comm.). This lack of rainbow trout found above the crossing suggests the crossing is a barrier to the upstream movement of stocked rainbow trout. There are no barriers to prevent fish stocked in this reach from moving into Mule Creek.

Connectivity suggests fish could be transported or emigrate downstream from the proposed stocking site to the Salt River. Salmonids could move freely downstream during cooler periods, however, year round survival near the confluence or in the Salt River would not be possible at the high summer temperatures. Survival, occurrence and movement of rainbow trout or brown trout in Canyon Creek on the reservation are not known.

Generally, the highest flows in Canyon Creek occur in the winter months from long duration, low-intensity storms. Smaller and infrequent flow events occur in summer from monsoon storms that result in short duration, high-intensity thunderstorms. Trout could be washed down or actively emigrate downstream in Canyon Creek, into the Salt River and then into Roosevelt Lake during high flood events or anytime during the cooler seasons. This is most likely to occur during the winter months but could also occur during the summer.

Catchable rainbow trout are stocked April through September in Canyon Creek and are at their highest densities in the stream during this time. Within the stocking reach rainbow and brown trout can overwinter and support a naturally reproducing population. Although rainbow trout could be washed downstream from summer floods during the stocking season, high summer temperatures seem to limit their movement and survival downstream to portions of Canyon Creek near the White Mountain Apache Reservation (J. Warnecke pers. com.). Therefore movement downstream on to the White Mountain Apache Reservation during summer months is unlikely. By the time the monsoon floods occur, the water temperature in Canyon Creek has been documented to exceed 29° C (84° F) near the White Mountain Apache Reservation boundary (Gill 2008b). Information needed to further evaluate likelihood of downstream movement and survival of stocked trout from the White Mountain Apache Indian reservation is proprietary information and unable to be included in this document.

Community Description

Canyon Creek maintains naturally occurring populations of native desert sucker and speckled dace. Non-native brown trout are also self-sustaining in the system and are found from the headwater to the reservation boundary. Rainbow trout are also found in Canyon Creek, although

their numbers dwindle at the reach just upstream of the reservation boundary due to warmer water temperatures and less optimal habitat, since the creek becomes shallower with more runs and riffles with fewer pools and substrate shifting to primarily bedrock.

Terrestrial gartersnakes are common along Canyon Creek above the Reservation boundary, as are canyon treefrogs and Arizona toads (Holycross et al. 2006). The complex lies within the historical range of the narrow-headed gartersnake and they may still occupy the system (see complex analysis). Crayfish are absent. The portion of Canyon Creek within the White Mountain Apache Reservation is relatively unknown to non-tribal personnel, but Rosen and Schwalbe (1988), reported narrow-headed gartersnakes, Sonoran mud turtles, canyon treefrogs, and "Colorado River chub" from Canyon Creek about 2.25 miles up from the Salt River in 1986.

The most recent survey conducted at Canyon Creek documented the presence of rainbow trout, brown trout, speckled dace, and desert sucker (Gill 2008a). Both rainbow trout and brown trout are common in the upper portion of the proposed stocking reach and become less common near the White Mountain Apache Reservation boundary. Brown trout successfully reproduce in Canyon Creek and maintain a viable population for recreational angling (Gill 2008a). Natural reproduction of rainbow trout has been noted in Canyon Creek (Gill 2006a, 2007). However, it should be noted that the reproduction of rainbow trout in 2006 was thought to be from a supplemental stocking in the lower portion of the creek in 2005 (Gill 2006a) and that the young of the year rainbow trout collected in 2007 were thought to be hatchery escapees, as all were collected in a short portion of stream at the hatchery outflow (Gill 2007a); however Canyon Creek hatchery raises both rainbow trout and cutthroat trout, and cutthroat trout have not been detected in any of the surveys of Canyon Creek. If fish were frequently escaping from the hatchery, cutthroat trout would likely also be found, but they have not. It is likely that rainbow trout could not maintain a viable population for recreational fishing, due to their low level of natural reproduction, angling pressure, and high summer temperatures without supplemental stocking.

Speckled dace and desert sucker are abundant from the OW Bridge to the White Mountain Apache Reservation boundary; from OW Bridge upstream their densities decline. Both speckled dace and desert sucker densities were more than double what they were prior to the Rodeo-Chediski Fire of 2002, but they have experienced a slight reduction in recent years (Gill 2008a). This may be attributed to predation by non-native brown and rainbow trout, or it may be natural cyclical variation within these populations.

Roundtail chubs have never been reported in the reach of Canyon Creek located on the Tonto National Forest. However, they were sampled from Canyon Creek in 1987 and 1988 on the Fort Apache Indian Reservation, more than 20 miles downstream from the Forest boundary (Voeltz 2002). Razorback suckers have not been found in Canyon Creek since they were stocked in 1989, and were only found for a short period immediately after stocking. The last Colorado

pikeminnow was collected in Canyon Creek in 1987, near the White Mountain Apache Reservation boundary (Warnecke et al. 1990), one year after they were stocked. Neither species is now expected to persist in any stream in the Salt River Watershed above Roosevelt Lake based on 11 surveys conducted from the spring source to the reservation boundary from 1990 to 2008. Information from the reservation is not available. Table 29 provides a summary of surveys and results in Canyon Creek.

A survey was conducted in Mule Creek in 2009 from two sites; one 200 m downstream of the spring at the headwaters, and one roughly half way between the spring and the confluence with Canyon Creek (Gill 2009b). Only brown trout and speckled dace were found. Brown trout were uncommon at both sites; speckled dace were uncommon near the spring and abundant in the middle section of Mule Creek. Rainbow trout, brown trout, and desert sucker have been documented within the creek previously. Table 30 provides a summary of surveys on Mule Creek.

Table 29. Summary of surveys conducted on Canyon Creek between 1965 and 2008.

Year	Collector	Location Description	Survey Type	Source	Species
1965	ASU	1 mi S of Reservation boundary		Son-Fish database	speckled dace
1967	ASU	18 mi NNW of Seneca		Son-Fish database	desert sucker Sonora sucker speckled dace roundtail chub
1987	RBSCSFMON	Confluence with Salt River & up0.5 mi	Backpack electrofishing	AGFD Native Fishes Database	desert sucker Sonora sucker roundtail chub smallmouth bass common carp
1988	RBSCSFMON	Crossing at Indian Rd #12, upstream	Backpack electrofishing	AGFD Native Fishes Database	desert sucker speckled dace roundtail chub
1988	RBSCSFMON	Crossing at Indian Rd #19, upstream	Backpack electrofishing	AGFD Native Fishes Database	brown trout rainbow trout speckled dace desert sucker
1988	RBSCSFMON	“The Pyramids”above road crossing at campground	Backpack electrofishing	AGFD Native Fishes Database	brown trout rainbow trout speckled dace desert sucker
1987 1988 1989	AGFD	From spring source to Reservation boundary	Backpack electrofishing	Fish Management Report (Warnecke et al. 1990)	brown trout rainbow trout speckled dace desert sucker

Year	Collector	Location Description	Survey Type	Source	Species
					Colorado pikeminnow
1990 1992 1993 1994	AGFD	From spring source to Reservation boundary	Backpack electrofishing	Fish Management Report (Warnecke et al. 1996)	brown trout rainbow trout speckled dace desert sucker
1998	AGFD	From spring source to Reservation boundary	Backpack electrofishing	Spot Check Survey (McMahon and Warnecke 1998)	brown trout rainbow trout speckled dace desert sucker
2003	AGFD	From spring source to Reservation boundary	Backpack electrofishing	Fisheries Survey (Warnecke and Weedman 2003)	brown trout rainbow trout speckled dace desert sucker
2004	AGFD	From spring source to Reservation boundary	Backpack electrofishing	Fisheries Survey (Warnecke and Wiggins 2004)	brown trout rainbow trout speckled dace desert sucker
2005	AGFD	From spring source to Reservation boundary	Backpack electrofishing	Fisheries Survey (Warnecke and Wiggins 2005)	brown trout rainbow trout speckled dace desert sucker
2006	AGFD	From spring source to Reservation boundary	Backpack electrofishing	Fisheries Survey (Gill 2006a)	brown trout rainbow trout speckled dace desert sucker
2007	AGFD	From spring source to Reservation boundary	Backpack electrofishing	Fisheries Survey (Gill 2007a)	brown trout rainbow trout speckled dace desert sucker
2008	AGFD	From spring source to Reservation boundary	Backpack electrofishing	Fisheries Survey (Gill 2008a)	brown trout rainbow trout speckled dace desert sucker

Table 30. Summary of surveys conducted on Mule Creek between 1967 and 2009.

Year	Collector	Location Description	Survey Type	Source	Species
1967	AGFD	~3/4 mi downstream of spring source	Backpack electrofishing	AGFD Native Fishes Database	brown trout rainbow trout
1968	AGFD	~1/4 mi upstream of spring source	Backpack electrofishing	AGFD Native Fishes Database	brown trout rainbow trout

1984	AGFD	Just downstream of spring source ~200yd	Backpack electrofishing	AGFD Native Fishes Database	brown trout rainbow trout
1984	AGFD	At old road crossing about ½ mi downstream of spring	Backpack electrofishing	AGFD Native Fishes Database	brown trout rainbow trout speckled dace desert sucker
1984	AGFD	Just upstream from Canyon Creek confluence ~400yd	Backpack electrofishing	AGFD Native Fishes Database	speckled dace desert sucker
2009	AGFD	Just downstream of spring source ~200yd	Backpack electrofishing	Fisheries Survey (Gill 2009b)	brown trout speckled dace
2009	AGFD	~ Halfway between spring and Canyon Creek confluence	Backpack electrofishing	Fisheries Survey (Gill 2009b)	brown trout speckled dace

Consultation Species or Critical Habitat
Potential impacts to bald eagle, Chiricahua and northern leopard frogs, northern Mexican and narrow-headed gartersnakes, roundtail chub and Mexican spotted owl are addressed below.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Chiricahua and Northern leopard frogs are analyzed at the local site and broad scale level due to the movement potential into the stocked area and fish movement potential up or downstream into areas where frogs may occur.

Narrow-headed gartersnakes are analyzed on a complex and downstream scale due to the movement potential into the stocked area and fish movement potential up or downstream into areas where the snakes may occur.

Bald Eagle
Non-breeding bald eagles can occur within the vicinity of the stocking site and may be present at any time of the year. The amount of human disturbance at this site may result in effects to roosting or foraging that may affect the eagles' use of the site. Non-breeding eagles normally

move between available sites so the reduction in use of a particular stocking site may not be significant.

Chiricahua Leopard Frog

Local Analysis: Although the Canyon Creek buffered stocking reach is within the historical range of the Chiricahua leopard frog, the likelihood that fish stocked in Canyon Creek would have an impact on Chiricahua leopard frogs is low. There are no historical records for Chiricahua leopard frogs within the buffered stocking reach (Figure 37, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 57 surveys at 34 sites within the buffered stocking complex between 1984 and 2007 and no Chiricahua leopard frogs were observed (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 12 sites between 2003 and 2007 and did not observe any Chiricahua leopard frogs (dated provided by Black Mesa Ranger District, Tonto National Forest). It is likely that Chiricahua leopard frogs do not occupy the Canyon Creek buffered stocking complex.

Broad Scale Analysis: The likelihood that dispersing sport fish would have an impact on Chiricahua leopard frogs downstream is low. The Chiricahua leopard frog Gentry Creek Management Area (GCMA), an actively managed Chiricahua leopard frog recovery area, is located to the west of Canyon Creek approximately 8.5 miles downstream from the stocking reach and 5 miles overland. There are numerous recent records for Chiricahua leopard frogs in the GCMA (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). The closest occupied Chiricahua leopard frog site in the GCMA is West Prong Gentry Creek, which is approximately 6.5 miles up the intermittent tributary of Gentry Creek. Another route that dispersing leopard frogs could access the stocked reach of Canyon Creek would be to travel approximately 7 miles up the intermittent Cherry Creek drainage (Arizona Game and Fish Riparian Herpetofauna Database, M.J. Sredl pers.comm.). It is not likely that stocked fish would travel that far up an intermittent tributary and it is not probable that Chiricahua leopard frogs would travel that far down an intermittent tributary.

Northern Leopard Frog

Local Analysis: Although Canyon Creek and the buffered stocking reach are within the historical range of the northern leopard frog, the likelihood that frogs will be exposed to fish stocked in Canyon Creek is low. There are 3 records for northern leopard frogs from 2 sites: Twin Lakes (1984, 1985) and Willow Springs Canyon (1996) (Figure 37, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 57 surveys at 34 sites within the buffered stocking reach between 1984 and 2007 (HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs were not observed at any site, including Twin Lakes (1999) or at Willow Springs Canyon (1997, 1998) (Figure 37, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 12 sites within the buffered stocking complex between

2003 and 2007 and did not observe any northern leopard frogs (Dated provided by Black Mesa Ranger District, Tonto National Forest). It is likely that northern leopard frogs no longer occupy Willow Springs Canyon; if they are the existing presence of sport fish in Willow Springs Lake and at the headwaters of Canyon Creek make it difficult for northern leopard frogs to disperse into Canyon Creek from Willow Creek Canyon.

Broad Scale Analysis: The likelihood that northern leopard frogs outside of the buffered stocking complex would be exposed to dispersing sport fish is low. Downstream of the Canyon Creek buffered stocking reach elevation drops below the minimum for the northern leopard frog in the Salt River watershed (approximately 4,800 ft) (Sredl 1997) and there are no historical records for northern leopard frogs in these drainages or in tributaries of Canyon Creek that fish could disperse into (AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). It is likely that northern leopard frogs do not occupy the drainages into which stocked fish are able to disperse to.

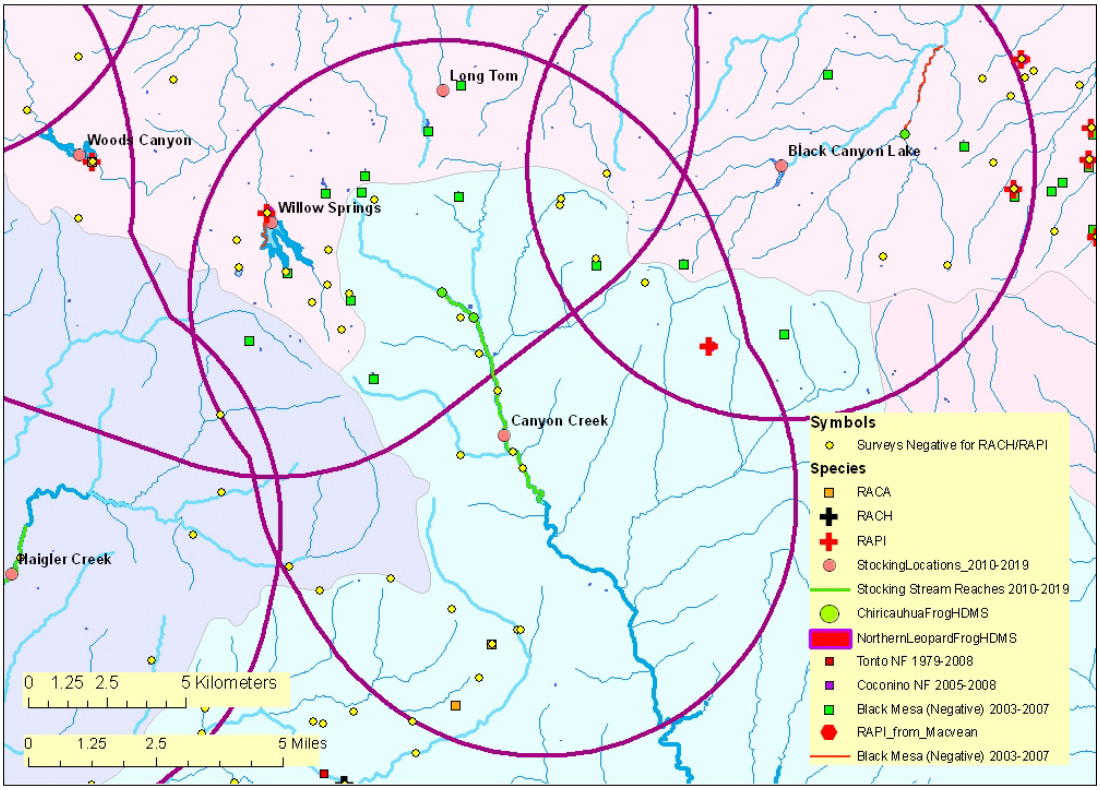

Figure 37. Map of Canyon Creek buffered stocking site:

The purple line illustrates the 5 mile buffer surrounding a stocking site, stocking reach, or a group of stocking sites. Blue lines symbolize streams and rivers (both perennial and intermittent). A black line represents a Chiricahua leopard frog Recovery Unit boundary. The background color represents the 8 digit Hydrologic Unit Code. Other data are described in the

legend. (Note: HDMS data appear as buffered points and may appear larger than site records for other surveys).

Narrow-headed Gartersnake

Stocking complex analysis: Canyon Creek lies within the historical range of narrow-headed gartersnakes; given the presence of suitable habitat, the species may still occupy the complex in low numbers. There are recent (1986, 1990) narrow-headed gartersnake records within the Canyon Creek stocking reach; however no narrow-headed gartersnakes were detected during species-specific surveys in 2004 and 2005 or subsequent surveys by the Department and other personnel (Holycross et al. 2006, B. Burger pers. comm.). Because narrow-headed gartersnakes may be present in the Canyon Creek stocking reach, gartersnakes could be exposed to stocked sport fish. Additionally, potential exists for future narrow-headed gartersnake recovery actions in this area because crayfish are absent (Holycross et al. 2006).

Downstream analysis: Although the data on narrow-headed gartersnakes are limited, this species may still occupy Canyon Creek and the surrounding tributaries within the White Mountain Apache Reservation (Rosen and Schwalbe 1988, HDMS, T. Jones pers. comm.). Stocked brown and rainbow trout could disperse downstream from the stocking reach in Canyon Creek, into the Salt River, as far as Roosevelt Lake; however, rainbow trout downstream of the stocking reach would likely die in the summer due to high water temperatures. The areas downstream of the sub-watershed have not been systematically surveyed for gartersnakes and there is a lack of available information on any gartersnake populations on the White Mountain Apache Reservation. If narrow-headed gartersnakes occupy areas downstream of the stocking complex, there is likelihood they could be exposed if stocked fish disperse downstream.

Roundtail Chub

Roundtail chub are not present in the stocking area. It is unknown if chub maintain a population in Canyon Creek on the Fort Apache Indian Reservation and in the Salt River near the confluence with Canyon Creek as results from surveys on the Fort Apache Indian Reservation are proprietary to the tribe and not available for consideration. The most recent records, in 1988, for roundtail chub are from the lower end of the creek near the confluence with the Salt River, but the current status of the population is unknown (Voeltz 2002). In the documentation for the recent July 7, 2009, 12-month finding designating the roundtail chub as a candidate, the status of the Canyon Creek population was determined to be unknown due to the lack of survey data. The population of roundtail chub in the Salt River near the confluence with Canyon Creek has been heavily impacted by the spread of channel catfish and flathead catfish (Voeltz 2002) and may be extirpated (Creef and Clarkson 1993, Jahrke and Clark 1999). The population of roundtail chub in the lower portion of Canyon Creek may also have been adversely impacted by this increase in predators. Three roundtail chub were collected in 2009 at the upper end of Gleason Flat in a connected backwater of the Salt River (Evans 2009a). These individuals possibly came from dispersal out of Canyon Creek or Ash Creek, which supports a re-established population of

roundtail chub. Canyon Creek confluence is about 2 miles upstream of Gleason Flat and Ash Creek is about 1 mile upstream. One rainbow trout was documented 1 mile upstream of the Canyon Creek confluence and one was also documented 2 miles downstream of the Canyon Creek confluence with the Salt River from early May 1986 survey (AGFD native fish database); however, it is unknown if these trout originated in Canyon Creek or elsewhere as rainbow trout are propagated in two Federal fish hatcheries and stocked within numerous lakes and tributaries on the White Mountain and San Carlos Apache Indian Reservations within the Salt River Drainage, which is upstream of Canyon Creek.

Potential impacts

Rainbow trout are competitors for food and space with roundtail chub, and may also prey on young chub (Propst et al. 1998). Brown trout are potential predators and competitors with roundtail chub. Canyon Creek is perennial throughout its length. Flow status is not known with certainty on the reservation. During spring floods or monsoon runoff, connectivity between the stocking sites and the lower part of the creek most likely exists. Both brown and rainbow trout can be displaced downstream during these events. During the winter or early spring, temperatures in the lower part of Canyon Creek may provide for survival of displaced trout until the water temperatures rise in the early summer. During that period, there is a potential for competition for space and food in pools where all three species live. Roundtail chub also breed during this time, so larval fish are at risk of predation.

Rainbow trout are stocked weekly from April through September. Typically the spring floods occur prior to the first stocking of rainbow trout. Warnecke et al. (1996) noted that stocked rainbow trout rarely overwinter in Canyon Creek due to fishing pressure and high summer water temperatures (J. Warnecke pers. comm.). By the time the monsoon floods occur the water temperature in Canyon Creek has been documented to exceed 29° C (84° F) near the White Mountain Apache Reservation boundary (Gill 2008b). The young of year rainbow trout collected in 2006 were likely a result of a supplemental stocking of rainbows into lower Canyon Creek in summer 2005 to provide angling opportunity within this reach. No young of year rainbows have been collected in these reaches since. The 45% young of year rainbow trout collected in 2007 were thought to all be hatchery escapees as they were all collected from the vicinity of the hatchery outflow as stated in the 2007 report. However, if fish were frequently escaping from the hatchery, cutthroat trout which are also produced at the hatchery would likely also be found, but they have not. This would not be an indication of natural reproduction. For these reasons, while possible in winter and spring, any exposure of roundtail chub to stocked rainbow trout in lower Canyon Creek would likely be of short duration. Brown trout do reproduce and overwinter in Canyon Creek. There is a higher likelihood of exposure to brown trout than rainbow trout because brown trout are more successful in reproducing and overwintering in Canyon Creek.

The last record of roundtail chub in Canyon Creek was found in September 1988, near the confluence with the Salt River. This survey documented non-native smallmouth bass and common carp, but no trout. Resident non-native species present year-round independent of the proposed stocking action, such as smallmouth bass, red shiner or common carp are thought to be having significant effects on roundtail chub through direct predation on eggs, larvae or young of year or competition for food and space in lower Canyon Creek. While potential exists for additional predation or competition pressures from seasonally present stocked trout, it would not be anticipated stocked trout would persist through the warmer months and numbers would be extremely low.

Mexican Spotted Owl and Critical Habitat

The stocking stream reach is within Mexican spotted owl (MSO) critical habitat (CH), occurs within 4 buffers, and is also in three individual PACs. There appears to be the opportunity for angler access based on topographic and world imagery maps.

Potential Impacts

The stocking site, extended area for fish movements from the stocking site, and/or the area of potential angler access are within boundary of at least one MSO PACs in the general vicinity of the site. There may be some disturbance of MSOs at the nest site, roosting or foraging areas within the PAC during the breeding season.

Indirect effects may include actions that can affect forest structure and maintenance of adequate prey species identified as PCEs or KHCs. These actions may include trampling of vegetation, soil compaction, removal of woody debris or other physical degradation potentially altering the productivity and succession/regeneration of the vegetation. In the designation of critical habitat (USFWS 2004) most recreational activities, including angling, were not identified as requiring restrictions to protect the PCE's of critical habitat from destruction or adverse modification. In making that statement, recreational activities, including angling were assumed to not contribute to significant habitat-affecting activities such as cutting large trees or snags, removal of large woody debris from the forest floor, altering the tree species diversity, or other large-scale changes to habitat structure. The act of a relatively small number of people walking through habitat is not likely to cause the kind of effects that would result in adverse effects to the PCEs/KHCs of MSO CH and/or restricted and protected habitats.

The CH designation included most other protected and restricted habitats for the MSO. Indirect effects to CH may include actions that can affect forest structure and maintenance of adequate prey species identified as PCEs. These actions may include trampling of vegetation, soil compaction, removal of small woody debris or other physical degradation potentially altering the productivity and succession/regeneration of the vegetation. In the designation of critical habitat (USFWS 2004) most recreational activities, including angling, were not identified as requiring

restrictions to protect the PCE's of critical habitat from destruction or adverse modification. In making that statement, recreational activities, including angling were assumed to not contribute to significant habitat-affecting activities such as cutting large trees or snags, removal of large woody debris from the forest floor, altering the tree species diversity, or other large-scale changes to habitat structure. The act of a relatively small number of people walking through habitat is not likely to cause the kind of effects that would result in adverse effects to the PCEs/KHCs of MSO CH and/or restricted and protected habitats.

WORKMAN CREEK COMPLEX

Workman Creek

Site Description

Workman Creek is a tributary of Salome Creek which flows directly into Roosevelt Lake (Figure 38). The Workman Creek stocking location is a 3 mile stream reach located upstream of Hwy 288 and ending at Workman Falls, a 200ft waterfall. Workman Creek is located in Gila County on the Tonto National Forest, 45 miles north of Globe; 15 miles on AZ 88, 26 miles on AZ 288, and 3 miles on Forest Route 487. There are three primitive campgrounds along Workman Creek and a hiking trail paralleling the creek that is used by all recreationists, including anglers. Only the campground at the falls is open to overnight camping. The other two are day use only. There is also a large group campground and individual campsites located approximately a half mile from Workman Creek at Reynolds Creek. This area is highly used by campers, hikers, and ATV users as well. All four of these campground sites are open seasonally from May 15 through October 15.

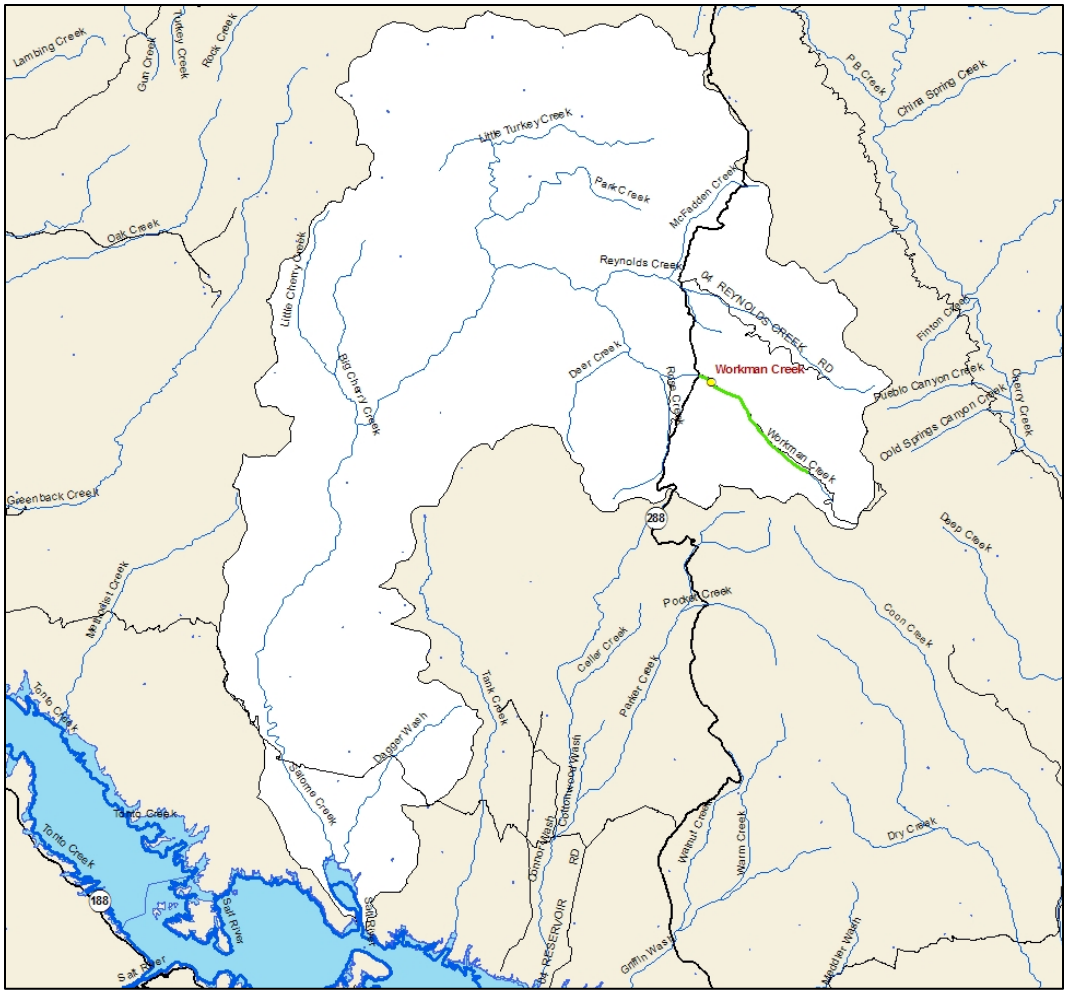

Figure 38. Map of Workman Creek stocking reach located in the Salome Creek drainage which flows into Roosevelt Lake.

Workman and Salome creeks are managed by the Tonto National Forest for all types of recreation, including camping, picnicking, fishing, water activities, hunting, birding, and hiking. The creek is accessible by road year round, except during extreme snow or rainfall. Land ownership along Workman Creek is almost entirely Tonto National Forest with the exception of private land inholdings at the Armer Ranch and the Dreamcatcher Ranch, located just west of Highway 288. Salome Creek is comprised of Tonto National Forest and 1% private lands.

Angling primarily occurs between Highway 288 and upstream to Workman Creek Falls during April through August (Figure 39). The creek is accessible by road east of Highway 288. West of Highway 288 it is accessed by a private road that is locked to the public. Lower Workman Creek is also accessible by the #288 hiking trail that joins Workman Creek below Armer Ranch, and again at Hells Hole, which is approximately one mile east of the Salome and Workman Creek confluence. Lower Workman Creek and Salome Creeks are extremely rugged and difficult to

access. Salome Creek is accessed at the lower end by the #61 Trail. This trail is used primarily by recreationists and not anglers.

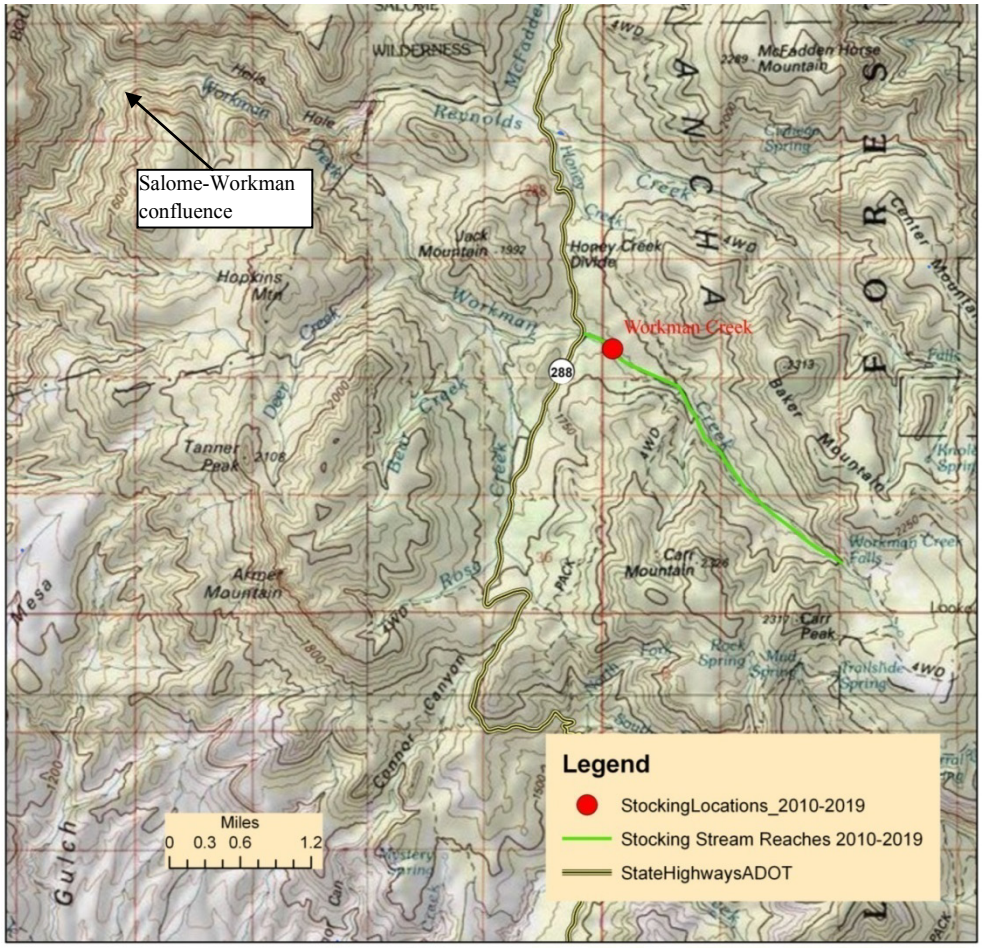

Figure 39. Map of Workman Creek, Hwy. 288 and Salome Creek area.

Management of Water Body

Workman Creek is managed as cold water intensive use, put-and-take rainbow trout fishery in the spring and summer months. It is typically stocked in April and May with approximately 400 trout stocked monthly (Table 31). Salome Creek and Reynolds Creek were stocked historically, but are not proposed for future stocking actions. Based on a 2001 survey of anglers conducted by the Department, Workman Creek provides 808 angler user days (an average of 2.2 anglers per day) for trout, which are supported primarily through the proposed stocking action, because reproduction is not sufficient to maintain a fishable population (Pringle 2004).

Table 31. Stocking history for Workman, Salome and Reynolds creeks.

Creek	Species	First Year	Last Year	Num Years Stocked	Num. Stocked
Workman Creek	Brook trout	1946	1947	2	1,575

	Brown trout	1974	1982	2	6,500
	Native trout*	1938	1938	1	9,000
	Rainbow trout	1939	2009	90	65,512
	Total				82,587
Salome Creek	Brown trout	1973	1974	2	6700
Reynolds Creek	Rainbow trout	1941	1946	5	14,101

Proposed Action

The proposed action is to stock rainbow trout (catchable and sub-catchable) in the spring and summer each year; numbers of trout may be from 0 to 1500 fish annually for the period covered under this consultation.

Water Distribution/Connectivity

Workman Creek begins at a spring east of Hwy 288 at 7000 feet in elevation and flows northwest approximately nine miles to the confluence of Salome Creek at 4000 feet elevation. Rose Creek and Deer Creek enter Workman Creek from the south downstream of Highway 288. Reynolds Creek flows into Workman Creek from the north, downstream of Rose and Deer Creeks and before Workman Creek joins Salome Creek. The water distribution and connectivity is unknown in Deer Creek and Rose Creek.

Reynolds Creek begins at 6800 feet elevation and is intermittent from its headwater downstream 5.2 miles to Hwy. 288. This stretch has abundant small pools and some larger pools. There is a 150 ft waterfall 4.7 miles upstream of Hwy. 288 in Reynolds Creek. Downstream of Hwy. 288, Reynolds Creek becomes perennial, resulting from several springs that appear as seeps. At 2.7 miles below the Young Road, the Reynolds Creek forms a bedrock canyon that flows into Hells Hole and into Workman Creek at 4700 feet in elevation. There are several waterfall/plunge pools that are fish barriers in this area of Reynolds Creek that preclude stocked trout in Workman Creek from accessing upper Reynolds Creek.

Salome Creek flows 14 miles to Roosevelt Lake from the Workman Creek confluence. Salome Creek begins at the confluence of JR Canyon and Little Turkey Creek at an elevation of 4200 feet, to Roosevelt Lake at an elevation of 2500 feet. Little Turkey Creek and Park Creek are tributaries to Salome Creek above the Workman Creek confluence. Big Cherry Creek and Little Cherry Creek are tributaries to Salome Creek below the Workman Creek confluence. It is unknown if these tributaries are perennial or intermittent, but these streams would flow into Salome Creek in a flood event.

Workman Creek is mostly perennial with intermittent and ephemeral reaches. The stream is generally well shaded by Douglas fir, ponderosa pine, oaks, large sycamores, alders, and willows

(Figure 2). Upstream from the stocking reach, above Workman Falls, the stream is ephemeral/intermittent. The stocking reach is perennial year round. Workman Creek below the stocked reach (downstream of Hwy 288) is ephemeral/intermittent and canyon bound; some stretches are waterless during dry years and in the summer months but may maintain some perennial pools during these years. The stream changes from a relatively flat forested riparian habitat with primarily boulder and cobble stream substrate above Hwy 288 to a bedrock canyon with a higher flow gradient with several deep, greater than 3 meter, pools. Patches of gravel that rainbow trout could use for spawning have been observed in Workman Creek but are sparse.

Salome Creek flows through a steep desert rocky canyon containing pools up to 30 feet deep, with swiftly flowing, shallow rocky areas. The surface flow in the lower reaches of Salome Creek is intermittent or entirely dry in the spring and summer. Salome Creek is frequently dry beginning at least 1 mile upstream of where the A-Cross Road intersects the creek, downstream to its confluence with Roosevelt Lake. Surveyors found very little water in Salome and Little Turkey Creek above their confluence in August 1994 (AGFD Salome Spot Check Report, August 1994).

Figure 2. Photo of Workman Creek.

Fish Movement

There are a number of falls on Workman Creek upstream and downstream of the stocked reach. These falls are barriers to upstream movement of fish out of the stocked reach, and barriers to fish movement into the stocked reach from downstream. One waterfall greater than 16 feet is located just upstream from the Salome confluence. Stocked rainbow trout and other existing fish can move downstream from the stocked reach of Workman Creek into Salome Creek, although in dry years and during the warmer months, the movements are restricted due to intermittent reaches below the stocking reach; however fish may persist in perennial pools that may be present. Downstream of the confluence of Workman Creek and Salome Creek, there is a large waterfall approximately 3 miles north of Salome's confluence with Roosevelt Lake (The Jug area) that restricts upstream movement of fish found between Roosevelt Lake and 'the Jug' approximately 3 miles north of Roosevelt Lake.

The highest surface water flows occur primarily in the winter months from long duration, low intensity storms, and secondarily from more infrequent flood events in summer-storm events from short-duration, high intensity thunderstorms (Figure 40). There is no stream discharge gauge for Workmen Creek, but USDA Surface-Water data from nearby Cherry Creek shows flood events are highest in January through March, and then surface flows are the lowest May through July, lessening the possibility of trout movement upstream and downstream of the stocked reach of Workman Creek (Figure 40). Trout could be pushed or actively migrate downstream from Workman Creek, into Salome Creek, and then into Roosevelt Lake by flood events. Rainbow trout are stocked in April and May when surface water is at or near base flow and peak flood events are the most infrequent. Overwintering trout may be available to move downstream during winter/spring flow events as well.

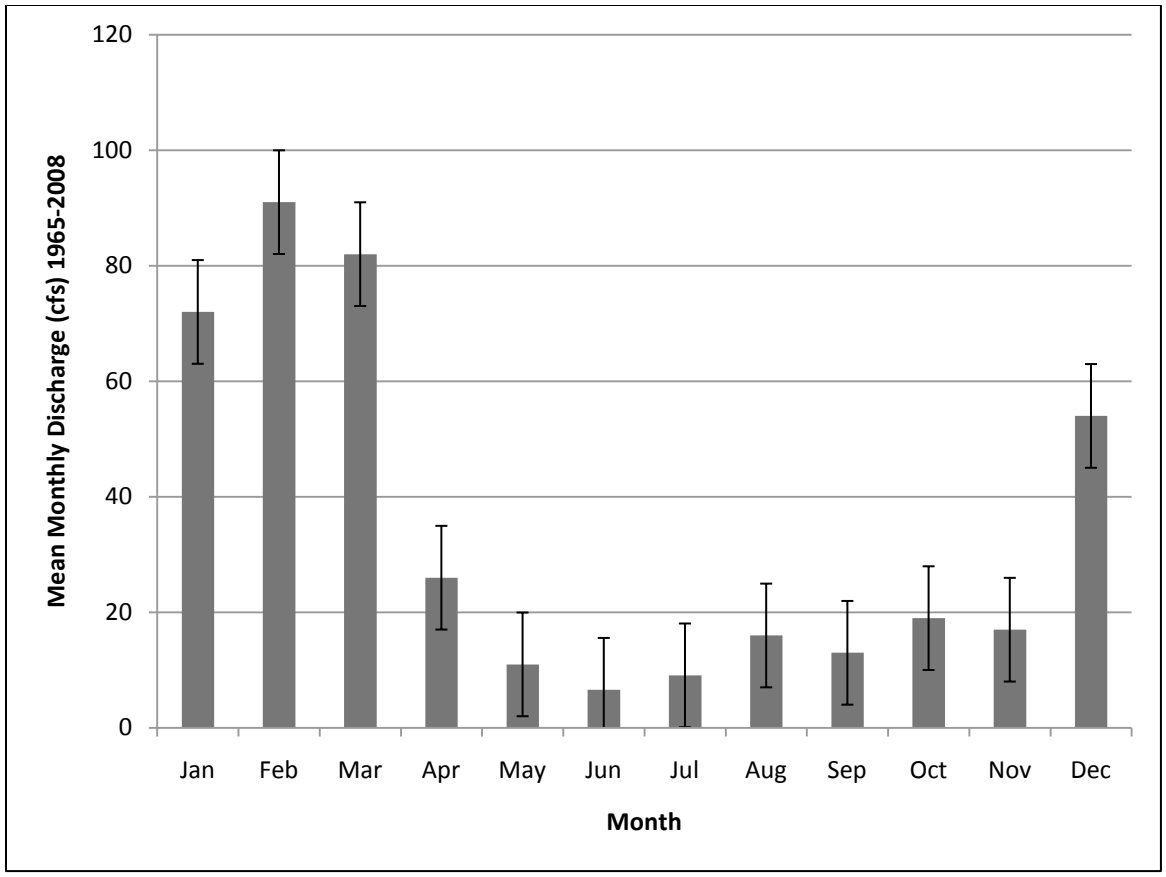

Figure 40. USGS Stream gage 00060 at Cherry Creek near Globe; mean (1 SE) monthly discharge (cfs) for 44 years of record (1965-06-01 to 2008-09-30).

Community Description

Fish surveys of various reaches in the Salome sub-watershed have reported rainbow trout, brown trout, brook trout, longfin dace, yellow bullhead, fathead minnows, green sunfish, roundtail chub, speckled dace, red shiners, and suckers of an unknown species (Table 32). The headwaters of Salome were surveyed in 1973 and only brown trout were reported. Fingerling brown trout were reported, indicating a self-sustaining population. The upper portion of Workman Creek above Highway 288 contains rainbow trout. Brook trout were found there in 1967 but have not been found since. From Highway 288 downstream to the confluence of Salome, rainbow trout, speckled dace, and longfin dace have been collected. In 2006, a visual survey was conducted from the Hells Hole Trailhead to the confluence of Salome Creek. Rainbow trout young were detected, indicating the occurrence of natural reproduction in the lower end of Workman Creek (Gill 2006b). Roundtail chub have never been reported in Workman Creek.

The most recent visual encounter/dip-net survey in 2006, covering Workman Creek from Highway 288 to Salome Creek found Longfin dace and Rainbow trout in Workman above its confluence with Salome Creek (Gill 2006d). Canyon treefrogs were also common; a black-

necked garter snake was caught. No crayfish were seen in either Workman or Salome in 2006 (Gill 2006d).

Surveys in 1994 of Reynolds Creek near Hwy 288 crossing found rainbow trout (11 fish ranging from 85-197 mm) and longfin dace (n = 15)(AGFD 1994). Speckled dace were found in a survey at the Ranger Station in 1967 (McDonald and Todd 1967). No roundtail chub have been reported in Reynolds Creek. Rainbow trout have not been stocked in Reynolds Creek since 1947, so the rainbow trout are self sustaining because pool/fall complexes preclude upstream movement of rainbow trout. No surveys have been conducted in Rose Creek and Deer Creek, which are tributaries to Workman Creek, and fish and other aquatic species assemblages are unknown.

Upstream of the Workman Creek confluence in Salome Creek, only green sunfish were collected in 1994 and 2000 surveys (Voeltz 2002). In 2007, downstream of the confluence of Workman Creek and Salome Creek, Burger found green sunfish to be the dominate species, along with "several" rainbow trout (Gill 2006d). In this stretch, roundtail chub, yellow bullhead, green sunfish, and rainbow trout were collected in 2000 (Voeltz 2002). Roundtail chub were only found in the lower reach (Voeltz 2002) at an area below a 32 foot waterfall just above "the Jug". At approximately 3 miles north of the Roosevelt Lake confluence, downstream from "the Jug" to the A-Cross road crossing, rainbow trout, roundtail chub, desert sucker, green sunfish, red shiners, and fathead minnows were reported in 1988 (ASU 1988) and 1997 (Voeltz 2002). The 1997 collection of rainbow trout occurred June 30, thus rainbow trout are assumed to persist year-round in this area.

Surveys of Little Turkey Creek (a tributary to Salome Creek) in 1994 found only green sunfish. Anglers consistently report catching brown trout in Little Turkey Creek (N. Robb and C. Gill pers. comm.)

No recent fisheries survey data exists for Little Turkey Creek and Park Creek, which are tributaries to Salome Creek above the Workman Creek confluence, and Big Cherry Creek and Little Cherry Creek, which are tributaries to Salome Creek below the Workman Creek confluence.

Table 32. Summary of fish surveys in Salome Watershed.

Date	Collector*	Location	Survey Type	Source	Species
May 24, 1967	AGFD McDonald, Todd	Workman Crk, from Hwy 288 upstream 2.1 miles	Electro shocking	Data Sheets	brook trout rainbow trout
				Num. and Size of Rainbow Trout (if Known)	9 (80-119mm) 7 (120-160 mm)
Sep 6, 1994	AGFD Carrothers, 640, 695	Workman Crk – at Confluence of Reynolds Crk	Electro shocking	Data Sheets	rainbow trout

Date	Collector*	Location	Survey Type	Source	Species
			Num. and Size of Rainbow Trout (if Known)		4 (60-99 mm) 6 (100-159 mm) 13 (160-239 mm)
1980	ASU	Workman Crk-Hwy 288 to above falls	Unknown	Kansas Gap	rainbow trout
			Num. and Size of Rainbow Trout (if Known)		1 rainbow trout
June 13, 1986	AGFD 604	Workman Crk-at YMCA Camp	Electro shocking	NFDB	rainbow trout brown trout
			Num. and Size of Rainbow Trout (if Known)		9 (00-59 mm) 13 (120-139 mm) 15 (220-259 mm)
Nov 6, 2006	AGFD Gill	Workman Crk, Trail 284 to confluence of Salome Creek	Visual	Trip Report	Longfin Dace rainbow trout
			Num. and Size of Rainbow Trout (if Known)		Stocked size Smaller than stocked size
May 29-30, 2007	AGFD Burger	Workman Crk, Hwy 288 to Salome Confluence	Visual Dipnet	Trip Report	Longfin Dace rainbow trout
			Num. and Size of Rainbow Trout (if Known)		“Several “ rainbow trout Size unknown
May 14, 1973	AGFD	Salome Creek, Headwaters	Electro shocking	AGFD Memo	Brown trout
			Num. and Size of Rainbow Trout (if Known)		15 adult, 2 fingerling brown trout
1988	SonFish-ASU	Salome Creek between A-Cross Road upstream to “the Jug”	Unknown	Kansas Gap	Yellow Bullhead Longfin Dace Green Sunfish Fathead Minnow Red Shiner
June 30, 1979	AGFD Cooper	Salome Crk, below falls, 3 miles N of Roosevelt Lake	Unknown	Trip Report	Roundtail Chub Sonoran Sucker Longfin dace Rainbow trout
			Num. and Size of Rainbow Trout (if Known)		1 (3 inches) 3 (8 to 9 inches) 1 (15 inches)
Aug 22-24, 1994	AGFD 694,695	Salome Crk upstream from Reynolds Creek to above confluence with Little Turkey Creek	Electro shocking	Spot Check Survey	Green Sunfish Brown trout Specked Dace
June 30, 1997	AGFD Duncan,	Salome Creek at “The Jug”	Angling Visual	Trip Report	Green sunfish Roundtail chub

Date	Collector*	Location	Survey Type	Source	Species
	Carlson				Rainbow trout Unidentified sucker
				Num. and Size of Rainbow Trout (if Known)	Approx 24 rainbow trout Size unknown
June 7-8, 2000	AGFD Timmons	Salome Creek, at Tinajas west of Dutchwoman Butte above "the Jug"	Gillnets, seines, angling	Timmons 2000	Yellow bullhead Green Sunfish Roundtail Chub
Aug 22-24, 1994	AGFD 694,695	Little Turkey Creek upstream from confluence of Salome Creek	Electro shocking	Spot Check Survey	Green Sunfish
May 29-30, 2007	AGFD Burger	Salome Crk, from Workman confluence downstream to just above "the Jug"	Visual Dipnet	Trip Report	Green Sunfish rainbow trout
				Num. and Size of Rainbow Trout (if Known)	1 Rainbow Trout, size unknown
May 26, 1967	AGFD McDonald, Todd	Reynolds Creek at Ranger Station	Electro shocking	NFDB	Speckled Dace
Sep 7, 1994	AGFD 694,697, AC	Reynolds Creek below Group Site	Electro shocking	Trip Report	longfin dace rainbow trout
				Num. and Size of Rainbow Trout (if Known)	5 (80-99)mm) 1 (160-179 mm) 5 (180-199 mm)
Sep 6, 1994	AGFD 640,694, 695	Reynolds/Workman Confluence	Electro shocking	Trip Report	Longfin Dace Rainbow Trout
				Num. and Size of Rainbow Trout (if Known)	5 (80-99 mm) 1 (160-179 mm) 5 (180-199 mm)

**three digit numbers in the collector column are AGFD numbers assigned to employees by position*

Consultation Species or Critical Habitat

Potential impacts to the Mexican spotted owl and critical habitat, and roundtail chub are discussed below.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.). Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed

action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Mexican Spotted Owl and Critical Habitat

The stocking stream reach is within Mexican Spotted Owl (MSO) critical habitat (CH), occurs within a buffer, and also occurs within a PAC. There appears to be the opportunity for angler access on the upstream part of the stocking reach with access becoming limited further downstream.

Potential Impacts

The stocking site, extended area for fish movements from the stocking site, and/or the area of potential angler access are within boundary of at least one MSO PACs in the general vicinity of the site. There may be some disturbance of MSOs at the nest site, roosting or foraging areas within the PAC during the breeding season.

Indirect effects may include actions that can affect forest structure and maintenance of adequate prey species identified as PCEs or KHCs. These actions may include trampling of vegetation, soil compaction, removal of woody debris or other physical degradation potentially altering the productivity and succession/regeneration of the vegetation. In the designation of critical habitat (USFWS 2004) most recreational activities, including angling, were not identified as requiring restrictions to protect the PCE's of critical habitat from destruction or adverse modification. In making that statement, recreational activities, including angling were assumed to not contribute to significant habitat-affecting activities such as cutting large trees or snags, removal of large woody debris from the forest floor, altering the tree species diversity, or other large-scale changes to habitat structure. The act of a relatively small number of people walking through habitat is not likely to cause the kind of effects that would result in adverse effects to the PCEs/KHCs of MSO CH and/or restricted and protected habitats.

Roundtail Chub

Roundtail chub are found in Salome Creek; however, the extent of the creek occupied by the species is unknown, because much of the creek is in steep canyons that limit access for surveys. Surveys in the lower reach near Roosevelt Lake in June 1979 found roundtail chub, rainbow trout, and suckers below a set of waterfalls (Cooper 1979). Above these waterfalls, green sunfish dominate the fish population along the entire stretch upstream to the confluence of Workman and Salome Creek. Roundtail chub have also been documented in the reach known as "The Jug" that extends from about 4 miles to 7 miles above A-Cross Road. (Duncan 1997; Timmons 2000). The Salome Creek roundtail chub population is designated as unstable-threatened (Voeltz 2002).

Reynolds Creek currently contains rainbow trout, upper Salome has brown trout, and the entire stretch of Workman Creek and Salome Creek contain rainbow trout (the latter apparently year-round). Workman Creek has been stocked with rainbow trout since 1939. Brook trout have not been stocked since 1947 but were sampled in a survey in 1974, suggesting that they were self reproducing in the system for over twenty years. Brown trout were stocked historically in both Workman Creek and Salome Creek. Brown trout were found in the headwaters of Salome in 1979 and 1994, although they have not been stocked in Salome since 1974.

Surveys have found not only the stocked size trout (either stocked or recruited) but also young of the year (YOY) rainbow trout in Workman Creek, Reynolds Creek, and Salome Creek (Table 32). The presence of trout smaller than the size that is consistently stocked is indicative of natural reproduction and a self-sustaining population of rainbow trout. Surveys in 1967 found two YOY rainbow trout; 1994 found 3 YOYs rainbow trout; there were 9 YOY rainbow trout in 1986; and in 2006 one YOY was observed. In 1994, 10 YOY rainbow trout were also been observed in Reynolds Creek. In 1979, a fingerling brown trout was also found in the upper reach of Salome.

The rainbow trout stocked in Workman Creek can move down the creek five and a half miles toward Salome Creek during flood events and winter months. The stream is intermittent with perennial pools during the summer so movement is less likely since summer flood events are less likely than winter storm events. A total of 800 rainbow trout are stocked in April and May, the beginning of the dry season, which limits trout movement in normal years until higher flows typically occur in December, January, February, and March. Angler catch and harvest rates are not known for Workman Creek; however, the creek does support approximately 800 angler use days per year (Pringle 2004). Rainbow trout are reported from lower Salome Creek (Duncan 1997) in habitat shared (presumably year round) with roundtail chub. It is not known how many of the stocked rainbow trout are moving into Salome Creek and how many trout in this area are wild trout that have recruited from the naturally reproducing population in the stream. The rainbow trout at “The Jug” were upstream of waterfall barriers and they may have come from Workman Creek as it is the only site in the Salome Creek drainage currently stocked with rainbow trout. The large number of angler use days and observed catch rates suggest that most of the stocked fish are harvested soon after being stocked. It is more likely that the trout in Salome Creek have long been established and are self sustaining.

Surveys of Salome Creek suggest the fish community is primarily dominated by green sunfish and yellow bullheads to a lesser extent. Given the community composition, these other nonnative fish species as well as brown trout (if present in this reach) likely contribute a larger piece to the overall impacts to roundtail chub via predation and competition than stocked trout. However, this analysis considers the incremental impacts by stocked species.

Potential Impacts

Roundtail chub are not present in Workman Creek based on surveys; however, exposure of roundtail chub to stocked trout could occur downstream in lower Salome Creek where stocked fish would join the self-sustaining populations of other fish. Roundtail chubs would not be able to access the stocked reach of Workman Creek due to the presence of barriers that restrict upstream movement. It is possible that stocked trout could be supplementing the self-sustaining populations, although the extent to which this may be occurring and the magnitude of any associated potential impacts is unknown since the impacts cannot be separated between them. Small trout size classes can compete with small roundtail chub size classes for habitat and food, but small trout can also serve as a prey source for larger roundtail. Adult stocked trout may compete with adult roundtail chub for habitat and food, and may also prey on small size classes of chub if present post chub spawning.

TONTO CREEK COMPLEX

Physical Geographic Description

Tonto Creek forms the longest continuous perennial stream within the Salt River watershed and flows southward for more than 55 miles from the Mogollon Rim to the Salt River at Roosevelt Lake (Figure 41 and Figure 42). The Tonto Creek watershed drains an area of 1042 square miles. The watershed elevation ranges from about 6500 ft at the headwaters to 2130 ft at the confluence with Roosevelt Lake.

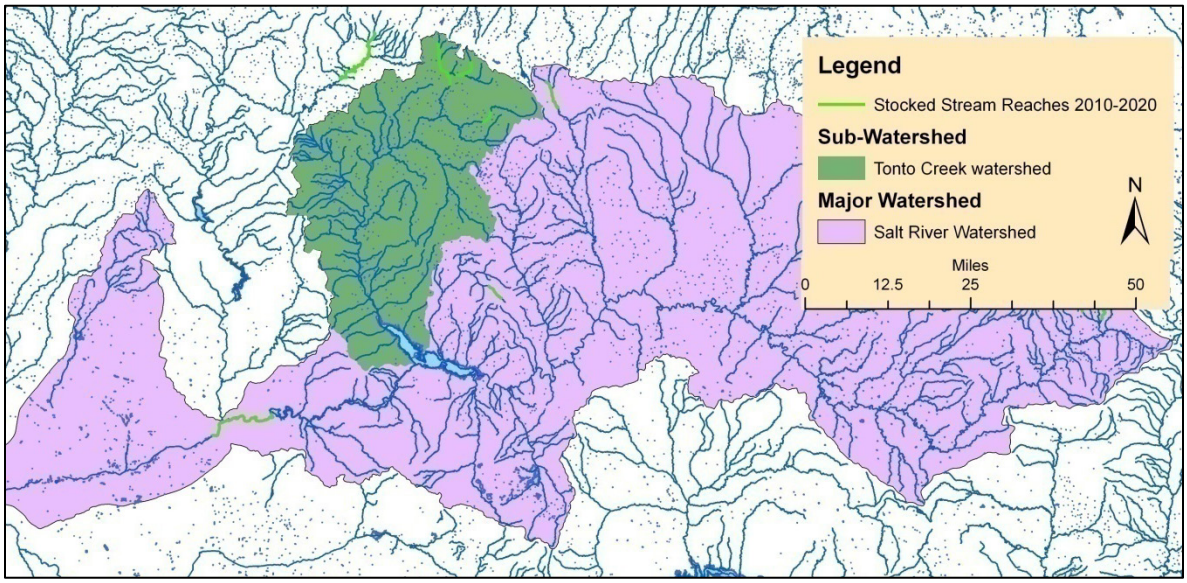

Figure 41. Overview map of the Tonto Creek drainage located within the Salt River watershed.

The Tonto Creek complex contains three proposed stocking locations: Tonto, Christopher, and Haigler Creeks (Figure 42). Christopher Creek is a tributary to Tonto Creek about 1.8 miles downstream of Hwy 260. Haigler Creek enters Tonto Creek another 9 miles downstream of Christopher Creek. The Christopher Creek confluence is within the proposed stocking reach on

Tonto Creek while the Haigler Creek confluence is 10 km (6 mi) downstream of the lowest most stocking site on Tonto Creek.

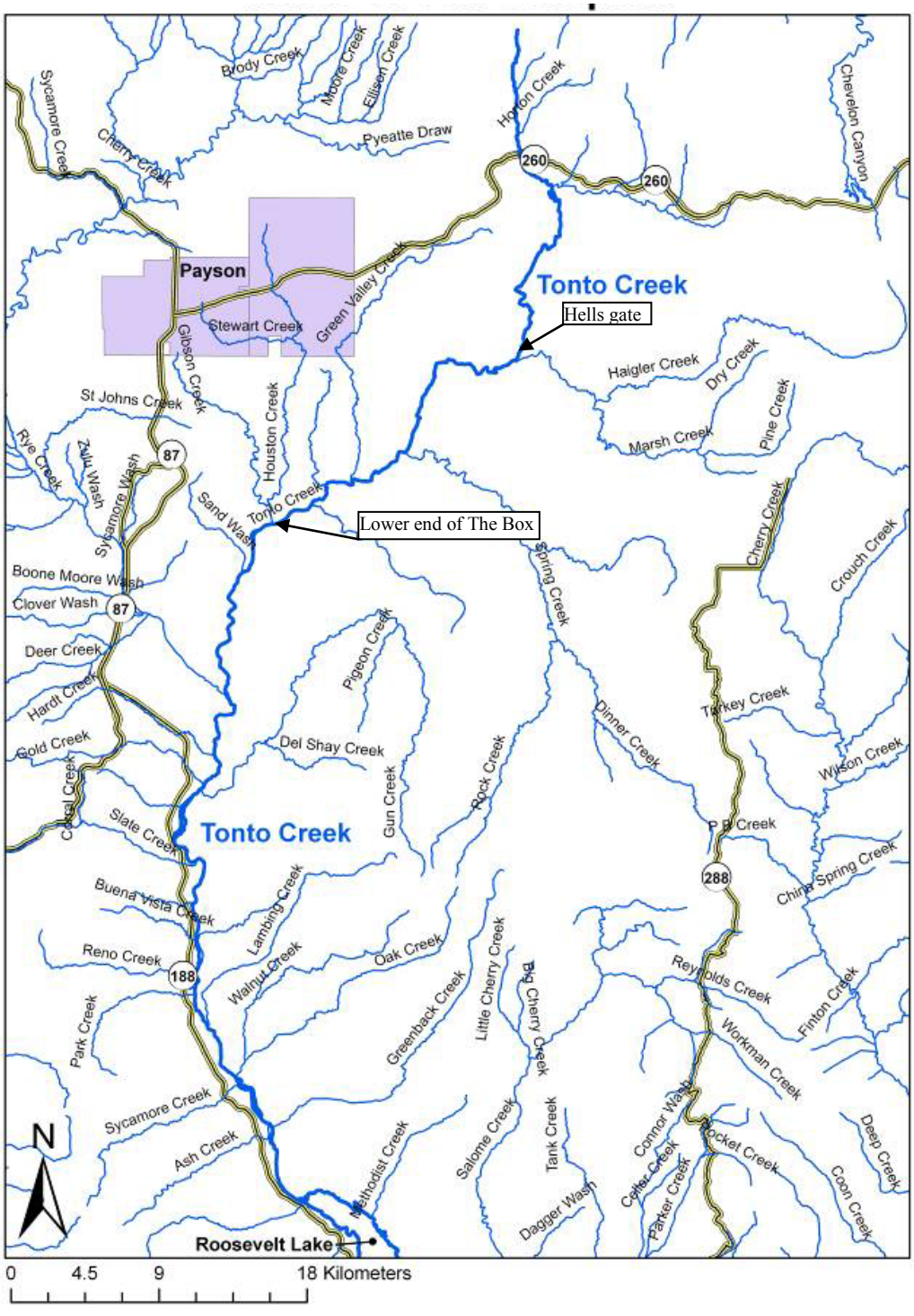

Figure 42. Overview map of the Tonto Creek Watershed.

Tonto Creek

Site Description

The watershed of Tonto Creek lies immediately below the Mogollon Rim. The stocked reach is located in the headwaters of Tonto Creek in Gila County and is roughly 7 miles long (Figure 42Figure 43). The stocked area begins just upstream of the confluence with Dick Williams Creek and ends at the Bear Flat Campground, downstream of the Highway 260 bridge crossing. It is approximately 16 miles east of Payson and is totally within the boundaries of the Tonto National Forest, although there are portions of stream with private cabins and in-holdings. The area ranges from 6400 ft to 5350 ft elevation and the stream gradient averages 93 ft/mi until the confluence with Gunn Creek, where it averages only 23 ft/mi.

Tonto Creek is managed by the Tonto National Forest for recreation, including camping, picnicking, hiking, bird watching, fishing, hunting, and water activities. The area includes the Horton day use area and the Upper Tonto Creek Campgrounds. These areas include picnic units and vault toilets. Tonto Creek is accessible by road from the Highway 260 turn-off to the fish hatchery and to recreation sites at the Bear Flat Campground from the Ponderosa Flat turn-off from Highway 260. Where access is not available from the road, short, steep hikes from Forest Road 289 can access much of the stream in the stocking reach. Below Bear Flat, Tonto Creek flows into the Hellsgate Wilderness and is only accessible by extremely rugged hiking until it approaches Gisela at “The Box”.

Tonto Creek originates in mixed conifer forest, dominated by Ponderosa pine and then transitions to a pinyon pine, juniper, oak, grass, and agave about 4 miles south of Bear Flat Campground. Tonto Creek again transitions from pinyon pine and juniper woodland into Sonoran desert below Hells Gate. Riparian trees include willow, Fremont cottonwood, Arizona Sycamore, net-leaf hackberry, Arizona Ash, and Arizona Alder. Much of the drainage was burned severely by the 1990 Dude Fire and is currently vegetated with grass and shrubs.

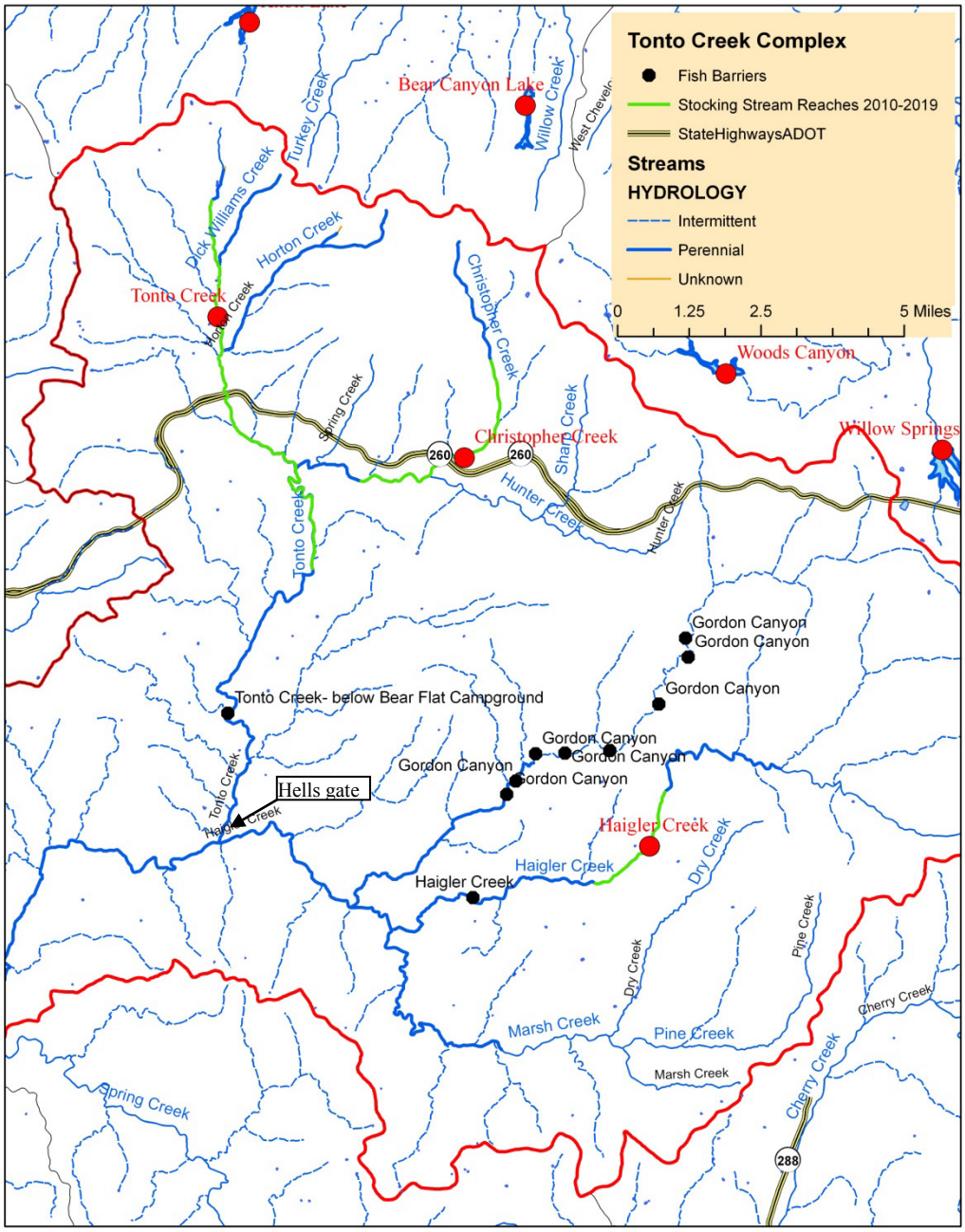

Figure 43. Stream reaches proposed for stocking in the Tonto Creek watershed.

Management of Water Body

Upper Tonto Creek is managed as a coldwater intensive use, put-and-take rainbow trout fishery throughout the spring, summer, and fall months. The rainbow trout fishery has been operating as a put-and-take cold water trout fishery for over 30 years. Trout are generally stocked at 14 sites along a 7 mile reach of stream below the hatchery. The majority of stocking sites (9) are concentrated along approximately 1.25 mi of stream between the 'Baptist Camp Bridge' and the FSR 289 bridge close to the confluence of Horton Creek. Three stocking sites are downstream of

the SR 260 bridge. Fish are stocked at a rate of approximately 1,300 to 3,000 fish per month between April 1 and October 1 annually. Peak rates of stocking are approximately 800 fish each week in mid-season.

As early as 1917, fish stocking was initiated by the Department in the upper Tonto Creek watershed (upper Tonto Creek goes from Tonto Spring down to the Bear Flat Campground). More than 2 million trout have been stocked into Upper Tonto Creek since 1933 (Table 33). Tonto Creek has received stockings of smallmouth bass and brook, brown, rainbow, and native trout of an undetermined species. Tonto Creek was also stocked with juvenile razorback sucker as part of a research program in 1987-1988. Except for brown trout, those fish no longer exist in the stocking reach. The middle (Bear Flat to Gisela) and lower reach (from Gisela to Roosevelt Lake) of Tonto Creek are managed as a basic yield fishery for warm water species.

A 1986 postal questionnaire identified 39,743 angler-use days spent at Tonto Creek during annual high use periods from April through September. Angler creel surveys from 1987 indicate high success rates (52%). There were 1.06 trout per angler caught, 0.86 fish per angler taken home and a 16% release rate (Warnecke 1988b). Based on a 2001 survey of anglers conducted by the Department, Tonto Creek provides 10,100 angler user days, which is an average of 27 anglers per day for trout, which are supported primarily through the proposed stocking action. Former Field Supervisor, Craig McMullen, who patrolled the creek, has observed that approximately 90% of the stocked rainbow trout are likely fished out within a week of being stocked (C. McMullen pers. comm.).

Table 33. Stocking history for Tonto Creek, Horton Creek and Spring Creeks.

Tonto Creek, Upper Reach (Tonto Spring to Bear Flat):				
Species	**First Year**	**Last Year**	**Num. of Years Stocked**	**Num. Stocked**
Brook trout	1936	1986	22	32,814
Brown trout	1933	1993	41	160,706
Native trout*	1936	1938	9	34,637
Rainbow trout	1933	2008	76	2,579,841
Razorback sucker	1987	1988	2	37,150
Smallmouth bass	1970	1970	1	121
			Total	2,844,819
Horton Creek:				
Species	**First Year**	**Last Year**	**Num. of Years Stocked**	**Num. Stocked**
Apache trout	1971	1971	1	23
Brook trout	1933	1947	16	44,016

Brown trout	1936	1974	7	15,839
Native trout*	1933	1939	4	19,375
Rainbow trout	1933	1965	179	247,025
			Total	326,278

Spring Creek:

Species	First Year	Last Year	Num. of Years Stocked	Num. Stocked
Brown trout	1948	1991	6	25,300
Rainbow trout	1950	1950	1	300
Native trout*	1938	1938	1	1
			Total	40,600

**Historical record – listed as "Native trout", no species specified.*

Proposed Action

The Department proposes to stock catchable rainbow trout from April through October; number of trout may be from 0 to 16,000 fish each year for the period covered under this consultation.

Water Distribution / Connectivity

Tonto Creek is mostly perennial with seasonally intermittent stretches in its lower reach below Gun Creek, where the stream channel becomes wider and braided as it flows through a broad alluvial basin. A winter/spring peak occurs as a result of precipitation and snowmelt at higher elevations, and the second peak in summer is due to monsoonal rains (Figure 45). Groundwater discharge, evapotranspiration, and pumping from wells have dropped the water level in the alluvium below the level of the streambed during part of the year. The alluvium is the principal aquifer in the lower basin and yields large quantities of water to wells (Schumann and Thomsen 1972). Dick Williams Creek is a small but mostly perennial tributary of upper Tonto Creek. The creek enters a small canyon downstream of the Highline trail which has serveral elevation drops that function as barriers during low flows. Dick Williams Creek was dry in September 2008 from is confluence with Tonto Creek to 0.25 miles upstream (Kern and Burger 2008).

Horton Creek begins below the Mogollon Rim with southwesterly flows for approximately 5 miles where the creek enters upper Tonto Creek near the campgrounds, approximately a mile north of Highway 260. Horton is mostly perennial but is seasonally intermittent approximately 0.75 miles upstream of the Tonto Creek confluence and on the upper east fork above the confluence with Horton Spring. The surface flow averages approximately 8 cubic feet per second and no barriers have been observed.

Bull Tank Canyon flows into Tonto Creek approximately 1.5 miles upstream of Hells Gate. In June 2008, Bull Tank Canyon had no flow with isolated pools in the first 100 yards from its confluence with Tonto Creek (Burger 2008).

Spring Creek is a perennial stream with no known barriers that flows northwesterly into Tonto Creek (Figure 44). The stream receives heavy impacts from livestock near both the Flying W Ranch and the Spring Creek Ranch causing low woody species regeneration and stream channel widening and degradation. Dinner Creek, Walnut Canyon, and Bryant Canyon are also tributary to Spring Creek. Walnut Creek has two large waterfall barriers found approximately 1.5 miles upstream of its confluence with Spring Creek (Figure 44). Rock Creek forms at the confluence of Turkey Creek and Bearhead Canyon flowing in a northeasterly direction until it reaches Spring Creek and is mostly perennial. Stream flow was estimated to be 1 cubic foot per second (Riley and Clarkson 2006). Buzzard Roost flows into Spring Creek and is mostly perennial but becomes intermittent in its upper reach. Dinner Creek flows into Spring Creek near the Spring Creek Ranch and has no known barriers. Dinner Creek is perennial in its lower two miles.

Houston Creek flows south into Tonto Creek just below "The Narrows" with no known barriers in the Creek or in its tributary, Gibson Creek. Houston Creek's, total stream flow was noted at approximately 0.5 cubic feet per second from its confluence with Tonto Creek to approximately ½ mile upstream (Clarkson and Marsh 2006). Fathead minnow have been found in Gibson Creek above its confluence with Houston Creek in 1995, indicating at least intermittent hydrology Lutch 1995). However, normal water connectivity between Houston and Gibson Creek is unknown in Gibson Creek.

Rye Creek is a tributary to Tonto Creek, draining the northeastern slope of the Matazal Mountains and entering Tonto Creek southeast of Rye. No surface flows were present in Rye Creek above the Forest Road 184 bridge in 2000 (Voeltz 2002). In Deer Creek, about 2.5 miles upstream of Rye Creek intermittent flows are possible, although extent and timing is unknown.

Gun Creek is a tributary to Tonto Creek, flowing off the northern and western slopes of the Sierra Ancha Mountains with lack of perennial flow as found in 2000 with no stream banks. There is a natural fish barrier in lower Gun Creek approximately 4 meters high.

Cottonwood Creek flows east to west and then converges with Tonto Creek below Tonto Creek's confluence with Gun Creek on the Tonto National Forest. No information was found to describe the physical attributes of Cottonwood Creek except that is was classified as a desert stream.

Ash Creek and Greenback Creek are the most downstream tributaries of Tonto Creek.

Fish Movement

There are a number of falls on Tonto Creek upstream and downstream of the stocked reach. These falls are definite barriers to upstream movement of fish out of the stocked reach, and barriers to fish movement into the stocked reach from downstream.

There is a roughly 20 ft waterfall 820 ft upstream of the Horton Creek confluence, within the stocking reach on Tonto Creek, that is a barrier to the upstream movement of fish. Fish that are stocked upstream of the waterfall have the ability to move freely downstream, but fish stocked downstream of the barrier cannot move upstream. Evidence of this is that brown trout have been collected during recent surveys from the Horton Creek confluence downstream, but not upstream of this location (Gill 2005). Also, approximately 3 mi south of Bear Flat Campground is a 12 ft waterfall serving as a fish barrier halting upstream movement of fish in Tonto Creek. Fish from the stocking reach can move downstream over the waterfall. No stocking occurs below this barrier.

Stocked rainbow trout and other existing fish can move downstream from the stocked reach of Tonto Creek and ultimately into Roosevelt Lake. However, few adult rainbow trout have been documented downstream of Bear Flat campground, only one rainbow trout was documented downstream of the confluence with Haigler Creek (Hells Gate) to the town of Gisela and never downstream of Gisela (LCRB Aquatic; Burger 2007; Kern 2008b; and Holycross et. al. 2006). Stocked rainbow trout, after moving downstream of the stocked reach can then swim upstream into Tonto Creek's tributaries, although their movement is restricted due to barriers, warmer temperatures, and dry and intermittent reaches found in the tributaries.

The highest surface water flows in Tonto Creek occur primarily in the winter months from long duration, low intensity storms, and secondarily from more infrequent flood events in summer-storm events from short-duration, high intensity thunderstorms. A stream discharge gauge on lower Tonto Creek at the confluence of Gun Creek shows flood events are highest in January through March, and then surface flows are the lowest May through July. Rainbow trout are stocked April through October when surface water is at or near base flow and peak flood events are the most infrequent, lessening the possibility of trout movement upstream and downstream of the stocked reach of Tonto Creek (Figure 45).

In conclusion, stocked rainbow trout are mostly restricted in the summer from moving downstream of Hells gate most likely due to higher water temperatures and limited, if any, overwintering has been documented to occur within the stocked reach due to poor habitat and angling pressure (Warnecke 1988b, C. Gill pers. comm., LCRB Aquatic GAP, Burger 2007, Kern 2008b, and Holycross et. al. 2006).

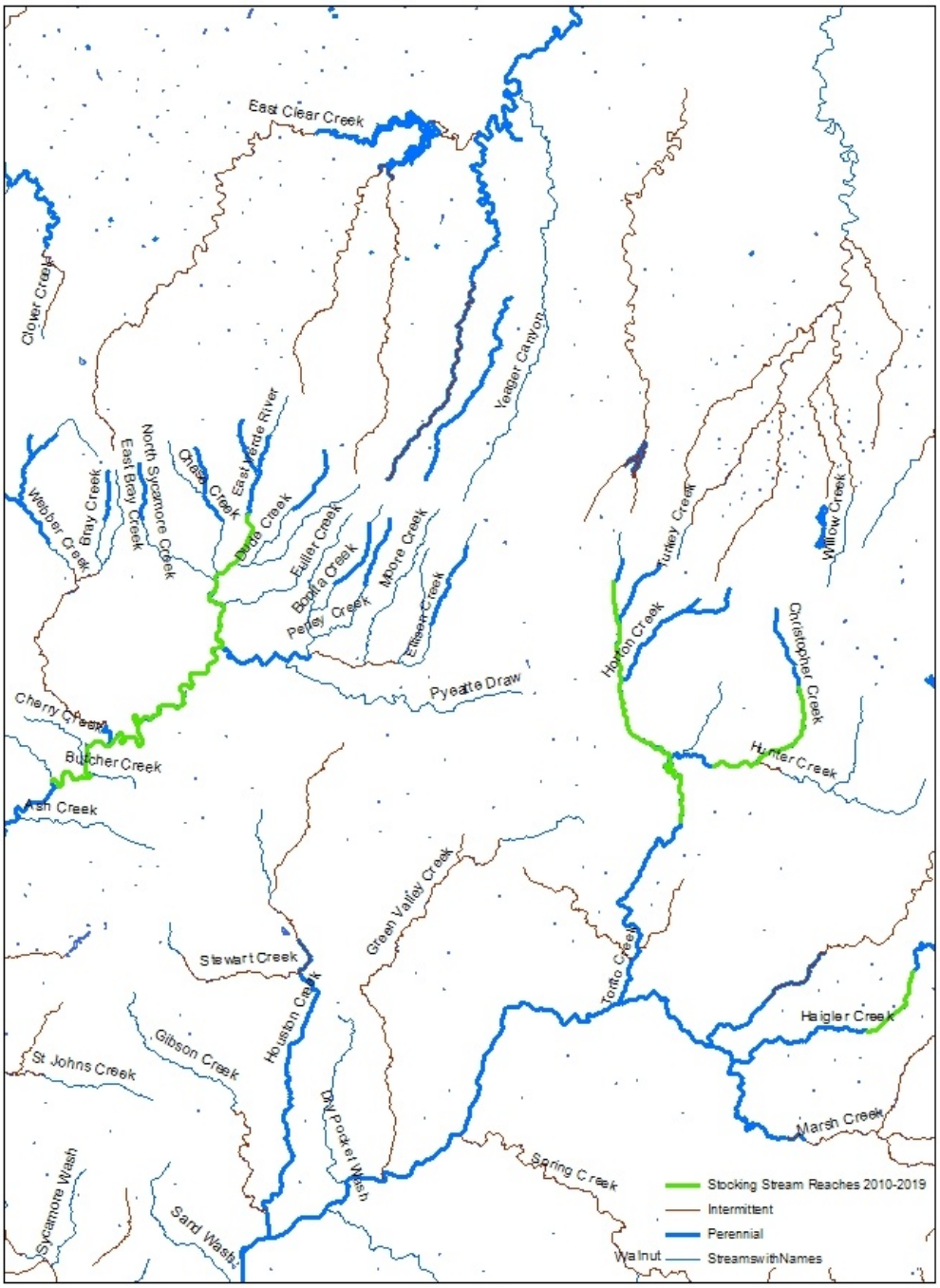

Figure 44. Tonto Creek and connecting tributaries.

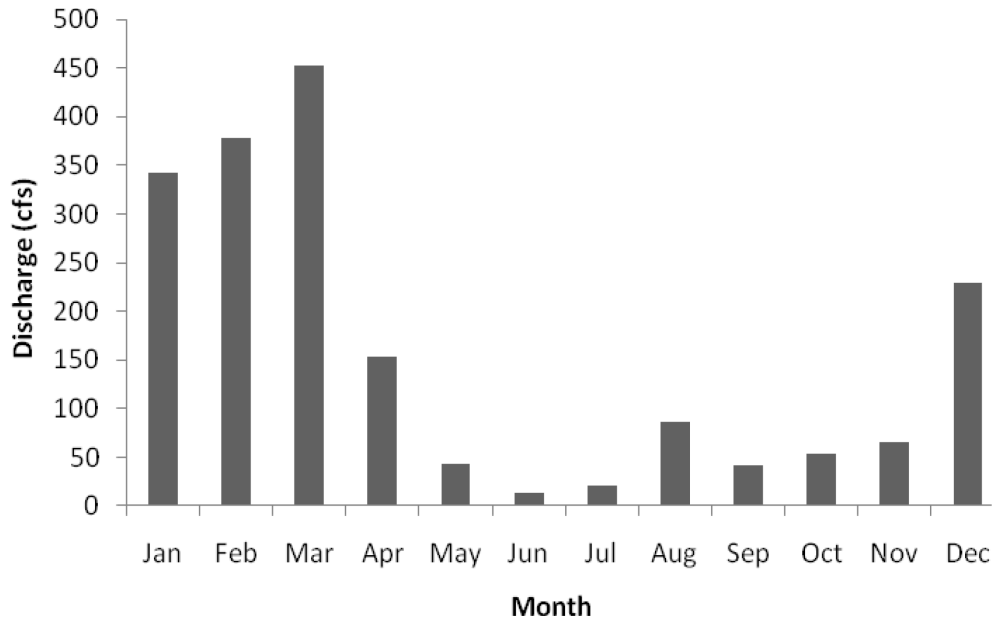

Figure 45. Mean monthly discharge for the period from 1941 to 2008 for Tonto Creek above Gun Creek, near Roosevelt, Arizona.

Community Description

Historically, Upper Tonto Creek supported only native species of fishes, potentially including longfin dace, speckled dace, Sonora sucker, desert sucker, headwater chub, spikedace, and loach minnow (Abarca and Weedman 1993). Headwater chub has been identified as the chub inhabiting the Tonto Creek watershed upstream of Roosevelt Lake (Minckley and Demarais 2000). They are currently known to exist in suitable habitats of the main stem of Tonto Creek and many of its tributaries, including Haigler, Buzzard Roost, Marsh, Rock, Dinner, and Spring Creeks below about 5500 feet in elevation (AGFD HDMS and Carveth 2007). Surveys reporting headwater chub from Tonto Creek are sporadic; efforts in the 1980s and 1990s show chub present from near Punkin Center upstream to the confluence with Haigler Creek at Hells Gate. Surveys in 1992 and 2008 noted headwater chub only above the vicinity of Hells Gate (Burger 2008b and AGFD Native Fish Database 1992).

The most recent surveys in 2005 (Gill 2005) and 2008 (AGFD unpublished data) indicate that the upper portion of Tonto Creek supports brown trout, rainbow trout, desert sucker, and longfin dace. Brown trout is not currently stocked, but represented a substantial portion of the fish community relative abundance in 1988 and 2008 from above the Horton Creek Confluence to just below the Bear Flat Campground within the reach proposed for rainbow trout stocking (Warnecke 1988a, 1988b). Speckled dace have not been documented from Upper Tonto Creek since 1984 when only 2 individuals were collected, despite surveys in 1991/1992 (Abarca and Weedman 1993), 2005 (Gill 2005) and 2008 (Kern 2008, Bear Flat to Hell's Gate). Rainbow

trout, longfin dace and desert suckers comprised a majority of the fish collected in the stocked reach.

Below the stocked reach, downstream of Bear Flat Campground, native headwater chub, longfin dace, desert sucker, Sonora sucker, speckled dace, rainbow trout, brown trout, green sunfish, and yellow bullhead were reported from the most recent survey in 2008 (Kern 2008b). Adult and young of the year rainbow and brown trout were commonly found in this stretch, indicating natural reproduction. In 2008, headwater chub were first seen directly below the 12 ft waterfall barrier about 3 miles downstream from Bear Flat Campground (Kern 2008b).

Downstream from the falls below Bear Flat Campground, rainbow trout and headwater chub were commonly observed in the same stream sections, although the trout numbers seemed to decrease the further downstream. A snorkel survey and a gill net set were completed in Tonto Creek downstream of Hells Gate (confluence of Haigler) with no rainbow trout sampled during June (Kern 2008b). Additionally, Burger (2007) did not report observing any rainbow trout on a survey of Tonto Creek between Hells Gate and Gisela, although Holycross et al. (2006) reported adults of both rainbow and brown trout between Bear Flat and Hells Gate in 2004. This indicates the lower most extent of trout is approximately around the Hells gate area.

Limited evidence is seen indicating successful reproduction of rainbow trout and brown trout in the stocked reach of Tonto Creek. However, more evidence is available below the stocked reach. Persistence of brown trout over time and the collection of small fish indicate that some successful reproduction occurs; reproduction of brown trout is also known to occur in Horton Creek (Warnecke 1988a). A majority of the rainbow and brown trout surveyed in upper Tonto Creek, from above the Horton Creek confluence to the Bear Flat Campground, during 1988 were less than 150 mm, which indicates that some reproduction but limited winter carry-over from the previous year (Warnecke 1988b). In 1993, the size of most captured rainbow trout indicate they were stocked fish, although there were some small rainbow trout that could have been the result of natural recruitment or escape from the hatchery (Abarca and Weedman 1993). Young of the year rainbow and brown trout have been captured at locations downstream of the stocked area, including between Bear Flat and Hells Gate (Gill 2005 and Kern 2008b).

Only one trout has ever been documented downstream of Hells Gate. This trout was found in the Gisela reach in 1970 (LCRB Aquatic GAP). Trout were not found during multiple surveys further downstream between Houston and Gun creeks in 2004 and 2005; mosquitofish, green sunfish, red shiner, carp, and catfish were found in those summer surveys (Holycross et al. 2006). Green sunfish and headwater chub were reported as common in Tonto Creek between Hells Gate and Gisela in a May 2007 survey (Burger 2007). Only smallmouth bass and green sunfish were sampled in October 2009 just above Gisela; however, carp were also observed (M. Dahlberg pers. comm.). Surveys in 1991 and 1992 (Abarca and Weedman 1993) found headwater chub from the confluence of Tonto Creek and Gun Creek upstream to the confluence

with Jones Canyon, which is approximately 3 miles downstream of the "The Box" which is downstream of Gisela.

Also noted in 1991 and 1992, downstream of the Gunn Creek and Tonto Creek confluence to Tonto Creek's terminus at Roosevelt Lake, green sunfish, red shiner, mosquito fish, common carp, smallmouth bass, largemouth bass, yellow bullhead, fathead minnow, speckled dace, desert sucker, and longfin dace were found (Table 34). No headwater chub or trout were found from Gunn Creek downstream to its confluence with Roosevelt Lake.

No survey records exist for Dick Williams Creek until 2008. No fish were observed along its entire length despite excellent viewing conditions. The relative abundance of aquatic invertebrates, adequate flow and habitat diversity are indicative of a stream capable of supporting a fish community. It is plausible that a large flood event or severe drought conditions eliminated the fish community at some point in the past, and that lack of navigable water in the lower potions of the creek have prevented Tonto Creek resident fish from re-populating Dick Williams Creek (Kern 2008b).

Horton Creek has had a self-sustaining brown trout fishery throughout the creek for the past 25 years. Brook, rainbow and brown trout have been stocked in the creek since the 1930's. The last stocking was of approximately 2,000 brown trout fingerlings in 1974. Brown trout is the only fish species recorded in Horton Creek since 1965, the last year rainbow trout were stocked (Table 35). Anglers currently report catching brown trout in Horton Creek. Twenty three Apache trout were stocked in 1971 (Table 33) with three Apache trout sampled in 1972. In 1935 "bonytail" chub were reported, which were likely headwater chub. Other than this record, no survey records or collections reporting chubs in Horton Creek are found and headwater chub are considered extirpated from the stream (Voeltz 2002).

Spring Creek was stocked historically (Table 33) with brown trout, rainbow trout, and native trout of an unknown species. Brown trout were stocked until 1991. The earliest collections of chub from Spring Creek were made in 1934 in the lower and upper portions of the creek. Surveys of Spring Creek since 1990 have recorded headwater chub, speckled dace, desert sucker, brown trout, yellow bullhead and green sunfish. In 2001**,** Spring Creek was found to have abundant headwater chub in the uppermost reaches. Speckled dace were also abundant; brown trout common, desert sucker uncommon, and mosquito fish and fathead minnow rare. Chubs were common in the middle reach (Bear Flat to Gisela); green sunfish and yellow bullhead abundant, and brown trout rare (LCRB Aquatic GAP).The latest spot survey in 2002 showed headwater chub, green sunfish, yellow bullhead and mosquito fish. No frogs or turtles were noted (Burger et al 2002). Anglers currently report catching brown trout in Spring Creek. Rainbow trout have never been sampled in Spring Creek since they were stocked historically.

Walnut Canyon is a tributary to Spring Creek. The only record of fish collected is of green sunfish in 2002. An unnamed tributary to Walnut Canyon contained green sunfish, Sonoran mud turtles, and bullfrogs (Burger et al. 2002). Rock Creek and Buzzard Roost, both tributaries to Spring Creek, are known to have desert sucker, headwater chub, brown trout, and speckled dace. Surveys were conducted in 1993 and 2001. It is unlikely that a sustainable chub population exists above the Buzzard Roost Ranch due to intermittent flows (Voeltz 2002).

Dinner Creek is a tributary to Spring Creek. The only documented survey was in 2007. Surveyors found green sunfish near its confluence with Spring Creek, and desert sucker and headwater chub upstream for approximately two miles.

Houston Creek contains longfin dace, green sunfish, and smallmouth bass (Burger 2005). Smallmouth bass, bullfrogs, and crayfish were observed by Marsh and Clarkson in 2006 just above its confluence with Tonto Creek (Clarkson and Marsh 2006).

Only fathead minnows have been found in Gibson Creek by a spot survey in 1995. No other survey records are known.

Many species of native and non-native fishes (but no rainbow trout) have been found in Rye Creek historically, mostly within one mile of its confluence with Tonto Creek. The most recent spot check survey in Rye Creek was October 2005, and only red shiners and an unidentified catfish were sampled. In past surveys in 1979, 1995 and 2000, smallmouth bass, green sunfish, yellow bullhead, channel catfish, desert sucker, sonoran sucker, speckled dace, and longfin dace were sampled. Headwater chub were last sampled in 1995 (LCRB Aquatic GAP). The headwater chub population in Rye Creek is likely extirpated due to lack of suitable habitat and the presence of nonnative fish and crayfish (Voeltz 2002). Deer Creek is a tributary to Rye Creek where desert sucker, green sunfish, and longfin dace were found in the only known survey (Lutch 1995).

Headwater chub were collected from lower Gun Creek during surveys in 2000 (LCRB Aquatic GAP). All chubs were found in the only water left, a few bedrock pools, and displayed signs of stress. A survey in the middle reach of Gun Creek during the summer of 2000 and one performed in 2002 (Burger et al. 2002) found only speckled dace. Green sunfish were also found in the lower reach. Black-necked garter snakes, canyon tree frogs, and Sonoran mud turtles were seen in this reach as well.

Historical records for Chiricahua leopard frogs exist in the vicinity. Recent surveys have found narrow-headed gartersnakes in the Tonto Creek within the complex, but not northern Mexican gartersnakes, although both are found within Tonto Creek downstream of the stocking complex.

Crayfish are common to abundant in lower portions of Tonto Creek, including upstream of Highway 260, but they decrease substantially in the uppermost reaches.

Table 34. Fish survey summary for Tonto Creek.

Date	Collector	Location	Survey Type	Source	Species	Num. and Size of Rainbow Trout (if known)
March, 1984	AGFD Warnecke	Upper Tonto Creek – Stocked Reach	Electro shocking	Management Report	brook trout rainbow trout brown trout desert sucker	1 (80-99 mm) 12 (100-119 mm) 6 (120-139 mm) 1 (180 mm) 1 (260 mm)
Oct, 2003	AGFD, Weedman	Upper Tonto Creek – Stocked Reach	Electro shocking	Trip report	rainbow trout longfin dace green sunfish desert sucker brown trout	17(84-310mm) Average 230 mm
Oct, 2005	AGFD Gill	Upper Tonto Creek – Stocked Reach	Electro shocking	Trip report	longfin dace rainbow trout green sunfish brown trout desert sucker	63 (70-295 mm) 60% <130 mm -all at Bear Flat Campground 33% >200 mm
June 16-19, 2008	AGFD Kern, Hanna, Burger	Tonto Creek – Bear Flat to Hells Gate	Visual and Net	Trip Report	rainbow trout brown trout longfin dace specked dace unknown Sucker Green sunfish	Adult and YOY rainbow and brown trout
Aug 28, 1991 and June 1992	AGFD Abarca and Weedman	Upper and Lower Tonto Creek	Seines and electro shocking	Trip Report	Longfin Dace Mosquitofish Common Carp Smallmouth bass	Juveniles < 100 mm not collected for survey

Date	Collector	Location	Survey Type	Source	Species	Num. and Size of Rainbow Trout (if known)
					Largemouth bass Yellow bullhead Red shiner Fathead minnow Speckled dace Desert sucker Green sunfish Headwater chub Sonoran sucker Rainbow trout	

Table 35. Fish survey summary for Horton Creek.

Date	Collector	Location	Survey Type	Source	Species	Num. and Size of Rainbow Trout (if Known)
1965	AGFD	Horton Creek	Unknown	HDMS	Rainbow trout	Approx 24 rainbow trout, Size unknown
May 2, 1968 May 10, 1967 May 9, 1966	AGFD McDonald & Peterson	Horton Creek	Electro shocking	Trip Report	Brown trout	
March 1984	AGFD Warnecke	Horton Creek	Electro shocking	Fish Management Report	Brown Trout	

Consultation Species or Critical Habitat
Potential impacts to bald eagle, Chiricahua and northern leopard frogs and headwater chub are addressed below. Potential impacts from stocked fish movement downstream on northern Mexican and narrow-headed gartersnakes are discussed in the Tonto Complex analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Chiricahua and Northern leopard frogs are analyzed at a local and broad scale due to the movement potential into the stocked area and fish movement potential up or downstream into areas where frogs may occur.

Bald Eagle
Woods Canyon Breeding Area is located approximately 8.4 miles from Tonto Creek. The Tonto Creek stocking reach is within the Bald Eagle DPS. The eagles were first observed at the breeding area in 2008 and were last observed in 2009. Nest watchers were able to observe the prey types and in some cases species that were delivered to the nest by the eagles. In 2009 fish accounted for 98.5%, mammals for 0.7% and unknown for 0.7%. Of the prey items further identified to species, rainbow trout accounted for 99.3% and ground squirrels for 0.7%. Woods Canyon Breeding Area productivity data shows that the nest failed in 2008 when an intense late spring snow storms occurred a few days before the confirmed failure. In 2009 the nest was successful (McCarty and Jacobson 2008, 2009). Tonto Creek does not currently have monofilament bins present.

Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site.

Chiricahua Leopard Frog
Local Analysis: Although Tonto Creek and the Tonto Creek buffered stocking complex are within the historical range of the Chiricahua leopard frog, the likelihood that Chiricahua leopard frogs could be exposed to stocked fish in the 5-mile buffered stocking complex that includes Tonto Creek is low. There are no historical records for Chiricahua leopard frogs from Tonto Creek; however, there are historical records for Chiricahua leopard frogs from 2 sites in the

buffered stocking complex, one of which includes current observations: Ellison Creek (= Highline Trail) (1995) and Unnamed Trib. of Ellison Creek (East of Pyle Ranch) (1997). Chiricahua leopard frogs were observed during subsequent surveys at Ellison Creek (= Highline Trail) (1997, 1998 and 2006) however, not reported during additional surveys at Unnamed Trib. of Ellison Creek (East of Pyle Ranch) (2005 and 2007). There have been 108 surveys at 55 sites within the buffered stocking complex between 1937and 2007 with most surveys conducted between 1968 and 2007. (Figure 46, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). The Black Mesa Ranger District, Tonto National Forest, surveyed 6 additional sites within the buffered stocking complex in 2004 and did not observe any Chiricahua leopard frogs (Dated provided by Black Mesa Ranger District, Tonto National Forest). Although current records show that Chiricahua leopard frogs occupy Ellison Creek (= Highline Trail) (1995), the likelihood that fish stocked in Tonto Creek would encounter frogs is low because the stocked fish and the occupied frog sites are in 2 different drainages flowing into 2 different major rivers. In addition, the area between Ellison Creek and Tonto Creek is not indicative of suitable habitat for leopard frogs and exceeds the 5 miles overland distance a Chiricahua leopard frog would likely disperse overland.

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing fish stocked in Tonto Creek is low. There are no historical records for frogs in Tonto Creek or its tributaries where fish may disperse outside the buffered complex (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, it is unlikely that Chiricahua leopard frogs that occupy Ellison Creek would disperse into Tonto Creek because the area between Ellison and Tonto Creeks does not contain suitable habitat for leopard frogs and the overland dispersal distance exceeds that which a Chiricahua leopard from would be expected to disperse.

Northern Leopard Frog

Local Analysis: Although Tonto Creek and the Tonto Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that northern leopard frogs could be exposed to stocked fish in the buffered stocking complex that includes Tonto Creek is low. There have been 108 surveys at 55 sites within the buffered stocking complex between 1937and 2007 with most surveys conducted between 1968 and 2007 (Figure 46, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There are no historical records for northern leopard frogs from Tonto Creek; however, there are historical records for northern leopard frogs from 2 sites in the buffered stocking complex; Unmarked Pond (= Cindy's Pond) (1984) and Woods Canyon Lake (= Spillway Recreation Site) (1968). Northern leopard frogs were not observed during subsequent surveys at Unmarked Pond (= Cindy's Pond) (1997 and 1998) and Woods Canyon Lake (= Spillway Recreation Site) (1992 and 1995) (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Given that the area within the Tonto Stocking Complex has been well surveyed and subsequent surveys have reported negative

observations, it is likely that northern leopard frogs no longer occupy Unnamed Pond (=Cindy's Pond) or Woods Canyon Lake (= Spillway Recreation Site) (1968). In addition, salamanders have been documented at (= Cindy's Pond) (1984) and bullfrogs at Woods Canyon Lake (= Spillway Recreation Site) (1968), making this area less suitable for northern leopard frogs.

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing fish stocked in the Tonto Creek stocking site is low, because there are no historical records for frogs in Tonto Creek or its tributaries where fish may disperse, and these drainages are below the elevational range of the northern leopard frog (approximately 5300 ft) (Ranid Frog Conservation And Management, Technical Report 121) (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

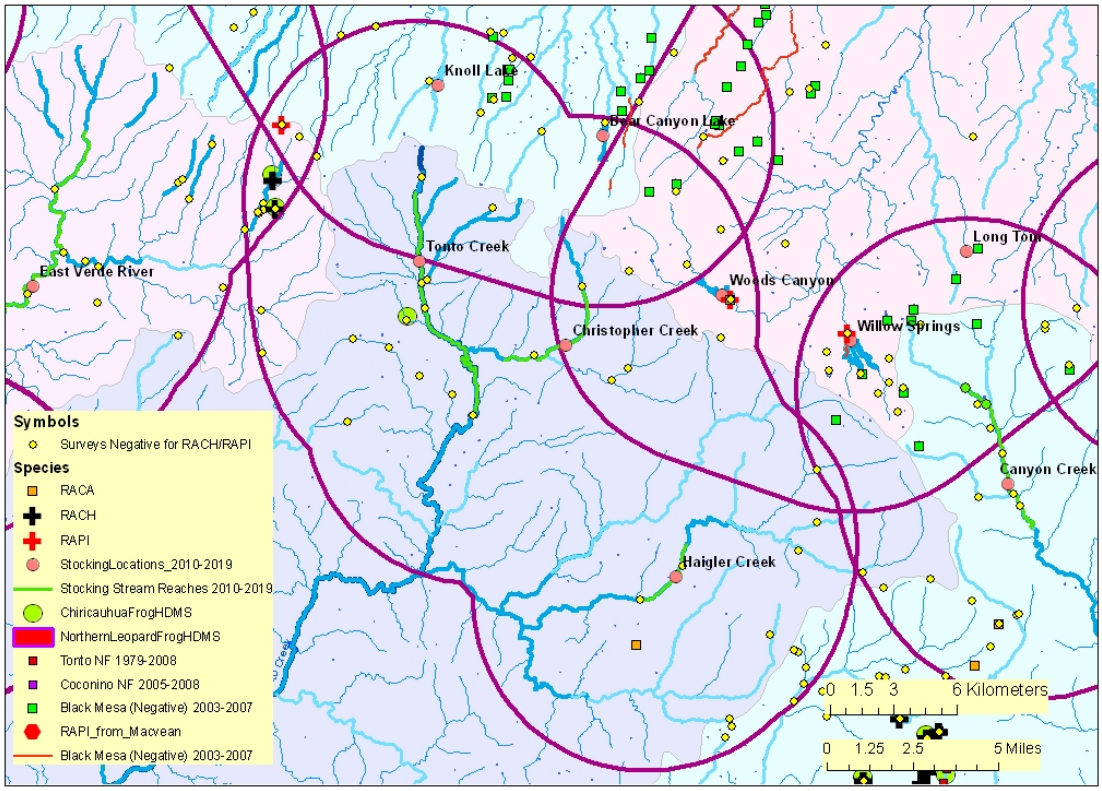

Figure 46.Map of Tonto Creek buffered stocking complex:

The purple line illustrates the 5 mile buffer surrounding a stocking site, stocking reach, or a group of stocking sites. Blue lines symbolize streams and rivers (both perennial and intermittent). A black line represents a Chiricahua leopard frog Recovery Unit boundary. The background color represents the 8 digit Hydrologic Unit Code. Other data are described in the legend. (Note: HDMS data appear as buffered points and may appear larger than site records for other surveys).

Headwater Chub

Headwater chub are found in the main stem of Tonto Creek below the waterfall located below Bear Flat Campground, at least to Hells Gate (Kern 2008b). Kern (2008b) reported multiple age classes of headwater chub in the portion of Tonto Creek below Bull Tank Canyon, but not in the portion upstream to Bear Flat. Kern (2008b) also noted that headwater chub could be present in low numbers in this upper area, which is functionally isolated from upstream fish movement by a series of slides and waterfalls. Headwater chub were also found downstream in Tonto Creek to at least Spring Creek in May 2007 (Burger 2007). Historically, chub were found above Bear Flat Campground in Tonto Creek, Horton Creek, and Christopher Creek, although these populations are considered extirpated (Voeltz 2002). The population in Rye Creek is thought to be extirpated due to limited water and habitat (Voeltz 2002).

Potential Impacts

Rainbow trout are proposed to be and have historically been stocked in Tonto, Christopher, and Haigler Creeks from April through October. In addition to stocked rainbow trout, wild self-sustaining rainbow trout and/or brown trout are found throughout Tonto Creek's watershed. They are found in Christopher Creek and its tributaries, Horton Creek, Haigler Creek and its tributaries, and Spring Creek and its tributaries. Surveys have found not only the stocked-size rainbow trout but also young of the year rainbow trout throughout the watershed (Table 34). The presence of trout smaller than the size that is consistently stocked, which is 8 inches, is indicative of natural reproduction and a self-sustaining population of rainbow trout.

The proposed action is stocking trout from April through October which is typically the driest months of the year. This reduces trout movement in normal years until higher flows typically occur in December, January, February, and March. Rainbow trout movement is further limited by high harvest rates during the warmer dry months. The duration that stocked rainbow trout would potentially have effects on headwater chub in Tonto Creek would likely be in the winter and early spring. Flows that could wash fish into the section of Tonto Creek occupied by headwater chub typically occur from December through March (Figure 3). This is also the period when stream temperatures are likely to be suitable for rainbow trout.

The rainbow trout stocked in the upstream stocking reach of Tonto Creek, as well as the rainbow trout stocked into Christopher and Haigler Creeks, can move down the creek and ultimately into Roosevelt Lake during flood events and winter months, however it has been well documented and stated above within fish movement and fish community that the extent of the rainbow trout lessens from Bear flat campground to becoming for the most part nonexistent downstream of Haigler Creek and absolute downstream of Gisela

Rainbow trout do share habitat with headwater chub in Tonto Creek, below Bear Flat Campground and north of Gisela. It is not known how many of the stocked rainbow trout are moving into lower Tonto Creek and how many trout in this area are wild trout from the naturally

reproducing population in the stream. The large number of angler-use days and observed catch rates suggest that most of the stocked fish are harvested soon after being stocked, and it is more likely that the trout below Bear Flat Campground in Tonto Creek have long been established and are self-sustaining.

It is possible for stocked rainbow trout to move downstream from the stocked reaches and then upstream into Tonto Creeks tributaries. However, this is limited due to intermittent and dry stretches in the tributaries, as well as natural barriers. The only creek where it is possible for stocked rainbow trout from Tonto Creek to move into occupied headwater chub populations is Spring Creek. Rainbow trout have not been sampled in Spring Creek since they were stocked in 1950, which suggests some unknown barrier to their movement into Spring Creek. Haigler Creek has barriers in its lower reach, and the remaining tributaries do not have existing populations of headwater chub.

During a June survey, Kern (2008b) did not detect rainbow trout downstream of the Haigler Creek confluence, but did collect yellow bullhead and green sunfish. This suggests that by June, Tonto Creek below Hells Gate is not suitable for rainbow trout survival, and begins to transition into more of a warm water stream at this point. Only one trout has been observed south of Hells Gate. The time of year of this record is unknown. Further, Burger (2007) did not detect any rainbow trout during a survey from Hells Gate to Gisela, again suggesting that below Hells Gate, Tonto Creek becomes unsuitable for rainbow trout, at least by late spring when both of these surveys occurred. Trout have not been found in Rye Creek, Gun Creek, or Tonto's tributaries below Hells Gate that have contained headwater chub in the past, but are currently thought to be extirpated (Voeltz 2002).

Rainbow trout are competitors for food and space with roundtail and headwater chub, and may also prey on young chub (Propst et al. 1998). Exposure of headwater chub to stocked trout could occur in Tonto Creek, below the stocked reach in occupied habitats by headwater chub, but not in the stocked reach of Tonto Creek, due to the presence of barriers that restrict upstream movement of headwater chub; however, the impacts cannot be separated from those of trout that appear to be self-sustaining in the system. It is possible that stocked trout could be supplementing those self-sustaining populations, although the extent to which this may be occurring is unknown. Small trout can compete with small headwater chub, but can also serve as a prey source for larger headwater chub. Surveys of both upper and lower Tonto Creek show a large part of the fish populations to be exotic species such as brown trout, common carp, yellow bullhead, green sunfish, red shiner, channel catfish, and large and small mouth bass (Table 34). Given the community composition, these other nonnative fish species, as well as brown trout, if present in this reach, likely contribute a larger piece the overall impacts to headwater chub via predation and competition than do stocked rainbow trout. Green sunfish and small mouth bass would have much larger impacts to headwater populations via predation.

Suitable spawning temperatures for headwater chub are likely to occur in the occupied headwater chub habitat during the stocking season. This creates an additional risk of predation on larval or post-larval individuals by resident and stocked rainbow trout. Although specifics on when headwater chub spawn in Tonto Creek are lacking, temperatures of 64 to 76° F are reported for spawning headwater chub in the upper Verde (Brouder et al. 2000) and upper Gila Rivers (Bestgen 1985). Little data on stream temperature has been collected; however, random temperatures collected during 1987 indicate that maximum temperatures near the Highway 260 Bridge were greater than 73° F. Stream temperature near the hatchery averaged 56° F during this time period and mean temperatures increased nearly 36° F in the short reach between the Baptist Bridge and Horton Creek.

Christopher Creek

Site Description

Christopher Creek is a tributary to Tonto Creek (Figure 47), flowing off of the Mogollon Rim on the Tonto National Forest south to just downstream of Highway 260, before turning west and paralleling Highway 260 to its confluence with Tonto Creek east of Payson. The perennial portion of Christopher Creek is approximately 8 miles long and the stream drains an area of 29 square miles.

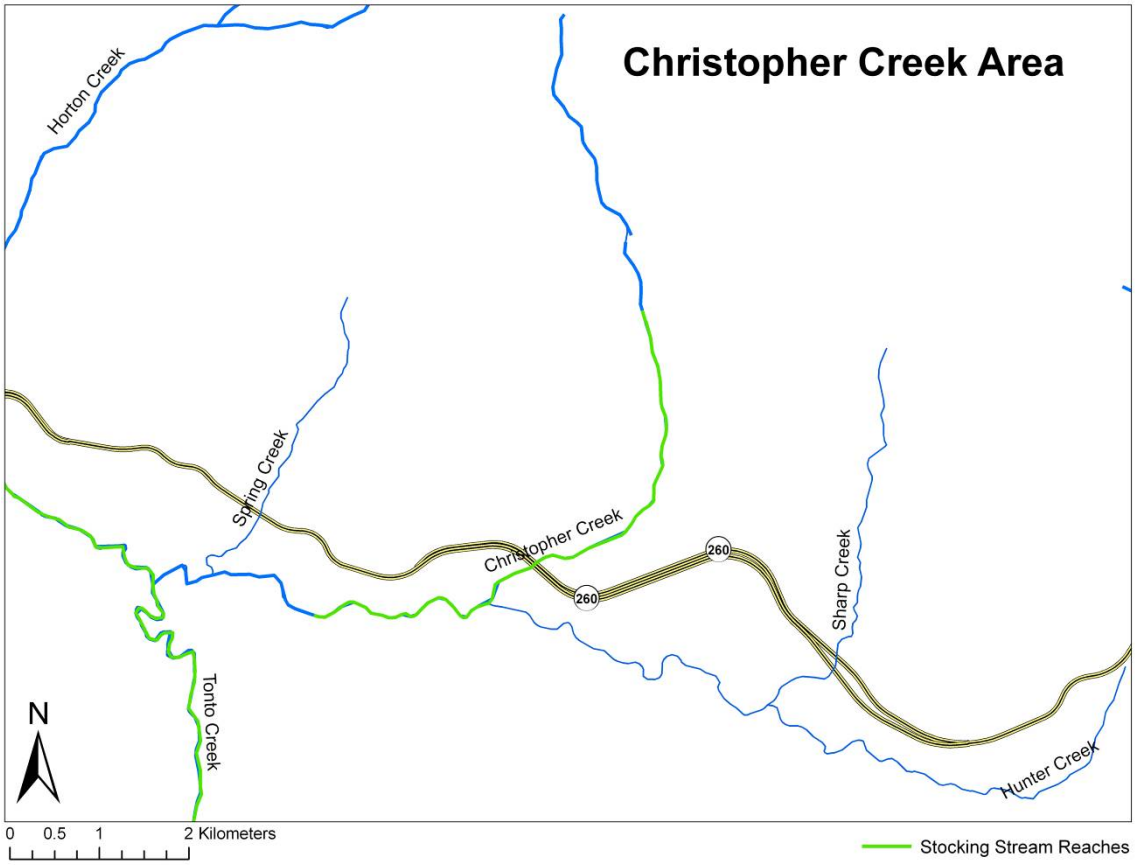

Figure 47. Overview map of Christopher Creek Stocking Area.

Christopher Creek is managed by the Tonto National Forest for recreation, including camping, picnicking, fishing, and water activities. The designated campground provides picnic tables, camp units, and a vault toilet. Christopher Creek is accessible by road to the campground off Highway 260 or just past the campground to FR 284. Downstream of the stocking reach the creek flows an additional 1.5 miles to the confluence with Tonto Creek. Land ownership is comprised of 78% Tonto National Forest, 17% Apache-Sitgreaves National Forest, and 6% private lands.

Hunter Creek is an interrupted perennial tributary to Christopher Creek 1000 ft upstream of Christopher Creek Campground (Figure 47) that begins near the base of the Mogollon Rim at 6500 ft in elevation near Hwy 260 and is roughly 5 miles long. The mouth of Hunter Creek is at an elevation of 5640 ft. Sharp Creek is a tributary to Hunter Creek.

Management of Water Body
Christopher Creek is managed as cold water intensive use, put-and-take rainbow trout fishery in the spring and summer months (Table 36). Christopher Creek supported about 10,865 angler user days in 2001 (Pringle 2004). From a 1986 postal questionnaire, there were 17,561 angler-use days spent at Christopher Creek during annual high-use periods from April through September.

Table 36. Stocking history for Christopher Creek.

Species	First Year	Last Year	Num. of Years Stocked	Num. Stocked
Brook trout	1933	1980	14	23,874
Brown trout	1936	1992	11	28,193
Native trout*	1933	1939	7	31,675
Rainbow trout	1933	2008	923	708,667
			Total	792,409

**Historical record – listed as "Native trout", no species specified.*

Proposed Action
The Department proposes to stock catchable rainbow trout from April through October. Number of trout may be from 0 to 10,000 fish annually for the period covered under this consultation.

Water Distribution / Connectivity
Christopher Creek is perennial from just below the Mogollon Rim to its confluence with Tonto Creek downstream of Hwy 260. Much of the base flow originates from springs at the head of See Canyon. In the upper portion of Christopher Creek boulders and cobble make up the primary bed material and cascade drop/pool habitats are the dominant type. Riffle and run habitats dominate from Hwy 206 downstream to shortly below the R-C Scout Camp. Below this Christopher Creek

enters a canyon-bound section, with frequent deep pools and substrate dominated by bedrock. There is a concrete stream crossing for vehicles at the Christopher Creek campground. Hunter Creek is an interrupted perennial tributary to Christopher Creek 1000 ft upstream of Christopher Creek Campground. Hunter Creek and Sharp creek are seasonally intermittent and are typically dry from the confluence with Christopher Creek to approximately a half mile north of Highway 260 (Evans 2009b, C. Gill pers. comm.). No fish barriers have been identified in Hunter or Sharp creeks.

Fish Movement

There are at least two barriers greater than 10 feet on Christopher Creek just downstream of the R-C Scout Camp that prevents upstream movement of fish. These are located in the canyon-bound section of Christopher Creek. It is likely that other barriers exist in this section. There is a concrete stream crossing at the Christopher Creek campground that could be a barrier to some fish species, but it is likely not a barrier to salmonids. A pool exists below the road crossing and the drop to the pool is not sufficient to prevent trout stocked below the crossing from moving upstream. Therefore, fish from the lowermost stocking site at Christopher Creek campground would have the ability to freely move upstream to the uppermost stocking locations near the See Canyon trailhead and beyond. Stocked fish would also have the ability to move up Hunter Creek and Sharp Creek. This crossing is scheduled to be replaced in 2010 by the Tonto National Forest, which may allow more fish passage in the future with the use of culverts.

Fish also have the ability to freely move downstream from the stocking locations to Tonto Creek and beyond. Once fish reach Tonto Creek they would be subject to the same controls limiting their long-term survival as discussed in the Tonto Creek section.

Community Description

Surveys of Christopher Creek in 1966, 1967, 1968, 1983, 1986,1987 (Warnecke 1986; Warnecke 1987) from See Canyon to just downstream of Christopher Creek Campground have found rainbow trout, brown trout, longfin dace, desert sucker, brook trout, and green sunfish. The most recent survey (Gill 2008c) reported rainbow trout, brown trout, longfin dace, green sunfish, and largemouth bass. In both 1987 and 2008, young of year rainbow trout were collected, indicating self-sustaining populations of rainbow trout and brown trout (Table 5). Madsen (1935) reported "bonytails" throughout Christopher Creek and some were also found in Sharp Creek. No other records for chubs from Christopher, Hunter, or Sharp Creek have been found, and the chub population is considered extirpated (Voeltz 2002).

Hunter Creek was most recently surveyed in 2009 (Evans 2009b). This survey documented green sunfish, rainbow trout, and longfin dace, with the dominant species being green sunfish. The survey also noted a high density of crayfish. The only other survey of Hunter Creek was in 1983, which found longfin dace, rainbow trout and desert sucker. Young of year rainbow trout were

found indicating natural reproduction (Table 37). Sharp Creek was surveyed in 1983 and only longfin dace were found.

Table 37. Fish survey summary for Christopher Creek, Hunter Creek and Sharp Creek.

Date	Collector	Location	Survey Type	Source	Species	Num. and Size of Rainbow Trout (if Known)
July 9-10, 2008	AGFD Gill	Stocked Reach of Christopher Creek	Electro shocking	Trip Report	Rainbow trout Brown trout Longfin dace Green sunfish	Approx 85% <70 mm 113 total rainbow trout collected
Oct 1987	AGFD Warnecke	Stocked Reach of Christopher Creek	Electro shocking	Trip Report	Rainbow trout Brown trout Longfin dace Green sunfish	70 mm to 230 mm Avg length = 125 mm 192 total rainbow trout
Sept, 1983	AGFD Reg 6	Hunter Creek	Electro shocking	Trip report	Longfin Dace Rainbow trout Desert sucker	
July 2009	AGFD Evans	Hunter Creek	Visual	Trip Report	Green sunfish Rainbow trout Longfin dace	1 (50-60 mm) 3 (60-70 mm) 2 (70-80 mm) 1 (130-140 mm) 1 (140-150 mm) 1 (170-180 mm)
Sept, 1983	AGFD Reg 6	Sharp Creek	Electro shocking	Trip Report	Longfin dace	

Historical records for Chiricahua leopard frogs exist in the vicinity. Both narrow-headed and northern Mexican gartersnakes are known from connected waters downstream in Tonto Creek. Crayfish are also known from the area of Christopher Creek near the confluence of Hunter Creek.

Consultation Species or Critical Habitat

Potential impacts to bald eagle, Chiricahua and northern leopard frogs, headwater chub and Mexican spotted owl are addressed below. Potential impacts from stocked fish movement downstream on northern Mexican and narrow-headed gartersnakes are discussed in the Tonto Complex analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Chiricahua and Northern leopard frogs are analyzed at a local and broad scale level due to the movement potential into the stocked area and fish movement potential up or downstream into areas where frogs may occur.

Bald Eagle

Woods Canyon Breeding Area is located approximately 4.5 miles from Christopher Creek. The Christopher Creek stocking reach is within the Bald Eagle DPS. The eagles were first observed at the breeding area in 2008 and were last observed in 2009. Nest watchers were able to observe the prey types and in some cases species that were delivered to the nest by the eagles. In 2009 fish accounted for 98.5%, mammals for 0.7% and unknown for 0.7%. Of the prey items further identified to species, rainbow trout accounted for 99.3% and ground squirrels for 0.7%. Woods Canyon Breeding Area productivity data shows that the nest failed in 2008 when an intense late spring snow storms occurred a few days before the confirmed failure. In 2009 the nest was successful (McCarty and Jacobson 2008, 2009). Christopher Creek does not currently have monofilament bins present.

Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site.

Non-breeding bald eagles can occur within the vicinity of the stocking site and may be present at any time of the year. The amount of human disturbance at this site may result in effects to roosting or foraging that may affect the eagles' use of the site. Non-breeding eagles normally move between available sites so the reduction in use of a particular stocking site may not be significant.

Chiricahua Leopard Frog

Local Analysis: Although Christopher Creek and the Tonto Creek buffered stocking complex are within the historical range of the Chiricahua leopard frog, the likelihood that fish stocked in Christopher Creek would have an impact on Chiricahua leopard frogs is low. There are no historical records for Chiricahua leopard frogs from Christopher Creek. There are historical records for Chiricahua leopard frogs from 2 of these sites; one of which includes current observations at Ellison Creek (= Highline Trail) (1995), and Unnamed Trib. of Ellison Creek (East of Pyle Ranch) (1997). Chiricahua leopard frogs were observed during subsequent surveys at Ellison Creek (= Highline Trail) (1997, 1998 and 2006) but not reported during additional surveys at Unnamed Trib. of Ellison Creek (East of Pyle Ranch) (2005 and 2007). There have been 108 surveys at 55 sites within the buffered stocking complex between 1937and 2007, with most surveys conducted between 1968 and 2007 (Figure 46, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). The Black Mesa Ranger District of the Tonto National Forest surveyed 6 additional sites within the buffered stocking complex in 2004 and did not observe any Chiricahua leopard frogs (Dated provided by Black Mesa Ranger District, Tonto National Forest). Although current records show that Chiricahua leopard frogs occupy Ellison Creek (= Highline Trail) (1995), the likelihood that fish stocked in Christopher Creek would encounter frogs is low because fish and occupied frog sites are in 2 different drainages flowing into 2 different major rivers. In addition, the habitat between the Ellison and Tonto creek drainages is not suitable habitat and exceeds the five mile overland distance a Chiricahua leopard frog would likely disperse overland.

Broad Scale Analysis: If fish were to disperse from Christopher Creek, the likelihood that they would impact Chiricahua leopard frogs is low. There are no historical records for frogs in Christopher Creek or its tributaries where fish may disperse outside the buffered complex. (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, it is unlikely Chiricahua leopard frogs that occupy Ellison Creek would disperse into Christopher Creek because the area between Ellison and Tonto Creeks does not contain suitable habitat for leopard frogs and the five mile overland dispersal distance exceeds that from which a Chiricahua leopard would be expected to disperse.

Northern Leopard Frog

Local Analysis: Although Christopher Creek and the Tonto Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that fish stocked in Christopher Creek would encounter northern leopard frogs is low. There are no historical records for northern leopard frogs from Christopher Creek; however, there are historical records for northern leopard frogs from 2 sites in the buffered stocking complex at Unmarked Pond (= Cindy's Pond) (1984) and Woods Canyon Lake (= Spillway Recreation Site) (1968). There have been 108 surveys and site visits at 55 sites within the buffered stocking complex between 1937and 2007, with most surveys conducted between 1968 and 2007 (Figure 5, Arizona Game

and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs were not observed during subsequent surveys at Unmarked Pond (= Cindy's Pond) (1997 and 1998) and Woods Canyon Lake (= Spillway Recreation Site) (1992 and 1995) (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Given that the area within the buffered stocking complex has been well surveyed and subsequent surveys have reported negative observations, it is likely that northern leopard frogs no longer occupy the complex.

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing fish stocked in Christopher Creek is low, because there are no historical records for frogs in Christopher Creek or its tributaries where fish may disperse outside the buffered complex. (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the habitat in these drainages is less suitable for northern leopard frogs due to the presence of non-native fish, crayfish and bullfrogs than in areas free of these non native species.

Headwater Chub

No headwater chub have been collected or identified in Christopher Creek or its tributaries since 1935. These species are reported as extirpated in these streams (Voeltz 2002). The closest recent record for headwater chub is over 7 miles downstream from the proposed stocking locality in Tonto Creek (Kern 2008b).

Potential Impacts

There are no potential impacts on headwater chub within the Christopher Creek drainage since headwater chub are considered extirpated from this stream (Voeltz 2002). It is possible that stocked rainbow trout could move out of Christopher Creek and into Tonto Creek. See discussion for Tonto Creek regarding potential impacts in this section of stream.

Mexican Spotted Owl and Critical Habitat

The stocking stream reach is within Mexican spotted owl (MSO) critical habitat (CH), and also occurs in a buffer. At the northern end of the stocking stream reach, 0.26 miles is within critical habitat and 0.55 miles is in the buffer with the rest of the stocking stream reach outside of critical habitat. There appears to be angler access along the whole stocking stream reach based on topographic and world imagery maps.

Potential Impacts

The stocking site, extended area for fish movements from the stocking site, and/or the area of potential angler access are within the 0.25 mile buffer around MSO PACs in the general vicinity of the site. No physical effects to MSO habitat in the PAC are anticipated, since anglers are not expected to be present in the PAC. There may be some disturbance to MSOs from human presence and associated noise if those owls are using the edge of the PAC or the buffer area for foraging or other normal activities. The disturbance effects do not occur in the PAC where nesting, roosting, and most foraging occur.

Indirect effects may include actions that can affect forest structure and maintenance of adequate prey species identified as PCEs or KHCs These actions may include trampling of vegetation, soil compaction, removal of woody debris, or other physical degradation potentially altering the productivity and succession/regeneration of the vegetation. In the designation of critical habitat (USFWS 2004) most recreational activities, including angling, were not identified as requiring restrictions to protect the PCE's of critical habitat from destruction or adverse modification. In making that statement, recreational activities including angling, were assumed to not contribute to significant habitat-affecting activities such as cutting large trees or snags, removal of large woody debris from the forest floor, altering the tree species diversity, or other large-scale changes to habitat structure. The act of a relatively small number of people walking through habitat is not likely to cause the kind of effects that would result in adverse effects to the PCEs/KHCs of MSO CH and/or restricted and protected habitats.

Haigler Creek

Site Description

Haigler Creek is located 10 miles north of Young, near FR200 within the Tonto National Forest; it is a tributary to Tonto Creek in the area known as Hells Gate (Figure 48). The headwaters are located between the Naegelin Rim and the Mogollon Rim in the vicinity of Colcord Mountain. Haigler Creek begins at the confluence of Naegelin and Lost Salt Canyons at 7000 ft in elevation. The stream is perennial from the Colcord Canyon confluence to its confluence with Tonto Creek at 4500 ft elevation, a distance of roughly 15 miles. The watershed drains an area of approximately 114 square miles.

Land ownership is primarily Tonto National Forest land, but there is a private inholding between Haigler Canyon Campground and Fisherman's Point, and several other inholdings between Haigler Canyon Campground and Alderwood Campground. Land ownership within a 1 mile buffer along Haigler Creek is comprised of Tonto National Forest (98%) and private lands (2%) (Voeltz 2002). Haigler Creek enters the Hellsgate Wilderness about 1 mile downstream of Alderwood Campground.

Haigler Creek is managed by the Tonto National Forest for recreation, including camping, picnicking, hiking, bird watching, fishing, hunting, and water activities. The Haigler Canyon Campground and Alderwood Campground provide camping opportunities. Haigler Creek is accessible by a road seasonally during the months of April through November. There are four points of access to the creek: Haigler Canyon Campground, Alderwood Campground, Hells Gate, and Fisherman's Point. Fisherman's Point is only accessible by hiking.

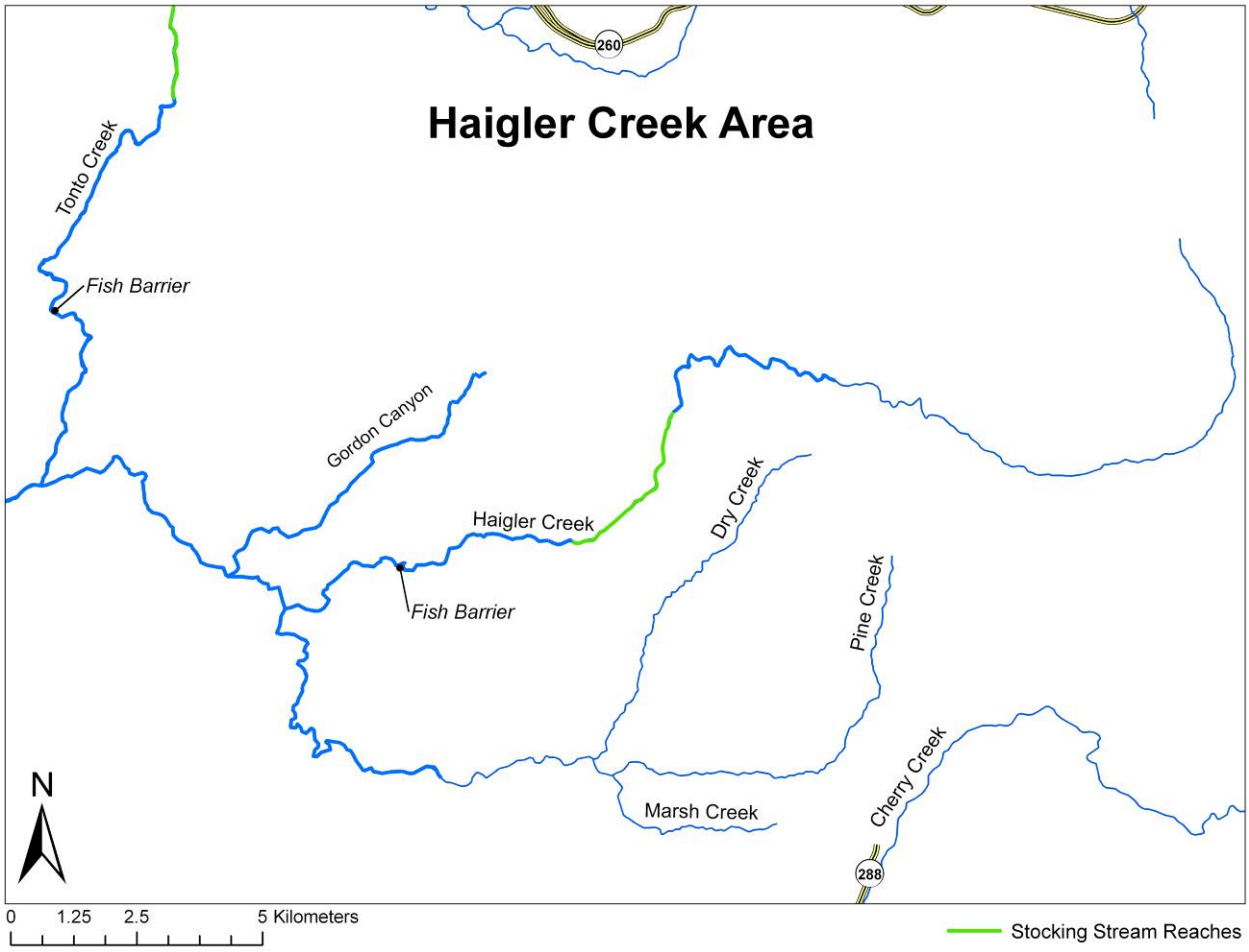

Figure 48. Overview map of Haigler Creek Stocking area.

Marsh Creek is also a tributary to Haigler Creek. Its headwaters originate along the southwestern slopes of the Naegelin Rim, north of Young (Figure 44). It flows from its headwaters at an elevation of roughly 6790 ft to its confluence with Haigler Creek at an elevation of approximately 4500 ft. Marsh Creek enters Haigler Creek roughly one mile upstream from Gordon Canyon. Land ownership of Marsh Creek is 98% Tonto National Forest and 2% private lands. Pine Creek and Dry Creek are intermittent streams that are tributaries to Marsh Creek (Figure 3).

Gordon Canyon is a tributary to Haigler Creek that flows in a southwesterly direction through the Tonto National Forest, before its confluence less than a mile downstream of the Marsh/Haigler confluence (Figure 3). Land ownership within a 1 mile buffer along Gordon Creek is comprised of 98% Tonto National Forest and 2% private lands (Voeltz 2002). Its headwaters are located between Turkey Peak and the Mogollon Rim, and the stream follows a generally southwesterly course towards Haigler Creek. Gordon Canyon was historically stocked with trout (Table 38) but is no longer proposed for future stocking.

Management of Water Body

Haigler Creek is managed as cold water intensive use, put-and-take rainbow trout fishery in the spring and summer months (Table 39). Upper Haigler Creek (above the stocking reach) and Gordon Canyon are managed as hike-in wild rainbow and brown trout fisheries. A creel survey was done in 1990. The creel census summary shows a 32% success rate for all anglers with a harvest rate of 0.34 fish per hour. A statewide survey of 2001 anglers showed 1,777 angler use days for Haigler Creek (Pringle 2004).

Table 38. Stocking History for Gordon Canyon.

Species	First Year	Last Year	Num. of Years stocked	Num. Stocked
Brook trout	1947	1947	1	1,000
Rainbow trout	1942	1975	123	34,924
			Total	35,924

Table 39. Stocking History for Haigler Creek.

Species	First Year	Last Year	Num. of Years stocked	Num. Stocked
Bluegill	1995	1995	1	13
Brook trout	1979	1986	3	1,200
Brown trout	1948	1991	9	38,600
Native trout*	1938	1938	1	7,000
Rainbow trout	1933	2008	75	600,718
Razorback sucker	1987	1987	1	10,000
			Total	657,531

**Historical record – listed as "Native trout", no species specified.*

Proposed Action

The Department proposes to stock catchable rainbow trout in Haigler Creek from April through August each year; numbers of trout may be from 0 to 16,000 fish annually for the period covered under this consultation.

Water Distribution / Connectivity

Haigler Creek is a perennial stream to its confluence with Tonto Creek. A number of natural barriers and one man-made barrier exist on this creek (Figure 3). Marsh Creek, a tributary of Haigler Creek, is perennial with certain sections going dry during the warmer months. In June 2009, approximately a mile of Marsh Creek was dry from 1 mile east of Marsh Creek Ranch to ¼ mile from its headwaters. No barriers were noted on Marsh Creek (Duffy 2005). Pine Creek and Dry Creek are intermittent streams which are tributaries of Marsh Creek (D. Daniels pers. comm.). More specific information regarding the water distribution of Pine and Dry Creeks are unknown, but these streams would likely flow into Tonto Creek in a flood event. Gordon Canyon

is perennial with sections located outside of the canyon stretches going dry in the warmer months of dry years. A number of smaller natural barriers exist between the Gordon Canyon confluence and the confluence with Tonto Creek.

Fish Movement

Several barriers exist on Haigler Creek that would prevent the upstream migration of fish. The first known natural barrier is downstream of Fisherman's Point just before the stream enters a private parcel of land (C. Gill pers. comm.). This is a definite barrier to the upstream movement of all fish species, substantiated up by the fact that a recent survey did not collect any stocked trout above this point (Gill 2009a). The second barrier is located on the parcel of private land between Fisherman's Point and the Haigler Canyon Campground. This barrier is created by a diversion dam that has been reinforced by travertine over time. It is a barrier to most fish species but may allow the passage of some fish that might overcome the water velocities at high flows. The next barrier, a natural waterfall over 30 feet high in a canyon-bound section of stream (Figure 5), is downstream of Alderwood Campground (Kern 2008c), and is a clear-cut barrier to all fish species at all flow levels.

There are several barriers to upstream fish movement on Gordon Canyon, the first of which is a waterfall approximately 3 miles upstream of the confluence with Haigler Creek. Other smaller natural barriers exist between the Gordon Canyon Confluence and the confluence with Tonto Creek. However, stocked fish have the ability to move freely downstream to the confluence of Tonto Creek. The fact that a naturally reproducing populations of rainbow trout exists downstream of the first waterfall below Alderwood Campground (Kern 2008c) suggest that stocked fish have in fact moved downstream at some point in the past. Rainbow trout have not been sampled downstream of Hells Gate at the confluence of Tonto Creek and Haigler Creek since 1970.

Additionally, Kern (2008d) documented a young of year rainbow trout in lower Gordon Canyon Creek, suggesting the ability of stocked fish to move at least part way up the stream but seem to be limited by the intermediacy of the creek, warmer temperatures, and by the natural barrier (C. Gill pers. comm. and C. Cantrell pers. comm.). A survey of upper Marsh Creek in 2005 did not detect either rainbow or brown trout (Duffy 2005), but both rainbow and brown trout have been documented in Marsh Creek in the past (LCRB Aquatic GAP). Whether these fish originated from stock ponds in the watershed or moved up from Haigler Creek is unknown, but suggests stocked fish from Haigler Creek, Tonto Creek, or Christopher Creek may be able to move up Marsh Creek and into Pine and Dry Creeks during the cooler months or during flood events.

Fish have the ability to freely move downstream from the stocking locations to Tonto Creek and beyond. Once fish reach Tonto Creek they would be subject to the same controls limiting their long-term survival as discussed in the Tonto Creek section.

Community Description

Haigler Creek contains a population of headwater chub (Minckley and DeMarais 2000; Voeltz 2002). Surveys reporting headwater chub from Haigler Creek were done in the 1980's and 1990's, and report headwater chub present from the vicinity of the Marsh Creek confluence and below (Voeltz 2002).

The historic fish assemblage of Haigler Creek is very similar to that previously described for Tonto and Christopher Creek. Data since 1980 from Haigler Creek indicate that the fish assemblage is comprised of both native and non-native species (Table 40). Fish collection data are available from the following years at locations that varied by year: 1984, 1990, 1992, 1993, 2000, and 2008 (Kern 2008c). Headwater chub collections in the last 20 years are from lower portions of Haigler Creek, the nearest of which is 1.4 miles downstream from the trout stocking area.

Holycross et al. (2006) reported rainbow trout, desert suckers, and longfin dace from Haigler Creek near Alderwood recreation area. Surveys conducted in August 2009 found the same three species plus brown trout at Alderwood. Desert suckers and longfin dace dropped out in surveys further upstream (Gill 2009a).

The most recent survey of lower Haigler Creek in 2008 resulted in observations of natural reproducing rainbow and brown trout below Alderwood Campground (Kern 2008c). From Alderwood Campground downstream to a large barrier waterfall, stocked rainbow trout, wild brown trout, and wild rainbow trout comprised the majority of the fish community. Headwater chub were first observed downstream of the waterfall barrier and were present down to the confluence of Marsh Creek. Multiple age classes of headwater chub, rainbow trout, and brown trout were observed in this stretch. Wild rainbow trout were observed all the way downstream to the confluence with Tonto Creek and rainbow and brown trout were observed just upstream of the Haigler Creek and Tonto Creek confluence in 1993. Suitable habitat for headwater chub exists upstream of the large waterfall barrier, although habitats generally become smaller and shallower closer to Alderwood campground, and if once historically present in these reaches, headwater chub would be considered extirpated from them today with limited potential for successful reintroduction due recreational pressure (C. Cantrell pers. comm.).

Table 40. AGFD Fish Collection History from Haigler Creek. An "X" indicates that species was collected or observed from the stream in that year.

Species	**1984**	**1990**	**1992**	**1993**	**2000**	**2008**	**2009**
Rainbow trout	X	X	X	X	X	X	X
Juvenile rainbow trout	X	X	X	X	X	X	X

Species	1984	1990	1992	1993	2000	2008	2009
Brown trout	X		X	X	X	X	X
Longfin dace	X		X	X		X	X
Headwater chub	X			X		X	
Speckled dace		X		X	X	X	
Desert sucker		X	X	X		X	X

A spot survey of Upper Marsh Creek in 2005 reported headwater chub, longfin dace, and green sunfish (Duffy 2005). Headwater Chub were also abundant during surveys in 2000 (Timmons and Weedman 2000). Green sunfish were abundant, rainbow trout were common, and brown trout were rare but observed. No crayfish were found in Marsh Creek. Pine Creek and Dry Creek are tributaries to Marsh Creek and no records are found regarding their aquatic assemblages.

Gordon Canyon also supports headwater chub (Minckley and DeMarais 2000; Voeltz 2002; Kern 2008d). A fairly recent (2000) fisheries survey of Gordon Canyon identified headwater chub and longfin dace from a point approximately 1 stream mile upstream of the Ellinwood Ranch. A 1993 survey identifies desert sucker, longfin dace, and headwater chub at approximately 1 mile downstream of Ellinwood Ranch near the Haigler Creek confluence (Voeltz 2002; AZGFD Statewide Fish Distribution Database). The most recent survey in 2008 identified desert sucker, headwater chub, and longfin dace in Gordon Canyon (Kern 2008d). Headwater chub were first seen approximately 2 miles north of the confluence of Haigler Creek and Gordon Canyon. A wild young of year rainbow trout was also seen in this stretch. In 1993, young rainbow trout were also sampled below the barriers; 5 trout ranging from 140 mm to 219 mm. Both the headwater chub and the wild young of year rainbow trout were found below the series of barriers. Rainbow trout were stocked below the barriers in the creek until 1975.

Historical records for Chiricahua leopard frogs exist in the vicinity. Narrow-headed garter snakes are known from Haigler Creek, with the most recent record in 2008. Northern Mexican garter snakes are known from Tonto Creek near Gisela. Crayfish are common throughout much of Haigler Creek and Gordon Canyon. Adult and tadpole canyon treefrogs were seen in lower Haigler Creek and Gordon Canyon (Kern and Burger 2008).

Consultation Species or Critical Habitat

Potential impacts to northern and Chiricahua leopard frogs, roundtail and headwater chub, bald eagle and Mexican spotted owl are addressed below. Potential impacts from stocked fish

movement downstream and into northern Mexican and narrow-headed gartersnakes are discussed in the Tonto Complex analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Chiricahua and Northern leopard frogs are analyzed at a local and broad scale due to the movement potential into the stocked area and fish movement potential up or downstream into areas where frogs may occur.

Bald Eagle

Woods Canyon Breeding Area is located approximately 8.5 miles from Haigler Creek. The Haigler Creek stocking reach is within the Bald Eagle DPS. The eagles were first observed at the breeding area in 2008 and were last observed in 2009. Nest watchers were able to observe the prey types and in some cases species that were delivered to the nest by the eagles. In 2009 fish accounted for 98.5%, mammals for 0.7% and unknown for 0.7%. Of the prey items further identified to species, rainbow trout accounted for 99.3% and ground squirrels for 0.7%. Woods Canyon Breeding Area productivity data shows that the nest failed in 2008 when an intense late spring snow storms occurred a few days before the confirmed failure. In 2009 the nest was successful (McCarty and Jacobson 2008, 2009). Haigler Creek does not currently have monofilament bins present.

Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site.

Non-breeding bald eagles can occur within the vicinity of the stocking site and may be present at any time of the year. The amount of human disturbance at this site may result in effects to roosting or foraging that may affect the eagles' use of the site. Non-breeding eagles normally move between available sites so the reduction in use of a particular stocking site may not be significant.

Chiricahua Leopard Frog

Local Analysis: Although Haigler Creek and the Tonto Creek buffered stocking complex are within the historical range of the Chiricahua leopard frog, the likelihood that frogs could be

exposed to stocked fish in the buffered stocking complex that includes Haigler Creek is low. There are no historical records for Chiricahua leopard frogs from the Haigler Creek stocking reach; however, there are historical records for Chiricahua leopard frogs from 2 sites in the buffered complex, one of which includes current observations at Ellison Creek (=Highline Trail) (1995), and Unnamed Trib. of Ellison Creek (East of Pyle Ranch) (1997). There have been 108 surveys at 55 sites within the buffered stocking complex between 1937and 2007, with most surveys conducted between 1968 and 2007 (Figure 5, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Chiricahua leopard frogs were observed during surveys at Ellison Creek (=Highline Trail) (1997, 1998 and 2006). Chiricahua leopard frogs were not observed during subsequent surveys at Unnamed Trib. of Ellison Creek (East of Pyle Ranch) (2005 and 2007) (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). The Black Mesa Ranger District of Tonto National Forest surveyed 6 additional sites within the buffered stocking complex in 2004 and did not observe any Chiricahua leopard frogs (Dated provided by Black Mesa Ranger District, Tonto National Forest). Although there are current records of Chiricahua leopard frogs at Ellison Creek (= Highline Trail) (1995), the likelihood that fish stocked in Haigler Creek would have an impact on Chiricahua leopard frogs is low because fish and frogs are in 2 different drainages flowing into 2 different major rivers. In addition, the five mile overland distance between Ellison Creek and Haigler Creek exceeds that which Chiricahua leopard frogs would likely disperse overland.

Broad Scale Analysis: If fish were to disperse from Haigler Creek, the likelihood that they would impact Chiricahua leopard frogs is low. There are no historical records for frogs in Haigler Creek or its tributaries where fish may disperse outside the buffered stocking complex (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, it is unlikely Chiricahua leopard frogs that occupy Ellison Creek would disperse into Haigler Creek because the area between Ellison and Tonto Creeks does not contain suitable habitat for leopard frogs and the five mile overland dispersal distance exceeds that from which a Chiricahua leopard would be expected to disperse.

Northern Leopard Frog

Local Analysis: Although Haigler Creek and the Tonto Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that northern leopard frogs could be exposed to stocked fish in the buffered stocking complex that includes Haigler Creek is low. There are no historical records for northern leopard frogs from Haigler Creek; however, there are historical records for northern leopard frogs from 2 sites in the buffered complex at Unmarked Pond (= Cindy's Pond) (1984) and Woods Canyon Lake (= Spillway Recreation Site) (1968). There have been 108 surveys at 55 sites within the buffered stocking complex between 1937and 2007 (Figure 5, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.), with most surveys conducted between 1968 and 2007. Northern leopard frogs were not observed during subsequent surveys at Unmarked Pond (= Cindy's Pond) (1997 and

1998) and Woods Canyon Lake (= Spillway Recreation Site) (1992 and 1995) (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Given that the area within the Tonto Stocking Complex has been well surveyed and subsequent surveys have reported negative observations, it is likely that northern leopard frogs no longer occupy Unnamed Pond (=Cindy's Pond) or Woods Canyon Lake (= Spillway Recreation Site) (1968).

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing fish stocked in Haigler Creek is low, because there are no historical records for frogs in Haigler Creek or its tributaries where fish may disperse outside the buffered complex. (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the habitat in these drainages is less suitable for northern leopard frogs due to the presence of non-native fish, crayfish, and bullfrogs.

Headwater Chub

Haigler Creek contains a population of headwater chub (Minckley and DeMarais 2000; Voeltz 2002). Surveys reporting headwater chub from Haigler Creek were done in the 1980's and 1990's and report headwater chub present from the vicinity of the Marsh Creek confluence and below (Voeltz 2002). Headwater chub collections in the last 20 years are from lower portions of Haigler Creek, the nearest of which is 1.4 miles downstream from the trout stocking area. In 2008, Headwater chub were not found above the waterfall located below Alderwood Campground, but became increasingly abundant below the waterfall with several age classes observed (Kern 2008c). In the lower reaches of Haigler Creek, headwater chub were the most common fish observed. Voeltz (2002) described this population as stable-threatened.

Potential Impacts

Rainbow trout are a potential predator on headwater chub larvae and small juveniles (Propst et al. 1998). The majority of the rainbow trout observed in the reach shared with headwater chub were wild (Kern 2008c), although some stocked fish are also likely in the area. In many instances across headwater chub occupied sites, headwater chub seem to coexist with trout species where low human use (i.e. development, recreational pressure (camping, hiking, angling, etc…), livestock pressure, roads, etc…) occurs. While the precise distribution of headwater chub is not known for many of these sites, it is possible that intensively used recreational sites have resulted in fewer chub occurring there; however it is equally possible that chub were not common in these areas historically (C. Cantrell pers. comm.). There may also be competition for food and space in pools through the habitat area, and both adult rainbow trout and headwater chub were observed preying on small crayfish (Kern 2008c).

Rainbow trout dominated the upper reach between the waterfall and its confluence with Marsh Creek. Headwater chub were a smaller component of the community. Below Marsh Creek rainbow trout became rarer and headwater chub dominated the community to the confluence with Tonto Creek. Multiple age classes of headwater chub were found in all sections of Haigler

Creek below the waterfall, so the determination of a stable population is appropriate (Kern 2008c). However, there may still be some predation and competition between stocked and wild rainbow trout and headwater chub, particularly in the reach above the confluence with Marsh Creek. Propst et al. (1998) documented that newly stocked rainbow trout quickly began to feed on the same items as wild rainbow trout, including eating small fish.

Any stocked trout that exit the stocking area over the waterfall augment the existing rainbow trout population in the creek below, and may exert additional pressure on the headwater chub. It is unclear what difference exists between the upper and lower reaches of the occupied habitat that results in the observed distribution. It may be that there are significant changes to the habitat downstream that favor headwater chub over rainbow trout that are not immediately apparent.

Young of the year rainbow trout were found in lower Gordon Canyon in 2008 (Burger 2008). Headwater chub were found both upstream and downstream of where the trout were found. The best chub habitat was found in the canyon stretches of Gordon Canyon. The sections that were not in canyon habitat showed evidence of seasonal drying and had less flow.

If stocked fish were to move out of Haigler Creek into Tonto Creek, their potential effects would be the same as described in the Tonto Creek section.

Mexican Spotted Owl and Critical Habitat

The northern 1.4 miles of the stocking stream reach is within Mexican spotted owl (MSO) critical habitat (CH) while the southern 2.8 miles of the stocking stream reach is outside of the critical habitat.

Potential Impacts

The CH designation included most other protected and restricted habitats for the MSO. Indirect effects to CH may include actions that can affect forest structure and maintenance of adequate prey species identified as PCEs. These actions may include trampling of vegetation, soil compaction, removal of small woody debris or other physical degradation potentially altering the productivity and succession/regeneration of the vegetation. In the designation of critical habitat (USFWS 2004) most recreational activities, including angling, were not identified as requiring restrictions to protect the PCE's of critical habitat from destruction or adverse modification. In making that statement, recreational activities, including angling, were assumed to not contribute to significant habitat-affecting activities such as cutting large trees or snags, removal of large woody debris from the forest floor, altering the tree species diversity, or other large-scale changes to habitat structure. The act of a relatively small number of people walking through habitat is not likely to cause the kind of effects that would result in adverse effects to the PCEs/KHCs of MSO CH and/or restricted and protected habitats.

TONTO CREEK COMPLEX ANALYSIS

This complex analysis focuses on the segment of Tonto Creek below the stocked reaches, Hells Gate to Roosevelt Lake (Figure 42) with respect to water distribution/connectivity, fish movement, and the associated potential impacts. As discussed in the narrative above, the potential for trout movement downstream into the lower section of Tonto Creek may occur.

Water Distribution / Connectivity
Tonto Creek transitions approximately one mile below Bear Flat Campground at the Hellsgate Wilderness, into a deep canyon-bound perennial stream with limited access. Tonto Creek is seasonally intermittent below Gun Creek, where the stream channel becomes wider and braided as it flows through a broad alluvial basin. There are two peak flow periods, one occurring in the winter/spring as a result of precipitation and snowmelt at higher elevations, and the second in the summer is due to monsoonal rains (Figure 45). The creek water level in the lower basin falls below the level of the streambed, creating dry sections above Roosevelt Lake during part of the year. Refer to the Tonto Creek water distribution/connectivity section for the detailed discussion of the tributaries for this stream section.

Fish Movement
Upstream fish movement is restricted due to barriers in the upper reach of Tonto and Haigler Creeks (Figure 42).

Fish have the ability to freely move downstream from the stocking locations to Tonto Creek and beyond. Once fish reach Tonto Creek they would be subject to the same controls limiting their long-term survival as discussed in the Tonto Creek section.

Rainbow trout typically are stocked in greater numbers in April and May when surface water is at or near base flow, peak flood events are the most infrequent, and water temperatures in the lower basin become lethal to salmonids.

Consultation Species or Critical Habitat
Chiricahua and Northern leopard frogs were analyzed at a local and broad scale level (Figure 5) as addressed previously in the site consultation species analysis.

Potential downstream impacts from the proposed stocking locations in the Tonto Creek Complex on headwater chub, northern Mexican and narrow-headed gartersnakes are discussed below.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen

or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Northern Mexican gartersnakes are analyzed on a complex and downstream scale due to the movement potential into the stocked area and fish movement potential up or downstream into areas where the snakes may occur.

Chiricahua Leopard Frog
See **Local** and **Broad Scale** analyses under each stocking location.

Northern Leopard Frog
See **Local** and **Broad Scale** analyses under each stocking location.

Headwater Chub
Headwater chub are found in the main stem of Tonto Creek below the waterfall located below Bear Flat Campground and at least to Hells Gate (Kern 2008b). Headwater chub were also found downstream in Tonto Creek to at least Spring Creek in May 2007 (Burger 2007). The population in Rye Creek is thought to be extirpated due to limited water and habitat (Voeltz 2002).

Potential Impacts
As stated above, rainbow trout are proposed for stocking into Christopher Creek, Tonto Creek, and Haigler Creek from April through October. In addition to stocked rainbow trout, wild self-sustaining rainbow trout and/or brown trout are found throughout the Tonto Creek's watershed. They are found in Christopher Creek and its tributaries, Haigler Creek and its tributaries, Horton Creek, and Spring Creek and its tributaries. Surveys have found not only the stocked size rainbow trout but also young of year rainbow trout throughout the watershed (Table 34). The presence of trout smaller than the size that is consistently stocked, which is 8 inches, is indicative of natural reproduction and a self-sustaining population of rainbow trout.

Although the proposed action is stocking trout from April through October, the highest stocking numbers usually occur in April and May, which is typically the driest months of the year. This reduces trout movement in normal years until higher flows typically occur in December, January, February, and March. Rainbow trout movement is further limited by high harvest rates during the warmer dry months. The time period that stocked rainbow trout potentially would have greater effects on headwater chub in Tonto Creek would likely be in the winter and early spring. Flows that could wash fish into the section of Tonto Creek occupied by headwater chub typically occur from December through March (Figure 3). This is also the period when stream temperatures are likely to be suitable for rainbow trout.

The rainbow trout stocked in the upstream stocking reach of Tonto Creek, as well as the rainbow trout stocked into Christopher and Haigler Creeks, can move down the creek and ultimately into

Roosevelt Lake during flood events and winter months, however it has been well documented and stated above within fish movement and fish community that the extent of the rainbow trout lessens from Bear flat campground to nearly nonexistent downstream of Haigler Creek and absolute downstream of the town of Gisela.

Rainbow trout do share habitat with headwater chub in Tonto Creek, below Bear Flat Campground and north of Gisela as well as in downstream portions of Haigler creek and its tributaries. It is not known how many of the stocked rainbow trout are moving into these areas and how many trout in this area are wild trout from the naturally reproducing population in the stream. The large number of angler-use days and observed catch rates suggest that most of the stocked fish are harvested soon after being stocked, and it is more likely that the trout below Bear Flat Campground in Tonto Creek have long been established and are self-sustaining.

It is possible for stocked rainbow trout to move downstream from the stocked reaches and then upstream into Tonto Creeks tributaries. However, this is limited due to intermittent and dry stretches in the tributaries, as well as natural barriers. The only creek where it is possible for stocked rainbow trout from Tonto Creek to move into occupied headwater chub populations is Spring Creek. Rainbow trout have not been sampled in Spring Creek since they were stocked in 1950, which suggests some unknown barrier to their movement into Spring Creek. Haigler Creek has barriers in its lower reach, and the remaining tributaries do not have existing populations of headwater chub.

During a June survey, Kern (2008b) did not detect rainbow trout downstream of the Haigler Creek confluence, but did collect yellow bullhead and green sunfish. This suggests that by June, Tonto Creek below Hells Gate is not suitable for rainbow trout survival, and begins to transition into more of a warm water stream at this point. Only one trout has been observed south of Hells Gate. The time of year of this record is unknown. Further, Burger (2007) did not detect any rainbow trout during a survey from Hells Gate to Gisela, again suggesting that below Hells Gate, Tonto Creek becomes unsuitable for rainbow trout, at least by late spring when both of these surveys occurred. Trout have not been found in Rye Creek, Gun Creek, or Tonto's tributaries below Hells Gate that have contained headwater chub in the past, but are currently thought to be extirpated (Voeltz 2002).

Rainbow trout are competitors for food and space with roundtail and headwater chub, and may also prey on young chub (Propst et al. 1998). Exposure of headwater chub to stocked trout could occur in lower Tonto Creek, but not in the stocked reach of Tonto Creek due to the presence of barriers that restrict upstream movement of headwater chub; however, the impacts cannot be separated from those of trout that appear to be self-sustaining in the system. It is possible that stocked trout could be supplementing those self-sustaining populations, although the extent to which this may be occurring is unknown. Small trout can compete with small headwater chub, but can also serve as a prey source for larger headwater chub. Surveys of both upper and lower

Tonto Creek show a large part of the fish populations to be exotic species such as brown trout, common carp, yellow bullhead, green sunfish, red shiner, channel catfish, and largemouth and smallmouth bass. Given the community composition, these other nonnative fish species as well as brown trout, if present in this reach, likely contribute a larger piece the overall impacts to headwater chub via predation and competition than stocked trout.

Suitable spawning temperatures for headwater chub are likely to occur in the occupied headwater chub habitat during the stocking season. This creates an additional risk of predation on larval or post-larval individuals by resident and stocked rainbow trout. Although specifics on when headwater chub spawn in Tonto Creek are lacking, temperatures of 64° to 76° F are reported for spawning headwater chub in the upper Verde (Brouder et al. 2000) and upper Gila Rivers (Bestgen 1985). Little data on stream temperature has been collected for the lower basin.

Northern Mexican Gartersnake

Stocking complex analysis: The distribution of northern Mexican gartersnakes within the Tonto Creek complex is incompletely known, but habitats adjacent to the stocking complex are generally not considered suitable for this species. Holycross et al. (2006) surveyed the Tonto Creek watershed extensively for gartersnakes, but found no northern Mexican gartersnakes. Within the 20 km (12.4 mi) buffer established for this stocking complex, there is one questionable northern Mexican gartersnake record from Hart Canyon, a tributary of Willow Creek (approx 8.7 air miles north of Woods Canyon Lake and approx. 8.7 air miles southwest of Chevelon Canyon Lake), for which Holycross et al. (2006) provides this analysis: "Wright and Wright (1957) discuss a *T. eques* from Hart Canyon....and provide both a physical description and photographs (p. 802). Unfortunately, it is difficult to tell from the photographs or description whether or not this specimen is a *T. eques*, so the specimen is not mapped…Whether [this record is valid] is a question that needs to be resolved, if possible." Regardless of the credibility of this record, there have been no systematic surveys for northern Mexican gartersnakes in that area. From the upper reaches of Christopher Creek, it is approximately 8.7 air miles to the Hart Canyon locality. If northern Mexican gartersnakes did occur at the Hart Canyon site, the Mogollon Rim at the headwaters of Christopher Creek at Promontory Point and unsuitable habitat (i.e., relatively dense, mixed coniferous forest) would likely preclude dispersal into the Tonto Creek complex. Surveys for gartersnakes in Tonto Creek between Bear Flat and Haigler Creek in 2004 found none (Holycross et al. 2006). Bullfrogs, crayfish, and non-native fish occupy the complex, making the habitat less suitable for northern Mexican gartersnakes. Steep, rocky canyon habitat in Tonto Creek upstream of the confluence with Haigler Creek probably never supported northern Mexican gartersnakes (Holycross et al. 2006). Therefore, it is unlikely that they occur in the complex. However, there are localities of northern Mexican gartersnakes in Tonto Creek downstream of the complex (see downstream analysis below), and individuals might be able to disperse upstream into the complex. Nonetheless, there is low likelihood that northern Mexican gartersnakes would be exposed to fish stocked in the complex.

Downstream analysis: Tonto Creek downstream of the complex is occupied by northern Mexican gartersnakes. Approximately 16 river miles downstream of Hells Gate, 15 northern Mexican gartersnakes were observed during surveys for the species in 2004, (HDMS, Holycross et al. 2006). Northern Mexican gartersnakes were also observed on Tonto Creek approximately 31 miles downstream of Hells Gate in 1995 (HDMS). Bullfrogs, crayfish, and non-native fish occupy Tonto Creek downstream of the complex, making the area downstream less suitable as habitat for northern Mexican gartersnakes than in areas free of these non native species. But, those conditions also exist where northern Mexican gartersnakes have been documented downstream; thus, there is likelihood that northern Mexican gartersnakes downstream of the complex would be exposed to rainbow trout if they disperse downstream and survive.

Narrow-headed Gartersnake

Stocking complex analysis: Narrow-headed gartersnakes occupy the Tonto Creek complex, which lies within the current and historical range of the species, and are likely found throughout. Holycross et al. (2006) surveyed the Tonto Creek watershed extensively for gartersnakes. Narrow-headed gartersnakes have been found within the Tonto Creek stocking reach in 1988 (HDMS), the Haigler Creek stocking reach in 1992 and 2008 (HDMS), and approx. 0.75 miles downstream of the Christopher Creek stocking reach in 1993 (HDMS). Although the presence of bullfrogs, crayfish, and several non-native fish including common carp, green sunfish, smallmouth bass, and yellow bullhead (Holycross et al. 2006) decreases the suitability of habitat for narrow-headed gartersnakes, recent records, good physical habitat, and connectivity of the habitats make it likely that narrow-headed gartersnakes are present in the complex, and there is likelihood of exposure to stocked rainbow trout within the Tonto Creek complex.

Downstream analysis: Tonto Creek downstream of the stocking complex is occupied by narrow-headed gartersnakes, and was surveyed extensively in 2004 and 2005 (Holycross et al. 2006). From Hells Gate at the Tonto Creek and Haigler Creek confluence, narrow-headed gartersnakes have been observed approximately 7,12, and 18 river miles downstream in 1990, 1999 and 2002, and from 1988-2005, respectively (HDMS, Holycross et al. 2006). Although crayfish and non-native fish species present downstream of the complex (Holycross et al. 2006) make the habitat less suitable for gartersnakes than in areas free of these non native species: however, there is likelihood that narrow-headed gartersnakes downstream of the complex would be exposed to rainbow trout if the trout disperse and survive.

LOWER SALT RIVER SUB-WATERSHED

Drainage Area and Elevations

The Lower Salt River Sub-Watershed includes the waters and drainage basins of the Salt River from Theodore Roosevelt Dam (upper Apache Lake) downstream to the confluence with the Gila River (Figure 49). This watershed includes: the lower Verde River below Bartlett Lake to the confluence with the Salt River, all of the connected tributaries, and the canal systems throughout the metropolitan Phoenix area. This complex drains a surface area of roughly 13,000 square miles. Elevations range from a high of over 2000 ft near Theodore Roosevelt Dam and a low of less than 1000 feet at the confluence of the Salt and Gila Rivers.

The Lower Salt River Sub-Watershed is divided into two complexes: 1) the Lower Salt River Complex, and 2) the Phoenix Metro Complex (Figure 50). The Lower Salt River Complex includes four proposed stocking locations: Apache, Canyon, and Saguaro Lakes, and the lower Salt River reach between Stewart Mountain Dam (Saguaro Lake) and the Granite Reef Diversion Dam. The Phoenix Metro Complex includes 31 proposed stocking locations: Tempe Town Lake, six Open System Urban Fishing Program (UFP) and Fishing in the Neighborhood (FIN) lakes, and 24 Closed System UFP and FIN lakes. The complex analysis includes the lower Verde River below Bartlett Dam because of hydraulic connectivity, although there are no proposed stocking sites in the Verde River drainage in or below Bartlett Dam.

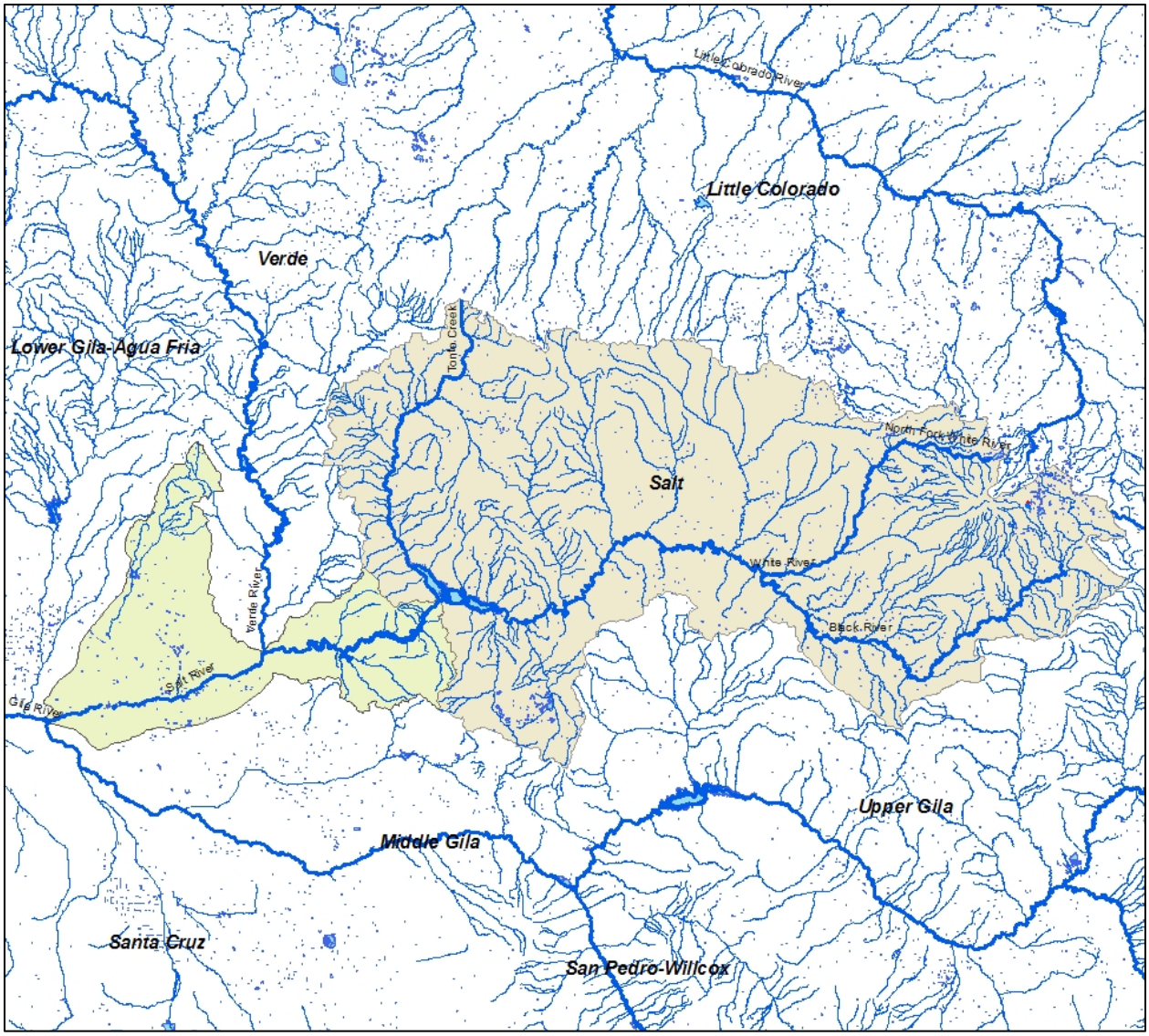

Figure 49. Map of the Salt River watershed with the lower Salt River drainage identified in green.

LOWER SALT RIVER LAKE COMPLEX

Apache Lake

Site Description

Apache Lake is second in a chain of four large reservoirs on the Salt River northeast of Phoenix and is the second largest in surface area. The lake is impounded by the 305 ft Horse Mesa Dam built in 1927. The 2,500 acre lake has a self-sustaining warm water fishery, which in recent years has been negatively impacted by fish kills attributed to blooms of golden alga, an invasive, toxin-producing alga. Apache Lake is actively maintained below its spillway elevation of 1,891 ft. The lake is owned by the Salt River Project (SRP) with the associated recreation areas and

surrounding lands under ownership and management of the Tonto National Forest (TNF). As the second of a series of four sequential lakes along the Salt River, SRP operates Apache Lake and Horse Mesa Dam to optimize water supply deliveries to Phoenix. Horse Mesa Dam is a hydro-electric generating dam providing additional power. The Dam has three conventional hydroelectric generating units rated at a total of 32,000 kW and one pumped storage hydroelectric unit added in 1972 and rated at 97,000 kW (SRP online). Recreation sites at the lake are managed by the TNF for: boating, camping, picnicking and hiking. The Burnt Corral recreation area includes a marina, restaurant, resort hotel, and camping areas.

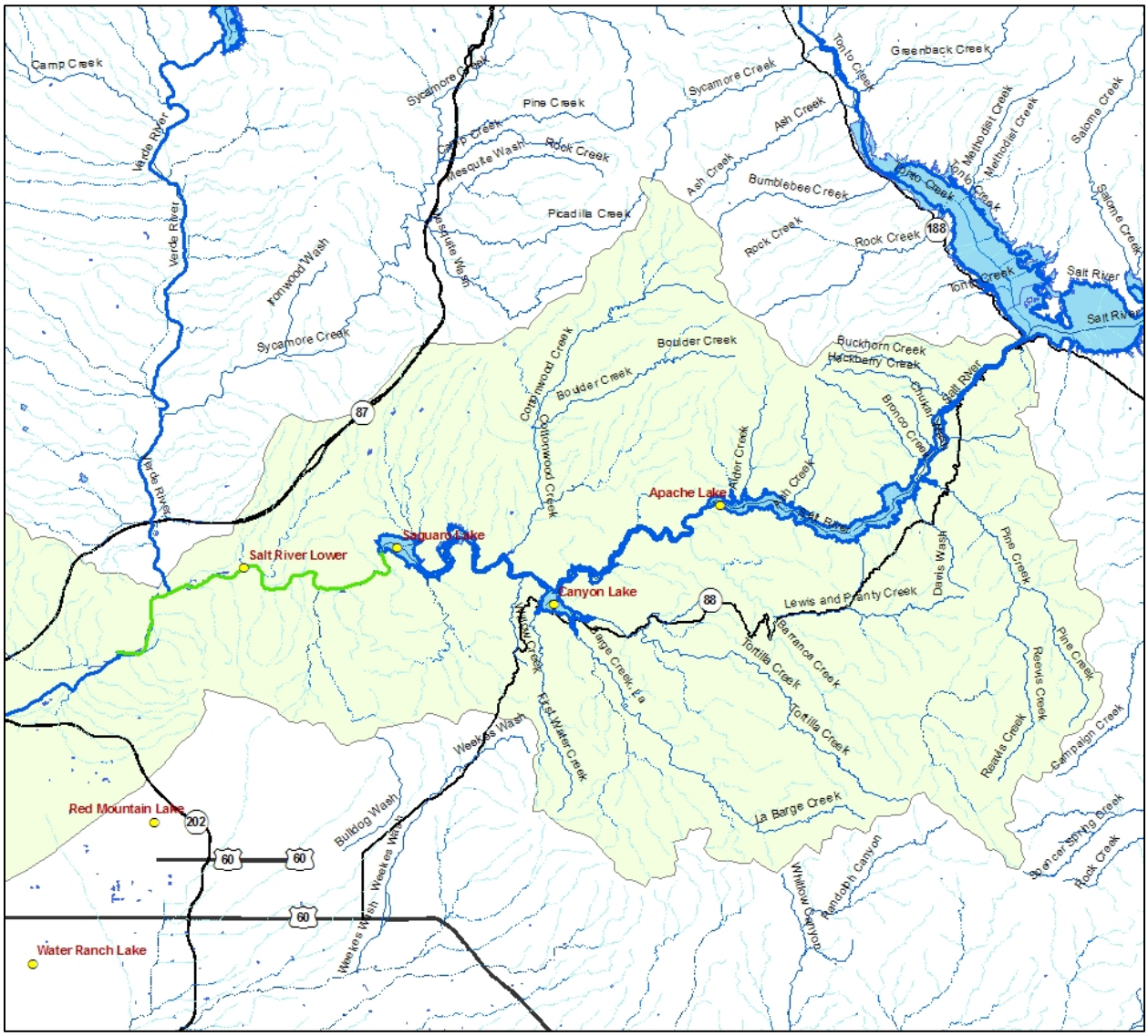

Figure 50. Lower Salt River Sub-Watershed overview with stocking locations.

Management of Water Body

The primary fishery is a warm water self-sustaining fishery. Apache Lake was first stocked by the Department in 1935. Largemouth and smallmouth bass, walleye, bluegill, redear sunfish, yellow perch, and black crappie were stocked over the years to establish a self-sustaining warm water sport fishery for angling recreation by the public (Table 41). Since the discovery of the fish-killing golden alga at Apache Lake in 2005, the main management focus has been to replace and reestablish the popular largemouth bass, smallmouth bass, and walleye fisheries through supplemental stockings. A research project was begun by the Department in 2007 to evaluate the effectiveness of restocking Saguaro, Apache, and Canyon lakes with largemouth and smallmouth bass to recover the warm water fish populations after the fish kills.

The secondary fishery is a coldwater intensive-use, put-and-take rainbow trout fishery throughout the winter months. Apache Lake is typically stocked every 2-3 weeks from early November through February with catchable rainbow trout. Numbers, timing, and size of trout stocked are usually adjusted depending on hatchery fish availability, stocking conditions, variations in angler demand levels, or due to changes in management strategy.

This fishery of Apache Lake has been negatively impacted by alga induced fish kills. Fish kills in lakes of this size are typically not complete kills. The surviving adult and juvenile fish remain to re-populate the fishery beginning with the next spawning season. The impacts from the 2005 algal fish kill on largemouth bass populations were severe at Apache Lake. Very few adults remained, but enough remained and a good spawn of largemouth bass was documented in 2008. The effects of the 2005 golden alga bloom were even more devastating on the smallmouth bass population. A fall 2005 post-kill fishery survey did not document any smallmouth bass (Warnecke et al. 2005a). Small mouth bass were subsequently stocked in 2007 and 2008.

In the fall of 2007 (two years after the initial fish kill), approximately 6,300 juvenile size largemouth bass between 150 and 210 mm were stocked into Apache Lake. Given the size of the lake, it is believed that these supplemental stockings represent a small contribution to the remaining bass population. Six months post stocking 18% of the largemouth bass population was comprised of stocked fish (Stewart 2008), however, 12 months post stocking the stocked bass made up slightly over 1% of the population (Stewart 2009a). The juvenile largemouth bass stocked were just reaching the minimum spawning size (180 - 210 mm) and may have contributed to spawning events in the spring of 2008. How much more successful those spawning events were because of the introduction is difficult to determine. The speed with which the largemouth bass populations rebounded may have been influenced by the stocking, or, the high reproductive successes of the remaining fish could have been sufficient to repopulate the lake. Stocking of adults or sub-adult fish to restore a bass population may be effective or may simply address angler and public concerns about the length of time needed to restore the fishery. It may take up to four years to reestablish a fishery and largemouth bass were stocked in 2009.

Based on a 2001 angler survey conducted by the Department, this lake provides a significant level of recreation: 10,600 angler user days (AUD) for trout (totally supported by the proposed stocking activity) and 147,400 AUD for other species (supported by naturally occurring and self-sustaining populations of warm water fish, with the exception of stocked walleye) (Pringle 2004).

Table 41. Summary of historic Department fish stockings at Apache Lake.

Species	First Year	Last Year	Num. of Years Stocked	Number Stocked
Black crappie	1935	1935	1	300
Bluegill	1935	1954	6	321,050
Coho salmon *	1972	1972	1	25,000
Largemouth bass	1935	2009	29	394,998
Rainbow trout	1972	2009	93	969,744
Redear sunfish	1947	1953	2	36,900
Smallmouth bass	2007	2008	4	8,726
Threadfin shad	1957	1957	1	3,000
Walleye	1972	2009	24	5,842,931
Yellow perch	1953	1953	1	5,824
Total				7,608,473

** No longer found in the system.*

Proposed action

The Department proposes to stock rainbow trout, largemouth bass, smallmouth bass, walleye, channel catfish, and black crappie for the period covered by this consultation.

Catchable and sub-catchable rainbow trout would be stocked multiple times from October through March each year; the numbers of trout stocked would range from 0 to 80,000 fish annually.

Sac fry and fingerling walleye would be stocked anytime annually; numbers of walleye stocked would be from 0 – 2.6 million sac fry annually and from 0 - 52,000 fingerling walleye annually.

Largemouth (fry/fingerling, sub-catchable, catchable), smallmouth bass (fry/fingerling, sub-catchable), channel catfish (sub-catchable, catchable), and black crappie (sub-catchable, catchable), may be stocked as needed at any time during the period covered by this consultation to augment the fishery or to recover the fishery following catastrophic events such as a golden alga kill. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the sport fish stocking protocol.

Water Distribution / Connectivity

Apache Lake is a 17-mile long lake with 41 miles of shoreline, confined between two dams, Horse Mesa Dam (lower end) and Theodore Roosevelt Dam (upper end). Apache Lake has a surface area of 2,568 acres at maximum level and a maximum depth of 255 ft (www.srpnet.com). The lake is operated with the other three interconnected Salt River lakes as one unit for hydroelectric power generation. Roosevelt Lake, upstream of Apache Lake, is the largest lake and the main storage reservoir for the system. Roosevelt Lake receives its water from two large watersheds, the Salt River and Tonto Creek drainages (Figure 51 and Figure 52). Water is released from Roosevelt Lake and travels through the chain lakes (Apache, then Canyon, then Saguaro) and is ultimately released from Stewart Mountain Dam (Saguaro Lake) into the lower Salt River (Figure 53). Water releases from Stewart Mountain Dam into the lower Salt River are seasonally variable, but average approximately 279 cfs daily. Two small ephemeral drainages feed Apache Lake from the north: Alder Creek and Long Canyon.

Apache Lake is operated to maintain a constant balanced level through input from the storage at Roosevelt and pump back from Canyon Lake (downstream). The pumps that transfer water are located at approximately 90 ft depths. In addition to the pumps, the reservoir also contains a bypass valve. Both the pumps and bypass valve can only handle up to 3,000 cfs. If incoming water flow increases above 3,000 cfs and the lake is at full capacity, the water will spill over Horse Mesa Dam and into Canyon Lake (C. Paradzick-SRP- pers. com.). These large runoff events occur on SRP reservoirs an average of once every 10 years.

Please see the following sections for downstream water distribution and connectivity discussion that includes Apache Lake, Canyon Lake, Saguaro Lake and the Lower Salt River as one interconnected complex. Also, the Lower Salt River Complex section discusses the overall water distribution and connectivity throughout this entire complex.

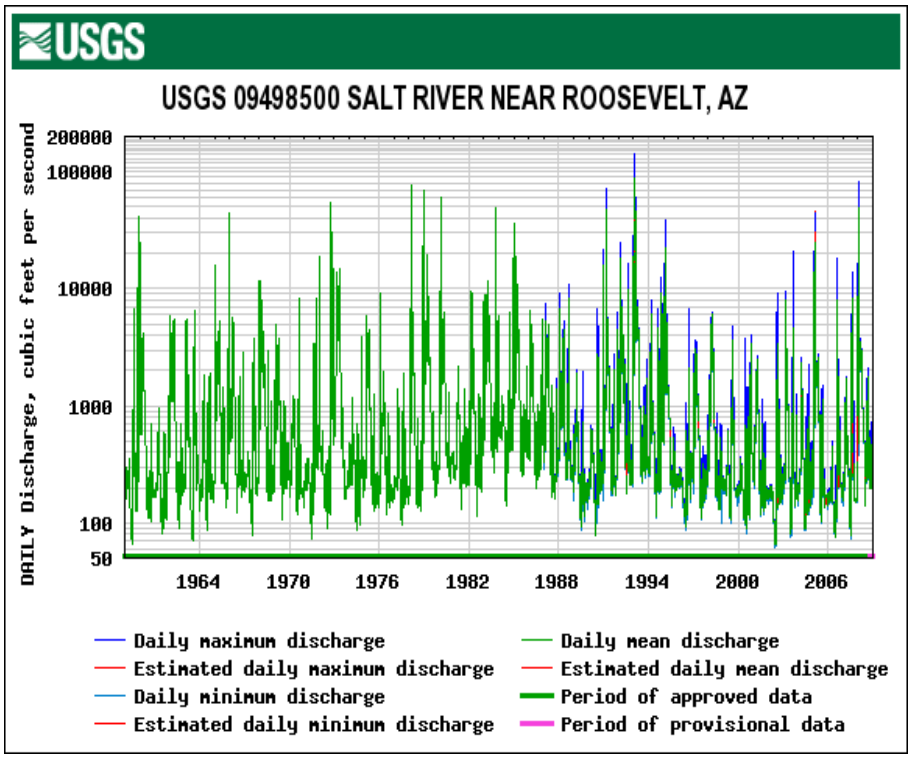

Figure 51. USGS Daily gage discharge at Salt River near Roosevelt, Arizona 1959 – 2009.

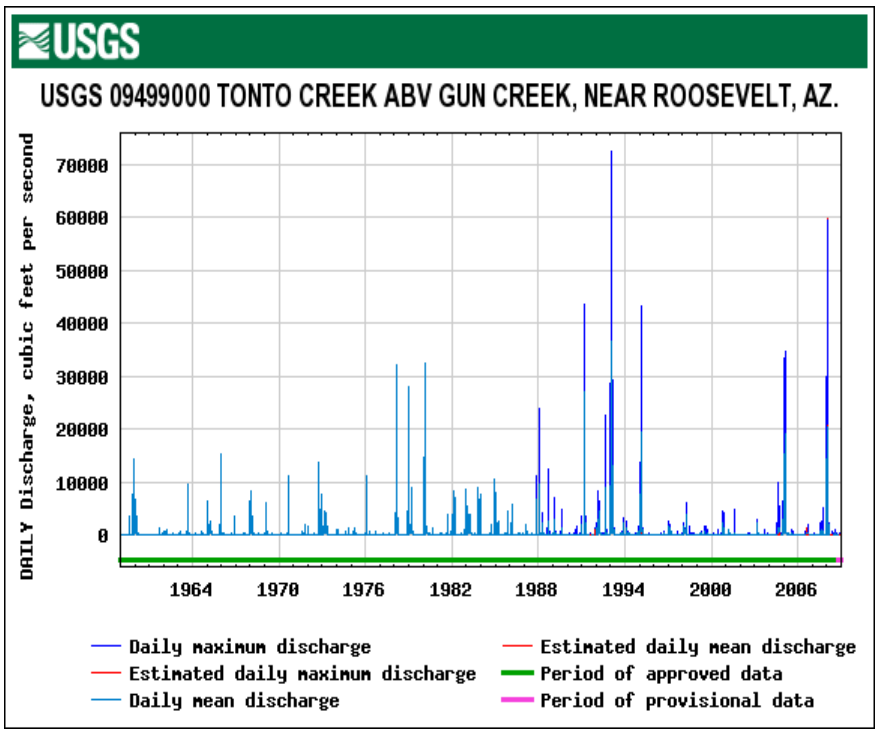

Figure 52. USGS Daily gage discharge at Tonto Creek near Roosevelt, Arizona 1959 – 2009.

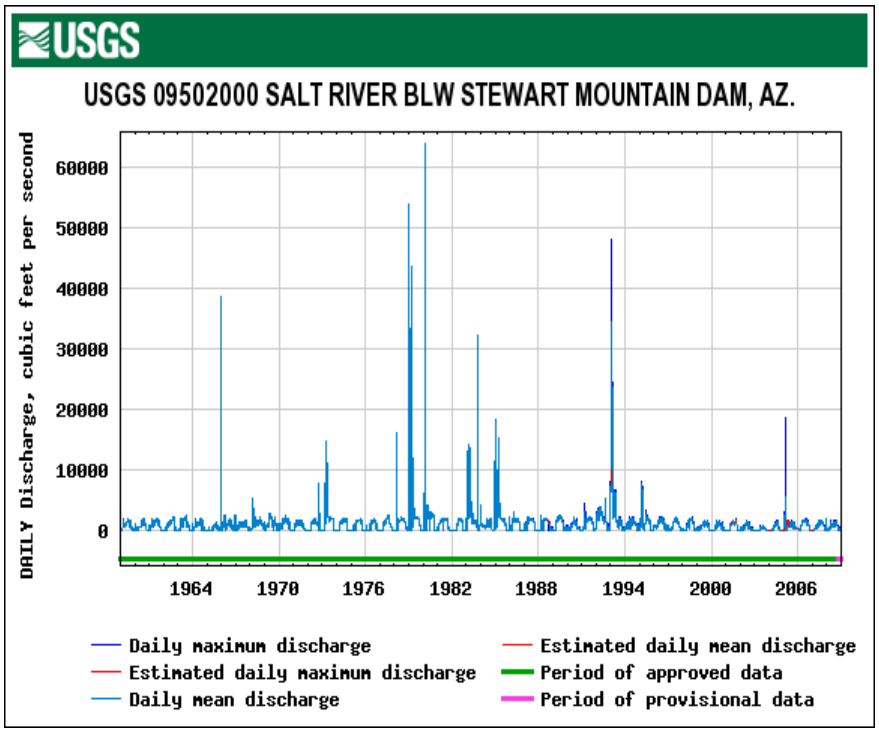

Figure 53. USGS Daily gage discharge at Salt River below Stewart Mountain Dam, Arizona 1959 – 2009.

Fish Movement

Fish within Apache Lake are impeded from upstream movement by the Theodore Roosevelt Dam. Horse Mesa Dam on the lower end confines fish through the penstock releases. As hydroelectric pumps and bypass valves move water through Horse Mesa Dam daily, there is a potential for fish to be displaced downstream into Canyon Lake. Fish moving through the dams would have to be present at the intakes which are located at 90 ft depths; Apache Lake becomes thermally and chemically (dissolved oxygen) stratified during summer; however, due to the pumpback that occurs during night time, the stratification near the dam is less strong, and in some cases nonexistent compared to the rest of the reservoir. The depth of the intake somewhat reduces the likelihood that fish will become entrained and it is expected that few fish would be able to survive passing through the turbines or bypass pipe at these depths. The physical force and cutting edges of turbines utilized in the movement of water through the Horse Mesa Dam would also limit the survival and potential movement of live fish Sale et al 2006.

Water passes over the Horse Mesa Dam spillway during episodic runoff events that occur during years when Roosevelt Lake discharges and spillway overflows exceed 3,000 cfs coming into Apache. Salt River Project dams spill on an average of once every 10 years. The passage of some fish, particularly smaller pelagic or littoral species, may go over the spillway into Canyon Lake.

Please see the following sections for fish as they have the potential to move downstream to Canyon Lake, Saguaro Lake, and the Lower Salt River. Also, the Lower Salt Complex section will discuss the overall fish movement potential throughout this entire complex.

Community Description

The lake contains a variety of nonnative species: common carp, threadfin shad, channel catfish, green sunfish, bluegill, largemouth bass, smallmouth bass, yellow bass, rainbow trout, flathead catfish, and walleye. The most recent surveys conducted at Apache Lake documented the presence of: bluegill, buffalo, channel catfish, common carp, flathead catfish, green sunfish, largemouth bass, mosquito fish, rainbow trout, smallmouth bass, threadfin shad, walleye, and yellow bass (Stewart 2008; 2009a). No rainbow trout were collected in fall 2007. One trout was captured in the fall of 2008 after stocking had begun and 15 were sampled in the spring of 2008 (Table 42).

In the fall of 2007, the Department initiated a research project to evaluate the effectiveness of restocking largemouth and smallmouth bass into Saguaro, Apache, and Canyon lakes to recover the warm water fish populations. Intensive electrofishing and gill net surveys were conducted in fall 2007, spring and fall 2008, and spring 2009 (Table 42).

The two bald eagle Breeding Areas (BAs) in the lake vicinity have birds that use Apache Lake for foraging. The adults may remain in the area year round and continue to use the lake. Yuma clapper rails have not been documented at the lake; however, they have been documented from Roosevelt Lake upstream.

Table 42. Total number of fish sampled with gillnets and electrofishing at Apache Lake from fall 2007 through spring 2009 surveys.

	Electrofishing				**Gillnetting**			
Species	**Fall 07**	**Fall 08**	**Spring 08**	**Spring 09**	**Fall 07**	**Fall 08**	**Spring 08**	**Spring 09**
Bluegill	224	358	714	863	1	0	3	11
Buffalo Fish	5	2	14	11	9	2	15	4
Channel Catfish	8	6	10	6	73	51	71	44
Common Carp	41	17	42	45	43	31	61	42
Flathead Catfish	1	3	1	1	20	7	15	9
Green Sunfish	15	93	367	191	1	2	8	35
Largemouth Bass	48	353	229	446	7	14	27	45
Mosquito fish	1	1	2	0	0	0	0	0

Rainbow Trout	0	0	6	5	0	1	15	0
Smallmouth Bass	0	2	104	44	0	3	27	13
Threadfin Shad	178	1,318	442	727	202	1,173	2,255	1,477
Walleye	1	0	2	0	38	11	28	22
Yellow Bass	4	116	43	206	136	78	199	265
Yellow Bullhead	1	6	0	1	0	0	1	0
Total	**527**	**2,275**	**1,976**	**2,546**	**530**	**1,373**	**2,725**	**1,967**

Consultation Species or Critical Habitat
Potential impacts from the stocking of rainbow trout and warm water species into Apache Lake to bald eagle and Yuma clapper rail are discussed below. Potential impacts on bonytail and roundtail chub, razorback sucker and critical habitat and Western yellow-billed cuckoo are discussed in the Lower Salt River Complex Analysis sections.

Bald Eagle
Horse Mesa Breeding Area is approximately 0.9 miles from Apache Lake and is within the Sonoran Desert Bald Eagle Discrete Population Segment (DPS). This BA was established in 1983 and the BA was active in the 2010 season. Nest watchers have not monitored the breeding area so the prey base specifics are largely unknown. Horse Mesa Breeding Area productivity data shows that the nest failed in 2007, was successful in 2008 with one nestling disappearing from the nest at 8-10 weeks old, and was successful in 2009 (Jacobson et al. 2007; McCarty and Jacobson 2008, 2009).

Rock Creek Breeding Area is approximately 5.6 miles from Apache Lake and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed in 2001 and were last observed 22 April, 2008. Nest watchers have not monitored the breeding area so the prey base specifics are largely unknown. Rock Creek Breeding Area productivity data shows that the nest was unoccupied in 2007, failed in 2008, and unoccupied in 2009 (Jacobson et al. 2007; McCarty and Jacobson 2008, 2009).

Fish Creek Breeding Area is approximately 0.5 miles from Apache Lake and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed at the breeding area in 2007 and the BA was active in the 2010 season. Nest watchers have not monitored the breeding area so the prey base specifics are largely unknown. Fish Creek Breeding Area productivity data shows that the nest failed in 2007, was unoccupied in 2008, and failed again in 2009 (Jacobson et al. 2007; McCarty and Jacobson 2008, 2009).

Table 43. Recent (10 years) bald eagle productivity for Apache Lake BAs. (Blank spaces by year indicate the BA did not exist at that time.)

Year	Fish Creek BA	Horse Mesa BA	Rock Creek BA
2000		Fledged 1	
2001		Fledged 1	Occupied (1st year)
2002		Fledged 1	Fledged 1
2003		Fledged 2	Failed
2004		Failed	Failed
2005		Fledged 1	Fledged 1
2006		Fledged 1	Unoccupied
2007	Failed (1st year)	Failed	Unoccupied
2008	Unoccupied	Fledged 1	Failed
2009	Failed	Fledged 1	Unoccupied

Potential impacts
Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site. Apache Lake does have monofilament bins present.

Yuma clapper rail
Yuma clapper rails have not been documented from Apache Lake. There is no suitable habitat at the lake.

Potential impacts
No impacts would be anticipated due to the lack of habitat.

Canyon Lake
Site Description
Canyon Lake is the third in the chain of four large reservoirs on the Salt River northeast of Phoenix. The lake is impounded by the 224 ft Mormon Flat Dam built in 1925. The 926 acre lake has a self-sustaining warm water fishery, which in recent years has been negatively impacted by fish kills attributed to blooms of golden alga, an invasive, toxin-producing alga. Fish Creek and Tortilla Creek are tributaries to Canyon Lake. Canyon Lake is maintained below its spillway elevation of 1,610 ft. The lake is owned by Salt River Project (SRP) and the surrounding lands are part of the Tonto National Forest (TNF). SRP operates Canyon Lake and Mormon Flat Dam as one section of a four part operation of lakes on the Salt River to increase the water supply available to SRP and provide additional hydropower production. Mormon Flat Dam is a hydroelectric generating dam. Two hydroelectric generating units are at the dam; one is a conventional unit rated at 10,000 kW and the other is a pumped storage unit built in 1971 and rated at 50,000 kW (SRP online). Canyon Lake is managed by the TNF for recreation such as

boating, picnicking, camping, and water sports. The area is accessible by road year round and includes a marina, an RV area, campgrounds, and a restaurant.

Management of Water Body
Canyon Lake is primarily a warmwater, year round fishery. Canyon Lake was first stocked by the Department in 1935. Largemouth and smallmouth bass, channel catfish, hybrid sunfish, walleye, bluegill, redear sunfish, yellow perch, and white and black crappie were stocked over the years to a self-sustaining warm water sport fishery for angling recreation by the public (Table 44). Largemouth and smallmouth bass (fry/fingerling, sub-catchable, catchable) and walleye (fry/fingerling, sub-catchable, catchable) are currently stocked on an as needed basis during spring, summer, or fall at densities sufficient to augment/recover the fishery following fish kill (summer or winter) events. Densities, timing, and stocked fish size are adjusted (adjustments not anticipated to be significant) outside the stated ranges depending on fish availability, stocking conditions, need to meet angler demands, or due to shifts in management strategy. A research project was begun by the Department in 2007 to evaluate the effectiveness of restocking Saguaro, Apache, and Canyon lakes with largemouth and smallmouth bass to recover the warm water fish populations after the fish kills.

The secondary fishery is a coldwater intensive-use, put-and-take rainbow trout fishery throughout the winter months. Canyon Lake is typically stocked every 2-3 weeks from early November through February with catchable rainbow trout. Densities, timing, and size of trout stocked are usually adjusted depending on hatchery fish availability, lake stocking conditions, variations in angler demand levels, or due to changes in management strategy.

This fishery of Canyon Lake has been negatively impacted by alga induced fish kills. Fish kills in lakes of this size are often not complete kills. The surviving adult and juvenile fish remain to re-populate the fishery beginning with the next spawning season. The impacts from the 2005 golden alga fish kill on largemouth bass were severe. While Canyon Lake was affected by the 2005 kills, reproduction was documented afterward (Warnecke et al 2005b).

In the fall of 2007 (two years after the initial fish kill), approximately 3,100 juvenile size largemouth bass between 150 and 210 mm were stocked into Canyon Lake. Given the size of the lake, it is believed that these supplemental stockings represent a small contribution to the remaining bass population. Six months post-stocking in spring 2008, the percentage of stocked largemouth bass to the entire population was less that 5% at Canyon Lake (Stewart 2008) and less that 1% 12 months post-stocking (Stewart 2009a). The juvenile largemouth bass stocked were just reaching the minimum spawning size (180-210 mm) and may have contributed to spawning events in the spring of 2008. How much more successful those spawning events were because of the introduction is difficult to determine. The speed with which the largemouth bass populations rebounded may have been influenced by the stocking, or the high reproductive successes of the remaining fish could have been sufficient to repopulate the lake. Stocking of

adult or sub-adult fish to restore a bass population may be effective or may simply address angler concerns about the length of time needed to restore the fishery.

Based on a 2001 angler survey conducted by the Department, this lake provides a significant level of recreation: 23,400 angler user days (AUD) for trout (totally supported by the proposed stocking activity) and 161,400 AUD for other species (supported by naturally occurring and self-sustaining populations of warm water fish, with the exception of stocked walleye) (Pringle 2004).

Table 44. Summary of historic Department fish stockings at Canyon Lake.

Species	First Year	Last Year	Number of Years Stocked	Number Stocked
Black crappie	1935	1936	4	2,800
Bluegill	1935	1956	23	481,610
Brown trout *	1963	1964	2	12,300
Bullhead catfish	1941	1941	1	1,860
Channel catfish	1958	1971	3	75,600
Coho salmon *	1971	1973	4	56,598
Largemouth bass	1935	2009	42	638,579
Rainbow trout	1970	2009	299	1,122,480
Redear sunfish	1947	1950	3	65,400
Smallmouth bass	2007	2008	3	2,545
Sunfish hybrid	1947	1947	1	5,000
Threadfin shad	1958	1960	4	15,000
Walleye	1957	2008	24	8,916,363
White crappie *	1958	1958	1	545
Total				11,396,680

** No longer found in the system.*

Proposed Action

The Department proposes to stock rainbow trout, largemouth bass, smallmouth bass, walleye, channel catfish and black crappie for the period covered by this consultation.

Catchable and sub-catchable rainbow trout would be stocked multiple times from October through March each year; the numbers of trout stocked would range from 0 to 22,500 fish annually.

Sac fry and fingerling walleye would be stocked anytime annually; numbers of walleye stocked would be from 0 – 1 million sac fry annually and from 0 - 19,000 fingerling walleye annually.

Largemouth (fry/fingerling, sub-catchable, catchable), smallmouth bass (fry/fingerling, sub-catchable), channel catfish (sub-catchable, catchable), and black crappie (sub-catchable, catchable) may be stocked as needed at any time during the period covered by this consultation to augment or to recover the fishery following catastrophic events such as a golden alga kill. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the sport fish stocking protocol.

Water Distribution / Connectivity

Canyon Lake is a 10-mile long lake with 28 miles of shoreline, confined between two dams, Horse Mesa Dam (upper end) and Mormon Flat Dam (lower end). Canyon Lake has a surface area of 950 acres at maximum level and a maximum depth of 131.5 feet (www.srpnet.com). The lake is operated along with the other three interconnected Salt River lakes as one unit for hydroelectric power generation. Roosevelt Lake, upstream of Apache Lake, which is upstream of Canyon Lake, is the main storage reservoir for the system. Roosevelt Lake receives its water from two large watersheds, the Salt River and Tonto Creek drainages. Water is released from Roosevelt and travels through the chain lakes (including Apache Lake and Canyon Lake) and released at Stewart Mountain Dam (Saguaro Lake), which is the furthest downstream dam. Water exits Canyon Lake through Mormon Flat Dam and into Saguaro Lake. Saguaro Lake empties into the lower Salt River through Stewart Mountain Dam.

Canyon Lake is operated to maintain a constant balanced level through input from the storage at Roosevelt Lake and pump back from Saguaro Lake (downstream). The pumps that transfer water are located at approximately 90 ft depths. In addition to the pumps the reservoir also contains a bypass pipe. Both the pumps and bypass pipe can only handle up to 3,000 cfs. If incoming water flow increases above 3,000 cfs and the lake is at full capacity, the water will spill over the Mormon Flat Dam spillway and into Saguaro Lake (C. Paradzick pers. com.). Salt River Project dams spill on an average of once every 10 years.

Tortilla Creek, La Barge Creek, and Fish Creek are tributaries to Canyon Lake. Tortilla Creek is considered intermittent with a few perennial reaches, but contains mostly dry reaches throughout, while Fish Creek is considered perennial throughout much of its drainage (ADWR 2007) although Lower and Middle Fish Creek may be intermittent for some portion of the year. Lower and middle Fish Creek is known to contain large pools and runs (Carveth 2006).

Please see the following sections for downstream water distribution and connectivity as flows move downstream to Saguaro Lake and the Lower Salt River. The Lower Salt River Complex section discusses the overall water distribution and connectivity throughout this entire complex.

Fish Movement

Fish within Canyon Lake are confined to the lake by Horse Mesa Dam at the top end and Mormon Flat Dam on the lower end. As there are pumps and bypass valves moving water

through Mormon Flat Dam daily, there is a potential for fish to be displaced downstream into Saguaro Lake. Fish moving through the dams would have to be present at the intakes which are located at 145 ft depths. Due to the depth of the intakes and bypass, water quality (low dissolved oxygen) at such depths would create a chemical and physical fish barrier. It is thought that few fish, if any, would be able to survive passing through the turbines or bypass pipe at these depths. The physical force and cutting edges of turbines utilized in the movement of water through the Horse Mesa Dam would severely limit the survival and potential movement of live fish. Wolff (2009) evaluated studies on fish passage through dams and summarized these severe limitations on fish passage.

Water passes over the Mormon Flat Dam spillway during episodic runoff events that occur during years when Roosevelt Lake discharges and spillway overflows exceed 3,000 cfs and passes through a full Apache Lake. Salt River Project dams spill on an average of once every 10 years. The passage of some fish, particularly smaller pelagic or littoral species, may go over the spillway into Saguaro Lake.

Tortilla Creek, La Barge Creek and Fish Creek are tributaries to Canyon Lake. A fish barrier exists on Tortilla Creek just above Canyon Lake. The barrier consists of an elevated road crossing with no culverts. Fish stocked in Canyon Lake are not expected to be able to migrate above this barrier. Fish Creek also has a barrier to upstream movement from Canyon Lake formed by a waterfall near the Highway 88 crossing, about 5 miles upstream from the lake. Lower and middle Fish Creek are intermittent and periodically contain large pools below the barrier that occasionally go dry. It is highly unlikely that stocked fish would be present or survive in Fish Creek due to barriers or warm water temperatures (for trout) most of the year. Surveys in Fish Creek in 1993 reported only longfin dace present above the waterfall near the road crossing (AGFD unpublished data) and no fish below the waterfall. La Barge Creek is an ephemeral tributary to the Salt River, now flowing into La Barge Cove at Canyon Lake. Fish movement up this stream during flow events would be possible, although extremely improbable because of the 9.6% gradient within the channel and turbidity and sediment transport that occurs during flow events. No non-native fish has been documented at the known perennial water source upstream from Canyon Lake in La Barge Creek, Charlebois Spring.

Please see the following sections for fish as they have the potential to move downstream to Saguaro Lake and the Lower Salt River. Also, the Lower Salt River Complex section discusses the overall fish movement potential throughout this entire complex.

Community Description

The lake contains a variety of nonnative fish species: common carp, threadfin shad, channel catfish, green sunfish, bluegill, redear sunfish, largemouth bass, yellow bass, rainbow trout, flathead catfish, and walleye.

The most recent surveys conducted at Canyon Lake documented the presence of the following fish species: bluegill, buffalo, channel catfish, common carp, flathead catfish, green sunfish, largemouth bass, mosquito fish, rainbow trout, redear sunfish, smallmouth bass, threadfin shad, walleye, yellow bass, yellow bullhead, and tilapia (Stewart 2008; Stewart 2009a, Table 45). No rainbow trout were captured in the fall of 2007 and only one in the spring of 2008 indicating that trout are soon fished out or die off when the water becomes warmer during the spring (Stewart 2008).

Table 45. Total number of fish sampled with electrofishing and gillnets at Canyon Lake from fall 2007 through spring 2009.

	Electrofishing				Gillnetting			
Species	**Fall 07**	**Fall 08**	**Spring 08**	**Spring 09**	**Fall 07**	**Fall 08**	**Spring 08**	**Spring 09**
Black Crappie	0	0	0	0	2	0	0	0
Bluegill	1,462	1,544	1,429	1,565	11	2	4	12
Buffalo Fish	1	1	1	1	0	0	0	0
Channel Catfish	31	3	2	15	88	69	123	74
Common Carp	67	15	38	39	18	8	23	11
Flathead Catfish	13	1	0	1	25	9	5	4
Goldfish	0	0	0	0	1	0	0	0
Green Sunfish	58	34	21	38	6	0	1	4
Largemouth Bass	560	393	558	414	52	73	24	46
Mosquitofish	3	0	0	0	0	0	0	0
Rainbow Trout	0	0	1	3	0	0	0	0
Redear Sunfish	1	0	0	0	0	0	0	0
Smallmouth Bass	0	3	4	3	0	0	1	0
Threadfin Shad	469	159	1,065	609	53	145	116	53
Tilapia	7	1	0	0	2	1	0	0
Walleye	1	7	0	1	0	5	4	11
Yellow Bass	138	59	74	47	168	47	157	204
Yellow Bullhead	32	0	0	0	4	2	1	3
Yellow Perch	0	0	0	0	1	0	2	0
Total	**2,843**	**2,220**	**3,193**	**2,736**	**431**	**361**	**461**	**422**

In the fall of 2007, the Department initiated a research project to evaluate the effectiveness of restocking largemouth and smallmouth bass into Saguaro, Apache, and Canyon lakes to recover the warm water bass populations. Intensive electroshocking and gill net surveys were conducted each spring and fall since fall 2007 (Stewart 2008; Stewart 2009a). Fish Creek was surveyed in February and March 2006 (Carveth 2006) and green sunfish and longfin dace were found in both the lower and middle reaches immediately above and below Hwy. 88. No rainbow trout were

found. Crayfish are also present in the creek. Lowland leopard frogs are also documented in Fish Creek (HDMS data).

Tortilla Creek was recently surveyed in the fall of 2005 and in the winter of 2006 (Voeltz 2005, Voeltz 2006). Only Gila topminnow and fathead minnows were caught below natural falls in a few tinajas and only Gila topminnow were collected above those natural falls. Lowland leopard frogs are also documented in Tortilla Creek (HDMS data).

There are no nesting bald eagles at Canyon Lake; however, the eagles at the Fish Creek BA on Apache Lake and the Saguaro BA on Saguaro Lake may also forage at Canyon Lake. Wintering bald eagles may forage along the Salt River. Yuma clapper rails have not been detected at Canyon Lake.

Consultation Species or Critical Habitat
Potential impacts from the stocking of rainbow trout and warm water species into Canyon Lake on bald eagle, Yuma clapper rail, Gila chub and Gila topminnow are discussed below. Potential impacts on bonytail, roundtail chub, razorback sucker and critical habitat and Western yellow-billed cuckoo are discussed in the Lower Salt River Complex analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Bald Eagle
Fish Creek Breeding Area is approximately 6.2 miles from Canyon Lake and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed at the breeding area in 2007 and the BA was active in the 2010 season. Nest watchers have not monitored the breeding area so the prey base specifics are largely unknown. Fish Creek Breeding Area productivity data show that the nest failed in 2007, was unoccupied in 2008, and failed again in 2009 (Jacobson et al. 2007, McCarty and Jacobson 2008, 2009).

Saguaro Breeding Area is approximately 3.8 miles from Canyon Lake and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed at the breeding area in 2008 and the BA was active in the 2010 season. Nest watchers were able to observe the prey types and in some cases species that were delivered to the nest by the eagles. In 2009 fish accounted for 67.9%,

birds 3.6%, mammals 3.6%, and unknown 25%. No prey items could further be identified. Saguaro Breeding Area productivity data show that the nest was successful in 2008 and 2009 (McCarty and Jacobson 2008, 2009).

Potential Impacts
Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site. Canyon Lake does have monofilament bins present.

Gila Chub
W.L. Minckley reportedly collected Gila chub in 1965 from Fish Creek. No Gila chub have been reported in Fish Creek since then and they are considered extirpated from the stream system (Weedman et al. 1996).

Potential Impacts
Due to the absence of Gila chub in any surveys within these reaches since 1965, this species is extirpated from Fish Creek and that there will be no impacts from stocking in Canyon Lake.

Gila Topminnow
Fish Creek was stocked with Gila topminnow in 1965. No Gila topminnow have been reported in Fish Creek since and it is thought that the Gila topminnows were eliminated by flooding that occurred following the stocking (Weedman and Young 1997).

Gila topminnows are present in two populations in drainages connected to Canyon Lake. The Unnamed Drainage #68 population occurs in plunge pools located in a narrow steep canyon of a tributary to Tortilla Creek which flows into Canyon Lake. Since sampling began in 1985 only topminnows have been detected. This population is functionally isolated from Canyon Lake because of the fish barrier that exists on Tortilla Creek just above Canyon Lake as was described in the fish movement section. Charlebois Spring is located in an isolated spring-fed drainage that joins La Barge Canyon and eventually would run into Canyon Lake after traversing about nine miles of ephemeral channel downstream, but only during flow events of unknown magnitude, frequency or duration. Only topminnows have been recorded in Charlebois Spring since their introduction in 1985. This population is functionally isolated from Canyon Lake because of the miles of ephemeral channel and gradient, especially in the ¼ mile of channel from the spring down to La Barge Canyon that drops about 120', a gradient of 9.6% (Figure 54). This assumption is supported by the only available data which identifies Charlebois Spring as being inhabited only by Gila topminnow (AGFD monitoring data).

Potential Impacts
Due to the absence of Gila topminnow within Fish Creek since 1965, we expect that this species is extirpated from Fish Creek and for that reason; there will be no impacts from stockings.

Due to the isolation of the Unnamed Drainage #68 and Charlebois Spring populations from Canyon Lake, it is unlikely that any stocked fish or their progeny could access the Gila topminnow populations.

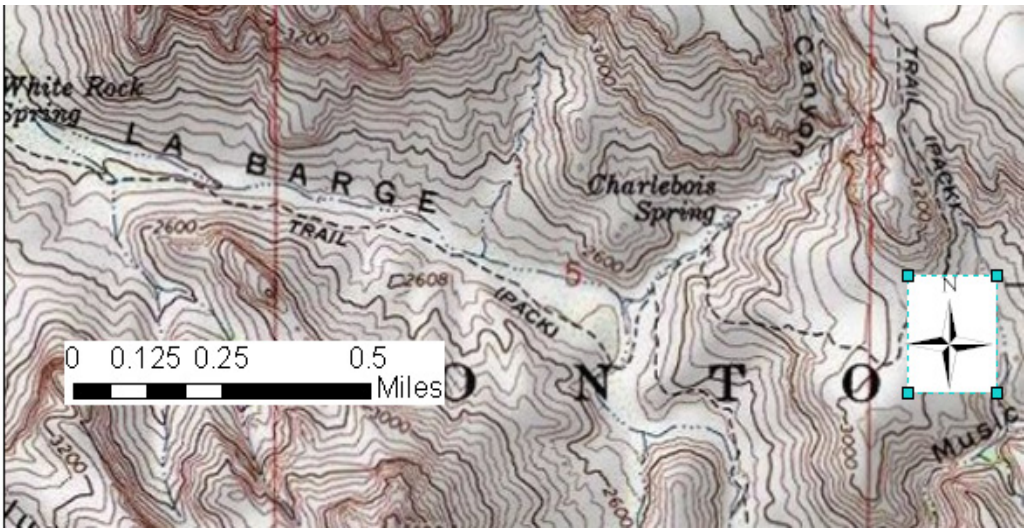

Figure 54. Topographic map of Charlebois Spring and La Barge Canyon.

There is a potential for Gila topminnow reaching the lake during periods of high flow that could carry individuals out of the protected spring. Voeltz and Bettaso (2003) stated that unnamed drainage has a small watershed and the area has probably allowed the topminnows to persist in this steep narrow canyon. Also, native fish species are adapted to the natural cycles of flood and low water periods and resist downstream transport (Minckley and Meffe 1987).The downstream dispersal of Gila topminnow into Canyon Lake has never been documented to occur; however, the small size of the Gila topminnow make finding any individuals unlikely. The intermittent exposure to high flows reduces the opportunity for their transport down to the lake as well.

However, if this was to occur those individuals would be lost to the recovery population in the spring since they could not move back upstream. It is likely that these displaced individuals would not survive in the lake, in part due to a lack of suitable habitat and predation on them by nonnative species including stocked fish or their progeny. Gila topminnow is at risk from predation from the existing and stocked warm water predatory fish; however, there is also a risk of predation from rainbow trout. A loss of these individuals is expected to be minimal, and is not significant to the overall health and survival of the protected population.

Yuma Clapper Rail

Yuma clapper rails have not been documented from Canyon Lake. There is no suitable habitat at the lake.

Potential impacts

No potential impacts are anticipated due to lack of suitable habitat.

Saguaro Lake

Site Description

Saguaro Lake is the fourth in a chain of four large reservoirs on the Salt River northeast of Phoenix. The lake is impounded by the 208 ft Stewart Mountain Dam built in 1930. The 1,100 acre lake has a self-sustaining warm water fishery, which in recent years has been negatively impacted by fish kills attributed to blooms of golden alga, an invasive, toxin-producing alga. Saguaro Lake is maintained below its spillway elevation of 1,506 ft. The lake is owned by SRP and the surrounding lands are part of the TNF. Salt River Project operates Saguaro Lake and Stewart Mountain Dam as the fourth of a series of sequential lakes along the Salt River for water supply and hydropower production. Stewart Mountain Dam is operated as a hydro electric generating dam. There is a 13,000 kilowatt (kW) hydroelectric generating unit operated mainly in the summer months (SRP online). Saguaro Lake is also managed by the TNF as a recreation area that includes a marina and restaurant, camping, picnicking, boating and water recreation. The lake is accessible by paved road year round. The area around the lake includes paths and recreation areas. Saguaro Lake is undoubtedly the busiest watercraft recreation lake in terms of density of boats per acre in Arizona. Most late spring through early fall recreational use is by watercraft and most anglers avoid the lake during this time, except for some night angling when the recreational boaters, speed boaters, jet-skis, and skiers have left the lake.

Management of Water Body

The primary fishery is a warm water self-sustaining fishery. Largemouth and smallmouth bass, channel catfish, sunfish hybrid, walleye, bluegill, redear sunfish and black crappie were stocked over the years to establish a self-sustaining warm water fishery for angling recreation by the public (Table 46). Largemouth and smallmouth bass are currently being stocked on an as needed basis during spring, summer or fall at densities sufficient to augment/recover the fishery following fish kill events (summer or winter). Densities, timing and stocked fish size are adjusted depending on: fish availability, stocking conditions, need to meet angler demands, or due to shifts in management strategy. Saguaro Lake has been negatively impacted by fish kills in recent years, primarily attributed to blooms of golden alga. A research project was begun by the Department in 2007 to evaluate the effectiveness of restocking Saguaro, Apache, and Canyon lakes with largemouth and smallmouth bass to recover the warm water fish populations after the fish kills.

The secondary fishery is a coldwater intensive-use, put-and-take rainbow trout fishery throughout the winter months. Saguaro Lake is typically stocked every 2-3 weeks from early November through February with catchable rainbow trout. Numbers, timing, and size of trout stocked are usually adjusted depending on: hatchery fish availability, stocking conditions, need to meet angler demands, or due to changes in management strategy.

This fishery of Saguaro Lake has been negatively impacted by alga induced fish kills. Fish kills in lakes of this size are not typically complete kills. The surviving adult and juvenile fish remain to re-populate the fishery beginning with the next spawning season. The impacts from the 2005 golden alga fish kill on largemouth bass populations were extensive at Saguaro Lake. Very few adults remained at this reservoir, but enough remained that spawning was noted in fall 2005 at Saguaro (Warnecke et al 2005c).

In the fall of 2007 (two years after the initial fish kill), approximately 3,200 juvenile size largemouth bass between 150 and 210 mm were stocked into Saguaro Lake. Given the size of the lake, it is believed that these supplemental stockings represent a small contribution to the remaining bass population. This is reinforced by data indicating that after six months (spring 2008) the percentage of stocked largemouth bass to the entire population was less that 5% at Saguaro (Stewart 2008) and less that 1% 12 months post-stocking (Stewart 2009a). The largemouth bass stocked were just reaching the minimum spawning size (180-210 mm) and may have contributed to spawning events in the spring of 2008. How much more successful those spawning events were because of the introduction is difficult to determine. The speed with which the largemouth bass populations rebounded may have been influenced by the stocking, or the high reproductive successes of the remaining fish could have been sufficient to repopulate the lake. Stocking of adults or sub-adults to restore a fish population may be effective or may simply address angler and public concerns about the length of time needed to restore the fishery. In either case, there are benefits to the stockings.

Based on a 2001 angler survey conducted by the Department, this lake provides a significant level of recreation: 11,600 angler user days (AUD) for trout (totally supported by the proposed stocking activity) and 205,100 AUD for other species (supported by naturally occurring and self-sustaining populations of warm water fish; Pringle 2004).

Proposed Action

The Department proposes to stock rainbow trout, largemouth bass, smallmouth bass, walleye, channel catfish, and black crappie for the period covered by this consultation.

Catchable and sub-catchable rainbow trout would be stocked multiple times from October through March each year; the numbers of trout stocked would range from 0 to 13,000 fish annually.

Sac fry and fingerling walleye would be stocked anytime annually; numbers of walleye stocked would be from 0 – 1.3 million sac fry annually and from 0 - 26,000 fingerling walleye annually.

Largemouth (fry/fingerling, sub-catchable, catchable), smallmouth bass (fry/fingerling, sub-catchable, catchable), channel catfish (sub-catchable, catchable), and black crappie (sub-catchable, catchable) may be stocked as needed at any time during the year to recover the fishery following catastrophic events such as a golden alga kill. Numbers of fish stocked for this purpose

would be determined according to stocking guidelines identified in the sport fish stocking protocol.

Table 46. Summary of historic Department fish stockings at Saguaro Lake.

Species	First Year	Last Year	Num. Years Stocked	Number Stocked
Black crappie	1935	1993	7	75,300
Bluegill	1935	1956	33	648,493
Brown trout *	1975	1975	1	7,836
Channel catfish	1948	1967	5	15,223
Coho salmon *	1972	1972	2	29,998
Largemouth bass	1935	2009	40	365,254
Rainbow trout	1966	2009	97	261,803
Redear sunfish	1947	1953	2	55,400
Smallmouth bass	1941	2008	8	28,700
Sunfish hybrid	1953	1953	3	20,342
Walleye	1973	2003	7	327,568
Total				1,835,917

** No longer found in the system.*

Water Distribution / Connectivity

Saguaro Lake is a 10-mile long lake with 22 miles of shoreline, confined between two dams, Mormon Flat Dam (upper end) and Stewart Mountain Dam (lower end). Saguaro Lake has a surface area of 1,264 acres at maximum level and a maximum depth of 110 feet (www.srpnet.com). The lake is operated with the other three interconnected Salt River lakes as one unit for hydroelectric power generation. Roosevelt Lake, upstream of Apache and Canyon Lakes, which is upstream of Saguaro Lake, is the main storage reservoir for the system. Roosevelt Lake receives its water from the Salt River and Tonto Creek Drainages. Water is released from Roosevelt and travels through the chain lakes (including Apache and Canyon Lakes) and released at Stewart Mountain Dam (Saguaro Lake), which is the lowest most dam.

Saguaro Lake is operated to maintain a constant balanced level through input from the storage at Roosevelt. The pumps that transfer water are located at approximately 90 ft depths. In addition to the pumps, the reservoir also contains a bypass pipe. Both the pumps and bypass pipe can only handle up to 3,000 cfs. If incoming water flow increases above 3,000 cfs and the lake is at full capacity, the water will spill over Stewart Mountain Dam and into the lower Salt River (C. Paradzick pers. com.). Saguaro Lake spills (spikes above 3,000 cfs) on average of once every 10 years.

Cottonwood Wash is an ephemeral wash that drains into Saguaro Lake. Hidden Water Spring is located at the headwaters of Cottonwood Wash.

Please see the following sections for downstream water distribution and connectivity as flows move downstream into the Lower Salt River. The Lower Salt River Complex section will discuss the overall water distribution and connectivity throughout this entire Salt River chain lake complex including the Lower Salt River and Lower Verde River above Granite Reef Diversion Dam.

Fish Movement

Fish within Saguaro Lake are confined to the lake by Mormon Flat Dam at the top end and Stewart Mountain Dam on the lower end. As the pumps and bypass valves move water through Mormon Flat Dam daily, there is a potential for fish to move into the Lower Salt River through Stewart Mountain Dam. Fish moving through the dams would have to be present at the intakes which are located at 90 ft depths. Unlike Apache Lake, Saguaro Lake has a stronger thermal and chemical stratification resulting in uninhabitable dissolved oxygen levels (below 2.0ppm) at depths greater than 30 feet during warmer months of the year (Figure 55). Stewart Mountain Dam does not have pumpback capabilities; hence the stratification surrounding the intake is less likely to be disrupted. Due to the depth of the intakes and bypass, water quality (low dissolved oxygen) at such depths would create a chemical and physical fish barrier during the summer season. It is thought that few fish, if any, would be able to survive passing through the turbines or bypass pipe at these depths. If fish did get entrained the physical force and cutting edges of turbines utilized in the movement of water through the Stewart Mountain Dam would also severely limit the potential fish survival (Wolff 2009).

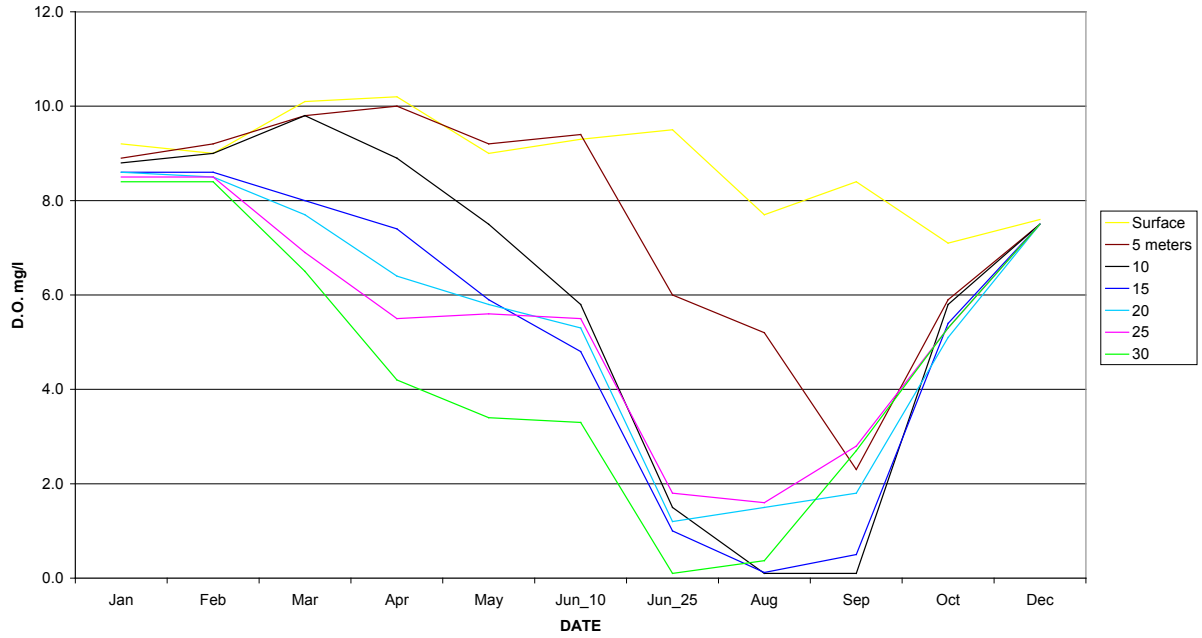

Figure 55. Dissolved Oxygen readings for Saguaro Lake recorded from January to December 1999. Oxygen readings were taken at 15 meter intervals.

Cottonwood Wash is a tributary to Saguaro Lake. There are several known but undocumented barriers within Cottonwood Wash that would prevent upstream migration from Saguaro Lake (Voeltz and Bettaso 2003). In addition to the barriers, the wash is ephemeral creating a geographic barrier as only Gila topminnow, longfin dace, and lowland leopard frogs are found in Hidden Water Spring (Voeltz and Bettaso 2003).

Please see the following sections for fish as they have the potential to move downstream to the Lower Salt River. Also, the Lower Salt River Complex section will discuss the overall fish movement potential throughout this entire complex.

Community Description
Intensive electroshocking and gill net surveys have been conducted in the Fall 2007, Spring 2008, Fall of 2008, and Spring 2009 (Stewart 2008; Stewart 2009a). The most recent surveys conducted at Saguaro Lake documented the presence of the following fish species: bluegill, channel catfish, common carp, flathead catfish, green sunfish, largemouth bass, rainbow trout, redear sunfish, threadfin shad, walleye, yellow bass, yellow bullhead, yellow perch, mosquito fish, and tilapia (Stewart 2008; Stewart 2009a; Table 47). No rainbow trout were found in the fall surveys and only three trout were sampled in spring 2008, indicating that trout do not survive through the warmer months (Stewart 2008; Stewart 2009a).

Table 47. Total number of fish sampled with gillnets and electrofishing at Saguaro Lake from fall 2007 through spring 2009.

	Electrofishing				Gillnetting			
Species	Fall 07	Fall 08	Spring 08	Spring 09	Fall 07	Fall 08	Spring 08	Spring 09
Bluegill	1,623	2,125	3,938	1,728	106	9	23	21
Buffalo Fish	0	1	0	1	0	0	0	0
Channel Catfish	1	8	7	6	150	158	184	107
Common Carp	9	17	21	7	36	16	14	12
Flathead Catfish	2	4	1	0	17	13	5	3
Goldfish	0	0	0	0	0	1	1	0
Green Sunfish	52	98	83	29	0	0	1	0
Largemouth Bass	307	218	1,002	432	694	116	217	141
Mosquito fish	0	1	0	0	0	0	0	0
Rainbow Trout	0	0	2	0	0	0	1	0
Redear Sunfish	0	7	38	0	0	0	0	0
Smallmouth Bass	0	4	0	2	0	0	0	0
Threadfin Shad	1,356	295	516	293	311	36	195	82
Tilapia	123	7	8	1	60	10	0	0
Walleye	0	0	0	0	3	4	3	1
Yellow Bass	21	63	113	225	318	292	345	476

Species	Electrofishing				Gillnetting			
	Fall 07	Fall 08	Spring 08	Spring 09	Fall 07	Fall 08	Spring 08	Spring 09
Yellow Bullhead	10	14	0	0	4	5	1	0
Yellow Perch	0	0	0	0	0	0	1	0
Total	3,504	2,862	5,729	2,724	1,699	660	991	843

Hidden Water Spring is known to contain Gila topminnow and lowland leopard frogs (Voeltz and Bettaso 2003)

Four bald eagle BA's use parts of Saguaro Lake for foraging. Three of these, Bagley, Blue Point, and Saguaro, have nest sites on the lake and the fourth, Bulldog, nests on the river below the dam. The particular nest sites used by each pair on the lake vary between years.

Yuma clapper rail and western yellow-billed cuckoo have been documented along the Salt River downstream of the lake within the riparian corridor, but have not been documented around the lake.

Consultation Species or Critical Habitat
Potential impacts from the stocking of rainbow trout and warm water species into Saguaro Lake to bald eagle, Yuma clapper rail, and Gila topminnow are discussed below. Potential impacts on bonytail and roundtail chub, razorback sucker and critical habitat and Western yellow-billed cuckoo are discussed in the Lower Salt River Complex analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Bald Eagle
Blue Point Breeding Area is approximately 1.6 miles from Saguaro Lake and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed in 1930 and the BA was unoccupied in the 2010 season. Nest watchers have not been monitoring the breeding area so the prey base specifics are largely unknown. Blue Point Breeding Area productivity data shows that

nest failed in 2007, failed in 2008 with an eaglet found dead on the ground, and was successful in 2009 (Jacobson et al. 2007; McCarty and Jacobson 2008, 2009).

Bull Dog Breeding Area is approximately 1.6 miles from Saguaro Lake and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed in 2003 and the BA was active in the 2010 season. Nest watchers have not been monitoring the breeding area so the prey base specifics are largely unknown. Bull Dog Breeding Area productivity data shows that the nest failed in 2007 when the nestlings were last seen at the nest at 3 weeks old, failed in 2008 when the nestlings were last seen at the nest at 8.5-9 weeks old, and was successful in 2009 (Jacobson et al.; McCarty and Jacobson 2008, 2009).

Bagley Breeding Area is approximately 1.8 miles from Saguaro Lake and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed in 2009 and the BA was active in the 2010 season. Nest watchers were able to observe the prey types and in some cases species that were delivered to the nest by the eagles. In 2009 fish accounted for 60.4%, birds 7.5%, mammals 5.7%, reptiles 1.9%, and unknown 24.5%. Of the prey items further identified to species, 50% were American coots, and 25% were koi. Bagley Breeding Area productivity data shows that the nest was successful in 2009 (McCarty and Jacobson 2009).

Saguaro Breeding Area is approximately 1.8 miles from Saguaro Lake and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed at the breeding area in 2008 and the BA was active in the 2010 season. Nest watchers were able to observe the prey types and in some cases species that were delivered to the nest by the eagles. In 2009 fish accounted for 67.9%, birds 3.6%, mammals 3.6%, and unknown 25%. No prey items could further be identified. Saguaro Breeding Area productivity data shows that the nest was successful in 2008 and 2009 (McCarty and Jacobson 2008, 2009).

Table 48. Recent (10 years) bald eagle productivity for Saguaro Lake BAs. (Blank spaces by year indicate the BA did not exist at that time.)

Year	Bagley BA*	Blue Point BA	Bulldog BA	Saguaro BA*
2000		Failed		
2001		Fledged 1		
2002		Fledged 2		
2003		Failed	Fledged 2	
2004		Fledged 2	Fledged 2	
2005		Fledged 3	Fledged 2	
2006		Fledged 1	Failed, 2nd nestling went to Granite Reef and fledged	

2007		Failed	Failed	
2008		Failed	Failed	Fledged 2
2009	Fledged 2	Fledged 2	Fledged 2	Fledged 1

Potential Impacts
Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site. Saguaro Lake does have monofilament bins present.

Gila Topminnow
Since stocked in 1976, Hidden Water Spring is the longest continually surviving population of reestablished Gila Topminnow (Voeltz and Bettaso 2003). In 1985, Brooks moved topminnows from the lower portion of the spring drainage upstream above several barriers that he thought would prevent upstream migration. Since surveys began in 1979-1980, only topminnow and longfin dace have been detected. This population is functionally isolated from Saguaro Lake due to natural barriers, primarily the ephemeral channel, gradient and nature of the stream channel and hydrological dynamics during flow events.

Potential Impacts
Due to the isolation of this population from Saguaro Lake, no nonnative fish have been documented in the spring. Therefore it is unlikely that stocked fish into Saguaro Lake would be able to access the Gila topminnow population in the spring.

The canyon is prone to flooding but is dry through most of the year when there is no run-off (Voeltz and Bettaso 2003), consequently there is a potential for Gila topminnow reaching the lake during periods of high flow that could carry individuals out of the protected spring. However, native fish species are adapted to the natural cycles of flood and low water periods and resist downstream transport (Minckley and Meffe 1987) and the riparian and aquatic vegetation may be thick enough to provide refuge during normal floods (Voeltz and Bettaso 2003). The downstream dispersal of Gila topminnow into Saguaro Lake has never been documented to occur; however, the small size of the Gila topminnow makes finding any individuals unlikely. Also, the intermittent exposure to high flows reduces the opportunity for their transport out of Hidden Water Spring into Saguaro Lake. If this was to occur any individuals transported to the lake would be lost to the recovery population in the spring since they could not move back upstream. It is likely that these displaced individuals would not survive in the lake, in part due to a lack of suitable habitat and predation on them by nonnative species including stocked fish or their progeny. Gila topminnow would be at risk of predation from the existing and stocked warm water predatory fish. There is a remote risk of predation from rainbow trout; however once stocked, trout are quickly harvested out or are consumed by the existing warm water fishery. A

loss of these Gila topminnows is expected to be minimal, and is not significant to the overall health and survival of the protected population.

Yuma Clapper Rail

Yuma clapper rails have not been documented from Saguaro Lake. There are small areas of isolated cattails around the perimeter of the lake that could provide some habitat on a limited basis.

Potential Impacts
Most angling on Saguaro Lake that could be near marsh habitats is via boat access that does not involve creating trails through cattail areas. There may be some limited amount of disturbance to individual Yuma clapper rail from boat anglers fishing in proximity to marsh habitats. Anglers fishing generally tend to be quiet, and not create large noise disturbances. Noise has not been identified as a concern for YCR. Monofilament line or lead fishing tackle has not been shown to be a concern for clapper rails.

Lower Salt River
Site Description
The Lower Salt River stocking site is a 21.5 km (13.3 mi) reach of the Salt River below Stewart Mountain Dam down to Granite Reef Dam. The lower Salt River reach is controlled by water releases from the dam to meet municipal, industrial, and agricultural needs of SRP customers in the Phoenix metropolitan area and is approximately 1,300 ft in elevation.

The TNF owns and manages the recreational access along most of this stocking area. The Salt River Indian Reservation abuts approximately 11 km (six miles) of the northern shoreline of the river at the lower end including the confluence with the Verde River.

The lower Salt River is managed by the TNF for recreation including: boating (non-motorized), picnicking and water activities with year round use. There are several access points to the river: Saguaro Lake Ranch, Water-Users, Blue Point, Goldfield, Coon Bluff, Phon D. Sutton, Tubers Landing and Granite Reef. All access points are along the Power Road/Bush Highway that parallels the river**.** There is a seasonal closure for bald eagle nesting (December 1-June 30) on the south side of the river from approximately one mile downstream of Stewart Mountain Dam to the power line crossing. Access to the south shore of the river is restricted during that period.

Management of Water Body
The lower Salt River is managed as a coldwater, intensive use, put-and-take rainbow trout fishery in the winter, spring and early summer months. Catchable rainbow trout are stocked every other week throughout the stocking season, typically early November through late March

but some years until the end of June if water flows of the appropriate temperature are available (Table 49).

Because flows in the upper part of the reach are low during the winter (due to limited releases from Stewart Mountain Dam), the winter fishery relies on the 400-1,000 cfs releases down the Verde River that provide flows from the confluence to Granite Reef Diversion Dam (Bryan et al. 2000). Generally, winter stockings are at sites below the Verde River confluence at Granite Reef and Phon D. Sutton recreation areas. Increased releases of this cold water in April through June from Stewart Mountain Dam enables rainbow trout stockings at Water Users and Blue Point recreation sites during the late-spring/summer period and allows the recreational fishery to disperse up river.

A 2001 Statewide Survey of Arizona Anglers estimates total Angler Use Days for the Lower Salt River below Saguaro Lake to be 38,664, of which 19,085 Use Days are primarily for trout angling (Pringle, 2004).

This area is intensively used from April to September by inner tubers and kayakers. The Tonto National Forest allows a concessionaire, Salt River Recreation, to manage tube rentals and shuttle bus services along an 11 mile segment of the Lower Salt River. Recreational user days are well over 200,000 annually.

Table 49. Summary of historic Department fish stockings at Lower Salt River.

Species	First Year	Last Year	Num. Years Stocked	Number Stocked
Brook trout *	1982	1982	1	2,500
Brown trout *	1948	1984	3	55,090
Colorado Pikeminnow *	1990	1990	1	4,400
Flathead catfish	1975	1975	1	8,540
Rainbow trout	1947	2008	43	1,288,538
Razorback sucker *	1988	1989	2	3,332
Smallmouth bass	1951	1951	1	18
Woundfin *	1972	1972	1	350
Total				1,362,768

** No longer found in the system.*

Proposed Action

The Department proposes to stock catchable and subcatchable rainbow trout multiple times from October thru June; the numbers of trout stocked would range from 0 to 38,000 trout annually for the period covered by this consultation.

Water Distribution / Connectivity

Water from the Salt River (Saguaro Lake) and Verde River (Bartlett Lake) storage reservoirs are released into the Lower Salt and Lower Verde Rivers. The confluence of these two systems is at the Phon D Sutton TNF recreation site where the Salt River flows a short 2 km downstream until reaching the Granite Reef Diversion Dam. Generally, Salt River flows are as low as 8 cubic feet per second (cfs) in the winter (November through April) and upwards of 1,000 cfs during May through October (Figure 53). Flows in the winter may be higher in response to runoff events or management considerations for overall SRP reservoir storage. Generally, the Verde River flows on average around 100 cfs during the summer months and fluctuates based on snowmelt and rains during the winter months, averaging between 300 to 1000 cfs (Figure 56).

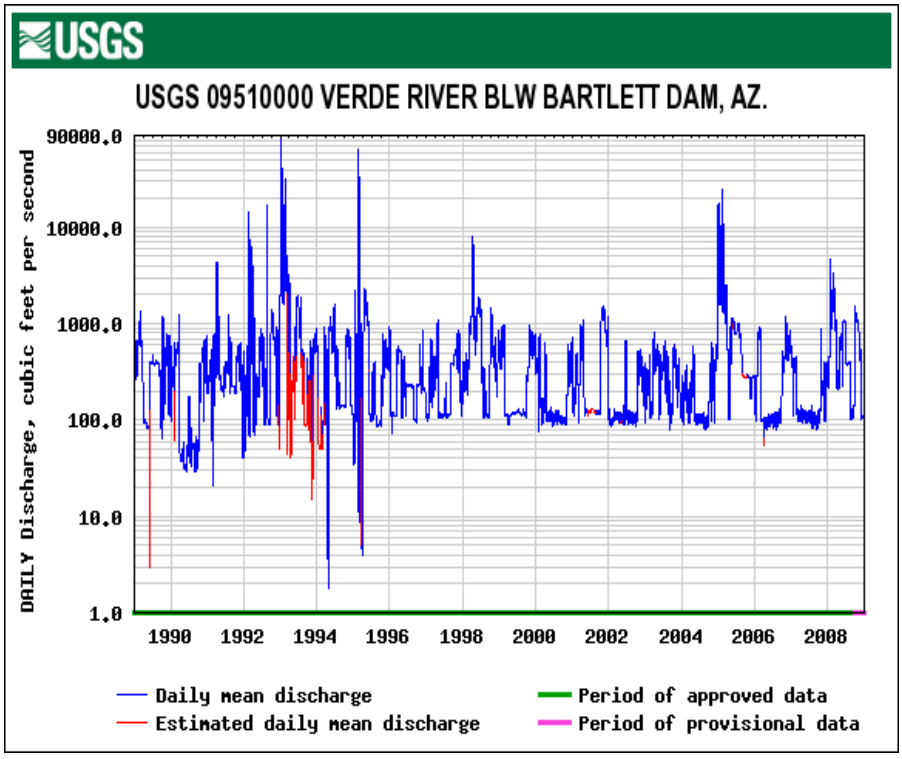

Figure 56. Mean daily discharge in cfs from the Lower Verde River below Bartlett Dam, AZ from 01/01/1989 to 01/01/2009.

The reach of the Verde River downstream of Bartlett Lake and the associated tributaries are perennially connected to the Lower Salt reach from Saguaro Lake (Stewart Mountain dam) to Granite Reef. Due to the connectedness, we discuss the Lower Salt River reach and the Lower Verde River together.

Granite Reef Diversion Dam diverts water away from the Salt River channel into two SRP canals; the Arizona Canal on the north side of the river and the Southern Canal on the south. The

Central Arizona Project (CAP) canal provides additional water supplies into the SRP canals below the Granite Reef Diversion Dam site.

Water that is not diverted into the canal systems flows over or seeps under the Granite Reef Diversion Dam into an intermittent reach of the Salt River. Water in this reach dries up during most of the year, but can connect during times of high flow. The water during these times of connectedness flows 17 miles into Tempe Town Lake and continues 22 miles further to the Gila River confluence.

Refer to the Lower Salt River Complex section for a discussion of the overall water distribution and connectivity throughout this entire complex including the Lower Verde River.

Fish Movement

The reach of the Verde River downstream of Bartlett Lake and the associated tributaries are perennially connected to the Lower Salt reach from Saguaro Lake (Stewart Mountain dam) to Granite Reef. Fish can move freely upstream and downstream between these two reaches during most times of the year when flows are adequate.

The tributaries connected to the Verde are mostly ephemeral with a few perennial sections. A perennial section of Camp Creek is functionally isolated from the mainstem due to the ephemeral condition between the two. This is demonstrated by the aquatic assemblage in Camp Creek, which only contains native fish. Indian Springs Wash is dry unless there is flash flooding and no fish records have been recorded in Indian Spring Wash. Sycamore Creek can connect to the Verde River and nonnative fish records have been recorded within this creek. There is potential for fish to move between these two perennial sections during times of above normal rain events creating a traversable connection.

Fish can and do move downstream from the Salt River, over the Granite Reef outflows into the two main canal systems. Electrical fish barriers/weirs were installed in each canal 100 m downstream of Granite Reef Dam to prevent fish from moving upstream from the canals past the Granite Reef Dam and into the Salt River. Barriers were specifically designed to prevent upstream movement of striped bass and white amur. The electric barriers prevent most fish from moving upstream toward the Granite Reef Diversion Dam, but there is some limited movement of fish upstream past the barriers due to infrequent mechanical failures (Clarkson 2003). There is no evidence or records documenting fish passage upstream from the canals past the Dam. Once fish flow past the Dam and the barriers, it is extremely unlikely they would be able to return to the river.

Community Description

The Lower Salt River contains a mix of native and nonnative fish species. Aside from the stocked rainbow trout, the remaining species maintain their populations through breeding in the reach or overflows from the upstream reservoirs. Four native species (Sonora sucker, desert

sucker, longfin dace, and roundtail chub) and over 18 nonnative species (including largemouth and smallmouth bass, channel catfish, carp, several sunfish species, red shiner and tilapia) were found in recent surveys below Stewart Mountain Dam (Marsh and Kesner 2004, 2006a, 2006b, 2007a, 2007b, 2008; Kesner and Marsh 2009). The Lower Salt River and the SRP Arizona and South Canals are included in this monitoring effort. These surveys are generally conducted from November through January at these three locations.

Historically, 22 species of fish have been documented in the Verde River from Bartlett Lake Dam to the confluence with the Salt River (LCRB Aquatic GAP). These are longfin dace, yellow bullhead, desert sucker, Sonora sucker, common carp, red shiner, mosquitofish, bonytail chub, roundtail chub, channel catfish, green sunfish, bluegill, redear sunfish, hybrid sunfish, smallmouth bass, largemouth bass, fathead minnow, sailfin molly, flathead catfish, and razorback sucker.

There are three tributaries to the Verde River within this reach, Camp Creek, Indian Spring Wash, and Sycamore Creek. Only longfin dace and speckled dace have been documented throughout Camp Creek (Kansas GAP). No fish have been documented in Indian Springs Wash (Kansas GAP). Within Sycamore Creek, longfin dace, desert suckers, Sonora suckers, red shiner, fathead minnow, mosquitofish, Gila topminnow, and speckled dace have been historically documented (Kansas GAP).

Bald eagles have been documented within this reach of the Salt River, upstream to Roosevelt Lake and up the Verde River toward Camp Verde. Within the stocking reach are four bald eagle Breeding Areas (BAs): Granite Reef, Goldfield-Kerr, Bulldog, and Orme. The bald eagles at these BAs forage along the Lower Salt River and on Saguaro Lake. Historically, the Blue Point BA was found on the river; however, this pair has moved up to Saguaro Lake and primarily uses the reservoir at this time. Yellow billed cuckoos and Yuma clapper rails may be found along the lower Salt River.

Consultation Species or Critical Habitat

Potential impacts from the stocking of rainbow trout and warm water species into the Lower Salt River to bald eagle and Gila topminnow are discussed below. Potential impacts on bonytail and roundtail chub, razorback sucker and critical habitat, Yuma clapper rail and Western yellow-billed cuckoo are discussed in the Lower Salt River Complex Analysis.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed

action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Bald Eagle

Blue Point BA is approximately 6.3 miles from the Lower Salt River and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed in 1930 and the BA was unoccupied in the 2010 season. Nest watchers have not been monitoring the breeding area so the prey base specifics are largely unknown. Blue Point Breeding Area productivity data show that nest failed in 2007, failed in 2008 with an eaglet found dead on the ground, and was successful in 2009 (Jacobson et al. 2007; McCarty and Jacobson 2008, 2009).

Bull Dog BA is approximately 4.4 miles from the Lower Salt River and is within the Sonoran Desert Bald Eagle DPS. The eagles were first observed in 2003 and the BA was active in the 2010 season. Nest watchers have not been monitoring the breeding area so the prey base specifics are largely unknown. Bull Dog Breeding Area productivity data shows that the nest failed in 2007 when the nestlings were last seen at the nest at 3 weeks old, failed in 2008 when the nestlings were last seen at the nest at 8.5-9 weeks old, and was successful in 2009 (Jacobson et al. 2007; McCarty and Jacobson 2008, 2009).

Orme Breeding Area is approximately 2.2 miles from the Lower Salt River and is within the Bald Eagle DPS. The eagles were first observed in 1987 and the BA was active in the 2010 season. Nest watchers were able to observe the prey types and in some cases species that were delivered to the nest by the eagles. In 2009 fish accounted for 46%, mammals 18%, and unknown 36%. Of the prey items further identified to species, 66.7% were Sonora sucker, 16.7% were common carp, and 16.7% were flathead catfish. Orme Breeding Area productivity data shows that the nest was successful in 2007, was successful in 2008 with one nestling found dead under the nest, and failed in 2009 with one nestling gone, and two nestlings injured on the ground, which later died in rehabilitation (Jacobson et al. 2007; McCarty and Jacobson 2008, 2009).

Granite Reef Breeding Area is approximately 3.7 miles from the Lower Salt River and is within the Bald Eagle DPS. The eagles were first observed in 2002 and the BA was active in the 2010 season. Nest watchers have not been monitoring the breeding area so the prey base specifics are largely unknown. Granite Reef Breeding Area productivity data shows that the nest was successful in 2007, successful in 2008, and successful in 2009 (Jacobson et al. 2007; McCarty and Jacobson 2008, 2009).

Goldfield Breeding Area is approximately 0.2 miles from the Lower Salt River and is within the Bald Eagle DPS. The eagles were first observed in 2009 and the BA was active in the 2010

season. Nest watchers were able to observe the prey types and in some cases species that were delivered to the nest by the eagles. In 2009 fish accounted for 66.7%, mammals 11.8%, carrion 5.9%, and unknown 15.7%. Of the prey items further identified to species, 50% were suckers, 12.5% were catfish, 12.5% were common carp, and 12.5% were rock squirrel. Goldfield Breeding Area productivity data show that the nest was successful in 2009 (McCarty and Jacobson 2009).

Potential Impacts
Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site. The Lower Salt River does not currently have monofilament bins present.

Continued stocking of rainbow trout into the lower Salt River may have adverse effects to the bald eagle prey base diversity that is important for the successful fledging of eaglets from these BAs. The additive effect of rainbow trout predation on larval suckers to that from existing warm water fish populations is unknown. Alternatively, the benefit of an additional forage species through stocking of rainbow trout is also unknown.

Gila Topminnow
Gila topminnows were thought to be historically stocked, but unfortunately these stockings could not be verified in any records (Weedman and Young 1997).

Potential Impacts
Due to the unverified stockings and lack of documented presence of topminnow within these reaches, we determine no potential impacts from our stockings.

LOWER SALT RIVER COMPLEX ANALYSIS
Water distribution and connectivity, fish movement and community descriptions were discussed for Apache Lake, Canyon Lake, Saguaro Lake, and the Lower Salt River, however we will restate these descriptions again as they contribute to the overall Lower Salt River Complex. Impacts to sensitive species in the Lower Salt River Complex (Apache Lake to Granite Reef Dam) are also discussed below, comprehensively in combination with all potential connected populations of these sensitive species.

Water Distribution / Connectivity
The chain lakes (Roosevelt, Apache, Canyon, and Saguaro) are operated by Salt River Project as one unit for hydroelectric power and water deliveries. Roosevelt Lake, upstream of Apache Lake, is the main storage reservoir for the system. Roosevelt Lake receives its water from the Salt River and Tonto Creek watersheds. Water is released from Roosevelt Dam and travels through the chain lakes (including Apache and Canyon Lakes) and released at Stewart Mountain

Dam (Saguaro Lake), which is the lowest most dam. Stewart Mountain Dam releases flows into the Lower Salt River at approximately 279 cfs of mean water daily. The chain lakes, excluding Roosevelt are operated to maintain constant balanced levels through input from the storage at Roosevelt and pump back from the lakes below. As Saguaro Lake does not have a lake below it, it only uses flow-through water to maintain its level. At Horse Mesa Dam and Mormon Flat Dam, the pumps that transfer water are located between 30-100 ft depths. In addition to the pumps, the reservoirs also contain a bypass valve. Both the pumps and bypass valve can only handle up to 3,000 cfs of water output at one time. If incoming water flows increase above 3,000 cfs and the lake is at full capacity, the water will pass over the spillways of each of the dams eventually flowing into the Lower Salt River (C. Paradzick pers. com.).

Apache Lake is a 17 mile long lake with 41 miles of shoreline, confined between two dams, Horse Mesa Dam (lower end) and Theodore Roosevelt Dam (upper end). Apache Lake has a surface area of 2,568 acres at maximum level and an average depth of 240 feet (Rogers 2009).

Canyon Lake is a 10 mile long lake with 28 miles of shoreline, confined between two dams, Horse Mesa Dam (upper end) and Mormon Flat Dam (lower end). Canyon Lake has a surface area of 950 acres at maximum level and an average depth of 131 feet (www.srpnet.com).

Saguaro Lake is a 10 mile long lake with 22 miles of shoreline, confined between two dams, Mormon Flat Dam (upper end) and Stewart Mountain Dam (lower end). Saguaro Lake has a surface area of 1,264 acres at maximum level and an average depth of 110 feet (SRP online).

Water from the Salt River storage reservoirs are released into the Lower Salt River and just below the Verde River confluence the perennial reach ends at the Granite Reef Diversion Dam. Generally, Salt River flows are as low as 8 cubic feet per second (cfs) in the winter (November through April) and upwards of 1,000 cfs during May through October (Figure 3). Flows in the winter may be higher in response to runoff events or management considerations for overall SRP reservoir storage.

The reach of the Verde River downstream of Bartlett Lake and the tributaries that drain into this reach of the Verde River are perennially connected to the Lower Salt River reach from Saguaro Lake (Stewart Mountain Dam) to Granite Reef Dam. Water from the Verde River (Bartlett Lake) storage reservoir is released into the Lower Verde River, where it connects to the lower Salt and is also diverted just below the confluence of both at the Granite Reef Diversion Dam. Generally, the Verde flows on average around 100 cfs during the summer months and fluctuates based on snowmelt and rains during the winter months, averaging between 300 to 1,000 cfs. Flows within the Verde River also are usually higher in the winter due to runoff events or management considerations for overall SRP reservoir storage.

The Granite Reef Diversion Dam diverts all Salt River water into two SRP canals; the Arizona Canal on the north side of the river and the South Canal on the south. The Central Arizona

Project (CAP) canal delivers additional water into the SRP canals below the Granite Reef Diversion Dam site.

Water that is not diverted into the canal systems flows over or seeps under the Granite Reef Diversion Dam into an intermittent reach of the Salt River. Water in this reach dries up during most of the year, but can connect during times of high flow. The water during these times of connectedness flows 17 miles into Tempe Town Lake and continues 22 miles further to the Gila River confluence.

Fish Movement

No studies have been completed nor has data been documented on the movement of fish out of Saguaro or Bartlett Lake into downstream reaches. There is a potential though for fish to move out of either Saguaro or Bartlett Lakes, through the turbines during the release of water, however, this potential would be extremely low. Specifically for Saguaro Lake, Wolff 2009 states, the Salt River reservoirs do not have hydro-generation like some of the Verde River dams and the intakes are deep (>30-40 ft with some >90 ft). Due to the depth of the intakes and water quality (depleted dissolved oxygen) at such depths, few fish, if any would be anticipated to pass through the turbines (C. Paradzick pers. comm.) during the warmer months (May to October) when the lakes are stratified. During episodic runoff events when Roosevelt Lake discharges and spillway overflows exceed 3,000 cfs, water coming into a full Apache Lake will pass over the spillway into Canyon Lake. A full Canyon Lake will spill over into Saguaro Lake and a full Saguaro will pass all inflows exceeding 3,000 cfs over the Stewart Mountain Dam spillway into the Lower Salt River. The passage of some fish, particularly smaller pelagic or littoral species, is probable going from lake to lake and into the Lower Salt River. Fish can move within the Lower Salt River stocking reach to the Lower Verde River up to Bartlett Dam and downstream past the Granite Reef Dam into the SRP canals that utilize the Salt and Verde River water supplies for deliveries to millions of municipal, industrial, and agricultural users.

Community Description

The aquatic assemblage for Apache Lake, Canyon Lake, Saguaro Lake, and the Lower Salt River/Lower Verde River were discussed in the previous sections. The aquatic assemblage for Bartlett Lake and the Salt River Project Southern and Arizona Canals are discussed below as they also do or have the potential to contribute to the overall complex analysis.

Eighteen species of fish have been documented in Bartlett Lake. These are largemouth bass, channel catfish, black crappie, flathead catfish, bluegill, green sunfish, redear sunfish, common carp, threadfin shad, sunfish hybrid, smallmouth bass, tilapia, goldfish, yellow bullhead, red shiner, golden shiner, mosquitofish, and walleye. The most recent survey (AGFD 2007) only documented 11 species. These are largemouth bass, channel catfish, black crappie, flathead catfish, bluegill, green sunfish, hybrid sunfish, common carp, threadfin shad, redear sunfish, and

golden shiner. Thread fin shad were the most abundant fish in the lake, followed by largemouth bass, bluegill, and then common carp. The rest of the species made up less than 15% of the catch.

The fish species assemblage within the canals is the most diverse of any waterbody in the state. This is due to waters running through the communities of the metropolitan Phoenix area that collect runoff from literally hundreds of public and private waterbodies that contain a wide array of fish assemblages. Further, the proximity of the canals to millions of urban residents offers the public an easy opportunity to illegally stock fish, or transfer fish from aquariums or ponds. Canal species documented in the past include longfin dace, yellow bullhead, goldfish, desert sucker, Sonora sucker, hybrid sucker, grass carp (white amur), common carp, red shiner, threadfin shad, mosquitofish, roundtail chub, channel catfish, green sunfish, redear sunfish, smallmouth bass, largemouth bass, yellow perch, yellow bass, striped bass, rainbow trout, fathead minnow, sailfin molly, shortfin molly, blue tilapia, black crappie, flathead catfish, walleye, Mozambique tilapia, redbelly tilapia (Marsh and Kesner 2004, 2006)

Consultation Species or Critical Habitat
Potential impacts on bonytail and roundtail chub, razorback sucker and critical habitat, Yuma clapper rail and Western yellow-billed cuckoo are discussed below.

Potential impacts from the proposed action to candidate and listed species are described below. Please refer to Chapter 4 for a detailed description of the nature of the impacts (which may include predation, competition for space and food, and hybridization etc.).Subsequent responses (resulting from the frequency, magnitude and duration of the impacts) between proposed stocked and candidate and listed species, and any site or complex factors that provide context for determining the meaningfulness of the impacts, are discussed below. Impacts from the proposed action resulting from angler related recreation and/or potential introduction of disease, pathogen or invasive species are evaluated at a broad scale for the entire action area and are described in Chapter 4. If potential impacts specific to a stocking site or complex have been identified they are discussed below.

Bonytail Chub
Bonytail chub were last documented in the Lower Salt and Lower Verde reaches in 1963 (LCRB Aquatic GAP). The Lower Verde River and Lower Salt River including all of the connected tributaries were not designated as critical habitat for bonytail chub. Bonytail chub were stocked into ponds at the ASU Research Park in the late 1980's and mid 1990's. The ponds are connected to the SRP canal system and fed by the Western Canal, a branch of the SRP south canal. Adult bonytail chub may remain in the ponds from those past stocking actions, although no recent data are available (P. Marsh, pers. comm.). More than 20 species of non-native fishes were recorded from the ponds when the bonytail were being stocked.

Potential Impacts

Due to the absence in all surveys of bonytail chub within these reaches since 1963, no potential impacts would be anticipated from the proposed action. There is a potential for stocked species to enter the SRP canal system and make it to ASU Research Park ponds where they could compete with bonytail chub, if they persist. Transport of stocked species to this area would not be likely to occur, though.

Colorado Pikeminnow

Colorado pikeminnow were stocked into ponds at the ASU Research Park in the late 1980's and mid 1990's. The ponds are connected to the SRP canal system and fed by the Western Canal, a branch of the SRP south canal. Adult pikeminnow may remain in the ponds from those past stocking actions, although no recent data are available (P. Marsh, pers. comm.). More than 20 species of non-native fishes were recorded from the ponds when the pikeminnow were being stocked.

Potential Impacts

There is a potential for stocked species to enter the SRP canal system and make it to ASU Research Park ponds where they could compete with pikeminnow if they persist. Transport of stocked species to this area would not be likely to occur, though.

Razorback Sucker and Critical Habitat

Razorback suckers were last documented in the Lower Salt and Lower Verde reaches in 1898 (Kansas State 2009). One record exists of a razorback sucker from Saguaro Lake in 1951 and they were known from Roosevelt Lake at least through the 1920's. Neither the Lower Verde River nor the Lower Salt River (below the reservoirs), nor any of the connected tributaries have designated critical habitat. Razorback sucker were stocked into ponds at the ASU Research Park in the late 1980's and mid 1990's. The ponds are connected to the SRP canal system and fed by the Western Canal, a branch of the SRP south canal. Adult razorback suckers may remain in the ponds from those past stocking actions, although no recent data is available (P. Marsh, pers. comm.). More than 20 species of non-native fishes were recorded from the ponds when the pikeminnow were being stocked.

Razorback sucker are currently stocked in the Middle Verde River reach near Camp Verde (see Verde River Chapter for extensive discussion of razorback suckers in the Verde River above Bartlett Dam). Since the initiation of these Middle Verde stockings in 1993, no razorback suckers have been found in the Lower Verde or Salt River drainages except for one individual collected from Tempe Town Lake. The source for that one razorback is unknown. Paucity of razorback records downstream of Horseshoe Lake and Bartlett Lake to the lower Verde reach, including the sampling in the lower Salt River related to the CAP monitoring indicates that movement of razorback suckers below Bartlett Dam is unlikely.

Potential Impacts

Due to the absence of razorback sucker within these reaches no impacts would be anticipated from the proposed action.

Roundtail Chub

The roundtail chub found within this stocking area are located in the Lower Salt River, Lower Verde River, and the upper portions of the SRP Canal system below Granite Reef Dam. These fish are considered one contiguous population throughout this area and genetically similar to the Verde River population above Horseshoe Reservoir (Bryan and Robinson 2000, Bryan and Hyatt 2004, Dowling 2008). Bryan et al. (2000) believed that the Lower Verde River has a more robust, successfully reproducing roundtail chub population, with the Salt only supporting a limited number of adults. Spawning by roundtail chub in the Salt River was not documented even though adults in breeding colors were observed. The authors believed that the Salt River fish went to the Verde River to spawn. Movement of roundtail chub between the two rivers is both hampered and facilitated by SRP's management of the water delivery system. High Verde River flows in the winter can transport roundtail chub to the lower portion of the river above the confluence with the Salt River (Bryan and Robinson 2000) and higher Salt River flows in the summer allow fish to move within that reach. Generally, roundtail chub recaptured after several months had not apparently moved far from the capture site (Bryan and Robinson 2000). The origin of the roundtail chubs found in the SRP canals are likely from the more robust Verde River population flushed downstream. However, during high flow releases from Stewart Mountain Dam, roundtail chubs in the Lower Salt River may also be transported over Granite Reef Dam to the canals.

CAP surveys since 1995 have surveyed fish populations in the Lower Salt River and SRP's Arizona and South Canals below Granite Reef Dam. In 14 years of record, only eight roundtail chub have been captured in the Lower Salt River (Table 50). Roundtail chub have also recently been sampled at the SRP canals. Table 50 also shows a peak year for successful roundtail chub sampling in 1998. In addition to the yearly CAP monitoring surveys, the most recent efforts to evaluate the roundtail chub population in the Lower Verde and Lower Salt Rivers were conducted in 2000 and 2003 (Bryan and Robinson 2000, Bryan and Hyatt 2004). The majority of the roundtail population is in the upper portion of the Verde River reach closer to Bartlett Dam where there are more of the preferred habitat types present (Bryan and Robinson 2000, Bryan and Hyatt 2004). This chub population was estimated at 6,424 (95% CI = 5,048-8,397) in 2000 (Bryan and Robinson 2000). In 2003, the population was estimated at 1,657 (95% confidence interval [CI] = 1,097-2,742), a decrease of 74% (Bryan and Hyatt 2004). It should be noted that roundtail chub are extremely tough to catch utilizing standard fisheries collection gear, so the capture probabilities may have affected actual numbers (Bryan and Robinson 2000). In the Salt River, low flows (~ 8 cfs) during winter confined roundtail chub to deep pools. Although movement of these fish was restricted because of the reduced discharge, they proved difficult to capture using electrofishing and gill nets, probably due to high conductivity (~1350 :S/cm). We snorkeled sites just

after sampling with the electrofisher and determined that we were only collecting approximately 10% of the roundtail at that site. High flows during spring and summer added to our difficulty in capturing fishes in the Salt River, so our perception of chub distribution and abundance may be biased due to the constraints of our sampling gear and methodology.

The roundtail chub population in the Lower Salt and Lower Verde has experienced significant declines that are likely still continuing. The decline in population size is hypothesized as being due to natural mortality of adults and insufficient recruitment to replace them. The flows in the rivers in spring 1998 allowed for a large, successful spawn and recruitment to the population and the passage of that cohort to adult status was documented in the two studies already referenced in this section and in Brouder et al. 2000 and Brouder 2001. Since 1998 there has been a lack of significant levels of recruitment, and the dying off of the 1998 cohort due to old age (roundtail chub may reach 11 or more years of age [AGFD unpublished data cited in Bryan and Hyatt 2004], but five to seven years is more usual [Bestgen 1985]) is the leading explanation for the decline of this population.

The SRP canals also act as a population sink for roundtail chub populations in the river. Once individuals pass over or through the Granite Reef Diversion Dam, enter the canals, and move below the electrical fish barriers, they are lost to the riverine population. Of the roundtail chub recorded in the CAP surveys, the vast majority were taken from the two SRP canals (Table 50). Over time, the decline of roundtail chub in the canals may also be indicative of the decline of the population in the river.

Table 50. CAP monitoring records from 1990 through 2008 for the Lower Salt River, the SRP Arizona Canal, and the SRP South Canal.

Data comes from the following sources: Clarkson 1998, 1999, 2001; Marsh 1999, 2004a, 2004b, 2004c; Marsh and Kesner 2005, 2006b, 2007a, 2007b, 2008; Kesner and Marsh 2009

Survey Reach	Survey Year/Month	Monitoring Site	Young of Year Roundtail Chub	Adult Roundtail Chub	Rainbow trout Caught
Lower Salt River	1995 November	Below Stewart Mountain Dam Goldfield Administrative Center Granite Reef	0 0 0	0 0 0	Yes No No
	1996 November	Below Stewart Mountain Dam Goldfield Administrative Center Granite Reef	0 0 0	0 4 0	No No No
	1997 November	Below Stewart Mountain Dam Goldfield Administrative Center Granite Reef	0 0 0	0 0 0	No No No
	1998 October and November	Below Stewart Mountain Dam Goldfield Administrative Center Granite Reef	0 1 0	0 0 0	No No No
	1999 November	Below Stewart Mountain Dam Goldfield Administrative Center Granite Reef*	0 0 0	1 0 0	No No Yes
	2000 November and December	Below Stewart Mountain Dam Goldfield Administrative Center Granite Reef	0 0 0	1 0 1	Yes No No

Survey Reach	Survey Year/Month	Monitoring Site	Young of Year Roundtail Chub	Adult Roundtail Chub	Rainbow trout Caught
	2001 January (02)	Below Stewart Mountain Dam	0	0	No
		Goldfield Administrative Center	ns	ns	No
		Granite Reef	0	0	Yes
	2002 November and December	Below Stewart Mountain Dam	0	0	No
		Goldfield Administrative Center	0	0	No
		Granite Reef	0	0	No
	2003 January (04)	Below Stewart Mountain Dam	0	0	No
		Goldfield Administrative Center	0	0	No
		Granite Reef*	0	0	Yes
	2004 January (05)	Below Stewart Mountain Dam	0	0	No
		Goldfield Administrative Center	ns	ns	ns
		Granite Reef	ns	ns	ns
	2005 February and March (06)	Below Stewart Mountain Dam	0	0	No
		Goldfield Administrative Center	0	0	No
		Granite Reef	0	0	No
	2006 December	Below Stewart Mountain Dam	0	0	No
		Goldfield Administrative Center	0	0	No
		Granite Reef*	0	0	Yes
	2007 November	Below Stewart Mountain Dam	0	0	No
		Goldfield Administrative Center*	0	0	Yes
		Granite Reef*	0	0	Yes
	2008 December	Below Stewart Mountain Dam	ns	ns	ns
		Goldfield Administrative Center	ns	ns	ns
		Granite Reef*	0	0	No
SRP Arizona Canal	1990 Dec?	Above and Below electric barrier	0	0	No
	1991 January (02)	Above and Below electric barrier	0	7	No
	1992 January (03)	Above and Below electric barrier	0	21	No
	1993 January (04)	Above and Below electric barrier	0	1	No
	1994 January (05)	Above and Below electric barrier	0	1	No
	1995 November	Above electric barrier	0	1	No
		Below electric barrier	0	1	
	1996 January (97)	Above electric barrier	0	31	No
		Below electric barrier	0	2	No
	1997 January (98)	Above electric barrier	8	2	No
		Below electric barrier	0	12	No
	1998 Nov/Dec	Above electric barrier	244	0	No
		Below electric barrier	5	0	No
	1999 January (00)	Above electric barrier	3	15	No
		Below electric barrier	0	0	No
	2000 January (01)	Above electric barrier	0	1	No
		Below electric barrier	0	0	No
	2001 January (02)	Above electric barrier	0	0	No
		Below electric barrier	0	0	No
	2002 January (03)	Above electric barrier	3	0	No
		Below electric barrier	0	2	No
	2003 January (04)	Above electric barrier	0	0	No
		Below electric barrier	0	0	No
	2004 January (05)	Above electric barrier	0	0	No
		Below electric barrier	0	0	No
	2005 January (06)	Above electric barrier	0	0	No
		Below electric barrier	0	0	No
	2006 January (07)	Above electric barrier	0	0	No
		Below electric barrier	0	0	No
	2007 January (08)	Above electric barrier	0	2	No
		Below electric barrier	0	0	No
	2008 January (09)	Above electric barrier	0	1	No
		Below electric barrier	0	0	No
SRP South Canal	1990 unknown	Above and Below electric barrier	0	0	No
	1991 unknown	Above and Below electric barrier	0	13	No
	1992 unknown	Above and Below electric barrier	0	2	No
	1993 unknown	Above and Below electric barrier	0	25	No
	1994 unknown	Above and Below electric barrier	0	Ns	ns

Survey Reach	Survey Year/Month	Monitoring Site	Young of Year Roundtail Chub	Adult Roundtail Chub	Rainbow trout Caught
	1995 October	Above electric barrier Below electric barrier	0 2	22 1	No No
	1996 October	Above electric barrier Below electric barrier	0 0	18 6	No No
	1997 October	Above electric barrier Below electric barrier	0 2	18 2	No No
	1998 Oct/Nov	Above electric barrier Below electric barrier	428 47	70 0	No No
	1999 November	Above electric barrier Below electric barrier	0 4	20 61	No No
	2000 November	Above electric barrier Below electric barrier	0 0	11 2	No No
	2001	Above electric barrier Below electric barrier	ns ns	Ns ns	ns ns
	2002 Nov/Dec	Above electric barrier Below electric barrier	0 0	2 4	No No
	2003 November	Above electric barrier Below electric barrier	0 0	0 0	No No
	2004 November	Above electric barrier Below electric barrier	0 0	0 0	No No
	2005 November	Above electric barrier Below electric barrier	0 0	6 3	No No
	2006 November	Above electric barrier Below electric barrier	0 0	1 0	No No
	2007 November	Above electric barrier Below electric barrier	0 0	4 0	No No
	2008 November	Above electric barrier Below electric barrier	0 0	10 0	No No

Potential Impacts

Rainbow Trout - Salt River Stockings

Bryan and Hyatt (2004) hypothesize that the roundtail chub may continue to decline due to senescence of the 1998 cohort and recommended, among other research, that the introduction of rainbow trout into the Lower Salt River be evaluated for its effect on the roundtail chub. Stocking rainbow trout into the Lower Salt River may result in competition for food and space between the trout and roundtail chub as they share similar habitats (Bryan et al. 2000). Stocked rainbow trout feed primarily on insects and invertebrates, but are also known, on occasion, to prey on small native or nonnative fish (Propst et al. 1998). Roundtail chub prefer pools and pool-glide habitats adjacent to riffles (Bryan and Robinson 2000), and in the Lower Salt River during the winter months pool habitat is limited (Bryan et al. 2000). The limited amount of habitat present during the winter months provides opportunity for overlap and exposure. The twice monthly stocking of rainbow trout during this period provides a continued pulse of nonnative species into the river and limited habitats. Roundtail chub are also spawning during the stocking period in the Verde River, but larvae may come into contact with stocked rainbow trout if they move down below the confluence with the Salt. Bryan et al. (2000) and Bryan and Hyatt (2004) both raise concerns about competition for food and space between stocked rainbow trout and roundtail chub in the stocking reach. The multi-agency group implementing the Statewide Conservation Agreement for roundtail chub (AGFD 2006) also recommended against stocking rainbow trout into prime roundtail chub habitats to reduce the potential for impacts.

The suite of other nonnative species in the Lower Salt River, particularly largemouth bass, green sunfish, flathead catfish, and channel catfish, are potential predators on roundtail chub eggs, larvae and juveniles, and are more significant predators than the hatchery-raised rainbow trout (Bonar et al. 2004). However, the continual replacement of the stocked rainbow trout population every two weeks results in a continuous load of fish into the system utilizing the same habitats. Other factors that may affect the reproductive potential of the Salt River roundtail chub populations include: 1) the loss of individuals into the SRP canal system at Granite Reef Diversion Dam (data provided in Table 50), and 2) large flow releases and fluctuating flow releases from Bartlett Dam during the spring spawning period that can disrupt spawning and hatching. Once individuals get below Granite Reef Diversion Dam and the electrical barriers in the canals, they are lost to the river populations, and this may be particularly important in the loss of adult spawners from a small population. As discussed previously, releases from Bartlett Dam that mimic the natural hydrograph may contribute to successful spawning by roundtail chub; however this has not been evaluated because those ideal releases have not occurred since.

Warm water species - Salt River Lakes

Due to the potential and suitable habitat for warm water species to reproduce, the potential impacts are evaluated for the proposed stocking of walleye, largemouth bass, smallmouth bass, channel catfish, and black crappie and also their future progeny.

Largemouth bass, smallmouth bass, channel catfish, and black crappie do maintain populations in the river and all of the chain lakes. Walleye do not have self-sustaining populations in the chain lakes, and also do not have self-sustaining populations in the Lower Salt River because the habitat is unsuitable in the Lower Salt for reproduction of this species. With the existing populations of these other fish in the chain lakes and the potential for their escapement into the Lower Salt River, it is impossible to separate and quantify the impacts from the stocked fish and/or their progeny from the larger, already existing fish populations in the river. Therefore, the impacts from the proposed stocking of largemouth bass, smallmouth bass, channel catfish, and black crappie and their progeny on the roundtail chub in the Lower Salt River would be additive to the extant populations of nonnative predators and competitors. There may be a potential for additional predation, competition for food and space, or inhibition of reproduction from these warm water stockings. However, these impacts would only occur if the stocked species or their progeny are able to move through dams and turbines or over the spillway and enter the river from Saguaro Lake, where they would come in contact with occupied roundtail chub sites.

The opportunity for warm water fish and/or their progeny stocked into Saguaro Lake reaching native fish habitat in the Lower Salt River via release is difficult to determine, however presumed to occur. No data has ever been collected to confirm this. The pump-back hydroelectric system allows for water movement between the lakes on a regular basis, but not from the river back up into Saguaro Lake. The fish communities of the three lakes are linked by

this exchange of waters. Additionally, water released through the hydroelectric generating system can also allow fish from Apache Lake and Canyon Lake to reach Saguaro Lake. As stated in each of the chain lakes fish movement sections, fish moving through the dams would have to be present at one of the multiple intakes which are located at: 45 to 230 ft deep at Horse Mesa Dam, 30 to 130 ft deep at Mormon Flat Dam, and 90 ft to 100 ft deep at Stewart Mountain Dam (C. Paradzick pers. comm.). Uninhabitable dissolved oxygen levels (below 2.0 ppm) occur at these depths during certain times of the year (Figure 55). Due to the depth of the intakes and bypass, water quality (low dissolved oxygen) at such depths would create a physical fish barrier during certain times of the year but allow for movement between lakes at other times.

During episodic runoff events when Roosevelt Lake discharges and spillway overflows exceed 3,000 cfs, water coming into a full Apache Lake will pass over the spillway into Canyon Lake. A full Canyon Lake will spill over into Saguaro Lake and a full Saguaro will pass all inflows exceeding 3,000 cfs over the Stewart Mountain Dam spillway into the Lower Salt River. Salt River Project dams spill on an average of once every 10 years. The passage of some fish, particularly smaller pelagic or littoral species, is probable going from lake to lake and into the Lower Salt River. Thus, during extreme runoff events when the chain lakes are at or near capacity, there is a probability of stocked fish and their progeny to move through Stewart Mountain Dam into the Lower Salt River into habitat occupied by roundtail chub.

To reduce the potential for impacts, the multi-agency group implementing the Statewide Conservation Agreement for roundtail chub (AGFD 2006) also recommended against stocking largemouth bass, smallmouth bass and channel catfish directly into sites with roundtail chub populations. However, the group did agree with the stockings of black crappie and walleye as long as the stocking sites had a low potential to contribute to the aquatic community within roundtail chub habitats, as in this case.

It is difficult to determine the magnitude of potential impacts to roundtail chub due to the combination of the low potential for the proposed stocked species and/or their progeny to move through dams and turbines or over the spillway and enter the river from Saguaro Lake and the difficulty in separating additional incremental impacts from the stocked warm water fishes from impacts due to existing nonnative predators and competitors.

Rainbow trout – Salt River Lakes

Rainbow trout do not have self-sustaining populations in the chain lakes or in the Lower Salt River. In 43 years of record of rainbow trout stockings in this complex, there is no documentation of successful reproduction by trout in the lakes or the river. Further, stocked trout have not been shown to have the ability to survive long-term in the Lower Salt River or the chain lakes due to high summer temperatures, competition for food, and predation by warm water species.

The movement of the trout out of the chain lakes through Stewart Mountain Dam and into the Lower Salt River would be the same as the warm water proposed fish species listed above, however the timing would eliminate late spring through late fall or when temperature rises above 25 degrees Celsius (Sublette et. al. 1990) and the oxygen is still above 2.0 ppm (FWS online http://www.fws.gov/nc-es/edout/albefitfish2.html). This can vary between years, but usually occurs May to October as shown in 1999 (Figure 57).

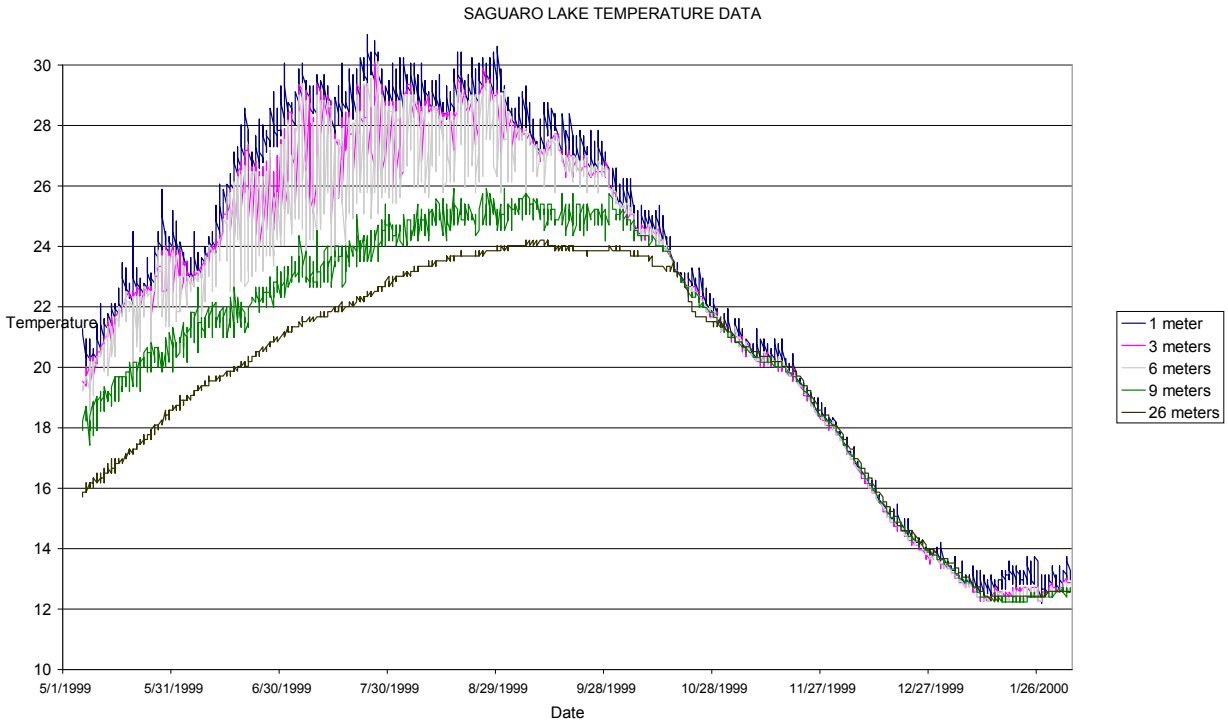

Figure 57. Temperature data readings for Saguaro Lake at various depths, May 1999 to January 2000.

The multi-agency group implementing the Statewide Conservation Agreement for roundtail chub (AGFD 2006) agreed that the stockings of rainbow trout into sites that have a low potential to contribute to the aquatic community within roundtail chub habitats would not create an impact to the chub population, as in the case for the Salt River reservoirs.

Due to the combination of the low potential for the proposed stocked species and/or their progeny to move through dams and turbines or over the spillway and enter the river from Saguaro Lake, the proposed action to stock rainbow trout into the Salt River reservoirs would not be expected to impact the population of roundtail chub in the Lower Salt River, Lower Verde River, and the SRP canals system.

Yuma Clapper Rail

Yuma clapper rails have not been documented from the lower Salt River since 1982, but were once found at Granite Reef Diversion Dam at the lowest end of the reach. There are small isolated areas of cattails along the riverbanks in the stocking site that could provide a limited amount of habitat. Refer to Saguaro Lake site analysis for specific information related to marsh access.

Potential impacts

The open shorelines along the river largely negate the need to create access through the cattail areas for fishing. Anglers fishing generally tend to be quiet, and not create large noise disturbances. Noise has not been identified as a concern for YCR. Monofilament line or lead fishing tackle has not been shown to be a concern for clapper rails.

Western Yellow-Billed Cuckoo

Historic occurrences for the cuckoo have been documented along the lower Salt River. No occurrences have been documented at or adjacent to Apache, Canyon or Saguaro Lakes. No breeding and/or foraging habitat is present at Apache, Canyon or Saguaro Lakes. The lower Salt River contains suitable breeding and/or foraging habitat for the cuckoo.

Potential impacts are identified below and described in greater detail in the methodology and criteria contained in Chapter 3.

Potential Impacts

There may be some limited amount of habitat degradation from anglers using or creating new trails to access the stocking sites along the lower Salt River.

Potential impacts to migrant cuckoos can occur statewide and are most frequently found in the riparian zones along aquatic habitats (rivers, creeks, etc.); it is difficult to identify areas where they could not occur during migration. Additionally, the habitat requirements for migrant cuckoos are not as specific as nesting birds and specific stopover locations used are unpredictable in timing, duration, location, and abundance.

PHOENIX METRO COMPLEX

The Phoenix Metro Complex is downstream of the Lower Salt River Complex and includes the following proposed stocking locations (Figure 58):

1. Tempe Town Lake – located in the Salt River channel. This is a state fishing water (not in the Urban Fishing or Fishing in the Neighborhood Programs).

2. Open System Urban Fishing Program Lakes and Proposed Fishing in the Neighborhood Lakes (6 locations) – all artificial, man-made park lakes located in or within Scottsdale and north Tempe's Indian Bend Wash floodway that flows into the Salt River channel at the upper end of Tempe Town Lake, or drains into the Salt River channel immediately below Tempe Town Lake.

    - Chaparral Lake and Papago Ponds (Urban Fishing Program waters)

    - Eldorado Lakes, Indian School Lake, McKellips Lake, and Tempe Papago Lake (proposed Fishing in the Neighborhood lakes)

3. Closed System Urban Fishing Program (UFP) Lakes and Proposed Fishing in the Neighborhood (FIN) Lakes (24 locations) – all closed system; artificial, man-made park lakes without outflow.

    - UFP LAKES: Alvord Lake, Cortez Lake, Desert Breeze Lake, Desert West Lake, Encanto Lake, Evelyn Hallman Pond, Kiwanis Lake, Red Mountain Lake, Rio Vista Pond, Riverview Lake, Steele Indian School Pond, Surprise Lake, Veterans Oasis Lake, and Water Ranch Lake (Urban Fishing Program waters).

    - FIN LAKES: Bonsall Lake, Crossroads Lake, Discovery District Lakes, Freestone Lake, Granada Lake, McQueen Lake, Pacana Lake, Roadrunner Lake, Selleh Lake, and Water Treatment Lake (proposed Fishing in the Neighborhood lakes).

Urban Fishing Program Waters - Background

Arizona's highly popular Urban Fishing Program (UFP) operates on the motto, "If people can't get to the fish, we'll bring fish to the people." In operation since 1985, the UFP includes 21 waters in 11 cities across the state. Sixteen of the UFP waters are in the Phoenix Metro Complex. Lakes range in size from 2.7 to 25 surface acres. Three types of fish stockings occur: 1) put-and-take stockings of catchable sized fish for the purpose of fishing recreation and harvest, 2) supplemental stockings that either add fish to a fishery to help augment low natural reproduction or increase fishing success for a clinic or other fishing event, and 3) restocking of fish communities following catastrophic events (e.g., golden alga blooms or dissolved oxygen crashes) or lake renovation and draining projects.

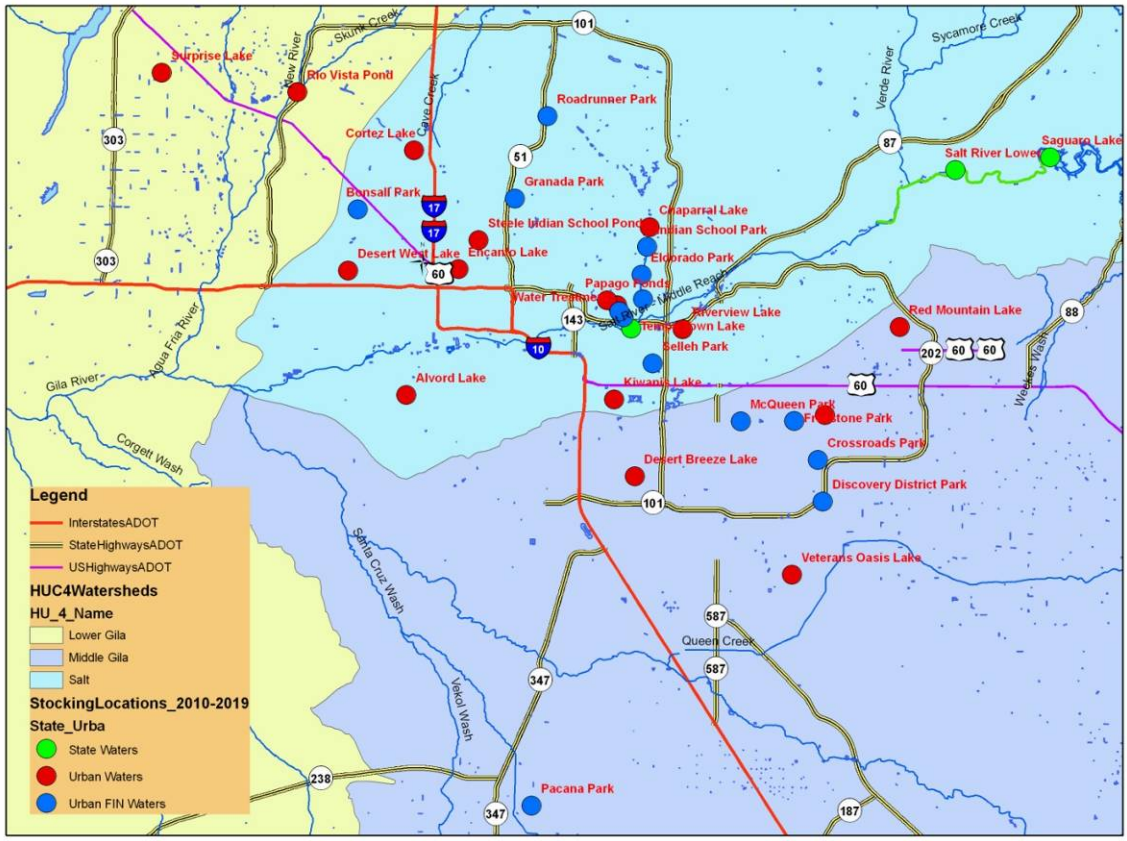

Figure 58. Phoenix Metro Complex Urban Fishing and Prospective Fishing in the Neighborhood Lakes.

Fishing in the Neighborhood Waters - Background

An AGFD priority goal is the recruitment and retention of anglers in Arizona. A proposed strategic concept to support this goal over the next ten years is the Fishing in the Neighborhood (FIN) program concept (note: the FIN name is subject to future change). There are 14 Phoenix area lakes proposed for addition to this new fishing program. Lakes range in size from 1 to 5 surface acres. Based in established urban areas at established urban park lakes, the FIN program would be based on supplemental stockings of these waters with catchable sport fish to increase recreational angling by attracting new anglers and retaining existing anglers. Reasons for stocking would be for: 1) fishing derbies and similar events, 2) supplemental stockings that add fish to augment low natural reproduction and increase fishing success, and 3) stockings of fish species to restart the fish population after a catastrophic event (e.g., golden alga kills) or lake draining.

This new, proposed concept would include stockings of catchable channel catfish 1-5 times per year, stockings of bluegill 1-4 times per year, and stockings of largemouth bass once every 1-3 years. The FIN concept differs from the Urban Fishing Program concept by: 1) primarily

delivering warm water sport fish at significantly fewer stockings each year, and 2) providing moderate, rather than intensive, angling recreation use. Additional fish stockings to augment low natural reproduction or replace fish lost during renovation projects or catastrophic events would include, as needed, stockings of channel catfish, bluegill, redear sunfish, and largemouth bass.

Open System Phoenix Metro Area State, Urban Fishing, and Fishing in the Neighborhood Lakes

This Phoenix Metro Complex Open System category includes Tempe Town Lake (a state fishing water) and six other lakes in either the Urban Fishing Program or the proposed Fishing in the Neighborhood Program. Four of these city park lakes are located in or within the Indian Bend Wash floodway that flows into upper Tempe Town Lake in the Salt River channel. The other two open system waters are the Papago Ponds and the Tempe Papago Lakes that may overflow into urban drainages and storm drains that end up in the Salt River channel immediately below Tempe Town Lake. Many of these Urban Lakes are connected and served by Salt River Project canal systems (Figure 59).

The designated Urban Fishing Program (UFP) waters in this open system grouping include Chaparral Lake and Papago Ponds. The proposed, and as yet unstocked, waters in the Fishing in the Neighborhood (FIN) concept program include the Eldorado Lakes, Indian School Lake, McKellips Lake, and Tempe Papago Lake.

There are an additional 14 UFP waters and 10 FIN waters that are all considered closed aquatic systems. These waters are discussed in the Closed System Urban Fishing Program Lakes and Proposed Fishing in the Neighborhood Lakes section that follows.

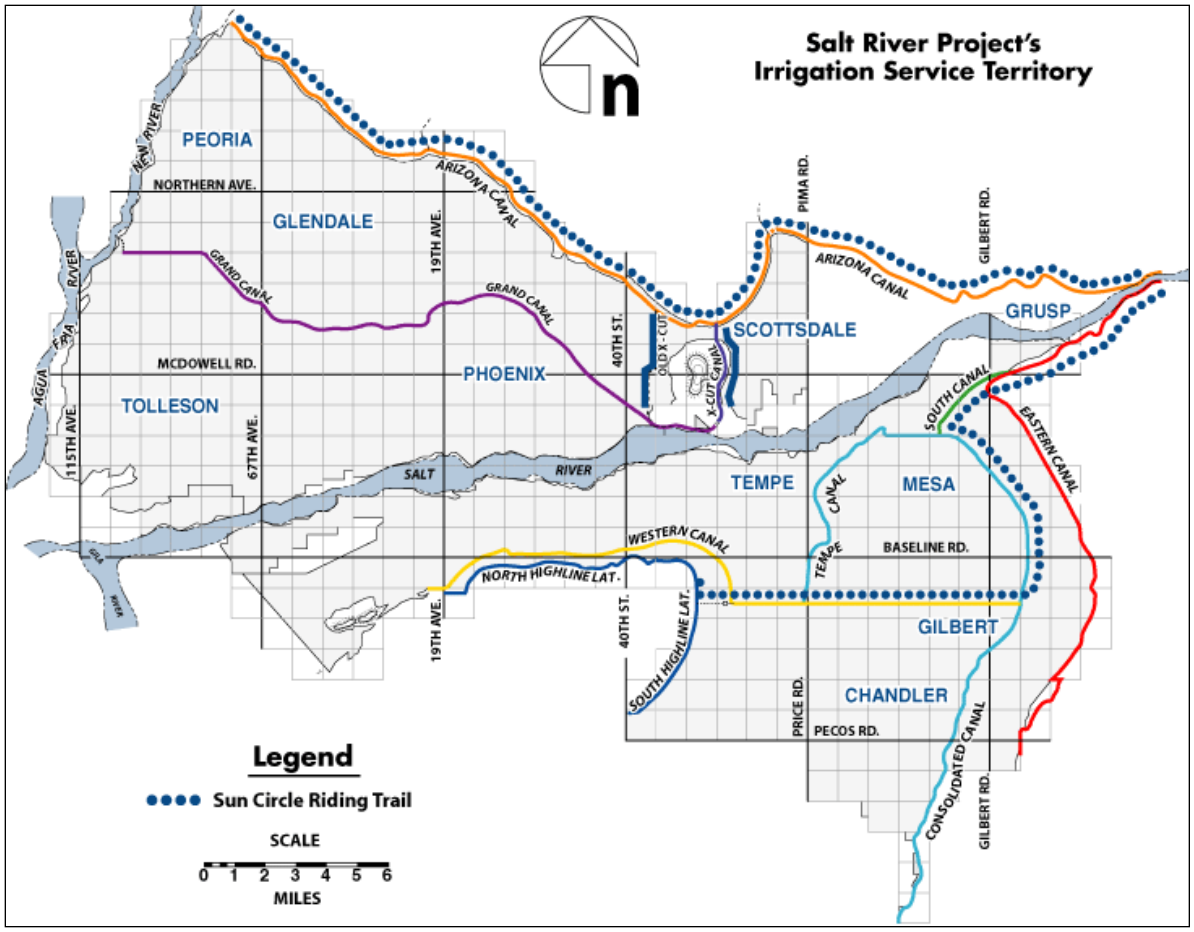

Figure 59. SRP's irrigation service territory.

Tempe Town Lake

Site Description

Tempe Town Lake is a 224-acre lake newly constructed and filled in 1999 and is managed by the City of Tempe for recreation (Figure 60). Tempe Town Lake is managed as a state fishing water and is not in the Urban Fishing Program. The lake is formed by a pair of inflatable dams in the channel of the Salt River. The lower dam is 19 feet tall and lake depths are 17 feet. Nearly two miles upstream, the upper inflatable dam is eight feet tall and lake depths are seven feet. The lake is essentially an impounded, engineered flood flow channel. The sides of the lake are steep, concrete banks that drop off rapidly. Lake levels are maintained through SRP canal water supplies from the Verde and Salt Rivers diverted at the Granite Reef Diversion Dam. Indian Bend Wash, an extensive urban floodway channel, also runs into the upper end of Tempe Town Lake. The Wash has flowed into the lake each year since 1999 during both winter rain events and summer monsoons.

Tempe Town Lake is owned and managed by the City of Tempe with SRP a cooperator. The area surrounding the lake is fully developed including commercial and private development in

addition to the lateral park system. The area includes paved paths, picnic areas, restrooms, docks, parks and a large children's splash area. According to Nancy Ryan, Rio Salado Project Manager, 2.7 million people use the recreational area each year. Non-motorized boating, kayaking and competitive rowing are popular on the lake. During triathlons, hundreds of athletes swim a one-mile distance in the lake.

Figure 60. Photo of Tempe Town Lake.

Management of water body

The primary management objective for Tempe Town Lake, a state fishing water, is to provide a put-and-take intensive-use coldwater rainbow trout fishery throughout the winter and spring months (Table 51). Since 2002, Tempe Town Lake has been stocked with catchable rainbow trout approximately every other week, from mid November to mid March. Numbers of trout stocked annually have ranged from 2,500 to 42,000. Number, timing, and hatchery trout sizes are adjusted depending on fish availability, stocking conditions, need to meet angler demands, or due to changes in management strategy.

A secondary objective of Tempe Town Lake is a self sustaining warm water fishery. Largemouth bass, channel catfish, bluegill, redear sunfish and black crappie populate the lake. The AGFD has not stocked any fish species other than rainbow trout into Tempe Town Lake. The origin of the warm water species is most logically from SRP canal inflows, Salt River flood flows over Granite Reef Dam, and flood flows from Indian Bend Wash.

Angler use, estimated at 16,000 anglers annually, is a minor component of the total Tempe Town Lake recreation use. The winter trout stockings have been very successful providing local angling opportunities for Phoenix area residents and winter visitors. Creel was conducted at Tempe Town Lake in December through March of 2003 and 2004; total angler use days for these four months was 7,602 in 2003 and 15,957 in 2004 (Pringle 2004).

Table 51. Summary of historic Department fish stockings at Tempe Town Lake.

Species	First Year	Last Year	Num. Years Stocked	Number Stocked
Rainbow trout	2002	2008	7	148,292
Total			7	148,292

Proposed action

The Department proposes to stock rainbow trout (catchable and sub-catchable) from November to April annually; numbers of trout may be from 0 to 45,000 fish annually, for the period covered by this consultation.

Water Distribution / Connectivity

Tempe Town Lake is maintained at a constant level using water from the SRP canal system. There is leakage from the inflatable dam that allows water to move a short distance downstream in the Salt River channel before it evaporates and/or sinks back into the alluvium (Figure 61). During flood releases from the Salt or Verde Rivers, the dams at Tempe Town Lake can be deflated within 30 minutes to allow the passage of the floodwaters downstream. If flows exceed 30,000 cfs the up- and downstream dams will be lowered (deflated) part way and then adjusted to any increased flow thereafter. Floodwater is then allowed to flow through the lake in the river channel. The dams are reinflated once the flood nears its end, capturing the tail waters of the flood and refilling the lake. Because the lake bed/channel must be managed to convey major flood flows, it is not a closed system and any fish species in the lake can move into the Salt River downstream of the lake when flood flows occur. Water flows out of Tempe Town Lake further downstream into the Gila River and on to Painted Rock Reservoir (a normally dry flood control impoundment) when flood flows from the Salt or Verde rivers occur.

Incoming flood flows from Scottsdale's Indian Bend Wash may also result in overflows out of Tempe Town Lake. Peak discharge flows down Indian Bend Wash have ranged from a low of 228 cfs in 2001 to 4,400 cfs in 2006 (Maricopa County Flood Control District website, Dec. 2009).

Figure 61. Photo of water releases over the inflatable dam at Tempe Town Lake.

Fish Movement

An inflatable dam at each end of Tempe Town Lake prevents the emigration of rainbow trout or warm water fish outside of the system except under high flow conditions in the Salt River. In these instances fish could theoretically move upstream 17 miles to Granite Reef Diversion Dam and/or move 22 miles downstream to the Gila River confluence. Upstream movement by fish during high flows could occur; however, fish would have to swim a long distance against a high velocity, low visibility flood flow current, then find a way to get over the nine foot tall Granite Reef Diversion Dam to access the lower Salt and Verde Rivers; as such, Granite Reef Diversion Dam is functionally a barrier to upstream fish movement. Fish that move downstream over the Tempe Town Lake dam during spill events may be transported as far as the Gila River confluence or beyond to reach Painted Rock Reservoir near Gila Bend. Under extremely high flood flows of a 100-year flood magnitude, fish may pass through Painted Rock dam and follow the Gila River until the confluence with the Colorado River at Yuma. Long-term survival of rainbow trout outside of Tempe Town Lake in the Salt or Gila Rivers is highly unlikely as temperatures exceed the upper thermal tolerance of rainbow trout during the summer months even in the permanently flowing sections near their confluence or in Painted Rock Reservoir. Warm water fish that escape from the lake could persist upstream or downstream in pools of perennial water, and in fact already exist in much of the Salt/Gila confluence area.

Community Description
Tempe Town Lake was constructed and filled for the first time in 1999. The Department began annual stockings of rainbow trout in Tempe Town Lake beginning in 2002. The City of Tempe has periodically stocked Israeli carp for midge fly control and redear sunfish under permit from AGFD. All other fish species in the lake entered the lake via SRP canals, through Indian Bend Wash during flood events, or down the Salt River channel from flooding in the Salt or Verde Rivers overflowing the Granite Reef Diversion Dam.

Prior to trout stocking in 2002, two fish surveys were conducted in 1999 and 2001 (Warnecke 1999, Warnecke et al 2003) that documented largemouth bass, green sunfish, bluegill, redear sunfish, channel catfish, carp, tilapia, threadfin shad, red shiner, yellow bass, goldfish, crayfish, and fathead minnow in Tempe Town Lake. In nine years of sampling, only two Sonora suckers were found (1999). Three 10 inch rainbow trout were sampled in 2001 and most likely entered the lake via the SRP canal system after being stocked in the Lower Salt River.

Additional surveys were conducted by the Department in March 2001, March 2003, March and April 2004, March 2005, April 2006, March 2007, March 2008 and March 2009 (Warnecke 2003, 2004a; Wiggins and Warnecke 2007; Rogers 2008c, 2009c). Species documented in Tempe Town Lake in these studies included those documented earlier with the addition of mosquito fish, inland silverside minnow, black crappie, flathead catfish, and one razorback sucker. The razorback sucker was caught in March 2004. Potential sources of this fish are from illegal removal from a pond at Arizona State University, transported from Lake Havasu via the CAP canal to the Arizona Canal, or from the stocking in the upper Verde River, through Horseshoe and Bartlett Lake down the Verde River into the Arizona Canal and then into Tempe Town Lake.

The most recent survey conducted at Tempe Town Lake in 2009 documented the presence of common carp, threadfin shad, bluegill, channel catfish, tilapia, largemouth bass, yellow bass, rainbow trout, flathead catfish, and black crappie (Rogers 2009c). Additionally, other than two Sonora suckers in 1999 and one razorback sucker in 2004, no other native species have been collected in Tempe Town Lake since it first filled in 1999. Three native species, Sonora sucker, desert sucker and roundtail chub, however, have been found in the Arizona Canal that supplies water to the lake (Marsh and Kesner 2004, 2006a, 2006b, 2007b, 2008; Kesner and Marsh 2009)

Consultation species or Critical Habitat
Potential impacts to bald eagles, roundtail chub and Yuma clapper rail are evaluated below. Possible impacts from sport fish leaving the lake during flooding events are evaluated in the Phoenix Metro Urban Lakes Complex Analysis.

Bald Eagle
Riverside Breeding Area is approximately 3.4 miles from Tempe Town Lake and is within the Bald Eagle DPS. The eagles were first observed in 2009. Nest watchers have not been monitoring the breeding area so the prey base specifics are largely unknown. Riverside Breeding Area productivity data shows that the nest failed with two nestlings found dead in the nest. It was active again in 2010.

Potential Impacts

Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site. Tempe Town Lake does not currently have monofilament bins present.

Roundtail Chub
Roundtail chub have never been observed, documented or reported in fisheries or creel surveys at Tempe Town Lake. They have been found, however in the Arizona Canal which provides water to the lake. In 1999, roundtail chub were approved for stockings into Tempe Town Lake through an interagency Environmental Assessment and Section 7 compliance documentation (F-7-M). No roundtail chub have been stocked in Tempe Town Lake to date. A discussion on impacts to roundtail chub is included in the Phoenix Metro Complex Analysis section below.

Yuma clapper rail
Yuma clapper rails have not been documented from Tempe Town Lake. There is no suitable habitat at the lake but there is habitat upstream and downstream on the Salt and Gila rivers.

Potential impacts

No impacts would be anticipated due to the lack of habitat at the lake and that rainbow trout are not a threat to rails or their prey base.

Chaparral Lake
Site Description
Chaparral Lake is located at Chaparral Park, at Hayden Road and Chaparral in Scottsdale at 1260 foot elevation. This 10-acre lake is the oldest in the UFP. Constructed by the City of Scottsdale in the 1960's and renovated in 2005, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 10 feet, with a maximum of 15 feet. Scottsdale's popular Chaparral Park has a variety of improvements, including restrooms, ramadas, plazas, picnic tables, lighting, handicap accessibility, a recreation center and pool, a children's playground, and a boat ramp.

Management of Water Body
Since 1977, Chaparral Lake has been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 52). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 21,600 angler use days per year, an angler satisfaction rate of 88%, and a 23% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 52. Summary of historic Department fish stockings at Chaparral Lake.

Species	Years	Num. of Stockings	Number Stocked
Rainbow trout	1977-2008	244	129,840
Channel catfish	1977-2008	329	175,009
Bluegill/Hybrid sunfish	1983-2008	51	37,500
Largemouth bass	1980-2008	14	11,540
Redear sunfish	1980	2	8,791
Common carp	1977	8	1,817
Tilapia (Mozambique)	1975-1977	5	3,465
Total		588	367,962

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill sunfish, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 20,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 1,500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be

stocked as needed at any time during the period covered by this consultation to augment a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity

Chaparral Lake is considered an open system but it has a small urban watershed inflow and controlled grated outflow. The lake is supplied with SRP water, gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Overflow events are rare and tend to occur only with extreme rainfall events of a five to seven year flood magnitude. Chaparral Lake is situated adjacent to the Indian Bend Wash flood control channel and is not directly affected by those high flood flows. Water leaving the lake must pass through a grated structure with ¾ inch bars before entering a culvert under Chaparral Road. From there, the water flows southerly into the newly completed Camelback Park for approximately 0.6 miles before merging into the adjoining Indian Bend Wash greenbelt and floodway corridor. From this point, urban runoff flows 4.6 miles down Indian Bend Wash through a series of urban ponds that are either a part of Scottsdale's park system or that belong to various golf courses. Indian Bend Wash then runs into the upper end of Tempe Town Lake in the Salt River channel.

Fish Movement

There is no opportunity for fish to move up through the irrigation head gates and buried pipelines. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems. There is opportunity for fish to escape downstream through the overflow structures during significant summer monsoon events or winter storm events. The grated structure limits fish with a head width over ¾ inches from passing through. Smaller fish could escape and travel the same pathway described in the water connectivity section above until reaching Tempe Town Lake. No sampling has been done to determine if fish have spilled out of Chaparral Lake.

Because Chaparral Lake can overflow and spill into Indian Bend Wash and connect to Tempe Town Lake, there is a possibility that stocked fish or their smaller progeny could escape. There are numerous perennial ponds and lakes in the Indian Bend Wash watershed above Chaparral Lake that are subject to flooding, that can provide sanctuary for escaping fish to grow and move downstream with the next flood event. These waters are owned by private golf courses and homeowner associations, and include lakes less than one acre to over 30 acres. A diversity of warm water fish species are found in these waters including all species found in Chaparral Lake.

Community Description

AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, largemouth bass, crappie, tilapia, common carp, and threadfin shad as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Consultation Species or Critical Habitat
There are no consultation species or designated critical habitat at Chaparral Lake. Possible impacts from sport fish leaving the lake during monsoon events are evaluated in the Phoenix Metro Urban Lakes Complex Analysis.

Papago Ponds

Site Description
Papago Ponds are an interconnected collection of three lakes, located at Papago Park off of Galvin Parkway north of Van Buren Street in Phoenix, at 1250 foot elevation. Constructed by the Department in the 1940's, the three ponds were originally built as part of an eight pond bass hatchery. In the early 1960's, the City of Phoenix took over management of the park, setting aside the upper three ponds for park aesthetics, recreational fishing, and for use in pumping water to the Papago Golf Course. These artificial ponds have natural dirt edges and unsealed dirt bottoms. The ponds have maximum depths of 8-11 feet, and are supplied with SRP water, gravity fed through a pipeline and ditch. Phoenix's popular Papago Park has a variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, hiking and biking trails, and the adjacent Phoenix Zoo.

Management of Water Body
Since 1993, Papago Ponds have been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 53). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur. Creel survey results from 2005 found 22,700 angler use days per year, an angler satisfaction rate of 84%, and a 42% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 53. Summary of historic Department fish stockings at Papago Ponds.

Species	Years	Number of Stockings	Number Stocked

Rainbow trout	1993-2008	135	29,880
Channel catfish	1979-2008	181	41,965
Bluegill/Hybrid sunfish	1956-2008	35	44,497
Largemouth bass	1956-2008	13	3,671
Total		364	122,233

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 12,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 1,000.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Papago Ponds #1-3 are considered a predominately closed system water body, because it is a flow-through chain of ponds that overflow to the next downstream pond. Pumps pull lake water from Pond #1 to irrigate the Papago Golf Course turf grass a half-mile away. The ponds flow in a series, with SRP water entering Pond #1. Pond #1 has two outflows, one goes to Pond #2 and the other goes to the Phoenix Zoo ponds via a ditch. Water flows through Pond #2 into Pond #3 and then flows from there to ponds in the Phoenix Zoo via a pipeline and ditch system. Water levels of the five ponds in the Phoenix Zoo are supported by this flow-through system. Lake #8 in the Phoenix Zoo is the final, downstream pond. The entire system is electronically monitored with leveling systems at the inflow into Pond #1 through Pond #8. Small leaks and overflow from Pond #8 may occur, carrying water through a small culvert and drainage ditch system that goes 0.6 miles before entering the Salt River channel below Tempe Town Lake.

Fish Movement
There is no opportunity for fish to move up through the irrigation head gates and buried pipelines. Because the Papago Ponds are interconnected as source water for the Phoenix Zoo ponds, and the Zoo ponds have some leakage through a grated overflow into a ditch/culvert system that eventually empties into the Salt River, there is a slight possibility of smaller stocked fish or their progeny escaping. Smaller fish could escape and travel the same pathway described in the water connectivity section, until reaching the Salt River below Tempe Town Lake. No sampling has been done to determine if fish have spilled out of Papago Ponds or the Phoenix Zoo.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, common carp, white amur, and largemouth bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Consultation Species or Critical Habitat
There are no consultation species or designated critical habitat at Papago Park Lakes. Possible impacts from sport fish leaving the lake are evaluated in the Phoenix Metro Urban Lakes Complex Analysis.

Eldorado Park Lakes
Site Description
The Eldorado Lakes are located at Eldorado Park at Miller Road and Murray Lane in Scottsdale. These 4 and 1.5-acre lakes are part of the Scottsdale Parks system. Constructed by the City of Scottsdale and U.S. Army Corps of Engineers in the 1970's, the artificial lakes were built for park aesthetics, recreational fishing, and are an integrated feature in the greenbelt and floodplain. The larger, northern lake was completely renovated by Scottsdale in 2008 and now has a sealed bottom and a concrete perimeter edge. Lake depths average 6 feet with a maximum of 12 feet. The southern lake has a dirt bottom and banks with a maximum depth of 8 feet. Scottsdale's popular Eldorado Park has are a variety of improvements including restrooms, ramadas, plazas, picnic tables, lighting, handicap accessibility, walking trails, a recreation center and pool, ball fields, and a children's playground.

Management of Water Body
Eldorado Lake has been managed by the City of Scottsdale as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for these lakes that reduces the harvest of trout and catfish. Angling use is light to moderate. In 2008, Scottsdale used bond money to fund a complete renovation of the north lake by deepening it, adding fish habitat in the form of rock reefs and spawning gravel, installing concrete walls, sealing the bottom, and putting in an aeration system to support a healthy fishery.

Catchable catfish and bluegill are occasionally stocked by the City of Scottsdale under a permit from AGFD for fishing derbies.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
The Eldorado Lakes are considered an open-system water body because they have a large urban watershed inflow and a spillway, and are situated in the Indian Bend Wash floodplain greenbelt. The lakes are supplied with Salt River Project water gravity fed through a pipeline. Pumps pull water from the lakes to irrigate surrounding park turf grass.

The lakes are subject to overflow runoff events a couple times a year on average. The Indian Bend Wash watershed above Eldorado captures urban runoff from a large area that brings runoff into the lake during winter and summer rains. Water leaving the lake will flow in a southerly direction in Indian Bend Wash, spilling over into numerous municipal and golf course ponds over 2.6 miles, before entering the upper end of Tempe Town Lake in the Salt River channel. The ephemeral Indian Bend Wash watershed above Eldorado includes numerous golf course ponds, home association ponds, and municipal ponds.

Fish Movement
Because the Eldorado Lakes are part of the Indian Bend Wash floodway and can overflow and spill, stocked fish or their smaller progeny may escape and be flushed downstream, traveling the same pathway described in the water connectivity section above. Most runoff events are substantial enough to transport fish into ponds downstream, or eventually into Tempe Town Lake 2.6 miles away. There are over a dozen perennial ponds and lakes in the Indian Bend Wash

watershed above Eldorado Lake that are subject to flooding and fish escapement that can provide sanctuary for escaping fish to grow and move downstream with the next flood event. These waters are owned by private golf courses, homeowner associations, and municipalities, and include lakes less than one acre to over 30 acres. A diversity of warm water fish species are found in these waters, including all species found in Eldorado. No sampling has been done, or records found, to determine if fish have spilled out of Eldorado Lake, but it is highly likely given the high peak discharges that can occur in Indian Bend Wash.

Community Description

Channel catfish, bluegill, redear sunfish, largemouth bass, carp, threadfin shad, and tilapia are present and have been observed from this lake.

See the Phoenix Metro Urban Lakes Complex Analysis for community description in the SRP canals that provide water to this lake.

Consultation Species or Critical Habitat
Possible impacts to bald eagles at the lakes are evaluated below. Possible impacts from sport fish leaving the lake are evaluated in the Phoenix Metro Urban Lakes Complex Analysis.

Bald Eagle

Riverside Breeding Area is approximately 2.9 miles from Eldorado Park and is within the Bald Eagle DPS. The eagles were first observed in 2009. Nest watchers have not been monitoring the breeding area so the prey base specifics are largely unknown. Riverside Breeding Area productivity data shows that the nest failed with two nestlings found dead in the nest in 2009 (McCarty and Jacobson 2009) but was active again in 2010.

Potential Impacts

Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site. Eldorado Park does not have monofilament bins present.

Indian School Park Lake

Site Description
Indian School Park Lake is located at Indian School Park at Hayden Road and Indian School Road in Scottsdale. This 2.5-acre lake is part of the Scottsdale park system. Constructed by the City of Scottsdale and U.S. Army Corps of Engineers in 1979, the lake was built for park aesthetics, recreational fishing, and is an integrated feature in the greenbelt floodway. This artificial lake has a sealed dirt bottom and a dirt perimeter edge. Lake depths average 5 feet with a maximum of 11 feet. Indian School Park has a variety of improvements including restrooms, ramadas, picnic tables, lighting, and handicap accessibility.

Management of Water Body
Indian School Lake has been managed by the City of Scottsdale as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for this lake that reduces the harvest of trout and catfish. Angling use is light to moderate.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Indian School Park Lake is considered an open-system water body because it has a large urban watershed inflow and a spillway and is situated in the Indian Bend Wash floodplain greenway. The lake is supplied with Salt River Project water gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

The lake is subject to overflow runoff events a couple times a year on average. The Indian Bend Wash watershed above Indian School captures urban runoff from a large area that brings runoff into the lake during winter and summer rains. Water leaving the lake will flow in a southerly direction in Indian Bend Wash, spilling over into numerous municipal and golf course ponds over 4.1 miles before entering the upper end of Tempe Town Lake in the Salt River channel. The ephemeral Indian Bend Wash watershed above Indian School Lake includes numerous golf course ponds, home association ponds and municipal ponds.

Fish Movement
Because Indian School Lake can overflow and spill into Indian Bend Wash and connect to Tempe Town Lake, there is a possibility of stocked fish or their smaller progeny escaping and traveling the same pathway described in the water connectivity section above. There are over a

dozen perennial ponds and lakes in the Indian Bend Wash watershed above Indian School Lake that are subject to flooding and fish escapement which can provide sanctuary for escaping fish to grow and move downstream with the next flood event. These waters are owned by private golf courses, homeowner associations, and municipalities, and include lakes less than one acre to over 30 acres. A diversity of warm water fish species are found in these waters, including all species found in Indian School Park Lake. No sampling has been done, or records found, to determine if fish have spilled out of Indian School Park Lake, but it is highly likely given the high peak discharges that can occur in Indian Bend Wash.

Community Description
Channel catfish, bluegill, redear sunfish, largemouth bass, carp, threadfin shad, and tilapia have been observed from this lake.

See the Phoenix Metro Urban Lakes Complex Analysis for the community description in canals that provide water to this lake.

Consultation Species or Critical Habitat
There are no consultation species or critical habitat at this site. Possible impacts from sport fish leaving the lake are evaluated in the Phoenix Metro Urban Lakes Complex Analysis.

McKellips Lake at Vista del Camino Park
Site Description
McKellips Lake is located at Vista del Camino Park at Hayden Road and Indian School Road in Scottsdale. This 5-acre lake is part of the Scottsdale park system. Constructed by the City of Scottsdale and U.S. Army Corps of Engineers in 1975, the lake was built for park aesthetics, recreational fishing, and is an integrated feature in the greenbelt floodway. This artificial lake has a sealed dirt bottom and a dirt perimeter edge. Lake depths average seven feet with a maximum of 14 feet. Vista del Camino Park has a variety of improvements including restrooms, ramadas, picnic tables, lighting, handicap accessibility, and a children's playground.

Management of Water Body
McKellips Lake has been managed by the City of Scottsdale as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for this lake that reduces the harvest of trout and catfish. Angling use is moderate.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
McKellips Lake is considered an open-system water body because it has a large urban watershed inflow and a spillway, and is situated in the Indian Bend Wash floodplain and greenbelt. The lake is supplied with SRP water gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

The lake is subject to overflow runoff events a couple of times a year on average. The Indian Bend Wash watershed above Vista del Camino captures urban runoff from a large area that brings runoff into the lake during winter and summer rains. Water leaving the lake will flow in a southerly direction in Indian Bend Wash, spilling over into a drainage channel and a small riparian area over 1.1 miles before entering the upper end of Tempe Town Lake in the Salt River channel. The ephemeral Indian Bend Wash watershed above McKellips Lake includes numerous golf course ponds, home association ponds, and municipal ponds.

Fish Movement
Because McKellips Lake can overflow and spill into Indian Bend Wash and connect to Tempe Town Lake, there is a possibility of stocked fish or their smaller progeny escaping and traveling the same pathway described in the water connectivity section above. There are over a dozen perennial ponds and lakes in the Indian Bend Wash watershed above McKellips Lake that are subject to flooding and fish escapement, which can provide sanctuary for escaping fish to grow and move downstream with the next flood event. These waters are owned by private golf courses, homeowner associations, and municipalities, and include lakes less than one acre to over 30 acres. A diversity of warm water fish species are found in these waters including all species found in McKellips Lake. No sampling has been done, or records found, to determine if fish have spilled out of McKellips Lake, but it is highly likely given the high peak discharges that can occur in Indian Bend Wash.

Community Description
Channel catfish, bluegill, redear sunfish, largemouth bass, carp, threadfin shad, and tilapia have been observed from this lake. Other fish species are unknown.

See the Phoenix Metro Urban Lakes Complex Analysis for the community description in canals that provide water to this lake.

Consultation Species or Critical Habitat
Possible impacts to bald eagles at the lakes are evaluated below. Possible impacts from sport fish leaving the lake are evaluated in the Phoenix Metro Urban Lakes Complex Analysis.

Bald Eagle
Riverside Breeding Area is approximately 2.4 miles from Vista del Camino Park and is within the Bald Eagle DPS. The eagles were first observed in 2009. Nest watchers have not been monitoring the breeding area so the prey base specifics are largely unknown. Riverside Breeding Area productivity data shows that the nest failed with two nestlings found dead in the nest in 2009 (McCarty and Jacobson 2009) but was active again in 2010.

Potential Impacts
Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site. Vista del Camino Park does not have monofilament bins present.

Tempe Papago Park Lake
Site Description
Tempe Papago Park Lake is located at Curry Road and College Avenue in Tempe. This 0.6 acre lake is part of the Tempe Parks system (Figure 62). Constructed by the City of Tempe in the 1970s, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. The artificial lake has a sealed bottom and a dirt shoreline perimeter. Lake depths average four feet with a maximum of seven feet.

Figure 62. Photo of Tempe Papago Park Lake.

Management of Water Body
Tempe Papago Park Lake has been managed by the City of Tempe as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for this lake that reduces the harvest of trout and catfish. Angling use is light.

Catchable catfish and bluegill have been stocked by the North Tempe Neighborhood Association under permit from AGFD for an annual fishing derby the past four years.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Tempe Papago Park Lake has a small urban watershed inflow and an overflow feature. The lake is supplied by SRP water gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Overflow events tend to occur only with extreme rainfall events of a two-year flood magnitude. Flood waters leaving the lake pass into an overflow structure, then into a buried pipeline and into a ditch. From there the water would flow along the ephemeral ditch about one mile westerly before entering a storm water drain near Highway 202 and Mill Avenue. The 0.5 mile drain eventually enters the Salt River channel below Tempe Town Lake.

Fish Movement
In the event of a spill from Tempe Papago Park Lake, water containing stocked fish or their progeny may potentially escape. Any escaped fish would travel the same pathway described in the water connectivity section until they reach the Salt River channel downstream of Tempe Town Lake. There is limited permanent water in this Salt River reach, and most fish that arrive there do not survive any length of time. No sampling has been done, or records found, to determine if fish have spilled out of Tempe Papago Park Lake.

Community Description
Channel catfish, bluegill, redear sunfish, largemouth bass, carp, threadfin shad, and tilapia have been observed from this lake.

See the Phoenix Metro Urban Lakes Complex Analysis for a community description in canals that provide water to this lake.

Consultation Species or Critical Habitat
There are no consultation species or critical habitat at this site. Possible impacts from sport fish leaving the lake are evaluated in the Phoenix Metro Urban Lakes Complex Analysis.

OPEN SYSTEM PHOENIX METRO AREA LAKES ANALYSIS
Water distribution and connectivity, fish movement and community descriptions were discussed for Tempe Town Lake, Chaparral Lake, Papago Ponds, Indian School Lake, Eldorado Lakes, McKellips Lake and Tempe Papago Lake. Descriptions for these waters will be restated again as

they contribute to the overall Phoenix Metro complex. Impacts to sensitive species in the Phoenix Metro complex are also discussed below, comprehensively in combination with all potential connected populations of these sensitive species.

Water Distribution / Connectivity

Seven of the proposed stocking locations in the Phoenix Metro area have water connectivity with the lower Salt River through Phoenix. Tempe Town Lake is right in the Salt River channel. Chaparral Lake, Indian School Lake, Eldorado Lakes and McKellips Lake are in or adjacent to the Indian Bend Wash, an environmentally engineered flood control channel that flows into the Salt River channel in the upper end of Tempe Town Lake. These four waters are periodically subjected to extreme overflow events in the form of winter storms or summer monsoons resulting in water discharges into the Salt River. The remaining two locations, Papago Ponds and Tempe Papago Lake reside on small urban drainages that may overflow during significant events with flows ending up in the Salt River immediately downstream of Tempe Town Lake.

All of these lakes are supplied with water from the SRP Arizona Canal system. SRP's 131-mile main canal system is supplied with water from the Salt and Verde River watersheds. These rivers flow together above Granite Reef Diversion Dam where SRP regulates the water into the canal system. From Granite Reef Diversion Dam, water travels into two canal networks; the north side of the dam delivers water to the Arizona Canal and all the canals on the north side of the Salt River channel; the south side of the dam provides water to the South Canal and all the connecting canals on the south side of the river. Gated outflow structures along the canals are used to supply water to each of the lakes through buried pipelines. Additional discussion of the SRP canal system is covered in the Lower Salt River section.

SRP distributes water to the Phoenix Metropolitan area municipalities, and for agricultural irrigation using an extensive series of transfer canals, ditches, and pipelines. Some water eventually returns to the Salt and Gila Rivers through community wastewater treatment plants and agriculture return drains.

Indian School, Eldorado and McKellips Lakes are subject to overflow runoff events a couple of times a year on average. The 101 square mile Indian Bend Wash watershed captures urban runoff from a large area that brings runoff into the series of lakes during winter and summer rains. Water leaving the lakes flows in a southerly direction in Indian Bend Wash, spilling over into a drainage channel and a small riparian area over 1.1 miles before entering the upper end of Tempe Town Lake in the Salt River channel. The ephemeral Indian Bend Wash upper and middle watershed includes numerous golf course ponds, home association ponds, and municipal ponds.

While Chaparral Lake is not in the immediate flood channel, it is susceptible to urban runoff from a side drainage. Overflow events are rare and tend to occur only with extreme rainfall events of a five to seven year flood magnitude. Chaparral Lake is situated adjacent to the Indian

Bend Wash flood control channel and is not directly affected by those high flood flows. Water leaving the lake must pass through a grated structure with ¾ inch bars before entering a culvert under Chaparral Road. From there, the water flows southerly into the newly completed Camelback Park for approximately 0.6 miles before merging into the adjoining Indian Bend Wash greenbelt and floodway corridor. From this point, urban runoff flows 4.6 miles down Indian Bend Wash through a series of urban ponds that are either a part of Scottsdale's park system or that belong to various golf courses. Indian Bend Wash then runs into the upper end of Tempe Town Lake in the Salt River channel.

Tempe Town Lake, located in the Salt River channel, receives a regular water supply from the SRP Arizona Canal system, flood flows released over Granite Reef Dam from the lower Salt River and Verde River systems, and flood flows from urban runoff through Indian Bend Wash. Tempe Town Lake is maintained at a constant level using water from the SRP canal system. There is leakage from the inflatable dam that allows water to move a short distance downstream in the Salt River channel before it evaporates and/or sinks back into the alluvium. During flood releases from the Salt or Verde Rivers, the dams at Tempe Town Lake can be deflated within 30 minutes to allow the passage of the floodwaters downstream. If flows exceed 30,000 cfs the up- and downstream dams will be lowered (deflated) part way and then adjusted to any increased flow thereafter. Floodwater is then allowed to flow through the lake in the river channel. The dams are reinflated once the flood nears its end, capturing the tail waters of the flood and refilling the lake. Because the lake bed/channel must be managed to convey major flood flows, it is not a closed system and any fish species in the lake can move into the Salt River downstream of the lake when flood flows occur.

Incoming flood flows from Scottsdale's Indian Bend Wash may also result in overflows out of Tempe Town Lake. Peak annual discharge flows down Indian Bend Wash have ranged from a low of 228 cfs in 2001 to 4,400 cfs in 2006 (Maricopa County Flood Control District website, Dec. 2009).

Fish Movement

SRP Canals - Native and nonnative fish originating from the Salt and Verde systems are entrained in SRP canals below the Granite Reef Diversion Dam. These fish move downstream throughout the canal system. The SRP canals have a series of variously sized grates and barriers that limit or restrict upstream and downstream fish movements. Gated outflow structures along the canals are used to supply water to each of the lakes through buried pipelines. These systems of gravity-fed pipelines create a distinct fish barrier, precluding fish in the lakes from re-entering the pipelines and moving into the canals, but smaller bodied fish are free to enter the lake from the canal.

Salt River Channel – Escapement of rainbow trout or warm water resident fish species from Tempe Town Lake may occur when the dams are lowered (deflated) and the river flows through

the lake. Rogers (2008c) discussed the 2008 and 2004-2005 overflow events at the lake. In 2004-2005, the inflatable dams were completely lowered for the 30,000 cfs flood flows, resulting in an estimated loss of 50% of the fish in the lake to the river downstream. In 2008, the 18,000 cfs flood flows required only a partial deflation of the dams; however, fish were washed over the dam, with over 700 dead and dying fish reported in the river channel below. Species flushed downstream included Israeli (mirror) carp, rainbow trout, channel catfish, yellow bass, threadfin shad, and common carp.

An inflatable dam at each end of Tempe Town Lake prevents the emigration of rainbow trout or warm water fish outside of the system except under high flow conditions in the Salt River. In these instances fish could theoretically move upstream 17 miles to Granite Reef Diversion Dam and/or move 22 miles downstream to the Gila River confluence. Upstream movement by fish during high flows could occur; however, it is unlikely that any stocked rainbow trout or warm water fish and their progeny in Tempe Town Lake could swim a long distance against a high velocity, low visibility flood flow current, then find a way to get over the nine foot tall Granite Reef Diversion Dam to access the lower Salt and Verde Rivers.

Fish that move downstream over the Tempe Town Lake dam during spill events may be transported as far as the Gila River confluence, or beyond to reach Painted Rock Reservoir near Gila Bend. Under extremely high flood flows of a 100-year flood magnitude, fish may pass through Painted Rock dam and follow the Gila River until the confluence with the Colorado River at Yuma. Long-term survival of rainbow trout outside of Tempe Town Lake in the Salt or Gila Rivers is highly unlikely as temperatures exceed the upper thermal tolerance of rainbow trout during the summer months even in the permanently flowing sections near their confluence or in Painted Rock Reservoir. Warm water fish that escape from the lake could persist upstream or downstream in pools of perennial water.

The Salt River is normally dry through much of the Phoenix metropolitan area; however, there are places of permanent water where warm water fish may persist after releases from the lake. Rainbow trout are actively stocked during the period of the year when the lake is most likely to spill and may persist in the river for a short time until temperatures become lethal. Warm water fish species would be expected to persist in the permanently watered areas. During spill events, suckers, roundtail chub and nonnative fish species present in the Salt and Verde River upstream of Granite Reef Diversion Dam may also move downstream with the high flows. The native fish component found in the Salt and Gila Rivers is extremely limited and the individuals washed into this area are essentially removed from the upstream populations by the movement barriers of Tempe Town Lake and the Granite Reef Diversion Dam.

The composition of the fish community in the pond and wetland habitats of the Salt River above Tempe Town Lake is not known. The area includes numerous large and small ponds, with limited riffle habitat so may not provide a suitable spawning area for native fish and it may be

supported by fish that come over Granite Reef Diversion Dam during flood flows or by natural reproduction in the intermittent pools.

Indian Bend Wash - Because Chaparral, Indian School, Eldorado and McKellips Lakes can overflow and spill into Indian Bend Wash and connect to Tempe Town Lake, there is a possibility of stocked fish or their smaller progeny escaping and traveling the same pathway described in the water connectivity section above. There are over a dozen perennial ponds and lakes in the Indian Bend Wash watershed above and between these four lakes that are subject to flooding and fish escapement, which can provide sanctuary for escaping fish to grow and move downstream with the next flood event. These waters are owned by private golf courses, homeowner associations, and municipalities, and include lakes less than one acre to over 30 acres. A diversity of warm water fish species are found in these waters including all species found in McKellips Lake. No sampling has been done, or records found, to determine if fish have spilled out of these lakes, but it is highly likely given the high peak discharges that can occur in Indian Bend Wash.

Community Description

SRP Canals - The fish species assemblage within the canals is the most diverse of any waterbody in the state. This is due to waters running through the communities of the metropolitan Phoenix area that collect runoff from literally hundreds of public and private waterbodies that contain a wide array of fish assemblages. Further, the proximity of the canals to millions of urban residents offers the public an easy opportunity to illegally stock fish, or transfer fish from aquariums or ponds. Canal species documented in the past include longfin dace, yellow bullhead, goldfish, desert sucker, Sonora sucker, hybrid sucker, grass carp (white amur), common carp, red shiner, threadfin shad, mosquitofish, roundtail chub, channel catfish, green sunfish, redear sunfish, smallmouth bass, largemouth bass, yellow perch, yellow bass, striped bass, rainbow trout, fathead minnow, sailfin molly, shortfin molly, blue tilapia, black crappie, flathead catfish, walleye, Mozambique tilapia, redbelly tilapia (LCRB Aquatic GAP, Table 50).

Wright and Sorensen (1995) found the presence of 20 fish species, 3 native and 17 nonnatives, in the SRP canals. The three native fish are the desert sucker, Sonora sucker, and roundtail chub. Nonnative species, in order of abundance are: threadfin shad, red shiner, white amur, largemouth bass, yellow bass, channel catfish, yellow bullhead, mosquitofish, common carp, bluegill, seasonal rainbow trout, goldfish, green sunfish, smallmouth bass, oscar, walleye, and flathead catfish. This species assemblage is almost identical, with a few nonnative fish differences, to those found by Marsh and Kesner (2008) in 2007. They found two tilapia species (blue and redbelly), redear sunfish, and striped bass, but did not capture mosquitofish, yellow bass, or walleye.

Salt River Channel – There are no known studies documenting fish species found in the permanent pools of water in the Salt River immediately above and below Tempe Town Lake.

Anecdotal evidence from visual observations suggest that common carp, largemouth bass, channel catfish, bluegill and threadfin shad occur in the pool and wetland habitat above Tempe Town Lake. Similar observations and personal communication with Steve Fairheisl (Sky Harbor Airport bird control consultant) indicate that in addition to the above species, yellow bass and black crappie have been found below Tempe Town Lake during periodic fish salvage and removal efforts.

During flooding events when water is spilled over Granite Reef Dam, fish communities in the Lower Salt River and lower Verde River are apt to be swept downstream into the Salt River channel, into Tempe Town Lake, and onto the river below. The Lower Salt River contains a mix of native and nonnative fish species. Aside from the stocked rainbow trout, the remaining species maintain their populations through breeding in the reach or overflows from the upstream reservoirs. Four native species (Sonora sucker, desert sucker, longfin dace, and roundtail chub) and over 18 nonnative species (including largemouth and smallmouth bass, channel catfish, carp, several sunfish species, red shiner and tilapia) were found in recent surveys in the Lower Salt River below Stewart Mountain Dam (Marsh and Kesner 2004, 2006a, 2006b, 2007b, 2008; Kesner and Marsh 2009).

Historically 22 species of fish have been documented in the Verde River from Bartlett Lake Dam to the confluence with the Salt River (LCRB Aquatic GAP). These are longfin dace, yellow bullhead, desert sucker, Sonora sucker, common carp, red shiner, mosquitofish, bonytail chub, roundtail chub, channel catfish, green sunfish, bluegill, redear sunfish, hybrid sunfish, smallmouth bass, largemouth bass, fathead minnow, sailfin molly, flathead catfish, and razorback sucker.

Indian Bend Wash – No fisheries investigations have been conducted in many of the dozens of public and private waterbodies along the Indian Bend Wash. However, known fish species from the four proposed stocking locations include: rainbow trout (seasonally stocked), channel catfish, bluegill, redear sunfish, hybrid sunfish, largemouth bass, black crappie, tilapia, common carp, threadfin shad, red shiner, and mosquitofish.

Salt River and Gila River west of Phoenix -- The Gila River downstream from the 91st Ave. Wastewater Treatment Plant (including Tres Rios area) appears to maintain a persisting and self-sustaining population of warm water nonnative fishes (Table 54).

Consultation Species or Critical Habitat
Potential impacts to bald eagle, desert pupfish, roundtail chub, Western yellow-billed cuckoo, woundfin and Yuma clapper rail are discussed below.

Bald Eagle

Discussion of the new, 2008 bald eagle BA immediately upstream of Tempe Town Lake on the Salt River channel is covered in the Tempe Town Lake section.

Desert Pupfish

Desert pupfish are located within proximity to Papago Ponds and Kiwanis Lake (HDMS data). The two populations are more than 5 miles away from either site at the Arizona Trail exhibit of the Phoenix Zoo, and at an interpretive pond within the Desert Botanical Gardens. Pupfish were established at the Phoenix Zoo in 1986, and the Desert Botanical population was established in 1987. Both populations remain extant, are isolated from existing surface waters, and have restricted public access.

Potential Impacts

No potential impacts are anticipated on the desert pupfish due to the lack of exposure of these isolated populations from surface waters.

Table 54. Summary of Fish collected from the Gila River downstream from the 91st Ave. Wastewater Treatment Plant in 1998.

Species	91 AVE TO 107 AVE	115 AVE.	BULLARD POND	COHEN LAKE	Total
yellow bullhead	3		1		4
goldfish			4		4
carp	28	20	62	21	131
red shiner	1038	919	276		2233
threadfin shad				19	19
mosquitofish	906	4	54		964
channel catfish	2	26	24	8	60
green sunfish			46	18	64
bluegill		5	14		19
redear sunfish				20	20
largemouth bass	4	61	48	83	196
yellow bass				3	3
sailfin molly	707	196	280		1183
black crappie			1	2	3
Tilapia spp.	726	55	68	41	890
Total	3414	1286	878	215	5793

Roundtail Chub

The nearest roundtail chub occurring within this stocking area are located in the Lower Salt River, Lower Verde River and the SRP Canal system below Granite Reef Dam. These fish are considered one contiguous population throughout this area and genetically similar to the Verde

River population above Horseshoe Reservoir (Bryan and Robinson 2000, Bryan and Hyatt 2004, Dowling 2008). Within the Lower Salt River section, this population is common, yet has declined in the past decade. Please refer to the Lower Salt River section for the specific status of this population.

Tempe Town Lake and Phoenix Metro open system UFP and FIN lakes have a hydrological connection to the sub-watershed; fish stocked into the lakes are not likely to escape to roundtail chub habitat. Roundtail chub in the canal could enter the lake(s) through the inflow if they are small enough to pass the 2-inch white amur grating. The existing data suggest that this may be a rare occurrence, since no roundtail chub have been found to date in UFP waters, and the number of roundtail chub in the canal system is small (Marsh and Kesner 2008). Over 20 years ago there were a couple of recalled incidences of Sonoran and desert suckers occurring in two UFP lakes fed by the SRP Arizona Canal, which suggests the potential for fish in the canals to enter UFP waters. However, ever since the white amur grating was installed throughout the SRP canal system (circa 1985-1988), there have been no reported findings or observations of suckers in any of the 13 UFP lakes supplied with SRP water.

In the event of a spill from the Papago Ponds or the Tempe Papago Lake, water containing stocked fish or their progeny may reach the Salt River channel immediately downstream of Tempe Town Lake. There is limited permanent water in this reach, and most fish that arrive there do not survive for any length of time. Any stocked fish or progeny reaching the river would not impact roundtail chub in the Salt River, the upstream barriers (Tempe Town Lake and Granite Reef Dam) and distance (17 miles) during flood flows would preclude it.

Roundtail chub that are small enough to enter the lake(s) through the 2-inch grating are subject to predation by other nonnative fish resident in the canals. However, should they reach the proposed stocking waters, the individual roundtail chub would be trapped in the water body, unable to leave and rejoin the Salt and Verde River populations, only to be eaten by stocked fish species or their progeny in the lake, or captured by anglers, since roundtail chub are a legal sport fish in Arizona.

As stated in the Tempe Town Lake consultation section for roundtail chub, no roundtail chub have ever been documented in Tempe Town Lake since it was first filled in 1999. The most recent survey conducted at Tempe Town Lake (Rogers 2008c) documented the presence of common carp, threadfin shad, bluegill, channel catfish, tilapia, largemouth bass, yellow bass, rainbow trout, flathead catfish, and black crappie. Roundtail chub have never been observed, documented, or reported in fisheries or creel surveys at Tempe Town Lake.

As discussed in the Lower Salt River Complex Analysis section, any roundtail chub passing over the Granite Reef Dam into the Salt River channel or passing over the Diversion Dam into the SRP canal system are considered permanently lost from the river populations. However, if

roundtail chub were able to get into Tempe Town Lake, the lake would be considered a "sink" for such individuals. Roundtail chub in Tempe Town Lake would be pursued or predated on by the existing warm water fish or their progeny. Roundtail chub in the lake would not be expected to breed successfully, and eventually the adult individuals would die. Due to this aspect it is assumed that the lake cannot support a reproducing population of roundtail chub and any adults present would eventually die.

Movement of fish species out of the lake and back into the canals or, more importantly, the riverine habitats of the lower Salt and Verde Rivers, is not likely to occur. No data have been documented to show the movement of fish back into the canals. If it were to occur as stated above in the Lower Salt River Fish Movement section, electrical fish barriers were installed in each canal downstream of Granite Reef to prevent fish from moving out of the canals back upstream into the Salt River. The electric barriers are preventing most fish from moving upstream toward the Granite Reef Diversion Dam, but still allow some limited movement of fish upstream of the barriers due to rare mechanical failures (Clarkson 2003). Once fish are below the barriers, it is extremely unlikely they would be able to return to the river.

The multi-agency group implementing the Statewide Conservation Agreement for roundtail chub (AGFD 2006) agreed that the stockings of rainbow trout into sites that have a low potential to contribute the aquatic community within roundtail chub habitats would not create an impact to the chub population, as in this case.

Potential Impacts

As discussed in the Lower Salt River Complex Analysis section, any roundtail chub passing over the Granite Reef Diversion Dam into the SRP canal system, or over the spillway during flood flows into the Salt River channel, are considered permanently lost, and disconnected from the Salt and Verde River populations. Subsequent exposure of any escaped roundtail chub living in the SRP canals, or isolated permanent pools along the Salt River channel, or flushed into Tempe Town Lake, to any of the proposed trout or warm water fish stockings would be nominal and inconsequential. Nevertheless, any minimal exposure will be discussed.

Although access is possible for roundtail chub to move into the UFP or FIN lakes, no roundtail chubs have been documented or reported in any urban lakes fed by SRP canal water. Over 20 years ago, there were a couple recalled incidences of Sonoran and desert suckers occurring in two UFP lakes fed by SRP canal water, which suggests the potential for fish in the canals to enter UFP waters (E. Swanson, pers com). However, ever since the white amur grating was installed throughout the SRP canal system (circa 1985-1988), there have been no documented or reported findings of suckers in any of the urban lakes.

Rainbow Trout – Predation on roundtail chub fingerlings by rainbow trout is possible although trout prefer insects and invertebrates and artificial baits, they have been documented to be

piscivorous if small fish are available. Propst et al. (1998) determined that stocked rainbow trout can prey on young or small native fish under certain conditions. Any potential predatory impacts by rainbow trout would only apply to larval or fingerling roundtail chub. There is no documentation in either the CAP canal fish sampling studies or the AGFD study by Wright and Sorenson (1995) that roundtail chub of this smaller size occur in the canals. Further, if rainbow trout from any of the proposed stocking locations were to escape into waters with roundtail chub, it may result in competition for food and space between the trout and roundtail chub as they prefer similar habitats (Bryan et al. 2000). The limited amount of habitat present during the winter months provides opportunity for exposure. It is unlikely that stocked rainbow trout survive in any of the proposed stocking locations much beyond June due to lethal high temperatures exceeding 26°C.

Warm Water Fish (channel catfish, largemouth bass, bluegill and redear sunfish) – Predation on roundtail chub by stocked channel catfish and largemouth bass, or their progeny is possible but unlikely due to the following factors. Catfish, bass, bluegill and redear sunfish stocked into the six open system UFP and FIN lakes would have to escape through overflows and end up in Tempe Town Lake or the Salt River below it to be exposed to any roundtail chub. Any roundtail chub that may, in the future, be found in Tempe Town Lake could be preyed on by stocked fish or their progeny that escape downstream from Chaparral Lake, Indian School Lake, Eldorado Lakes or McKellips Lake. Any roundtail chub in Tempe Town Lake are already at risk of predation by nonnative fish or by capture by anglers, and the additional risk to the individual roundtail chub from the stocked fish in the five urban waters in or along Indian Bend Wash is negligible. To date, no chub have been documented in Tempe Town Lake or the Salt River below.

Roundtail chub that are small enough to enter any of the proposed stocking locations through the 2-inch grating on the SRP canal outflows are subject to predation by other nonnative fish resident in the canals. The suite of other self-sustaining, nonnative species in the SRP canal systems, particularly largemouth bass, green sunfish, and channel catfish, are potential predators on roundtail chub eggs, larvae and juveniles, and are likely to be significant predators. Indian School, Eldorado and McKellips Lakes are all in the middle of the Indian Bend Wash and are exposed to nonnative fish transfers from a large suite of private and public ponds and lakes in the large urban watershed. These other waters are known to contain predatory fish including largemouth bass, bluegill, redear sunfish, common carp, and channel catfish.

Should roundtail chub reach the Phoenix Metro complex lakes via the SRP canal system, the individual chub would be trapped in the water body unable to leave and rejoin the Salt and Verde River populations, only to be eaten by stocked fish species or their progeny in the lake, or captured by anglers, since roundtail chub is a legal sport fish in Arizona.

The implementation of the proposed stocking action would not be expected to change the overall status of the population of roundtail chub in the Lower Salt River, Lower Verde River, and the SRP canal system because it is expected that few stocked species or their progeny will move downstream over dams or spillways. If they did they would have to then move upstream from 17-23 miles against flood flows in the intermittent Salt River channel and pass over the nine foot tall Granite Reef Dam and enter the Lower Salt River, where they would join the already existing nonnative predators and competitors,

To reduce the potential for impacts, the multi-agency group implementing the Statewide Conservation Agreement for roundtail chub (AGFD 2006) recommended against stocking largemouth bass and channel catfish directly into sites with roundtail chub populations. They also agreed that the stockings of rainbow trout into sites that have a low potential to contribute to the aquatic community within roundtail chub habitats would not create an impact to the chub population. The only roundtail chub populations existing within the Phoenix Metro complex are a relict, escaped population in the SRP canals. Consequently, these proposed stocking actions would not create an impact.

Woundfin

The Fish and Wildlife Service established "nonessential" experimental population areas for the woundfin in Arizona on July 24, 1985 (50 FR30188-30195). For incidental take due to Federal actions requiring consultations, the woundfin in these populations are considered proposed for listing.

On July 2, 2007, the Arizona Game and Fish Department and The Nature Conservancy released 50 adult woundfin into the experimental reach near the TNC Hassayampa River Preserve. The Hassayampa River site (Red Cliffs to Wagoner) is partly perennial through the vicinity of Wickenburg, with the lower section to the Gila River usually dry.

It is unknown if these fish reproduced or persisted in the river. Future stockings with woundfin into the Hassayampa River are uncertain; however, since they may occur within the 10-year period covered by this consultation, they will be evaluated. Although woundfin, like most desert evolved fish species is resistant to downstream displacement by flooding, data from the Virgin River indicates that they will move downstream during flow events.

Potential Impacts

If woundfin are displaced to the lower Hassayampa or to the Gila River approximately 35 miles below the experimental reach, they could be exposed to both warm and cold water species stocked under this program into the lower Salt River, the Salt River lakes, Tempe Town Lake, and those urban waters that drain into Tempe Town Lake.

Closed System Phoenix Metro Area Lakes

The following 14 UFP lakes and the 10 FIN lakes in the greater Phoenix Metro area are all closed system fisheries. These artificial lakes are all in municipal public parks and urban recreational areas. They have no outflow, they have no watershed inflow, they are simply excavated basins designed to hold water and provide an aesthetic and recreational component to urban parks.

There are no listed species found in association with these 24 park locations. Since all these Phoenix Metro lake systems are considered closed with no hydrological connection to the sub-watershed, and significant barriers precluding movement back upstream into the SRP canal, there is no possibility of escapement of stocked fish. Consequently, the closed system complex analysis at the end of this section is mostly background documentation supporting a no potential impact conclusion.

Alvord Lake at Cesar Chavez Park

Site Description

Alvord Lake is located at Cesar Chavez Park at 35th Avenue and Baseline Road in Phoenix, at 1065 foot elevation (Figure 63). This 25-acre lake is the largest in the UFP. Constructed by the City of Phoenix in the 1970's, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 14 feet, with a maximum of 18 feet. Cesar Chavez Park has a variety of improvements including restrooms, ramadas, plazas, picnic tables, lighting, handicap accessibility, a library, a children's playground, and a boat ramp.

Figure 63. Photo of Alvord Lake.

Management of Water Body
Since 1987, Alvord Lake has been managed in partnership with the City of Phoenix as an intensively stocked put-and-take fishery to provide year round high-use urban fishing opportunities for anglers of all ages and abilities. Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 43,500 angler use days per year, an angler satisfaction rate of 66%, and a 41% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring (Table 55). Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 55. Summary of historic Department fish stockings at Alvord Lake.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	1987-2008	191	188,835

Channel catfish	1980-2008	254	279,105
Bluegill/Hybrid sunfish	1987-2008	42	119,500
Largemouth bass	1987-2008	11	29,400
Redear sunfish	1980	1	1,000
Total		500	617,840

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 30,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 3,000.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Alvord Lake is a closed system; it has no drainage inflow and no spillway or outflow. The lake is supplied with Salt River Project (SRP) water, gravity fed through a pipeline and ditch. Fish from the lake cannot go back up the pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feed the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, largemouth bass, yellow bass, white amur, and common carp as

being present. See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Cortez Lake

Site Description

Cortez Lake is a 3-acre lake located at Cortez Park at 35th Avenue and Dunlap Road in Phoenix, at 1230 foot elevation. Constructed by the City of Phoenix in the 1970's and completely renovated in 2000, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 10 feet, with a maximum of 14 feet. The City of Phoenix's popular Cortez Park has a variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, ball fields, and a children's playground.

Management of Water Body

Since 1989, Cortez Lake has been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 56). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 34,800 angler use days per year, an angler satisfaction rate of 73%, and a 36% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 56. Summary of historic Department fish stockings at Cortez Lake.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	1989-2008	171	34,200
Channel catfish	1979-2008	229	57,250
Bluegill/Hybrid sunfish	1989-2008	40	28,950
Largemouth bass	1974-2008	12	4,131
Redear sunfish	1978	1	47
White bass	1975	1	1
Total		454	124,579

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 6,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Cortez Lake is a closed system; it has no drainage inflow and no spillway or outflow. The lake is supplied with SRP water, gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, largemouth bass, common carp, tilapia, and white amur as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Desert Breeze Lake
Site Description
Desert Breeze Lake is a 4-acre lake located at Desert Breeze Park at Desert Breeze Parkway south of Ray Road, at 1175 foot elevation (Figure 64). Constructed by the City of Chandler in 1989, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 8 feet, with a maximum of 12 feet. Chandler's popular Desert Breeze Park has a variety

of improvements, including restrooms, ramadas, plazas, picnic tables, lighting, handicap accessibility, a railroad ride, a children's playground, and ball fields.

Figure 64. Photo of Desert Breeze Lake.

Management of Water Body

Since 1990, Desert Breeze Lake has been managed as an intensively stocked put-and-take fishery to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 57). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 26,000 angler use days per year, an angler satisfaction rate of 86%, and a 30% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 57. Summary of historic Department fish stockings at Desert Breeze Lake.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	1990-2008	162	32,220
Channel catfish	1990-2008	216	47,250
Bluegill/Hybrid sunfish	1990-2008	37	23,000
Largemouth bass	1990-2008	10	5,402
Total		425	107,872

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 8,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 600.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity

Desert Breeze Lake is a closed system; it has no drainage inflow and no spillway or outflow. The lake is supplied with SRP water, gravity fed through a buried pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement

There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, common carp, white amur, and largemouth bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Desert West Lake

Site Description
Desert West Lake is a 5-acre lake located at Desert West Park at 63rd Avenue and Encanto Boulevard in Phoenix, at 1075 foot elevation. Constructed by the City of Phoenix in the 1995, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 11 feet, with a maximum of 15 feet. Phoenix's Desert West Park has a variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, volleyball, soccer and softball fields, a children's playground, skateboard park, and multi-generational recreation center.

Management of Water Body
Since 1995, Desert West Lake has been managed as an intensively stocked put-and-take fishery to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 58). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 32,900 angler use days per year, an angler satisfaction rate of 74%, and a 17% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 58. Summary of historic Department fish stockings at Desert West Lake.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	1995-2008	117	23,400
Channel catfish	1995-2008	156	32,149
Bluegill/Hybrid sunfish	1995-2008	27	30,000
Largemouth bass	1995-2008	7	3,627
Total		425	89,176

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 10,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 800.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Desert West Lake is a closed system; it has no drainage inflow and no spillway or outflow. The lake is supplied with SRP water, gravity fed through a buried pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, white amur, and largemouth bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Encanto Lake

Site Description
Encanto Lake is a 7.5-acre lake located at Encanto Park at 15th Avenue and Encanto Boulevard in Phoenix, at 1095 foot elevation. Constructed by the City of Phoenix in the 1940's, the lake

was built for park aesthetics, paddle boat rentals, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 8 feet, with a maximum of 12 feet. Phoenix's popular Encanto Park has a variety of improvements, including restrooms, picnic tables, lighting, handicap accessibility, paddle boat rental, a children's playground, and Enchanted Island, which is a small amusement park featuring children's rides.

Management of Water Body
Since 1989, Encanto Lake has been managed as an intensively stocked put-and-take fishery to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 59). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 22,300 angler use days per year, an angler satisfaction rate of 82%, and a 31% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 59. Summary of historic Department fish stockings at Encanto Lake.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	1989-2008	171	55,670
Channel catfish	1979-2008	229	80,300
Bluegill/Hybrid sunfish	1942-2008	59	269,912
Largemouth bass	1942-2008	34	25,067
Redear sunfish	1949-1988	2	1,400
Tilapia species	1966	1	783
Total		496	433,132

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 15,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 1,100.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Encanto Lake is a closed system; it has no drainage inflow and no spillway or outflow. The lake is supplied with SRP water, gravity fed through a buried pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass and a golf course.

Fish Movement
There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, common carp, white amur, tilapia, and largemouth bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Evelyn Hallman (formerly Canal) Pond

Site Description
Evelyn Hallman Pond is a 3-acre pond located at Evelyn Hallman Park at College Avenue and McClintock Road in Tempe, at 1245 foot elevation. Constructed by the City of Tempe in the 1970's, the lake was built for park aesthetics and recreational fishing. This artificial lake has a natural dirt edge and an unsealed dirt bottom. Lake depths average 5 feet, with a maximum of 7 feet. Tempe's Evelyn Hallman Park, which was previously called Canal Park up to July 2007, has some improvements, including a restroom, armadas, and handicap accessibility.

Management of Water Body
Since 1987, Evelyn Hallman Pond has been managed as an intensively stocked put-and-take fishery to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 60). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 15,800 angler use days per year, an angler satisfaction rate of 81%, and a 15% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 60. Summary of historic Department fish stockings at Evelyn Hallman Pond.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	1987-2008	189	20,370
Channel catfish	1987-2008	252	35,700
Bluegill/Hybrid sunfish	1987-2008	42	20,580
Largemouth bass	1987-2008	11	4,200
Total		494	80,850

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 5,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major

fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Evelyn Hallman Pond is a closed system; it has no drainage inflow and no spillway or outflow. The lake is supplied with SRP water, gravity fed through a pipeline and ditch. There are no pumps to pull water from the lake. Without a lined bottom, the lake bottom is semi-porous, allowing water to seep into the aquifer.

Fish Movement
There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. Movement up through the ditch and irrigation head gates is impossible. There is no lake outflow or means of pumping water from the lake.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, white amur, common carp, tilapia, and largemouth bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Kiwanis Lake
Site Description
Kiwanis Lake is a 13-acre lake located at Kiwanis Park at Mill Avenue and Baseline Road in Tempe, at 1190 foot elevation (Figure 65). Constructed by the City of Tempe in the 1970's, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 5 feet, with a maximum of 8 feet. Tempe's popular Kiwanis Park has a variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, soccer fields, a paddle boat concession, a children's playground, and a boat ramp.

Figure 65. Photo of Kiwanis Lake.

Management of Water Body

Since 1984, Kiwanis Lake has been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 61). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 37,300 angler use days per year, an angler satisfaction rate of 77%, and a 27% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 61. Summary of historic Department fish stockings at Kiwanis Lake.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	1984-2008	216	126,720

Channel catfish	1979-2008	289	178,916
Bluegill/Hybrid sunfish	1989-2008	50	47,788
Largemouth bass	1984-2008	12	10,992
Total		567	364,416

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 25,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 2,000.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity

Kiwanis Lake is a closed system; it has no drainage inflow and no spillway or outflow. The lake is supplied with SRP water, gravity fed through a buried pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass

Fish Movement

There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. Movement up through the pipeline and irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description

AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, largemouth bass, common carp, tilapia, flathead catfish, white amur, black crappie, and yellow bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Red Mountain Lake

Site Description

Red Mountain Lake is an 8-acre lake located at Brown Avenue and Sun Valley Boulevard in Mesa, at 1505 foot elevation (Figure 66). Constructed by the City of Mesa in the 1995, the lake was built for park aesthetics, recreational fishing, groundwater recharge, and for use in watering park landscape. This artificial lake has an unsealed bottom and a concrete perimeter edge. Lake depths average 12 feet, with a maximum of 17 feet. Mesa's popular Red Mountain Park has a variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, ball fields, a children's playground, and a multigenerational recreation center.

Figure 66. Photo of Red Mountain Lake.

Management of Water Body

Since 1995, Red Mountain Lake has been managed as an intensively stocked put-and-take fishery to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 62). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 40,600 angler use days per year, an angler satisfaction rate of 77%, and a 31% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 62. Summary of historic Department fish stockings at Red Mountain Lake.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	1995-2008	123	47,647
Channel catfish	1995-2008	156	72,332
Bluegill/Hybrid sunfish	1995-2008	28	20,036
Largemouth bass	1995-2008	8	4,588
Total		315	144,603

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 16,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 1,200.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity

Red Mountain Lake is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with Central Arizona Project (CAP) water,

gravity fed through a 0.7 mile buried pipeline that originates at the Mesa Water Treatment facility. CAP water from the facility passes through a grinder box device that allows for no movement potential of live fish to Red Mountain. Pumps pull water from the lake to irrigate surrounding park turf grass and soccer fields. A significant amount of water percolates into the aquifer.

Fish Movement
There is no opportunity for fish to leave this lake. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, common carp, white amur, and largemouth bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in CAP canals that provide water to this lake.

Rio Vista Pond

Site Description
Rio Vista Pond is a 2.7-acre pond located at Rio Vista Park on Rio Vista Boulevard north of Thunderbird Road in Peoria, at 1165 foot elevation (Figure 67). Constructed by the City of Peoria in 2004, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 7 feet, with a maximum of 13 feet. Peoria's popular Rio Vista Park has a variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, skate park, ball fields, splash play area, a children's playground, and multigenerational recreation center.

Figure 67. Photo of Rio Vista Lake.

Management of Water Body

Since 2004, Rio Vista Pond has been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 63). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 23,600 angler use days per year, an angler satisfaction rate of 81%, and a 42% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 63. Summary of historic Department fish stockings at Rio Vista Pond.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	2004-2008	36	4,000

Channel catfish	2004-2008	48	7,512
Bluegill/Hybrid sunfish	2004-2008	8	3,332
Largemouth bass	2004-2008	2	516
Total		94	15,360

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 5,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity

Rio Vista Pond is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with SRP water, gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement

There is no opportunity for fish to leave this pond. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description

AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, white amur, common carp, and largemouth bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Riverview Lake

Site Description

Riverview Lake is a 3.3-acre lake located at Riverview Park at 8th Street and Dobson Road in Mesa, at 1200 foot elevation (Figure 68). Constructed by the City of Mesa in the 1970's, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a shotcrete perimeter apron. Lake depths average 10 feet, with a maximum of 16 feet. Mesa's popular Riverview Park has a variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, ball fields, and a children's playground.

Figure 68. Photo of Riverview Lake.

Management of Water Body

Since 1987, Riverview Lake has been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 64). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 28,300 angler use days per year, an angler satisfaction rate of 82%, and a 31% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 64. Summary of historic Department fish stockings at Riverview Lake.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	1987-2008	189	37,380
Channel catfish	1987-2008	252	65,961
Bluegill/Hybrid sunfish	1987-2008	42	18,795
Largemouth bass	1987-2008	11	4,116
Total		494	126,252

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 7,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 600.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity

Riverview Lake is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with SRP water, gravity fed through a pipeline with two cascading water features. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Movement up through the water features, buried pipelines, or irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, common carp, white amur, tilapia, and largemouth bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Bald Eagle

Riverside Breeding Area is approximately 1.6 miles from Riverview Lake and is within the Bald Eagle DPS. The eagles were first observed in 2009. Nest watchers have not been monitoring the breeding area so the prey base specifics are largely unknown. Riverside Breeding Area productivity data shows that the nest failed with two nestlings found dead in the nest in 2009 (McCarty and Jacobson 2009). It is unknown if Riverview Lake has monofilament bins present.

Potential Impacts
Nesting bald eagles are known to occur in the vicinity of this stocking site all year. Human disturbance and monofilament line/fishing tackle disposal are issues for this site.

Steele Indian School Pond

Site Description
Steele Indian School Pond is a 2.5-acre lake located at Steele Indian School Park at 3rd Street and Indian School Road in Phoenix, at 1120 foot elevation. Constructed by the City of Phoenix in 2003, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 8 feet, with a maximum of 12 feet. Phoenix's popular Steele Indian School Park has a variety of improvements including restrooms, ramadas, plazas, picnic tables, lighting, handicap accessibility, historical buildings, memorials and peace gardens, and a children's playground.

Management of Water Body
Since 2005, Steele Indian School Pond has been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 65). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 13,900 angler use days per year, an angler satisfaction rate of 83%, and a 31% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 65. Summary of historic Department fish stockings at Steele Indian School Pond.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	2005-2008	27	2,523
Channel catfish	2005-2008	36	5,559
Bluegill/Hybrid sunfish	2005-2008	6	2,724
Largemouth bass	2005-2008	2	498
Total		71	11,304

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 5,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity

Steele Indian School Pond is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with SRP water, gravity fed through a pipeline and ditch. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, white amur, threadfin shad, largemouth bass, and tilapia as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Surprise Lake
Site Description
Surprise Lake is a 5-acre lake located at the Surprise Recreation Campus on Bullard Avenue south of Bell Road in Surprise, at 1215 foot elevation. Constructed by the City of Surprise in 2003, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape and sports fields. This artificial lake has a sealed bottom and a gently sloping dirt/gravel shoreline. Lake depths average 8 feet, with a maximum of 12 feet. Surprise's popular Surprise Recreation Campus has a wide variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, a library, a children's playground, municipal pool and aquatic center, dog runs, and a large spring training baseball facility.

Management of Water Body
Since 2003, Surprise Lake has been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 66). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Creel survey results from 2005 found 35,600 angler use days per year, an angler satisfaction rate of 86%, and a 35% youth participation rate.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 66. Summary of historic Department fish stockings at Surprise Lake.

Species	Years	Number of Stockings	Number Stocked

Rainbow trout	2003-2008	45	12,800
Channel catfish	2003-2008	60	18,385
Bluegill/Hybrid sunfish	2003-2008	10	6,990
Largemouth bass	2003-2008	3	1,045
Total		118	39,220

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 10,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 800.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Surprise Lake is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with either Maricopa Water District water, gravity fed through a pipeline, or from groundwater. Pumps pull water from the lake to irrigate surrounding park turf grass and a large sports field complex.

Fish Movement
There is no opportunity for fish to leave this lake. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, tilapia, white amur, and largemouth bass as being present.

See Phoenix Metro Urban Lakes Complex Analysis for community description in Maricopa Water District canals that provide water to this lake.

Veterans Oasis Lake

Site Description

Veterans Oasis Lake is a 5-acre lake located at Veterans Oasis Park at Lindsay Road and Chandler Heights Road in Chandler, at elevation 1275. Constructed by the City of Chandler in 2007, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a perimeter edge of concrete and shallow dirt. Lake depths average 12 feet, with a maximum of 14 feet. Chandler's Veterans Oasis Park has a variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, an environmental center, and watchable wildlife areas.

Management of Water Body

Since 2008, Veterans Oasis Lake has been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 67). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 67. Summary of historic Department fish stockings at Veterans Oasis Lake.

Species	Years	Number of Stockings	Number Stocked
Rainbow trout	2008	4	1,005
Channel catfish	2008	4	1,090
Bluegill/Hybrid sunfish	2008	2	6,350
Largemouth bass	2008	1	600
Total		11	9,045

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 10,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 1,000.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Veterans Oasis Lake is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with pumped groundwater. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD has stocked rainbow trout seasonally, channel catfish, bluegill, redear sunfish, hybrid sunfish, tilapia, and largemouth bass. White amur have been stocked by the City of Chandler for aquatic weed control.

Water Ranch Lake

Site Description
Water Ranch Lake is a 5-acre lake located at Gilbert's Riparian Preserve at Greenfield Road and Guadalupe Road in Gilbert, at 1275 foot elevation. Constructed by the City of Gilbert in 1999, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a perimeter edge of concrete and shallow dirt. Lake depths average 12 feet, with a maximum of 17 feet. Gilbert's Riparian Preserve at Water Ranch Park has a variety of improvements, including restrooms, ramadas, picnic tables, lighting, handicap accessibility, a library, children's playground, and extensive watchable wildlife areas.

Management of Water Body

Since 1999, Water Ranch Lake has been managed as an intensively stocked put-and-take fishery, to provide year round high-use urban fishing opportunities for anglers of all ages and abilities (Table 68). Special regulations are in place for this UFP water that governs the harvest of trout, catfish, bass, sunfish, and white amur.

Put-and-take stockings occur from September through early July each year, with trout stocked in November through March and catfish stocked in the fall and spring. Sunfish and largemouth bass are stocked in the fall and/or spring. Due to high temperatures, rainbow trout do not persist through the summer. Besides providing put-and-take fishing, some of the stocked warm water species remain to spawn and augment the modest sport fish populations of the lake.

Table 68. Summary of historic Department fish stockings at Water Ranch Lake.

Species	**Years**	**Number of Stockings**	**Number Stocked**
Rainbow trout	1999-2008	81	21,303
Channel catfish	1999-2008	108	23,400
Bluegill/Hybrid sunfish	1999-2008	19	17,987
Largemouth bass	1999-2008	5	3,105
Total		213	65,795

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times each year; the numbers of each of these species stocked would range from 0 to 10,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 1,000.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation to restore a depleted fishery, to recover the fishery following catastrophic events that cause major fish kills, or for construction events that require draining the lake. Numbers of fish stocked for

this purpose will be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines (sections 3.2.3).

Water Distribution/Connectivity
Water Ranch Lake is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with pumped groundwater. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Movement up through the irrigation head gates is impossible. There is no lake outflow. Water pumped from the lake has screened intakes and feeds the turf sprinkler systems.

Community Description
AGFD records (Swanson and Hill 2006) report seasonal rainbow trout, channel catfish, bluegill, redear sunfish, hybrid sunfish, tilapia, white amur, and largemouth bass are present.

Bonsall Park Lake
Site Description
Bonsall Lake is located at Bonsall Park on 59th Avenue and Bethany Home Road in Glendale (Figure 69). This 2-acre lake is part of the Glendale Parks system. Constructed by the City of Glendale in the 1960's and completely renovated in 2001, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 6 feet with a maximum of 11 feet. Bonsall Park has a variety of improvements including restrooms, ramadas, picnic tables, lighting, and handicap accessibility.

Figure 69. Photo of Bonsall Lake.

Management of Water Body

Bonsall Lake has been managed by the City of Glendale as a light-use recreational fishery, primarily for families, with a modest warm water fishery. Special regulations are in place for this lake that reduces the harvest of trout and catfish. Angling use is light to moderate.

Catchable catfish, rainbow trout, and bluegill are occasionally stocked by the City of Glendale for fishing derbies.

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Bonsall Lake is a closed system; it has no drainage inflow and no outflow or spillway. The lake is supplied with Salt River Project water gravity fed through a pipeline. Pumps pull lake water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. There is no lake outflow. Water pumped from the lake has screened intakes and supplies the turf sprinkler systems.

Community Description
Largemouth bass, bluegill, and channel catfish have been observed from this lake. Other fish species are unknown.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Crossroads Park Lake
Site Description
Crossroads Lake is located at Crossroads Park at Knox Road and Greenfield Road in Gilbert (Figure 70). This 3-acre lake is part of the Gilbert Parks system. Constructed by the City of Gilbert in the 1990's, the lake was built for park aesthetics, recreational fishing, storage of reclaimed water, stormwater retention, and for use in watering park landscape. This artificial lake has a sealed bottom and both a dirt and concrete perimeter edge. Lake depths average 7 feet with a maximum of 12 feet. Crossroads Park has a variety of improvements including restrooms, ramadas, picnic tables, lighting, handicap accessibility, a children's playground, and ball fields.

Figure 70. Photo of Crossroads Park Lake.

Management of Water Body

Crossroads Lake has been managed by the City of Gilbert as a light-use recreational fishery with a modest warm water fishery. The lake also serves a role for reclaimed water utilization, urban runoff storage, and flood control. Special regulations are in place for this lake that reduces the harvest of trout and catfish. Angling use is light.

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity
Crossroads Lake is considered a predominately closed system water body because it has a small urban watershed inflow and an overflow feature. The lake is entirely supplied and maintained with reclaimed water piped in from the nearby water treatment plant. Pumps pull water from the lake to irrigate surrounding park turf grass.

Overflow events are rare and tend to occur only with extreme rainfall events of a 5-year flood magnitude. Water leaving the lake passes over a spillway down a short ephemeral drainage of 0.2 miles, and then empties into a municipal storm drain. The route of the underground storm drain has not been researched. It likely empties into a dry drainage to the south where it would eventually empty into the ephemeral Gila River approximately 20 miles to the south southwest.

Fish Movement
At infrequent intervals, Crossroads Lake can overflow and spill into a small drainage where there is a limited chance of stocked fish or their progeny escaping. Any escaped fish would travel the same pathway described in the water connectivity section until reaching the ephemeral Gila River a few miles upriver of the Interstate 10 crossing. No sampling has been done, or records found, to determine if fish have spilled out of Crossroads Lake.

Community Description
Largemouth bass, bluegill, tilapia, common carp, and threadfin shad have been observed from this lake. Other fish species are unknown.

Discovery District Park Lakes
Site Description
The Discovery Lakes are located at Discovery District Park on Santan Village Parkway and Pecos Road in Gilbert. These 1.5 and 0.6-acre lakes are part of the Gilbert Parks system. Constructed by the City of Gilbert in 2007, the lakes were built for park aesthetics, recreational fishing, and for use in watering park landscape. These artificial lakes have sealed bottoms and a concrete perimeter edge. Lake depths average 5 feet with a maximum of 10 feet. Discovery District Park has a variety of improvements including restrooms, ramadas, picnic tables, lighting, handicap accessibility, ball fields, and ball courts.

Management of Water Body
Discovery District Lakes have been managed by the City of Gilbert as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for this lake that reduces the harvest of trout and catfish. Angling use is light to moderate.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution / Connectivity
The Discovery Park Lakes are considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with Salt River Project water gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement

There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. There is no lake outflow. Water pumped from the lake has screened intakes and supplies the turf sprinkler systems.

Community Description
Largemouth bass, bluegill, redear sunfish, and tilapia have been observed from this lake. Other fish species are unknown.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Freestone Park Lakes

Site Description

The Freestone Lakes are located at Freestone Park on Juniper Avenue and Lindsay Road in Gilbert. These 1.5 and 1.7-acre lakes are part of the Gilbert Parks system. Constructed by the City of Gilbert in 1990, the lakes were built for park aesthetics, recreational fishing, storage of reclaimed water, and for use in watering park landscape. These artificial lakes have sealed bottoms and a concrete perimeter edge. Lake depths average 7 feet with a maximum of 12 feet. Freestone Park has a variety of improvements including restrooms, ramadas, picnic tables, lighting, handicap accessibility, a children's playground, ball fields, ball courts, and a train depot for children.

Management of Water Body

These lakes were in the Urban Fishing Program for a brief period in early 1990, but high and persistent pH levels due to the reclaimed water were not compatible with regular fish stockings, and the lake was withdrawn from the program. Freestone Lake has been managed by the City of Gilbert as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for these lakes that reduces the harvest of trout and catfish. Angling use is light.

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution / Connectivity

The Freestone Park Lakes (north and south) are considered a closed system water body because they have no drainage inflow and no outflow or spillway. The lakes are entirely supplied with

reclaimed water from the nearby water treatment plant. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. There is no lake outflow. Water pumped from the lake has screened intakes and supplies the turf sprinkler systems.

Community Description
Channel catfish, bluegill, largemouth bass, carp, and tilapia have been observed from this lake.

Granada Park Lakes

Site Description
The Granada Lakes are located at Granada Park on 20th Street and Maryland Road in Phoenix. These 1.0 and 1.2 acre lakes are part of the Phoenix Parks system. Constructed by the City of Phoenix in the 1970's, the lakes were built for park aesthetics, recreational fishing, and for use in watering park landscape. The artificial lakes have a sealed bottom and a concrete perimeter edge/apron. Lake depths average 4 feet with a maximum of 8 feet. Granada Park has a variety of improvements including restrooms, ramadas, picnic tables, lighting, handicap accessibility, and tennis courts.

Management of Water Body
Granada Lake has been managed by the City of Phoenix as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for these lakes that reduces the harvest of trout and catfish. Angling use is light to moderate.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution / Connectivity
The two small, interconnected Granada Lakes are considered a closed system water body because they have no drainage inflow and no outflow or spillway. The lakes are supplied with Salt River Project water gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. There is no lake outflow. Water pumped from the lake has screened intakes and supplies the turf sprinkler systems.

Community Description
Channel catfish, bluegill, redear sunfish, hybrid sunfish, largemouth bass, carp, threadfin shad, and tilapia have been observed from this lake. Other fish species are unknown.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

McQueen Park Lake
Site Description
Located at McQueen Park on McQueen Park Road and McQueen Road in Gilbert, this 1.4-acre lake is part of the Gilbert Parks system. Constructed by the City of Gilbert in 2007, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 5 feet with a maximum of 10 feet. McQueen Park has a limited number of improvements including restrooms, ramadas, picnic tables, lighting, and handicap accessibility.

Management of Water Body
McQueen Lake has been managed by the City of Gilbert as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for this lake that reduces the harvest of trout and catfish. Angling use is light.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution / Connectivity
McQueen Lake is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with Salt River Project water gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. There is no lake outflow. Water pumped from the lake has screened intakes and supplies the turf sprinkler systems.

Community Description
Channel catfish, bluegill, largemouth bass, carp, threadfin shad, and tilapia have been observed from this lake.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Pacana Park Lake

Site Description
Pacana Lake is located at Pacana Park on Honeycut Road and Porter Road in Maricopa. This 3-acre lake is part of the Town of Maricopa Parks system. Constructed by the Town of Maricopa in 2006, the lake was built for park aesthetics, recreational fishing, storage of reclaimed water, and for use in watering park landscape. This artificial lake has a sealed bottom and a concrete perimeter edge. Lake depths average 7 feet with a maximum of 12 feet. Pacana Park has a variety of improvements including restrooms, ramadas, picnic tables, lighting, handicap accessibility, a children's playground, and ball fields.

Management of Water Body
Pacana Lake has been managed by the Town of Maricopa as a light-use recreational fishery with a modest warm water fishery. Angling use is moderate. Catchable catfish are occasionally stocked by the Town of Maricopa for fishing derbies.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution / Connectivity
Pacana Lake is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is entirely supplied with reclaimed water from the nearby water treatment plant. Pumps pull water from the lake to irrigate surrounding park turf grass and deliver water to nearby housing developments.

Fish Movement
There is no opportunity for fish to leave this lake. There is no lake outflow. Water pumped from the lake has screened intakes and supplies the turf sprinkler systems.

Community Description
Channel catfish, bluegill, largemouth bass, carp, and tilapia have been observed from this lake. Other fish species are unknown.

Roadrunner Park Lake
Site Description
Located at Roadrunner Park on 34th Street and Cactus Road in Phoenix, this 1.6-acre lake is part of the Phoenix Parks system. Constructed by the City of Phoenix in the 1960's, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. The artificial lake has a sealed bottom and a concrete perimeter edge/apron. Lake depths average 4 feet with a maximum of 8 feet. Roadrunner Park has a variety of improvements including restrooms, ramadas, picnic tables, lighting, handicap accessibility, a children's playground, ball fields, tennis courts, and swimming pool.

Management of Water Body
Roadrunner Lake has been managed by the City of Phoenix as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for this lake that reduces the harvest of trout and catfish. Angling use is moderate. Catchable catfish, rainbow trout and bluegill have occasionally been stocked by the City of Phoenix, and other sponsors, for fishing derbies.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution / Connectivity
Roadrunner Lake is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with Salt River Project water gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement
There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. There is no lake outflow. Water pumped from the lake has screened intakes and supplies the turf sprinkler systems.

Community Description
Channel catfish, bluegill, redear sunfish, hybrid sunfish, largemouth bass, carp, threadfin shad, and tilapia have been observed from this lake.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Selleh Park Lake

Site Description

Selleh Lake is located at East Concordia Drive east of McClintock Drive in Tempe. This 1.5-acre lake is part of the Tempe Parks system. Constructed by the City of Tempe in the 1970's, the lake was built for park aesthetics, recreational fishing, and for use in watering park landscape. The artificial lake has a sealed bottom and a concrete perimeter edge/apron. Lake depths average 4 feet with a maximum of 8 feet. Selleh Park has a variety of improvements including restrooms, picnic tables, lighting, handicap accessibility, a children's playground, and ball court.

Management of Water Body

Selleh Lake has been managed by the City of Tempe as a light-use recreational fishery with a modest warm water fishery. Special regulations are in place for this lake that reduces the harvest of trout and catfish. Angling use is light.

Proposed Action

The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution/Connectivity

Selleh Lake is a closed system water body since it has no drainage inflow and no outflow or spillway. The lake is supplied with Salt River Project water gravity fed through a pipeline. Pumps pull water from the lake to irrigate surrounding park turf grass.

Fish Movement

There is no opportunity for fish to leave this lake. Fish from the lake cannot go back up the pipeline. There is no lake outflow. Water pumped from the lake has screened intakes and supplies the turf sprinkler systems.

Community Description
Channel catfish, bluegill, largemouth bass, carp, threadfin shad and tilapia have been observed from this lake.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

Water Treatment Lake
Site Description
Water Treatment Lake is located south of Marigold and College Avenue in Tempe. This 1-acre lake is currently under renovation within the City of Tempe Water Treatment Plant and has been closed to public access. By 2010, the City of Tempe plans to modify access to this pond and allow public access. Constructed by the City of Tempe in the 1980s, the lake was built as a storage reservoir as part of the Water Treatment Plant complex. The artificial lake has a sealed dirt bottom and a dirt shoreline. Lake depths average four feet with a maximum of eight feet.

Management of Water Body
Located in the City of Tempe's Water Treatment Plant and not open to the public, there are no current improvements. The City plans to include restrooms, picnic tables, lighting, and handicap accessibility to the recreation site before it opens to public use. There is no current angling use of this lake. The City plans to create a recreational area at the pond and manage for a light-use recreational fishery with a modest warm water fishery. Once opened, special regulations that apply to all public fishing waters in the City of Tempe would apply to this park water reducing the harvest of trout and catfish.

Proposed Action
The Department proposes to stock rainbow trout, channel catfish, bluegill, redear sunfish, and largemouth bass for the period covered by this consultation.

Catchable rainbow trout, channel catfish, bluegill, and redear sunfish would be stocked multiple times annually; the numbers of each of these species stocked would range from 0 to 2,000 fish annually.

Largemouth bass (subcatchables, catchables) would be stocked annually in numbers ranging from 0 to 500.

Largemouth bass (fry/fingerlings, subcatchables, catchables), bluegill (fry/fingerlings, subcatchables, catchables), and redear sunfish (fry/fingerlings, subcatchables, catchables) may be stocked on an as-needed basis at any time during the period covered by this consultation, to restore a depleted fishery, or recover the fishery following catastrophic events that cause major fish kills, or construction events that require draining the lake. Numbers of fish stocked for this

purpose would be determined according to stocking guidelines identified in the Urban Fishing Start-up and Augmentation Stocking Guidelines.

Water Distribution / Connectivity
Water Treatment Lake is considered a closed system water body because it has no drainage inflow and no outflow or spillway. The lake is supplied with SRP water gravity fed through a pipeline and water that is processed through the Tempe Water Treatment facility.

Fish Movement
There is no opportunity for fish to leave this lake. There is no lake outflow.

Community Description
Bluegill, largemouth bass, carp, threadfin shad, and tilapia have been observed from this lake.

See Phoenix Metro Urban Lakes Complex Analysis for community description in SRP canals that provide water to this lake.

CLOSED SYSTEM PHOENIX METRO AREA LAKES ANALYSIS
Water distribution and connectivity, fish movement and community descriptions were discussed for the 14 closed system Urban Fishing Program (UFP) waters and the 10 Fishing in the Neighborhood (FIN) waters. Impacts to sensitive species (roundtail chub) in the Phoenix Metro complex are also discussed below, comprehensively in combination with all potential connected populations of these sensitive species.

Water Distribution/Connectivity
Eighteen of the 24 closed system Phoenix UFP lakes and FIN lakes are supplied with water from the SRP Canal system. SRP's 131-mile main canal system is supplied with water from the Salt and Verde River watersheds. There are no outlets from these closed systems.

Fish Movement
SRP Canals - The SRP canals have a series of variously sized grates and barriers that limit or restrict upstream and downstream fish movements. It is possible for a small fish to move through the system and access the lakes, although this is thought to be unlikely because… Gated outflow structures along the canals are used to supply water to each of the lakes through buried pipelines. These systems of gravity-fed pipelines create a distinct fish barrier in the lakes, precluding fish from the lakes from entering the pipelines and moving into the canals.

Community Description
SRP Canals - The fish species assemblage within the canals is the most diverse of any waterbody in the state. This is due to waters running through the communities of the metropolitan Phoenix area that collect runoff from literally hundreds of public and private waterbodies that contain a wide array of fish assemblages. Further, the proximity of the canals to millions of urban residents offers the public an easy opportunity to illegally stock fish, or transfer fish from aquariums or

ponds. Canal species documented in the past include longfin dace, yellow bullhead, goldfish, desert sucker, Sonora sucker, hybrid sucker, grass carp (white amur), common carp, red shiner, threadfin shad, mosquitofish, roundtail chub, channel catfish, green sunfish, redear sunfish, smallmouth bass, largemouth bass, yellow perch, yellow bass, striped bass, rainbow trout, fathead minnow, sailfin molly, shortfin molly, blue tilapia, black crappie, flathead catfish, walleye, Mozambique tilapia, redbelly tilapia (LCRB Aquatic GAP; Table 50).

Wright and Sorensen (1995) found the presence of 20 fish species, 3 native and 17 nonnatives, in the SRP canals. The three native fish are the desert sucker, Sonora sucker, and roundtail chub. Nonnative species, in order of abundance are: threadfin shad, red shiner, white amur, largemouth bass, yellow bass, channel catfish, yellow bullhead, mosquitofish, common carp, bluegill, seasonal rainbow trout, goldfish, green sunfish, smallmouth bass, oscar, walleye, and flathead catfish. This species assemblage is almost identical, with a few nonnative fish differences, to those found by Marsh and Kesner (2008) in 2007. They found two tilapia species (blue and redbelly), redear sunfish, and striped bass, but did not capture mosquitofish, yellow bass, or walleye.

Consultation Species or Critical Habitat

Roundtail Chub

The nearest roundtail chub occurring within this stocking area are located in the Lower Salt River, Lower Verde River and the SRP Canal system below Granite Reef Dam. Phoenix Metro closed system UFP and FIN lakes have no hydrological connection to the sub-watershed and fish stocked into the lakes have no access to roundtail chub habitat. Roundtail chub in the canal could enter the lake(s) through the inflow if they are small enough to pass the 2-inch white amur grating. The existing data suggest that this may be a rare occurrence, since no roundtail chub have been found to date in UFP waters, and the number of roundtail chub in the canal system is small (Marsh and Kesner 2008). Over 20 years ago there were a couple of recalled incidences of Sonoran and desert suckers occurring in two UFP lakes fed by the SRP Arizona Canal, which suggests the potential for fish in the canals to enter UFP waters. However, ever since the white amur grating was installed throughout the SRP canal system (circa 1985-1988), there have been no reported findings or observations of suckers in any of the 13 UFP lakes supplied with SRP water.

Roundtail chub that are small enough to enter the lake(s) through the 2-inch grating are subject to predation by other nonnative fish resident in the canals. However, should they reach the proposed stocking waters, the individual roundtail chub would be trapped in the water body, unable to leave and rejoin the Salt and Verde River populations, only to be eaten by stocked fish species or their progeny in the lake, or captured by anglers, since roundtail chub are a legal sport fish in Arizona.

Movement of fish species out of the lake and back into the canals or, more importantly, the riverine habitats of the lower Salt and Verde Rivers cannot occur from these closed stocking sites.

Potential Impacts

No potential impacts are anticipated on the roundtail chub due to the lack of connectivity of these closed system stocking locations to chub habitat in the Lower Salt and Verde Rivers.