Chapter 6 LITTLE COLORADO RIVER WATERSHED, CONTINUED

Middle Little Colorado River Sub-Watershed

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Little Colorado River Watershed, continued

MIDDLE LITTLE COLORADO RIVER

The Chevelon Canyon drainage contains five proposed stocking sites. These sites form two complexes: Black Canyon Lake Complex and Chevelon Creek Complex (Figure 1). Chevelon Canyon flows perennial and intermittent north into the Little Colorado River (LCR).

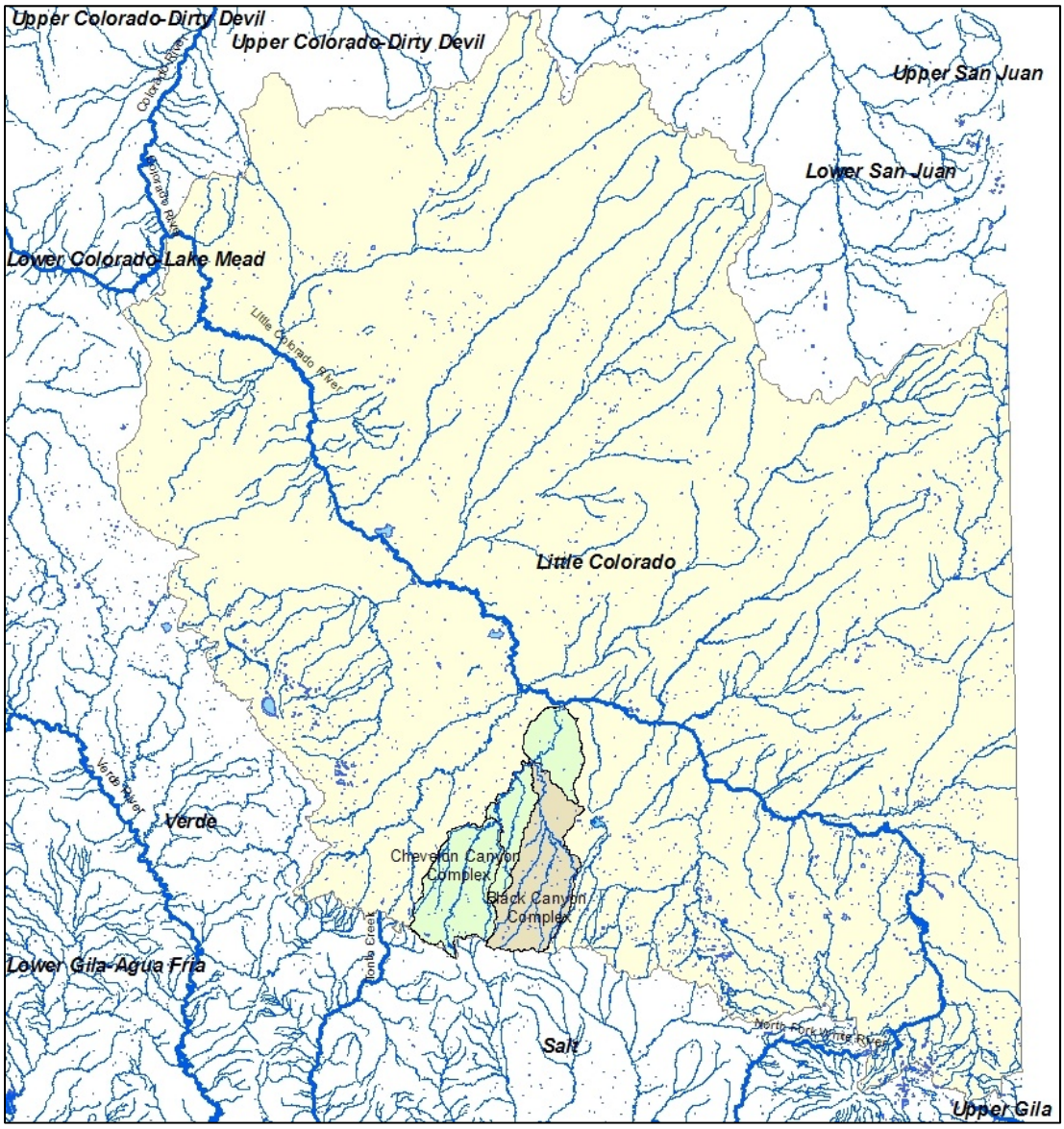

Figure 1. Chevelon Canyon sub-watershed location within the Little Colorado River watershed.

BLACK CANYON LAKE COMPLEX

Black Canyon Lake

Site Description
Black Canyon Lake is located in the headwaters of Black Canyon, an intermittent tributary of Chevelon Creek on the Apache-Sitgreaves National Forest, approximately 18 miles southwest of Heber. The dam was constructed in 1964, creating a lake 78 surface acres in size, with a maximum and average depth of 60 and 35 feet, respectively. The lake is located at an elevation of 7060 feet on West Fork Black Canyon.

Black Canyon Lake is accessed by an all-weather gravel road, Forest Road 86, from April through November. The lake ices over in the winter and is typically inaccessible by vehicle during that time. The lake receives little ice fishing use because snowmobiles that would have access prefer to ride to other destinations. The lake offers paved parking, restrooms, and a boat launch ramp on the southwest side of the lake. This spot is the only vehicle access to the lake and shore anglers must hike to other parts of the lake. Shore fishing is usually concentrated around the vehicle access point. Camping is not allowed at the lake, but a Forest campground is located close by at the junction of Forest Roads 300 and 86.

Management of Water Body
Primary fishery is a cold water put-grow-and-take fishery. Catchable and sub-catchable rainbow trout are stocked multiple times throughout the stocking season, and brook trout are being proposed for future stockings. This fishery supports angling use from spring through fall.

Black Canyon Lake was historically a good put-grow-and-take trout fishery until the long term drought started impacting water quality and lowering water levels. Then the lake turned into a put-and-take trout fishery, especially after largemouth bass were illegally stocked. Table 1 provides a summary of historical stocking in Black Canyon Lake. Ash runoff from the Rodeo-Chediski Fire in 2002 caused a complete fish kill, and the lake was monitored for several years following that event. Oxygen and primary productivity returned quickly to Black Canyon Lake and it was stocked with trout late that fall. For the next couple years the lake was very productive, partially because of the nutrient loading in the lake from the ash runoff, but also because most of the crayfish were also killed. Other benthic invertebrates, such as chironomids, exploded and led to rapid growth in stocked trout. As the crayfish slowly repopulated to original levels, the other benthic invertebrates crashed, and so did the trout growth. Currently, the lake is semi-productive, but best as a put-and-take trout fishery, particularly after the illegal stocking of largemouth bass plus green sunfish.

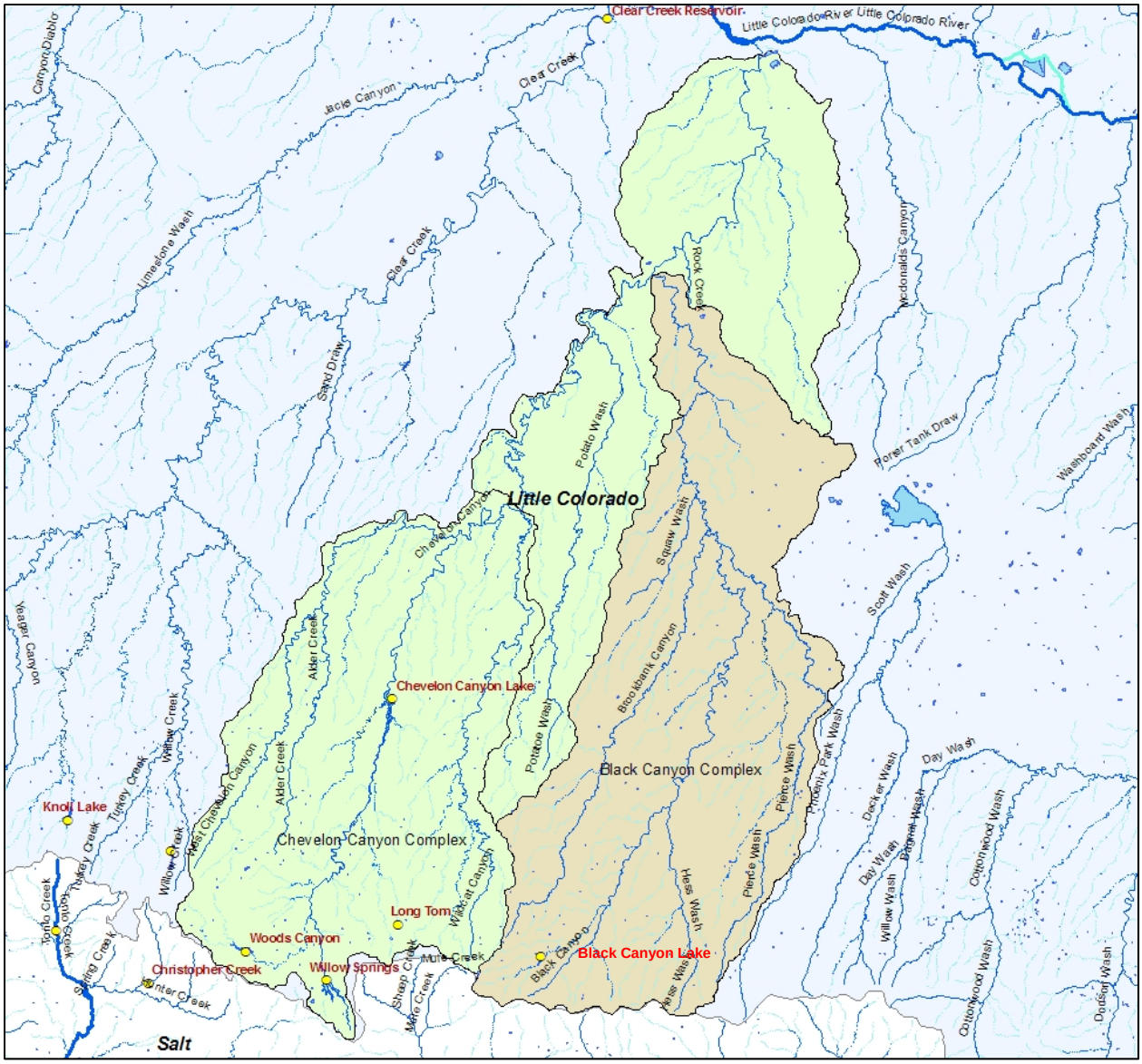

Figure 2. Chevelon Creek drainage which contains the Black Canyon Complex (Black Canyon Lake) and flows north into the Little Colorado River.

Table 1. Stocking history in Black Canyon Lake.

Species	First Year	Last Year	Num. of Stockings	Num. Stocked
Brook trout	1964	1990	12	160,786
Brown trout	1977	1994	20	164,403
Rainbow trout	1964	2009	258	1,796,983
Total			290	2,122,172

AGFD is planning to increase the size of the spillway on Black Canyon Lake for dam safety reasons, at which time the lake may have to be temporarily lowered to accommodate the construction. The new spillway will not increase the chance of spilling once it is completed; as it will be built at the same elevation as the current spillway, just wider to better handle possible extreme flood flows. The new spillway may result in a decreased potential for fish to go over the spillway during low and moderate spill events because the spill volume will be spread across a broader cross-sectional area, resulting in a shallower flow over the spillway.

Black Canyon Lake is managed exclusively for cold water trout fishing; however, illegal stockings of largemouth bass and green sunfish have impacted that management direction. Beginning on January 1, 2009, bag limits on warm water fishes were removed, allowing unlimited harvest of bass and catfish on all rim area lakes, as a first step to send the message to anglers that those area waters are managed only for trout.

Black Canyon Lake has been stocked with rainbow trout only since 1995; however, the Department would like to offer some diversity to the trout fishing opportunity. Brown trout were considered, but dropped because of their ability to survive warmer temperatures better than other trout species. Thus, brook trout were added to the proposal since they were considered to be of little to no threat of surviving in lower Chevelon Creek if they were to get out of Black Canyon Lake.

Black Canyon Lake supported 16,101 angler use days in 2001, as reported by mail-out survey (Pringle 2004), and 11,059 AUDs in 1985, as documented by on-site angler creel surveys.

The Integrated Fisheries Management Plan for the Little Colorado River (LCR) Watershed (Young et al. 2001) identifies a management emphasis of basic yield and intensive use sport fish, with a desired species assemblage of rainbow trout and bluehead sucker. The proposed action is consistent with this emphasis, except that brook trout, which will be managed as intensive use sport fish, have been added to provide additional diversity of angling opportunity, which will help deter anglers from illegally stocking much more harmful species when they are not satisfied with the fishing.

Proposed action

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

Catchable, sub-catchable, and fingerling rainbow will be stocked multiple times from April to September each year; numbers of trout stocked may be from 0 to 40,000 fish annually.

Catchable, sub-catchable, and fingerling brook trout will be stocked multiple times from April to September each year; numbers of trout stocked may be from 0 to 15,000 fish annually.

Water Distribution/Connectivity

Black Canyon Lake is located on the West Fork Black Canyon, which is intermittent both above and below the lake. Black Canyon Lake receives most of its water from spring snowmelt runoff or seasonal monsoon events. There are no permanent flows entering the lake. The small watershed, which is approximately 3400 acres, in upper West Fork Black Canyon above the lake, is the only contributing watershed. AGFD owns water rights in Black Canyon Lake and does not release water for irrigation or other uses downstream.

The lake fills and spills into West Fork Black Canyon only during years with heavy snowpack runoff or heavy winter precipitation. West Fork Black Canyon extends for 4.5 miles from the lake to its confluence with Black Canyon. Black Canyon extends for 51.6 miles to its confluence with Chevelon Creek at a point approximately 47.9 miles downstream of Chevelon Canyon Lake at an area called McCauley Sinks. Additional information about this area can be found in the Chevelon Creek Complex discussion. West Fork Black Canyon and Black Canyon are normally dry and flow when the lake spills during heavy spring snowmelt runoff and extreme monsoon events. Portions of Black Canyon downstream from the lake may flow during spring runoff and monsoon events even when the lake does not spill, because the Black Canyon watershed itself is large and also receives runoff from areas other than Black Canyon Lake. The lake can experience some drastic water level fluctuations, despite having no irrigation releases, due to the very small watershed when storms fail to replace water lost to evaporation and seepage during drought years.

The Black Canyon and Chevelon confluence area is dry most of the year, and flows regularly in the spring when Chevelon Lake spills on an annual basis. From the confluence area, the flow continues down Chevelon Creek for 5.1 miles to permanent flow in Chevelon Creek and the area that can support fish year around. From there it is another 3.5 miles downstream to occupied Little Colorado spinedace habitat, and another 2.4 miles downstream to the upper end of Critical Habitat for Little Colorado spinedace. Then it is another 8.6 miles downstream to the confluence with the LCR. Overall, Black Canyon Lake is located 51.6 miles upstream of Chevelon Canyon, 64.7 miles upstream of occupied Little Colorado spinedace habitat, 67.1 miles upstream of designated Little Colorado spinedace critical habitat, and 75.7 miles upstream of the confluence with the LCR.

The lower 14.5 miles of Chevelon Creek has permanent continuous flow, supporting fish populations year around; however, it is unsuitable for trout. This portion of Chevelon Creek gets very warm in the lower elevations (4900-5165 feet) and experiences extremely high conductivity. Some water is diverted from lower Chevelon Creek for waterfowl ponds on the Chevelon Wildlife Area, and also towards the city of Winslow at a large diversion dam 1.7 miles upstream of the LCR. From the confluence of Chevelon Creek and the LCR, the LCR runs downstream for 176.3 miles to the confluence with the Colorado River. The upper 12-15 miles of

this portion of the LCR runs perennial from flows coming from lower Chevelon Creek, at which point permanent flows disappear into the sand. Then, most of the LCR is dry down to permanent water entering the lower LCR at Blue Spring, approximately 13.1 miles upstream of the Colorado River.

The entire drainage is connected and can flow heavily from Black Canyon Lake to the Colorado River, via West Fork Black Canyon, Black Canyon, Chevelon Creek, and the LCR, when the lake is spilling during heavy spring snowmelt runoff. However, much of it dries up during the summer, including all 4.5 miles of West Fork Black Canyon, all 51.6 miles of Black Canyon, 5.1 miles of portions of Chevelon Creek, and much of the LCR from Winslow to Blue Spring. There are no physical barriers that would prevent downstream movement of trout when it is flowing continuously in the spring during wet years. Two USGS stream gauges exist in Chevelon Canyon, but none in Black Canyon; one near Winslow at the bottom of the stream system (Figure 3) and one below the confluence with Wildcat Canyon (Figure 4).

Fish Movement

Trout stocked into Black Canyon Lake cannot go far upstream when the drainage upstream is flowing in the spring; they will die when the drainage dries in the summer.

Trout can only escape downstream when the lake spills, because no water is released for irrigation. The lake does not spill every year; usually only during years with above average winter precipitation. When the lake does spill, it is possible for an escaped fish to travel down West Fork Black Canyon, Black Canyon, into Chevelon Creek, and down to Little Colorado spinedace occupied habitat. It is also possible for trout to continue down Chevelon Creek and into the LCR and beyond.

However, an escaped trout would have to travel the entire 51.6 miles to Chevelon Creek in the short period of spring runoff. If a trout did not make it all the way to Chevelon Creek before the summer months, it would die as the West Fork Black Canyon and Black Canyon dry up entirely.

If a trout did reach permanent water in Chevelon Creek, it would not persist, as the water temperatures warm to lethal levels for trout in the summer months, particularly downstream of Black Canyon confluence. Lack of persistence is supported by the lack of trout in the survey data in Chevelon Creek downstream of Black Canyon over many years of surveys (see Chevelon Canyon Complex analysis for survey information).

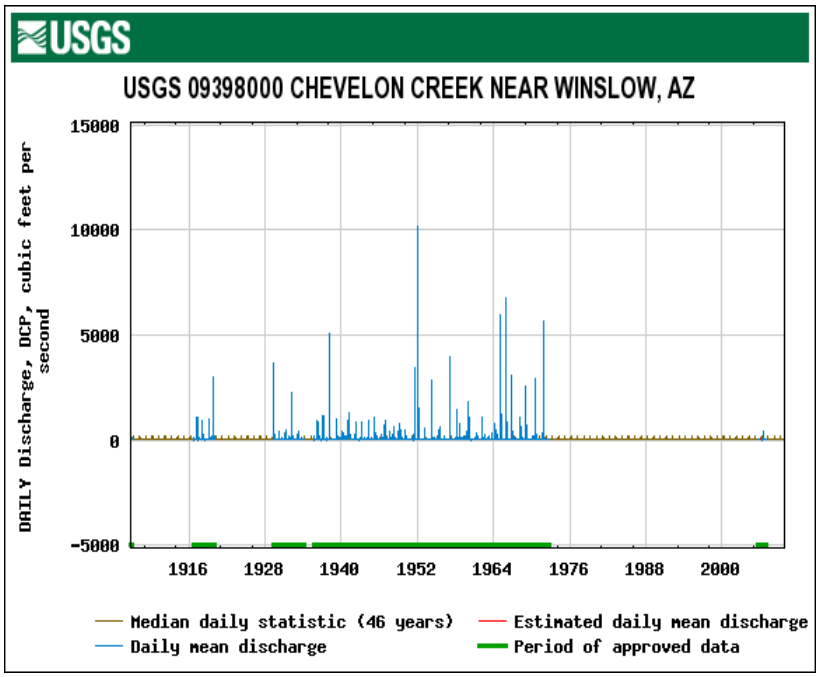

Figure 3. USGS Stream flow gauge flow for the period of record at Chevelon Canyon near Winslow.

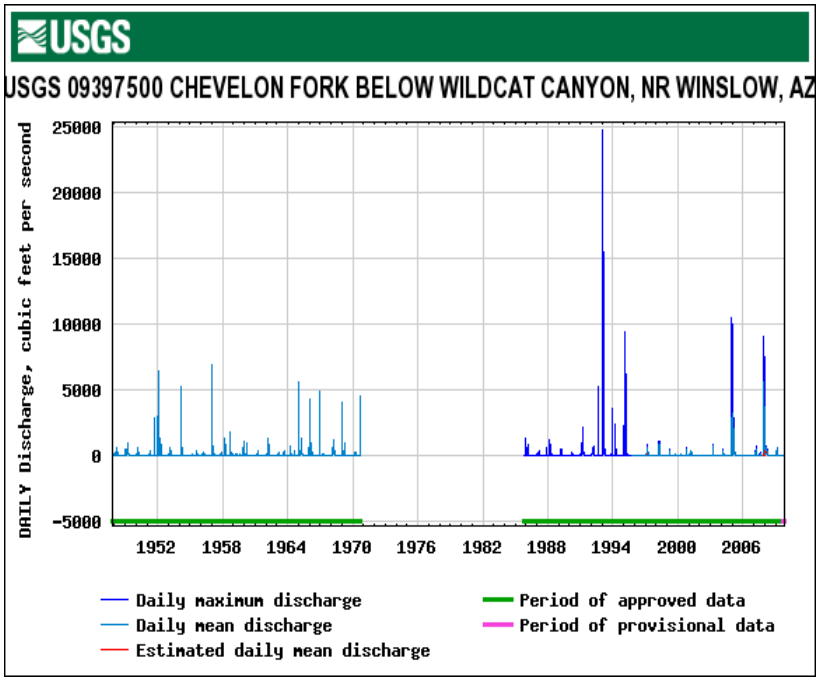

Figure 4. USGS Stream flow gauge data from Chevelon Canyon below Wildcat Canyon for the period of record.

In the unlikely event that trout did reach Chevelon Creek, it could also potentially swim upstream for 37.4 miles to the confluence with West Chevelon Canyon, and another 10.5 miles to the base of Chevelon Lake Dam during spring runoff. Most of this reach also dries up in the summer, although it does support isolated permanent pools that have the potential to hold fish. The isolated pools do get warm in the summer months and are not able to support trout long term, but could be temporary holding areas. Trout would likely not persist through to the next spring runoff because of high temperatures in the summer months. A trout could also potentially swim up West Chevelon Canyon for 26.1 miles during spring snowmelt runoff, to occupied Little Colorado spinedace habitat in the upper reaches. However, the trout would also have to make that journey during the short spring runoff, because a long portion of the lower reach dries entirely. The lack of trout in the survey data in West Chevelon, as well as the lack of any other non-native aquatic wildlife, including crayfish, indicates that the long stretch of normally dry stream is functioning as a fish barrier to upstream movement.

Although extremely unlikely, an escaped trout could potentially swim upstream in the LCR from the confluence with Chevelon Creek, for 43.3 miles to the confluence with Silver Creek during high flows. But the trout could not get upstream of the Woodruff Dam on the very lower portion of Silver Creek. It could continue up the LCR for an additional 85.1 miles to Lyman Lake dam, but also only during high flows. However, it is not expected that trout would ever make it into these habitats due to the distance and high water temperatures. No trout has ever been documented in the LCR in these reaches, or in lower Silver Creek below White Mountain Lake.

Although extremely unlikely, an escaped trout could also potentially swim downstream in the LCR from the confluence with Chevelon Creek during high flows. At Clear Creek, a trout could not get past the Clear Creek Reservoir dam in very lower Clear Creek, but could possibly get up into Jacks Canyon, or into Diablo Canyon, or even further downstream. Trout have never been found in lower Chevelon Creek below Black Canyon; it is even more unlikely they get beyond that habitat due to distance, high temperatures and dry stream..

Community Description

Black Canyon Lake currently contains stocked rainbow trout, naturally reproducing fathead minnow, crayfish, and illegally stocked largemouth bass and green sunfish, which are also naturally reproducing (Table 2). Trout do not reproduce in Black Canyon Lake.

Table 2. Survey history at Black Canyon Lake with experimental gillnets.

Species	Mar 2004 5 GN	Apr 2005 4 GN	Apr 2006 3 GN	Apr 2007 3 GN	Apr 2008 3 GN
Rainbow trout	63 (102-338)	56 (133-345)	29 (245-335)	22 (295-386)	12 (327-445)
Largemouth bass		4 (352-387)	2 (180-185)	27 (191-393)	32 (239-331)
Green sunfish	2 (77-84)	11 (111-142)	86 (135-205)	6 (140-157)	0

Sampling effort is listed as gillnet nights (GN). The size range of fish collected is provided in parentheses as Total length in mm.

The 56.1 miles of Black Canyon and West Fork Black Canyon dries every year during the summer and does not support fish. Isolated permanent pools in Chevelon Creek immediately below Chevelon Canyon Lake have been found to contain brown trout, rainbow trout, fathead minnow, golden shiner, roundtail chub, bluehead sucker, Little Colorado sucker, speckled dace, and numerous crayfish. Rainbow trout have been collected downstream of the Chevelon Canyon Lake on several occasions, with most collections between Chevelon Canyon Lake and West Chevelon Canyon, 10.5 miles downstream of the lake. Rainbow trout likely did not come from Black Canyon Lake because it does not spill every year; plus trout have 56.1 miles to travel before even reaching Chevelon Creek. However 1 isolated rainbow trout collection near Potato Wash was the lowest record of rainbow trout in Chevelon Creek over many years of surveys. Information on aquatic community assemblage in Chevelon Canyon downstream from Chevelon Canyon Lake is provided in the Chevelon Canyon Complex discussion, including potential impacts in that area. The origin of stocked species in that area may not be specifically attributable to the Chevelon Canyon Complex of stocking sites, or of Black Canyon Lake.

Consultation Species or Critical Habitat

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.

Additional discussion of the potential for impacts to consultation species is included in the Chevelon Creek Complex analysis because of the opportunity for fish from this site to reach areas coming from other stocking sites in that complex.

Northern Leopard Frog

Local Analysis: The Black Canyon Lake buffered stocking site is within the historical range of the northern leopard frog and the likelihood that northern leopard frogs could be exposed to stocked fish is high. There are no records for northern leopard frogs at Black Canyon Lake itself, in addition, crayfish and non-native fish have been documented at the reservoir, making it less suitable leopard frog habitat. However, there is a 2004 northern leopard frog record approximately 4 miles downstream of the lake in Black Canyon, within the 5 mile buffer (D. Groebner pers. comm.). There have been 18 surveys at 13 sites within the buffered stocking reach between 1984 and 1999 (Figure 5; HDMS; AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). There are records for northern leopard frogs from 2 of these sites; Twin Lakes from 1984 and 1985 and Unnamed Tank (North of Walker Park) from1994 (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs were not observed during later surveys at Unnamed Tank (North of Walker Park) (1995 and 1999) (HDMS, AGDF Riparian Herpetofauna Database). The Black Mesa Ranger District, Tonto National Forest, surveyed 8 additional sites within the buffered stocking complex in 2003, 2005, and 2006 and did not observe any northern leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). Although there are crayfish and non-native fish at Black Canyon Lake, in Black Canyon and its tributaries, due to the 2004 record in Black Canyon, it is likely that northern leopard frogs currently occupy portions of Black Canyon.

Broad Scale Analysis: It is likely that northern leopard frogs occupy the area downstream of the Black Canyon Lake buffered stocking site and nearby tributaries, in particular Buckskin Wash and its tributaries. Therefore the likelihood that northern leopard frogs could be exposed to dispersing fish from the Black Canyon Lake stocking site is high. If Black Canyon Lake spilled, stocked fish could disperse into West Fork Black Canyon and Black Canyon and its tributaries, where it is likely occupied by northern leopard frogs (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Chiricahua leopard frog

Local Analysis: Although the Black Canyon Lake buffered stocking site is within the historical range of the Chiricahua leopard frog, the likelihood that Chiricahua leopard frogs could be exposed to sport fish stocked in Black Canyon Lake is low because there are no historical records for Chiricahua leopard frogs at Black Canyon Lake or within the 5 mile buffer around the lake (Figure 5, HDMS, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, crayfish and non-native fish have been documented at the reservoir, making it less suitable leopard frog habitat, therefore it is not likely that Chiricahua leopard frogs occupy this area.

Broad Scale Analysis: If fish were to disperse from Black Canyon Lake, the likelihood that Chiricahua leopard frogs could be exposed to them is low because there are no records for Chiricahua leopard frogs in the drainages that fish could disperse to (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

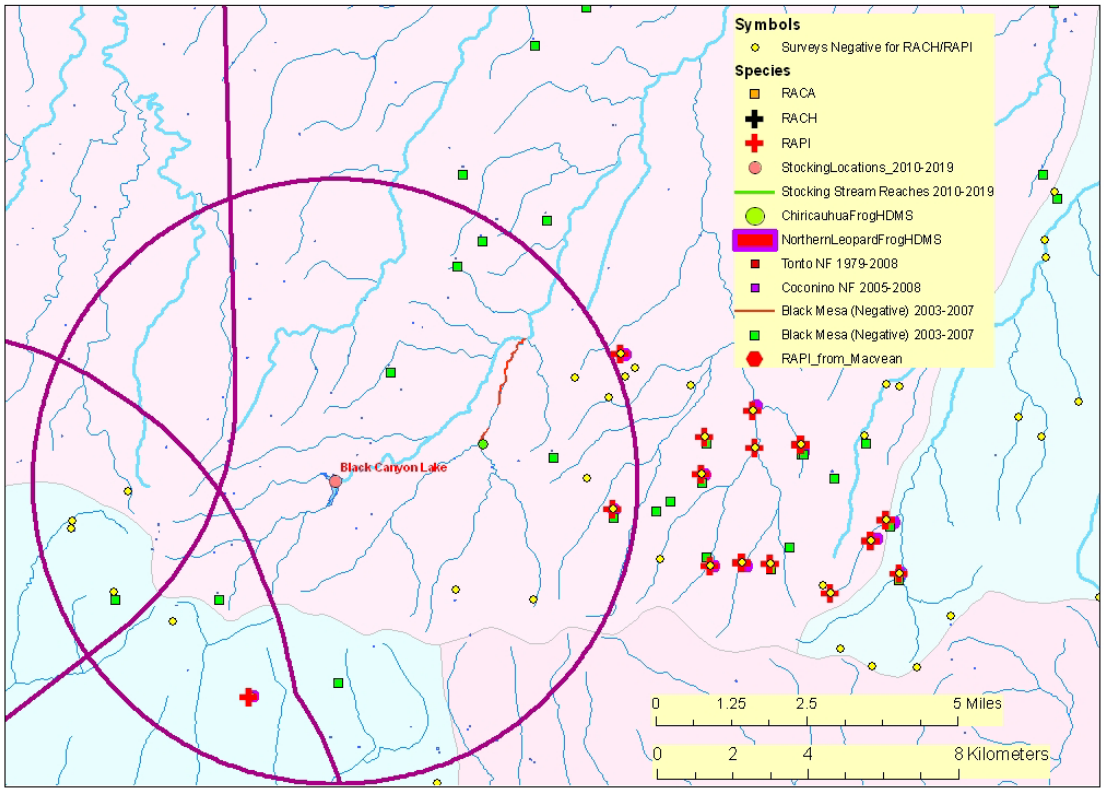

Figure 5. Map of Black Canyon Lake buffered stocking site.

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).

Little Colorado Spinedace and Critical Habitat

Little Colorado spinedace are located in upper West Chevelon Canyon, as a result of reintroduction as a conservation action in July 2007; they are also located in lower Chevelon Creek. Both occupied locations are hydrologically downstream of Chevelon Canyon Lake, which is the lowest stocking site in the Chevelon Complex. Black Canyon joins Chevelon Canyon downstream from the Chevelon Canyon complex. Occupied habitat in upper West Chevelon Canyon is located 119.6 stream miles from Black Canyon Lake. This is via 56.1 miles of West

Fork Black Canyon, into Black Canyon, and then back upstream in Chevelon Canyon 37.4 miles to the confluence with West Chevelon, and up West Chevelon Canyon for 26.1 miles from the confluence with Chevelon Creek.

Surveys of the West Chevelon population of Little Colorado spinedace showed that in July 2008 that they had moved a short distance downstream, approximately 150 meters from where they were originally stocked. In August 2009 they were found a little further downstream, about 0.3 miles. The Little Colorado spinedace are dispersing within the series of permanent pools in upper West Chevelon Canyon, but still within a small area, with many miles of dry habitat to Chevelon Creek. It is possible for a Little Colorado spinedace to wash down into Chevelon Creek during a very high flow event, but this would likely be a rare occurrence because we believe those high flow events to be rare occurrences.

It is possible for an escaped trout to travel upstream in West Chevelon during high flow events, but the many miles of habitat that dry entirely on an annual basis means the trout would have to make the entire distance in the short spring runoff period. The survey data shows that non-native aquatic organisms, including trout, crayfish, fathead minnow, and others are not making it to permanent water in upper West Chevelon, and that the long stretch of dry habitat is functioning as a barrier to upstream movement of fish and other organisms. Two surveys of upper West Chevelon in 1999, and other surveys in 2003, 2004, 2005, 2006, 2007, 2008, and 2009 found only native fish species and no crayfish or trout.

Occupied Little Colorado spinedace habitat in lower Chevelon Creek is located 64.7 miles downstream of Black Canyon Lake. While it is possible for an escaped trout to travel that distance into occupied habitat during heavy flows, it is unlikely because of the great distance they would need to travel in a single season, since most of the habitat dries annually. Only isolated pools that are unsuitable for trout are available in Chevelon Creek during the summer months. The isolated permanent pools in Chevelon Creek get warm and become stagnant, and are generally unable to sustain trout throughout the entire summer. All of West Fork Black Canyon and Black Canyon dry every summer, killing any fish trapped in that habitat. Permanent flow within occupied Little Colorado spinedace habitat in Lower Chevelon Creek also becomes unsuitable for trout, becoming very warm with extremely high conductivity. Trout have not been collected in spinedace occupied habitat in lower Chevelon Creek after multiple surveys (see the Chevelon Canyon Complex section). The survey data show that if trout reach occupied habitat it is likely that they are in extremely low numbers and don't persist long. It is likely given the distance and warm temperature that stocked trout from Black Lake to not reach this area.

The nearest designated Critical Habitat for Little Colorado spinedace is located 67.1 miles downstream of Black Canyon Lake. The critical habitat extends for approximately 8 miles to the confluence with the LCR. Again, it is extremely unlikely that a trout would reach critical habitat, but if one should reach the area, it would not persist in the warm waters of lower Chevelon

Creek. No trout has been collected in either occupied or critical habitat in many years of surveys as summarized in the Chevelon Creek Complex analysis.

Potential impacts

The proposed stocking activity is not expected to impact the Little Colorado spinedace because trout are not likely to reach occupied habitat, and have never been documented in occupied habitat in West Chevelon or lower Chevelon Creek. Black Canyon Lake spills occasionally and some trout likely do escape downstream, but the long distances of normally dry habitat in West Fork Black Canyon and Black Canyon, plus unsuitable habitat for trout in lower Chevelon Creek, are keeping trout from reaching occupied or critical habitat in upper West Chevelon Canyon and lower Chevelon Creek.

It is possible for a Little Colorado spinedace to wash down from upper West Chevelon into Chevelon Creek during flood flows, where it could encounter an escaped trout from Black Canyon Lake. This would be a very rare event, especially since a trout would have to navigate the extremely long distance to get there. Trout occasionally collected in the vicinity of the West Chevelon confluence are likely escapees from Chevelon Canyon Lake, which is only 10.5 miles upstream, compared to 93.5 miles from Black Canyon Lake. If the trout did navigate that great distance and a Little Colorado spinedace did disperse from upper West Chevelon, the trout could prey directly on this dispersing Little Colorado spinedace, or compete for habitat (Blinn et al. 1993; Robinson et al. 2000). There would likely be very little chance of impacting the reproduction of Little Colorado spinedace, since the occurrence of a dispersing Little Colorado spinedace is so low, they would not be expected to reproduce in that part of Chevelon Creek. Escaped trout would not affect dispersal of Little Colorado spinedace or connectivity between populations, because of the very low occurrence of trout in the area downstream of upper West Chevelon and the area upstream of lower Chevelon Creek. Additionally, the long reaches of dry and/or unsuitable habitat present between these populations are likely the greatest impediment to dispersal. Non-native predators that are not part of this proposed action, such as brown trout, crayfish, green sunfish, and largemouth bass are more likely to be encountered by a dispersing Little Colorado spinedace, than is an escaped rainbow trout or brook trout from Black Canyon Lake.

Mexican Spotted Owl

This stocking location is within Mexican Spotted Owl (MSO) critical habitat (CH), and is within 3 individual buffers. There is access around the whole perimeter of the lake with little vegetation along the shoreline.

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.

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 Canyon Lake Analysis

Rainbow and brook trout stocked into Black Canyon Lake can likely escape the reservoir when it occasionally spills during high flow events from spring snowmelt runoff. Trout can persist in Black Canyon Lake, but cannot persist in the 56.1 miles of West Fork Black Canyon and Black Canyon, as those systems dry entirely during the summer months. It is possible for an escaped trout to reach Chevelon Creek, but unlikely, since it would have to travel the entire 56.1 miles to Chevelon Creek in the short period of spring runoff, before West Fork and Black Canyon dried

up. A stocked fish will not persist in the portion of Chevelon Creek at the confluence with Black Canyon, since most of that reach, up to the dam at Chevelon Lake, dries during the summer; this reach does contain isolated permanent pools, but these pools get warm and fairly stagnant during the summer. Occasional rainbow and brown trout have been found in the reach of Chevelon Creek from Chevelon Lake to the West Chevelon confluence; however, these records are few, with no evidence of them establishing or persisting. The lower reach of West Chevelon Creek dries up every year and is considered to be functioning as a barrier to upstream movement of fish towards Little Colorado spinedace occupied habitat in upper West Chevelon. The data from several surveys (see Chevelon Creek Complex for additional information) support this statement, because no trout, or any non-native aquatic organism, including crayfish, has been found in West Chevelon Creek.

It is possible for an escaped trout to travel downstream of the Black Canyon – Chevelon Creek confluence towards permanent water, Little Colorado spinedace occupied habitat, and designated critical habitat for LC spinedace in lower Chevelon Creek. However, this is very unlikely because of the distance involved. Furthermore if it did occur, trout would not persist because of the unsuitable habitat conditions in this lower portion of Chevelon Creek. The data from numerous surveys support this statement, because no trout has been collected in occupied Little Colorado spinedace habitat, critical habitat in lower Chevelon Creek, or anywhere downstream of the Black Canyon confluence (See Chevelon Creek Complex analysis).

It is possible for a dispersing Little Colorado spinedace to get washed downstream from upper West Chevelon Canyon and into Chevelon Canyon during flood flows, and to encounter an escaped trout that had made it to Chevelon Creek. However, this would likely be an unlikely occurrence because of the distance involved from occupied habitat in upper West Chevelon, plus the very low probability of trout present in Chevelon Creek being from Black Canyon Lake. The low occurrence of trout in the reach around the confluence with West Chevelon are likely from Chevelon Lake, which is a much shorter distance directly upstream and spills every year. Regardless, any impact under this situation would be because of an individual fish, with no impact on the species or population level, since a dispersing Little Colorado spinedace from upper West Chevelon would be lost to the population; that fish could not make it back to occupied habitat that it came from, would not be expected to establish in Chevelon Creek in that area, and are not likely to be washed even further downstream to the next Little Colorado spinedace population in lower Chevelon Creek because of the distances involved and numerous predators along the way. It is also unlikely that Little Colorado spinedace would disperse upstream from lower Chevelon Creek, since their current upstream distribution is very close to the upper extent of permanent and continuous flows in lower Chevelon Creek. The dry and intermittent habitat in middle Chevelon Creek, the portion from Chevelon Canyon dam downstream to Pony Canyon, is likely the greatest influence on upstream distribution of Little Colorado spinedace. Even then, the occurrence of escaped trout in Chevelon Creek is very low,

most likely from Chevelon Lake, not Black Canyon Lake, and would not likely present a major obstacle to upstream movement of Little Colorado spinedace if they were to overcome the habitat deficiencies of that reach.

CHEVELON CREEK COMPLEX

Physical Geographic Description

The Chevelon Creek complex contains 4 stocking sites: Woods Canyon Lake, Willow Springs Lake, Chevelon Canyon Lake, and Long Tom Tank (Figure 6).

Drainage area and elevations

The Chevelon Creek Complex drains the upper reaches of the mainstem Chevelon Canyon. The upper most stocking sites, Woods Canyon Lake and Willow Springs Lake, are located at the head of the upper tributaries, Woods Canyon and Willow Springs Canyon, respectively. These two canyons have perennial and ephemeral reaches and meet to form Chevelon Creek. From this point, Chevelon Creek is nearly all perennial and flows into Chevelon Canyon Lake 12.2 miles downstream of the confluence. Long Tom Tank, is located in the headwaters of an intermittent tributary, which enters Chevelon Creek approximately 4.4 miles upstream of Chevelon Canyon Lake.

Willow Springs Lake and Woods Canyon Lake are at the highest elevation within the complex, at 7513 and 7505 feet, respectively. Chevelon Creek flows north to the lowest elevation within the complex in Chevelon Canyon Lake, at 6366 feet. Long Tom is located at 7500 feet and enters into Chevelon Creek between the upper lakes and Chevelon Canyon Lake.

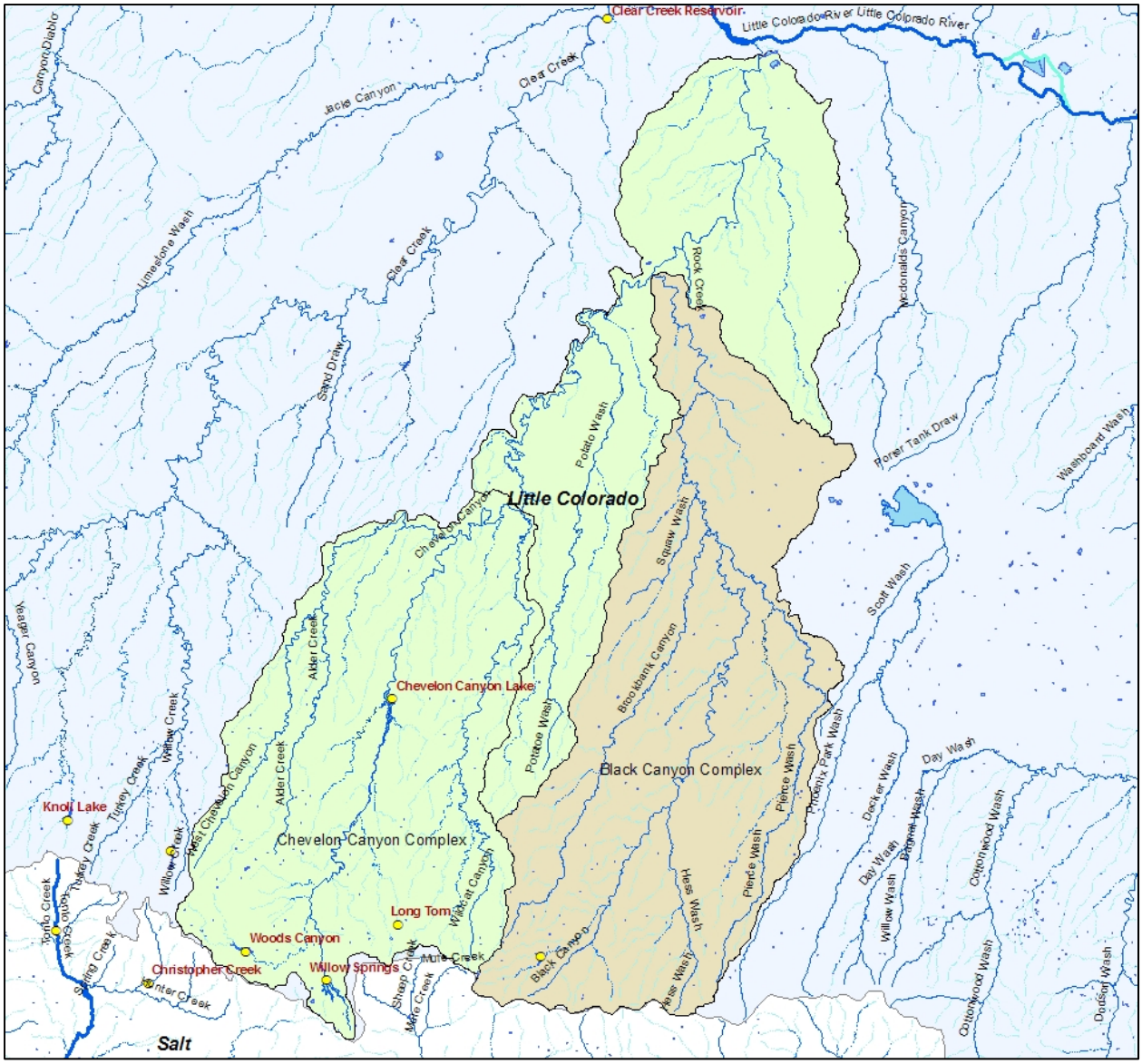

Figure 6. Chevelon Creek Complex located within the Chevelon Creek sub-watershed.

Long Tom Tank

Site Description

Long Tom Tank is a small 3-acre pond located on the edge of the Forest Lakes subdivision on the Mogollon Rim (Figure 7 and Figure 8). It is located at an elevation of 7500 feet on the Apache-Sitgreaves National Forest. Long Tom is located at the headwaters of Long Tom Canyon, which is a tributary to upper Chevelon Creek. Long Tom joins Chevelon Creek above Chevelon Canyon Lake at a point that is downstream from Woods Canyon and Willow Springs lakes. The date of construction of the dam forming the lake is unknown.

Long Tom Tank is accessed by an all-weather gravel road through the community of Forest Lakes, about 2 miles from paved Highway 260. There is a dirt parking lot, but no other amenities exist.

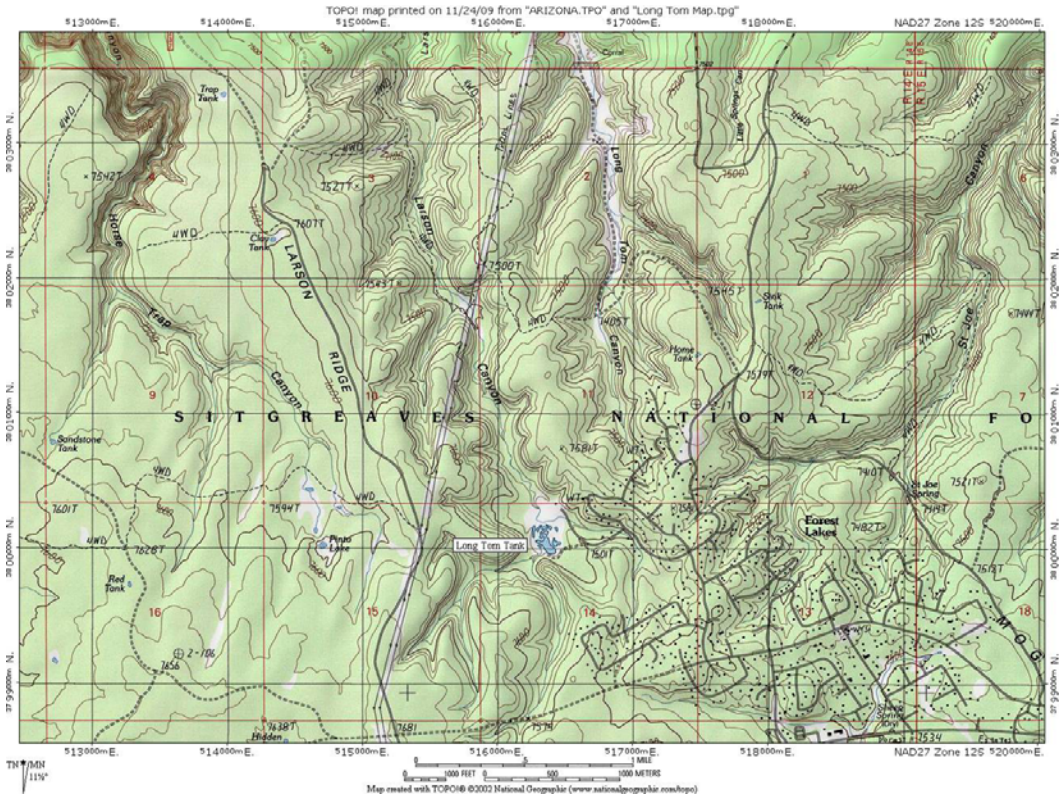

Figure 7. Map of Long Tom Tank.

Figure 8. Long Tom Tank.

Management of Water Body

Long Tom Tank has been managed as a put-grow-and-take cold water fishery with fingerling and sub-catchable rainbow trout stocked once per year; however largemouth bass and bluegill were illegally stocked in the late 1990s or early 2000s. The tank has not been stocked since 2003 (Table 3). The Department desires to continue stocking the tank again with rainbow trout, but will switch to stocking with catchable size trout instead of fingerling and sub-catchables so that the fish are immediately catchable and harvestable. Resuming regular stocking at Long Tom Tank will also help discourage additional illegal stocking at the tank.

Table 3. Stocking history at Long Tom Lake.

Species	First Year	Last Year	Num. of Stockings	Num. Stocked
Brown trout	1978	1995	17	24,176
Rainbow trout	1978	2003	13	29,500
Total			30	53,676

Beginning on January 1, 2009, bag limits on warm water fishes were removed, allowing unlimited harvest of bass and catfish on all rim area lakes, as a first step to send the message to

anglers that the tank is managed only for trout. There have been no angler creel surveys conducted at Long Tom Tank.

The Integrated Fisheries Management Plan for the LCR Watershed (Young et al. 2001) identifies a management emphasis of basic yield, put-grow-and-take cold water sport fishery with a desired species assemblage of rainbow trout, which is mostly consistent with the proposed action. The proposed action is to stock catchable size rainbow trout, which will allow better control of when trout are at catchable size, and better control of angler success and satisfaction.

Proposed Action

The Department proposes to stock rainbow trout for the period covered by this consultation.

Catchable rainbow trout would be stocked multiple times from May to September each year to; numbers of trout stocked may be from 0 to 3,000 fish annually.

Water Distribution/Connectivity

Long Tom Tank receives water from an extremely small watershed during spring snowmelt runoff. There is no permanent stream or spring inflow coming into the tank. There is no outlet on the dam, thus no water is released for irrigation or other uses downstream. It is unknown if the tank spills, but if it did, it would drain into Larson Canyon. From the tank, it is 3.3 miles down Larson Canyon to Long Tom Canyon, then another 4.1 miles to Chevelon Creek above Chevelon Canyon Lake. The entire drainage from near the tank down to Chevelon Creek goes dry each summer. Long Tom Canyon enters upper Chevelon Creek, which is perennial, 4.4 miles upstream of Chevelon Canyon Lake. (See Chevelon Canyon Lake for further details on the connectivity below Chevelon Canyon Lake).

Fish Movement

There is nowhere upstream from Long Tom Tank for stocked trout to travel, as there is no stream entering the tank. If the tank spills, it likely does so only in the spring, which would allow fish to travel down Larson Canyon, to Long Tom Canyon, and down into upper Chevelon Creek. If the escaped trout did not make it all the way to Chevelon Creek during high flow events, they would die, since Larson Canyon and Long Tom Canyon dry up each year. Once in upper Chevelon Creek, escaped trout could persist and possibly reproduce, as this is good trout habitat and supports a healthy population of wild brown trout, among other fishes (Table 4).

In Chevelon Creek, an escaped trout could swim upstream for 7.8 miles to the confluence with Woods Canyon and Willow Springs Canyon. It could then swim up Woods Canyon for 5.8 miles or up Willow Springs Canyon for 3.4 miles, then get stopped at Woods Canyon Lake dam and Willow Springs Lake dam on the respective streams. An escaped trout could also swim downstream from Long Tom Canyon for 4.4 miles and into Chevelon Canyon Lake. (See Chevelon Canyon Lake for further details on the fish movement below Chevelon Canyon Lake).

Table 4. Summary of surveys of Chevelon Creek upstream of Chevelon Canyon Lake (Lopez et al. 1998a; AGFD unpublished data). All surveys were conducted with a backpack electroshocker.

Species	1995	1996	1999	2007
Brown trout		212	4	73
Rainbow trout		17	6	
Little Colorado sucker	34	5	7	
Speckled dace	27	5,573	65	300
Green sunfish				2
Fathead minnow			750	
Golden shiner	4			

Community Description

Long Tom Tank currently contains naturally reproducing and illegally stocked largemouth bass and bluegill. It likely no longer contains rainbow trout since they were last stocked in 2003 and do not reproduce in the lake. The stocked trout should persist in Long Tom Tank but will not reproduce in the tank. There is no formal survey history at Long Tom Tank. The largemouth bass and bluegill were collected during an informal survey on October 1, 2004 with a dipnet, which is not traditional gear for sampling fish in a pond or lake. Small fish were observed along the shoreline during a water quality visit to the lake and a dipnet was all that was on hand at that moment. An attempt was made to catch the fish, which definitely were not trout, but was enough to catch some of the fish and confirm the presence of bluegill and largemouth bass.

Larson Canyon and Long Tom Canyon are fishless since they dry entirely every year. A survey on October 19, 2001, found Long Tom Canyon to be almost entirely dry, with only 3 extremely small pools of water only a few inches deep in the entire stream. These pools were fishless.

Chevelon Creek at the confluence with Long Tom Canyon contains naturally reproducing brown trout, speckled dace, Little Colorado suckers, and rainbow trout, plus numerous crayfish.

Consultation Species or Critical Habitat

Chiricahua and northern leopard frogs are analyzed below 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. Figure 9 provides a map of the complex and leopard frog analysis information.

The nearest occupied and critical habitat for Little Colorado spinedace and the known roundtail chub populations occur downstream of Chevelon Canyon Lake. For this reason they are discussed in the Chevelon Canyon complex analysis, 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 Leopard Frog

Local Analysis: Although Long Tom Tank and the Chevelon 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 Long Tom Tank is low. There are no historical records for Chiricahua leopard frogs at Long Tom Tank or within the Chevelon Creek buffered stocking complex. There have been 56 surveys at 37 sites within the buffered stocking complex between 1968 and 2005 (Figure 9; Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 29 sites between 2003 and 2007 and did not observe any Chiricahua leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). Based on available data, it is likely that Chiricahua leopard frogs do not occupy the buffered stocking complex that includes Long Tom Tank (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing fish stocked in sites within the Chevelon Creek stocking complex due to an extreme storm event or a breached dam is moderate. Even though there are no historical records for Chiricahua leopard frogs, some available habitats have not been surveyed and it is possible that there are populations of Chiricahua leopard frogs in the area outside the buffered stocking complex where stocked fish can disperse (HDMS).

Northern Leopard Frog

Local Analysis: Although Long Tom Tank and the Chevelon Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that frogs could be exposed to stocked fish in Long Tom Tank is low. There are no historical records for northern leopard frogs at Long Tom Tank. There have been 56 surveys at 37 sites within the Chevelon Creek buffered stocking reach between 1968 and 2005 (Figure 9, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There are 2 sites with records for northern leopard frogs; Woods Canyon Lake (1968) and Willow Springs Canyon (1996). Northern leopard frogs were not observed during subsequent surveys at Woods Canyon (1992

and 1995) or at Willow Springs Canyon (1997 and 1998) (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). The Black Mesa Ranger District, Tonto National Forest, surveyed 29 sites within the buffered stocking complex between 2003 and 2007 and did not observe any northern leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). Data suggest that northern leopard frogs no longer occupy the buffered stocking complex and the current presence of crayfish and non-native fish in the Chevelon Creek drainage, tributaries, and surrounding tanks and lakes make the habitat within the buffered stocking complex less suitable for northern leopard frogs (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing fish stocked in the Chevelon Creek stocking complex due to an extreme storm event or a breached dam is low. Although the area outside the buffered stocking complex has been poorly surveyed, it is likely that northern leopard frogs no longer occupy the few historical (1932, 1968) sites within the drainages where escaped fish could disperse (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

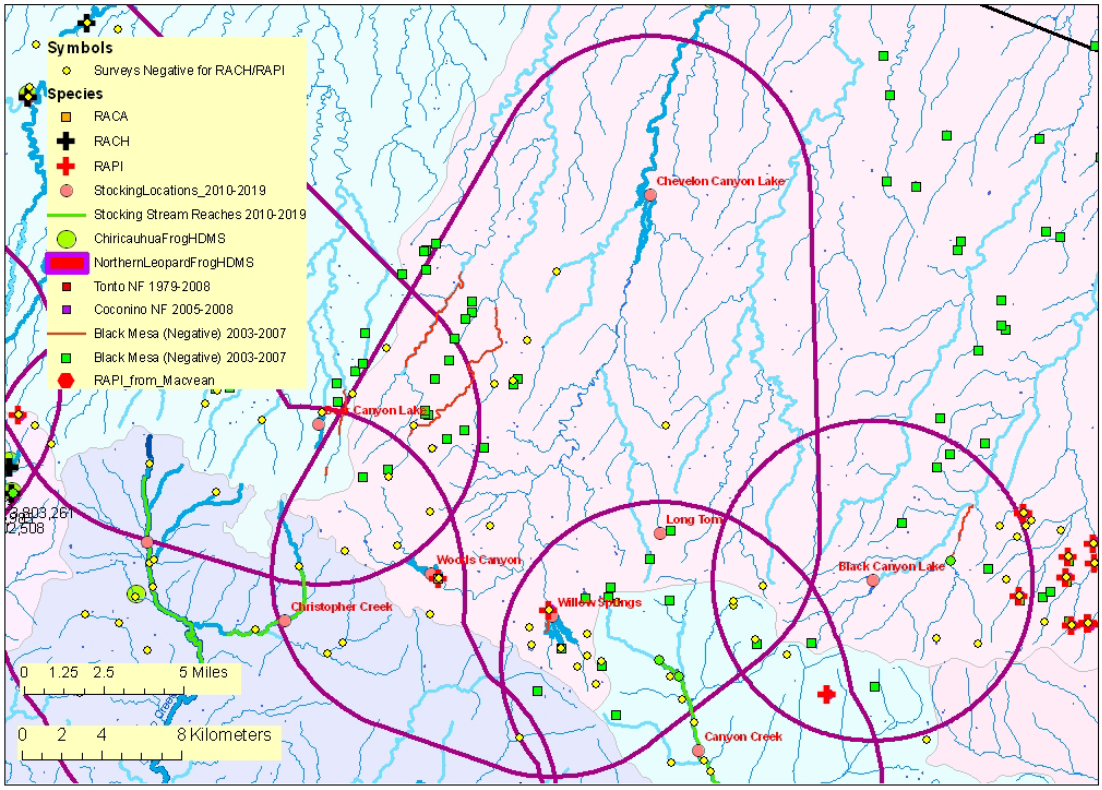

Figure 9. Map of Chevelon Creek buffered stocking complex.

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).

Willow Springs Lake

Site Description

Willow Springs Lake is located at the head of Willow Springs Canyon (Figure 10), a headwater tributary of Chevelon Creek, one of two lakes at the top end of the complex. The lake was constructed in 1967 at an elevation of 7513 feet on the Apache-Sitgreaves National Forest, creating a 158 surface-acre lake. Willow Springs Lake is located approximately 23 miles southwest of Heber and is a popular and highly visited recreation area (Figure 11).

Willow Springs Lake can be accessed by paved Forest Road 149, usually from April through November. The lake freezes and is inaccessible by vehicle during the winter. A boat launch ramp, paved parking, restrooms, picnic facilities, and a fishing pier/boat dock are located on the west side of the lake at the main access point. Additional access points include a dirt spur road to Sardine Point between the two arms of the lake, plus hike in to the upper end of an arm from Highway 260. Sinkhole Campground is also located close by on Forest Road 149.

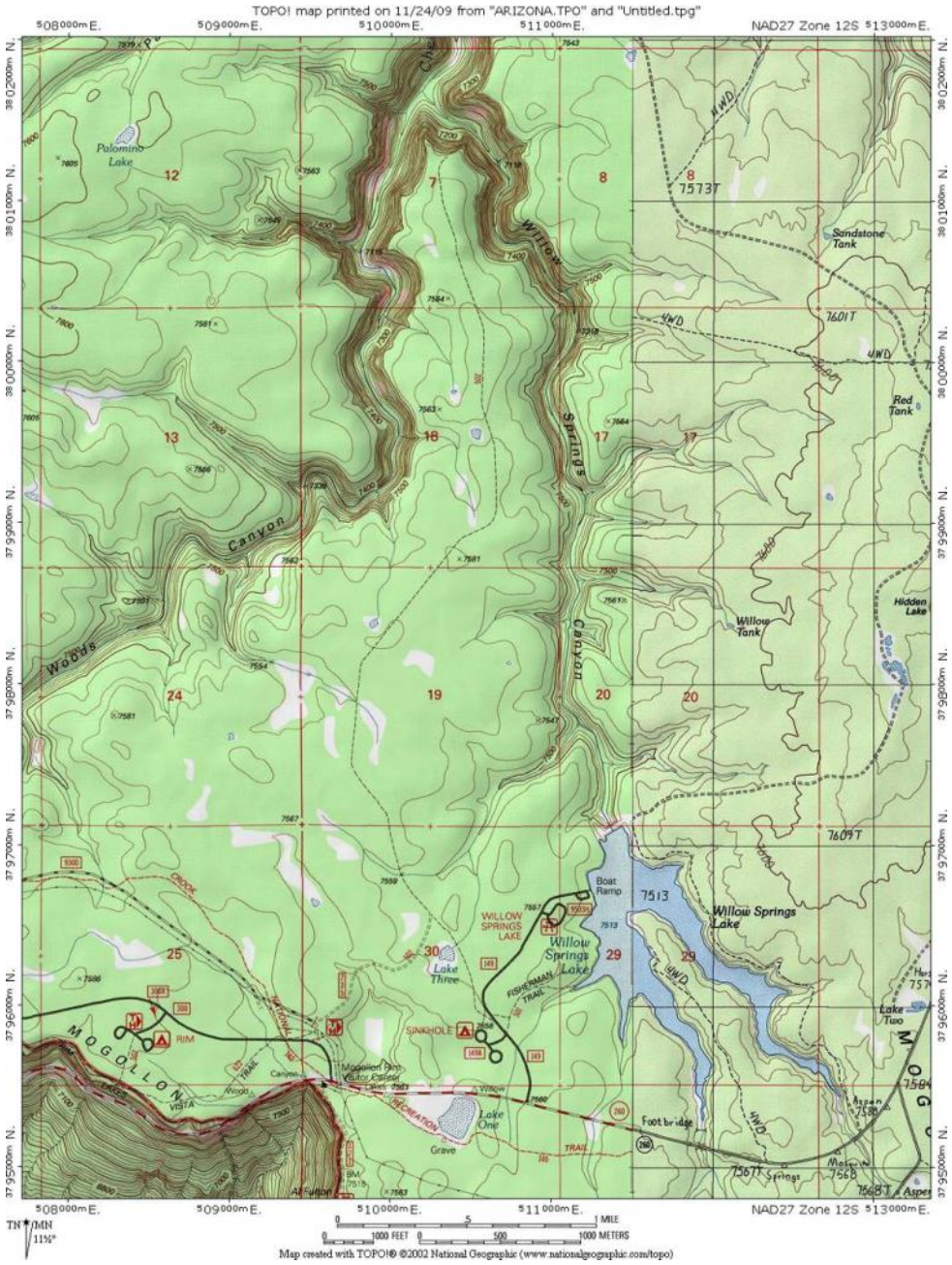

Figure 10. Map of Willow Springs Lake.

Figure 11. Willow Springs Lake.

Management of Water Body

Primary fishery is a cold water rainbow trout intensive use put-and-take fishery from spring through fall. Catchable rainbow trout are the only trout currently stocked here (Table 5) and are stocked multiple times during the stocking season.

Table 5. Stocking history at Willow Springs Lake.

Species	First Year	Last Year	Num. of Stockings	Num. Stocked
Brook trout	1978	1995	44	339,057
Brown trout	1976	1995	40	600,000
Cutthroat trout	1972	1995	15	495,706
Rainbow trout	1968	2009	846	3,270,485
Total			945	4,705,248

Willow Springs Lake receives very high angler use during the summer months; 65,090 AUDs as determined by mail-out survey in 2001 (Pringle 2004), which is over 10% of the total angler use for all the Department's Region I waters. The lake usually ices over in the winter from December through March and receives some ice fishing use from anglers hiking into the lake when the road is closed.

Willow Springs Lake fills and spills every year, maintaining very good water levels and water quality throughout the year. The lake is not very productive, so it is managed as a put-and-take intensive use trout fishery and is stocked on a regular basis throughout the summer. Largemouth bass were illegally stocked into the lake years ago. Recently, smallmouth bass and green sunfish were illegally introduced. These warm water fishes have reproduced and are numerous in the lake. Beginning on January 1, 2009, bag limits on warm water fishes were removed, allowing unlimited harvest of bass and catfish on all rim area lakes to send the message to anglers that the lake is managed only for trout.

The water rights for Willow Springs Lake are owned by the Department and no water is released out of the headgate on the dam. This helps to maintain a good water level in Willow Springs Lake year around, in addition to the heavy snowfall and runoff in this area of the Mogollon Rim.

The Integrated Fisheries Management Plan for the LCR Watershed (Young et al. 2001) identifies a management emphasis of intensive use put-and-take cold water sport fish, with a desired species assemblage of rainbow trout, which is consistent with the proposed action.

Proposed Action

The Department proposes to stock rainbow trout for the period covered by this consultation.

Catchable rainbow trout would be stocked multiple times per season from April to September each year; numbers of trout stocked may be from 0 to 100,000 fish annually.

Water Distribution/Connectivity

Willow Springs Lake has no permanent inflow; however it receives adequate winter snowpack to fill the lake every year. The water rights are owned entirely by the Department, and no water is released downstream for irrigation or other uses. The lake spills during runoff every spring. Most of the year, no water flows over the spillway (Figure 12 and Figure 13), but since there are no irrigation releases, the lake maintains a fairly constant water level. When it does spill, it drains down Willow Springs Canyon for 3.4 miles to the confluence with Woods Canyon to form Chevelon Creek. Chevelon Creek has perennial flow for 12.2 miles down to Chevelon Canyon Lake. Woods Canyon and Willow Springs Canyon have some permanent water; however, portions of these creeks dry in the summer months. Refer to the Chevelon Canyon Lake analysis for the detailed description of the connectivity below Chevelon Canyon Lake.

Figure 12. Spillway at Willow Springs Lake.

Figure 13. Downstream of the spillway at Willow Springs Lake.

Fish Movement

Stocked rainbow trout do persist in the lake, as shown by spring surveys conducted prior to stocking, but they do not reproduce in the lake. Trout have the ability to escape downstream only when the lake spills, which it does every spring, except in extreme drought years. Escaped trout can travel 3.4 miles down Willow Springs Canyon to Chevelon Creek, then down Chevelon Creek for 12.2 miles to Chevelon Canyon Lake. Trout can also move downstream of Chevelon Canyon Lake when it spills in the spring. Refer to the Chevelon Canyon Lake analysis for the detailed description of fish movement below Chevelon Canyon Lake.

Community Description

Willow Springs Lake currently contains stocked rainbow trout. The lake also contains illegally stocked largemouth bass, smallmouth bass, and green sunfish (Table 6), which are now naturally reproducing. Crayfish and fathead minnow are also very abundant in the lake. Trout do not reproduce in the lake.

Table 6. Survey history at Willow Springs Lake with experimental gillnets and electroshocking boat.

Species	Apr. 14,	Mar. 7,	Apr. 10,	Mar. 29,	Apr. 9 &

	2001	2002	2003	2005	May 5, 2008
Rainbow trout	4	22	14	22	113
Brown trout	-	-	-	-	1
Largemouth bass	13	2	2	-	49
Smallmouth bass	-	-	-	-	149
Green sunfish	-	1	-	-	113

Willow Springs Canyon contained brown trout, brook trout, and speckled dace, all in very low numbers when surveyed in 1995 (Lopez et al. 1998d). Numbers of total fish were very low for twelve 50-meter stations surveyed by electroshocking 3 depletion passes. Brook trout and brown trout may or may not be reproducing in Willow Springs Lake. Either trout collected below the lake may have escaped from the lake, or brown trout may also be swimming upstream from Chevelon Creek where they are known to maintain a reproducing population in the stream.

Habitat ratings for the potential spawning area and potential rearing area in reach 2 where all the fish were collected below Willow Springs Lake were extremely low, as determined by a General Aquatic Wildlife System survey conducted in July 1995 (Lopez et al. 1998d; Table 7). However, these ratings were much better in reach 1 where no fish were found. The gravel bottom rating for both reaches was fair. The size range on brook trout collected could indicate natural reproduction, but could also be a result of fingerling size stocked trout escaping. The brook and brown trout stocked into Willow Springs Lake in 1995 were fingerling size, while rainbow trout were catchable size, but were not collected in the 2 sampled reaches below the Lake in 1995. Brook and brown trout are no longer proposed for stocking in this lake.

Table 7. Survey results of twelve 50-meter stations in Willow Springs Canyon in July 1995 using a backpack electroshocker with 3 depletion passes (Lopez et al. 1998d).

Species	Num. Collected	Size Range (mm TL)
Brook trout	4	61-195
Brown trout	5	148-240
Speckled dace	2	35-89

Chevelon Creek upstream of Chevelon Canyon Lake contained naturally reproducing brown trout, speckled dace, Little Colorado sucker, rainbow trout, and numerous crayfish, when comprehensively surveyed in 1996 (Lopez et al. 1998a). Golden shiner, fathead minnow, and green sunfish have been collected during surveys in 1995, 1999, and 2007, respectively (Lopez

et al. 1998a and Table 4). Refer to the Chevelon Canyon Lake analysis for a detailed description for the aquatic community description downstream of Chevelon Canyon Lake.

Consultation Species or Critical Habitat
Chiricahua and Northern leopard frogs are analyzed below 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.

The nearest occupied and critical habitat for Little Colorado spinedace and the known roundtail chub populations occur downstream of Chevelon Canyon Lake. For this reason they are discussed in the Chevelon Canyon complex analysis, 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 Leopard Frog
Local Analysis: Although Willow Springs Lake and the Chevelon Creek buffered stocking complex are within the historical range of the Chiricahua leopard frog, the likelihood that frogs could be exposed to stocked fish from Willow Springs Lake is low. There are no historical records for Chiricahua leopard frogs at Willow Springs Lake or within the Chevelon Creek buffered stocking complex. There have been 56 surveys at 37 sites within the buffered stocking complex between 1968 and 2005 (Figure 9, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 29 sites between 2003 and 2007 and did not observe any Chiricahua leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). Based on available data, it is likely that Chiricahua leopard frogs do not occupy the buffered complex that includes Willow Springs Lake (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing fish stocked in the Chevelon Creek complex due to an extreme storm event or a breached dam is moderate. Even though there are no historical records for Chiricahua leopard frogs and some available habitats have not been surveyed, it is possible that Chiricahua leopard

frogs occupy the area outside the buffered complex (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Northern Leopard Frog

Local Analysis: Although Willow Springs Lake and the Chevelon Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that frogs could be exposed to stocked fish in Willow Springs Lake is low. There are no historical records of northern leopard frogs in Willow Springs Lake itself. There have been 56 surveys at 37 sites within the Chevelon Creek buffered stocking reach between 1968 and 2005 (Figure 9, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There are 2 sites with records for northern leopard frogs from; Woods Canyon Lake (1968) and Willow Springs Canyon (1996), just below the Willow Springs Lake dam. Northern leopard frogs were not observed during subsequent surveys at Woods Canyon (1992 and 1995) or at Willow Springs Canyon (1997 and 1998) (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). The Black Mesa Ranger District, Tonto National Forest, surveyed 29 sites within the buffered stocking complex between 2003 and 2007 and did not observe any northern leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). Data suggest that northern leopard frogs no longer occupy the buffered stocking complex and the current presence of crayfish and non-native fish in the Chevelon Creek drainage, its tributaries, and surrounding tanks and lakes make the habitat within the buffered stocking complex less suitable for northern leopard frogs (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing fish stocked in the Chevelon Creek stocking complex due to an extreme storm event or a breached dam is low. Although the area outside the buffered stocking complex has been poorly surveyed, it is likely that northern leopard frogs no longer occupy the few historical (1932, 1968) sites within the drainages where escaped fish could disperse. (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Woods Canyon Lake

Site Description

Woods Canyon Lake is located at the head of Woods Canyon, a headwater tributary of Chevelon Creek (Figure 14). It is located approximately 27 miles southeast of Heber and is one of two lakes at the top of the Chevelon Complex. The lake was constructed in 1956 at an elevation of 7505 feet on the Apache-Sitgreaves National Forest, creating a 55 surface-acre recreational lake (Figure 15), with a maximum depth of 40 feet and average depth of 25 feet. Woods Canyon Lake has no permanent inflow; however, it receives adequate winter snowpack to fill the lake every year.

Woods Canyon Lake can be accessed by paved Forest Roads 300 and 105, usually from April through November. The lake freezes and is inaccessible by vehicle during the winter. A boat launch ramp, paved parking, restrooms, picnic facilities, several campgrounds, and a concession store with boat rentals are located on the south side of the lake at the only access point.

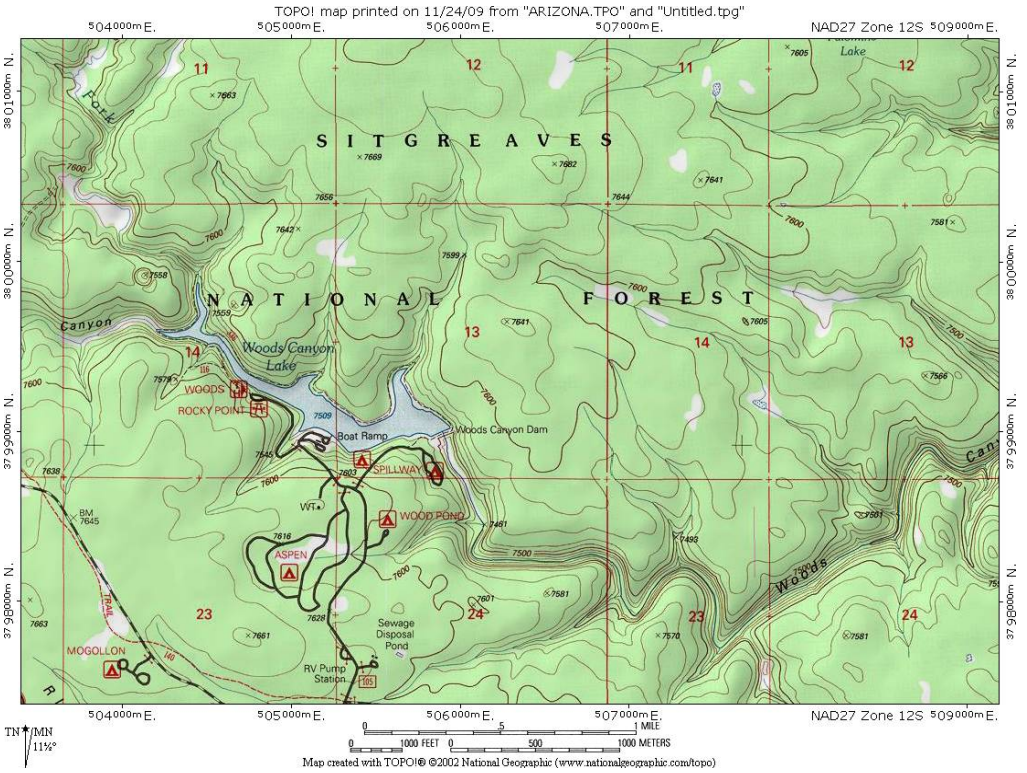

Figure 14. Map of Woods Canyon Lake.

Figure 15. Woods Canyon Lake.

Management of Water Body

Primary fishery is a cold water rainbow trout intensive use put-and-take fishery from spring through fall. Catchable rainbow trout are stocked multiple times during the stocking season. Woods Canyon Lake receives very high use during the summer months; 67,832 AUDs as determined by mail-out survey in 2001 (Pringle 2004), which is over 10% of the total angler use for all Region I waters and is stocked repeatedly to provide for that use (Table 8). The lake ices over in the winter and access is restricted by snowpack and closed Forest roads, but the lake receives some ice fishing use from anglers hiking into the lake.

Table 8. Stocking history at Woods Canyon Lake.

Species	First Year	Last Year	Num. of Stockings	Num. Stocked
Brook trout	1963	1995	41	195,311
Brown trout	1963	1995	32	234,730
Coho salmon	1972	1973	2	10,000
Cutthroat trout	1987	1995	8	153,000
Rainbow trout	1957	2009	1,432	3,521,258
Bullfrog tadpole	1968	1978	2	7,000

Total	1,247	3,651,024

The water rights for Woods Canyon Lake are owned by the Department and no water is released out of the headgate on the dam. This helps to maintain a good water level in Woods Canyon Lake year around, in addition to the good snowfall in this area of the Mogollon Rim.

Woods Canyon Lake fills and spills every year, maintaining very good water levels and water quality throughout the year. The lake is not very productive, so it is managed for put-and-take intensive use trout fishery, stocked on a regular basis throughout the summer. Reports of illegal stocking of warm water species and goldfish have not been verified, but would not be surprising given 4 other rim lakes have been illegally stocked with warm water fish. Beginning on January 1, 2009, bag limits on warm water fishes were removed, allowing unlimited harvest of bass and catfish on all rim area lakes, as a first step to send the message to anglers that the lake is managed only for trout.

The Integrated Fisheries Management Plan for the LCR Watershed (Young et al. 2001) identifies a management emphasis of intensive use put-and-take cold water sport fish at Woods Canyon Lake, with a desired species assemblage of rainbow trout, which is consistent with the proposed action.

Proposed Action

The Department proposes to stock rainbow trout for the period covered by this consultation.

Catchable rainbow trout would be stocked multiple times from April to September each year; numbers of trout stocked may be from 0 to 120,000 fish annually.

Water Distribution/Connectivity

Woods Canyon Lake has no permanent inflow; however, it receives adequate winter snowpack to fill the lake every year. The water rights are owned entirely by the Department and no water is released downstream for irrigation or other uses. The lake does fill with snowmelt runoff and spills every spring. Some of the year, no water is flowing over the spillway (Figure 16), but since there are no irrigation releases, the lake maintains a fairly constant water level. When the lake does spill, it drains down Woods Canyon Creek for 5.8 miles to the confluence with Willow Springs Canyon to form Chevelon Creek. Chevelon Creek flows perennial for 12.2 miles down to Chevelon Canyon Lake. Woods Canyon and Willow Springs Canyon have some permanent water; however, portions of these creeks dry in the summer months. For more information, see the Chevelon Canyon Lake analysis for detailed description of the connectivity below Chevelon Canyon Lake.

Figure 16. Woods Canyon Lake spillway.

Fish Movement

Stocked rainbow trout do persist in the lake, as shown by spring surveys conducted prior to stocking, but they do not reproduce in the lake. Trout have the ability to escape downstream only when the lake spills, which it does every spring, except in extreme drought years. Escaped trout can travel 5.8 miles down Woods Canyon to Chevelon Creek, then down Chevelon Creek for 12.2 miles to Chevelon Canyon Lake. Refer to the Chevelon Canyon Lake analysis for the detailed description of fish movement below Chevelon Canyon Lake.

Community Description

Woods Canyon Creek contains stocked rainbow trout, and naturally reproducing fathead minnow, possibly reproducing golden shiner, and abundant crayfish. Low numbers of brown trout are maintaining a small population in the creek, despite being last stocked in 1995. This is unusual for a lake with no permanent inflow where trout can spawn. Stocked rainbow trout will persist in the lake, but have not been documented to reproduce in Woods Canyon Lake. One

largemouth bass was caught in 2002, but none since then, and goldfish have been recently reported, but not verified through Department surveys (Table 9).

Table 9. Survey history at Woods Canyon Lake with gillnets.

Species	Apr. 2001	Apr. 2002	Apr. 2003	Apr. 2004	Apr. 2005
Rainbow trout	15	15	28	28	72
Brown trout	2	4	7	5	2
Golden shiner			1		
Cutthroat trout		1			
Largemouth bass		1			

Woods Canyon Creek was found to contain rainbow trout, brook trout, brown trout, fathead minnow, and speckled dace when surveyed in 1995 (Lopez et al. 1998e; Table 10). Brook and brown trout were the majority of fish collected in the survey, but were all collected in low numbers over the twelve 50-meter stations surveyed with 3-pass backpack electroshocking depletion. The 3 species of trout collected may not be reproducing in Woods Canyon Creek and are likely escapees from Woods Canyon Lake. Evidence to support this is based on very low ratings for potential spawning area and gravel bottom, determined by a General Aquatic Wildlife System survey in 1995 (Lopez et al. 1998e); no small trout were collected, and brook, brown and rainbow trout were stocked in Woods Canyon Lake up to and including 1995.

Table 10. Survey summary at Woods Canyon Creek in Aug. 1995 (Lopez et al. 1998e).

Species	Num. Collected	Size range (mm TL)
Rainbow trout	2	195-230
Brook trout	12	142-210
Brown trout	10	159-277
Fathead minnow	1	52
Speckled dace	5	45-70

Chevelon Creek upstream of Chevelon Canyon Lake contained naturally reproducing brown trout, speckled dace, Little Colorado sucker, rainbow trout, and numerous crayfish, when comprehensively surveyed in 1996 (Lopez et al. 1998a; Table 4). Golden shiner, fathead minnow, and green sunfish have been collected during surveys in 1995, 1999, and 2007, respectively (Lopez et al. 1998a; AGFD unpublished data). Refer to the Chevelon Canyon Lake analysis for a detailed description for the aquatic community description downstream of Chevelon Canyon Lake.

Consultation Species or Critical Habitat
Chiricahua and northern leopard frogs are analyzed below 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. The nearest occupied and critical habitat for Little Colorado spinedace and the known roundtail chub populations occur downstream of Chevelon Canyon Lake. For this reason they are discussed in the Chevelon Canyon complex analysis, 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 Leopard Frog
Local Analysis: Although Woods Canyon Lake and the Chevelon Creek buffered stocking complex are within the historical range of the Chiricahua leopard frog, the likelihood that frogs could be exposed to fish stocked in Woods Canyon Lake is low. There are no historical records for Chiricahua leopard frogs in Woods Canyon Lake or within the Chevelon Creek buffered stocking complex (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 56 surveys at 37 sites within the buffered stocking complex between 1968 and 2005 (Figure 9, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 29 sites between 2003 and 2007 and did not observe any Chiricahua leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). Based on available data, it is likely that Chiricahua leopard frogs do not occupy the buffered complex that includes Woods Canyon Lake (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing fish stocked in the Chevelon Creek complex due to an extreme storm event or a breached dam is moderate. Even though there are no historical records for Chiricahua leopard frogs and some available habitats have not been surveyed, it is possible that Chiricahua leopard frogs occupy the area outside the buffered complex (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Northern Leopard Frog

Local Analysis: Although Woods Canyon Lake and the Chevelon Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that frogs could be exposed to stocked fish in Woods Canyon Lake is low. There is a historical record of northern leopard frogs at Woods Canyon Lake from 1968, but they have not been observed during subsequent surveys in 1997 and 1998 (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 56 surveys at 37 sites within the Chevelon Creek buffered stocking reach between 1968 and 2005 (Figure 9, Arizona Game and Fish Riparian Herpetofauna Database). There is one other site within the buffered stocking complex with a record for northern leopard frogs; Willow Springs Canyon from 1996 (Arizona Game and Fish Riparian Herpetofauna Database). Northern leopard frogs were not observed during subsequent surveys at Willow Springs Canyon in 1997 and 1998 (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). The Black Mesa Ranger District, Tonto National Forest, surveyed 29 sites within the buffered stocking complex between 2003 and 2007 and did not observe any northern leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). Data suggest that northern leopard frogs no longer occupy the buffered stocking complex and the current presence of crayfish and non-native fish in the Chevelon Creek drainage, its tributaries, and surrounding tanks and lakes make the habitat within the buffered stocking complex less suitable for northern leopard frogs (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing fish stocked in the Chevelon Creek stocking complex due to an extreme storm event or a breached dam is low. Although the area outside the buffered stocking complex has been poorly surveyed, it is likely that northern leopard frogs no longer occupy the few historical (1932, 1968) sites within the drainages where escaped fish could disperse. (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Chevelon Canyon Lake

Site Description

Chevelon Canyon Lake is located between the headwaters and confluence with the LCR on Chevelon Creek on the Apache-Sitgreaves National Forest (Figure 17), approximately 28 miles northwest of Heber. The dam was built in 1965, creating a 200 surface-acre lake at an elevation of 6366 feet. It has a maximum depth of 80 feet and an average depth of 35 feet. The lake is fed by upper Chevelon Creek, which is perennial. The lake spills every year, except the most severe drought years and is the lowermost stocking site in the Chevelon Complex. All other stocking sites Long Tom Tank, Willow Springs Lake, and Woods Canyon Lake, drain into upper Chevelon Creek, which flows into and through Chevelon Canyon Lake.

Chevelon Canyon Lake can be accessed by all-weather gravel Forest Road 169 and dirt Forest Road 169B to the top of the canyon. Chevelon Canyon Lake campground, which is semi-

primitive with a restroom, is located here at the top of the rim on the west side of the lake. An extremely rough road continues from the campground down into the canyon to the dam, but is only used for stocking and dam maintenance, and a locked gate prohibits public vehicle use down to the lake shore. Anglers must hike down into the canyon to fish. Some anglers haul boats to the lake by ATV which can often squeeze under the locked gate. Boat motors on the lake are restricted to a single gas motor no larger than 10 horsepower. A primitive boat launch ramp is present at the bottom of the gated road. No other facilities exist for this primitive managed lake. Access to the lake from the highest used paved roads to the south is usually cut off during the winter months; however access is usually possible much longer from the north (lower elevation).

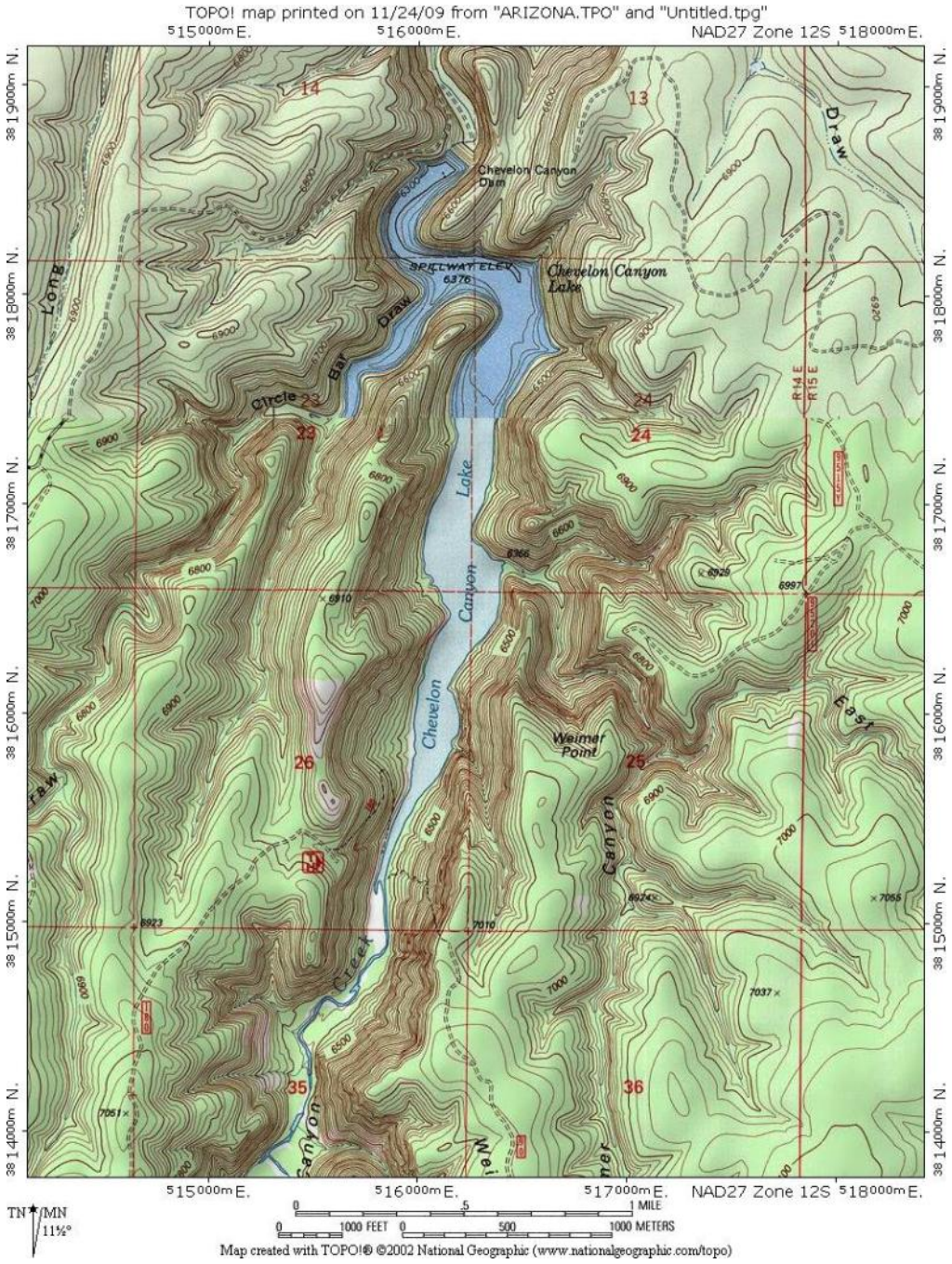

Figure 17. Map of Chevelon Canyon Lake.

Management of Water Body

Chevelon Canyon Lake is managed primarily as a cold water put-grow-and-take cold water fishery with fingerling and sub-catchable rainbow trout (Table 11) and secondarily as a cold

water featured species Arctic grayling fishery. The lake was previously stocked only with fingerling trout because it is easier to stock high numbers in few trips and allows them to grow in the lake. It would be extremely difficult to stock enough catchable trout to support the fishery, despite the lower angler use, largely because of the difficulty in getting a heavy hatchery truck to the bottom of the canyon. The Department recently switched some fingerling stockings to sub-catchables because of finding poor survival of some fingerling stockings, and it is still possible to get a good number of sub-catchables stocked into the lake in one trip per year.

Primary fishery is a cold water rainbow trout put-grow-and-take fishery, offering quality size trout. The Department proposes to add a secondary cold water featured species fishery for Arctic grayling.

Table 11. Stocking history at Chevelon Canyon Lake.

Species	First Year	Last Year	Num. of Stockings	Num. Stocked
Arctic grayling	1968	1990	3	72,737
Brown trout	1966	1995	33	921,015
Coho salmon	1971	1972	3	25,076
Cutthroat trout	1987	1990	2	92,780
Rainbow trout	1966	2009	121	3,011,621
Bullfrog tadpole	1969	1969	1	8,580
Total			163	4,131,809

Stream flow in upper Chevelon Creek is perennial, which keeps Chevelon Canyon Lake fairly full. The lake fills and spills every spring, except in only the most severe drought years. Figure 18 provides a picture of the lake and near-shore vegetation at normal water levels. Water quality at the lake remains good all year around, likely due to the depth of the lake. The lower elevation location sometimes leads to fairly warm surface waters; however, the deeper portions of the lake remain cool. The lake is productive enough to grow rainbow trout to 14-16 inches consistently, but not much beyond that.

Because of illegal stockings in other rim lakes, bag limits on warm water fishes were removed, starting on January 1, 2009, allowing unlimited harvest of bass and catfish on all rim area lakes, as a first step to send the message to anglers that the lake is managed only for trout.

The water rights for Chevelon Canyon Lake are owned by the Department and no water is released out of the headgate on the dam. This helps to maintain a good water level in the lake year around, in addition to the perennial stream flowing into the lake.

Figure 18. Chevelon Canyon Lake.

The Department recommends managing the lake for the primitive and remote conditions that currently exist. These conditions are meeting the needs of a segment of anglers that desire a primitive experience and opportunity to catch a larger trout. These conditions are also likely contributing to the lake not being illegally stocked with warm water fish like 4, possibly 5, other rim lakes.

Chevelon Canyon Lake receives fairly low angler use, likely because of the remote conditions and physical effort to get to the lake, supporting 9,062 AUDs in 2001 as determined by a mail-out survey (Pringle 2004). This is fairly consistent with the last on-site angler creel survey conducted at Chevelon Canyon Lake from April through November in 1985. This creel survey reported 8,325 AUDs. However, the lake meets the needs of a portion of anglers that wish to get away from the noise and crowds, such as Willow Springs Lake and Woods Canyon Lake.

The Integrated Fisheries Management Plan for the LCR Watershed (Young et al. 2001) identified the management emphasis at Chevelon Canyon Lake as Blue Ribbon sport fishery, which is basically a put-grow-and-take strategy that promotes growth of stocked fish to larger trophy

sizes. The desired species assemblage in Chevelon Canyon Lake is rainbow trout, brown trout, and Little Colorado sucker. Current regulations do not protect the larger blue ribbon trout from harvest. The proposed action is mostly consistent with this plan in regards to stocking rainbow trout, by allowing them to grown in the lake to larger sizes than normally caught in nearby lakes. The proposed action also adds a new species to the stocking plan; Arctic grayling. Grayling were historically stocked into Chevelon Canyon Lake, but haven't been since 1990. The Department seeks to increase the diversity for anglers and perhaps establish a much needed wild broodstock within the state. Brown trout are common in the lake, but only reproduce in the stream entering the lake (M. Lopez, pers. comm.), and are not part of the proposed stocking action. Little Colorado sucker are abundant in the lake and are naturally reproducing in the lake and in the stream. It is unknown if natural recruitment of Little Colorado sucker is occurring within the lake spawning, or is maintained by juvenile fish spawned in the stream washing down into the lake, as is expected that happens with the brown trout.

Proposed Action

The Department proposes to stock rainbow trout and Arctic grayling for the period covered by this consultation.

Sub-catchable and fingerling rainbow trout and Arctic grayling would be stocked up to multiple times in May to September each year; numbers of trout stocked may be from 0 to 140,000 rainbow trout and 0 to 10,000 Arctic grayling annually.

Water Distribution/Connectivity

Chevelon Canyon Lake receives water from the perennial flow of upper Chevelon Creek. Upper Chevelon Creek is about 12.2 miles long, most of which runs perennial into the lake with high quality water supporting good fish populations. Chevelon Creek is formed at the confluence of its two major headwater streams, Woods Canyon and Willow Springs Canyon, each with a major trout lake at the upper end, Woods Canyon Lake and Willow Springs Lake, 5.8 miles and 3.4 miles upstream of the confluence, respectively. These two headwater lakes do not have perennial water feeding them, but are perennial themselves, maintaining good water quality throughout the year, with a good temperature, pH and oxygen levels, and do not experience winterkills. They are the two uppermost stocking sites within the Chevelon Complex and spill into their respective canyons every spring during snowmelt runoff. Woods Canyon and Willow Springs Canyon have some permanent water; however, portions of these creeks dry in the summer months, which can also lead to a very short dry section in the extreme portion of upper Chevelon Creek.

There are no other tributaries to upper Chevelon Creek that have perennial water, except Long Tom Canyon. Long Tom itself does not have perennial water; however, Long Tom Tank is located on Larson Canyon, a tributary to Long Tom Canyon. This tank is perennial and is the third stocking site, with Chevelon Canyon Lake being the fourth and lowermost stocking site in the Chevelon Complex. Long Tom Tank is located on Larson Canyon approximately 3.3 miles

upstream of Long Tom Canyon. Long Tom Canyon then runs down for 4.1 miles to Chevelon Creek, at a point approximately 4.4 miles upstream of Chevelon Canyon Lake. Larson, Long Tom, and other smaller tributaries do not have perennial water and only flow during spring snowmelt runoff or during an extreme monsoon event. Since the historical management of Long Tom Lake consisted of stocking fingerling trout, it is assumed at this point that it does not winterkill, although there is no survey history to confirm winterkills or winter survival.

Chevelon Canyon Lake fills and spills over the spillway (Figure 19 and Figure 20) every year in the spring with spring snowmelt runoff, except in the most extreme drought years when it may not spill. The Department owns all the water rights and no water is released downstream through the headgate in the dam; therefore, the water levels remain fairly constant, dropping 5-6 feet through the summer during base flows, which is not significant to this deep lake. Water quality (temperatures, pH and oxygen) remains very good throughout the year and the lake does not experience winterkills.

Figure 19. Chevelon Canyon Lake spillway.

Figure 20. Chevelon Canyon Lake spillway.

From the lake, Chevelon Creek continues downstream through a mostly intermittent canyon (Figure 21) for 53.0 miles to the first permanent flow in lower Chevelon Creek, at the confluence with Pony Canyon. Through this mostly intermittent canyon, there are occasional perennial pools, some of which are several hundred yards long and support fish year around, like Durfee Crossing, Chevelon Crossing, and Points of Wildcat, to name a few. The reaches immediately downstream from Chevelon Canyon Lake support brown trout year around but appear to support rainbow trout for only part of the year, with the reaches midway and lower towards perennial flow do not support trout. Even the upper pools become warm and somewhat stagnant in the summer as the flow between pools dries up, leaving the pools with no inflow and poor water quality.

Figure 21. Dry stream channel in Chevelon Creek.

From the start of perennial flow, it is another 3.5 miles down to occupied spinedace habitat, near Rock Tank Canyon confluence, and another 2.4 miles to designated spinedace critical habitat at Bell Cow Canyon confluence. Perennial flows continue down for another 3.1 miles through The Steps, a well known spinedace collection site (Figure 22), and into a very long, deep pool. This reach from the start of perennial flow down to the large pool consists of mostly shallow flows over bedrock, with small pools vegetated with bulrushes, sedges, and overhanging willows. The large pool is entirely different habitat, and is approximately 1.7 miles long in a very narrow slot canyon with no vegetation. Vertical canyon walls drop straight down into the pool, allowing access though this reach only by canoe, kayak or other type of floatation. Depths measured in 1997 indicate that portions of the pool are at least 19.8 feet deep, bottom substrates are unknown, and water velocities are un-noticeable. This pool transitions into another perennial pool that is approximately 2.4 miles long. This pool starts approximately where the canyon and cliffs end and opens into the Little Colorado valley floor, thus, this pool consists of much shallower habitat, and consists of all sand/silt substrates and banks covered with thick stands of salt cedar. At the bottom end of this pool is a large diversion dam operated by the City of Winslow,

diverting some water through a ditch for unknown uses in Winslow. Water flows permanently over, or through cracks in the diversion, and down the lowest reach of Chevelon Creek for 1.7 miles to the confluence with the LCR. This lower reach is almost entirely shallow lotic flows over sand/silt substrates. Figure 22, Figure 23, Figure 24, Figure 25, Figure 26, Figure 27, and Figure 28 provide representative photos of the habitat transitions and types through this reach of stream. Perennial flows continue down the LCR for 9.1 miles to the confluence with Clear Creek, then another 2.5 miles to the City of Winslow, then another several miles before permanent flows disappear into the sand. Upstream of the confluence with Chevelon Creek, the LCR is often dry for many miles. It is 43.3 miles from the confluence with Chevelon Creek upstream to the confluence with Silver Creek. Silver Creek is perennial and contributes perennial flow into the LCR for several miles downstream, then it becomes intermittent. From the confluence with Silver Creek, it is 54.2 miles to Zion Reservoir, then another 30.9 miles to Lyman Lake.

Several large tributaries enter into lower Chevelon Creek downstream of Chevelon Canyon Lake. The first is West Chevelon Canyon, entering approximately 10.5 miles downstream of Chevelon Canyon Lake. The lower 16.2 miles of West Chevelon Canyon is normally dry, running only during spring snowmelt runoff. The next 7.5 miles is mostly dry, but has an occasional shallow isolated pool that supports native fish. From here it is another mile or so to more abundant, more perennial, and deeper pools, plus occupied spinedace habitat. West Chevelon runs continuous during spring snowmelt runoff. Wildcat Canyon enters Chevelon Creek approximately 18.5 miles downstream of Chevelon Canyon Lake. Wildcat Canyon is considered to be dry most of the year, as observed at several Forest Road crossings and by aerial big-game surveys; however, some reaches of Wildcat Canyon have not been surveyed by foot that might detect isolated pools.

Black Canyon enters Chevelon Creek approximately 47.9 miles downstream of Chevelon Canyon Lake. Black Canyon is considered to be dry throughout its length for 56.1 miles, based on observations at Forest Road crossings and aerial big-game surveys, except for Black Canyon Lake near its origin (M. Lopez, pers. comm.). Black Canyon Lake does not have perennial flow entering above, and only spills in years with heavy snowpack or heavy winter precipitation. However, when it does spill, it runs continuous to the confluence with Chevelon Creek. Black Canyon Lake is not included in the Chevelon Complex. Refer to the Black Canyon Lake analysis in the Black Canyon Complex for a detailed description of that lake and fish community in Black Canyon.

Figure 22. Spinedace occupied habitat at The Steps in lower Chevelon Creek.

Figure 23. Deep pool habitat in lower Chevelon Creek downstream of The Steps.

Figure 24. Shallow pool habitat in lower Chevelon Creek just upstream of diversion dam.

Figure 25. Diversion dam on lower Chevelon Creek.

Figure 26. Chevelon diversion ditch.

Figure 27. Spinedace habitat below diversion dam in 1998.

Figure 28. Same photo point as Figure 27 of habitat below diversion dam in 2008.

During heavy spring snowmelt runoff, the entire watershed of Chevelon Creek is connected, and flows downstream into the LCR. From the confluence of Chevelon Creek and the LCR, the LCR runs for 82.2 miles to Grand Falls, another 49.7 miles to the LCR gorge, another 31.3 miles to Blue Spring, and another 13.1 miles to the Colorado River.

Fish Movement

Trout and grayling stocked into Chevelon Canyon Lake will persist in the lake, as the lake maintains good water quality year around and does not winterkill. They also have the opportunity to move upstream into the perennial flows of upper Chevelon Creek. This habitat is suitable for trout, and escaped trout from the lake can persist and possibly reproduce in upper Chevelon Creek. persistence and reproduction of grayling in this area would not be expected to occur. Stocked fish may also swim upstream into Long Tom Canyon, Woods Canyon, or Willow Springs Canyon, where they likely will not persist long because of regularly dry conditions in Long Tom or sub-optimal conditions in Woods Canyon and Willow Springs Canyon. Movement of stocked fish downstream of the lake is discussed below in the complex analysis.

Community Description

Chevelon Canyon Lake contains stocked rainbow trout, and naturally reproducing brown trout, Little Colorado sucker, golden shiner, fathead minnow, speckled dace, and numerous crayfish (Table 10). The brown trout, and possibly stocked rainbow trout, reproduce in the perennial stream entering the lake, but not in the lake itself. Large schools of speckled dace were observed along the shoreline of Chevelon Canyon Lake just above the spillway in 2009.

Table 12. Survey history at Chevelon Canyon Lake with experimental gillnets.

Species	Apr. 2004	Apr. 2005	Apr. 2006	Apr. 2007	Apr. 2008
Rainbow trout	48	92	62	28	3
Brown trout	5	13	2	9	2
LC sucker	47	111	55	78	32

Chevelon Creek above the lake is dominated by wild brown trout (Lopez et al 1998a), which helps to keep the lake populated with that species since they haven't been stocked there since 1995. Rainbow trout have been documented upstream of the lake in extremely low numbers (total number collected was 17) based on surveys conducted 1995-1998 (Lopez et al 1998a). Little Colorado sucker are also found in the stream above the lake, as were golden shiner and speckled dace. Unsubstantiated reports of bluehead sucker above the lake need to be investigated.

Isolated permanent pools immediately below the lake have been found to contain brown trout, rainbow trout, fathead minnow, golden shiner, roundtail chub, bluehead sucker, Little Colorado sucker, speckled dace, and numerous crayfish. Rainbow trout have been collected downstream of the lake on several occasions, with most collections between the lake and West Chevelon Canyon, 10.5 miles downstream of the lake; however, 1 isolated collection near Potato Wash, 42.0 miles downstream of the lake, was the lowest record of rainbow trout in Chevelon Creek over many years of surveys. No trout have been recorded below the confluence with Black Canyon. One black bullhead was found near the confluence with Potato Wash. California floater shells and canyon treefrogs have also been reported from this reach.

Table 13 provides a summary of fish surveys in Chevelon Creek from Chevelon Canyon Lake downstream to Pony Canyon, which is the end of intermittent reach with isolated permanent pools. The table begins with a survey site immediately below Chevelon Canyon Lake dam and lists other survey sites in sequence downstream towards the lower reaches of Chevelon Creek. The surveys in 1965 were from an unknown source in the Kansas Gap database (cited from SONFISHES data) and are about the time of dam construction. The 1983 surveys were conducted with 1/8" mesh seines, with an effort of 10 seine hauls per site (Minckley 1984). The 1991-1995 surveys were conducted with a combination of 1/8" mesh seines and backpack electroshocker (Dorum and Young 1995). The 1995-1998 surveys were conducted with 1/8"

mesh seines, green meanie gillnets, backpack electroshocker, and canoe electroshocker (Lopez et al 1998a). The 2005 surveys were conducted with hoop nets, green meanie gillnets, and backpack electroshocker (McKell 2005b). The 2007 surveys were conducted with hoop nets, minnow traps, 1/8" mesh seines, and backpack electroshocker (Weiss 2007a; AGFD unpublished data). The 2008 survey was conducted with 1/8" mesh seines (AGFD unpublished data). The 2009 surveys were conducted with 1/8" mesh seines, backpack electroshocker, green meanie gillnets, and hoopnets (AGFD unpublished data).

Table 13. Summary of fish surveys below Chevelon Canyon Lake.

Date	Species								
	Brown Trout	Rainbow Trout	LC Sucker	Bluehead Sucker	Speckled Dace	Fathead Minnow	Golden Shiner	Black Bullhead	Roundtail Chub
Immediately below Chevelon Canyon Lake									
1965	present	Present	present		present				present
1983					present	present			present
8/3/2005			3		49	47			
Durfee Crossing									
1991			7		5	33			
10/3/1995	2		44	3	3				1
8/2/2005			6			36			25
8/3/2005			1		166	16			3
9/6/2007			11		21	785			36
9/23/2008						present			30
Upstream of Chevelon Crossing									
1966		Present	present		present		present		present
8/15/1995					27		22		1
8/16/1995					4		11		
Chevelon Crossing									
1965					present				
1983					present	present	present		
6/19/1991		5	1		18	110			
8/15/1995			4		86	3	92		1
6/5/2001									present
8/1/2005						49			18
8/2/2005					3	60			2
9/6/2007					3	68			1

Date	Species								
	Brown Trout	Rainbow Trout	LC Sucker	Bluehead Sucker	Speckled Dace	Fathead Minnow	Golden Shiner	Black Bullhead	Roundtail Chub
USFS downstream of Chevelon Crossing									
6/21/1991		1							
8/9/1995						3	151		
8/9/1995					25	18	75		
8/10/1995					7	1	50		
Wildcat Gage station									
6/1991			11			466	4		5
7/25/1991			53	1					14
8/1993				1	2	183			
7/1995				1	10	45			3
10/7/1996						194			
8/1/2005			1			8			
6/2/2009			278			311			
Intermittent below Forest Boundary									
10/2/1997						49			
10/2/1997						280			
10/2/1997									
10/2/1997			43			102			
10/3/1997			1			93			
10/3/1997			38						
10/4/1997						38			2
10/4/1997									
10/4/1997									
10/4/1997									
10/4/1997									
10/4/1997									
10/4/1997									
10/4/1997									
10/4/1997									
10/27/1997									
10/27/1997									
10/27/1997									
10/27/1997			5						7

Date	Species								
	Brown Trout	Rainbow Trout	LC Sucker	Bluehead Sucker	Speckled Dace	Fathead Minnow	Golden Shiner	Black Bullhead	Roundtail Chub
10/28/1997									
10/28/1997						15			
10/29/1997		1				120		1	
10/30/1997						89			
10/5/1997						567			
10/5/1997						831			
6/15/1998			3			36			
6/16/1998			1			25			1
6/16/1998			4			5			
6/2/2009						1087			

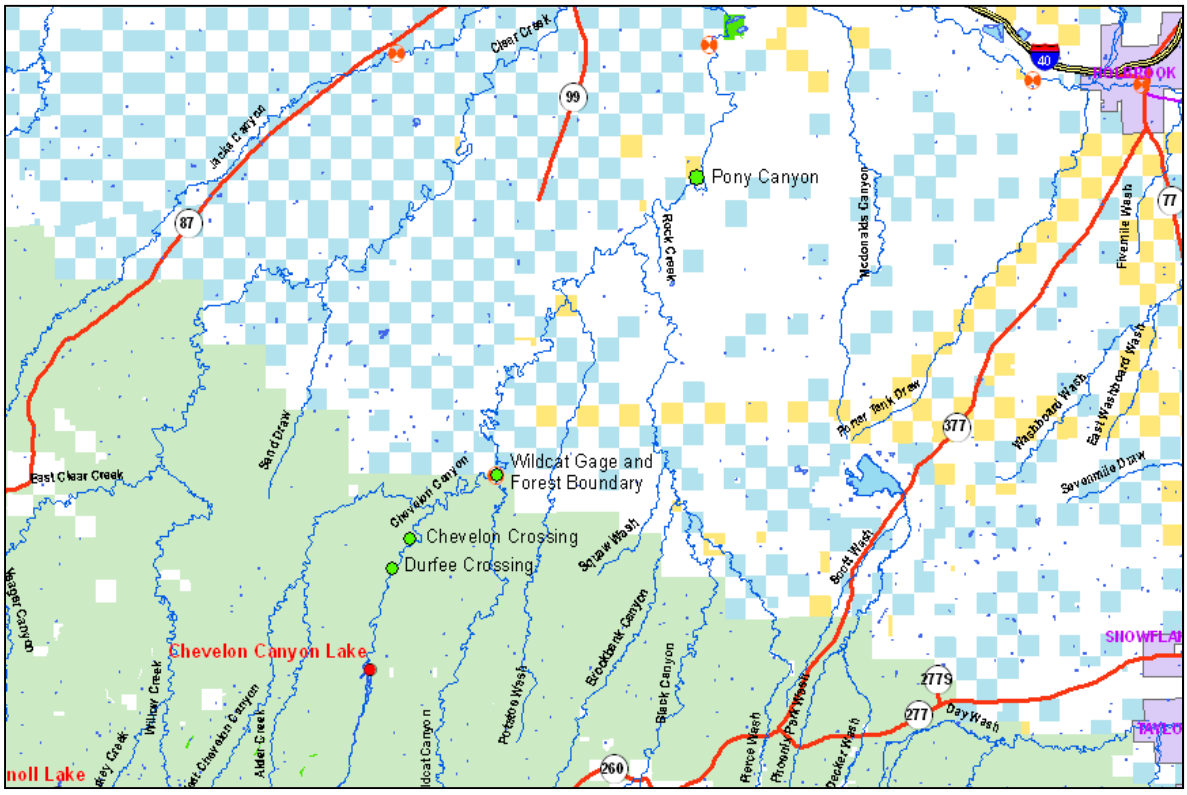

Figure 29. Map of points mentioned in Table 13.

Permanent flow from the confluence of Pony Canyon downstream to just above the very large pool (including The Steps) contains LC spinedace, LC sucker, bluehead sucker, speckled dace, green sunfish, fathead minnow, plains killifish, red shiner, golden shiner, black bullhead, yellow bullhead, and crayfish. The population of spinedace in and around The Steps area is large and robust, containing the highest densities of spinedace anywhere recorded. They have been observed in schools up to several hundred individuals. Little Colorado sucker, bluehead sucker, speckled dace, green sunfish, fathead minnow, and crayfish are also well established in this area. Plains killifish and black bullhead are locally common, and records of red shiner, golden shiner, and yellow bullhead are rare.

Table 14 provides a summary of fisheries surveys in reaches believed to provide permanent flow, and where occupied spinedace habitat is known to occur in Chevelon Creek from Pony Canyon to 1.7 miles above McLaws Road. Surveys were conducted with a backpack electroshocker and seines (Dorum and Young 1995; Lopez et al. 1998a; Weiss 2007a; AGFD unpublished data).

Table 14. Summary of fisheries surveys in permanent flow in Chevelon Creek from Pony Canyon to 1.7 miles above McLaws Road.

Date	Species										
	LC Spinedace	LC Sucker	Bluehead Sucker	Speckled Dace	Green Sunfish	Fathead Minnow	Plains Killifish	Red Shiner	Golden Shiner	Black Bullhead	Yellow Bullhead
Where permanent flow begins											
6/1998						499					
6/1998		1		2	41	10				1	
6/1998	17	3		37	27	144				1	
6/1998	1	6	2	11	146	119				9	
6/1998	5			1	1	8					
1 mile above The Steps											
10/8/1996	1			18	29	110					
7/1995	2		44	106							
6/1994	3	6	5	84	5	8					
8/1993		36		185	1						
7/1990	4										
Bell Cow Canyon confluence											
6/4/2009	221		1	18	322	191					
Just above The Steps											
6/4/2009	11		13	72	9	6					

Date	Species										
	LC Spinedace	LC Sucker	Bluehead Sucker	Speckled Dace	Green Sunfish	Fathead Minnow	Plains Killifish	Red Shiner	Golden Shiner	Black Bullhead	Yellow Bullhead
The Steps											
8/1977	111	21			75				1		
7/1983	76			3	7	443					
6/1990	33			5	55	89					2
7/1990	244		1	5	120	75					
8/1993	4		45	162	11	8					
6/1994	6			62	11	21					
7/1995	1		1	33	10	9					
10/8/1996				1	47	206	13	1			
7/23/2002	417					present	present				
10/11/2006	165					present	present				
7/23/2007	95	present	present	present	present	present					
9/4/2009	105		7	44	10	25					
Downstream of The Steps											
6/1998	1	present			present	3				present	
6/1998	6										
6/1998	2										
6/1998	7										
6/1998	1				present						
6/1998	4										
6/1998	1										
6/1998	1										
6/1998	2										
6/4/2009	267		5	94	4	1					

Downstream of The Steps area is a very large, deep pool in a deep slot canyon. This point down to the LCR is dominated by non-native fishes. This deep pool is difficult to navigate and even more difficult to survey because of the depth, difficult access, and nearly no structure on which

to attach gillnets. Limited surveys in this large pool in June 1998 with some gillnets resulted in the capture of Little Colorado sucker, green sunfish, and black bullhead (Lopez et al. 1998a; Table 15). An angling survey also found largemouth bass, green sunfish, and common carp in this large pool (M. Lopez, pers. comm.).

Table 15. Survey summary of the large deep pool between the McClaws Road bridge and The Steps area, conducted in Jun 1998 with gill nets.

Date	Largemouth Bass	Green Sunfish	Black Bullhead
6/1998 (3-2)	5	13	2
6/1998 (3-1)	2		

Downstream of the large, deep pool in the slot canyon, and downstream of McClaws Road Bridge, is another pool backed up by a large diversion dam. This area is not within a canyon, but entering the LCR valley, with much of the pool located on the Chevelon Wildlife Area. It consists of sand/silt substrates and has thick salt cedar stands along both banks. This reach contains native Little Colorado sucker, but dominated by non-native fishes, including green sunfish, fathead minnow, plains killifish, common carp, red shiner, channel catfish, and black bullhead (Lopez et al. 1998a; Table 16).

Table 16. Survey summary of the shallow pool downstream of McClaws Road bridge, conducted in 1997 and 1998, with gillnets, canoe electroshocker, and seine.

Date	Species							
	LC Sucker	Green Sunfish	Fathead Minnow	Plains Killifish	Common Carp	Red Shiner	Channel Catfish	Black Bullhead
7/1998	1	2			4			2
7/1998		40	75	20		21		
11/21/1997	3							
11/21/1997	16	11			2		3	28
11/21/1997	4	1			2		1	1
11/21/1997	9	11			1		1	6

Downstream of the diversion dam, extreme lower Chevelon Creek flows as a stream again down to the confluence with the LCR, but in wide, shallow, sand/silt habitat. A very short section of

this area immediately downstream of the diversion dam once consisted of run/riffle habitat over gravel and cobble substrates, and supported native fishes including Little Colorado spinedace, Little Colorado sucker, bluehead sucker, and speckled dace, in addition to massive numbers of non-native minnows (mostly cyprinids) and crayfish (Dorum and Young 1995; Lopez et al. 1998a). However, this run/riffle section has been replaced by a larger and deeper pool immediately downstream of the diversion dam, which leads directly into the sand/silt substrates, and is currently dominated by largemouth bass, crayfish, and other non-natives (Weiss 2007a; Table 17). A portion of this reach is also located on the Chevelon Wildlife Area and is also known as the Hugo Meadow survey site.

Table 17. Survey summary of the Hugo Meadow survey site, using backpack electroshockers and seines.

Date	Species						
	LC Spinedace	LC Sucker	Bluehead Sucker	Speckled Dace	Green Sunfish	Fathead Minnow	Plains Killifish
Aug-77	6	10			68	72	10
Jul-83	154				5	832	134
Jun-90	55				27	482	9
Aug-93	2	34		52	1000+	10000+	3
Jun-94	3	21	2	10	6	1243	20
Jul-95	46			14		1222	44
Oct-96	9			4	4	402	91
Nov-97				3	40	202	83
Jul-02					26	240	48
Jul-07					12		10
Jun-09						310	

Date	Species							
	Common Carp	Red Shiner	Golden Shiner	Channel Catfish	Largemouth Bass	Black Bullhead	Yellow Bullhead	Bluegill
Aug-77	92		22	12	12	9	1	
Jul-83	4			3				83
Jun-90	5	8	1				1	

Aug-93	4	10000+		4				
Jun-94	Present	378						
Jul-95	13	211						
Oct-96		1787						
Nov-97		539						
Jul-02		201						
Jul-07		1			108			
Jun-09	20	168		1	88			

The LCR is also dominated by non-native fishes in the vicinity of the Chevelon Creek confluence, with Little Colorado suckers occasionally collected. The next closest population of Little Colorado spinedace occurs near St. Johns, approximately 110 miles upstream of the Chevelon Creek confluence. Table 18 provides a summary of fishes surveyed from the LCR between Winslow upstream to near St. John's (Dorum and Young 1995; Weiss 2007a; AGFD unpublished data).

Table 18. Survey summary of the LCR using backpack electroshockers and seines. The table begins with the Winslow site and lists other sites in sequence upstream towards Lyman Lake.

Date	Species												
	LC Spinedace	LC Sucker	Bluehead Sucker	Speckled Dace	Fathead Minnow	Green Sunfish	Plains Killifish	Bluegill	Channel Catfish	Red Shiner	Common Carp	Yellow Bullhead	Goldfish
LCR – Winslow													
7/2007					703	1	1587	1	5	10			
6/2009		4			39		104			22			
LCR – Indian Cove													
8/1991					608								10
LCR – Holbrook													
4/2007					10		1						
5/2007					1								
6/2009													
LCR – Woodruff													
8/1991			1		143					3			
8/1991			11		30	5				1			
6/1994		5			11				2		1	1	

6/2009					38								
LCR – Silver Creek confluence													
7/1997		2			536						6		
6/2009		7			14						4	21	
LCR – Sewage Ponds North of St. Johns													
9/1991	2			3	3		50						
8/1993	16		1		2		16						
7/2009													
LCR – North of St Johns													
9/1991	33			2	86		95				2		
LCR – St Johns													
7/2009					5	1					2		
LCR – South of St Johns, near Little Reservoir													
7/1983	30	17			3		2						
9/1991	69	1	1	3			2						
8/1993	11		30	6									
6/1994	10	1		2									
7/1995	12			10			4						
LCR – Carl Pew's property													
7/1990	4	6		4									
7/1990	23	1			14	1	12						
7/2009	21	5		1	9	1	1						
7/2009					5		9						
7/2009		1			19		10						
7/2009	1				9		4						
7/2009	2				6								
LCR – Downstream of Salado													
7/1990		2			3								
8/1993					16						1		
4/2007					6	1	2				1		
LCR – Salado													
8/2009					3	1					1		
8/2009											1		
8/2009											2		

West Chevelon Creek was originally surveyed in 1999, finding only native fish, bluehead sucker and speckled dace (AGFD unpublished data). An extreme drought in 2002 nearly dried up all

habitats within West Chevelon, likely eliminating bluehead sucker, as they have not been collected there since. However, speckled dace persisted through the drought and currently exist in the stream (AGFD unpublished data; Carter 2006; Weiss 2008). Little Colorado spinedace were reintroduced into permanent pools in upper West Chevelon in July 2007 (Weiss 2007e). Recent surveys in upper West Chevelon have documented the persistence of speckled dace and LC spinedace (Table 19), with evidence of reproduction by spinedace (AGFD unpublished data). No trout or other non-native fish, including non-native crayfish, have ever been collected in West Chevelon Creek, providing evidence that the lower 16.2 miles of dry habitat has effectively kept non-native organisms out of permanent habitat in upper West Chevelon, including rainbow trout.

Table 19. Survey summary in West Chevelon Creek, conducted with backpack electroshocker, dipnets, and seines.

Date	Species		
	Speckled Dace	Bluehead Sucker	Little Colorado Spinedace
6/1999	Present	Present	
11/1999	75	25	
9/2003	Present		
4/2004	Present		
5/2005	250		
6/2006	Present		
6/2007	Present		
11/2007	Present		Present
5/2008	Present		Present
7/2008	79		12
8/2009	207		76

Consultation species or Critical Habitat

Potential impacts to Mexican spotted owl, Chiricahua and northern leopard frogs are analyzed below. Both frog species 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. The nearest occupied and critical habitat for Little Colorado spinedace and the known roundtail chub populations occur downstream of Chevelon Canyon Lake. For this reason they are discussed in the Chevelon Canyon complex analysis 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

The stocking location is within Mexican spotted owl (MSO) critical habitat (CH) and is within a buffer. The stocking location is located in a very steep canyon based on review of topographic maps which limit angler access. World imagery maps show that there is minimal shoreline around the lake. Most access to the reservoir will be by boat.

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 Mexican spotted owl PACs in the general vicinity of the site. No physical effects to Mexican spotted owl habitat in the PAC are anticipated, since anglers are not expected to be present in the PAC. There may be some disturbance to Mexican spotted owls 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 Mexican spotted owl critical habitat and/or restricted and protected habitats.

The critical habitat designation included most other protected and restricted habitats for the Mexican spotted owl. Indirect effects to critical habitat 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 Mexican spotted owl critical habitat and/or restricted and protected habitats.

Chiricahua Leopard Frog

Local Analysis: Although Chevelon Canyon Lake and the Chevelon Creek buffered stocking complex are within the historical range of the Chiricahua leopard frog, the likelihood that fish stocked in Chevelon Canyon Lake will have an impact on Chiricahua leopard frogs is low. There are no historical records for Chiricahua leopard frogs at Chevelon Canyon Lake or within the Chevelon Creek buffered stocking complex. There have been 56 surveys at 37 sites within the buffered stocking complex between 1968 and 2005 (Figure 9, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 29 sites between 2003 and 2007 and did not observe any Chiricahua leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). Based on available data, it is likely that Chiricahua leopard frogs do not occupy the buffered complex that includes Chevelon Canyon Lake (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing fish stocked in the Chevelon Creek complex due to an extreme storm event or a breached dam is moderate. Even though there are no historical records for Chiricahua leopard frogs and some available habitats have not been surveyed, it is possible that there are populations of Chiricahua leopard frogs in the area outside the buffered stocking complex (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Northern Leopard Frogs

Local Analysis: Although Chevelon Canyon Lake and the Chevelon Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that frogs could be exposed to stocked fish in Chevelon Canyon Lake is low. There are no historical records of northern leopard frogs at Chevelon Canyon Lake. There have been 56 surveys at 37 sites within the Chevelon Creek buffered stocking reach between 1968 and 2005 (Figure 9, Arizona Game and Fish Riparian Herpetofauna Database). There are 2 sites with records for northern leopard frogs; Woods Canyon Lake (1968) and Willow Springs Canyon (1996) (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern

leopard frogs were not observed during subsequent surveys at Woods Canyon (1992 and 1995) or at Willow Springs Canyon (1997 and 1998) (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). The Black Mesa Ranger District, Tonto National Forest, surveyed 29 sites within the buffered stocking complex between 2003 and 2007 and did not observe any northern leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). Data suggests that northern leopard frogs no longer occupy the buffered stocking complex and the current presence of crayfish and non-native fish in the Chevelon Creek drainage, its tributaries, and surrounding tanks and lakes make the habitat within the buffered stocking complex less suitable for northern leopard frogs (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing fish stocked in the Chevelon Creek stocking complex due to an extreme storm event or a breached dam is low. Although the area outside the buffered stocking complex has been poorly surveyed, it is likely that northern leopard frogs no longer occupy historical (1932, 1968) sites within the drainages where escaped fish could disperse. (Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.).

CHEVELON CREEK COMPLEX ANALYSIS

Water Distribution

Woods Canyon Lake and Willow Springs Lake spill into Woods Canyon and Willow Springs Canyon during the spring runoff. These two canyons meet to form Chevelon Creek, which runs perennial into Chevelon Canyon Lake. Woods Canyon and Willow Springs are the main headwater tributaries to Chevelon Creek, contributing most of the spring runoff flow, but are only partially perennial at base flows. Long Tom Tank is located in the headwaters of tributary Long Tom Canyon, which is dry during the summer and a minor contributor to spring runoff in the system. Chevelon Creek, between the confluence of Woods Canyon and Willow Springs Canyon down to Chevelon Canyon Lake, is good quality perennial trout habitat for approximately 12 miles.

Water draining over the spillway at Chevelon Canyon Lake, the lowest stocking site in the complex, drains down to the LCR. However, only isolated pools persist through the summer in the middle 53.0 miles of Chevelon Creek below the reservoir. Perennial continuous flow does return in the lower 14.5 miles of Chevelon Creek down to the confluence with the LCR.

Fish Movement

Rainbow trout stocked into Long Tom Tank, Willow Springs Lake, Woods Canyon Lake, and Chevelon Canyon Lake, plus Arctic grayling in Chevelon Canyon Lake, can likely escape those reservoirs during high flow events that occur during spring snowmelt runoff, and end up in Chevelon Canyon Lake, the lowest stocking site in the complex. Rainbow trout can persist in all these lakes and in upper Chevelon Creek between the lakes. All trout that are in Chevelon

Canyon Lake, including those coming down from the other 3 reservoirs, have the potential to disperse downstream over the spillway at Chevelon Canyon Lake during spring runoff. At this point it is not possible to know which lake a dispersing trout comes from, but is most logically those stocked directly into Chevelon Canyon Lake. Rainbow trout do escape Chevelon Canyon Lake and have been documented in the creek below the lake. They were collected downstream of the lake on several occasions, with most collections occurring between the lake and West Chevelon Canyon, 10.5 miles downstream of the lake; however, 1 rainbow trout was collected near Potato Wash in 1997, 42 miles downstream of the lake. This isolated collection was the furthest downstream record of rainbow trout in Chevelon Creek over many years of surveys presented in previous tables. Although it is possible for escaped trout to travel throughout lower Chevelon Creek and even into the LCR during heavy spring flows, no trout of any kind has been collected in occupied spinedace habitat in lower Chevelon Creek, or in the LCR upstream from Grand Falls to Lyman Lake based on the data presented in the previous tables. Trout are not expected to persist due to the drying of the stream and unsuitable habitat between the lake and spinedace populations. The data from numerous surveys support this statement, because no trout has been collected in occupied spinedace habitat in upper West Chevelon Canyon and lower Chevelon Creek, or anywhere in West Chevelon Canyon, or in designated Critical Habitat in lower Chevelon Creek. Arctic grayling have not been stocked since 1990, but they would be expected to have dispersal and survival chances lower than rainbow trout due to their natural history, habitat limitations and biology.

Escaping fish could potentially swim upstream in the LCR from the confluence with Chevelon Creek, for 43.3 miles to the confluence with Silver Creek during high flows. However, they could not get upstream of the Woodruff Dam on the very lower portion of Silver Creek. They could continue up the LCR for an additional 85.1 miles to Lyman Lake dam, also only during high flows, but it is extremely unlikely escaped stocked fish would ever make it into these habitats. No trout has ever been documented in the LCR in these reaches, or in lower Silver Creek below White Mountain Lake.

Escaped fish could also potentially move downstream in the LCR from the confluence with Chevelon Creek during high flows. At Clear Creek, a trout could not go upstream past the Clear Creek Reservoir dam into very lower Clear Creek, but could possibly get up into Jacks Canyon, or into Diablo Canyon, or even further downstream. However, it is extremely unlikely because of the harsh conditions that exist in all but the most wetted periods and given that trout have never been found in lower Chevelon Creek or any of the other lower stream reaches mentioned.

Community Description

Isolated permanent pools immediately below the lake have been found to contain brown trout, rainbow trout, fathead minnow, golden shiner, roundtail chub, bluehead sucker, Little Colorado sucker, speckled dace, and numerous crayfish (Table 13). Rainbow trout have been collected

downstream of the lake on several occasions, with most collections between the lake and West Chevelon Canyon, 10.5 miles downstream of the lake; however, one isolated collection near Potato Wash, 42.0 miles downstream of the lake, was the record of rainbow trout at the lowest elevation in Chevelon Creek over many years of surveys. No trout have been recorded below the confluence with Black Canyon. One black bullhead was found near the confluence with Potato Wash. California floater shells and canyon treefrogs have also been reported from this reach.

Permanent flow from the confluence of Pony Canyon (which is 12 miles upstream from the LCR confluence) downstream to just above the very large pool, including The Steps (about 5 miles upstream of the confluence), contains Little Colorado spinedace, Little Colorado sucker, bluehead sucker, speckled dace, green sunfish, fathead minnow, plains killifish, red shiner, golden shiner, black bullhead, yellow bullhead, and crayfish (Table 14). The population of spinedace in and around The Steps area is large and robust, containing the highest densities of spinedace anywhere recorded, and were observed in schools up to several hundred individuals. Little Colorado sucker, bluehead sucker, speckled dace, green sunfish, fathead minnow, and crayfish are also well established in this area. Plains killifish and black bullhead are locally common, and records of red shiner, golden shiner, and yellow bullhead are rare.

Downstream of The Steps area is a very large, deep pool in a deep slot canyon. From this point down to the LCR is dominated by non-native fishes. This deep pool is difficult to navigate and even more difficult to survey because of the depth, difficult access, and nearly no structure on which to attach gillnets. Limited surveys in this large pool in June 1998 with some gillnets resulted in the capture of Little Colorado sucker, green sunfish, and black bullhead (Lopez et al. 1998a; Table 15). An angling survey also found largemouth bass, green sunfish, and common carp in this large pool (M. Lopez, pers. comm.).

Downstream of the large, deep pool in the slot canyon, and downstream of McClaws Road Bridge, is another pool backed up by a large diversion dam. This area is not within a canyon, but entering the LCR valley, with much of the pool located on the Chevelon Wildlife Area. It consists of sand/silt substrates and has thick salt cedar stands along both banks. This reach contains native Little Colorado sucker, but is dominated by non-native fishes, including green sunfish, fathead minnow, plains killifish, common carp, red shiner, channel catfish, and black bullhead (Lopez et al. 1998a; Table 16).

Downstream of the diversion dam, extreme lower Chevelon Creek flows as a stream again down to the confluence with the LCR, but in wide, shallow, sand/silt habitat. A very short section of this area immediately downstream of the diversion dam once consisted of run/riffle habitat over gravel and cobble substrates, and supported native fishes including Little Colorado spinedace, Little Colorado sucker, bluehead sucker, and speckled dace, in addition to massive numbers of non-native minnows (mostly cyprinids) and crayfish (Dorum and Young 1995; Lopez et al. 1998a). However, this run/riffle section has been replaced by a larger and deeper pool

immediately downstream of the diversion dam, which leads directly into the sand/silt substrates, and is currently dominated by largemouth bass, crayfish, and other non-natives (Weiss 2007a; Table 17). A portion of this reach is also located on the Chevelon Wildlife Area and is also known as the Hugo Meadow survey site.

The LCR is also dominated by non-native fishes in the vicinity of the Chevelon Creek confluence, with Little Colorado suckers occasionally collected. Little Colorado spinedace also occur near St. Johns, approximately 110 miles upstream of the Chevelon Creek confluence. Table 18 provides a summary of fishes surveyed from the LCR between Winslow and near St. John's (Dorum and Young 1995; Weiss 2007b; AGFD unpublished data).

West Chevelon Creek was originally surveyed in 1999, finding only native fish, bluehead sucker and speckled dace (AGFD unpublished data). An extreme drought in 2002 nearly dried up all habitats within West Chevelon, likely eliminating bluehead sucker, as they have not been collected there since. However, speckled dace persisted through the drought and currently persist in the stream (AGFD unpublished data; Carter 2006; Weiss 2008). Little Colorado spinedace were reintroduced into permanent pools in upper West Chevelon in July 2007 (Weiss 2007e). Recent surveys in upper West Chevelon have documented the persistence of speckled dace and Little Colorado spinedace (Table 19), with evidence of reproduction by spinedace (AGFD unpublished data). No trout or other non-native fish, including non-native crayfish, have ever been collected in West Chevelon Creek, providing evidence that the lower 16.2 miles of dry habitat has effectively kept non-native organisms, including rainbow trout, out of permanent habitat in upper West Chevelon.

Consultation Species or Critical Habitat
Potential impacts to Little Colorado spinedace and roundtail chub downstream from Chevlon Canyon Lake 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.

Little Colorado Spinedace

Spinedace were reintroduced as a conservation action in July 2007 in upper West Chevelon Canyon. They also persist as a naturally occurring population in lower Chevelon Creek, downstream of Chevelon Canyon Lake, which is the lowest downstream stocking site in the Chevelon Complex. Occupied spinedace habitat in upper West Chevelon Canyon is located 36.6 miles from Chevelon Canyon Lake, via 10.5 miles of Chevelon Creek downstream of the lake and up West Chevelon Canyon for 26.1 miles from the confluence with Chevelon Creek. Surveys of the West Chevelon spinedace indicate they have moved approximately 150 meters downstream in July 2008 from where they were originally stocked and 0.3 miles further downstream in August 2009. The spinedace are dispersing within the series of permanent pools within upper West Chevelon Canyon, but still within that small area, with many miles of dry habitat existing downstream to Chevelon Creek.

Potential Impacts

The potential for trout or grayling to disperse downstream of Chevelon Canyon Lake into occupied and critical habitat for spinedace in lower Chevelon Creek exists, but is extremely low. Trout do disperse downstream of the lake, and individual rainbow trout have been documented. However, the numbers are low and the fish do not persist. Trout and grayling have the potential to go over the dam only during spring runoff, at which time Chevelon Creek is flowing continuously down to occupied habitat. But as the flows drop to base flow, approximately 53 miles of Chevelon Creek dries to isolated pools that do not appear to support rainbow trout through the summer. Grayling have a lower tolerance for warm temperatures and drying stream conditions and would be expected to have an even lower opportunity for dispersal and persistence. Brown trout seem to persist in some of the pools at the upper end of this reach, but this species is more tolerant of warm conditions. Rainbow trout have also never been found downstream past the confluence of Black Canyon, and have never been documented in occupied spinedace habitat or critical habitat in many years of surveys.

It is possible for a dispersing spinedace to get washed downstream from upper West Chevelon Canyon and into Chevelon Canyon during flood flows and encounter an escaped rainbow trout or grayling from the upper stocking sites. However, this would not be a likely occurrence because of the distance involved from occupied habitat, plus the low occurrence of rainbow trout near the confluence of West Chevelon Creek. Because the population of spinedace in West Chevelon has been reintroduced, any impact under this situation would be on an individual fish and have no impact on the species or population level, since a dispersing spinedace from upper West Chevelon would be lost to the population. Since that fish could not make it back to occupied habitat that it came from, it would not be expected to establish in Chevelon Creek in that area due to the presence of non-native fish and crayfish, and is not likely to be washed even further downstream to the next spinedace population in lower Chevelon Creek, because of the distances involved and numerous predators along the way. It is also unlikely that spinedace would disperse

upstream from lower Chevelon Creek, since their current upstream distribution is nearly identical to the upper extent of permanent and continuous flows in lower Chevelon Creek. The dry and intermittent habitat in middle Chevelon Creek, from Chevelon Canyon dam downstream to Pony Canyon, is likely the greatest influence on upstream distribution of spinedace. Even then, the occurrence of escaped trout in Chevelon Creek downstream of the lake is very low and would not likely present a major obstacle to upstream movement of spinedace if they were to overcome the habitat deficiencies of that reach.

Roundtail chub

Roundtail chub are known to occupy habitats at Durfee Crossing (just upstream from the West Chevelon Canyon confluence and Chevelon Crossing, approximately 10 miles downstream from Chevelon Canyon Lake) and downstream to the confluence with the Little Colorado River.

Potential Impacts

Exposure to stocked fish that could escape from Chevelon Canyon or lakes upstream would be to adult and juvenile chub. While there is a possibility that escaped trout or grayling may reach occupied chub habitat, the low likelihood of persistence reduces the potential for impacts to roundtail chub. If stocked trout dispersed into occupied roundtail chub habitat in lower parts of Chevelon Canyon, they could compete with roundtail chub for food and space or prey on juvenile roundtail chub as described in the species interactions if the timing of the escapement of trout and spawning of chub overlap. However, this impact, if it did occur, would be of short duration due to the poor conditions for trout and grayling.

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). The attendees at that meeting were:

- *Arizona Game and Fish Department*: Chuck Benedict, Chris Cantrell, Greg Cummins, Tim Grosch, Mike Lopez, Scott Reger, Matt Rinker, Jeff Sorensen, Dannette Weiss
- *Arizona State University:* Tom Dowling, Mike Schwemm
- *U.S. Fish & Wildlife Service (USFWS or Service)*: Glen Knowles
- *U.S. Forest Service (USFS)*: Bob Calamusso
- *The Nature Conservancy (TNC)*: Mark Haberstich
- *U.S. Bureau of Reclamation (BR)*: Rob Clarkson, Jeff Lantow
- *National Park Service:* Melissa Trammell, and
  Salt River Project (SRP): Chuck Paradzick

According to Chris Cantrell, Arizona's lead on the conservation agreement team (pers. comm.) the reason they felt it was ok was due to the limited potential for the stocked fish to actually disperse to occupied sites with the roundtail (i.e. flood events and fish over the top of dams). If they did, they would be in small numbers and due to their known feeding preferences they didn't

think it would be detrimental to the roundtail population that exists there. In almost all chub sites where rainbow trout are the only fish stocked the two species have continued to coexist together for extended periods. Small numbers of stocked fish wouldn't create a detrimental impact. It was where we stock (or have in the past) thousands of trout on top of chub populations we have seen impacts that result in extirpations and lower population numbers. Cantrell also provided that "Grayling would be ok as well as they also wouldn't be envisioned to create an impact" (pers. comm.).

The main threats to roundtail chub in Chevelon Canyon are from highly piscivorous brown trout near the dam, largemouth bass in the lower canyon, bullhead catfish and green sunfish throughout, the abundant crayfish and dewatering of the stream channel.

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 Gartersnake
Stocking complex analysis: There are no verified records of northern Mexican gartersnakes from the Chevelon Creek Complex, thus, the likelihood that the species will be exposed to stocked sportfish is low. Outside of the stocking complex there is one questionable record from Hart Canyon, a tributary of Willow Creek (approx. 14 air km N of Woods Canyon Lake and W of Chevelon Canyon Lake), for which Holycross et al (2006) provide 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."

Downstream analysis: There are no northern Mexican gartersnake records downstream of the stocking sites, therefore, gartersnakes are not likely to be exposed to dispersing stocked sport fish.

Narrow-headed Gartersnake
Stocking complex analysis: There are no verified records of narrow-headed gartersnakes from the Chevelon Creek Complex and they likely do not occupy the stocking complex. Therefore, the likelihood that the gartersnakes will be exposed to stocked sport fish is low. There is an unvouchered narrow-headed gartersnake record from Hart Canyon (HDMS, V. Boyarski pers. comm.), however, Holycross et al. (2006) consider this a misidentification.

Downstream analysis: There are no narrow-headed gartersnake records downstream of the stocking sites, therefore, gartersnakes are not likely to be exposed to dispersing stocked sport fish.

CLEAR CREEK COMPLEX

Physical Geographic Description

The Clear Creek drainage drains an area of approximately 608.3 square miles (389,292 acres) above Clear Creek Reservoir before entering the Little Colorado River (Figure 30; Figure 31). The Clear Creek Complex consists of 3 reservoirs found near the Mogollon Rim in north central Arizona; all drain into Clear Creek, which is a tributary to the Little Colorado River (LCR). C.C. Cragin Reservoir, formerly known as Blue Ridge Reservoir, is the furthest upstream, and is located on East Clear Creek approximately 50 miles southeast of Flagstaff. Knoll Lake is about 70 Miles South East of Flagstaff and is located on Leonard Canyon, which is a tributary of East Clear Creek. The confluence of East Clear Creek and Leonard Canyon is about 14 miles downstream of C.C. Cragin Reservoir. Bear Canyon Lake is located on Willow Creek. Willow Creek and East Clear Creek join to form Clear Creek about 3 miles downstream of the Leonard Canyon and East Clear Creek confluence. Clear Creek drains into Clear Creek Reservoir near Winslow. Water that spills from Clear Creek Reservoir drains into the LCR.

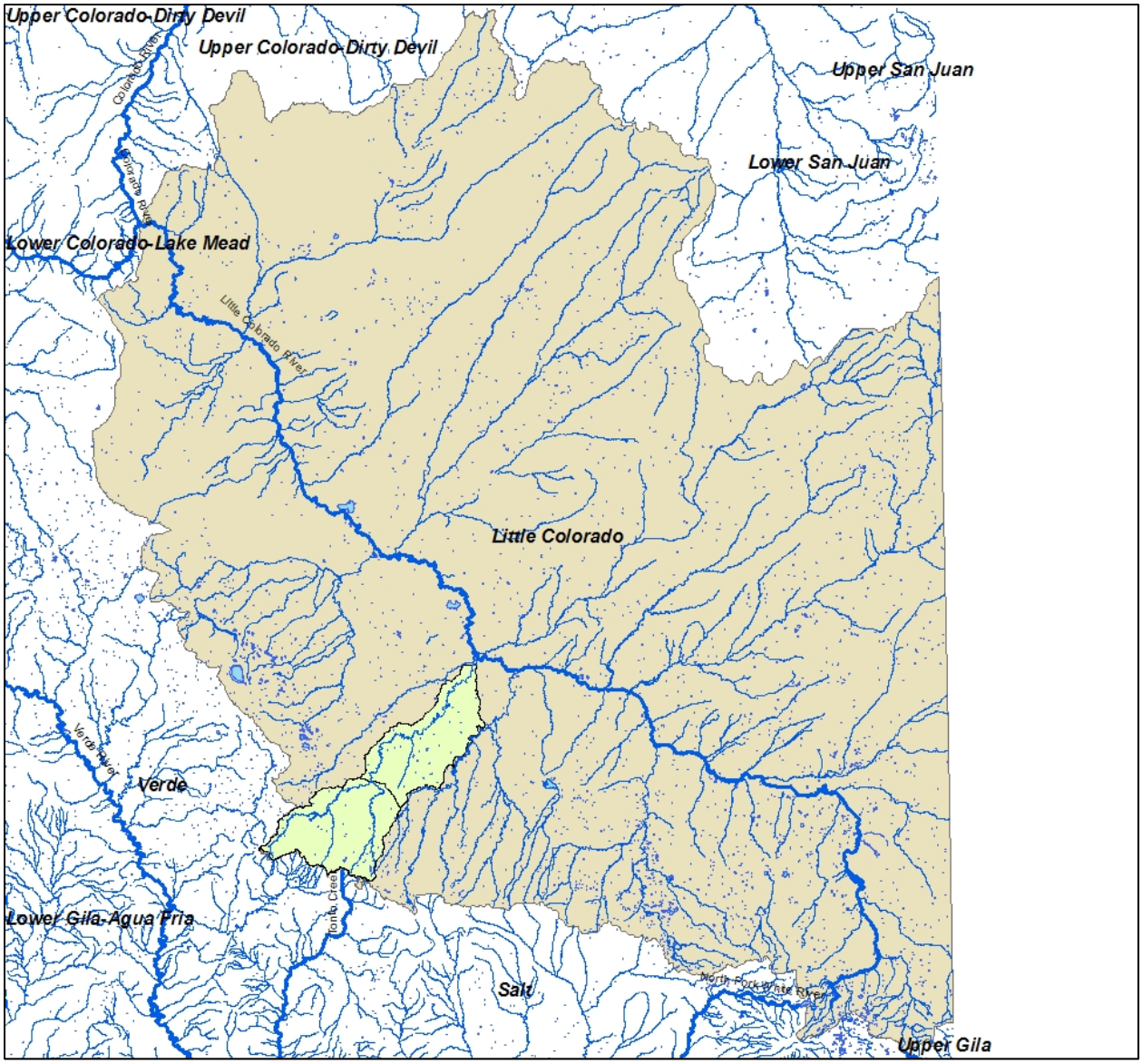

Figure 30. Map of the Clear Creek Complex(shaded in light green) and drainage within the Little Colorado River watershed.

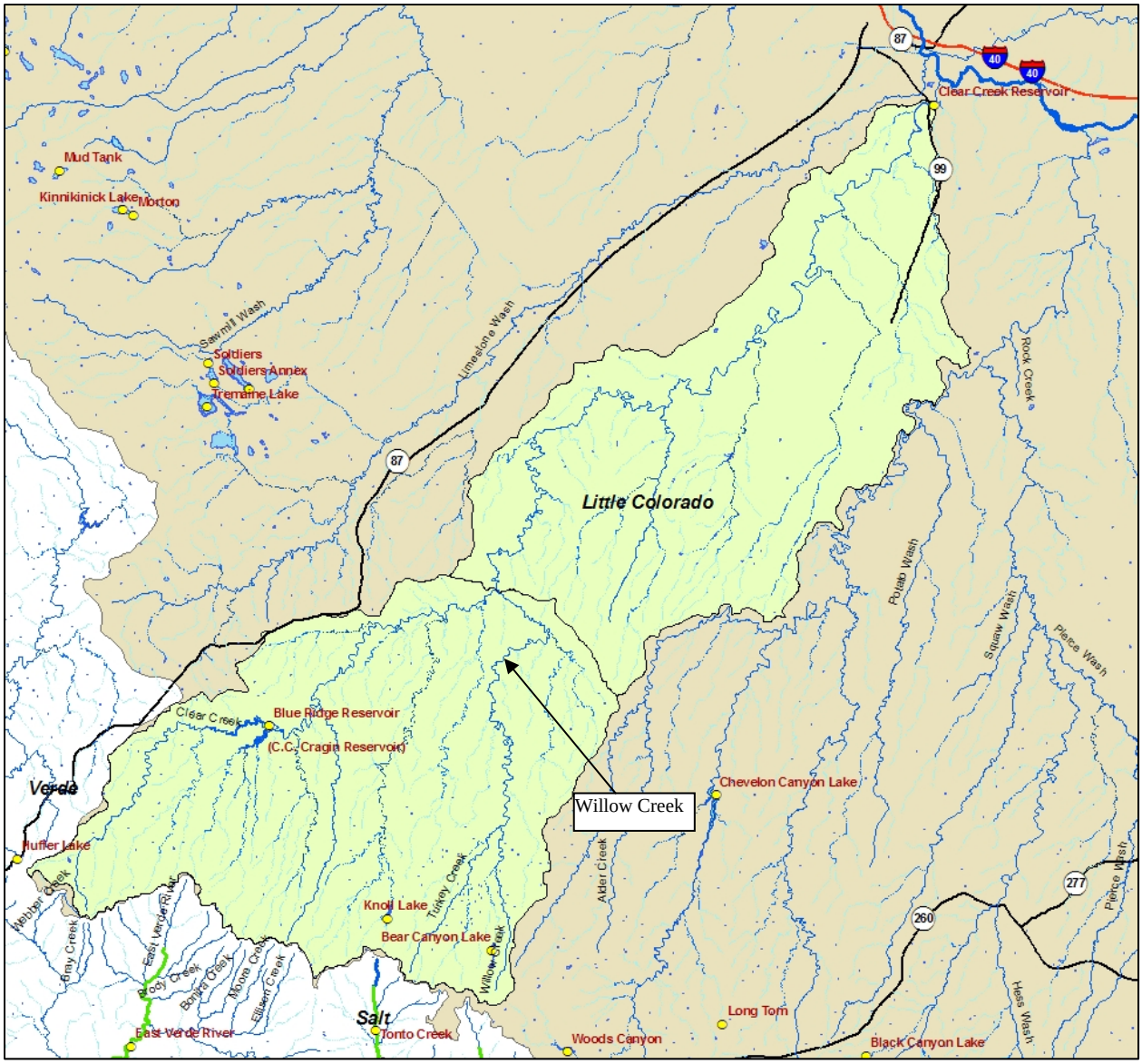

Figure 31. Map of the Clear Creek Complex within the Clear Creek drainage that flows into Clear Creek Reservoir before entering the Little Colorado River.

C.C. Cragin Reservoir

Site Description

C.C. Cragin Reservoir, formerly known as Blue Ridge Reservoir, is a 275 acre reservoir located on the Coconino National Forest (Figure 32). The reservoir is about 10 miles north of the Mogollon Rim and about 50 miles southeast of Flagstaff. Constructed in 1964, the reservoir impounds East Clear Creek at its confluence with Bear Canyon, forming a V-shaped lake, with one arm in Bear Canyon and one in East Clear Creek Proper. The dam was originally constructed by Phelps Dodge Corporation, to provide water via a pump system to the East Verde River, as a

repayment to Salt River Project (SRP) for water used by Phelps Dodge's mining operation in the Salt River drainage. During the years Phelps Dodge operated the reservoir it was pumped down most summers. The reservoir is currently owned by the Bureau of Reclamation (BR) and the management of the reservoir is conducted by SRP. Currently the pump system is being repaired and tested. SRP plans to begin pumping the water over the Mogollon rim into the East Verde River to supply water for its customers by 2012.

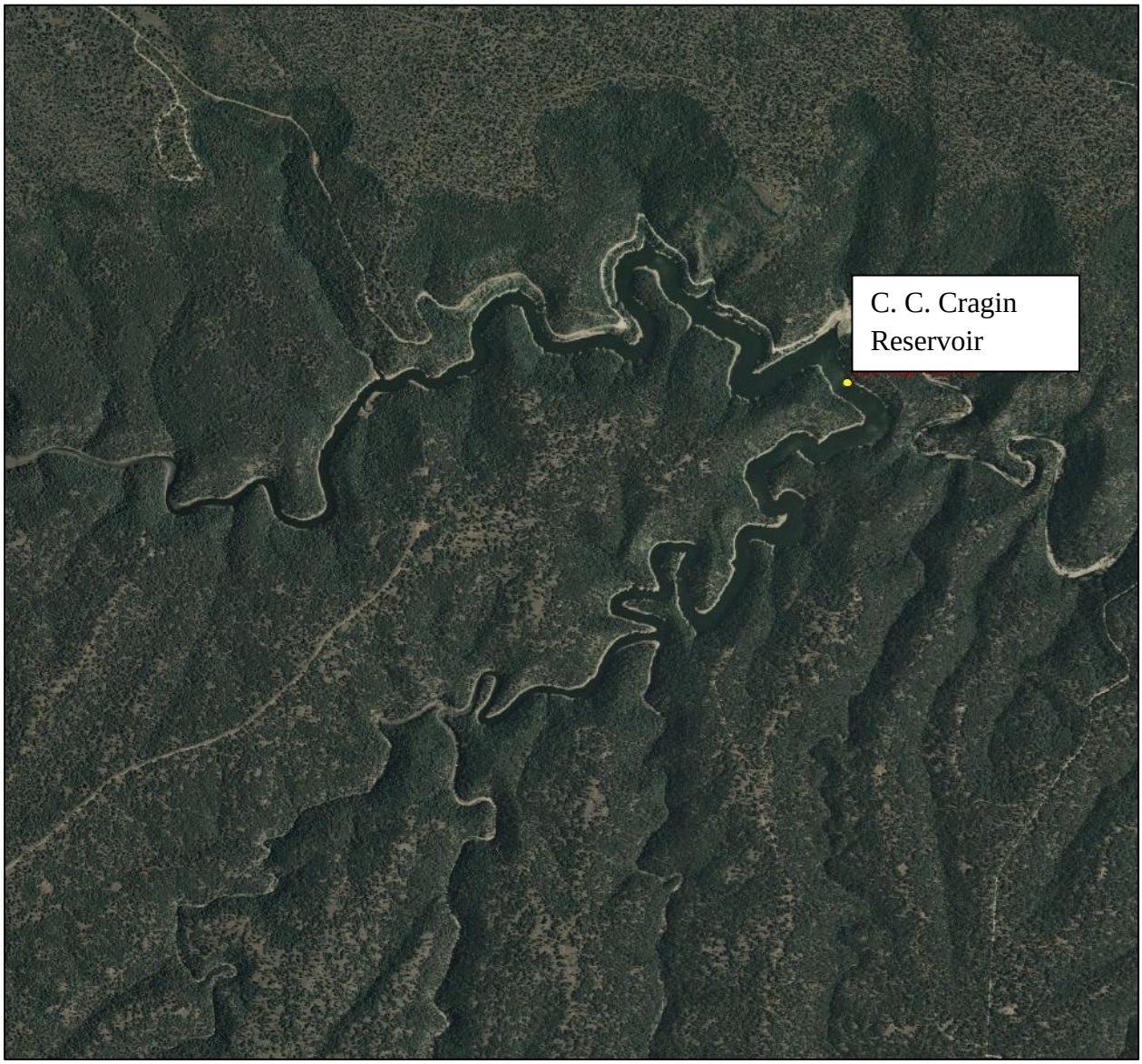

Figure 32. Image of C.C. Cragin Reservoir located in the Clear Creek complex (©2009 ESRI, i-cubed, GeoEye).

Management of Water Body

Since its completion, the reservoir has been managed primarily as a put-and-take rainbow trout fishery. Stockings of rainbow trout first occurred in C.C. Cragin Reservoir in 1965. Brown trout, brook trout, and cutthroat trout have been historically stocked into the reservoir in addition to the rainbow trout.

In 1993 the Department's stocking of C.C. Cragin Reservoir and Knoll Lake was part of an interagency Section 7 consultation on the Department's statewide stocking program. A determination of "May Effect" on the threatened Little Colorado spinedace was given on the stocking of C.C. Cragin Reservoir and Knoll Lake. Stocking at these lakes was halted in 1994 while formal consultation occurred.

A Biological Opinion (BO) was issued with the determination that stocking, as proposed under specific stocking conditions was not likely to jeopardize the continued existence of the threatened Little Colorado spinedace, and that designated critical habitat for the spinedace was not likely to be adversely affected. This consultation covered the stocking of catchable rainbow trout for a 5-year period, January 1, 1996, to December 31, 2000 (USFWS 1995).

The Department conducted a five-year evaluation in 2000, and formal intra-service consultation was reinitiated in 2001. The 2001 biological evaluation found that the proposed action of rainbow trout stocking would have no effect on the southwestern willow flycatcher or Chiricahua leopard frog. The U.S. Fish and Wildlife Service (USFWS) concurred. The 2001 biological opinion found that the proposed stocking was not likely to jeopardize the continued existence of the Little Colorado Spinedace (USFWS 2001). The Department then approved stocking rainbow trout into C. C . Cragin Reservoir.

In 1997, AGFD proposed a change in fishing regulations to increase the harvest of trout in the East Clear Creek watershed. In the proposed regulations, from May 1 to September 1, the statewide harvest and bag limits of 6 trout apply; from September 2 to April 31, after stocking is completed for the year, there is no bag limit on trout in the system, including C.C. Cragin Reservoir and Knoll Lake. The proposed regulations were approved and went into effect in 1998. These regulations were further refined with the statewide harvest and bag limits of 6 trout, applying from April 1 through August 31, and unlimited harvest for rainbow and brown trout from September 1 through March 31.

In 2001, consultation was reinitiated for the two reservoirs. Stocking provisions were re-assessed and modified:

Stock to maintain put-and-take rainbow trout fishery.
All stocked fish to be tagged with coded wire tags or tetracycline.

Stocking to begin each year as soon as practical following spring runoff and outflow from the reservoir ceases.
Cease stocking if/when habitat conditions (temperature, pH) deteriorate but prior to Labor Day.
Initial stocking rate to be 15,000 catchable rainbow trout per year, but adjusted to accommodate angler use, fish survival, and water conditions.

Monitoring was also implemented:

Creel census to be stratified random, 2 weekdays, 2 weekend/holiday per month during the period of April to September at least once every 5 years.
Following significant stocking season runoff events resulting in spills sufficient to move fish, population surveys upstream and downstream from the reservoir, conducted during the low flow periods of May to June and September to October, are needed to detect movement of tagged fish should they migrate from the reservoir

The emphasis listed in the Integrated Fisheries Management Plan for the LCR Watershed for C.C. Cragin Reservoir is for sport fish management with a desired concept of Intensive Use Fishery (Young et al. 2001).

The primary fishery is a high intensity put-and-take rainbow trout fishery. Catchable rainbow trout are stocked multiple times during the stocking season (Table 20). The limit on trout is 6 fish from April 1 to August 31, with unlimited harvest from September 1 to March 31.

Table 20. Stocking History for C.C. Cragin Reservoir

Species	First Year	Last Year	Num. of Stockings	Num. Stocked
Arctic grayling	1968	1969	2	35,000
Brook trout	1965	1987	14	175,680
Brown trout	1969	1993	22	137,401
Cutthroat trout	1990	1992	4	114,792
Rainbow trout	1965	2008	134	799,761
Total			176	1,262,634

Proposed Action

The Department proposes to stock rainbow trout for the period covered by this consultation.

Catchable rainbow trout will be stocked multiple times from May to June annually but only after the reservoir stops spilling following spring snow melt; numbers of trout stock may be from 0-15,000 fish annually.

Water Distribution / Connectivity

C.C. Cragin is located on East Clear Creek at its confluence with Bear Canyon. The lake runs generally west to east in a V shape, with the northern arm of the lake located in East Clear Creek Canyon, and the southern arm located in Bear Canyon. Spring runoff from East Clear Creek and Bear Canyon (this a different Bear Canyon than where Bear Canyon Lake is located) provides most of the water for the reservoir, but some inflow can occur during other seasons as a result of storms in the watershed.

Most years the portion of East Clear Creek located upstream of the reservoir is intermittent with a few pockets of water present. Two stream systems, Miller Canyon and Kehl Canyon, have their confluences with East Clear Creek upstream of the reservoir. Both Miller and Kehl Canyons have sections of permanent water upstream of their confluence with East Clear Creek.

The Bear Canyon arm of the lake receives water from Bear Canyon and from General Springs Canyon. Bear Canyon has permanent water in its upper reaches, but generally goes dry near the reservoir, except in very wet years. General Springs Canyon is typically dry except for a short section located near the Mogollon Rim in the area around General Springs.

Seepage from the dam and water released from a 2 inch pipe provide the majority of the flow for East Clear Creek downstream of the reservoir, although spilling water also flows into East Clear Creek. Flow is generally permanent downstream to the confluence with Leonard Canyon, where flows become intermittent during dry years. East Clear Creek becomes known as Clear Creek downstream from the confluence with Leonard Canyon, according to USGS topographic maps. Major tributaries of East Clear Creek located downstream of the reservoir include Barbershop Canyon, Yeager Canyon, and Leonard Canyon. During the time period when Phelps Dodge was pumping water from the reservoir, C.C. Cragin rarely spilled and then only spilled during the highest water years. Phelps Dodge ceased pumping water from the reservoir around 2000, and since that time spills have become more frequent. The reservoir spilled in 2005, 2008, and 2009. SRP plans to begin pumping the reservoir in about 2012.

Fish Movement

C.C. Cragin is an open system; fish can move freely upstream of the reservoir when East Clear Creek is flowing. The creek upstream of the reservoir, most years, ranges from dry to isolated pools most of the year. Survival of fish swimming upstream of the reservoir is limited. During wet years, there is a potential for fish to move from C.C. Cragin upstream into the tributaries of East Clear Creek above C.C. Cragin. Fish that go over the spillway may survive in the permanent waters of East Clear Creek downstream of the reservoir. There is a potential for fish from C.C.

Cragin to move upstream into the tributaries of East Clear Creek below the reservoir when connections are made.

Community Description
Electrofishing sampling has been conducted on the reservoir periodically since 1994 (Table 21). Prior to 1999, the species caught during the reservoir sampling were rainbow trout, brown trout, Little Colorado sucker, golden shiner, and fathead minnows. Golden shiners and fathead minnows were found in great numbers and were not counted during the surveys (Table 21; Table 22). Brown trout have not been collected from the reservoir since 1998. In 2007, three new species were captured during electrofishing surveys of the reservoir; green sunfish, largemouth bass, and yellow bullhead (Table 23). In addition, an angler reported a yellow perch from the reservoir in 2008, which was confirmed by the local wildlife manager.

Table 21. Number of Fish Sampled on C.C. Cragin using electrofishing 1994-1999.

Species	1994	1995	1996	1997	1998	1999
rainbow trout	0	4	14	19	37	6
Brown trout	1	27	2	5	3	0
LC sucker	8	5	3	1	17	40
fathead minnow	Present	Present	Present	Present	Present	Present
Golden shiner	Present	Present	Present	Present	Present	Present

Table 22. C.C. Cragin Reservoir 2004 Electrofishing Data.

Species	Num	Catch/ min	% of Total	Mean TL (mm)	Min-Max TL (mm)	Max Wt. (g)
rainbow trout	8	.07	18.60	314.63	280-387	425
LC sucker	3	.03	6.98	385.00	338-425	855
Golden shiner	32	.29	74.41	149.84	109-207	-
fathead minnow	Present	-	-	-	-	-
Total	43	.39	-	-	-	-

Total EFFORT 6,633 SECONDS. (110.55 MINUTES)

Table 23. 2007 C.C. Cragin Reservoir Electrofishing Data.

Species	Num.	Catch/min	% of Total	Mean TL (mm)	Min-Max TL (mm)	Max Wt. (g)
rainbow trout	7	0.066	0.36	281.57	136-353	530
LC sucker	31	0.29	1.58	316.74	145-440	1,050

Golden shiner	8	0.075	0.41	164.88	131-213	125
fathead minnow	1,899	17.81	96.99	-	-	-
Largemouth bass	1	0.009	0.0005	144	144	45
Bullhead (unid)	1	0.009	0.0005	240	264	230
Green sunfish	11	0.10	0.56	100.64	25-154	75
Total	1,958	18.36	-	-	-	-

Total EFFORT 6,398 SECONDS. (106.63 MINUTES)

Annual stream sampling has been conducted on East Clear Creek at 5 standard stations downstream of the reservoir since 1995 (Table 24 through Table 30) in accordance with the East Clear Creek Watershed Recovery Strategy for the Little Colorado Spinedace and Other Riparian Species (USDA Forest Service 1999). Only 2 stations were sampled in 2002 prior to the forest closure because of extreme fire danger. To date no marked hatchery rainbow trout have been caught during the standard station sampling in East Clear Creek (Benedict 2000; Benedict et al. 2005, 2007). Fish captured during standard station sampling in 2000, 2004, 2005 and 2007 include rainbow trout, brown trout, Little Colorado sucker, bluehead sucker, speckled dace, Little Colorado spinedace, and fathead minnows (Benedict 2000; Benedict et al. 2005 and 2007). In 2005, one marked hatchery trout was collected in East Clear Creek below the dam during non-standard pre-stocking stream fish surveys. Roundtail chub are found near Macks Crossing and downstream of Macks Crossing.

Table 24. Locations for East Clear Creek Surveys.

Station	Location
1) 1 mile above 95 road crossing	T14N, R11E, Section 34
2) 95 crossing	T13N, R11E, Section 35
3) Kinder Crossing	T14N, R11E, Section 25
4) Horse Crossing	T14N, R11E, Section 24
5) Macks Crossing	T14N, R12E, Section 8

Table 25. Fish Survey Results 1 mile above 95 road crossing Station 1995-2008

Year	LC Spinedace	Speckled Dace	Bluehead Sucker	LC Sucker	Fathead Minnow	Rainbow Trout	Brown Trout
1995	9	261	1	10	70	2	1
1996	10	176	0	0	27	2	0
1997	11	328	6	7	0	0	0
1998	0	244	0	16	81	0	0
1999	0	138	0	30	36	0	0

2001	0	183	4	0	17	0	0
2004	0	66	10	1	13	0	0
2005	0	66	4	1	4	0	0
2006	0	53	5	0	1	0	0
2007	0	64	13	4	14	0	0
2008	0	52	5	2	30	0	0

Table 26. Fish Survey Results 95 Road Crossing Station 1995-2008

Year	LC Spinedace	Speckled Dace	Bluehead Sucker	LC Sucker	Fathead Minnow	Rainbow Trout	Brown Trout
1995	0	55	1	0	50	3	0
1996	10	131	0	0	29	1	0
1997	0	128	0	1	153	0	0
1998	0	33	0	0	242	0	0
1999	0	175	0	19	207	0	0
2001	0	100	0	2	239	0	0
2005	0	41	2	3	13	1	0
2006	0	94	1	0	0	0	0
2007	0	104	14	3	81	0	0
2008	0	78	7	0	41	0	1

Table 27. Fish Survey Results Kinder Crossing Station 1995-2008

Year	LC Spinedace	Speckled Dace	Bluehead Sucker	LC Sucker	Fathead Minnow	Rainbow Trout	Brown Trout
1995	4	47	0	7	38	0	0
1996	5	73	0	11	0	0	0
1997	0	178	0	0	105	1	0
1998	0	142	2	0	38	1	0
1999	0	207	3	5	0	0	0
2001	0	150	0	2	31	0	0
2004	0	196	14	1	4	2	0
2005	0	33	5	2	8	0	0
2006	0	78	3	0	6	3	0
2007	0	97	17	1	4	2	0
2008	0	20	3	2	6	0	0

Table 28. Fish Survey Results Horse Crossing Station 1995-2008

Year	LC Spinedace	Speckled Dace	Bluehead Sucker	LC Sucker	Fathead Minnow	Rainbow Trout	Brown Trout
1995	0	63	0	0	26	2	0
1996	3	81	0	11	0	4	1
1997	0	141	10	1	76	12	1
1998	0	386	4	20	78	6	2
1999	0	121	0	5	22	14	14
2001	0	71	0	0	2	2	0
2004	0	37	0	0	26	0	0
2005	0	15	0	3	13	0	0
2006	0	42	4	1	49	1	0
2007	0	36	0	1	39	0	0
2008	0	26	2	0	17	4	0

Table 29. Electrofishing Fish Survey Results Macks Crossing Station 1995-2008

Year	LC Spinedace	Speckled Dace	Bluehead Sucker	LC Sucker	Roundtail Chub	Fathead Minnow	Rainbow Trout
1995 Dry	0	0	0	0	0	0	0
1996	0	152	0	0	0	56	1
1997	0	138	2	1	0	47	0
1998	0	28	0	0	0	6	0
1999	0	215	0	7	0	3	0
2001 Dry	0	0	0	0	0	0	0
2008	0	54	0	2	1	8	4

Table 30. Trammel Net Fish Survey Results Macks Crossing area 2007-2008

Year	Bluehead Sucker	LC Sucker	Roundtail Chub	Rainbow Trout	Brown Trout
2007	0	9	5	5	1
2008	0	41	1	6	1

During sampling of East Clear Creek in June-July 2003, a total of 7 stations were sampled using electrofishing. As in the past two years, large numbers of crayfish made sampling difficult. A total of 10 small rainbow trout were caught out of 403 total fish sampled (Table 31). No Little Colorado spinedace were sampled. The YOY rainbows may be part of a reproducing population below the lake.

Table 31. Results of East Clear Creek sampling below C.C. Cragin Reservoir in 2003.

Species	Number	Mean Length
Little Colorado Sucker	1	181
Bluehead Sucker	22	69.6
Rainbow Trout	10	94.8
Brown Trout	2	61
Speckled Dace	211	44.4
Fathead Minnows	157	43

Sampling of the ½ mile of the creek directly below the dam is conducted prior to stocking of the reservoir whenever the lake spills. In 2005, the only marked hatchery rainbow trout collected in East Clear Creek during any of the stream surveys was collected during the post spilling survey, approximately ¼ of a mile below the dam. A Little Colorado spinedace was also collected below the dam during this survey (Benedict et al. 2005).

Fish sampling has also been conducted in waters of the drainage that contain Little Colorado spinedace, or in waters where spinedace could potentially be stocked (Table 32 through Table 34). Miller Canyon is located upstream of the reservoir, Bear Canyon flows into the reservoir, and Dane Canyon is a tributary to Barbershop Creek and is downstream of the reservoir. None of the rainbow trout captured in these areas over this time period were marked (i.e. stocked) fish.

Table 32. Bear Canyon Electrofishing sampling results all stations 2003-2008

Year	LC Spinedace	Speckled Dace	Bluehead Sucker	LC Sucker	Fathead Minnow
2003	0	457	0	6	
2005	0	61	0	0	
2006	24	167	4	1	
2007	20	557	11	0	
2008	3	285	22	0	
2009	63	2831	168	1	8

Table 33. Dane Canyon Electrofishing sampling results all stations 2003-2009

Year	LC Spinedace	Speckled Dace	Bluehead Sucker	Rainbow trout
2005	0	25	0	0
2006	0	325	6	0
2007	0	218	4	0
2008	1	306	10	0
2009	55	1826	105	4

Table 34. Miller Canyon 2008 fish sampling all stations

Species	Number
Speckled dace	55
Bluehead sucker	6
Fathead minnow	13

In 2009, sampling was conducted on Kehl Canyon, which is upstream of C.C. Cragin; Miller Canyon, which is upstream of C.C. Cragin;, Bear Canyon, which drains into C.C. Cragin; Barbershop Canyon, which is downstream of C.C. Cragin; Dane Canyon, which is a tributary of Barbershop Canyon; Yeager Canyon, which is downstream of C.C. Cragin; West Leonard Canyon, which is downstream of C.C. Cragin; and Dines Tank, which is in Leonard Canyon and drains in downstream of C.C. Cragin (Table 35). None of the rainbow trout captured in these areas over this time period were marked (i.e. stocked) fish. See Figure 33 for areas sampled in the summer of 2009.

Table 35. 2009 Summer Sampling

Location	Species captured
Kehl Canyon	Rainbow Trout, Fathead minnows
Miller Canyon	Little Colorado sucker, bluehead sucker, speckled dace, fathead minnow
Bear Canyon	bluehead sucker, speckled dace, Little Colorado spinedace, fathead minnow (near C.C. Cragin), green sunfish (near C.C. Cragin)
Barbershop Canyon	bluehead sucker, speckled dace, rainbow trout
Dane Canyon	bluehead sucker, speckled dace, Little Colorado spinedace, rainbow

	trout
Yeager Canyon	Little Colorado spinedace
West Leonard Canyon	Little Colorado sucker, bluehead sucker, speckled dace, Little Colorado spinedace
Dines Tank	Little Colorado sucker, bluehead sucker, speckled dace, Little Colorado spinedace, fathead minnow

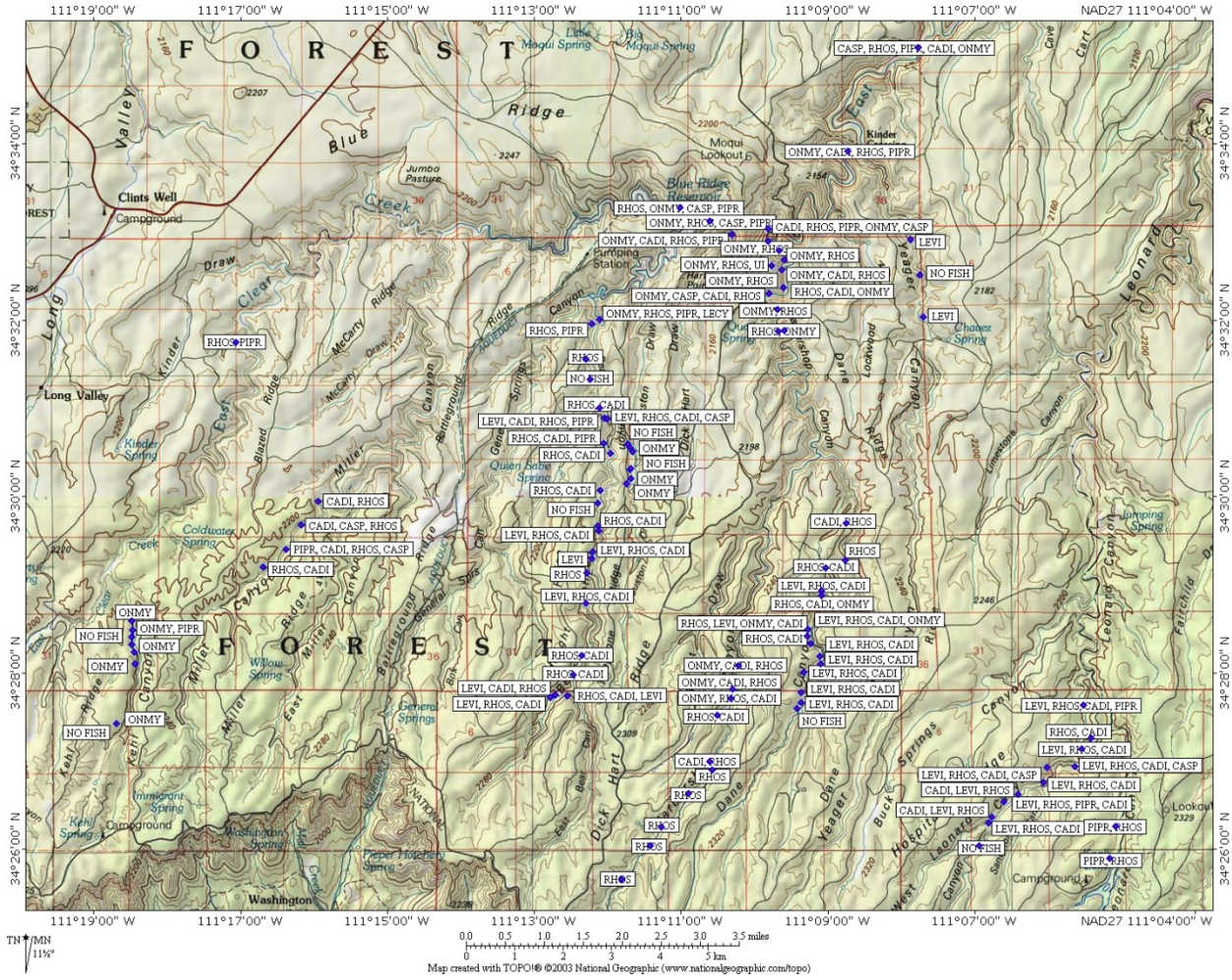

Figure 33. 2009 Stream Fish Sampling.

(LEVI =Little Colorado spinedace, CADI= bluehead sucker, CASP=Little Colorado sucker, ONMY= rainbow trout, SATR=brown trout, PIPR=fathead minnow, LECY=green sunfish)

Consultation Species or Critical Habitat

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.

Potential impacts from the proposed action to Little Colorado Spinedace and critical habitat, Mexican spotted owl, Little Colorado spinedace are covered below and Chiricahua and Northern leopard frogs are also analyzed below 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. Potential impacts to northern Mexican garter snake and narrow-headed garter are addressed in the Clear Creek Complex analysis.

Northern Leopard Frog

Local Analysis: Although C.C. Cragin Reservoir and the Clear Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that frogs will be exposed to fish stocked in C.C. Cragin Reservoir or within the buffered stocking complex is low. There are no historical records for northern leopard frogs at C.C. Cragin Reservoir; however, there are historical records for northern leopard frogs from 3 sites in the complex: Dines Tank (1981), Unmarked Pond (=Cindy's Pond) (1984), and Unnamed Tank (=Borrow Pit South Tank) (1981) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 80 surveys at 44 sites within the buffered stocking complex between 1961 and 2000 (Figure 34; HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs were not observed during subsequent surveys at Dines Tank (1990, 1992, 1993, and 1997) or Unmarked Pond (=Cindy's Pond) (1997 and 1998) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 19 sites within the buffered stocking complex in 2004 and 2007 and did not observe any northern leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). It is likely that that northern leopard frogs no longer occupy Dines Tank, Unmarked Pond (=Cindy's Pond), or Unnamed Tank (=Borrow Pit South Tank) and current presence of crayfish and non-native fish in C.C. Cragin Reservoir, East Clear Creek, and its tributaries make the habitat within the buffered stocking complex less suitable for northern leopard frogs.

Broad Scale Analysis: The likelihood that northern leopard frogs will be exposed to dispersing fish stocked in C.C. Cragin Reservoir or elsewhere in the Clear Creek buffered stocking complex is low. It is likely that northern leopard frogs no longer occupy the upper stretch of Clear Creek or any of its tributaries. In addition, the habitat in these drainages are less suitable for northern leopard frogs due to the presence of crayfish and non-native fish.

Chiricahua leopard frog

Local Analysis: Although C.C. Cragin Reservoir and the Clear Creek buffered stocking complex are within the historical range of the Chiricahua leopard frog, the likelihood that frogs will be exposed to fish stocked in C.C. Cragin Reservoir or within the buffered stocking complex is low. There are no historical records for Chiricahua leopard frogs at C.C. Cragin Reservoir; however, there are historical records for Chiricahua leopard frogs from 3 sites in the complex: East Clear Creek (=Horse Crossing) (1961), Unnamed Tank (=Buck Springs Canyon Tank) (1984), and East Clear Creek (=FS 96/95 JCT) (1972) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 80 surveys at 44 sites within the buffered stocking complex between 1961 and 2000 (Figure 34; HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Chiricahua leopard frogs were not observed during subsequent surveys at East Clear Creek (=Horse Crossing) (1992, 1995, and 1997), Unnamed Tank (=Buck Springs Canyon Tank) (later in 1984, 1997, and 1998), and East Clear Creek (=FS 96/95 JCT) (1987, 1990, 1992, 1993, and 1999) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 19 sites within the buffered stocking complex in 2004 and 2007 and did not observe any Chiricahua leopard frogs (Black Mesa Ranger District, Tonto National Forest). It is likely that Chiricahua leopard frogs no longer occupy East Clear Creek (=Horse Crossing), Unnamed Tank (=Buck Springs Canyon Tank), or East Clear Creek (=FS 96/95 JCT) and current presence of crayfish and non-native fish in C.C. Cragin Reservoir, East Clear Creek, and its tributaries make the habitat within the buffered stocking complex less suitable for Chiricahua leopard frogs.

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs will be exposed to dispersing sport fish from C.C. Cragin Reservoir or elsewhere in the Clear Creek Complex is low. It is likely that Chiricahua leopard frogs no longer occupy Clear Creek or any of its tributaries due to the presence of crayfish and non-native fish which make the habitat less suitable for Chiricahua leopard frogs.

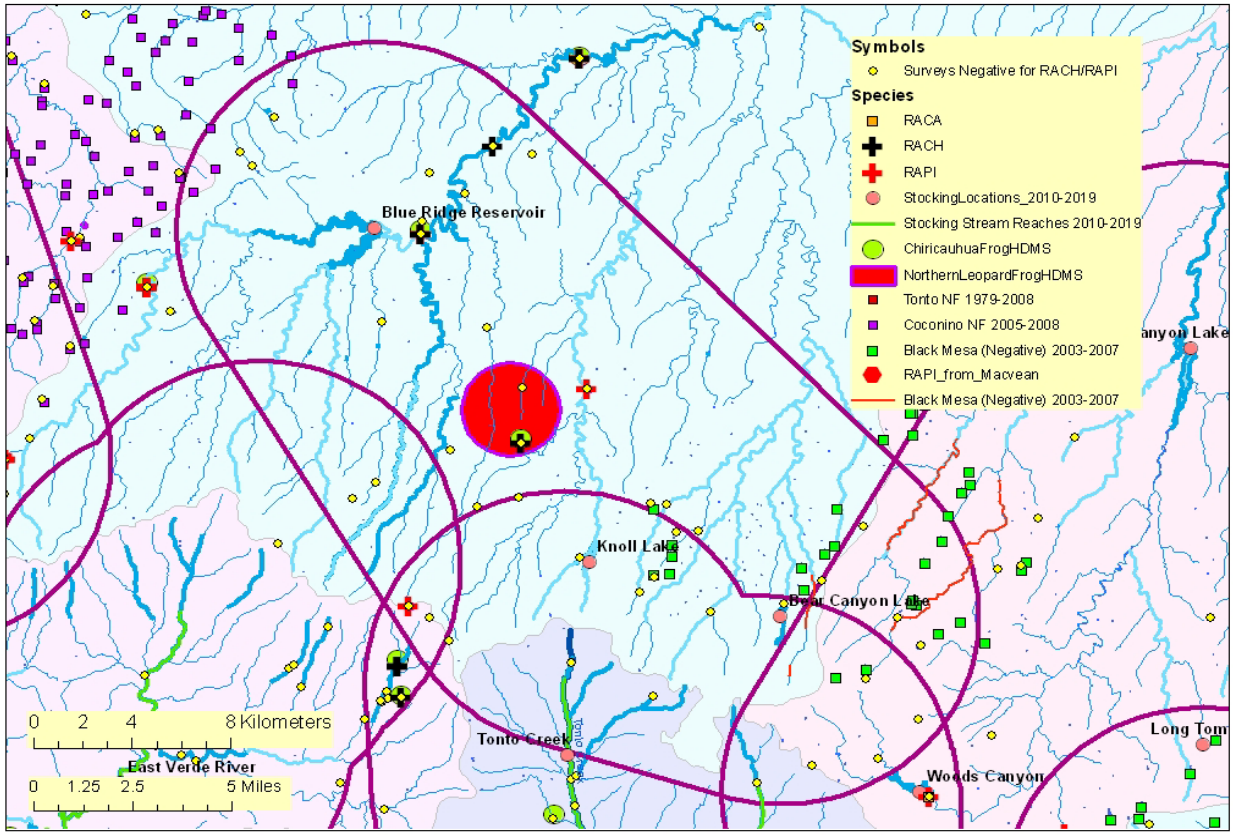

Figure 34. Map of Clear Creek buffered stocking complex:

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).

Colorado Spinedace and Critical Habitat

Little Colorado spinedace currently occupy small, perennial pool habitats in West Leonard Canyon, Leonard Canyon including Dines Tank, Dane Canyon, and Yeager Canyon downstream of C.C. Cragin Reservoir. They are also found in Bear Canyon, which feeds directly into C.C. Cragin. Bear Canyon, Dane Canyon, and Yeager Canyon populations were established by moving spinedace from West Leonard Canyon and Dines Tank to these areas (USFWS 2008e). Further information including critical habitat is discussed in the Clear Creek Complex Analysis.

Potential Impacts

The summary of potential impacts is discussed in the Clear Creek Complex Analysis. Below is specific information pertinent to the site analysis.

Currently, East Clear Creek contains self-sustaining rainbow and brown trout populations. Any rainbow trout stocked and escape from C.C. Cragin Reservoir would be assimilated into the sustaining trout population outside of C.C. Cragin Reservoir. Fish sampling has occurred annually since 1994, except for 2002 when the forest was closed, downstream of the reservoir at 5 stations, along with sampling of the ½ mile directly below the reservoir in years when the reservoir spills. Over all of the years of sampling outside of C.C. Cragin Reservoir, only one stocked rainbow trout has been captured (2005, Below C.C. Cragin Reservoir, refer back to Table 26). All of the other trout collected during sampling have been part of the self sustaining population outside the reservoir. Any rainbow trout stocked that leaves would likely be assimilated into the self-sustaining trout population. Any stocked trout that escapes may prey on eggs, fry, juvenile, and adult fish, if they encounter spinedace.

Trout escaping from C.C. Cragin Reservoir do not appear to enter most of the waters currently containing Little Colorado spinedace, except for the East Clear Creek proper.

Critical habitat

Critical habitat includes eighteen miles of East Clear Creek in Coconino County; eight miles of Chevelon Creek in Navajo County and five miles of Nutrioso Creek in Apache County (USFWS 1987). Constituent elements for critical habitat, include clean, permanent flowing water, with pools and a fine gravel or silt-mud substrate..

Potential Impacts

Currently no barriers exist to prevent upstream movement of trout into designated critical habitat upstream of C.C. Cragin reservoir. Likewise there are no barriers to prevent downstream movement of trout from C.C. Cragin or Nelson Reservoirs other than the dams that impound the stream. When critical habitat areas for spinedace were designated, these areas were reported as "…presently support(ing) healthy self-perpetuating populations of the Little Colorado spinedace" (USFWS 1987). Since that time, habitat degradation, introduction of non-native fishes, and scarcity of water have resulted in low numbers of spinedace in East Clear Creek and Leonard Canyon. In years of high precipitation or during periods of high runoff, trout have the opportunity to move out of stocked area into spinedace habitat. Similarly, spinedace may move into trout areas. In either case, some spinedace could be consumed by rainbow trout or other non-native species. Movement of predaceous fish into designated critical habitat may contribute to the disjunct distribution patterns and retreat of spinedace to suboptimal habitats. Results may include competition, predation, harassment or further loss of spinedace.

Mexican Spotted Owl and Critical Habitat

This stocking location is within Mexican spotted owl (MSO) critical habitat (CH), and is within 4 buffers. Four PACS borders the reservoir. Angler access along the shoreline is difficult based of the topography and vegetation in the area. Most access to the reservoir will be by boat.

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 because 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.

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.

Knoll Lake

Site Description

Knoll lake is a 75 acre lake located on the Coconino National Forest (Figure 35). The lake is about 2 miles north of the Mogollon Rim and about 80 miles southeast of Flagstaff. Knoll Lake impounds East Leonard Canyon, a tributary to Leonard Canyon, and ultimately East Clear Creek. The concrete dam on Knoll Lake was completed in 1963 with a spillway elevation of 7,340 feet and a capacity of 1,575 acre-feet of water at 77 surface acres.

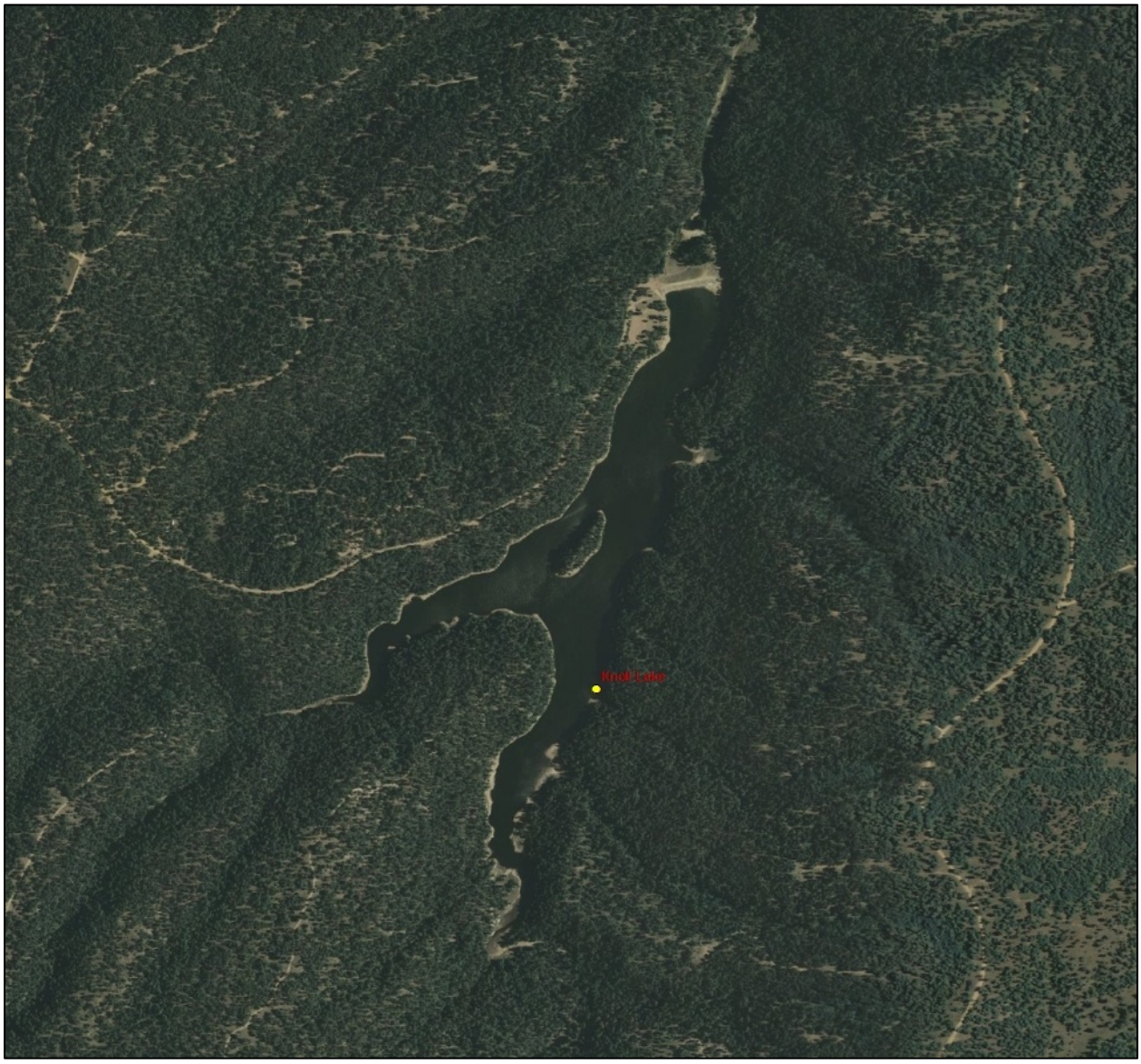

Figure 35. Image of Knoll Lake located in the Clear Creek complex (©2009 ESRI, i-cubed, GeoEye).

Management of Water Body
Since its completion, the reservoir has been managed primarily as a put-and-take rainbow trout fishery. Stockings of rainbow trout first occurred in Knoll Lake in 1965. Brown trout, brook trout, and cutthroat trout have been historically stocked into the reservoir in addition to the rainbow trout (Table 36).

In 1993, the Department's stocking of C.C. Cragin Reservoir and Knoll Lake was part of an interagency Section 7 consultation on the Department's statewide stocking program. Refer to the discussion in C.C. Cragin for information on the previous consultation and provisions there in.

Creel censuses from May to September and fish sampling were conducted on Knoll Lake in 2007. Expansion of the creel census data estimated that 15,559 rainbow trout were caught by anglers with 8,652 being reported as harvested, out of the 20,067 stocked (Benedict et al. 2007).

The emphasis listed in the Integrated Fisheries Management Plan for the LCR Watershed for Knoll Lake is for sport fish management with a desired concept of Intensive Use Fishery (Young et al. 2001).

The primary fishery is a high intensity put-and-take rainbow trout fishery. Catchable rainbow trout are stocked multiple times during the stocking season. The limit on trout is 6 fish from April 1 to August 31, with unlimited harvest from September 1 to March 31.

Table 36. Stocking History

Species	First Year	Last Year	Num. of Stockings	Num. Stocked
Arctic grayling	1968	1969	2	15,000
Brook trout	1964	1983	13	98,500
Brown trout	1969	1993	12	85,999
Cutthroat trout	1992	1992	1	38,000
Rainbow trout	1963	2009	238	729,184
Total			260	947,281

Proposed Action
The Department proposes to stock rainbow trout for the period covered by this consultation.

Catchable rainbow trout will be stocked multiple times from May to July annually but only after the reservoir stops spilling following spring snow melt; numbers of trout stock may be from 0-20,000 fish annually.

Water Distribution/Connectivity
Knoll Lake is located near the Mogollon Rim in the head waters of East Leonard Canyon. Runoff from the surrounding area fills the lake, with the primary runoff occurring during the spring. Surveys of the area located upstream of the reservoir have not shown any permanent water. When Knoll Lake spills it flows down East Leonard Canyon; East Leonard Canyon joins West Leonard Canyon to form Leonard Canyon, which eventually flows into East Clear Creek.

Fish Movement
Knoll Lake is an open system. Fish can move freely upstream of the reservoir, but the inflow sources dry, so survival of fish swimming upstream of the reservoir is unlikely. Fish that go over the spillway may survive in Leonard Canyon and possibly East Clear Creek.

Community Description
Brown trout were present historically, but have not been captured during sampling since pre 1999 (Table 37 through Table 40)(Benedict 2000; Benedict et al. 2005, 2007). Knoll Lake contains bluehead sucker, speckled dace, fathead minnow, and rainbow trout (Table 40) (Benedict et al. 2007).

Table 37. Number of Fish Sampled on Knoll Lake.

Species	1994	1995	1996	1997	1998	1999
rainbow trout	0	0	154	29	3	1
Brown trout	29	16	10	5	3	0

Table 38. Knoll Reservoir Electrofishing Data from 11/15/04; surveys were canceled by snow after 2 stations)

Species	Num.	Catch/min.	% of Total	Mean length (mm)	Min-Max length (mm)	Max Weight (grams)
rainbow trout	5	0.20	50	243.6	220-261	Not measured
fathead minnow	5	0.20	50	Not measured	-	-
Total	10	0.40	-	-	-	-

Total EFFORT=1,510 SECONDS. (25.17 MINUTES)

Table 39. Knoll Reservoir Electrofishing Data on 5/24/05.

Species	Num.	Catch/min.	% of Total	Mean	Min-Max	Max

				length (mm)	length (mm)	Weight (grams)
bluehead sucker	3	0.04	1%	83	76-91	-
fathead minnow	304	4.01	98.4%	-	-	-
speckled dace	2	0.03	.6%	75	70-80	-
Total	309	4.08	-	-	-	-

Total EFFORT SECONDS=4549 (75.82MINUTES)

Table 40. 2007 Knoll Reservoir Electrofishing Data.

Species	Num.	Catch/min	% of Total	Mean length (mm)	Min-Max length (mm)	Max Weight (g)
rainbow trout	47	0.77	3.49	231.40	174-368	455
speckled dace	97	1.60	7.21	72.58	42-114	2
fathead minnow	1,198	19.73	89.07	43.30	26-67	-
bluehead sucker	3	0.05	0.22	47	42-52	-
Total	1,345	21.15	-	-	-	-

Total EFFORT=3,644 SECONDS. (60.73 MINUTES)

Dines Tank is located downstream of Knoll Lake in Leonard Canyon and contains Little Colorado spinedace, speckled dace, bluehead sucker, and Little Colorado sucker (Table 41). The same species are found in West Leonard Canyon upstream of the confluence with East Leonard Canyon.

To date no stocked rainbow trout have been collected downstream of Knoll Lake during post-spilling surveys or during sampling in Dines Tank or West Leonard Canyon.

Table 41. Dines Tank 2006 Fish Sampling.

Species	Num.	% of Total
Speckled dace	50	27.32
Bluehead sucker	14	7.65
Little Colorado Spinedace	119	65.03
Total	183	-

Consultation Species or Critical Habitat
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.

Potential impacts from the proposed action to Mexican spotted owl are covered below and Chiricahua and Northern leopard frogs are also analyzed below 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. Potential impacts to northern Mexican garter snake and narrow-headed garter snakes as well as downstream impacts to Little Colorado Spinedace and critical habitat are addressed in the Clear Creek Complex analysis.

Northern Leopard Frog
Local Analysis: Although Knoll Lake and the Clear Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that frogs will be exposed to fish stocked in Knoll Lake or within the buffered stocking complex is low. There are no historical records for northern leopard frogs at Knoll Lake; however, there are historical records for northern leopard frogs from 3 sites in the complex; Dines Tank (1981), Unmarked Pond (=Cindy's Pond) (1984), and Unnamed Tank (=Borrow Pit South Tank) (1981) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 80 surveys at 44 sites within the buffered stocking complex between 1961 and 2000 (Figure 34**Error! Reference source not found.**; HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs were not observed during surveys at Dines Tank (1990, 1992, 1993, and 1997) or Unmarked Pond (=Cindy's Pond) (1997 and 1998) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 19 sites within the buffered stocking complex in 2004 and 2007 and did not observe any northern leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). It is likely that northern leopard frogs no longer occupy Dines Tank, Unmarked Pond (=Cindy's Pond), or Unnamed Tank (=Borrow Pit South Tank) and current presence of crayfish and non-native fish in the surrounding waters make the habitat within the buffered stocking complex less suitable for northern leopard frogs.

Broad Scale Analysis: The likelihood that northern leopard frogs will be exposed to dispersing fish stocked in Knoll Lake or elsewhere in the Clear Creek buffered stocking complex is low. It is likely that northern leopard frogs no longer occupy the upper stretch of Clear Creek or any of its tributaries. In addition, the habitat in these drainages is less suitable for northern leopard frogs due to the presence of crayfish and non-native fish.

Chiricahua leopard frog

Local Analysis: Although Knoll Lake and the Clear Creek buffered stocking complex are within the historical range of the Chiricahua leopard frog, the likelihood that frogs will be exposed to fish stocked in Knoll Lake or within the buffered stocking complex is low. There are no historical records for Chiricahua leopard frogs at Knoll Lake; however, there are historical records for Chiricahua leopard frogs from 3 sites in the complex: East Clear Creek (=Horse Crossing) (1961), Unnamed Tank (=Buck Springs Canyon Tank) (1984), and East Clear Creek (=FS 96/95 JCT) (1972) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 80 surveys at 44 sites within the buffered stocking complex between 1961 and 2000 (Figure 34; HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Chiricahua leopard frogs were not observed during subsequent surveys at East Clear Creek (=Horse Crossing) (1992, 1995, and 1997), Unnamed Tank (=Buck Springs Canyon Tank) (later in 1984, 1997, and 1998), and East Clear Creek (=FS 96/95 JCT) (1987, 1990, 1992, 1993, and 1999) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 19 sites within the buffered stocking complex in 2004 and 2007 and did not observe any Chiricahua leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). It is likely that Chiricahua leopard frogs no longer occupy East Clear Creek (=Horse Crossing), Unnamed Tank (=Buck Springs Canyon Tank), and East Clear Creek (=FS 96/95 JCT) and current presence of crayfish and non-native fish in the surrounding waters make the habitat within the buffered stocking complex less suitable for Chiricahua leopard frogs.

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs will be exposed to dispersing fish stocked from Knoll Lake or elsewhere in the Clear Creek buffered stocking complex is low. It is likely that Chiricahua leopard frogs no longer occupy the upper stretch of Clear Creek or any of its tributaries. In addition, the habitat in these drainages is less suitable for leopard frogs due to the presence of crayfish and non-native fish.

Mexican Spotted Owl and Critical Habitat

The stocking location is within Mexican spotted owl (MSO) critical habitat (CH), occurs in two individual buffers, and 2 individual PACS border the whole lake. There appears to be opportunity for angler access around the majority of the lake based on topographic 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.

Bear Canyon Lake

Site Description

Bear Canyon Lake is located at the head of Bear Canyon, a tributary of Willow Creek in the Clear Creek drainage; it is not to be confused with a different Bear Canyon upstream of C.C. Cragin Reservoir. Bear Canyon Lake is located towards the bottom of the Clear Creek Complex, as Willow Creek drains into Clear Creek downstream of Knoll Lake and C.C. Cragin Reservoir. However, all the stocked lakes in the Clear Creek Complex, including Bear Canyon Lake, are considered to be in the headwaters of the Clear Creek watershed.

The dam at Bear Canyon Lake was built in 1964 at an elevation of 7560 feet, creating a 60 surface acre lake, with a maximum depth of 50 feet (Figure 36). Bear Canyon Lake is located on the Apache-Sitgreaves National Forest, approximately 36 miles west of Heber-Overgaard. The lake fills and spills every year, maintaining very good water levels and water quality throughout the year. The Department holds the water rights in the lake; thus no water is released for downstream irrigation or domestic use.

Bear Canyon Lake is accessed only by a short hike into Bear Canyon from nearby roads and parking areas on top of the canyon rim. Vehicle access to these trailheads is by all-weather gravel Forest Roads 300 and 89, typically from April through November. The lake freezes and is inaccessible during the winter. Vehicle access on Forest Road 89 ends at 2 dirt parking areas with restrooms on the rim of the canyon on the west side of the lake, with hiking trails down to the lake shore. Bear Canyon Lake campground is also located at the rim of the canyon on Forest Road 89. Other hike-in access points off smaller dirt roads occur at the head of the lake and also on the east side down to the dam. The east side access also includes a gated road to the dam that is used only for stocking and dam maintenance. A primitive boat launch ramp is located at the corner of the dam at the end of this road. Small boats can be carried in by foot on this short road because vehicle access is not allowed, and launched at the dam. Boat motors on Bear Canyon are restricted to electric motors only.

Figure 36. Image of Bear Canyon Lake located in the Clear Creek complex (©2009 ESRI, i-cubed, GeoEye).

Management of Water Body

Bear Canyon Lake is managed as an intensive use, put-and-take cold water fishery, stocked regularly through the summer with catchable size rainbow trout, and occasionally stocked with arctic grayling. The lake is deep with not much primary productivity, thus trout do not grow well in this lake. Catchable size trout are stocked so that anglers can catch and harvest them immediately, without having to rely on growth of fingerling or sub-catchable fish. Sub-catchable and/or fingerling grayling may be stocked because of the limited availability of sizes and numbers of this species. The Integrated Fisheries Management Plan for the LCR Watershed

(Young et al. 2001) identifies the management emphasis for Bear Canyon Lake as intensive use sport fish, with a desired fish species assemblage of rainbow trout and Arctic grayling. This plan also identifies the current stocking regime of catchable rainbow trout and occasional stocking of Arctic grayling.

Bear Canyon Lake was historically managed for featured species Apache trout and Arctic grayling, with special regulations of artificial lure and fly only, and an occasional restricted bag limit for Arctic grayling (Table 42). Apache trout were stocked from 1967 through 1973 when State hatcheries had Apache trout broodstock. Arctic grayling were initially stocked in 1965 and 1966, then sporadically in the 1980s and 1990s. Because of the difficulty in obtaining Arctic grayling and Apache trout for stocking, brook trout were added, beginning in 1977, to help meet angler demand. Rainbow trout and cutthroat trout were similarly added in the late 1980s. Brook trout, cutthroat trout, and Arctic grayling were last stocked in 1995, with only rainbow trout stocked annually since then. Regulations were also changed in 1995 from artificial lure and fly only to statewide regulations with no special size or restricted bag limits. This change was made because the low productivity of the lake did not grow trout well, and the low angler use at the lake. Rainbow trout are available in catchable size and are easily caught by anglers.

Angler use at Bear Canyon Lake increased from 4,659 AUDs in 1985, as determined by the only on-site angler creel survey, to 19,266 AUDs in 2001, as determined by mail-out survey; data also showed that bear Canyon Lake receives moderate use during the summer months, likely limited by access to the lake shore (Pringle 2004).

Bear Canyon Lake is managed as a put-and-take cold water fishery with rainbow trout. To discourage illegal stocking of warm water fish, bag limits on warm water fishes were removed at five other rim lakes, allowing unlimited harvest of bass and catfish on all rim area lakes starting January 1, 2009, as a first step to send the message to anglers that the lake is managed only for trout.

Table 42. Stocking history at Bear Canyon Lake.

Species	First Year	Last Year	Num. of Stockings	Num. Stocked
Apache trout	1967	1973	11	38,956
Arctic grayling	1965	1995	10	85,608
Brook trout	1977	1995	23	274,562
Brown trout	1977	1977	1	500
Cutthroat trout	1965	1995	7	98,248
Rainbow trout	1984	2009	65	168,191

Total	111	657,237

Proposed Action

The Department proposes to stock rainbow trout and Arctic grayling for the period covered by this consultation.

Catchable rainbow trout would be stocked multiple times from April through September each year; numbers of trout stocked may be from 0 to 30,000 trout annually.

Arctic grayling may be stocked multiple times as fingerlings or sub-catchables from April through September each year; numbers of grayling may be from 0 to 15,000 fish annually.

Water Distribution / Connectivity

There is no permanent inflow to the lake. There are two very small intermittent drainages that flow into the upper end of the lake in the spring during snowmelt runoff. These drainages are dry for the remainder of the year. The lake gets nearly all its water from winter snowpack and snowmelt runoff in the spring. The lake fills and spills every spring, then the water level in the lake drops slowly but steadily after the snowmelt runoff subsides, and the lake does not fill again until the following spring.

When the lake spills in the spring, water flows continuously down Bear Canyon for 4.2 miles to Willow Creek. Bear Canyon is mostly dry outside of the spring runoff season, with occasional isolated pools, which are typically small and shallow, capable of holding only fathead minnow, as found during a survey through the canyon in 1999.

In Willow Creek, water flows continuously during the spring runoff season for 25.2 miles to Clear Creek. For much of the year outside of spring runoff, Willow Creek is mostly dry throughout its length to Clear Creek. Exceptions include a fair amount of continuously flowing water in the 2.7 miles from the confluence of Bear Canyon downstream to the confluence of Gentry Canyon; however, most of this water appeared not to be permanent and was very shallow and exposed. Gentry Canyon is a major tributary that contributes water to Willow Creek, and deep permanent pools are present from this point downstream to Clear Creek. There are short stretches of flowing water connecting some of the deep permanent pools in the 17.6 mile reach from Gentry Canyon downstream to Cabin Draw, but still having a fair amount of dry streambed in places. The very lower 4.3 miles of Willow Creek are mostly dry, with occasional isolated deep pools that did not appear as permanent as those pools in the middle reach.

After the confluence of Willow Creek and Clear Creek, the stream flows on to Clear Creek Reservoir, 40 miles away. Clear Creek Reservoir then drains into the LCR less than a mile downstream of the reservoir.

There are no irrigation or other releases from Bear Canyon Lake dam. Water flows downstream over the spillway only during spring runoff, during the months of March and April, occasionally in May, then does not spill the rest of the year.

Fish Movement

The only barriers to downstream movement are long stretches of ephemeral stream channel in Willow Creek and Clear Creek, which are effective at keeping trout from moving around after the spring runoff ceases; however, these long stretches would not be an effective barrier during the spring runoff when the water is all continuous.

Stocked trout may move upstream into the two very small drainages during spring runoff only, but will die when the drainages dry up during the summer.

Stocked trout have the ability to move downstream over the spillway into Bear Canyon, and throughout Willow Creek and into Clear Creek during spring runoff when everything is connected. After spring runoff ceases, trout do not have the ability to leave the reservoir, or move around within or from Bear Canyon and Willow Creek. There are few opportunities for trout to hold over within Bear Canyon, or within Willow Creek from the Bear Canyon confluence down to the Gentry Canyon confluence, because of the shallow and exposed habitat present in those reaches (Lopez et al. 1999b). However, brook trout were collected in 1991 at Mule Crossing, upstream of the confluence with Bear Canyon (Dorum and Young 1995), indicating that some suitable habitat for trout exists in that area. Trout could holdover in the deep perennial pools within the middle and lower reaches of Willow Creek downstream of Gentry Canyon confluence; some of the perennial pools are connected by low flow in the middle reach, although most are isolated, especially in the lower reach.

Trout moving downstream into Willow Creek and towards Clear Creek would have deep perennial pools to occupy; however, they do not appear to persist well in those perennial pools, assuming they do exit the reservoir; a thorough survey of 70 sites in Willow Creek in 1997 found no rainbow trout. However, five brook trout ranging in size from 92 to 105 mm were found in one pool. Other surveys at Wiggins Crossing within the middle reach in 1991, 1993, and 2009 found only native fishes (and fathead minnow in 1991) (Table 43).

Table 43. Summary of fish collected at Wiggins Crossing.

Species	June 1991	August 1993	June 2009
Speckled dace	108	164	346
Bluehead sucker	0	129	127
Fathead minnow	7	0	0
Unid. Sucker	0	1	0
Total fish	115	294	473

Community Description

Bear Canyon Lake contains stocked rainbow trout and naturally reproducing fathead minnow and crayfish. The lake no longer contains Arctic grayling, Apache trout or brook trout because they have not been stocked since 1995. Trout do not reproduce in the lake. One adult brook trout remaining form the last stocking was collected in 2000 (Table 44).

Table 44. Survey history at Bear Canyon Lake.

Species	1999	2000	2001	2002	2003
Rainbow trout	23	3	28	13	9
Brook trout	0	1	0	0	0

Bear Canyon downstream of the lake contained fathead minnow, rainbow trout, and crayfish when surveyed in June 1999 (Table 45). The one rainbow trout was caught in a small pool at the bottom of the spillway, obviously coming from the reservoir, but the remainder of Bear Canyon was not very suitable for holding trout during this survey.

Table 45. Summary of fish survey in Bear Canyon in 1999.

Species	Num. Collected	Size
Fathead minnow	6	Not recorded
Rainbow trout	1	10 inches

Willow Creek, downstream of Bear Canyon, contains speckled dace, bluehead sucker, fathead minnow, and few brook trout (Lopez et al. 1999b; Table 46). These surveys were conducted by AGFD using gear suitable for the habitat, including backpack electrofisher, seines, and gill nets. A small number of speckled dace were collected upstream of the Gentry Canyon confluence, within the reach where Bear Canyon drains into Willow Creek. Dorum and Young (1995) found 11 brook trout in this general area in 1991, specifically at Mule Crossing upstream of the Bear Canyon confluence, but found no fish during surveys in the same location in 1993 and 1994.

The middle reach from Gentry Canyon confluence downstream to Cabin Draw contained primarily native fishes; speckled dace and bluehead sucker. In a thorough survey in 1997, however, 5 small brook trout were found in one isolated pool. Other surveys at Wiggins Crossing within this reach in 1991, 1993, and 2009 found mostly native fishes and a small number of fathead minnow, but no trout (Table 43).

The lower reach was dominated by many fathead minnow, with very few native fish, in 1997. This reach also contained numerous crayfish and tiger salamander larvae.

Table 46. Summary of fish collected throughout Willow Creek in 1997.

Reach	Species	Num. Collected	Average length (mm)	Average weight (g)	Size range (mm)
Clear Creek to Cabin Draw confluence (Reach 1)	Fathead minnow	2195	47	1	15-75
	Speckled dace	2	51	2	37-65
	Bluehead sucker	1	100	10	100
	Total fish	2198	-	-	-
Cabin Draw confluence to Gentry Canyon confluence (Reach 2)	Speckled dace	1343	43	2	11-97
	Bluehead sucker	515	51	4	15-170
	Brook trout	5	97	11	92-105
	Total fish	1863	-	-	-
Gentry Canyon confluence upstream for 10,617 meters (Reach 3)	Speckled dace	16	75	9	51-108
	Total fish	16	-	-	-
Reach 4	No fish				
Reach 5	No fish				
Stream Total	Fathead minnow	2195	47	1	15-75
	Speckled dace	1358	44	2	11-108
	Bluehead sucker	516	51	4	15-170
	Brook trout	5	97	11	92-105
	Total fish	4074	-	-	-

Fathead minnows are well established and reproducing in the lower reach of Willow Creek and within Bear Canyon Lake. Native fishes speckled dace and bluehead sucker are well established and reproducing in the middle reach of Willow Creek, from the confluence of Gentry Canyon downstream to Cabin Draw. One rainbow trout has been found downstream of Bear Canyon Lake, in the pool immediately below the dam. More rainbow trout have likely come over the dam, but none have been caught within Willow Creek, or downstream in Clear Creek during surveys in 1999 and 2000 (AGFD unpublished surveys), and 2004-2005 (Clarkson and Marsh 2005).

Spinedace historically inhabited Willow Creek but have not been found since 1966. Spinedace currently occupy small, perennial pool habitats in West Leonard Canyon, Leonard Canyon including Dines Tank, Bear Canyon, Dane Canyon, and Yeager Canyon.

Consultation Species or Critical Habitat

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.

Potential impacts from the proposed action to Chiricahua and Northern leopard frogs are analyzed below 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. Potential impacts to northern Mexican garter snake and narrow-headed garter snakes as well as downstream impacts to Little Colorado Spinedace and critical habitat are addressed in the Clear Creek Complex analysis.

Northern Leopard Frog

Local Analysis: Although Bear Canyon Lake and the Clear Creek buffered stocking complex are within the historical range of the northern leopard frog, the likelihood that frogs will be exposed to fish stocked in Bear Canyon Lake or within the buffered stocking complex is low. There are no historical records for northern leopard frogs at Bear Canyon Lake; however, there are historical records for northern leopard frogs from 3 sites in the complex: Dines Tank (1981), Unmarked Pond (=Cindy's Pond) (1984), and Unnamed Tank (=Borrow Pit South Tank) (1981) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 80 surveys at 44 sites within the buffered stocking complex between 1961 and 2000 (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs were not observed during surveys at Dines Tank (1990, 1992, 1993, and 1997) or Unmarked Pond (=Cindy's Pond) (1997 and 1998) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 19 sites within the buffered stocking complex in 2004 and 2007 and did not observe any northern leopard frogs (based on data provided by the Black Mesa Ranger District, Tonto National Forest). It is likely that northern leopard frogs no longer occupy Dines Tank, Unmarked Pond (=Cindy's Pond), or Unnamed Tank (=Borrow Pit South

Tank) and current presence of crayfish and non-native fish in Bear Canyon Lake, Willow Creek, and its tributaries make the habitat within the buffered stocking complex less suitable for northern leopard frogs.

Broad Scale Analysis: The likelihood that northern leopard frogs will be exposed to dispersing fish stocked in Bear Canyon Lake or elsewhere in the Clear Creek buffered stocking complex is low. It is likely that northern leopard frogs no longer occupy the upper stretch of Clear Creek or any of its tributaries. In addition, the habitat in these drainages is less suitable for northern leopard frogs due to the presence of crayfish and non-native fish.

Chiricahua Leopard Frog

Local Analysis: Although Bear Canyon Lake and the Clear Creek buffered stocking complex are within the historical range of the Chiricahua leopard frog, the likelihood that frogs will be exposed to fish stocked in Bear Canyon Lake or within the buffered stocking complex is low. There are no historical records for Chiricahua leopard frogs at Bear Canyon Lake; however, there are historical records for Chiricahua leopard frogs from 3 sites in the complex: East Clear Creek (=Horse Crossing) (1961), Unnamed Tank (=Buck Springs Canyon Tank) (1984), and East Clear Creek (=FS 96/95 JCT) (1972) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). There have been 80 surveys at 44 sites within the buffered stocking complex between 1961 and 2000 (Figure 34; HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Chiricahua leopard frogs were not observed during subsequent surveys at East Clear Creek (=Horse Crossing) (1992, 1995, and 1997), Unnamed Tank (=Buck Springs Canyon Tank) (later in 1984, 1997, and 1998), and East Clear Creek (=FS 96/95 JCT) (1987, 1990, 1992, 1993, and 1999) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). In addition, the Black Mesa Ranger District, Tonto National Forest, surveyed 19 sites within the buffered stocking complex in 2004 and 2007 and did not observe any Chiricahua leopard frogs (Black Mesa Ranger District, Tonto National Forest). It is likely that Chiricahua leopard frogs no longer occupy East Clear Creek (=Horse Crossing), Unnamed Tank (=Buck Springs Canyon Tank), and East Clear Creek (=FS 96/95 JCT) and current presence of crayfish and non-native fish in Bear Canyon Lake, Willow Creek, and its tributaries make the habitat within the buffered stocking complex less suitable for Chiricahua leopard frogs.

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs will be exposed to dispersing fish stocked from Bear Canyon Lake or elsewhere in the Clear Creek buffered stocking complex is low. It is likely that Chiricahua leopard frogs no longer occupy the upper stretch of Clear Creek or any of its tributaries. In addition, the habitat in these drainages is less suitable for leopard frogs due to the presence of crayfish and non-native fish.

CLEAR CREEK COMPLEX ANALYSIS

The Clear Creek Complex consists of 3 reservoirs found near the Mogollon Rim in north central Arizona; C.C. Cragin Reservoir, Knoll Lake, and Bear Canyon Lake. All drain into Clear Creek, which is a tributary to the Little Colorado River (LCR). Downstream of these three stocked reservoirs, Clear Creek leaves National Forest ownership and enters checker-boarded state and private lands. Throughout the next 40+ miles the stream is ephemeral or interrupted perennial with isolated pools. Clear Creek drains into Clear Creek Reservoir near Winslow. Additional information on this area is provided in the section on Clear Creek Reservoir. Water that spills from Clear Creek Reservoir drains into the LCR and is discussed later under the LCR Watershed analysis.

Water Distribution / Connectivity

Most of the headwaters of the Clear Creek watershed are found near the Mogollon Rim, beginning with the headwaters of East Clear Creek upstream of C.C. Cragin Reservoir, including Kehl Canyon and Miller Canyon. Bear Canyon also drains into C.C. Cragin Reservoir. In the summer the drainages upstream of C.C. Cragin Reservoir vary from often dry during drought years to only isolated pools with no surface flow during wetter summers. Water from seepage around the dam at C.C. Cragin Reservoir and from a 2 inch pipe provide permanent flow for East Clear Creek, which extends from the dam downstream to Macks Crossing. Tributaries to East Clear Creek in this section of the creek include Barbershop Canyon (Dane Canyon is a tributary of Barbershop Canyon) and Yeager Canyon, both of which flow during spring runoff but are often reduced to dry stretches with isolated pools in the summer. Downstream of Macks Crossing, East Clear Creek dries to isolated pools during dry years. Knoll Lake is located on East Leonard Canyon, and when it spills it flows down East Leonard Canyon, which joins with West Leonard Canyon to form Leonard Canyon. Leonard Canyon is a tributary of East Clear Creek with the confluence being located about 2 to 3 miles downstream of Macks Crossing. These canyons flow during spring runoff but are usually reduced to dry stretches and or isolated pools in the summer. Dines Tank is an example of an isolated pool in the bottom of Leonard Canyon. Bear Canyon Lake is located on Willow Creek; when it spills, it flows down Willow Creek to its confluence with East Clear Creek downstream of Leonard Canyon. The Willow Creek Drainage Flows during spring runoff, but is often reduced to dry stretches and or isolated pools during the summer. East Clear Creek and Willow Creek join to form Clear Creek. All of these waters are connected except for fish moving upstream from below the dams to above the dams.

Fish Movement

Fish can move upstream of all of the stocking sites, though most of the waters go dry or at the most are restricted to isolated pools during the summer. Fish can move downstream of the reservoirs during runoff events that cause the reservoirs to spill, and move throughout the watershed unless natural barriers are present to prevent fish from moving. To date only one stocked rainbow trout has been captured downstream of the reservoirs since sampling began downstream of Knoll and C.C. Cragin Reservoir in 1995.

Community Description
Fish found in the reservoirs include rainbow trout, green sunfish, largemouth bass, yellow perch, yellow bullhead, fathead minnow, golden shiner, crayfish, speckled dace, bluehead sucker in Knoll Lake, and Little Colorado Sucker in C.C. Cragin Reservoir. Fish found in the East Clear Creek and Clear Creek proper include rainbow trout, brown trout, green sunfish, fathead minnow, crayfish, speckled dace, and roundtail chub from about Macks Crossing downstream; in addition, bluehead sucker, Little Colorado sucker, and Little Colorado spinedace are present. Little Colorado spinedace, Little Colorado sucker, bluehead sucker, and speckled dace are also present in Dane Canyon, Bear Canyon, Yeager Canyon, West Leonard Canyon, and Dines Tank. Naturally spawned rainbow trout are also found in Dane Canyon, Barbershop Canyon, Kehl Canyon, West Leonard Canyon, and Leonard Canyon. Green sunfish and fathead minnows were also found in 2009 in Lower Bear Canyon near where it enters C.C. Cragin Reservoir. Narrow-headed garter snakes are not known from the LCR (see analysis below). Although northern Mexican garter snakes have been observed in the LCR watershed near Lakeside, they are not known from Clear Creek (see analysis below).

Consultation Species or Critical Habitat
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.

Potential impacts from the proposed action to northern Mexican garter snake and narrow-headed garter snakes, Little Colorado Spinedace and critical habitat and roundtail chub are addressed below in the Clear Creek Complex analysis.

Potential impacts to Chiricahua and northern leopard frogs was discussed at the site specific analysis and includes the broader scale analysis.

Little Colorado Spinedace and Critical Habitat
Little Colorado spinedace currently occupy small, perennial pool habitats in West Leonard Canyon, Leonard Canyon including Dines Tank, Dane Canyon, and Yeager Canyon downstream of C.C. Cragin Reservoir. They are also found in Bear Canyon, which feeds directly into C.C. Cragin. The populations and available habitat are all relatively small throughout the watershed, but West Leonard Canyon and Leonard Canyon continue to be one of the most dependable

locations to find spinedace in the entire watershed. Bear Canyon, Dane Canyon, and Yeager Canyon populations were established by moving spinedace from West Leonard Canyon and Dines Tank to these areas (USFWS 2008e).

Additionally, it has been reported spinedace populations appear and disappear over short time frames, which makes specific determination on status and exact location of populations difficult to determine. This makes management of the species difficult, because responses of the population to changes within the watershed cannot be measured with certainty (USFWS 2008e).

Currently, East Clear Creek and Leonard Canyon contain self-sustaining rainbow trout and brown trout populations.

Potential Impacts

To date, no stocked fish have been observed outside of Knoll Lake. Should any stocked trout exit Knoll Lake, competition is potentially possible (refer to the interactions discussed in Chapter 4). Any rainbow trout stocked that leave Knoll lake would likely be assimilated into self-sustaining trout populations in East Clear Creek. Any stocked trout that escape may prey on eggs, fry, juvenile, and adult fish, if they encounter spinedace.

Any rainbow trout or arctic grayling stocked that were to escape from Bear Canyon Lake during natural events would not likely persist for long periods of time, and would not become established due to high water temperatures and drying conditions. Surveys completed by AGFD in over 70 locations in Willow Creek in 1997 did not find any rainbow trout. Additional surveys of the confluence of Willow and Gentry creek in 2006 also did not detect rainbow trout. In addition, AGFD surveys in 2000, 2004, and 2005 in Clear Creek near the confluence with Willow Creek did not find any rainbow trout.

Trout and/or arctic grayling escaping Bear Canyon Lake may temporarily compete for food and space and potentially prey on eggs, fry, and juvenile fish. Due to the intermittent nature of the stream and the lack of evidence supporting long-term survival of trout once they have escaped Bear Canyon Lake, it is unlikely these fish would persist long enough to have opportunity to ascend into Leonard Canyon, to occupied spinedace habitat, or into East Clear Creek to critical habitat.

Potential impacts to Little Colorado spinedace from stocking fish in C.C. Cragin reservoir are discussed in the C.C. Cragin reservoir section above.

Robinson et al. (2000) reported that diet overlap between rainbow trout and Little Colorado spinedace was low in both experimental and natural settings, indicating a low potential for diet overlap in general. Competition is most likely to occur between small trout and small bodied fish and less likely to occur between larger bodied trout (Robinson et al. 2000). Because stocked trout

are larger bodied, competition is unlikely. Any rainbow trout stocked that leaving stocking locations would likely be assimilated into self-sustaining trout populations. Any stocked trout that escape may prey on eggs, fry, juvenile, and adult fish, if they encounter spinedace.

Arctic grayling escaping may temporarily compete for food and space and potentially prey on eggs, fry, and juvenile fish. Due to the intermittent nature of the stream and the lack of evidence supporting long-term survival of grayling once they have escaped, it is unlikely these fish would persist long enough to have opportunity to ascend into the Leonard Canyon complex, to occupied spinedace habitat, or into East Clear Creek to critical habitat.

Critical habitat

Critical habitat includes eighteen miles of East Clear Creek in Coconino County; eight miles of Chevelon Creek in Navajo County and five miles of Nutrioso Creek in Apache County (USFWS 1987). Constituent elements for critical habitat, include clean, permanent flowing water, with pools and a fine gravel or silt-mud substrate.

Potential Impacts

There are no barriers to prevent downstream movement of trout from Bear Canyon or Knoll Lake other than the dams that impound the stream. When critical habitat areas for spinedace were designated, these areas were reported as "…presently support(ing) healthy self-perpetuating populations of the Little Colorado spinedace" (USFWS 1987). Since that time, habitat degradation, introduction of non-native fishes, and scarcity of water have resulted in low numbers of spinedace in East Clear Creek and Leonard Canyon. In years of high precipitation or during periods of high runoff, trout have the opportunity to move out of stocked area into spinedace habitat. Similarly, spinedace may move into trout areas. In either case, some spinedace could be consumed by rainbow trout or other non-native species. Movement of predaceous fish into designated critical habitat may contribute to the disjunct distribution patterns and retreat of spinedace to suboptimal habitats. Results may include competition, predation, harassment or further loss of spinedace.

Potential impacts to Little Colorado Spinedace from stocked fish at C.C. Cragin reservoir are addressed in the C.C. Cragin reservoir section above.

Roundtail Chub

Known populations of roundtail chub in the Clear Creek watershed are in Clear Creek downstream of the National Forest boundary, to near Clear Creek Reservoir.

Potential Impacts

Currently, East Clear Creek contains self-sustaining rainbow trout and brown trout populations. Any rainbow trout stocked that were to escape from stocking sites during natural events would

most likely be incorporated into the self sustaining trout population. Rainbow trout are not thought to persist in the majority of the occupied chub habitat in the lower elevations of Clear Creek due to warm water temperatures, which makes for unsuitable habitat. However, trout escaping from the 3 reservoirs may temporarily compete for food and space and potentially prey on eggs, fry, and juvenile fish if they are able to survive the transport into occupied roundtail chub habitat.

Northern Mexican Garter Snake

Stocking Complex Analysis: There are no verified records of northern Mexican garter snakes from this part of the watershed or the mainstem LCR. Although no systematic surveys for garter snakes have been conducted in this area, within the 20 km buffer established for this stocking complex, there is one questionable historical (1933) record from Hart Canyon, a tributary of Willow Creek (approx. 2.2 air mi NW of Woods Canyon Lake and approx. 6.2 air mi E of Knoll Lake), for which Holycross et al. (2006) provide 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." The presence of non-native fishes and crayfish in Cragin Reservoir, Knoll Lake, Bear Canyon Lake, and the Clear Creek complex makes this habitat less suitable for the species. Therefore, it is unlikely that northern Mexican garter snakes will be exposed to fish stocked into the Clear Creek complex.

Downstream Analysis: There are no records of northern Mexican garter snakes downstream of the Clear Creek complex (HDMS, Arizona Game and Fish Riparian Herpetofauna Database). Within the LCR watershed, the only northern Mexican garter snake records are from and near Lake of the Woods (1942, 1949), which is more than 150 river km upstream of the confluence of Clear Creek and the LCR, and none have been detected there since (Holycross et al. 2006). Therefore, it is unlikely that northern Mexican garter snakes will be exposed to dispersing stocked sport fish.

Narrow-headed Garter Snake

Stocking Complex Analysis: There are no verified narrow-headed garter snake records from the Clear Creek complex, though the area has not been systematically surveyed for garter snakes. Unidentified garter snakes were observed during surveys in 1999 and 2000 and were likely *T. cyrtopsis* (known from Wildcat Canyon) or *T. elegans* (common in the area); they were unlikely to be narrow-headed garter snakes. There is an unvouchered report of a narrow-headed garter snake in Hart Canyon, a tributary of Willow Creek (approx. 2.2 air mi NW of Woods Canyon Lake and approx. 6.2 air mi E of Knoll Lake) (HDMS); Holycross et al. (2006) consider this

report a misidentification. Therefore, it is unlikely that narrow-headed garter snakes will be exposed to sport fish stocked in the complex.

Downstream Analysis: There are no known records of narrow-headed garter snakes downstream of the Clear Creek complex. Although stocked fish may disperse up or downstream, it is unlikely that narrow-headed garter snakes will be exposed.

Clear Creek Reservoir

Site Description

The reservoir is located about 6 miles southwest of Winslow at an elevation of 4870 feet (Figure 37). Clear Creek Reservoir is a 45 acre reservoir impounding lower Clear Creek approximately one mile above its confluence with the Little Colorado River (Figure 38, Figure 39, and Figure 40). The dam and water rights are managed by the City of Winslow for irrigation and domestic water use. The reservoir is permanent and fills and spills annually during the spring snowmelt runoff in the Clear Creek watershed. The lake level can drop several feet through the year as water is released to the City of Winslow. Clear Creek Reservoir is accessed year around by paved Highway 99. A county park, McHood Park, is located at the reservoir with paved parking, picnic facilities, restrooms on the east side, and a boat launch ramp and picnic/camping sites on the west side, with the facilities managed as a City of Winslow town park.

Management of Waterbody

Clear Creek Reservoir is managed primarily for a naturally reproducing warmwater fishery because the lake gets very warm in the summer. Largemouth bass, sunfish, channel catfish, black bullheads, and common carp reproduce naturally in the reservoir. Catchable size rainbow trout are stocked in the spring/early summer after the lake stops spilling when the water quality is still cool enough to support trout survival. Channel catfish and brown trout were stocked annually during the 1980s and early 1990s. However, catchable rainbow trout have been the only species stocked in Clear Creek Reservoir since 1993 (Table 47).

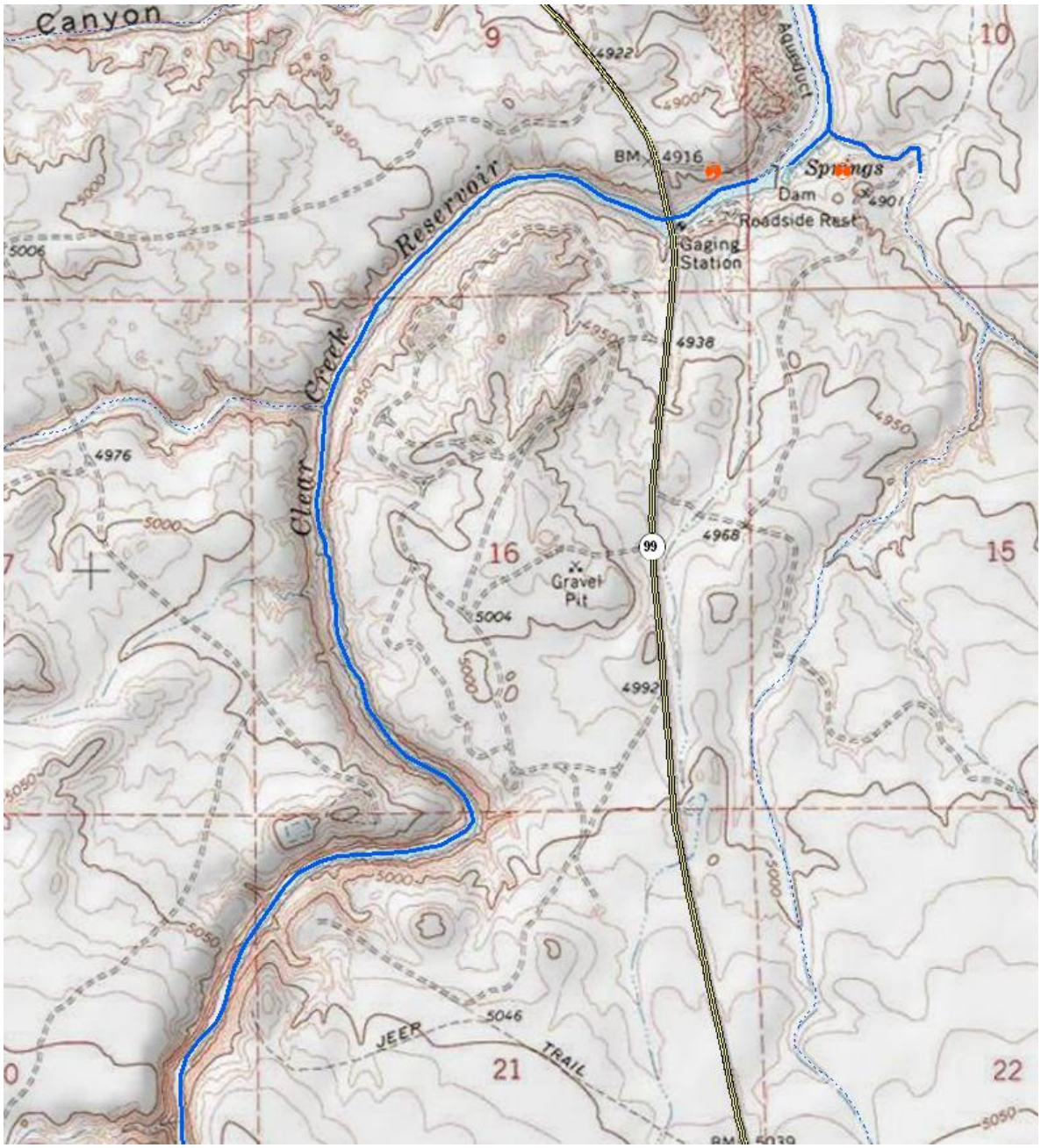

Figure 37. Map of Clear Creek Reservoir.

Figure 38. Clear Creek Reservoir, lower shallow portion

Figure 39. Clear Creek Reservoir at recreation site

Figure 40. Clear Creek Reservoir in upper canyon portion

The primary fishery is self-sustaining warm water with the secondary fishery being cold water for rainbow trout. The primary objective is naturally reproducing warm water fishery, while the secondary objective is put-and-take intensive use coldwater fishery for stocked rainbow trout. The warm water fishery is year around, while the coldwater put-and-take fishery is late spring, early summer (April through June) only.

Stocked trout are mostly caught out quickly and likely do not survive through the summer as they are not detected in surveys above or below the reservoir (Table 49, Table 50, Table 51 and Table 52). Water temperatures in Clear Creek Reservoir reach 26.7 degrees C according to M. Lopez (pers. comm.), exceeding the upper critical thermal tolerances for trout which is 25^{o}C (Raleigh et al 1984). The timing of the stocking after the spill helps to keep the trout from escaping the reservoir. The fish cannot go downstream into the LCR after it stops spilling, and they would have a difficult time going far upstream after the flows decrease from the high snowmelt runoff because of the shallow channel morphology and elevated water temperatures.

Table 47. Clear Creek Reservoir stocking history.

Species	First Year	Last Year	Num. of Stockings	Num. Stocked
Bluegill	1936	1936	2	18,110
Brown trout	1953	1992	8	52,600
Channel catfish	1974	1992	9	29,925
Largemouth bass	1935	1975	9	35,650
Rainbow trout	1953	2009	227	569,826
Total			255	706,111

The Integrated Fisheries Management Plan for the Little Colorado River Watershed (Young et al. 2001) identifies the management emphasis for Clear Creek Reservoir as intensive use coldwater and self sustaining warmwater sport fish. The desired species assemblage is identified as rainbow trout, largemouth bass, bluegill, channel catfish, and Little Colorado sucker. The warmwater fishes reproduce naturally within the reservoir and do not need to be stocked.

Angler creel surveys were conducted on site from January through December in 1999. These surveys showed 3,992 AUDs at the reservoir, with 9.1% of the overall catch of rainbow trout. Bullheads consisted of 57.2% of the angler catch and sunfish were 22.3% of the catch. Trout were caught in April through July, from stockings that occurred in April and May. One trout was checked in November; however this was likely from a stocking event that occurred in October of that year, not from earlier stocked trout holding over through the summer. Trout are no longer stocked in the fall. An angler mail out survey in 2001 showed 1,938 AUDs at Clear Creek Reservoir (Pringle 2004).

Proposed Action
The Department proposes to stock rainbow trout for the period covered by this consultation.

Catchable rainbow trout would be stocked from April through June annually following spring runoff; numbers of trout stocked may be from 0 to 15,000 trout annually. Trout may be stocked multiple times per season, but focused within the late spring, early summer period following the spring runoff but before the warm water temperatures of the hot summer months.

Water Distribution/Connectivity
Clear Creek is perennial where it enters the reservoir, with a few cubic feet per second of flow (Clarkson and Marsh 2005a). The headwaters of the Clear Creek watershed are cold, perennial streams flowing through Ponderosa pine forest, while the middle reaches are seasonally intermittent in deep, steep walled canyons (Clarkson and Marsh 2005a). The main upper tributaries Leonard Canyon and East Clear Creek are located approximately 63 miles upstream of Clear Creek Reservoir. Surface water in the lower reaches of Clear Creek is intermittent in the upper few kilometers, but perennial flows are gradually sustained in a deep slot canyon toward the lower end and into the reservoir (Clarkson and Marsh 2005a). The source of this perennial flow results from the incision of the Clear Creek channel into the C-aquifer (Clarkson and Marsh 2005b). The watershed produces a heavy spring snowmelt runoff from the headwaters into the reservoir, which fills the reservoir and causes it to spill every spring. Following the snowmelt runoff, much of Clear Creek is reduced to dry streambed with isolated pools, except the perennial portion just above the lake. Water level in the lake begins dropping after the snowmelt runoff ceases and the City of Winslow begins drawing water from the reservoir.

Outflows from Clear Creek Reservoir occur when the lake spills over the spillway (Figure 41) in the spring or when the City of Winslow draws water for irrigation and domestic use. The spills occur only in the spring during snowmelt runoff, flowing down the very lower portion of Clear Creek for 0.5 miles to the confluence with the Little Colorado River, then down the Little Colorado River for approximately 167 miles to the Colorado River. At base flow, the middle Little Colorado River downstream of the Clear Creek confluence flows for a short distance and disappears into the sand near or just downstream of Winslow. The lake occasionally receives a lot of sediment washing down the narrow canyon during extreme flood events and the sediment is deposited in the wider part of the lake as the water slows down coming out of the canyon.

Figure 41. Clear Creek Reservoir spillway

The Little Colorado River upstream of the confluence with Clear Creek is typically perennial for 9 miles up to the confluence with Chevelon Creek due to the perennial flows in lower Chevelon Creek. The Little Colorado River upstream of Chevelon Creek is often dry at base flows and flows only during spring runoff and heavy monsoon events.

Surface water from the Clear Creek Reservoir does not reach the Little Colorado River when the reservoir is not spilling. Withdrawals from the reservoir by the City of Winslow go directly into a pipe that leads to the city and is not connected to the Little Colorado River. The timing and duration of withdrawals by the city is unknown. Trout may escape Clear Creek Reservoir

through irrigation releases; however, they would be transported within the pipe system to the town with no return possible to the Little Colorado River or release to other aquatic habitats.

Fish Movement

During the stocking season, most of the stocked trout are caught quickly, and the remainders likely do not survive in the reservoir through the hot months of July and August. Consequently, very few if any trout are expected to be present in the reservoir when it spills in the spring. Trout were historically stocked in the spring and fall, but now only stocked in the late spring or early summer to minimize overwintering and presence of trout when the reservoir spills in the spring. It is possible a trout might persist in the upper canyon portion of the reservoir, where water temperatures may be lower and which might allow over summer survival. Water temperatures are not measured in the canyon portion because of accessibility, thus, this information is not known.

If trout were present in the reservoir in the spring, they could potentially move upstream in Clear Creek. There are no permanent structural physical barriers to upstream movement of stocked trout between the reservoir and spinedace critical habitat in East Clear Creek. However, barriers to upstream movement are present seasonally due to the intermittent nature of the middle reaches of the stream. Elevated water temperatures in the lower perennial reach throughout much of the warmer part of the year also limit upstream migration of stocked trout.

Both distance and timing are impediments to trout moving upstream into occupied or critical habitat. Trout would not be able to swim upstream through dry streambed between isolated pools in the middle reaches during the summer or even the fall and winter. Thus, a trout would have to navigate the entire distance upstream over 63 miles to reach suitable trout habitat in East Clear Creek and Leonard Canyon during the high flows of the spring snowmelt runoff. The likelihood of this occurring is low because of the timing of trout stocking in the reservoir. Stockings occur in the late spring and early summer after the snowmelt runoff, when it is still cool enough in the reservoir and, as discussed above, few if any stocked trout are expected to overwinter.

When the reservoir spills in the spring, overwintering trout (please see discussion above) could go over the spillway into the Little Colorado River. Once in the LCR, a dispersing trout could swim either upstream towards the confluence of Chevelon Creek. Chevelon Creek is perennial where it joins the Little Colorado River. Escaping trout could also go downstream towards the Colorado River. As the spring runoff subsides, the LCR dries and becomes a warm, wide, shallow, sandy streambed for many miles, until flows eventually disappear into the sand at base flows. During spring runoff, the river flows continuously to the Colorado River, which is approximately 167 miles away. At the confluence of Chevelon Creek with the LCR the perennial flow is contained in a wide, shallow and sandy stream bed, which is difficult for a trout to navigate during base flows. It would be possible for a trout to navigate this area during high spring runoff when the temperatures are cooler. But there is no evidence showing that trout have

reached occupied habitat and critical habitat for spinedace in lower Chevelon Creek. No trout have been collected in numerous surveys at the lower end of Chevelon Creek (Table 54).

A diversion dam on lower Chevelon Creek, located 1.7 miles upstream from the confluence with the LCR, may be somewhat of a barrier to upstream movement of fish, however, it is likely not a complete barrier to trout which are known to be good jumpers and able to move upstream. However, trout have not been collected in numerous surveys in 12.8 miles of Chevelon Creek above the diversion dam where spinedace is considered (Table 55 and Table 56).

Community Description
Clear Creek Reservoir contains naturally reproducing warm water species year round, including largemouth bass, channel catfish, black bullhead, green sunfish, bluegill, fathead minnow, rock bass, and common carp (Table 48). Bullfrogs and crayfish are also present.

Table 48. Survey history in Clear Creek Reservoir.

Survey date and method	Species collected	Number collected	Size range (mm TL)
May 23, 1962	Largemouth bass	8	68-415
Boat shocker	Rock bass	3	98-218
	Green sunfish	29	43-203
	Carp	Present	Not measured
	LC sucker	Present	Not measured
	Trout	Present	Not measured
March 10, 1999	Rainbow trout	1	243
Exp. gillnets (4)	Bluegill	2	110-130
	Channel catfish	6	331-610
	Carp	2	320-445
	Little Colorado sucker	15	338-446
	Black bullhead	24	163-195
June 30, 2003	Rainbow trout	1	231
Boat shocker	Largemouth bass	6	99-230
	Bluegill	2	82-136
	Green sunfish	4	57-136
	Carp	18	185-460
	Black bullhead	6	180-225
	Golden shiner	1	112
March 30, 2009	Largemouth bass	1	393
Exp. gillnet (4)	Bluegill	3	121-164
	Channel catfish	1	451

	Carp	23	335-444
	Little Colorado sucker	7	312-373
	Black bullhead	2	163-172
May 21, 2009	Rainbow trout	16	200-330
Boat shocker	Largemouth bass	29	81-390
	Bluegill	76	30-172
	Green sunfish	109	47-140
	Hybrid sunfish	7	85-100
	Carp	74	147-465
	Black bullhead	78	125-225

Thorough surveys of the creek conducted by the Department downstream of the National Forest boundary in 1999 and 2000 (Table 49) found Little Colorado sucker, roundtail chub, speckled dace, green sunfish, fathead minnow, canyon tree frogs, and unidentified garter snakes. A total of 74 sites were surveyed from 25.6 kilometers to 73.7 kilometers upstream of the bridge at Clear Creek Reservoir. No trout were collected. Nearly half the sites were dry at the time of survey. Additionally, no crayfish were observed throughout these surveys.

Table 49. Fish collected in Clear Creek in 1999 and 2000.

Surveys were conducted with a backpack electroshocker, green meanie gillnets, 1/8” mesh seines, and a dipnet. Twenty-eight sites were sampled with the backpack electroshocker (effort=8007 seconds). Three sites were sampled with green meanie gillnets (effort=5 netnights). Two sites were sampled with 1/8” mesh seines. Four sites were very small and sampled with a dipnet, no effort was recorded. Thirty-five sites were dry.

Species	Num. collected
Little Colorado sucker	185
Roundtail chub	129
Speckled dace	20
Green sunfish	20
Fathead minnow	500
Unidentified sucker	1
Unidentified fry	150
Total	1005

Two surveys were conducted in Clear Creek above the reservoir by the Bureau of Reclamation and Arizona State University for the Office of Surface Mining and Reclamation Enforcement in 2004 and 2005 (Clarkson and Marsh 2005a, Clarkson and Marsh 2005b) Those efforts found

Little Colorado sucker, roundtail chub, fathead minnow, green sunfish, rock bass, and crayfish (Table 50 and

Table 51). No trout were collected.

Table 50. Fish collected in Clear Creek in September 2004 (Clarkson and Marsh 2005a).

Species	Upper site	Middle site	Lower site
Little Colorado sucker	Rare (YOY)	7 (adult)	5 (adult)
Roundtail chub	1 (YOY)	-	-
Fathead minnow	Abundant	Common	-
Green sunfish	Abundant	Common	5 (adult)
Rock bass	-	-	32 (adult)

Table 51. Fish collected in Clear Creek in August 2005 (Clarkson and Marsh 2005b).

Species	Site 1	Site 2
Little Colorado sucker	158	31
Roundtail chub	20	2
Fathead minnow	-	Common
Green sunfish	383	670

A survey was also conducted in a reach of Clear Creek immediately downstream of Clear Creek Reservoir in 2005 (Clarkson and Marsh 2005b). Roundtail chub, fathead minnow, plains killifish, and common carp were collected from this area (Table 52). No trout were collected.

Table 52. Fish collected in Clear Creek below the reservoir in August 2005 (Clarkson and Marsh 2005b).

Species	Site 3
Roundtail chub	1
Fathead minnow	Common
Plains killifish	Abundant
Common carp	Rare

The Little Colorado River downstream of the confluence with Clear Creek, near the City of Winslow, contained only non-native fish when surveyed in July 2007 by the Department. No trout were collected. A subsequent Department survey in the same vicinity near Winslow in June

2009 had similar results with additional collection of 4 Little Colorado suckers. Again, no trout were collected (Table 53).

Table 53. Fish collected in the Little Colorado River downstream of the confluence with Clear Creek, near the City of Winslow.

Species	July 2007 (Weiss 2007b)	June 2009 (AGFD unpublished)
Plains killifish	1,587	104
Fathead minnow	703	39
Red shiner	10	22
Channel catfish	5	-
Bluegill	1	-
Green sunfish	1	-
Little Colorado sucker	-	4
Total fish	2,305	169

No trout have been collected in lower Chevelon Creek in many surveys in that area, likely due to the very warm water temperatures in the summer and distance downstream from stocking sites in the Chevelon headwaters (Table 54). The 1997 survey data (Dorum and Young 1995) provided no information on gear type. The 1983 surveys were conducted with 1/8" mesh seines, with 10 seine hauls per site (Minckley 1983). The 1990-1995 surveys were conducted with 1/8" mesh seines (Dorum and Young 1995). The 1996 survey was conducted over 200 meters with 1/8" mesh seines and the 1997 survey was conducted with a backpack electroshocker (Lopez et al 1998a). The 2002 and 2009 surveys were conducted with 1/8" mesh seines (AGFD unpublished data). The 2007 survey was conducted with 1/8" mesh seines (Weiss 2007a).

Table 54. Fish collected in lower Chevelon Creek at Hugo Meadow/Chevelon Wildlife Area

Species	Aug 1977	July 1983	June 1990	Aug 1993	June 1994	July 1995	Oct 1996	Nov 1997	July 2002	July 2007	June 2009
LC spinedace	6	154	55	2	3	46	9	0	0	0	0
LC sucker	10	0	0	34	21	0	0	0	0	0	0
Bluehead sucker	0	0	0	0	2	0	0	0	0	0	0
Speckled dace	0	0	0	52	10	14	4	3	0	0	0
Black bullhead	9	0	0	0	0	0	0	0	0	0	0

Yellow bullhead	1	0	1	0	0	0	0	0	0	0	0
Carp	92	4	5	4	Present	13	0	0	0	0	20
Red shiner	0	0	8	10,000+	378	211	1,787	539	201	1	168
Plains killifish	10	134	9	3	20	44	91	83	48	10	0
Channel catfish	12	3	0	4	0	0	0	0	0	0	1
Green sunfish	68	5	27	1,000+	6	0	4	40	26	12	0
Bluegill	0	83	0	0	0	0	0	0	0	0	0
Largemouth bass	12	0	0	0	0	0	0	0	0	108	88
Golden shiner	22	0	1	0	0	0	0	0	0	0	0
Fathead minnow	72	832	482	10,000+	1,243	1,222	402	202	240	0	310
TOTAL	314	1,215	588	21,000+	1,683	1,550	2,297	867	515	131	587

Upstream of the diversion dam on Chevelon Creek towards the McLaws Road Bridge is a large pool backed up by the diversion dam. This area is within the Little Colorado River valley, with much of the pool located on the Chevelon Wildlife Area. It consists of sand/silt substrates and has thick salt cedar stands along both banks. This reach contains native Little Colorado sucker, but is dominated by non-native fishes, including green sunfish, fathead minnow, plains killifish, common carp, red shiner, channel catfish, and black bullhead. No trout were found in 1997 and 1998 using gillnets, a canoe electroshocker, and seines (Lopez et al 1998a and Table 9).

Table 55. Survey summary of the shallow pool from the Diversion Dam to McClaws Road Bridge.

Date	LC sucker	Green sunfish	Fathead minnow	Plains killifish	Carp	Red shiner	Channel catfish	Black bullhead
7/1998	1	2			4			2
7/1998		40	75	20		21		
11/21/1997	3							
11/21/1997	16	11			2		3	28
11/21/1997	4	1			2		1	1
11/21/1997	9	11			1		1	6

Upstream of the diversion pool is another large deep pool located in a slot canyon. This pool extends upstream for 1.7 miles to a point just downstream of The Steps, a famous spinedace collection site. This deep pool is difficult to navigate and even more difficult to survey because of the depth, difficult access, and nearly no structure on which to attach gillnets. Limited surveys in this large pool in June 1998 with some gillnets resulted in the capture of Little Colorado sucker, green sunfish, and black bullhead, but no trout (Lopez et al 1998a and Table 10). An angling survey also found largemouth bass, green sunfish, and common carp in this large pool (M. Lopez, pers. comm.).

Table 56. Survey summary of the large deep pool between the McClaws Road Bridge and The Steps conducted in June 1998 with gill nets.

Date	Largemouth bass	Green sunfish	Black bullhead
6/1998 (3-2)	5	13	2
6/1998 (3-1)	2		

Permanent flow in Chevelon Creek for 8.7 miles from just above the very large slot canyon pool upstream to the confluence with Pony Canyon contains Little Colorado spinedace, Little Colorado sucker, bluehead sucker, speckled dace, green sunfish, fathead minnow, plains killifish, red shiner, golden shiner, black bullhead, yellow bullhead, and crayfish. The population of spinedace in and around The Steps area within this reach is large and robust, containing the highest densities of spinedace recorded in recent times, observed in schools up to several hundred spinedace.

Fisheries surveys conducted with a backpack electroshocker and seines did not collect trout within occupied spinedace habitat in Chevelon Creek from Pony Canyon to 1.7 miles above McLaws Road (Dorum and Young 1995; Lopez et al 1998a; Weiss 2007b; AGFD unpublished data).

There have been few rainbow trout collected in the middle reaches of Chevelon Creek, upstream of the confluence with Black Canyon (see the Chevelon Complex analysis). These rainbow trout in Chevelon Creek are most likely coming downstream from the Chevelon complex and most likely not upstream from Clear Creek Reservoir. The use of live baitfish is prohibited at Clear Creek Reservoir, and is prohibited in all of Coconino, Apache and Navajo counties.

Consultation species, Critical Habitat & Potential Impacts

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 Leopard Frog

Local Analysis: Clear Creek Reservoir and the buffered stocking site area are within the historical range of the northern leopard frog and the likelihood that frogs could be exposed to stocked sportfish in Clear Creek Reservoir is moderate. There are no historical records for northern leopard frogs at Clear Creek Reservoir or within the 5 mile buffer around the reservoir (Figure 42, AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.) and the habitat is less suitable due to the presence of crayfish and bullfrogs. However, the buffered stocking site has not been adequately surveyed and it is possible that northern leopard frogs occupy this area.

Broad Scale Analysis: The likelihood that northern leopard frogs could be exposed to dispersing fish stocked in Clear Creek Reservoir is moderate. There are 2 historical records (1932 and 1963) for northern leopard frogs in Winslow, just outside of the buffered stocking site area and 4 from upstream; Clear Creek (Echinique Place) (1960), East Clear Creek (Mack's Crossing) (1971), East Clear Creek (Jones Crossing) (1970), and East Clear Creek (FS 96/95 Jct) (1972) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Northern leopard frogs were not observed during subsequent surveys at these sites; however, the area has not been adequately surveyed and it is possible that northern leopard frogs still occupy the drainages into which Clear Creek Reservoir flows.

Chiricahua Leopard Frog

Local Analysis: Clear Creek Reservoir and the buffered stocking site area are within the historical range of the Chiricahua leopard frog and the likelihood that frogs could be exposed to stocked sportfish in Clear Creek Reservoir is moderate. There are no historical records for Chiricahua leopard frogs at Clear Creek Reservoir or within the 5 mile buffer around the reservoir (Figure 42; AGFD Riparian Herpetofauna Database, M. Sredl pers. comm.) and the habitat is less suitable due to the presence of crayfish and bullfrogs. However, the buffered stocking site has not been adequately surveyed and it is possible that Chiricahua leopard frogs occupy this area.

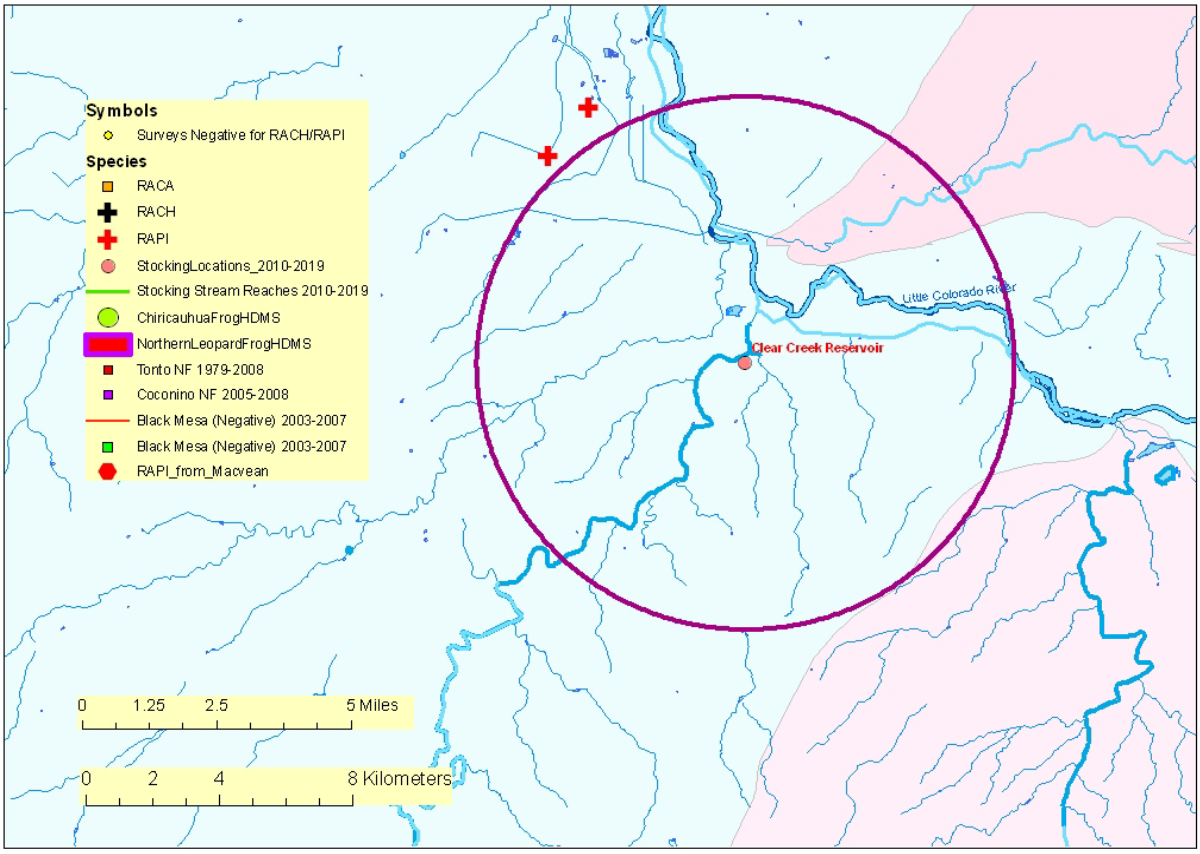

Figure 42. Map of Clear Creek Reservoir buffered stocking complex.

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).

Broad Scale Analysis: The likelihood that Chiricahua leopard frogs could be exposed to dispersing fish stocked in Clear Creek Reservoir is moderate. There are 5 historical records for Chiricahua leopard frogs from East Clear Creek (Horse Crossing) (1961), Clear Creek (Echinique Place) (1960), East Clear Creek (Mack's Crossing) (1971), East Clear Creek (Jones Crossing) (1970), and East Clear Creek (FS 96/95 Jct) (1972) (HDMS, Arizona Game and Fish Riparian Herpetofauna Database, M. Sredl pers. comm.). Chiricahua leopard frogs were not observed during subsequent surveys at these sites however; the area has not been adequately surveyed and it is possible that Chiricahua leopard frogs still occupy the drainages into which Clear Creek Reservoir flows.

Humpback Chub and Critical Habitat

Suitable and designated critical habitat for the humpback chub occurs at the confluence of the Little Colorado and Colorado Rivers, approximately 167 miles away. Refer to the lower LCR complex analysis which describes the potential impacts and analysis to Humpback chub.

Little Colorado Spinedace and Critical Habitat

Spinedace historically inhabited Willow Creek (which has its confluence with Clear Creek about 45 miles upstream from Clear Creek Reservoir) but have not been found since 1966. Spinedace currently occupy small, perennial pool habitats in West Leonard Canyon, Leonard Canyon (including Dines Tank), Bear Canyon, Dane Canyon, and Yeager Canyon. The populations and available habitat are all relatively small throughout the watershed, but West Leonard and Leonard Canyons continue to be one of the most dependable locations to find spinedace in the entire watershed. Bear, Dane, and Yeager Canyon populations are sustained by translocation of spinedace from West Leonard Canyon and Dines Tank to these areas (USFWS 2008e).

In addition to the above in-stream populations of spinedace, there are currently two refuge populations of spinedace. A refuge population of East Clear Creek spinedace is located at the Flagstaff Arboretum and a refuge population of Little Colorado River spinedace is located at the Department's Grasslands Wildlife Area. Currently, there is not a refugia population for the Chevelon Creek sub-group, although it is expected to have a captive population established at Winslow High School in the near future.

Critical habitat for Little Colorado spinedace includes eighteen miles (29 km) of East Clear Creek in Coconino County located approximately 63 miles upstream of the reservoir; eight miles (13 km) of Chevelon Creek in Navajo County, located 0.5 miles down Clear Creek to the LCR, then up the LCR 9.1 miles to Chevelon Creek; and five miles (8 km) of Nutrioso Creek in Apache County (FR 52(179), Sept 16, 1987). The nearest designated critical habitat to this site is West Chevelon Creek approximately 40+ miles upstream from the reservoir.

Potential Impacts

Any stocked rainbow trout that escaped from Clear Creek Reservoir during natural events would not likely become established because the conditions in the creek and in the LCR during the warmer months as previously described would preclude survival. In support of this conclusion, numerous surveys have not detected trout in any of these areas-- a further indicator that the stocked trout do not persist in the streams above or below the lake.

If trout were to escape Clear Creek Reservoir and move upstream to interact with spinedace coming down the watershed from upstream areas, they may temporarily compete for food and space and potentially prey on eggs, fry and juvenile fish, but would soon die out because the pools get warm or dry up entirely. Fish surveys in lower Clear Creek have found no salmonids

(Clarkson and Marsh 2005a; Clarkson and Marsh 2005b; AGFD unpublished data). Due to the intermittent nature of the stream it is unlikely stocked trout would survive to ascend Leonard or Bear Canyons and reach occupied spinedace habitat, or East Clear Creek to reach critical habitat.

Spinedace potentially could move downstream during high flows and enter Clear Creek Reservoir and be exposed to competition for space and food with the broad suite of non-native fishes in the reservoir. Spinedace moving downstream in Clear Creek to the reservoir would be exposed to the greater threat of the large assemblage of naturally reproducing warm water species, including largemouth bass, channel catfish, black bullhead, green sunfish, rock bass and bullfrog adults and tadpoles in the reservoir. Additionally, it has been reported that spinedace populations are extremely unpredictable which makes management of them difficult because responses of the population to changes within the watershed cannot be measured with certainty (USFWS 2008e).

Spinedace dispersing downstream from the headwaters of the Clear Creek watershed could potentially reach Clear Creek Reservoir where they would join the assemblage of non-native fish species. Stocked trout would be present in the system only until water temperatures rise to lethal levels, whereas the warmwater assemblage is present year round.

While stocked trout were in the system, impacts may include predation and competition for food and space on both adults and young. Stocked trout may potentially travel upstream towards spinedace occupied habitat in Leonard Canyon and East Clear Creek, however, this potential is low because of the distance involved (67 miles), intermittent habitat during base flows, the difference in timing of the spring flows and stocking, supported by lack of trout records in the survey data in lower Clear Creek.

Stocked trout may potentially go downstream over the spillway, up the LCR to Chevelon Creek and enter spinedace occupied and critical habitat. However, this is also unlikely because of the timing of the spill in the spring and stocking after, and the lack of trout records in the survey data in all of lower Chevelon Creek. Any interactions between dispersing trout and spinedace would be on a rare occasion from an extremely small number of trout likely to get to occupied habitat, and they would not persist, except in Leonard Canyon and East Clear Creek.

It is possible for the progeny of stocked trout to interact with spinedace, but the stocked trout would have to travel upstream over 63 miles to suitable trout habitat for reproduction to occur, then the progeny could interact with spinedace occupying that same habitat, potentially competing for food and space. Robinson et al (2000) reported little dietary overlap between spinedace and large trout, but stated that overlap is more likely for fish of equal size, such as a spinedace and fingerling trout. Robinson et al (2000) also reported shifts in spinedace habitat use in the presence of rainbow trout.

There are no threats of hybridization with spinedace. Recruitment levels may be suppressed if a stocked trout were able to reach occupied and critical habitat 63 miles upstream, which is unlikely, by preying upon young spinedace.

An escaped stocked trout from Clear Creek Reservoir would not likely affect the dispersal of spinedace. If a trout ever were to make it to the lower end of spinedace range, it would likely be an isolated event that would not have the level of impact to restrict dispersal. The multitudes of other non-native fish species within Clear Creek that are not part of this proposed action are a much greater threat to spinedace dispersing downstream from Leonard Canyon and East Clear Creek. Clarkson and Marsh (2005a; 2005b) expressed concern of the overwhelming dominance of non-native fishes in lower Clear Creek, which did not include the mention or collection of rainbow trout.

Stocked trout in Clear Creek Reservoir are not reducing the connectivity between spinedace populations in the headwaters of Clear Creek and those in lower Chevelon Creek, because of their short time in the reservoir and the distance required to travel for interactions to take place. Rather, the multitudes of other non-native species (largemouth bass, green sunfish, black bullhead, channel catfish, and crayfish) in conjunction with the natural hydrographs of streams in this area and the existence of the dam forming Clear Creek Reservoir are the greater impediment to dispersal and connectivity between spinedace populations.

Potential Impacts to Critical Habitat

There were no Primary Constituent Elements identified for critical habitat for spinedace. Several activities were listed that might impact critical habitat (Federal Register, 1987) including activities that would deplete, lessen, or significantly alter the natural flow; extensively alter the channel morphology; and extensively alter water chemistry.

Although the stocking of rainbow trout would do none of those things, the presence of a few stocked trout in designated critical habitat might alter the biological features essential to conservation of the species. However, fish stocked at Clear Creek Reservoir would not be expected to impact critical habitat because trout are stocked after the snowpack runoff so trout are unlikely to leave Clear Creek Reservoir to go downstream. Also, trout cannot withstand the temperature extremes in the summer and would die out. If a few trout persist in the upper part of the reservoir, they would have to travel the entire 63 miles to critical habitat during a single runoff season because there is no intermediate suitable over-summering habitat. The distance, flow and conditions of potential movement periods would preclude trout reaching critical habitat. It is not expected that fish would be transported over the reservoir because the stocking comes after runoff and the temperatures cause mortality before the monsoon season arrives. However, if a fish left the reservoir downstream into the LCR and was able to reach Chevelon Creek critical habitat, 15 miles away, any impact would be for a short duration until the trout dies from thermal

stress resulting in very low severity because the few, if any, stocked trout would reach critical habitat. In addition to these reasons, rainbow trout have not been found in surveys above or below Clear Creek Reservoir, indicating they either are never present or are present only sporadically or in extremely low number.

Roundtail Chub

Known populations of roundtail chub in the Little Colorado River watershed are in Clear Creek above Clear Creek Reservoir (Voeltz 2002). Chub have been documented from a reach of Clear Creek about 14-38miles upstream from the reservoir and from East Clear Creek just below C.C. Cragin Reservoir. Stocked trout are not expected to reach East Clear Creek as described in the spinedace discussion above.

Potential impacts

It is possible for trout to swim a short distance upstream into the perennial stream where chub are known to occur or for a chub to disperse downstream into the reservoir; however, impacts by trout would have a short opportunity to occur since trout are in the system for such a short period before water temperatures rise to unsuitable levels. Clarkson and Marsh (2005b) describe the existing non-native warm-water fish assemblage which likely already limits the occupation or movement of roundtail chub in this system, providing for a limited opportunity for chub and trout to interact. Additionally, for the period this reach of stream is suitable for occupation by rainbow trout, they would also be suffering from the interactions with the non-native fish community, further limiting their opportunity for dispersal.

Any stocked rainbow trout that were to escape from Clear Creek Reservoir would not likely become established because they do not persist in the streams above or below the lake based on numerous surveys detailed above. The stocked trout could have a small, short-term impact on roundtail chub by predation on young chub or competition for space and food. If trout were to escape Clear Creek Reservoir and move upstream they may temporarily compete for food and space and potentially prey on eggs, fry and juvenile fish. However, they would die out as the pools become too warm.