ARIZONA GAME AND FISH DEPARTMENT
PROJECT INFORMATION SHEET

Habitat Branch Log #: M12-0821083644

PROJECT TITLE: Fossil Creek Rotenone Treatment (Includes Stock Tanks in Watershed)	
PROJECT COORDINATOR: Scott Rogers	**BRANCH/REGION**: Region II
PROJECT FUNDING: ☒ USFWS Federal Aid ☐ Federal (Other) ☒ State ☐ Other ☐ No AGFD Funding Used (double click box to check/uncheck)	**FUNDING SOURCE NAME(s) & INDEX #(s)**: • Sportfish Restoration 06198 • Sportfish Restoration CAMP 06358 • Heritage CAMP 17232
PROJECT START DATE:	September 4 (23), 2012
PROJECT END DATE:	September 1, 2022
LANDOWNER(s):	Coconino National Forest , Tonto National Forest, Yavapai County
COOPERATIVE PARTIE(s):	Arizona Game and Fish Department, Tonto National Forest, US Fish and Wildlife Service, Bureau of Reclamation, Northern Arizona Flycasters

	LANDOWNER AND/OR SITE NAME	TOWNSHIP	RANGE	SEC.	UTM (meters) / GPS COORDINATES (Northing / Lat.)	(Easting / Long.)
PROJECT LOCATION	Irving Falls	12 N	7 E	29	34°24.186' N	111°37.070' W
	Fossil Creek Barrier	11 N	7 E	29	34°21.203' N,	111°39.933' W
	Soldier Mesa Tank	13 N	8 E	15	34°30.456' N,	111°29.599' W
	Sand Rock Draw Tank	13 N	8 E	16	34°31.027' N,	111°30.495' W
	Sand Rock Tank	13 N	8 E	17	34°30.807' N,	111°31.823' W

BACKGROUND

In 2004 a barrier was constructed on Fossil Creek and the creek was treated, using the piscicide antimycin A, from about 750 m below Fossil Springs Dam to the barrier to remove nonnative fish species (smallmouth bass and green sunfish) for the benefit of native fish species. The EA completed for the 2004 treatment included the possibility of retreatment. The treatment was successful in removing the nonnative fish species. In 2005 as part of a settlement agreement Arizona Public Service returned full flows to the creek and began removing its infrastructure, which it completed in 2011. During 2007 thru 2011 four endangered species including Gila topminnow (*Poeciliopsis occidentalis*), loach minnow (*Tiaroga cobitis*), spikedace (*Meda fulgida*), and razorback sucker (*Xyrauchen texanus*) were stocked into Fossil Creek. As of 2012, it appears that topminnow have established, but it is unclear if spikedace or loach minnow have established, and razorback suckers failed to establish. In 2009 the Department opened

Fossil Creek to fishing as a short season catch and release fishery for native chub. Opening day events have been held each year to promote the fishery and educate the public. A high flow event in 2010 deposited sediment and large boulders in the area below the barrier and reduced its effectiveness. In July of 2011 smallmouth bass were reported above the fish barrier and crews were sent to determine how far bass had invaded upstream; they were restricted to downstream of Sally May Wash. In September of 2011 a temporary barrier was constructed in Fossil Creek near the confluence of Sally May Wash to prevent the further upstream migration of the bass. In the spring/summer of 2012 the permanent barrier was repaired. In April 2012, a few large-bodied smallmouth bass were found upstream of the temporary barrier; all but one sighted was removed. The reach from the temporary barrier up to Irving Falls is being repeatedly surveyed to ensure that no smallmouth bass remain in that section.

The primary action area is from the temporary barrier to the permanent barrier. If young-of-year smallmouth bass are detected above the temporary barrier, then the action area will be extended up to Irving Falls.

The necessary documentation to update the EA (Section 18) is being completed by the Coconino National Forest.

During the first phase of the Fossil Creek Native Fish Restoration project, all wetted stock tanks in the Fossil Creek drainage were surveyed. Only five of the 48 contained fish (nonnative fish), and those five tanks were renovated in 2004. These 5 tanks have been stocked illegally with fish several times since Fossil Creek was treated.

PURPOSE AND NEED

This project is being completed to preserve the unique native fishery in Fossil Creek. Smallmouth bass have proven to be incompatible with most native fish. The only effective method of removing a fish population is the use of piscicide. Removal of the nonnative fish is necessary to preserve this unique native fish fishery.

The following native fishes are found in the action area: roundtail chub, headwater chub, Sonora sucker, desert sucker, Gila topminnow, longfin dace, and speckled dace; all of which are Arizona Species of Greatest Conservation Need (Tier 1A or 1B). It is also possible that loach minnow or spikedace are in the action area because they were stocked into upstream reaches. However, none have ever been captured or observed in the action area. Gila topminnow, loach minnow, and spikedace are ESA-listed as endangered. Establishing populations of these species and removing threats to populations are actions identified in their recovery plans. The roundtail chub and headwater chub are managed under a signed conservation agreement, which the Department is a signatory to.

PROJECT/PROGRAM DESCRIPTION

Rotenone will be applied to Fossil Creek at or below the concentration allowable on the label using drip stations, backpack sprayers and rotenone sand. The rotenone will be detoxified using potassium permanganate at the permanent fish barrier. Sentinel fish will be used to determine if the treatment is effective and to determine if the detoxification is effective. Prior to the treatment a portion of the native fish will be salvaged and transported upstream of the treatment area. The AZGFD Piscicide Treatment Planning and Procedures Manual, the American Fisheries Society Rotenone SOP and HACCP procedures will be followed for the salvage and treatment.

In adherence to the AFS SOP and Department piscicide procedures manual, an *in-situ* bioassay will be conducted prior to the treatment to confirm the minimum effective concentration of rotenone that will

eradicate smallmouth bass. In addition, the project partners will also collect and have tested a series of water samples from the Project Area before and after the treatment that follow the guidance from the AFS SOP.

The proposed action will begin September 10, 2012, or thereafter when Fossil Creek is at base flow and no rain or flash floods are occurring within the watershed. The Fossil Creek treatment involves up to two applications of rotenone over a short period. The first application is scheduled for the week of September 10th (with the week of September 17th as an alternate). The second application is scheduled for the following week.

Liquid emulsifiable rotenone (Chem-Sect Chem Fish, or Prenfish Toxicant, or CFT Legumine) is used for the chemical treatment of flowing systems. CFT Legumine and Prenfish Toxicants are the only formulations currently registered for use in Arizona. CFT Legumine will be used, if available, for treatment of Fossil Creek. In some situations, a mixture of rotenone powder (Prenfish Prentox Fish Toxicant Powder) and sand may be used.

Drip stations are the primary means of release of rotenone into the river, and various sizes are used depending on water quantity (flow) of the target area. Drips will be set to deliver rotenone into flowing water at a concentration at or less than the maximum allowable on the label (4 ppm). The actual rate of application will be determined after a bioassay is conducted. Ground crews manually apply liquid rotenone from backpack sprayers at the same target concentration in all standing water, poorly mixing areas, side channels, backwaters, marshes, seeps, springs and other sources of fresh water which could provide refuge for non-native species. In certain groundwater seep locations and deep pools, where backpack sprayer application is inadequate, small volumes of rotenone are mixed with sand (sand mix) and dispersed in the seep, creating a slow and continual release of piscicide.

Detoxification is the final step in the treatment process. Rotenone in flowing systems is neutralized with potassium permanganate (KMnO4), delivered downstream from active treatment areas via automated dry feed hoppers. Application rates are adjusted continually to accommodate any observed changes in upstream water volume and/or calculated possible maximum rotenone concentration. Standard rotenone detoxification / concentration rates are used. As an extra precaution against accidental drift of pesticide outside of the target reaches, KMnO4 is delivered at a rate to detoxify double the target rotenone concentration throughout all treatments (i.e. twice the expected instream concentration). Distribution rates of KMnO4, are continually monitoring by dedicated detoxification personnel throughout the application of rotenone. An independent second dry hopper is also set up as an emergency precaution during all rotenone treatments. Automated hoppers are powered by portable generators. Several additional functioning generators are maintained on site as backups.

Closed minnow traps containing live sentinel fish are placed both within and below the treated areas to: assess the effectiveness of rotenone exposure time and concentration (lethality / toxicity), ensure that rotenone does not escape the target reach without successful detoxification (survival), and verify that prior to termination of detoxification, water above the station is non-toxic to fish (survival). Minnow traps are monitored hourly through the treatment process.

After treatment, native fish will disperse from upstream reaches and recolonize the treated section. In addition, spikedace, Gila topminnow, razorback sucker, and longfin dace will be stocked into the treated reach (stocking of the T&E species was described in EAC M07-05291229; stocking of longfin dace was described in EAC M07-04172930). After the treatment and the native fish stockings, the stream will be monitored to assess the recolonization of native fishes. Various gear types will be utilized in the monitoring of the creek.

The 3 stock tanks listed are known to have been illegally stocked over recent years with nonnative fish. The Department plans to chemical renovate these tanks and will follow procedures in the AFS SOP and Department Piscicide Procedures Manual. After the treatment, the tanks will continue to be monitored to assess the possible illegal stocking of nonnative fishes. Various gear types will be utilized in the monitoring of these tanks.

Several other tanks exist within the Fossil Creek watershed and illegal stocking of these tanks poses a threat to the native fish in Fossil Creek as well. The removal of nonnative fish from these other tanks within the Fossil Creek watershed may be necessary if the tanks are illegally stocked and will be addressed in a separate EAC.

COORDINATION

Coconino National Forest, Tonto National Forest, US Fish and Wildlife Service, Bureau of Reclamation, Northern Arizona Flycasters

NEPA

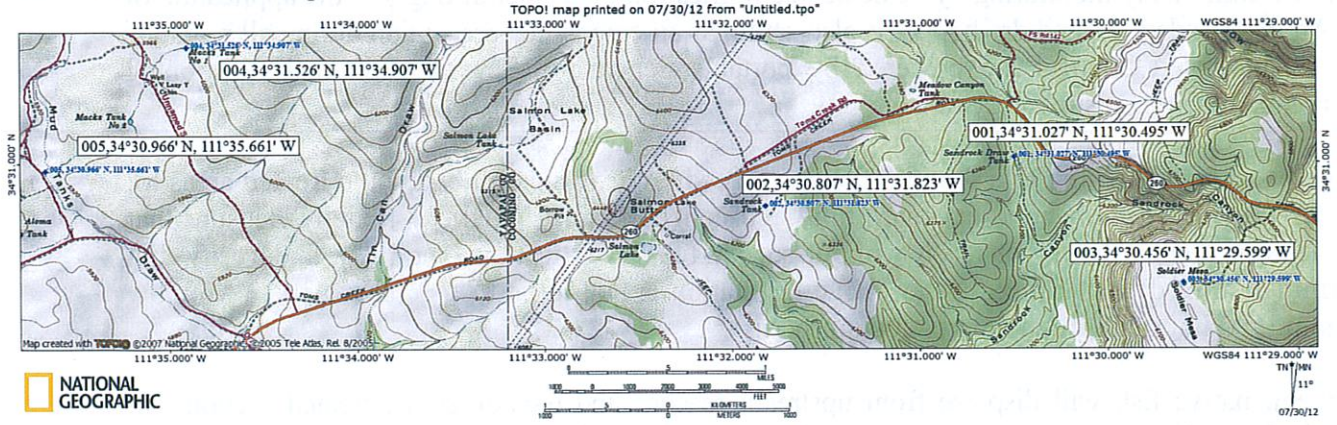
Will NEPA compliance be completed by a Federal Agency? No☐ Yes☒ If Yes, list agency:

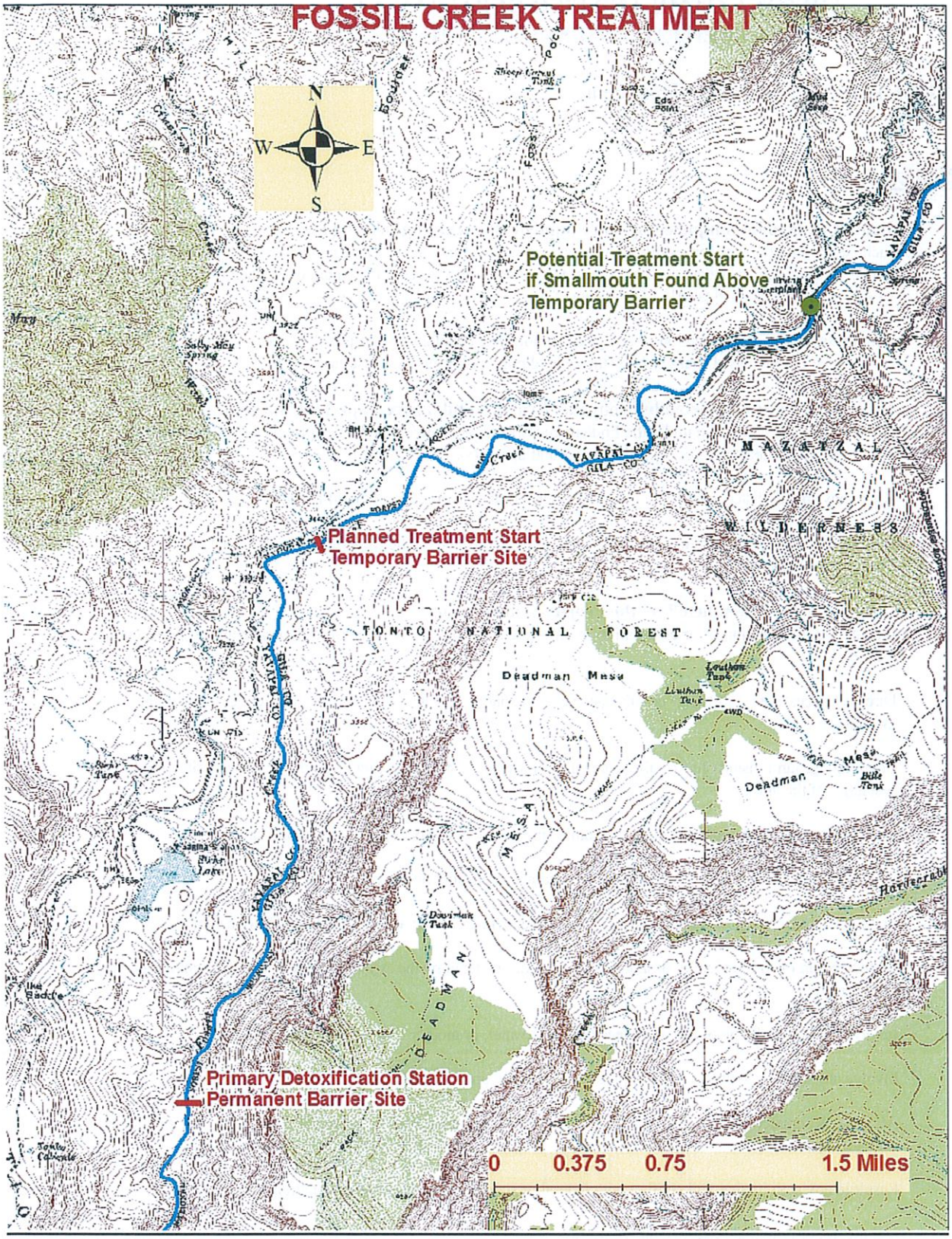
USFS, BOR, or USFWS are all Federal agencies and could conduct and/or assist with developing NEPA for Federal actions in the area.

- An EA was completed and a FONSI signed in 2004. (BOR, 2004)
- A letter of concurrence for treatment of stock tanks. (FWS, 2005)
- A Biological Opinion has been completed for the allotment in which these three tanks occur (USFWS, 2009)
- A Section 18 document (necessary to update the EA) has been prepared to evaluate the change in piscicide use from antimycin to rotenone. (Coconino NF, USFS, 2012)
- An updated Biological Opinion has been prepared for these actions. (USFWS, 2012)

PROJECT MAP

Fossil Creek Tanks Map




FOSSIL CREEK TREATMENT
N
W
E
S
Potential Treatment Start
if Smallmouth Found Above
Temporary Barrier
Planned Treatment Start
Temporary Barrier Site
Primary Detoxification Station
Permanent Barrier Site
MAZATZAL
WILDERNESS
TONTO NATIONAL FOREST
Deadman Mesa
0 0.375 0.75 1.5 Miles

ARIZONA GAME AND FISH DEPARTMENT
ENVIRONMENTAL ASSESSMENT CHECKLIST

PROJECT TITLE: Fossil Creek Rotenone Treatment

WILL THIS PROJECT:

YES	NO		
			Items A & B to be completed by Development Branch, Engineering Section.
☐	☒	A.	Include construction, major modification, emergency construction or additions to buildings, shooting ranges, roads, parking and passenger loading zones, walkways, trails, accessibility, public use facilities, water control structures or impoundments (ADA Compliance)?
☐	☒	B.	Require substantive consumption of energy to complete or maintain this project (heavy equipment, large vessels, etc.) or result in increased energy use by the general public (new public use areas, etc.)?
			Items C - E to be completed by Nongame Branch, Endangered Species Coordinator.
☒	☐	C.	Affect any species protected under the Endangered Species Act and/or candidate species? (Check yes for positive and/or negative impacts) If yes, identify species and impact(s).
☒	☐	D.	Affect any species listed as Wildlife of Special Concern in Arizona. If yes, identify species.
☐	☐	E.	Would any take resulting from the proposed activities be covered by the Department's 10(a)(1)(A) Permit or Section 6 authorities?
			Items F - T to be completed by the Project Coordinator.
☐	☒	F.	Include the introduction of or exportation of any species not presently or historically occurring in the receiving location?
☒	☐	G.	Directly necessitate mortality or displacement of native plants, fish or wildlife, either intentionally or incidentally?
☐	☒	H.	Cause any ground disturbance or affect any archaeological, historical, religious shrine or cultural site or alter the aesthetics of the area?
☐	☒	I.	Have substantive sociological or socioeconomic consequences or affect public health and safety?
☐	☒	J.	Be expected to have organized opposition, or generate substantial public controversy?
☐	☒	K.	Involve land use changes such as planting, burning, clearing, grazing, or modification of public use?
☐	☒	L.	Be located on or in the vicinity of lands owned or administered by the Arizona Game and Fish Commission and Department?
☐	☒	M.	Involve the manipulation or use of surface or groundwater, or modify or deny access for water usage?
☐	☒	N.	Involve any modification to, or development in a flood plain or wetland?
☒	☐	O.	Affect a designated Wilderness Area, Wild or Scenic River, prime or unique farmland or forestland, any ecologically critical area, National Trail, or other areas with special designation?
☐	☒	P.	Result in any activity that will conflict with federal or state air or water quality regulations?
☒	☐	Q.	Include use or potential release of any toxicant?
☐	☒	R.	Have any environmental impacts not addressed above, or result in cumulative impacts that separately do not require assessment but together may be considered substantial?
☒	☐	S.	Require any federal, state or other permits? (Clean Water Act Sec. 401, 404; Arizona Department of Agriculture Salvage Permit; ROW for access; etc.)
☒	☐	T.	Other NEPA compliance completed, and attached. (Federal EA, FONSI, DN, BAE, ROD)

ARIZONA GAME AND FISH DEPARTMENT
ENVIRONMENTAL ASSESSMENT CHECKLIST
DEVELOPMENT EXPLANATION OF "YES" RESPONSES

PROJECT TITLE: Fossil Creek Rotenone Treatment

IDENTIFY THE ITEM LETTER(S) AND PROVIDE A DETAILED EXPLANATION:

Development: For any item (A or B) that received a "yes" response, describe the impact(s) or issue(s) and explain information or actions that will be implemented to address/resolve the particular item(s). If necessary, coordinate with Habitat Branch and Nongame Branch to complete explanation(s).

ARIZONA GAME AND FISH DEPARTMENT
ENVIRONMENTAL ASSESSMENT CHECKLIST
NONGAME EXPLANATION TO RESPONSES

PROJECT TITLE: Fossil Creek Rotenone Treatment

IDENTIFY THE ITEM LETTER(S) AND PROVIDE A DETAILED EXPLANATION:

Nongame: For any item (C through E) describe any impact(s) or issue(s) and explain information or actions that will be implemented to address/resolve the particular item(s).

C. Affect any species protected under the Endangered Species Act and/or candidate species?

Yes. During the treatment phase of the project, the project will negatively affect roundtail chub and headwater chub, both ESA-listed candidate fishes, and will negatively affect Gila topminnow, ESA endangered, because these species are found in the treatment reach. The project could potentially affect spikedace and loach minnow, which have been stocked into upper reaches of Fossil Creek, but none have ever been detected in the project reach. Pre-treatment survey and live salvage of these fish and other native fishes in the treatment reach will help reduce incidental take during the renovation. The use of rotenone in Fossil Creek is anticipated to lethally remove all fishes in the treatment reach. However, after the treatment, native fish will recolonize and will also be stocked into the treated reach. The project is anticipated to have an overall beneficial effect on the ESA protected species.

The proposed action should have no effect to non-aquatic species (birds, bats, and tortoises), since rotenone is a target–specific pesticide (fish toxicant) and there have been numerous published laboratory studies that demonstrate rotenone exposure to various animal taxa poses little to no harm or mortality when used under label application rates. Amphibians (Lowland Leopard Frogs) in the Project Area may likely be affected, but their terrestrial forms are able to escape from rotenone-treated waters during the short duration of the treatment.

D. Affect any species listed as Wildlife of Special Concern in Arizona?

Refer to response in letter C for roundtail chub, headwater chub, Sonora Sucker, desert sucker, longfin dace, and speckled dace.

E. Would any take resulting from the proposed activities be covered by the Department's 10(a)(1)(A) Permit or Section 6 authorities?

Yes. Take of Gila topminnow and any potential take of spikedace and loach minnow would be covered under the Department's 10(a)(1)(A) Permit, as well as the EA Biological Opinion. Take of candidate species (roundtail chub and headwater chub) would be covered under the Department's Section 6 authorities, as well as the EA Biological Opinion.

ARIZONA GAME AND FISH DEPARTMENT
ENVIRONMENTAL ASSESSMENT CHECKLIST
PROJECT COORDINATOR EXPLANATION OF "YES" RESPONSES

PROJECT TITLE: Fossil Creek Rotenone Treatment

IDENTIFY THE ITEM LETTER(S) AND PROVIDE A DETAILED EXPLANATION:

Project Coordinator: For any item (F through T) that received a "yes" response, describe the impact(s) or issue(s) and explain information or actions that will be implemented to address/resolve the particular item(s). If necessary, coordinate with Habitat Branch and Nongame Branch to complete explanation(s).

G. Directly necessitate mortality or displacement of native plants, fish or wildlife, either intentionally or incidentally?

Yes. A small number of roundtail chub, headwater chub, Sonora Sucker, desert sucker, longfin dace and speckled dace may be lost during salvage and relocation outside the treatment reach. All precautions and efforts will be made to eliminate the likelihood of potential mortalities. Water temperatures will be maintained and aerators will be used during transport and before stocking salvaged fish in refuge habitat. Water will be tempered with that of the receiving habitat water. Any fatality of salvaged native fishes will be covered under the USFWS Biological Opinion (revised August 2012), as well as the Department's Section 6 authorities (for non-listed fishes).

The rotenone treatment will cause the fatality of all fishes remaining in the treatment reach following the salvage of native fishes. Any loss of remaining native fishes are covered under the action's Biological Opinion Incidental Take Statement.

O. Affect a designated Wilderness Area, Wild or Scenic River, prime or unique farmland or forestland, any ecologically critical area, National Trail, or other areas with special designation?

The National Forests evaluated the effects of the proposed action on Wilderness-designated lands with a MRDG.

Q. Include use or potential release of any toxicant?

Yes. The Department has submitted a NOI and PDMP to the ADEQ for the use and discharge of rotenone into the treatment reach, including neutralization by potassium permanganate below the treatment reach. A Special Local Needs 24(c) Pesticide Registration will be completed if the deviations from the rotenone label are planned.

None Anticipated LMR

S. Require any federal, state, or other permits? (Clean Water Act Sec. 401, 404; Arizona Department of Agriculture Salvage Permit; ROW for access; etc.).

A Special Local Needs 24(c) Pesticide Registration will be completed if the deviations from the rotenone label are planned. Any mortality of native fishes will be covered under the action's Biological Opinion Incidental Take Statement, as well as the Department's Section 6 authorities, and mortality of Federally Listed species will be covered under the Department's Federal Permit TE821577-2.

No deviations from label anticipated

T. Other NEPA compliance completed, and attached. (Federal EA, FONSI, DN, BAE, ROD)

Yes. NEPA-related documents (Final EA, BO, FONSI, and PUP) have already been completed or are being completed. Any mortality of native fishes will be covered under the action's Biological Opinion Incidental Take Statement, as well as the Department's Section 6 authorities, and mortality of Federally Listed species will be covered under the Department's Federal Permit TE821577-2.

ARIZONA GAME AND FISH DEPARTMENT
ENVIRONMENTAL ASSESSMENT CHECKLIST
INTERNAL PERMIT/DOCUMENTATION CHECKLIST

PROJECT TITLE: Piscicide Treatment of Fossil Creek

		Not Applicable	Pending	Completed
HDMS Check				x
Special Use Permit (USFS)		x		
Federal Documentation:	☒Environmental Assessment ☐Environmental Impact Statement ☐Record of Decision ☐Biological Assessment ☐Biological Evaluation ☐Memorandum of Understanding			
404 Permit (ACOE)				
401 Permit (ADEQ)				
Arizona State Land Department	☐Right of Way ☐Application to Place Improvement ☐Right of Entry ☐Special Land Use Permit	x		
Cultural Resource Clearance / SHPO Clearance		x		
Department of Agriculture	A Special Local Needs 24(c) pesticide registration will be completed if the deviations from the rotenone label are planned.		x	
Commission or Director Approval		x		
Landowner Coordination	☒Coconino National Forest ☒Tonto National Forest ☒USFWS ☒BOR			x
Other	☐_____ ☐_____	x		

		Not Applicable	Pending	Completed
Compliance Document	☒Federal Aid ☐File			x
Section 7 Documentation	☒Federal Aid ☐File			x
Lands Program Review		x		

		Not Applicable	Addressed in a Section 7 Biological Evaluation Form
Special Management Considerations	☐Jaguar Area of Capture Concern	x	
	☐Ocelot Area of Capture Concern	x	
	☐		
	☐		

ARIZONA GAME AND FISH DEPARTMENT
ENVIRONMENTAL ASSESSMENT CHECKLIST
SIGNATURES

PROJECT TITLE: Fossil Creek Rotenone Treatment

Project Coordinator see attached Date _____
(EA Checklist items F - T)

Project Leader see attached Date _____
(Approval of funding source and availability)

Nongame Acting Chief Date 8/30/12
(EA Checklist items C - E)

Fisheries Date 8-29-2012

Engineering NA Date _____
(EA Checklist items A and B)
(If engineering components are involved in the project)

Region 1 Supervisor NA Date _____

Region 2 Supervisor see attached Date _____

Region 3 Supervisor NA Date _____

Region 4 Supervisor NA Date _____

Region 5 Supervisor NA Date _____

Region 6 Supervisor NA Date _____

Assistant Director, WMD Date 8/30/2012
(If EA Checklist is for a translocation project or a controversial issue)

Habitat David Weedman ABC Date 9/4/12
EA required: yes (cx)
Other NEPA compliance documents: EA/BO
This project is assessed as Categorical Exclusion: NA

pending final Treatment Plan per Dept. Procedure

ARIZONA GAME AND FISH DEPARTMENT
ENVIRONMENTAL ASSESSMENT CHECKLIST
SIGNATURES

PROJECT TITLE: Fossil Creek Rotenone Treatment

Project Coordinator _____ Date 8/6/12
(EA Checklist items F - T)

Project Leader _____ Date 8/6/12
(Approval of funding source and availability)

Nongame see attached Date –
(EA Checklist items C - E)

Engineering NA Date –
(EA Checklist items A and B)
(If engineering components are involved in the project)

Region 1 Supervisor NA Date –

Region 2 Supervisor _____ Date 8/6/12

Region 3 Supervisor NA Date –

Region 4 Supervisor NA Date –

Region 5 Supervisor NA Date –

Region 6 Supervisor NA Date –

Assistant Director, WMD see attached [redacted] Date [redacted] –
(If EA Checklist is for a translocation project or a controversial issue)

Habitat see attached Date –

EA required: –
Other NEPA compliance documents: –
This project is assessed as Categorical Exclusion: –

REFERENCES

REFERENCES

A. Americans with Disabilities Act, Section 504 of the Rehabilitation Act of 1973, (P.L.93-112).

B. National Environmental Policy Act, 1969; CEQ Guidelines, 40 CFR (1502.16 part e).

C. Section 7, Endangered Species Act of 1973, as amended.

D. Wildlife of Special Concern; Same species as listed in "Threatened Native Wildlife in Arizona (1988)."

E. Executive Order 11987, Exotic Organisms; Executive Order 13112, Invasive Species; and 50 CFR 92.

F. Arizona Native Plant Law (ARS 3-901 to 3-915, 3-931 to 3-934).

G. Executive Order 11593, Protection and Enhancement of the Cultural Environment, (P.L. 93-291); Section 106 of the National Historical Preservation Act of 1966, as amended (U.S.C. 470), EO 11593; Archaeological and Historic Preservation Act of 1974, 5-24-74; CEQ guidelines, Federal Register 43(230), 11-29-78, Section 1508.8; Native American Graves and Repatriation Act (NAGPRA) (P.L. 101-601); American Indian Religious Freedom Act (AIRFA) (42 U.S.C.1996); Arizona Antiquities Act of 1927 (ARS 41-841 to 41-846); State Historic Preservation Act of 1982 (ARS 41-861 to 41-864); and the Burial Protection Law of 1990 (ARS 41-865).

H. Acquisition and Disposition of Lands and Waters (ARS 17-241); Agreements with other entities for wildlife management (ARS-231); Arizona Game & Fish Department Policy Manual (I2.4N).

I. Water development and use (ARS-231/12c)

J. Executive Order 11988, Flood Plain Management; Executive Order 11990, Protection of Wetlands; the Clean Water Act Amendments of 1977, (P.L. 95-217); and Arizona Department of Environmental Quality standards (Arizona Administrative Code Title 18, Ch 11(401)).

K. Wild and Scenic Rivers Act, (P.L. 90-542); Wilderness Act, (P.L. 88-577); National Trails Act, (P.L. 90-543); Federal Land Planning Documents.

L. Clean Air Act of 1970, (P.L. 91-604); Federal Water Pollution Control Act, (P.L. 92-500); Executive Order 11738; the Clean Water Act Amendments of 1977, (P.L. 95-217); and Arizona Department of Environmental Quality standards (Arizona Administrative Code Title 18, Ch 11(401) .

M. Laboratory Animal Welfare Act of 1966 (P.L. 89-544).

Habitat Branch Log #: M12-0821083644

COMPLIANCE DOCUMENTATION FORM

Grant Title/Index #:

- Sportfish Restoration 06198
- Sportfish Restoration CAMP 06358
- Heritage CAMP 17232

Project Title: Fossil Creek Rotenone Treatment (Includes Stock Tanks in Watershed)

Start Date: September 4, 2012 **End Date:** September 4, 2022

Geographic Location of Project:

	LANDOWNER AND/OR SITE NAME	TOWNSHIP	RANGE	SEC.	UTM (meters) / GPS COORDINATES (Northing / Lat.)	(Easting / Long.)
PROJECT LOCATION	Irving Falls	12 N	7 E	29	34°24.186' N	111°37.070' W
	Fossil Creek Barrier	11 N	7 E	29	34°21.203' N,	111°39.933' W
	Soldier Mesa Tank	13 N	8 E	15	34°30.456' N,	111°29.599' W
	Sand Rock Draw Tank	13 N	8 E	16	34°31.027' N,	111°30.495' W
	Sand Rock Tank	13 N	8 E	17	34°30.807' N,	111°31.823' W

Description of Proposed Action:
Rotenone will be applied to Fossil Creek at or below the concentration allowable on the label using drip stations, backpack sprayers and rotenone sand. The rotenone will be detoxified using potassium permanganate at the permanent fish barrier. Sentinel fish will be used to determine if the treatment is effective and to determine if the detoxification is effective. Prior to the treatment a portion of the native fish will be salvaged and transported upstream of the treatment area. The AZGFD Piscicide Treatment Planning and Procedures Manual, the American Fisheries Society Rotenone SOP and HACCP procedures will be followed for the salvage and treatment.

In adherence to the AFS SOP and Department piscicide procedures manual, an *in-situ* bioassay will be conducted prior to the treatment to confirm the minimum effective concentration of rotenone that will eradicate smallmouth bass. In addition, the project partners will also collect and have tested a series of water samples from the Project Area before and after the treatment that follow the guidance from the AFS SOP.

The proposed action will begin September 10, 2012, or thereafter when Fossil Creek is at base flow and no rain or flash floods are occurring within the watershed. The Fossil Creek treatment involves up to two applications of rotenone over a short period. The first application is scheduled for the week of

September 10th (with the week of September 17th as an alternate). The second application is scheduled for the following week.

Liquid emulsifiable rotenone (Chem-Sect Chem Fish, or Prenfish Toxicant, or CFT Legumine) is used for the chemical treatment of flowing systems. CFT Legumine and Prenfish Toxicants are the only formulations currently registered for use in Arizona. CFT Legumine will be used, if available, for treatment of Fossil Creek. In some situations, a mixture of rotenone powder (Prenfish Prentox Fish Toxicant Powder) and sand may be used.

Drip stations are the primary means of release of rotenone into the river, and various sizes are used depending on water quantity (flow) of the target area. Drips will be set to deliver rotenone into flowing water at a concentration at or less than the maximum allowable on the label (4 ppm). The actual rate of application will be determined after a bioassay is conducted. Ground crews manually apply liquid rotenone from backpack sprayers at the same target concentration in all standing water, poorly mixing areas, side channels, backwaters, marshes, seeps, springs and other sources of fresh water which could provide refuge for non-native species. In certain groundwater seep locations and deep pools, where backpack sprayer application is inadequate, small volumes of rotenone are mixed with sand (sand mix) and dispersed in the seep, creating a slow and continual release of piscicide.

Detoxification is the final step in the treatment process. Rotenone in flowing systems is neutralized with potassium permanganate (KMnO4), delivered downstream from active treatment areas via automated dry feed hoppers. Application rates are adjusted continually to accommodate any observed changes in upstream water volume and/or calculated possible maximum rotenone concentration. Standard rotenone detoxification / concentration rates are used. As an extra precaution against accidental drift of pesticide outside of the target reaches, KMnO4 is delivered at a rate to detoxify double the target rotenone concentration throughout all treatments (i.e. twice the expected instream concentration). Distribution rates of KMnO4, are continually monitoring by dedicated detoxification personnel throughout the application of rotenone. An independent second dry hopper is also set up as an emergency precaution during all rotenone treatments. Automated hoppers are powered by portable generators. Several additional functioning generators are maintained on site as backups.

Closed minnow traps containing live sentinel fish are placed both within and below the treated areas to: assess the effectiveness of rotenone exposure time and concentration (lethality / toxicity), ensure that rotenone does not escape the target reach without successful detoxification (survival), and verify that prior to termination of detoxification, water above the station is non-toxic to fish (survival). Minnow traps are monitored hourly through the treatment process.

After treatment, native fish will disperse from upstream reaches and recolonize the treated section. In addition, spikedace, Gila topminnow, razorback sucker, and longfin dace will be stocked into the treated reach (stocking of the T&E species was described in EAC M07-05291229; stocking of longfin dace was described in EAC M07-04172930). After the treatment and the native fish stockings, the stream will be monitored to assess the recolonization of native fishes. Various gear types will be utilized in the monitoring of the creek.

The 3 stock tanks listed are known to have been illegally stocked over recent years with nonnative fish. Several other tanks exist within the Fossil Creek watershed and illegal stocking of these tanks poses a threat to the native fish in Fossil Creek. The removal of nonnative fish from any tank within the Fossil

Creek watershed may be necessary if the tanks are illegally stocked. Any chemical renovation of tanks will follow procedures in the AFS SOP and Department Piscicide Procedures Manual. After the treatment, the tanks will continue to be monitored to assess the possible illegal stocking of nonnative fishes. Various gear types will be utilized in the monitoring of these tanks.

Recommended Determinations:

SECTION 7

X Section 7 consultation forms are attached for review and determination.

- A Biological Opinion has been completed for the allotment in which these three tanks occur (USFWS, 2009)
- An updated Biological Opinion has been prepared for these actions. (USFWS, 2012)

National Environmental Policy Act (NEPA)

X Federal Agency Environmental Compliance Documentation attached for review. (Include agency name, document type [i.e. ROD, EA, other Federal Categorical Exclusions, etc.] & number, and date)

USFS, BOR, and USFWS are all Federal agencies and could conduct and/or assist with developing NEPA for Federal actions in the area.

- An EA was completed and a FONSI signed in 2004. (BOR, 2004)
- A letter of concurrence for treatment of stock tanks. (FWS, 2005)
- A Section 18 document (necessary to update the EA) has been prepared to evaluate the change in piscicide use from antimycin to rotenone. (Coconino NF, USFS, 2012)

National Historic Preservation Act (NHPA)

X No ground disturbing activities or modification to eligible or currently listed properties/sites in the National Register of Historic Places.

Submitted by: [signature] AZC **Date** 8-3012

Approved FA: See NEPA Determination attached to Section 7 BE Form signed by N. Timenez **Date** 4/4/12

Habitat Branch Log #: M12-0821083644

FEDERAL AID SECTION 7 BIOLOGICAL EVALUATION FORM
U.S. Fish and Wildlife Service
Region 2 Federal Aid Programs

1. **State:** Arizona

2. **Agency:** Arizona Game and Fish Department

3. **Program(s):** x_ Sport Fish Restoration
x_ State Wildlife Grants

4. **Grant Title and Index Number:**

- Sportfish Restoration 06198
- Sportfish Restoration CAMP 06358
- Heritage CAMP 17232

5. **Project Title:** Fossil Creek Rotenone Treatment (Includes Stock Tanks in Watershed)

Start Date: Upon approval or September 1, 2012 **End Date:** September 1, 2022

6. **Originating Person/Phone:** Acting Habitat Branch Chief

7. **Date:** August 27, 2012

8. **Pertinent Species and Habitat:**

The following are Endangered, Threatened, or Candidate species, and Designated or Proposed Critical Habitat, that have been identified from the Arizona Game and Fish Department's Heritage Data Base Management System as occurring within the buffer area of this project. Although the official USFWS County list reflects additional species and critical habitat, these will not be assessed in this document because they are outside of the identified project area buffer, and are not anticipated to be impacted by the proposed action(s).

A. Listed species and/or their critical habitat within the action area:

Apache trout	*Oncorhynchus apache*	LT	
Bald eagle	*Haliaeetus leucocephalus*		BGA
Chiricahua leopard frog	*Lithobates chiricahuensis*	LT	CH
Colorado Pikeminnow	*Ptychocheilus lucius*		10 J Area

Gila topminnow	*Poeciliopsis occidentalis occidentalis*	LE	
Golden eagle	*Aquila chrysaetos*		BGA
Loach minnow	*Tiaroga cobitis*		CH
Mexican spotted owl	*Strix occidentalis lucida*	LT,	CH
Razorback sucker	*Xyrauchen texanus*	LE,	CH
Spikedace	*Meda fulgida*		CH
Southwestern willow flycatcher	*Empidonax trailii extimus*		CH

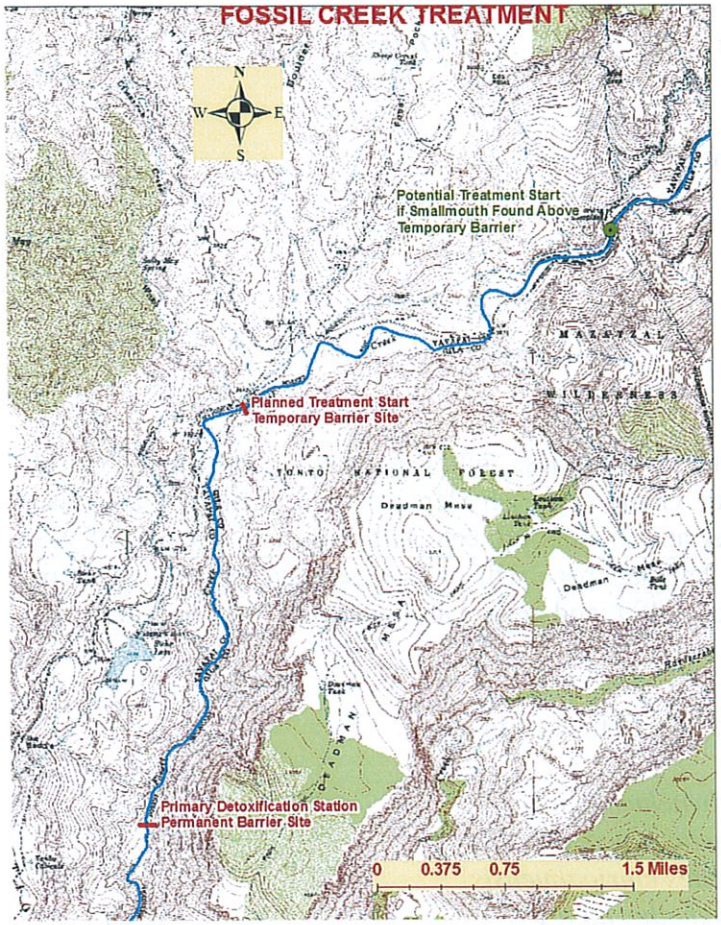
B. Proposed species and/or proposed critical habitat within the action area:

None

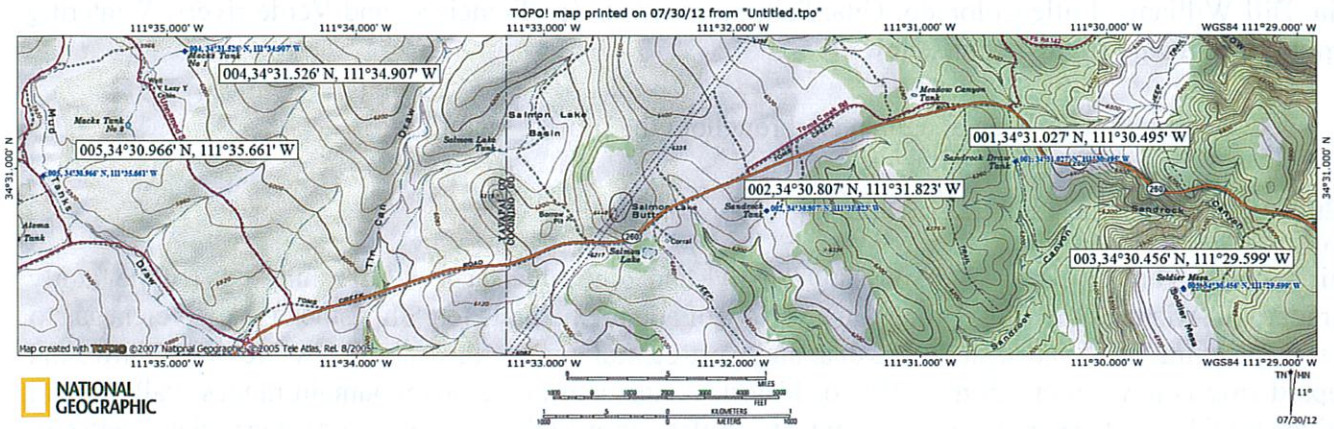
C. Candidate species within the action area:

Headwater chub	*Gila nigra*	C
Northern Mexican gartersnake	*Thamnophis eques megalops*	C
Roundtail chub	*Gila robusta*	C
Yellow-billed cuckoo	Coccyzus americanus	PS: C

9. Geographic area (attach map):



Fossil Creek Tanks Map



10. Species/habitat occurrence:

Apache trout LT

Historic and Present Status:

Apache trout is believed to have historically occupied headwaters of the Salt, San Francisco, and Little Colorado rivers. The species is native to the White Mountains of Arizona, in headwaters of the Little Colorado, Black and White Rivers. It is restricted to headwater streams of the Salt (Black and White rivers), Little Colorado, and Blue rivers in the White Mountains of eastern-central, Arizona. The species was introduced and established outside of its natural range in several streams in the Pinaleno Mountains, Coronado N.F. (Grant and Ash creeks) and Kaibab N.F. (North Canyon Creek).

The Apache trout is the only trout native within its range in the Black, White, Little Colorado, and Blue River drainages. The introduction of nonnative salmonids, as well as, habitat degradation and loss have greatly reduced the range of Apache trout. The reduction in range has been to approximately 48 km of small headwater tributaries from an estimated distribution of about 965 km of stream habitat. Currently there are 20 pure and 6 reintroduced populations in the state.

- Occurrences have been documented 5 miles northeast of the project area, northeast of Callaway Butte in West Clear Creek.

Bald eagle BGA

Historic and Current Status:

Historically, the bald eagle was widespread across North America, mainly Canada and the United States of America. Post European settlement, the species began a significant decline in the late 1800's. The subsequent use of the insecticide dichloro-diphenyl-trichloroethane (DDT) nearly brought the species to extinction before it was banned as a pesticide in the United States in 1973. After decades of conservation and management, the species is now common throughout much of the species' historic range.

In Arizona before the 1970's, there was little information about the size and condition of the bald eagle breeding population. With the exception of two breeding areas, nesting bald eagles occur within one mile of water. Currently, nesting areas are located along: Burro, Canyon, Cibecue, Oak, Pinal, Tangle, Tonto, and Walnut creeks; Alamo, Apache, Bartlett, Crescent, Greer, Horseshoe, Lower Lake Mary, Luna, Lynx,

Pleasant, Roosevelt, Saguaro, San Carlos, Talkalai, and Woods Canyon lakes or reservoirs; and the Agua Fria, Bill Williams, Little Colorado, Gila, Salt, San Carlos, San Francisco, and Verde rivers. Wintering populations of bald eagles occur statewide.

- Occurrences have been documented throughout the project vicinity.

Chiricahua leopard frog LT, CH

Historic and Current Status:

Chiricahua leopard frog is one of 6, possibly 7 native and 2 introduced species of ranid frogs (of the family Ranidae) in Arizona. The frog is found in a variety of aquatic habitats (e.g., livestock tanks to cienegas to rivers) in central and southeastern Arizona, and west-central and southwestern New Mexico. Chiricahua leopard frog is now absent from > 75% of historical sites and numerous mountain ranges, valleys, and drainages within its former range. Where extant populations exist they are small and often widely scattered, occupying marginal and dynamic habitats. Within Arizona, the species range is divided into two portions. The first portion extends from montane central Arizona east and south along Mogollon Rim to montane parts of west-southwestern New Mexico. The second portion extends through the southeastern montane sector of Arizona and adjacent Sonora.

- Critical Habitat occurs 3.5 miles to the north of the Fossil Creek project area near Buckskin Hills. Occurrences have been documented in Fossil Creek west of Deadman Mesa.

Colorado pikeminnow 10J Area

Historic and Present Status:

The fish was once abundant in the Colorado River Basin and most of its major tributaries. In Arizona, this included the mainstem Colorado, Gila, Salt, San Pedro, Verde, and lowermost stretch of the Little Colorado River. The last adult record in Arizona was in Lake Mohave on the Colorado River in 1967. Natural populations are restricted to the upper basin states in the Green, Yampa, White, and Colorado Rivers. Since 1995, the Department and cooperators have stocked 8,537 pikeminnow into the Verde River at 2 locations, near Camp Verde and Childs. These fish were released as an experimental-nonessential population under the Endangered Species Act 10j rule.

- 10J Area for Colorado pikeminnow occurs in the southern portion of the project area in the Verde River.

Gila topminnow LE

Historic and Present Status:

Historically Gila topminnow was widespread in the Gila River Drainage below 1500 m in elevation. The subspecies was found in the San Francisco River at Frisco Hot Springs, New Mexico, west to the mainstem Gila River near Yuma, Arizona, and possibly even in the lower Colorado River. The fish thrived in the Salt River as far upstream as the present site of Roosevelt Lake and was common in Tonto Creek. Topminnow probably occurred in the Verde and San Simon Rivers. Records indicate that it occurred in the San Pedro River, and was abundant in the Santa Cruz River. Also the species was present in many tributaries and smaller order streams throughout its range.

In the U.S., the species currently occurs in the Gila River Drainage, Arizona, particularly in the upper Santa Cruz River, Sonoita and Cienega creeks, and the middle Gila River. Gila topminnow is restricted to 14

natural localities in Arizona. In Mexico, the species occurs in the Río Sonora, Río de la Concepción, and Santa Cruz River.

- Occurrences have been documented less than a mile to the west of the Fossil Creek stretch of the project area, just north of Stehr Lake.

Golden eagle BGA

Historic and Current Status:

Golden eagles are moderately threatened range-wide as their habitat lends itself to other uses. They are susceptible to power line electrocution, poison intended for other species, occasional shootings and habitat loss to agriculture and suburban land uses. They are extremely sensitive to human disturbance during the nesting period. In eastern North America they are reappearing in some sites in historic nesting range but they may be decreasing in northeastern U.S. A decline has also been noted in parts of its range in Canada.

- Occurrences have been documented near the Verde River to the northwest of Verde Hot Springs.

Headwater chub C

Historic and Present Status:

Headwater chubs are endemic to the Gila River basin of Arizona and New Mexico where they occupy the middle and headwater reaches of middle-sized streams. Populations have been recognized from the mainstem Gila River (above confluence with Mangus Creek) in New Mexico. This includes West, Middle and East forks of the Gila River, along with the San Carlos River (a tributary to the Gila). They are also identified from Ash Creek (tributary to San Carlos River), Tonto Creek (tributary to the Salt River), and Spring Creek, (tributary of Tonto Creek). In the Verde River system, they inhabit Upper Fossil Creek (above the diversion dam), East Verde River and Deadman Creek.

In Arizona, they are identified from Ash Creek (tributary to San Carlos River), Tonto Creek (tributary to the Salt River), and Spring and Marsh Creeks, (tributaries of Tonto Creek). In the Verde River system, they inhabit Upper Fossil Creek (above the diversion dam), East Verde River and Deadman Creek.

- Occurrences have been documented in the northern stretch of the Fossil Creek project area, near Towel Peak and Deadman Mesa.

Loach minnow CH

Historic and Present Status:

Loach minnow is endemic to the Gila River Basin upstream of Phoenix Arizona and into New Mexico. It was once common throughout most of the major tributaries of the Gila River (i.e., Blue, Salt, San Francisco, San Pedro, Tularosa, Verde, and White Rivers. It occupied mainstem reaches and moderate gradient perennial tributaries up to 2500 m (8200 ft) elevation. Loach minnow is now restricted to approximately 15-20 % of its former range (the Black, Blue, San Francisco, and White Rivers, and Aravaipa and Eagle Creeks). It has been completely extirpated from the Verde River drainage.

- Critical Habitat occurs throughout the Fossil Creek project area.

Mexican spotted owl LT, CH

Historic and Current Status:

The historic range of the Mexican spotted owl extended from the southern Rocky Mountains in Colorado and the Colorado Plateau in southern Utah, southward through Arizona, New Mexico, and far western Texas, through the Sierra Madre Occidental and Oriental, to the mountains at the southern end of the Mexican Plateau. The present range is thought to be similar to the historic range.

Populations in Arizona have a disjunct distribution and occur in all but the arid southwestern portion of the state or much of the lowland riparian zones.

- Occurrences have been documented within 3 miles to the north of the project area along the Mogollon Rim near Good Enough Ridge.

Northern Mexican gartersnake C

Historic and Current Status:

Historically, the Northern Mexican Gartersnake occurred in perennial rivers, intermittent streams, and isolated wetlands throughout the southern half of Arizona, extreme western New Mexico and is associated with the Sierra Madre Occidental and Mexican Plateau in Mexico.

The current distribution of the Northern Mexican Gartersnake is believed to be constrained to the middle/upper Verde River drainage, middle/lower Tonto Creek, the San Rafael Valley, as well as in a small number of isolated wetland habitats and stream reaches in southeastern Arizona.

- Occurrences have been documented throughout the project vicinity.

Razorback sucker LE, CH

Historic and Present Status:

The Razorback sucker is endemic to the Colorado River Basin and formerly occurred in all major rivers and larger streams in the Basin and was once the most widespread and abundant of the Basin's big-river fishes. In the Lower Basin, populations are isolated to Lakes Mohave, mead, and the lower Colorado below Lake Havasu. In the Upper Basin, small remnant populations are found in the Green, Yampa and mainstem Colorado Rivers. These suckers are also found in the San Juan River near the new Mexico-Utah border.

In the lower basin, the largest extant population occurs in Lake Mohave, while small numbers of individuals occur in Lake Mead and in the Grand Canyon. Razorback sucker have been reintroduced into several locations in the lower basin. More than 12 million young and juvienile where stocked into riverine habitats in Arizona and California from 1981-1990, but indications are that non-native predatory fishes consumed most of these stocked fish. In 1991, the Department and its cooperators increased the size of the stocked fish to approximately 30 cm. Since 1994, 13,250 suckers have been stocked into the Verde River near Childs, and 2046 were stocked into the Salt River at Horseshoe Bend upstream of Roosevelt Lake. The reintroduced populations in both rivers are fully protected under the Endangered Species Act.

- Occurrences have been documented in Fossil Creek near Deadman Mesa, near Fossil Springs.
- Critical Habitat occurs in the Verde River.

Roundtail chub C

Historic and Current Status:

Roundtail chubs are known from larger tributaries of the Colorado Basin from Wyoming south to Arizona and New Mexico, as well as, the Rio Yaqui south to Rio Piaxtla, northwestern Mexico. In New Mexico, it occurs in the upper Gila River. The Zuni and San Francisco Rivers, New Mexico, represent waterways where *G. robusta* has been extirpated.

In Arizona, it occurs in two tributaries of the Little Colorado River (Chevelon and East Clear Creeks); several tributaries of the Bill Williams River basin (Boulder, Burro, Conger, Francis, Kirkland, Sycamore, Trout, and Wilder Creeks); the Salt River and four of its tributaries (Ash Creek, Black River, Cherry Creek and Salome Creek); the Verde River and five of its tributaries (Fossil, Oak, Roundtree Canyon, West Clear, and Wet Beaver Creeks); Aravaipa Creek (a tributary of the San Pedro River); Eagle Creek (a tributary of the Gila River).

- Occurrences have been documented within the Fossil Creek project area, north of Deadman Mesa.

Southwestern willow flycatcher CH

Historic and Current Status:

The historical range of the southwestern willow flycatcher included southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and extreme northwestern Mexico. The current range is similar to its historical range, but the quantity of suitable habitat within that range has been greatly reduced. USFWS (2002) estimate that the total range wide population to be 1,200 – 1,300 territories/pairs.

In Arizona, historically this species was found along portion of rivers within all the major watersheds. 328 territories were documented in 2000 on 12 drainages (Bill Williams, Big Sandy, Colorado, Gila, Hassayampa, Little Colorado, Salt, San Francisco, San Pedro, Santa Maria, Verde Rivers and Tonto Creek). In 2002, flycatchers were also documented on the Virgin River and Cienega Creek, a tributary of the Santa Cruz River.

- Critical Habitat occurs to the south of the confluence of Fossil Creek and Houston Creek.

Spikedace CH

Historic and Present Status

Spikedace is endemic to the Gila River Basin upstream of Phoenix in Arizona and New Mexico. It was once common throughout most of the major tributaries of the Gila River (i.e., Agua Fria, Salt, San Francisco, San Pedro, and Verde Rivers. It now is restricted to 10-15 % of former range. Spikedace was once common throughout most of the major tributaries of the Gila River (i.e., Agua Fria, Salt, San Francisco, San Pedro, and Verde Rivers). It occurred in mainstem and moderate gradient perennial tributaries up to 1800-1900 m (5900-6200 ft) in elevation. The species is presently common in 24 km (15 miles) of Aravaipa Creek and 108 km (67 miles) of the upper Gila River New Mexico. It may also be present in the lower San Pedro River, upper Verde River, and Eagle Creek.

- Critical Habitat occurs throughout the project area in Fossil Creek and the Verde River.

Yellow-billed cuckoo PS: C

Historic and Present Status:

The Yellow-billed cuckoo was once widespread and locally common in California and Arizona. It was locally common on a few drainages in New Mexico, common but with a very restricted distribution in Oregon and Washington, and generally local and uncommon in scattered drainages of the arid and semi-arid portions of western Colorado, western Wyoming, Idaho, Nevada, and Utah.

Through statewide surveys in Arizona, cuckoos were detected on 25 drainages with the upper San Pedro River having the greatest concentration in 1999. Other significant concentrations occur along the Agua Fria and Verde Rivers, Cienega and Sonoita Creeks.

- Occurrences have been documented within 1 mile to the east, near the Limestone Hills and the Verde River.

11. Description of proposed action:

Rotenone will be applied to Fossil Creek at or below the concentration allowable on the label using drip stations, backpack sprayers and rotenone sand. The rotenone will be detoxified using potassium permanganate at the permanent fish barrier. Sentinel fish will be used to determine if the treatment is effective and to determine if the detoxification is effective. Prior to the treatment a portion of the native fish will be salvaged and transported upstream of the treatment area. The AZGFD Piscicide Treatment Planning and Procedures Manual, the American Fisheries Society Rotenone SOP and HACCP procedures will be followed for the salvage and treatment.

In adherence to the AFS SOP and Department piscicide procedures manual, an *in-situ* bioassay will be conducted prior to the treatment to confirm the minimum effective concentration of rotenone that will eradicate smallmouth bass. In addition, the project partners will also collect and have tested a series of water samples from the Project Area before and after the treatment that follow the guidance from the AFS SOP.

The proposed action will begin September 10, 2012, or thereafter when Fossil Creek is at base flow and no rain or flash floods are occurring within the watershed. The Fossil Creek treatment involves up to two applications of rotenone over a short period. The first application is scheduled for the week of September 10th (with the week of September 17th as an alternate). The second application is scheduled for the following week.

Liquid emulsifiable rotenone (Chem-Sect Chem Fish, or Prenfish Toxicant, or CFT Legumine) is used for the chemical treatment of flowing systems. CFT Legumine and Prenfish Toxicants are the only formulations currently registered for use in Arizona. CFT Legumine will be used, if available, for treatment of Fossil Creek. In some situations, a mixture of rotenone powder (Prenfish Prentox Fish Toxicant Powder) and sand may be used.

Drip stations are the primary means of release of rotenone into the river, and various sizes are used depending on water quantity (flow) of the target area. Drips will be set to deliver rotenone into flowing water at a concentration at or less than the maximum allowable on the label (4 ppm). The actual rate of application will be determined after a bioassay is conducted. Ground crews manually apply liquid rotenone from backpack sprayers at the same target concentration in all standing water, poorly mixing areas, side channels, backwaters, marshes, seeps, springs and other sources of fresh water which could provide refuge for non-

native species. In certain groundwater seep locations and deep pools, where backpack sprayer application is inadequate, small volumes of rotenone are mixed with sand (sand mix) and dispersed in the seep, creating a slow and continual release of piscicide.

Detoxification is the final step in the treatment process. Rotenone in flowing systems is neutralized with potassium permanganate (KMnO4), delivered downstream from active treatment areas via automated dry feed hoppers. Application rates are adjusted continually to accommodate any observed changes in upstream water volume and/or calculated possible maximum rotenone concentration. Standard rotenone detoxification / concentration rates are used. As an extra precaution against accidental drift of pesticide outside of the target reaches, KMnO4 is delivered at a rate to detoxify double the target rotenone concentration throughout all treatments (i.e. twice the expected instream concentration). Distribution rates of KMnO4, are continually monitoring by dedicated detoxification personnel throughout the application of rotenone. An independent second dry hopper is also set up as an emergency precaution during all rotenone treatments. Automated hoppers are powered by portable generators. Several additional functioning generators are maintained on site as backups.

Closed minnow traps containing live sentinel fish are placed both within and below the treated areas to: assess the effectiveness of rotenone exposure time and concentration (lethality / toxicity), ensure that rotenone does not escape the target reach without successful detoxification (survival), and verify that prior to termination of detoxification, water above the station is non-toxic to fish (survival). Minnow traps are monitored hourly through the treatment process.

After treatment, native fish will disperse from upstream reaches and recolonize the treated section. In addition, spikedace, Gila topminnow, razorback sucker, and longfin dace will be stocked into the treated reach (stocking of the T&E species was described in EAC M07-05291229; stocking of longfin dace was described in EAC M07-04172930). After the treatment and the native fish stockings, the stream will be monitored to assess the recolonization of native fishes. Various gear types will be utilized in the monitoring of the creek.

The 3 stock tanks listed are known to have been illegally stocked over recent years with nonnative fish. Several other tanks exist within the Fossil Creek watershed and illegal stocking of these tanks poses a threat to the native fish in Fossil Creek. The removal of nonnative fish from any tank within the Fossil Creek watershed may be necessary if the tanks are illegally stocked. Any chemical renovation of tanks will follow procedures in the AFS SOP and Department Piscicide Procedures Manual. After the treatment, the tanks will continue to be monitored to assess the possible illegal stocking of nonnative fishes. Various gear types will be utilized in the monitoring of these tanks.

12. Explanation of effects of the action:

A. Species status –

Apache trout LT

Timeline and Cause for Listing:

The Apache trout was listed as Threatened in 1975. Interactions with nonnative trout are the most serious threats to the Apache trout. Hybridization with rainbow trout, and historically with cutthroat trout (*Oncorhynchus clarki*), threatens the genetic purity of Apache trout. Brook and brown trout, along with other non-native fish, threaten population sizes with competition for space and food. Brown trout are also included

in a group of nonnatives which reduce Apache trout numbers through predation. Habitat loss and degradation from cattle grazing, logging, damming, and water diversion also threaten the existence of the Apache trout.

- Potential suitable habitat occurs in the project area.

Bald eagle BGA

Timeline and Cause for Listing:

This species was listed as Endangered in 1978 and downlisted to Threatened in 1995. The eagle was delisted on August 9, 2007. The Sonoran Desert Population was listed as Threatened on May 1, 2008.

- Suitable habitat occurs throughout the project area.

Chiricahua leopard frog LT, CH

Timeline and Cause for Listing:

Chiricahua leopard frog was added to list of Category 2 candidate species in 1991, and again in 1994, but lacking sufficient data to support a listing proposal. It was elevated to a Category 1 candidate 1994. The frog was then listed as threatened without critical habitat in 2002 with a special rule allowing maintenance and operation of cattle stock tanks on all non-federal lands (activities are exempted from section 9 of the ESA). Cause for decline and listing included habitat alteration, destruction, fragmentation, and predation by non-native organisms and disease.

- Suitable habitat occurs throughout the project area.

Colorado pikeminnow 10J Area

Timeline and Cause for Listing:

The Colorado pikeminnow was listed as Endangered in 1967 and critical habitat was designated in 1994 in the Upper Basin (no habitat was designated in Arizona). A recovery plan was approved in 1978 and revised in 1990. Natural populations of the species have been extirpated from the lower basin, but hatchery-reared fish have been introduced at some locations. Significant threats and cause for listing include alteration of habitat due to river management (impoundment, dewatering, channelization) and introduction of non-native fish species.

- Suitable habitat occurs in the Verde River.

Gila topminnow LE

Timeline and Cause for Listing:

Gila topminnow was listed as endangered in 1967. No critical habitat has been designated for the species. A recovery plan was approved in 1984 and a revised draft prepared by D. Weedman in 1999, which has been submitted to the USFWS. Decline of the population was caused by habitat alteration, destruction, and the introduction of non-native fish.

- Suitable habitat occurs throughout the project area.

Golden eagle BGA

Timeline and Cause for Listing:

In 2009 congress passed the Bald and Golden Eagle Protection Act which extends protection to both species.

- Suitable habitat occurs throughout the project area.

Headwater chub C

Timeline and Cause for Listing:
Headwater chub was listed as a candidate in May 2006. Headwater chub populations have declined due to a combination of habitat loss and degradation related to dams, diversions, groundwater pumping, mining, recreation, and livestock grazing, and competition and predation from non-native fish.

- Suitable habitat occurs throughout the project area.

Loach minnow CH

Timeline and Cause for Listing:
Loach minnow was listed as a Category 1 Candidate in 1982 and uplisted to Threatened in 1986. A Recovery Plan was completed in 1991 and Critical Habitat was designated in 1994. However, a subsequent court ruling set aside Critical Habitat in order to perform an economic analysis. The analysis was completed and final determination of critical habitat made April 25, 2000. Critical Habitat was designated in 6 areas including portions of the Black, Blue, Gila, San Francisco, San Pedro, and Verde Rivers, and Tonto Creek.

The primary cause for listing the species as threatened was habitat destruction and alteration due to damming, diversions, groundwater pumping, and introduction and spread of exotic predatory and competitive fish species (especially red shiner and catfishes).

- Suitable habitat occurs throughout the project area.

Mexican spotted owl LT, CH

Timeline and Cause for Listing:
The species was listed as Federally threatened in 1993 and critical habitat was designated in 2001. Threats include destruction and modification of nesting forest habitat. A Recovery Plan exists for the species identifying delisting criteria and conservation measures.

- Suitable habitat does not occur in the project area.

Northern Mexican gartersnake C

Timeline and Cause for Listing:
This species was originally listed as a candidate species as a Category 2 in 1985. Category 2 species were those for which existing information indicated that listing was possibly appropriate, but for which substantial supporting biological data to prepare a proposed rule were lacking. In 1996, the USFWS published a Candidate Notice of Review in which the use of Category 2 candidates was discontinued, and the northern Mexican gartersnake was no longer recognized as a candidate. In 2006, the USFWS published a 90-day finding on a 2003 petition to list the northern Mexican gartersnake in which they indicated that the petition included sufficient information to warrant listing the northern Mexican gartersnake under the ESA as threatened or endangered throughout its range in the United States and Mexico, but listing was precluded by higher priority actions. Since 2006, new information on threats to this species in Mexico has been identified.

Of particular importance, Mexican scientists have documented the expansion of the exotic American bullfrog in Mexico, a particularly serious threat to the gartersnake and its prey base. In 2008, the US Fish and Wildlife Service found that listing of the northern Mexican gartersnake throughout its range was "warranted but precluded," therefore it is a candidate species at this time until funding becomes available to prepare a proposed rule.

Possible threats include predation by introduced bullfrogs and predatory fishes, urbanization and lowered water tables, and habitat destruction, including that due to overgrazing (Holycross et al., 2006). Within the United States, the northern Mexican gartersnake has been reduced to possibly less than 10 percent of its former distribution. The subspecies' current distribution in Mexico is less certain although the species is listed as Threatened by the Mexican government. The last observation of this species in New Mexico was in 2002 of a single individual. Population numbers are decreasing, with extirpations at several localities since 1950 as habitat is changed and introduced predators invade habitat (Holycross et al., 2006).

- Suitable habitat occurs throughout the project area.

Razorback sucker LE, CH

Timeline and cause for listing:

The Razorback sucker was listed as endangered in 1991 and critical habitat was designated in 1994. A Recovery plan was finalized in 1998. Decline in abundance and distribution was caused by alteration of river conditions and loss of habitat due to dam construction, irrigation dewatering and channelization, and predation by exotic fish species, such as black bullhead, carp, and channel catfish.

- Suitable habitat occurs throughout the project area.

Roundtail chub C

Timeline and cause for listing

The roundtail chub was listed as a Candidate in 2009. As with many native fish, reductions in range and numbers are likely the result of habitat loss, as well as competition with, and predation by, non-native fish species. Threats include aquifer pumping, stream diversion, reduction in stream flows, predation by and competition with non-native aquatic wildlife.

- Suitable habitat occurs throughout the project area.

Spikedace CH

Timeline and Cause for Listing:

Spikedace was added as a Category 1 Candidate in 1982 and listed as Threatened in 1986. A Recovery Plan was completed in 1991. Critical Habitat was designated in 1994 but subsequent court ruling set it aside to perform an economic analysis. The analysis was complete and final determination of critical habitat made April 25, 2000. Critical Habitat was designated in 6 areas including portions (and/or tributaries) of the Blue, Gila, San Francisco, San Pedro, and Verde Rivers and Tonto Creek.

The primary cause for listing the species as threatened was habitat destruction and alteration due to damming, diversions, groundwater pumping, and introduction and spread of exotic predatory and competitive fish species (especially red shiner and catfishes).

- Suitable habitat occurs throughout the project area.

Southwestern willow flycatcher CH

Timeline and Cause for Listing:

Petitioned for listing in 1992, and in 1993 FWS published a proposal to list as Endangered with critical habitat. The Final Rule was published in 1995, but deferred designation of critical habitat. Under a court order in 1997, critical habitat was designated. However, a 2001 10th circuit court of appeals decision set aside the designated critical habitat within the courts jurisdiction. In response to the lawsuit, the USFWS decided to set aside critical habitat throughout the subspecies range. The Department contacted USFWS (Greg Beatty, AESO) to determine if significant changes to critical habitat were anticipated. One area that may be excluded includes West Clear and Wet Beaver Creeks due to the stream gradient precluding development of suitable breeding habitat. To determine impacts of stocking we used the original delineated critical habitat and reference the potential exclusion of West Clear and Wet Beaver Creeks where appropriate.

The cause for its decline is primarily loss, degradation, and fragmentation of riparian habitat within the subspecies range caused by dams, water diversions, groundwater withdrawal, channelization, phreatophyte control, livestock grazing, recreation, fire, urbanization, agriculture development; introduction of invasive exotic plant species [e.g., tamarisk (*Tamarix spp.*), Russian olive (*Eleagnus angustifolia*), and giant reed (*Arundo donax*)]; brood parasitism; demographic and genetic effects of small population size; and migration and winter range stresses.

- Suitable habitat occurs throughout the project area.

Yellow-billed cuckoo PS: C

Timeline and Cause for Listing:

Yellow-billed cuckoo (Western U.S. DPS) was listed as a candidate in 2002. There has been a general population decline across its range. North American Breeding Bird Surveys indicate population declines of 1.6% per year in North America. The cause for its decline is primarily habitat loss, degradation, and fragmentation of riparian habitat throughout the western United States. Other factors to consider include clearcutting, grazing, and pesticide use in riparian areas. Riparian habitat has declined up to 90% in Arizona and New Mexico thus negatively effecting this species.

- Suitable habitat occurs throughout the project area.

B. Habitat status –

Apache trout LT

Habitat Requirements:

Apache trout prefer cool, clear, high elevation streams and rivers. Large individuals live in pools, while smaller ones remain near obstructions or other cover such as overhanging trees or brush in runs and riffles. The species is restricted to elevations of approximately 1,763 m (5,780 ft.) and up.

Breeding Biology:

Spawning occurs from March through mid-June, but varies with elevation. Redd construction occurs at the downstream end of pools in a variety of gravel compositions, depths, and velocities, only after water

temperatures reached 8 °C (46.4 °F). Maturity was found to occur in three years at a size of approximately 13 cm (5.1 in.). Fecundity increases with size, ranging from 72 to 240 eggs in 13.1 to 19.1 cm (5.2 to 7.5 in.) fish and from 646 to 1,083 eggs in 29.8 to 34.9 cm (11.7 to 13.7 in.) fish. Fry hatch in 30 days and emerge from redds after another 30 days, then exhibit nocturnal downstream movements.

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

Bald eagle BGA

Habitat Requirements:
Bald Eagles inhabit coastal areas, estuaries, unfrozen inland waters, and some arid areas of the western interior and southwestern portion of the U.S. In Arizona, eagles have been observed from 460 - 7,930 feet, in Lower and Upper Sonoran Life Zones, including saguaro-palo verde, desert grassland, chaparral, and pinyon-juniper community types. They like areas with high water-to-land edge, and areas with unimpeded views including both horizontal and vertical aspects. Areas selected for as wintering habitat will have an adequate food supply, and have open water such as river rapids, impoundments, dam spillways, lakes, and estuaries.

They typically have 4 types of perches; 1) Guard/Sentry Perch - these perches are located in tall trees, cliff and ridge tops, and cliff faces, where the nest can be watched, 2) Foraging Perch - these perches are normally adjacent to or overhanging the river or lake, and are low to moderate in height, 3) Shade Perch (warm arid areas) - these are areas that provide adequate shade during warm periods of the year, 4) Roost Perch - These perches are mainly used for resting at night, and are usually sheltered from the elements (e.g. wind), and are near to or possessing a good view of the nest. Bald eagles will use guard and foraging perches for loafing. Communal roosts are common in the winter, and are found in areas that provide protection from adverse weather conditions, and may be comprised of several individuals. These include sheltered valleys, forested bottomlands, and coniferous trees. Hunting area varies between 1,700 and 10,000 acres, but can be smaller if food is abundant. An eagle's lifting weight is about four pounds.

Migration: Bald eagles that have nested tend to stay on or near their nesting locality through the year if food is available and the weather is bearable. If they do vacate the area, they go whatever distance is necessary to find adequate food and shelter. There tend to be extensive southern migrations from northern regions, especially of younger birds. Generally, young of northern populations tend to migrate south earlier and return north later than older migrants.

When eaglets are present, at least 1 parent remains in constant attendance for the first 2 weeks. Night brooding lasts about 3 to 4 weeks. Both parents may feed the eaglets, but by 6 to 9 weeks of age, the eaglets are well able to tear off pieces of food for themselves. Survival of both young at nests containing 2 eaglets is frequent, and appears to depend on the ability of the parent to provide food. The larger of 2 eaglets usually gets fed first, and if food is scarce, may get all of it resulting in the death of the smaller eaglet. This is termed siblicide and usually occurs at 3 to 8 weeks of age, and occurs more with golden eagles. Later in nest life, parents spend less time near the young. Eaglets, however, see and recognize their parents at a great distance. During this later stage, eaglets spend much time in preening, flight preparation (flapping), hunting and fighting play, and sunbathing. Eaglets attain flight around 10-11 weeks of age, and usually leave the nest a

week to 2 weeks later. After dispersal or migration, the usual pattern of birds aged 1 to 3 years, is to return to the general region of their birth.

Breeding habitat of bald eagles in Central Arizona is found mainly within 2 of the biotic life zones described by C.H. Merriam:

1) Lower Sonoran Life Zone is from the desert valley surrounding Phoenix upstream into lower portions of the Canyon country of the Salt and Verde Rivers. This habitat is of the saguaro-palo verde community type between 200-800 meters, in valley floors and hillsides.

2) Upper Sonoran Life Zone is found farther upstream in the canyons and on the surrounding hillsides, and is characterized by coarse-soiled, rocky hillsides, talus and cliffs. It is composed of desert grassland and transition community types. Lower slopes possess perennial bunch grass, jojoba, cactus, yucca and agave. Middle and upper slopes often grade into the chaparral community type. Upper slopes are of the pinyon pine habitat type.

Nesting habitat as described by Palmer 1988, consists of areas with tall trees (usually old growth) that are taller than surroundings. The type of tree used varies geographically, for example Engelmann Spruce, Lodge Pole Pine, and Douglas Fir are common trees used in the Rocky Mountains. Ideally, the nest lies below the top of the crown in a live tree, where young are sheltered above from the elements. In treeless areas, the nest is usually on a high place such as a cliff face. Bald Eagles nesting in Arizona typically nest on cliff faces, ledges, and pinnacles. Cliff nests are generally located within 183.0 m (600.0 ft) of the riverbank and approximately 92.0 m (300.0 ft) above water. Collection of nest material (limbs, branches, and debris) is done by both sexes, but actual construction of the nest is thought to be done by the female. The lining consists of finer items, such as sedges, grasses, moss etc. The nest usually measures 0.3-1.0 m high, and 1.0-2.0 m in the top diameter. The cup or cavity measures 14 inches in diameter and 4 inches deep. Continually used nests can become quite large, and normally last no more than a few years.

Breeding Biology:
Bald eagles are believed to form a lifelong pair bond; if a mate is lost, a replacement is found rather quickly. The female and male of a previously mated pair may arrive on the breeding grounds separately or they may meet during migration and arrive together. Bond maintenance may be enhanced by soaring together, billing, stroking each other, joint nest-building or repair, sitting together on the nest, and having the male bring food to the female. Pairs that are uninhibited (low density of birds in area) can breed as early as 4 years of age. A younger bird of either sex may be acquired as a mate or foster parent to replace a lost mate. A high density of established nesters in an area can inhibit breeding by other reproductive aged pairs. The laying rate is normally 2-5 days after the first egg is laid, which usually occurs in the morning. Incubation follows laying of the first egg. Clutch size is usually 2 and more often 3 than 1. The eggs are white, rather rough, and without luster. If the first clutch is taken (Fails) early enough, the female may lay a second clutch after an interval of 4 weeks or more. Dates of first clutches varies geographically: Arizona = Late January to the third week of February. Incubation lasts 35 days, the nestling stage lasts 77 days, and first flight occurs around 112 days.

When eaglets are present, at least 1 parent remains in constant attendance for the first 2 weeks. Night brooding lasts about 3 to 4 weeks. Both parents may feed the eaglets, but by 6 to 9 weeks of age, the eaglets are well able to tear off pieces of food for themselves. Survival of both young at nests containing 2 eaglets is

frequent, and appears to depend on the ability of the parent to provide food. The larger of 2 eaglets usually gets fed first, and if food is scarce, may get all of it resulting in the death of the smaller eaglet. This is termed siblicide and usually occurs at 3 to 8 weeks of age, and occurs more with golden eagles. Later in nest life, parents spend less time near the young. Eaglets, however, see and recognize their parents at a great distance. During this later stage, eaglets spend much time in preening, flight preparation (flapping), hunting and fighting play, and sunbathing. Eaglets attain flight around 10-11 weeks of age, and usually leave the nest a week to 2 weeks later. After dispersal or migration, the usual pattern of birds aged 1 to 3 years, is to return to the general region of their birth.

Feeding Preferences:
Bald eagles have a diet comprised mainly of fish (catfish, suckers, and carp; and yellow bass <6 in), followed by small mammals (jackrabbits, cottontails, squirrels, and woodrats), carrion (including large mammals), avian (normally waterfowl, mainly American Coots), and to a lesser extent various herps, such as the Sonora Mud and Spiny Softshell turtles, and unidentified snakes that are usually dead. Fish consumption increases in the diet as the nesting season progresses, while the consumption of mammals declines. These eagles are also opportunistic, and will pirate meals from other raptors as well, such as Ospreys and other eagles. Both parents may feed eaglets, usually by tearing food, and dropping it into open mouths. By the 4th week, young eaglets have to reach for the food from the adults.

Chiricahua leopard frog LT
Habitat Requirements:
Leopard frogs in general are riparian generalists, found in springs, cienegas, canals, small creeks, main stem rivers, lakes, and earthen cattle tanks. These tanks are very dynamic, small size, and possibly lead to ephemeral populations of Chiricahua leopard frogs. Adult Chiricahua leopard frogs are the most aquatic of all Arizona leopard frogs and require permanent to semi-permanent water to survive and reproduce. Important habitat components may include shallow water with emergent vegetation for breeding and deeper water for escaping predators.

Breeding Biology:
Breeding may occur any time of the year. Eggs are oviposited in shallow water attached to vegetation and sometimes on bottom substrates. The tadpoles can metamorphose in 3 months, but may over winter taking up to 9 months.

Feeding Preferences:
Larval frogs are herbivorous, feeding on bacteria, diatoms, phytoplankton, filamentous green algae, water milfoil (*Myriophyllum sp.*), duckweed (*Lemna minor*) and detritus; adults consume a wide variety of insects and other arthropods.

Colorado pikeminnow 10J Area
Habitat Requirements:
The Colorado pikeminnow prefers rivers with high silt content, warm water, turbulence, and variable flow by season under 1,219 m (4000 ft) in elevation. Adults inhabit pools and eddies just outside the main current, while young are found in backwater areas. During winter, pikeminnow use backwaters, runs, pools, and shallow shoreline areas. In spring and early summer, they use shorelines and lowlands inundated during typical spring flooding.

Breeding Biology:
High spring flows, increasing water temperatures, and chemical inputs of from flooded lands and springs possibly cue the migratory behavior of Colorado pikeminnow. Pikeminnow have been recorded migrating up to 320 km (200 mi) upstream or downstream. Spawning in the Green and Yampa Rivers occurs most frequently in summer months with average water temperatures between 22- 25 °o, but it has been reported that reproduction can occur in a wide range of temperatures (14 – 28 C°). Data from the Green River indicate that pikeminnow emerge from spawning substrates and enter the stream drift as young fry. These larval fish are transported downstream for about 6 days, traveling an average distance of 160 km (100 mi) to reach nursery areas in low gradient reaches.

Feeding Preferences:
Young Colorado pikeminnow feed primarily on zooplankton and insect larvae. It is the only primarily piscivorous, predatory native species in Arizona. The juvenile and adult life-stages of the species and other members of the genus are documented to eat small mammals and birds in addition to a variety of fishes.

Gila topminnow LE
Habitat Requirements:
Generally, Gila topminnow prefer shallow, warm, and fairly quiet waters. However, they can become acclimated to a much wider range of conditions. Environmental variability includes temperature (tolerances range from near freezing to 37°C), pH (6.6-8.9), dissolved oxygen (2.2-11mg/l), and salinities equal to seawater. Topminnow prefer habitat that contain dense algae mats and debris, usually along stream margins or below riffles, with sandy substrates sometime covered with organic mud and debris. They are usually found in the upper 1/3 of the water column and frequent the warmest and shallowest areas.

Breeding Biology:
Topminnows are viviparous fish (i.e., embryos grow and mature within the female and are born living). Mean interval between broods is 21.5 days, and brood size can range form 1-31. Under optimum conditions, this species can produce 10 broods a year at intervals of 7-14 days. Breeding occurs primarily during January-August, but in thermally constant environments may occur throughout the year.

Feeding Preferences:
Gila topminnow are opportunistic omnivores, feeding on detritus, vegetation, amphipods, ostracods, and insect larvae; and rarely other fishes.

Golden eagle BGA
Habitat Requirements:
Golden eagles are usually found in open country, in prairies, arctic and alpine tundra, open wooded country and barren areas, especially in hilly or mountainous regions. They nest on rock ledges, cliffs or in large trees. The pair may have several alternate nests and they may use the same nests in consecutive years or shift to alternate nest used in different years. In Arizona they are found in mountainous areas and are virtually vacant in some desert areas after breeding.

Breeding Biology:
The dates for laying the eggs vary depending on the location but for California to Texas the peak is late February to March. The clutch size is 1-3, rarely 4 (usually 2). The incubation period is about 43-45 days and is done mostly by the female. The eggs are dull white spotted and blotched or freckled with brown or red

brown. The young can fly at 60-77 days and the parents care for them for another 30+ days. The older stronger eaglet will often kill smaller nest mates and adults do nothing to prevent it. The family units sometimes stay together for several months. They typically first breed in their fourth or fifth year. Lifelong monogamy may be the rule, though some exceptions have been recorded.

The distance between active nests is almost never less than .5 mile (0.8km). The nest can be 8-10 ft (2.4-3 m) across and 3-4 ft (.9-1.2 m) deep, as the site allows. The nest is made from a foundation of sticks, weeds, brush, roots, twigs, lined with soft mosses, lichens, down, and fur. The pair often adds leafy green branches to the nest. Other nests may be a mere scrape on a shelf or a cliff with a circle of branches surrounding it. Their courtship display is similar to that of the Buteos. It consists mainly of spectacular flight maneuvers, spiral sailings in ever-rising circles in which the birds frequently come together and then drift apart.

Feeding Preferences:
The Golden Eagle is a carnivore that feeds mainly on small mammals like rabbits, marmots and ground squirrels. They may also eat insects, snakes, birds, juvenile ungulates and carrion. They can fast for days between feedings. They hunt while soaring or from their perch and they may hunt cooperatively. They commonly hunt in the early morning and early evening.

Headwater chub C
Habitat Requirements:
Adult headwater chub occupy cool to warm water in mid- to headwater stretches of mid-sized streams of the Gila River basin. They are associated with deep, near shore pools adjacent to swift riffles and runs, and near obstructions. Cover consists of root wads, boulders, undercut banks, submerged organic debris, or deep water. In Fossil Creek, they were found in water >1.8 m deep with velocities of <0.10 mps. Substrates they associate with are gravel, small boulders, and large instream objects. Preferred water temperature ranges 20-27°C with minimum temperature around 7°C. Juveniles are associated with shallow, low velocity habitat with overhead cover. In Fossil creek, they seem to select depths between 0.9-1.5 m and velocities of 0.15 mps and are found over sand substrate.

Breeding Biology:
Headwater chub life span is 8-10 years. They grow rapidly but growth is dependant on water temperature. Maximum size is about 50 cm. Headwater chub first reproduce between 2-5 years of age. Females are about 100-180 mm total length. Both males and females produce spawning tubercles. In males, tubercles are usually uniformly distributed from the head to the base of the dorsal fin and rarely to the base of the tale. Females display tubercles only on the head, operculum, pectoral and caudal fins. Both males and females may develop red/orange coloration on the opercles, posterior parts of the lips and fin bases. Spawning occurs in spring and early summer at the end of spring runoff. Suitable water temperatures range 14-24°C. Each female is escorted by several males and spawning is performed in pool, run and riffle habitat. Eggs are scattered randomly over substrate. Eggs hatch in 4-7 days at a water temperature of 19-20°C. Larval stage lasts up to 53 days.

Feeding Preferences:
Stomach analysis of fish from Fossil Creek in 1976 showed headwater chubs feed on aquatic and terrestrial insects, ostracods, and some plant material. Adults show seasonal variation in their diet, with greatest diversity in spring and summer. Various aquatic invertebrates, macrophytes, and algae where present in spring with terrestrial insects and diatoms being added in the summer. No fish were found in headwater

chubs from Fossil Creek, however two iguanid lizards were. Juvenile chubs (<50mm) consisted almost exclusively of filamentous algae and diatoms. Young feed on small insects, crustaceans, and algae in quiet backwaters until they reach 25 to 50 mm (0.99 to 1.97 in.) in length. In stomachs of chubs <100 mm from the mainstem Gila, Bestgen (1985) found algae to be predominant, along with trichopterans and miscellaneous insect parts. In chubs between 150-170 mm he found algae to be a major dietary component along with ephemeropterans, trichopterans, and unidentified insects. Fish >170 mm contained algae, trichopterans, and ephenoeropterans, in addition to fish and crayfish.

Loach minnow CH

Habitat Requirements:

Loach minnow is found in small to large perennial streams, and frequents shallow, turbulent riffles with primarily cobble substrate and swift currents. It uses spaces between, and in the lee side or larger substrates for resting and spawning. Loach minnow is rare or absent over habitats where fine sediments have filled in interstitial spaces. Reoccurring flooding has been identified as an important ecological process that maintains suitable habitat conditions.

Rinne (1989) identified lifestage specific habitat parameters for loach minnow: adult prefer riffles with moderate to swift flow (30 –40 cm/s) in shallow (<20 cm) water with gravel and cobble (16 – 256 mm) substrates. Juveniles prefer similar habitat as adults, but may be found in habitat with smaller substrate sizes. Larval loach minnow use shallow water (< 10 cm), less swift (<20 cm/s) waters, and is often found along stream margins.

Breeding Biology:

Little information exists concerning the breeding biology of loach minnow.

Feeding Preferences:

This species is an opportunistic benthic insectivore, feeding on larval ephemeropterans (mayfly nymphs), simuliid, and chironomid dipterans (midges). Aquatic insect groups vary in importance seasonally or among lifestages. Chironomids are important to larval and juvenile loach minnow.

Mexican spotted owl LT, CH

Habitat Requirements:

This species primarily breeds on steep slopes in deep, shady ravines in dense old growth mixed conifer forests from 4,100-9,000 ft elevation. Habitat consists of mature montane forest and woodland, or mixed conifer and pine oak communities. In forested habitats, uneven-aged stands with high canopy closure, high tree density, and sloped terrain, appear to be key habitat components. Nests are found in live trees, snags, and on canyon walls. Food source is primarily woodrats, and also includes birds, lagomorphs and insects. In Arizona, range size for single owls averages 1,600 acres and for combined home ranges occupied by pairs 2,000 acres.

Breeding Biology:

The courtship period begins in February, with nesting beginning in March and lasting through June. Fledglings can be located through August and into September. The young depend on their parents for food during the summer and will eventually disperse out of the natal area in the fall. This species is monogamous and may not breed yearly. The species hunts by night, roosts by day, daytime summer roosts on north facing slopes with dense overhead canopy. The species is intolerant of moderately high temperatures.

Feeding Preferences:
These owls hunting by night, most commonly taken are woodrats, birds, lagomorphs and insects.

Northern Mexican gartersnake C

Habitat Requirements:
In Arizona, these snakes are most abundant in densely vegetated habitat surrounding cienegas, cienega-streams, and stock tanks and in or near water along streams in valley floors and generally open areas, but not in steep mountain canyon stream habitat (Rosen and Schwalbe 1988). They usually occur at elevations ranging from 130 to 6,150 feet. In Mexico, they have been found at elevations as high as 8,497 feet.

Breeding Biology:
Females are larger than males and begin reproducing at 53-70 cm (21-28 in) total length (Degenhardt et al. 1996). Clutch sizes range up to 26 live-born young, which are born from June through August (Rosen and Schwalbe 1988; Stebbins 1985).

Feeding Preferences:
Northern Mexican Gartersnakes feed mainly in water on native fish and frogs and supplement their diet with organisms such as earthworms, lizards and small rodents (Rosen and Schwalbe 1988).

Razorback sucker LE, CH

Habitat Requirements:
Habitat preferences change seasonally, with water type, and life stage. Within rivers during spring, Adults prefer runs and backwaters; during summer the fish can be found over in mid-channel bars, runs, and pools; and during winter deeper water seems to be preferred including runs, slack-water, eddies, and pools. In impoundments, this species utilizes both backwater and the main impoundment. Juveniles in reservoirs use near-shore habitats but disperse within a few weeks. Juvenile habitat selection within rivers has not been well studied. Young Razorbacks presumably require quiet, warm, shallow water as nursery habitats in rivers, and backwaters in can provide quiet water where there is the potential for increased food availability. In reservoirs, coves can provide warm, shallow shorelines suitable as nursery habitat.

Breeding Biology:
Spawning has been documented in mainstem rivers, riverine-influenced areas of large impoundments, and wave-washed shorelines of reservoirs. In lacustrine habitats (Lake Mohave), spawning occurs early in the year (January-April/May) in flat or gently sloping shoreline areas over gravel, cobble, or mixed substrates. Water temperatures during spawning may range from 11.5-18°C (52.7-64.4°F). In riverine habitats, staging occurs in flooded lowlands and eddies formed in the mouths of tributary streams, and then the fish move to main-channel sand, gravel, and cobble bars for egg deposition.

Feeding Preferences:
Diet varies depending on life stage, habitat, and food availability. Larvae feed primarily on phytoplankton and small zooplankton. Juvenile feeding habits have not been clearly identified. Adults taken from riverine habitat consisted of immature Ephemeroptera, Trichoptera, Chironomidae, along with algae, detritus, and inorganic material. The diets of reservoir fish were dominated by planktonic crustaceans, but also contained some algae and detritus.

Roundtail chub C

Habitat Requirements:

Roundtail chub occupy cool to warm water, mid-elevation streams and rivers where typical adult microhabitat consists of pools up to 2.0 meters (6.6 feet) deep adjacent to swifter riffles and runs. Cover is usually present and consists of large boulders, tree rootwads, submerged large trees and branches, undercut cliff walls, or deep water. Smaller chubs generally occupy shallower, low velocity water adjacent to overhead bank cover. Sublette et al. (1990) state that roundtails also inhabit large reservoirs.

Breeding Biology:

Roundtail chub breed in spring and early summer as spring runoff is subsiding, often in association with submerged cover such as fallen trees and brush. Fertilized eggs are randomly scattered over gravel substrate with no parental care.

Feeding Preferences:

Roundtail chub are primarily carnivorous. Adults feed on aquatic and terrestrial insects, filamentous algae, and other fishes. Young feed on small insects, crustaceans, and algae in quiet backwaters until they reach 25 to 50 mm (1 to 2 in.) in length.

Spikedace CH

Habitat Requirements:

Spikedace can be found in moderate to large perennial streams; it inhabits shallow riffles, with sand and gravel substrates, and moderate to swift currents and swift pools over sand or gravel substrates. Seasonal and ontogenetic variations have been documented. Adult microhabitat preferences include shear zones where rapid flow borders slower flow, areas of sheet flow at the upper ends of mid-channel sand/gravel bars, and eddies of downstream riffle edges. Juveniles prefer slow to moderate flow velocities in shallow water with moderate amounts of instream cover. Larval spikedace are found in slow to moderate flow in shallow water with abundant instream cover.

Breeding Biology:

Spikedace breeding occurs over shallow (8-15 cm deep), sand bottomed areas with moderate flow. Spawning occurs begins in March when water temp reach 19 C^{o}, and proceeds until June but mature ovaries have been detected through September. Young spikedace first appear in April and May.

Feeding Preferences:

Its primary food sources include larval baetid ephemeropterans (mayfly), Hydropsychid trichopterans (net-spinning caddisflies), Chironomid dipterans (midges), and Simuliid diperans (black flies).

Southwestern willow flycatcher CH

Habitat Requirements:

Southwestern willow flycatchers are found primarily in riparian forest in the lower elevations (<1800 m) and in shrub willow thickets at high elevations. Low elevation forest composition varies across its range from coast oak on the San Luis Rey River in California, cottonwood/willow/tamarisk associations in Arizona, and boxelder stands in New Mexico. Although tree species composition varies, dense forest is preferred with wide patches (> 10-20 m) and generally near surface water.

In Arizona, habitat selection has been correlated to the densest riparian vegetation on the landscape, broad

floodplains that allow vegetation to develop in dense patches of tamarisk and willow. In lower elevations, nest placement within the patch to dense foliage in all vertical strata and canopy breaks. Nests in low elevation sites have been placed in buttonbush (*Cephalanthus occidentalis*), Fremont cottonwood, Goodding's willow, mesquite, netleaf hackberry (*Celtis reticulata*), seep willow (*Baccharis salicifolia*), and tamarisk.

Breeding Biology:
Arrive on the breeding grounds between early May and mid-June. Nest building commences in mid-May and continues through late July. Nests are small (8 cm high and 8 cm wide) open cups generally constructed of leaves, grass, fibers, feathers, and animal hair. The nesting cycle (nest building through fledging) requires approximately 28 days. Females produce 3 - 4 eggs per nest and may renest if the nest fails early in the nesting season. Females may renest in the same nest cup. Renesting clutches tend to be smaller than first clutches. Although not common, double brooding has been recorded in Central Arizona. Females incubate and shade the eggs. Both parents feed the nestlings and fledglings. Fledglings stay close to the nest for 3-5 days and may return to the nest during this period, remaining in the local area for up to two weeks.

Feeding Preferences:
Flycatchers are insectivorous. It uses mid to upper forest canopy, open spaces, patch edges, and areas over water to forage. Common prey includes insects in the orders of Hymenoptera, Diptera, Coleoptera, Lepidoptera, Homoptera, and Hemiptera.

Yellow-billed cuckoo PS: C
Habitat Requirements:
Historical records indicate the Yellow-billed cuckoo is associated with broadleaf deciduous riparian forests dominated by cottonwood and willow thickets, and within river bottoms or near water. Cuckoos were found nesting in dense mesquite bosques on the Santa Cruz River near Tucson, Arizona.

In Arizona, this species are found primarily below 5,000 ft., in habitat dominated by Fremont cottonwood (*Populus fremontii*), willow (*Salix spp.*), ash (*Fraxinus velutina*), and mesquite (*Prosopis spp.*). Corman and Magill (2000) documented nests in four different tree species: Salt Cedar (*Tamarix spp.*), Arizona alder (*Alnus oblongifolia*), Fremont cottonwood, and Goodding willow (*S. gooddingii*).

Breeding Biology:
Cuckoos arrive on breeding grounds beginning in June; the earliest egg reported in Arizona is June 15 with nesting activity continuing through August and frequently into September. Both male and female build nest, often in willow or mesquite thickets, from 4 to 30 ft above ground. Incubate 3-4 unmarked, pale greenish-blue eggs and in good prey-abundant years, may lay more eggs. Extra eggs may be parasitized in other birds' nests. Eggs hatch synchronously. Male feeds first fledglings, female feeds second fledglings (Erlich et al. 1988). Incubation lasts 4-11 days with eggs changing color to greenish-yellow. Young are atricial but leave nest in 7-8 days.

Feeding Preferences:
The cuckoo consumes a variety of insects (ants, beetles, wasps, flies, tent caterpillars, hairy caterpillars), bird eggs, frogs, lizards, berries and fruit.

C. Impacts of the proposed action on species and/or critical habitat –

The proposed action is not anticipated to impact directly, indirectly, or cumulatively Bald eagle, Golden eagle, Mexican spotted owl, Southwestern willow flycatcher, or Yellow-billed cuckoo. These species are not affected by rotenone as it is a piscicide (targeted for fish species). Apache trout will not be impacted by this project as they are located over 5 miles from the project area. The proposed action may impact, but is not likely to adversely affect Chiricahua leopard frog or Northern Mexican gartersnake as these species should not be affected by the fish-targetting piscicide unless exposed for an extended period of time, which is unlikely.

The proposed action will affect the native fish species which may possibly occur in the project area. Loss of native fish (Colorado pikeminnow, Gila topminnow, Loach minnow, Razorback sucker, Spikedace, Headwater chub, Roundtail chub) due to collection, transport, and/or stocking is expected to be minimal due to the use of best management practices in handling and moving fish. There is potential to take native fish as a result of the application of Rotenone. However, this was consulted upon, and if any native fish mortalities occur, they would be covered under the USFWS Biological Opinion Incidental Take Statement (for listed fishes) for this action, and the Dept's Section 6 authorities (for non-listed fishes).

D. Assessment of effects –

No beneficial or adverse effects are anticipated to Bald eagle, Golden eagle, Mexican spotted owl, Southwestern willow flycatcher, or Yellow-billed cuckoo. These species are not affected by rotenone as it is a piscicide (targeted for fish species). Apache trout will not be impacted by this project as they are located over 5 miles from the project area.

A long term, beneficial effect is anticipated for native fish (Colorado pikeminnow, Gila topminnow, Loach minnow, Razorback sucker, Spikedace, Headwater chub, and Roundtail chub) and aquatic species (Chiricahua leopard frog and Northern Mexican gartersnake) in the project area. The removal of non-native fish would be wholly beneficial for these aquatic species.

The three tanks described in this project do not have Chiricahua leopard frogs at the present time, nor are they Designated Critical Habitat. In addition, biological opinions for the frog completed for the allotment (Hackberry Pivot Rock) on which these tanks occur (as well as the adjacent allotment, Fossil Creek) include reasonable and prudent measures and terms and conditions that require the Forest Service to work with USFWS and AGFD to remove the nonnative species as soon as possible. The removal of these nonnative fish would be wholly beneficial for the Chiricahua leopard frog and all native aquatic species occurring down drainage of these tanks.

No alternatives are recommended for this action due to the lack of adverse impacts of the proposed project.

13. State Recommendation:

A. Listed species/critical habitat:

No effect (list species/habitat)

Apache trout	*Oncorhynchus apache*	LT
Bald eagle	*Haliaeetus leucocephalus*	BGA
Golden eagle	*Aquila chrysaetos*	BGA
Mexican spotted owl	*Strix occidentalis lucida*	LT, CH
Razorback sucker	*Xyrauchen texanus*	LE, CH
Southwestern willow flycatcher	*Empidonax trailii extimus*	CH

May affect, not likely to jeopardize (list species/habitat)

Chiricahua leopard frog	*Lithobates chiricahuensis*	LT, CH
Colorado Pikeminnow	*Ptychocheilus lucius*	10J Area
Gila topminnow	*Poeciliopsis occidentalis occidentalis*	LE

May affect, likely to adversely affect (list species/habitat)

Loach minnow	*Tiaroga cobitis*	CH
Spikedace	*Meda fulgida*	CH

B. Proposed species/critical habitat:

None

C. Candidate species:

No effect (list species/habitat)

Yellow-billed cuckoo	Coccyzus americanus	PS: C

May affect, not likely to jeopardize (list species/habitat)

Roundtail chub	*Gila robusta*	C
Headwater chub	*Gila nigra*	C
Northern Mexican gartersnake	*Thamnophis eques megalops*	C

14. Remarks:

The information in this Section 7 was gathered from:

- Arizona Game and Fish Department Heritage Data Management System
- Arizona Game and Fish Department. Unpublished abstracts compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, AZ

15. State Approval:

Signature _____ Date 8-20-12

16. Federal Aid Determination:

No effect (list species/habitat)

Not likely to adversely affect (list species/habitat)

Likely to adversely affect (list species/habitat)

Undetermined effect (list species/habitat)

Remarks:

_____ _____
Signature Date

17. Reviewing ESSO evaluation: Concurrence _____ Nonoccurrence _____

Remarks:

_____ _____
Signature Date

Ref: Sport Fish Restoration Federal Compliance Approval for AZ FW100-P-20
EAC # M12- 0821C83644

Project Approach: *Fossil Creek Rotenone Treatment (Includes Stock Tanks in Watershed)*

In order to protect the native fish assemblage in Fossil Creek, the nonnative bass currently located between the temporary and permanent fish barriers in Fossil Creek and the nonnative fishes found in the two stock tanks need to be completely removed. Because of the complexity of habitat, the amount of flow present in Fossil Creek, and the fact that the smallmouth bass have reproduced below the temporary barrier, manual removal methods have not been and would continue to be unsuccessful in removing bass. Therefore, AGFD, FWS, and the Forest Service determined that in order to completely remove the smallmouth bass and the threat they pose to the entire aquatic species community in Fossil Creek, treatment using the chemical piscicide rotenone is needed. Currently, the action area is the section of Fossil Creek located between the temporary and permanent fish barriers. However, if smallmouth bass are detected reproducing above the temporary barrier, the area of rotenone application could be extended to include Fossil Creek from Irving (where the next known barrier to bass movement is located) down to the permanent barrier.

Prior to application of rotenone to any section of Fossil Creek, native fish will be salvaged from the creek and placed upstream of the treated area. A combination of seines, baited hoop nets, dip nets and angling in appropriate habitat types of the treated reach may be used for salvaging native fish. Fish salvage activities will take place prior to piscicide application. Salvage efforts will focus on collection and transport of the following focal fish species: longfin dace, headwater chub, roundtail chub, Sonora sucker *(Catostomus insignis),* desert sucker *(Catostomus [Pantosteus] clarki),* and Gila topminnow. Longfin dace *(Agosia chrysogaster)* and Gila topminnow of all size classes will be captured and moved; for the other species, only individuals greater than 200 millimeters (mm) total length will be translocated since there are likely a large number of these fish present in the 2.8 mile stretch of creek to be treated. Likewise, although other species have not been detected or encountered during past surveys within the treated reach, any other native fish captured will be moved. Captured fish will be held in live cars (i.e., in-stream fish containers) prior to transport and then taken via vehicle and released at appropriate locations and similar habitat in readily accessible portions of Fossil Creek above the treated reach.

The proposed rotenone retreatment will use the same techniques as were used during the 2004 project to apply chemical piscicide and potassium permanganate to detoxify the rotenone below the permanent fish barrier. Similar to the decision implemented in the 2004 EA (see USDA and USBOR 2004), a certified pesticide applicator will supervise rotenone and potassium permanganate application, following label requirements that will protect applicators and mitigate point and non-point source pollution of water quality. Rotenone will be applied to approximately 2.8 miles of stream (or 5.8 miles if the reach between Irving and the temporary barrier is found to contain smallmouth bass young-of-the-year). Rotenone will also be applied to the stock tanks in the uplands that have been illegally stocked with nonnative fishes. Potassium permanganate will only be applied below the permanent fish barrier to detoxify the rotenone and mark the end of the treatment.

Endangered Species Act Determinations:
Programmatic Consultations:

- Business Administration
- Biological and Conference Opinion for Federal Funding to AGFD to Conduct Native Fish Salvage and Piscicide Application in Fossil Creek

NEPA Determinations:
USFWS was a Cooperating Agency on the original 2004 EA and FONSI for this project. The Chapter 18 Review (FSH 1909.15, Chapter 10, 18.1) was signed on August 30, 2012. The IDT review found that any changes in the context and intensity of environmental effects from the current proposal would be within those analyzed and documented in the 2004 EA. Based on the IDT review, I have decided that a correction or revision of the *Native Fish Restoration in Fossil Creek* project EA ***is not*** necessary**.** This document shall serve as the analysis supplement to illustrate the consideration of effects and lack of significance of effects for using rotenone rather than antimycin for fish restoration treatments in Fossil Creek and upland stock tanks. **Project implementation may proceed.** The environmental review followed the direction contained in FSH 1909.15, Section 18.1 and CEQ regulations §1502.9(c).

SHPO: No ground disturbing activities. However, mitigation measures were specified in the original EA document that will protect all known archaeological sites from adverse effects.

Nicole D. Jimenez

Grant Manager

09/04/2012
Date

Special Status Species Within 5.0 Miles of 5 Tanks in FC Watershed					
NAME	**COMNAME**	**FWS**	**USFS**	**BLM**	**STATE**
Accipiter gentilis	Northern Goshawk	SC	S	S	WSC
Aquila chrysaetos	Golden Eagle	BGA		S	
CH for Lithobates chiricahuensis	Designated Critical Habitat for Chiricahua leopard frog				
CH for Strix occidentalis lucida	Designated Critical Habitat for Mexican spotted owl				
Cimicifuga arizonica	Arizona Bugbane	SC	S		HS
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S	WSC
Gila robusta	Roundtail Chub	C	S		WSC
Haliaeetus leucocephalus (wintering pop.)	Bald Eagle - Winter Population	SC,BGA	S	S	WSC
Lithobates chiricahuensis	Chiricahua Leopard Frog	LT			WSC
Oncorhynchus apache	Apache Trout	LT			WSC
Strix occidentalis lucida	Mexican Spotted Owl	LT			WSC

AGFD #M12-0821083644. EA Checklist.

Arizona Game and Fish Department, Heritage Data Management System, August 21, 2012.
Project Evaluation Program.

Special Status Species Within 5.0 Miles of Fossil Creek (between Irving Falls and Fossil Creek Barrier)					
NAME	**COMNAME**	**FWS**	**USFS**	**BLM**	**STATE**
Agosia chrysogaster chrysogaster	Gila Longfin Dace	SC	S	S	
Aquila chrysaetos	Golden Eagle	BGA		S	
Bat Colony					
Buteogallus anthracinus	Common Black-Hawk		S		WSC
Catostomus clarkii	Desert Sucker	SC	S	S	
Catostomus insignis	Sonora Sucker	SC	S	S	
CH for Empidonax traillii extimus	Designated Critical Habitat for southwestern willow flycatcher				
CH for Lithobates chiricahuensis	Designated Critical Habitat for Chiricahua leopard frog				
CH for Meda fulgida	Designated Critical Habitat for spikedace				
CH for Strix occidentalis lucida	Designated Critical Habitat for Mexican spotted owl				
CH for Tiaroga cobitis	Designated Critical Habitat for loach minnow				
CH for Xyrauchen texanus	Designated Critical Habitat for razorback sucker				
Cicindela oregona maricopa	Maricopa Tiger Beetle	SC			
Coccyzus americanus	Yellow-billed Cuckoo (Western U.S. DPS)	PS:C	S		WSC
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S	WSC
Gila nigra	Headwater Chub	C	S		
Gila robusta	Roundtail Chub	C	S		WSC
Haliaeetus leucocephalus (wintering pop.)	Bald Eagle - Winter Population	SC,BGA	S	S	WSC
Haliaeetus leucocephalus pop. 3	Bald Eagle - Sonoran Desert Population	SC,BGA	S	S	WSC
Lithobates chiricahuensis	Chiricahua Leopard Frog	LT			WSC
Nyctinomops femorosaccus	Pocketed Free-tailed Bat		S		
Poeciliopsis occidentalis occidentalis	Gila Topminnow	LE			WSC
Ptychocheilus lucius	10J area for Colorado pikeminnow				
Pyrgulopsis simplex	Fossil Springsnail	SC	S	S	
Rana yavapaiensis	Lowland Leopard Frog	SC	S	S	WSC
Rhinichthys osculus	Speckled Dace	SC		S	
Thamnophis eques megalops	Northern Mexican Gartersnake	C	S		WSC
Thamnophis rufipunctatus	Narrow-headed Gartersnake	SC	S		WSC
Xyrauchen texanus	Razorback Sucker	LE			WSC

AGFD #M12-0821083644. EA Checklist.
Arizona Game and Fish Department, Heritage Data Management System, August 21, 2012.
Project Evaluation Program.

INQUIRY REPORT

INDEX CODE PROFILE

FISCAL YEAR 12

8/20/2012

INDEX:	06198	FOR2 FISHERIES MGMT
FUND:	2028	GAME & FISH REVOLVING FUND
PCA:	91300	SPORTFISH MANAGEMENT
GRANT NO.:	640000 19	DJ GRANT FW100-P SEG NO.19
GRANT BEGIN DATE:	07/01/2010	
GRANT END DATE:	09/30/2012	
PROJECT NO.:	600007 19	F7M FISHERIES
PROJECT BEGIN DATE:	04/01/2010	
PROJECT END DATE:	12/31/9999	
APPROPRIATION NO.:	91000	
BUDGET CONTROL ORG:	3230	
ORG2:	3000	FIELD OPERATIONS DIVISION
ORG3:	3200	FOR2 REGION II-FLAGSTAFF
ORG4:	3203	FOR2 SPORTFISH
ORG5:	3230	FOR2 FISH MGMT
ORG6:		

INQUIRY REPORT

INDEX CODE PROFILE

FISCAL YEAR 12

8/20/2012

INDEX:	06358	WMD FS DJ REG2 CAMP
FUND:	2028	GAME & FISH REVOLVING FUND
PCA:	91300	SPORTFISH MANAGEMENT
GRANT NO.:	640000 19	DJ GRANT FW100-P SEG NO.19
GRANT BEGIN DATE:	07/01/2010	
GRANT END DATE:	09/30/2012	
PROJECT NO.:	600022 19	F23M HATCHERIES CAMP 19
PROJECT BEGIN DATE:	04/01/2010	
PROJECT END DATE:	12/31/9999	
APPROPRIATION NO.:	91000	
BUDGET CONTROL ORG:	4645	
ORG2:	4000	WILDLIFE MANAGEMENT DIVISION
ORG3:	4600	WMD FISHERIES BRANCH
ORG4:	4604	WMD FS HATCHERIES
ORG5:	4645	WMD FS DJ HATCHERIES CAMP
ORG6:	4613	WMD FS DJ HATCHERIES CAMP COORDINAT

INQUIRY REPORT

8/20/2012

INDEX CODE PROFILE

FISCAL YEAR 12

INDEX:	17232	WMD FS REGION 2 CAMP
FUND:	2295	AZ GAME & FISH COMMISSION HERITAGE FUND
PCA:	91300	SPORTFISH MANAGEMENT
GRANT NO.:	017000 02	HERITAGE IIPAM
GRANT BEGIN DATE:	07/01/2001	
GRANT END DATE:	12/31/9999	
PROJECT NO.:		
PROJECT BEGIN DATE:		
PROJECT END DATE:		
APPROPRIATION NO.:	91000	
BUDGET CONTROL ORG:	4631	
ORG2:	4000	WILDLIFE MANAGEMENT DIVISION
ORG3:	4600	WMD FISHERIES BRANCH
ORG4:	4604	WMD FS HATCHERIES
ORG5:	4646	WMD FS HATCHERIES CAMP
ORG6:	4631	WMD FS CAMP

Native Fish Restoration in Fossil Creek
Post-Decisional (Section18) Review

(FSH 1909.15, Chapter 10, §18.1)

Introduction

The Coconino and Tonto National Forests conducted an IDT (interdisciplinary team) review of the analysis for the *Native Fish Restoration in Fossil Creek* project that was documented in the 2004 Environmental Assessment (EA) and Decision Notice and Finding of No Significant Impact signed by the Regional Forester, Southwestern Region on June 8, 2004, for compliance and consistency with agency NEPA policy in FSH 1909.15, Section 18.1. The Bureau of Reclamation was the co-lead for NEPA and signed their Notice of Decision and Finding of No Significant Impact on June 8, 2004.

This Section 18 review consists of two parts:

1. Interdisciplinary review of the project to determine if any new information or changed circumstances exist and if so, whether they are within the scope and range of effects considered in the original analysis, and,
2. Review of the documentation by the responsible official and a determination if a correction, supplement, or revision to the EA is necessary. If not, implementation should continue.

2004 Project Decision

The Regional Forester decision was to construct a fish barrier within the Mazatzal Wilderness, as opposed to an alternative location outside of the Wilderness, to prevent the upstream migration of non-native fish, and to apply antimycin, a piscicide, to remove the non-native fish above the barrier and in upland stock tanks. The decision included minor modifications to the proposed alternative to further minimize wilderness impacts. The rationale for the decision was based on:

- Restoring ecological functionality to wilderness;
- Rarity of values based on the recognition that Arizona ranks number one in the U.S. for the percentage of native fish species at risk. The selected alternative provided almost 3 more miles of stream restored for native fish and would provide for reintroduction of threatened and endangered fishes; and,
- Reduced risk of recreational users being able to transplant non-natives into Fossil Creek above the barrier location because of its remote location.

The project was implemented in fall of 2004. Fish monitoring and barrier inspections have been ongoing.

New Information

A. For seven years, monitoring showed that Fossil Creek remained free of non-native fish above the concrete fish barrier. However, in July 2011, non-native smallmouth bass were detected above the barrier in the Mazatzal Wilderness. During the winter of 2009/2010, a very large flood event resulted in the deposition of a slug of rocks and boulders below the left notch of the barrier (looking downstream). This likely provided the avenue for the non-native fish to swim up and over the fish barrier. Additionally, one of the concrete abutments was damaged.

A temporary barrier was installed in August 2011 upstream of the non-native bass intrusion in order to contain the bass to as small of a reach of the stream as possible. The temporary barrier is located 2.8 miles upstream from the permanent fish barrier. The Arizona Game and Fish Department manually removed as many of the re-invading bass as possible, but were unable to remove them all.

B. In April 2012, 8-9 large adult bass were observed in one location above the temporary fish barrier but below Irving. The Arizona Game and Fish Department has removed all but one. That individual fish was re-detected in the same pool in August 2012, but no young-of-the-year bass have been detected in the reach between the temporary barrier and Irving. Therefore, it appears smallmouth bass have not reproduced in this reach. AGFD personnel are continuing efforts to catch and remove the one individual. Because of their size and other indicators, the smallmouth bass appear to have been illegally transported from another location and released into Fossil Creek.

C. Additionally, ongoing monitoring of stock tanks in the uplands and tributaries that feed in to Fossil Creek has detected non-native fish in several stock tanks in the uplands that could be a source into Fossil Creek.

D. The 2004 Environmental Analysis (EA) included the potential for additional applications of the piscicide antimycin if nonnative fish were found in Fossil Creek in the future. It called for the Forest Service to prepare a supplemental information report to evaluate if treatment(s) are consistent with the EA or not. The selected alternative in the 2004 EA also disclosed the potential for upland treatments based on surveys. The piscicide used for the stream treatment in 2004 was antimycin A, but it is no longer commercially available. The only approved piscicide available is rotenone.

E. As a result of concerns by some members of the public regarding the use of rotenone as a piscicide, the Arizona Game and Fish Department placed a temporary moratorium on the use of rotenone in the state, pending a thorough review by an advisory committee. The results were documented in "Rotenone Review Advisory Committee Final Report and Recommendations to the Arizona Game and Fish Department" (December 31, 2011). Based on the rotenone review, this moratorium on rotenone has since been lifted and rotenone has now replaced antimycin as the primary piscicide used for native fish restoration efforts.

Action Subject to Section 18 Review

In order to restore the native fish assemblage in Fossil Creek, the non-native bass currently present above the fish barrier in the Mazatzal Wilderness and those in upland stock tanks need to be removed. Because of the complexity of habitat and amount of flow present in Fossil Creek, manual removal methods have not been fully successful. Eventually, the stream would revert to an aquatic system dominated by non-native fish and declining native aquatic species.

This review evaluates whether the proposed stream retreatment using rotenone instead of antimycin is within the scope and range of effects of the 2004 decision.

Completed and Ongoing Actions Not Subject to Section 18 Review

Construction of the temporary barrier to contain the bass has been completed (see above).

In early April 2012, the rock and boulder debris below the left notch was removed and redistributed using primitive tools and skills, such as blasting, hand drilling using star bits, and breaking up rocks with sledgehammers.

In addition to the deposition of rocks and boulders below the left barrier plug, a critical portion of the rock abutment that the concrete notch was anchored to was removed by the flood. The abutment needs to be repaired in order to direct stream flows over the left concrete notch as originally designed, which will protect the left bank from erosion, and to prevent non-native fish from swimming up and over the barrier during high flow events. This will restore the barrier to its original functional condition. NEPA has been completed. The Bureau of Reclamation will be awarding the contract for the abutment repair in early October and the work will be completed by mid-November. The work could include some additional rock and boulder removal. A Minimum Requirements Decision Guide and Minimum Tools Analysis has been completed for both the barrier repair and use of rotenone for stream treatment in the Mazatzal Wilderness.

The AGFD is planning on treating Fossil Creek within the timeframe of September 10-28. This timing is important to successful implementation, since treatment needs to occur after spawning but before water temperatures get too cold beginning in October. Although the abutment repair won't be completed until after treatment, the removal of the rock and sediment debris in April restored the effective drop of the fish barrier that will keep nonnative fish from migrating up and over except under extraordinary flood conditions. Because the timing of stream treatment and abutment repair is occurring during a low flow portion of the year, the fisheries biologists do not expect there to be any issues with nonnatives migrating above the fish barrier.

Comparison of Rotenone and Antimycin

This section discusses any potential differences that could occur from using rotenone instead of antimycin in the context of the analysis and disclosure of effects in the 2004 EA and its Decision Notice. Refer to the description of the selected alternative (Proposed Action, Wilderness Alternative) for stream renovation and stock tank treatments on pages 24-27 in the EA.

Scope of Treatment

In 2004, approximately 9.5 miles of Fossil Creek were treated with antimycin. This proposal will treat a subset of the original treatment. At a minimum, the 2.8 mile reach between the temporary fish barrier at the Sally May confluence down to the permanent fish barrier will be treated (Figure 1). At this time, the Arizona Game and Fish Department does not expect that any more of the stream will need treatment, but they are intensively monitoring to determine if there is a need to treat above the temporary fish barrier up to the Irving site. If so, approximately 3.0 miles of stream will also need treatment. Project implementation is expected to take 2-3 weeks.

Application techniques

The proposed rotenone retreatment will use the same techniques as were used during the 2004 project. Native fish will be salvaged from reaches pre-treatment; however, holding tanks for these fish will not be set up at the Irving site. Instead, salvaged fish will be placed in Fossil Creek above the treated reaches. Non-native fish surveys will be ongoing until the retreatment would occur. If non-native fish are found between Irving and the temporary fish barrier and that reach needs to be treated, there may be a run-of-the-river holding facility set up at the Irving site similar to the 2004 project.

As in 2004, the amount of rotenone to be applied will be determined through bioassays and calculations to ensure effective treatment.

Rotenone application and neutralizing techniques will be the same as the 2004 project. Rotenone will be applied using drip stations, backpack sprayers, and sand. There will be fewer drip stations per mile than in 2004. At the lower end of treated reaches, neutralization stations will be set up to ensure proper detoxification occurs. Sentinel fish will be placed below the first detox station to ensure that detoxification is occurring as expected. A certified pesticide applicator will supervise rotenone application.

Control of Other Upstream Sources of Nonnative Fishes

The 2004 environmental analysis disclosed that there would be potential antimycin treatment in upstream stock tanks or tributaries that could serve as a source of nonnative fish in to Fossil Creek. As a result of surveys, the decision included treatment of five stock tanks. In October 2004, the Regional Forester approved the use of rotenone instead of antimycin for the stock tank treatments.

Currently, non-native fish are in two stock tanks within the Hackberry/Pivot Rock Range Allotment that could serve as a source in to Fossil Creek. Recent monitoring has found that non-native green sunfish are within Soldier Mesa Tank (T 13N, R 9E, Sec. 15). Additionally, goldfish may be present in Sand Rock Tank (T 13N, R 8E, Sec. 18).

Immediate removal of non-native species in stock tanks is a mandatory term and condition of the Hackberry/Pivot Rock Range Allotment Biological Opinion (U.S. Fish and Wildlife Service 2003) as follows:

> "2.3 If nonnative species are detected in stock tanks, the Coconino National Forest shall immediately initiate a multi-stakeholder planning effort to remove the nonnative species from the stock tank as quickly as possible. If a complete drying of a stock tank is deemed as the most effective management tool to address the threat of nonnative species, the Coconino National Forest may time this action so as to not place an unnecessary burden on the permittee."

Impacts to Non-Target Organisms

Note: The U.S. Fish and Wildlife Service prepared a detailed comparison of the effects of rotenone compared to antimycin (Hedwall 2012). The following paragraphs summarize the

impacts of the two piscicides from that document. Please refer to the full document for more information.

Aquatic invertebrates

Rotenone and antimycin both affect aquatic invertebrates the same way as fish, inhibiting respiration by blocking biochemical pathways of cell metabolism. The sensitivity of aquatic invertebrate species to rotenone varies.

Both rotenone and antimycin have short-term impacts on aquatic invertebrate abundance and can have longer-term effects on species composition. For both piscicides, the insect groups Ephemeroptera, Plecoptera, and Trichoptera are more sensitive than Coleptera and Diptera, and pre-treatment abundance is reached more quickly than taxonomic composition.

In summary, the effects of rotenone and antimycin on invertebrates are similar. The proposed retreatment will treat fewer miles of stream than the original treatment, leaving more miles of untreated stream to serve as a recolonization source from both above and below treated sections. Therefore, the use of rotenone on aquatic invertebrates will be within the scope and range of effects disclosed in the 2004 environmental analysis.

Amphibians and Reptiles

Both antimycin and rotenone impact gill-breathing life stages of amphibians, i.e. tadpole stages. Adult amphibians have low sensitivity. Therefore, delaying treatments until tadpoles have metamorphosed minimizes mortality.

While air-breathing reptiles are not expected to be directly impacted, the fish prey base of aquatic garter snakes is reduced post-treatment within the treated reach.

Because the effects of rotenone on amphibians and reptiles is the same as antimycin, and the proposed fall treatment with rotenone would be the same timing as when antimycin was applied in 2004, the effects are within the range and scope of effects disclosed for amphibians and reptiles in the 2004 environmental analysis.

Terrestrial birds and mammals

The exposure risk of rotenone to terrestrial organisms is low and studies have shown that it would take levels of consumption of fish, vegetation, and/or water that are not physically possible or probable to reach a lethal dose. Similarly, antimycin has been shown to have low toxicity when tested on a wide variety of terrestrial wildlife. Because rotenone and antimycin affects terrestrial animals similarly, the effects of the proposed rotenone treatment on terrestrial birds and mammals are within the scope and range of effects disclosed in the 2004 environmental analysis.

Evaluation of New Information and/or Changed Circumstances by Resource

Soil and Water Resources

The original EA disclosed Fossil Creek water quality as "inconclusive" (which is Category 3) for all beneficial uses based on the ADEQ 2002 305 (b) Assessment Report. More recent monitoring was conducted and reported in the ADEQ 2006/2008 305 (b) Assessment Report and classifies Fossil Creek as Category 1 – Attaining All Uses which is an improvement over the 2002 report. Some more recent water quality monitoring conducted by NAU detects elevated levels of E. Coli but has not been formally accepted as credible data by ADEQ. Elevated levels of E. Coli are a result of large numbers of recreationists depositing sanitary waste inappropriately near the stream. It is not connected to piscicide effects.

Effects to Water Quality

The proposed rotenone retreatment will use the same techniques as were used during the 2004 project. Similar to the decision implemented in the original EA, a certified pesticide applicator will supervise rotenone application, following label requirements that will mitigate point and non- point source pollution of water quality.

Piscicide treatments would impact only about 2.8 miles of stream (or 5.8 if the reach between Irving and the temporary barrier needs treatment), much less than the original antimycin application of 9.5 miles. Consequently, the effects to water quality are expected to be even less extensive than the original EA. The short-term-effects from use of rotenone at recommended concentrations are similar to antimycin and generally restricted to fish and aquatic macroinvertebrates and not to humans or livestock. Other mitigation measures identified with the application and use of antimycin will be implemented with the application of rotenone and will similarly protect soil and water resources from adverse effects.

Effects to Soils

The original EA disclosed that on-site fish barrier construction would directly affect about 0.4 acres of channel substrates and 0.9 acres of upland soil at the Stehr Lake and the Wilderness area staging areas. Since fish barrier construction is already complete, rotenone application would not disturb the soil at these sites nor contribute to non-point source water pollution.

Summary of Effects to Soil and Water Quality

The use of rotenone on water quality and soils will be within the scope and range of effects disclosed in the 2004 environmental analysis.

Biological Resources

Vegetation

As with antimycin, aquatic and/or riparian vegetation will not be harmed by the application of rotenone.

Terrestrial Wildlife and Human Health and Safety

The 2004 EA disclosed that humans, wildlife, and livestock could be exposed to antimycin during implementation of the project, but that toxicity of antimycin to vertebrate animals is generally restricted to fish and is very low or nonexistent for other vertebrates.

The impacts of rotenone on terrestrial wildlife and humans are essentially the same negligible effects disclosed in the 2004 EA. The opportunity for people, wildlife, and livestock to come into contact with rotenone treated water is minimal. Vertebrate animals would have to consume impossible amounts of rotenone treated water to reach the Environmental Protection Agency's Level of Concern. For example, a 0.25 pound bird would have to drink 25 gallons of treated water in 24 hours and a cow weighing 1,620 pounds would have to ingest 4,615 gallons of treated water in 24 hours to reach lethal dose levels.

Federally-listed Species

Because of the serious decline of fish native to the Gila River Basin, repatriation of native fishes was a key goal of the 2004 project, given the habitat Fossil Creek was expected to provide post-project (EA, pages 2-8, 10, 28). Since the 2004 decision, four species of federally-listed native fish that were not present in 2004 have been stocked into Fossil Creek. They are: Gila topminnow, loach minnow, spikedace, and razorback sucker.

The Biological Assessment and 2004 EA disclosed no effect to listed species, primarily because the species were not present. The potential for providing habitat for repatriation was considered to be positive for razorback sucker, loach minnow, and spikedace. Gila topminnow was not analyzed since the current range was outside of the project area. The EA also disclosed no adverse modification to critical habitat.

Like antimycin, rotenone affects gill-breathing organisms and will result in the death of any fish remaining within treated reaches. As in 2004, salvage of native fish will occur prior to treatment with rotenone. The following sections update the analysis for the four federally-listed fish species that have been stocked into Fossil Creek since 2004.

Gila Topminnow

Gila topminnow has recently been reintroduced into Fossil Creek, and is present in that system. Topminnow once occupied aquatic habitats in the Gila River drainage in New Mexico, Arizona and Mexico below 1,524 m (5,000 ft.) in elevation. At one time this was the most common fish found in the Gila River Basin. Populations of Gila topminnow historically expanded into intermittent waters during wet years and then retreated to headwater springs and perennial reaches of streams during drier years. Their high fecundity and long reproductive season allow them to rapidly expand into new habitat. The life span of this species is approximately 1 year, but it appears to be linked to sexual maturation which is dependent upon time of year in which they were born (AGFD 2001).

Habitat in the Analysis Area

Since 2007, Gila topminnows have been stocked into multiple locations in Fossil Creek above the location of the temporary barrier at Sally May Wash. It is unclear if Gila topminnow have established a self-sustaining population in Fossil Creek (Robinson and Crowder 2012). Suitable habitat, including vegetated stream margins and backwaters, exist from Sally May Wash upstream to the perennial spring inflow in the upper-most reach of Fossil Creek. Some topminnows have been detected in reaches between Fossil Springs and the confluence of Sally May Wash with Fossil Creek (Robinson and Crowder 2012) but none below the temporary barrier.

Environmental Consequences

Treatments will likely occur from the temporary barrier downstream to the permanent barrier. This stretch of Fossil Creek has not been stocked with Gila topminnow, and it does not contain suitable habitat for the species. If treatments do occur between the temporary barrier and the Irving site, any non-salvaged Gila topminnow individuals within that reach would be killed by rotenone. The Gila topminnow was not specifically analyzed within the 2004 EA because the current range was outside of the project area. However, the EA disclosed that all native fish not salvaged would be eliminated in treated reaches, but that genetic repopulation after piscicide application would occur from a combination of returning salvaged fish into the creek, downstream dispersal from non-treated reaches upstream, and translocations (EA pg. 54). This would be the case for the Gila topminnow. Therefore, the effects of the proposed retreatment are within the scope and range of effects in the 2004 EA.

Loach Minnow and Spikedace

Loach minnow and spikedace are historic to the Verde River and have recently been reintroduced into Fossil Creek. It is not known if these species have yet established a reproducing population in the stream.

Loach minnow and spikedace were upgraded from federally threatened to endangered on March 26, 2012 and the lower 13.8 miles of Fossil Creek was designated as critical habitat (USDI 2012). In 2004, critical habitat included the lower 4.7 miles of Fossil Creek and 0.2 miles of that was above the fish barrier.

Habitat in the Analysis Area

Since 2007, loach minnow and spikedace have been stocked numerous times into Fossil Creek above the historic dam site near the headwaters of the stream. Sampling success within Fossil Creek has had low success, and it is unknown at this time if these species have established a reproducing population. 2,900 loach minnow were stocked from 2007 through 2010, and only five were observed in 2008, two in 2009, none in 2010, and one in 2011 (Robinson and Crowder 2012). For spikedace, over 3,000 were stocked from 2007 through 2010, but none were found until 2011 in the upper two reaches of Fossil Creek (Robinson and Crowder 2010). No loach minnow or spikedace have been found in Fossil Creek below the Irving site.

Environmental Consequences

Rotenone treatment of Fossil Creek in fall 2012 will have no effect to the loach minnow, spikedace or their critical habitat in Fossil Creek. Treatments will likely occur from the temporary barrier downstream to the permanent barrier, but could include up to Irving. These stretches of Fossil Creek have not been stocked with loach minnow or spikedace. Individuals of these two species have only been found in the upper two reaches of Fossil Creek, within the vicinity of stocking sites. These areas are well outside of the proposed treatment reach(es).

More critical habitat will be treated than in 2004. This improves a greater number of critical habitat steam miles for these species for future repatriations.

Given that loach minnow and spikedace do not occur within proposed treatment reach(es) and that treatment will improve unoccupied critical habitat, the effects are within the scope and range of effects disclosed in the 2004 EA.

Razorback Sucker

Razorback sucker was once common throughout the Colorado River Basin. The species is believed to have ranged in the Verde River mainstem up to Perkinsville. This belief is based on bone samples taken from an archaeological site near Perkinsville (Minckley and Alger 1968). The species is currently present on the Coconino National Forest in the Verde River and Fossil Creek. Over 1,500 razorback sucker were stocked downstream of the Sally May Wash Confluence in Fossil Creek from 2007 thru 2009, but during snorkel surveys only two razorback suckers were observed in October 2008 (Robinson 2009), none in September 2009 (Boyarski et al. 2011), and none in 2010 (Robinson and Crowder 2012) . However, 19 razorback suckers were captured in fyke nets set across the entire width of the stream within nine days after they were stocked in 2009. No razorback suckers were captured or observed by Marsh et al. (2010) during 2008 thru 2010. Because razorback suckers have not been stocked, captured, or observed since 2009, the species is assumed to not currently be occupying Fossil Creek above the fish barrier.

Habitat in the Analysis Area

It is likely that only rearing habitat is available in Fossil Creek for razorback suckers, so the repatriation goal is for juvenile fish to grow out in Fossil Creek and then disperse downstream to the Verde River. Since 2008, razorback sucker has only been stocked into Fossil Creek downstream of the temporary barrier site at the confluence with Sally May Wash. Sampling success for razorback sucker within Fossil Creek has had low success. Even though suitable habitat exists, razorback sucker has not been collected or observed in Fossil Creek below the Irving site since 2009.

Environmental Consequences

Rotenone treatment of Fossil Creek in fall 2012 will have no effect on razorback sucker in Fossil Creek. No razorback suckers currently occur in the creek. Removing the nonnative fish above the barrier will allow for future repatriation efforts. Effects of the rotenone treatment are within the scope and range of effects disclosed in the 2004 EA.

Southwestern Willow Flycatcher

Since the 2004 Final EA, surveys for the southwestern willow flycatcher have been conducted. This updates the 2004 affected environment section.

Prior to restoration of full flows, riparian habitat along Fossil Creek differed from habitats typically occupied by southwestern willow flycatcher in Arizona due to the higher gradient, the narrow band of riparian vegetation and the relatively open mid- and under-story vegetation layers. Since full flows were restored in 2005, travertine dams have formed step pools with slower water, resulting in better quality habitat for willow flycatchers. In 2011, Matt Johnson from NAU, through an agreement with the Forest Service, conducted surveys for the southwestern willow flycatcher in Fossil Creek in five locations. Routes were placed at these locations based on the marginal flycatcher habitat that is present. Most other areas in Fossil Creek do not meet the habitat requirements. All surveys in 2011 were negative. Because even the best habitat within Fossil Creek is marginal and surveys have been negative, it is the determination that there is a very low possibility that southwestern willow flycatchers nest in the Fossil W&S boundary.

Because rotenone and antimycin affect terrestrial animals similarly, the effects of the proposed rotenone treatment on flycatchers are within the scope and range of effects disclosed in the 2004 environmental analysis.

Sensitive Species

Headwater and Roundtail Chub

Roundtail and headwater chub are both present in Fossil Creek and roundtail are also present in the Verde River. Both are candidate species under the Endangered Species Act (ESA) and have been precluded from listing for now due to higher priority actions. In Fossil Creek headwater chub are found in the headwater reaches above the decommissioned Irving power plant diversion dam. The chub population in Fossil Creek is predominantly headwater chub or intergrades of headwater and roundtail chub, with only 25% of chub between Irving and the fish barrier genetically assignable as roundtail (Dowling and Marsh 2009).

Roundtail chub was included on the Regional Foresters' (USDA Forest Service – Southwestern Region) 21 July 1999 sensitive species list. Taxonomic classification for headwater chub was made in 2000 (Minckley and DeMarais 2000). This classification established the distinction between the roundtail and headwater chub species. Roundtail chub occupy the Verde River and the lower elevation reaches of major tributaries (including Fossil Creek) to the Verde River. Headwater chub, as it name implies, occupies higher elevation reaches of these tributaries.

At the time of the 2004 decision, both the roundtail chub and headwater chub were petitioned for federal listing and subsequently designated as candidate species by the U.S. Fish and Wildlife Service.

Habitat in the Analysis Area

Roundtail and headwater chub that were temporarily salvaged prior to treatment were repatriated into Fossil Creek following stream renovation in 2004. Population size increased rapidly following repatriation, but has since declined somewhat (Marsh et al. 2010). Roundtail and

headwater chub can be found throughout Fossil Creek, from the headwaters down to the confluence with the Verde River. These species, however, are more abundant upstream from the permanent barrier.

Environmental Consequences

The 2004 EA disclosed that stream renovation would kill chubs not captured during salvage operations, but that the project would benefit the two species of chub in the long term by removing competition from nonnative fish and improving conditions for the natives. The proposed project will have the same impacts but within fewer stream miles than the original project. Therefore, the proposed retreatment is within the scope and range of effects of the 2004 EA.

Lowland Leopard Frog

Since the 2004 Final EA, surveys for the lowland leopard have been conducted. This updates the 2004 affected environment section. Prior to restoration of flows and the restoration of the native fishery, very few leopard frogs were found below the Fossil Springs dam. Historically, lowland leopard frogs were found near the Forest Boundary in 1950 but not in 1985, 1990, 1992, or 1995. A survey in 1998 by Environet did not turn up any leopard frogs from the bridge to the Irving Power Plant and further upstream to ca 3,840.

Post full-flow frog surveys from 2005 through 2009, conducted by F.S. biologists, show that leopard frogs responded well to more flows, complex habitats created by travertine dams, and lack of non-native fish. Between restoration of full flows in 2005 and dam-lowering activities in 2009, lowland leopard frogs recolonized Fossil Creek below the dam and reached viable population levels.

After APS lowering of the historic dam in the fall of 2009, the new channel height above the lowered dam was very unstable with raw exposed banks and no vegetation to hold soil in place. Exacerbating this condition were several large flood events in 2009 and 2010 that further scoured the banks and channels and blew out established frog habitat below the dam. As a result frog monitoring showed much lower population levels. Combined with this was an increase in recreation at Fossil Springs and down by the waterfall.

Currently, lowland leopard frogs are known to persist in Fossil from above the springs all the way downstream below the large falls, but not as far downstream as Irving powerplant (See Map Eight). Frog densities are highest from the Springs downstream to just upstream of the large waterfall. While this reach contains the most developed travertine formations and the most complex habitat, suitable habitat exists downstream of there. Why lowland leopard frogs have not recolonized in viable numbers from just above the waterfall downstream is unknown. Lowlands occur from above the waterfall downstream to just above the waterfall trail, but only in very low densities. One attributable cause in this section is the increasing number of recreationists.

Proposed treatment in Fossil, even if they begin at Irving will not affect lowland leopard frogs because they do not occur down in this portion of Fossil Creek.

Given that lowland leopard frogs do not occur within proposed treated reach(es) and that treatment will improve unoccupied habitat, the effects are within the scope and range of effects disclosed in the 2004 EA.

Western Yellow-billed Cuckoo

The western yellow-billed cuckoo is a candidate species. Since the 2004 Final EA, surveys for the yellow-billed cuckoo have been conducted. This updates the 2004 affected environment section.

A single yellow-billed cuckoo was detected in the Fossil Creek riparian area by former Coconino biologist Cathy Taylor. Although surveys conducted by USGS in 2005 and 2006 have not detected yellow-billed cuckoos in Fossil Creek, surveys were not conducted in two thirds of Fossil Creek and there is potential for them to establish occupancy now that full flows have been restored.

The following information was obtained directly from the report " 2008 Common Black-Hawk and Yellow-Billed Cuckoo Distribution and Abundance in the Upper Reach of Fossil Creek, AZ" prepared by Matthew J. Johnson, Research Biologist, Northern Arizona University, Christopher Calvo, Biological Technician, Northern Arizona University , Kenneth E. Etzel, Biological Technician, Northern Arizona University , and Jennifer A. Holmes, Wildlife Biologist, Northern Arizona University:

> NAU has taken the lead on the decommissioning monitoring for yellow-billed cuckoos in Fossil Creek. Beginning in 2005, they have conducted surveys during the breeding season to determine presence/absence and breeding status. In 2008, they completed four Yellow-billed Cuckoo surveys during the four allocated time periods; there were no Yellow-billed Cuckoo detections. No Yellow-billed cuckoos were detected in previous years either. The riparian zone along Fossil Creek includes many areas that appear, based on vegetation characteristics, to be potential Yellow-billed Cuckoo breeding habitat (Halterman 1991, Hughes 1999). All of the important habitat components exist within the riparian habitat along Fossil Creek and currently we are unsure why cuckoos are not present along Fossil Creek.
>
> The Western Yellow-billed Cuckoo may be experiencing what the Southwestern Willow Flycatcher is experiencing, a recent low population level at many sites in the southwest making local populations susceptible to extirpation (Sogge et al 1997, Hughes 1999, USFWS 2002). It is possible that as cuckoo populations in Arizona riparian corridors have become reduced and more fragmented than in the past, and local breeding groups may have produced insufficient young to offset adult mortality. Similar local extirpation of Southwestern Willow Flycatchers has recently been documented (Sferra et al. 1997) and can be driven by habitat loss. As Yellow-billed Cuckoos became rarer in the region, the likelihood of recolonization of former breeding areas could be greatly reduced. Therefore, suitable habitat may currently be unoccupied because the cuckoo is now so rare that there are not enough cuckoos to disperse into and settle in all available habitats. If so, effective management and recovery of current cuckoo populations

and riparian habitats may lead to increasing populations which could resettle in areas such as Fossil Creek.

Environmental Consequences

Because rotenone and antimycin affects terrestrial animals similarly, the effects of the proposed rotenone treatment on cuckoos are within the scope and range of effects disclosed in the 2004 environmental analysis.

Common Black-hawk

Since the 2004 Final EA, surveys for the black-hawk have been conducted. This updates the 2004 affected environment section. The black-hawk has been observed in all reaches of Fossil Creek. Suitable nesting habitat is present from Fossil Springs downstream to the Verde. Some information exists for black-hawk nest sites along Fossil creek due to monitoring conducted by NAU. Since this monitoring from 2005 through 2009 was for APS decommissioning activities, only the portion of Fossil Creek from the springs to just downstream of Irving was monitored. The remaining downstream portion of Fossil with high recreation use was not monitored in those years. In 2009, NAU incidentally found two additional nests further downstream, however, this downstream portion was not thoroughly monitored until 2011. In 2011, the Forest Service funded NAU to continue monitoring nesting black-hawks, but to extend surveys from downstream of Irving to downstream of the last designated recreation site called Mazatzal. Following is a summary of results by year.

In 2005 NAU detected 37 black-hawks and 4 active nests. NAU confirmed one nest with a single nesting and a second nest with one fledgling. The third nest was abandoned and the disposition of the fourth nest was undetermined.

In 2006 NAU detected 28 black-hawks and 3 active nests. One nest had a single nestling, one nest was unsuccessful and the outcome of the third nest was undetermined. A fourth nest was discovered post fledgling/failure; outcome was undetermined.

In 2007 NAU detected 45 black-hawks and 4 active nests all of which had a single nesting and 3 of the 4 nests successfully fledged their single young.

In 2008, NAU detected only 9 black-hawks and 2 active nests. The two nests each had one nestling but it was undetermined whether the nestlings fledged. NAU reported on the decline of black-hawk detections in 2008 (9) from 2007 (45) and predicted that the decline was due to disturbance from increased dam decommissioning activity. In addition, they noted an increase in raven activity, including the documentation of ravens occupying a 2007 black-hawk nest.

Four black-hawk nests were located and monitored in 2009 during the breeding season, two nests (#1 and #2) were located in historical nesting patches (Table 4, Figure 1) and two downstream locations (#3 and #4) were newly discovered in 2009. The surveys in previous years did not extend into this lower reach of the creek where nests #3 and #4 were observed. All nests fledged one young in 2009, however, it was confirmed that nests #1 and #2 initially had at least two nestlings. The cause of mortality of these two nestlings is unknown. Fledglings were sighted at all four nests during post fledging monitoring. Note that detections in 2009 were lower than the

black-hawk detections in 2007 (45). NAU, in their report, speculated the decrease was a result of high visitor numbers in 2008 and 2009.

In 2011, surveys were extended to also include the lower half of middle Fossil Creek (just downstream of the Mazatzal site). In 2011 NAU detected 38 black-hawk detections and six active nests. Nest 1 had two nestlings but subsequent visits did not result in the detection of nestlings or fledglings. Nests 2, 3, 4, 5 and 6 each successfully fledged one young.

Environmental Consequences

Because rotenone and antimycin affects aquatic and terrestrial animals similarly, the effects of the proposed rotenone treatment on black-hawks are within the scope and range of effects disclosed in the 2004 environmental analysis.

Mexican Garter Snake

While status of the Mexican garter snake was upgraded to Candidate, effects disclosed in the 2004 Final EA are the same for the use of rotenone.

Sensitive Bats

Since the 2004 project surveys have detected the presence of several bat species not known in 2004.

Western Red Bat

Habitat in the Analysis Area
This tree-roosting bat occurs along intermittent and perennial streams where they roost in deciduous trees, including riparian trees and Gambel oak. They emerge from their roosts several hours after dusk to forage on a variety of flying insects. Wintering behavior of this migratory bat is unknown, but other species of tree roosting bats over-winter in leaf litter. The main food source for red bats are moths although they also forage on flies, bugs, beetles, cicadas, ground dwelling crickets, and hymenopterans.

Surveys in the Analysis Area
Until 2011, limited bat surveys were conducted in Fossil Creek and there was no record of red bat detection from those efforts. In 2011, a multi-agency effort resulted in hundreds of mist net hours. Two western red bats were mist netted in the middle portion of Fossil Creek. None were captured in the Fossil Springs area or the earthen tanks in the uplands above the rim.

Allen's Lappet-browed Bat

Habitat in the Analysis Area
Although known to occur over a wide range of elevations and vegetation types, the Allen's lappet-browed bat is found primarily in ponderosa pine forests where they roost underneath exfoliating bark on standing ponderosa pine snags. On the Coconino, Allen's lappet-browed bats have been detected in pinyon juniper woodlands. While ponderosa pine forests occur in the watershed but not in the CRMP corridor, pinyon-juniper woodlands (3,544 acres) occur in the

corridor. Allen's lappet-browed bats feed mostly on soft-bodied insects with their main food source of small moths (Microlepidoptera) but also soldier beetles (Cantharidae), dung beetles (Scarabeidae), leaf beetles (Chrysomelidae), roaches (Blattidae) and fly ants (Formicidae).

Surveys in the Analysis Area
Until 2011, limited bat surveys were conducted in Fossil Creek and there was no record of Allen's lappet-browed bat detection from those efforts. In 2011, a multi-agency effort resulted in hundreds of mist net hours. One Allen's lappet-browed bat was mist netted in the drainage upstream of Fossil Springs (riparian with uplands of primarily pinyon juniper with some chaparral), but not in the uplands above the rim nor the middle section of Fossil Creek.

Pale Townsend's Big-eared Bat

Habitat in the Analysis Area
This wide-ranging bat roosts in caves, mines, and other man-made structures including cliff dwellings and abandoned shacks. In the Fossil CRMP corridor, possible roosting habitat occurs in caves, in various abandoned APS flume tunnels, cliff dwellings near Fossil Springs, and abandoned buildings. AGFD's Heritage Data Management System (HDMS) database shows one record of a Townsend's roost in a cliff dwelling within five miles of Fossil creek. Townsend's big-eared bats forage on small moths as their primary food source but will sometimes prey on neuropterans (not aquatic), coleopterans (mostly terrestrial but some have aquatic life stages), dipterans (mostly aquatic, some terrestrial), and hymenopterans (almost all terrestrial).

Surveys in the Analysis Area
Until 2010, limited bat surveys were conducted in Fossil Creek and there was no record of Townsend's big-eared bat detection from those efforts. In 2011, a multi-agency effort resulted in hundreds of mist net hours. One Townsend's big-eared bat was mist netted in the drainage upstream of Fossil Springs, but not in the uplands above the rim nor the middle section of Fossil Creek.

Spotted Bat and Greater Western Mastiff Bat

Habitat in the Analysis Area
Both of these bat species roosts in cracks and crevices along high cliff ledges. Prominent rock features are required for spotted bat roosts. The spotted bat occurs across a range of elevations and habitat types. The mastiff bat occurs at lower elevation and roosts in rugged canyons where there are abundant crevices. Due to their body shape and adaptation for straight, fast flight, mastiff bats require longer stretches of water to drink and this requirement likely is a limiting factor for where they occur on the landscape. Much of the Fossil Creek corridor is suitable for these canyon roosting bats. Spotted bats forage on small moths as their primary food source but will sometimes prey on June beetles and grasshoppers. Greater western mastiff bats feed mainly on terrestrial insects, especially Hymenoptera (bees, wasps, ants and sawflies).

Surveys in the Analysis Area
Until 2010, limited bat surveys were conducted in Fossil Creek and there was no record of these two bat species from those efforts. In 2011, a multi-agency effort resulted in hundreds of mist

net hours, however, no spotted or greater western mastiff bats were mist netted. There are plans in 2012 for additional survey work using acoustical methods which have better chances than mist netting for detecting these high-flying bat species.

Environmental Consequence for All Insectivorous Bats
Rotenone and antimycin both affect aquatic invertebrates by inhibiting respiration by blocking biochemical pathways of cell metabolism. Both rotenone and antimycin have short-term impacts on aquatic invertebrate abundance and can have longer-term effects on species composition. For both piscicides, the insect groups Ephemeroptera, Plecoptera, and Trichoptera are more sensitive than Coleptera and Diptera, and pre-treatment abundance is reached more quickly than taxonomic composition. The proposed retreatment will treat fewer miles of stream than the original treatment, leaving more miles of untreated stream to serve as a recolonization source from both above and below treated sections. Within the treated reach, aquatic invertebrates with an aerial life stage will be temporarily unavailable for foraging bats. This will result in an overall loss of prey base for insectivorous bats in the treated reach for a short time.

Although these species were not specifically analyzed in 2004, the impact of rotenone on aquatic invertebrates will have little to no impact on insectivorous bats. Bats prey on both terrestrial and aquatic insects; however, the majority of prey is terrestrial invertebrates and will not be affected by rotenone. The rotenone treatment will impact a small subset of available prey for bats. The effects of rotenone on invertebrate prey of insectivorous bats are within the scope and range of effects discloses in 2004.

Cultural Resources

The 2004 Environmental Assessment states "No areas of traditional cultural importance... are known within the project area..." Subsequent to 2004, Apache elders from the Yavapai-Apache Nation have specifically told the Forest Service that the entire Fossil Creek canyon is a culturally significant area, although they have also indicated that they do want to pursue the process of officially identifying the canyon as a traditional cultural property (TCP). The Forest Service has long known that the canyon is important to several tribes, and we have managed the area as if it were a formally recognized TCP. The Apache have also expressed that they are satisfied with efforts the Forest Service is making to manage the Fossil Creek area and that they support the restoration of Fossil Creek. Mitigation measures were specified in the original EA document that will protect all known archaeological sites from adverse effects. Explicit recognition that Fossil Creek is a culturally important place does not change the original analysis of environmental consequences.

Also, the exact type of piscicide to be used is different than that specified the original EA. The substitution of piscicide will not change the original analysis of environmental consequences.

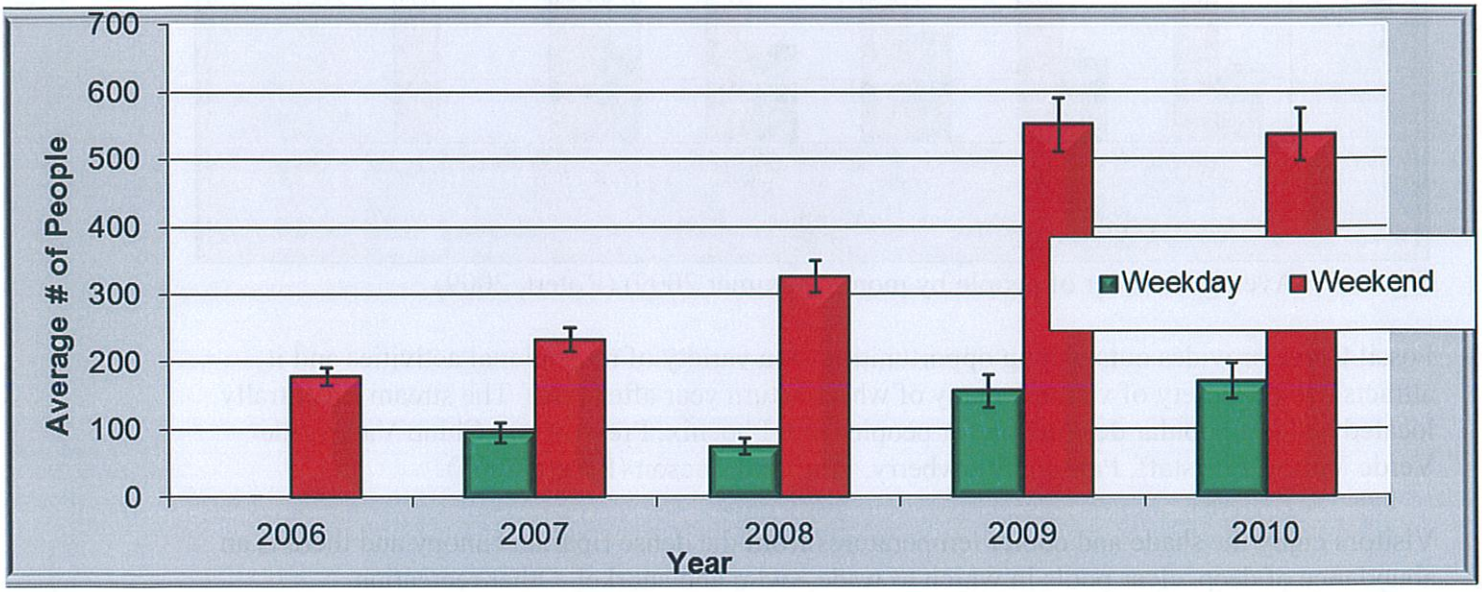
Recreation and Visuals

Notable changes in Recreation and Scenery Affected Environment since the 2004 assessment resulted from the removal of Arizona Public Service Company's (APS) hydroelectric facilities. APS began removal of facilities in March of 2005 with completion of the removal accepted by

the Forest Service in September of 2010. Return of full flows and increased media attention about Fossil Creek has resulted in increased recreation visits.

After the APS dam was removed, the Forest Service started more consistent patrols of the area and began counting numbers of people and vehicles. During the summer of 2009, rangers patrolled nearly every day to interact with visitors and count people and vehicles. Rangers estimated the mean number of visitors for 2006-2010 and the estimates appear in Figure 1. Recreation use has almost tripled during this time.

Figure 1 – Mean Number of People by Year (2006-2010) (Rotert, 2010)



The 2009 and 2012 data collection also showed that weekend use was much higher than weekday use and that use slowed down after September (figure 2).

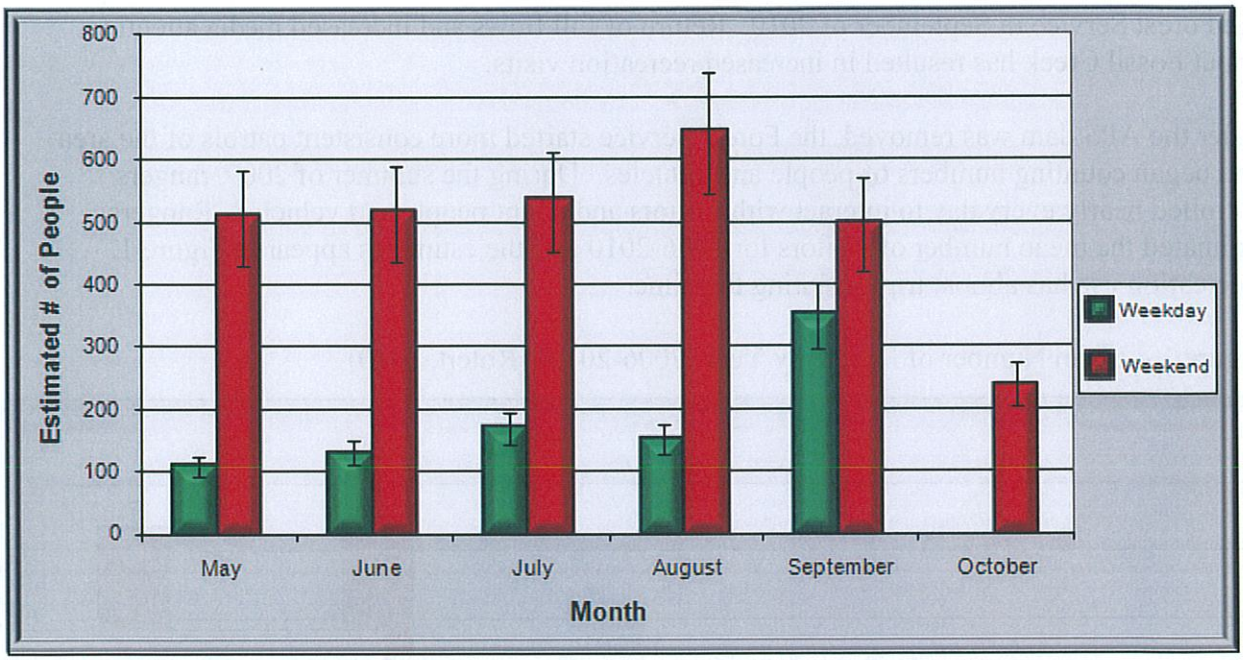


Figure 2 – Average number of people by month (summer 2009) (Rotert, 2009)

Fossil Creek provides outstanding opportunities for a variety of recreational activities and it attracts a wide variety of visitors, many of whom return year after year. The stream is centrally located and is a popular destination for people from Phoenix, Prescott and Chino Valley, the Verde Valley, Flagstaff, Payson, Strawberry, Pine, and Tucson (Rotert, 2009).

Visitors enjoy the shade and cooler temperatures from the dense riparian canopy and there is an abundance of deep, clear pools in which to wade, swim and snorkel. Other recreation opportunities include swimming/wading, camping, hiking, wilderness appreciation, fishing, wildlife and nature observation, photography, bird watching, and potential cultural and historical site interpretation.

With restoration of natural water flows to Fossil Creek since dam removal, new pools, runs, and riffles have established influenced by travertine deposits. The creek will continue to change as new travertine forms on the existing surfaces. The springs that form Fossil Creek keep the water flow constant throughout the year, which is an uncommon and welcome attribute for residents and visitors of the southwest. Travertine formations in the creek tint the water a unique blue-green color (Hohl, 2012).

Increased visitation has resulted in increased litter, human waste, soil compaction and denuded landscapes as new areas and "swimming holes" are discovered. These impacts detract from the overall scenic integrity and aesthetic appeal of Fossil Creek. The most intensively used portions of Fossil Creek continue to be in the roaded section, where access is easiest.

Changes specific to anglers include the fish restoration completed prior to the APS facilities removal and restoration of full flow to the creek bed. New state regulations changed the fishery to a seasonal catch and release artificial lure and fly only, with single barbless hooks. And of course, there was a shift to a native sport fishery from a non-native sport fishery. The deep

pools in Fossil provide ideal settings for fishing, however, the majority of these pools are also destinations for other recreational interests – and thereby likely crowded and difficult to fish. However, the fishing season runs from the first Saturday in October through April 30th, which is outside of the high recreational use season and limits conflicts between anglers and other recreationists.

Environmental Consequences

The environmental consequences of re-treating the creek with piscicide are temporary in nature when considered from a recreation and scenery standpoint. Public access to the creek will be closed during the chemical renovation. The salvage of native fish prior to chemical treatment may be visible if recreationists are in the nearby vicinity. Visitors may notice equipment, including the temporary "holding pens" in the water. The transporting of natives upstream may also be seen if visitors are nearby. Increased activity at drip stations, staging areas, and detoxification stations as staging begins for the treatment may also be noticeable. The proposed helicopter transport of the potassium permanganate (detoxification chemical) will take place prior to the treatment and will be seen from those in the near vicinity. During application at the detoxification stations near the fish barrier, this chemical has a purple tint, which is visible. However, since the area will be closed, this is unlikely to be seen by the public.

After the piscicide treatment is complete, dead fish will briefly be visible in the stream corridor as they wash downstream or are eaten by predators. The treatment effects are not likely to be noticeable in the Verde River (approximately 4.5 miles south of the project area).

Cumulatively, the effect of the increased activity along pedestrian and horse access routes and staging areas will need to be mitigated to ensure a more permanent trail is not established to the barrier site. This work should take place after the barrier repair work is complete and should include any necessary reseeding and re-grading of the access route and staging areas so they are not visually evident.

Environmental Consequences

All of the activities and effects described above were considered and disclosed in the 2004 EA. Therefore, the proposed retreatment with rotenone is within the scope and range of effects originally described.

Wild and Scenic River ORVs

In 2004, Fossil Creek was an eligible wild and scenic river. The analysis done at that time evaluated and disclosed potential effects of fish barrier construction and potential impacts to free-flow and Outstandingly Remarkable Values (ORVs) of Fossil Creek at two different sites. In 2009, Fossil Creek was designated as a wild and scenic river, with the upper and lower sections classified as wild, and the middle section classified as recreational. The fish barrier is in the lower section that is designated as wild. ORVs were listed as fish, geologic, historic, riparian/ecological, and wildlife.

A Comprehensive River Management Plan (CRMP) is currently being developed. In the resource assessment (Forest Service 2011), the ORVs were identified as: fish and aquatic resources, geology, history and traditional uses, recreation, water, and wildlife. The ORVs in the resource assessment differ from those listed in 2004 in that the fish ORV was expanded to include other aquatic species, history was expanded to include traditional uses, riparian/ecological was dropped, and recreation was added.

Environmental Consequences
As described in the other sections, impacts to the identified ORVs from the proposed rotenone treatment are within the scope and range of effects of the 2004 EA. The geologic ORV, not addressed in other sections, will not be impacted by the treatment.

Wilderness

The substitution of rotenone will not have any different effects from those disclosed in the 2004 EA. Helicopters will be used for up to 2 days (Minimum Requirements Decision Guide approved May 31, 2012) versus the 7 to 9 days of helicopter use analyzed in 2004, so effects on people's wilderness experience will be less than in 2004. There are no system trails in the vicinity of the project. Crews will use a Forest Service marked trail which will be rehabilitated after the project in the Wilderness. Crews will camp at a designated camp spot, and an emergency helipad will be identified. Wilderness values associated with native aquatic biota would be restored and enhanced within the same 2.8 miles of stream within the Mazatzal Wilderness. Because of the redesignation of critical habitat for loach minnow and spikedace that includes more of Fossil Creek, the mileage of critical habitat for loach minnow and spikedace increases from 0.2 to 2.8 miles of stream. The same techniques as in 2004 will be used, including application of the chemical through drip stations, backpack spraying, and sand, and the chemical will be neutralized in the vicinity of the fish barrier. Fewer drip stations will be needed in the Wilderness.

Environmental Consequences

The use of rotenone will have the same or fewer effects as the use of antimycin in 2004, except for the increased amount of loach minnow and spikedace critical habitat within wilderness treated. This furthers the main goal of the restoration of Fossil Creek, which was to improve conditions for native fish and allow for repatriation of species.

Air Quality

The application of rotenone is within the scope, intensity, and range of effects described in the 2004 EA. There will be no effects to air quality.

Changes to any applicable Laws, Regulations or Policy

There are no additional changes to laws, regulations, and policies that have not been discussed above that could affect this project.

Conclusion/Finding

Based on the IDT review, I have decided that a correction, revision, or supplement of the *Native Fish Restoration in Fossil Creek* project EA ***is not*** necessary**.** The IDT review found that the effects of the proposed retreatment of Fossil Creek, including upland stock tanks, is within the scope, context, and intensity of environmental effects of those analyzed and documented in the 2004 EA. This document shall serve as the analysis documentation to illustrate the consideration of effects for using rotenone rather than antimycin for fish restoration treatments is within the range and intensity of effects for all resources considered in the 2004 Native Fish Restoration EA. **Project implementation may proceed** under the 2004 decision**.** The environmental review followed the direction contained in FSH 1909.15, Section 18.1 and CEQ regulations §1502.9(c).

see attached approval letter — 8-30-2012

Corbin Newman — Date
Regional Forester, Southwestern Region

Preparers

Janie Agyagos, Wildlife Biologist, Red Rock Ranger District, Coconino National Forest
Sarah Belcher, Landscape Architect, Red Rock Ranger District, Coconino National Forest
Travis Bone, Archeologist, Red Rock Ranger District, Coconino National Forest
Mike Childs, Forest Fisheries Biologist, Coconino National Forest Service
Cecelia Overby, Wildlife and Fish Program Manager, Coconino National Forest Service
Rory Steinke, Watershed Program Manager, Coconino National Forest

Reviewers

Mike Dechter, NEPA Specialist, Coconino National Forest
Don DeLorenzo, Director, Wildlife, Fish and Rare Plants, Forest Service Southwestern Regional Office
Angela Elam, District Ranger, Payson Ranger District, Tonto National Forest
Eric LaPrice, District NEPA Coordinator, Red Rock Ranger District, Coconino National Forest
Heather Provencio, District Ranger, Red Rock Ranger District, Coconino National Forest
Peg Sorensen, Regional Environmental Coordinator (NEPA), Forest Service Southwestern Regional Office
Diane Taliaferro, Wilderness, Wild and Scenic Rivers, and Caves Program Leader, Forest Service Southwestern Regional Office
Francisco Valenzuela, Director of Recreation, Heritage and Wilderness, Southwest Regional Office Recreation Heritage & Wilderness

References Cited

Hedwall, S. 2012. Use of rotenone compared to antimycin-a for retreatment of Fossil Creek. Unpublished report. U.S. Fish and Wildlife Service. 18 pp.

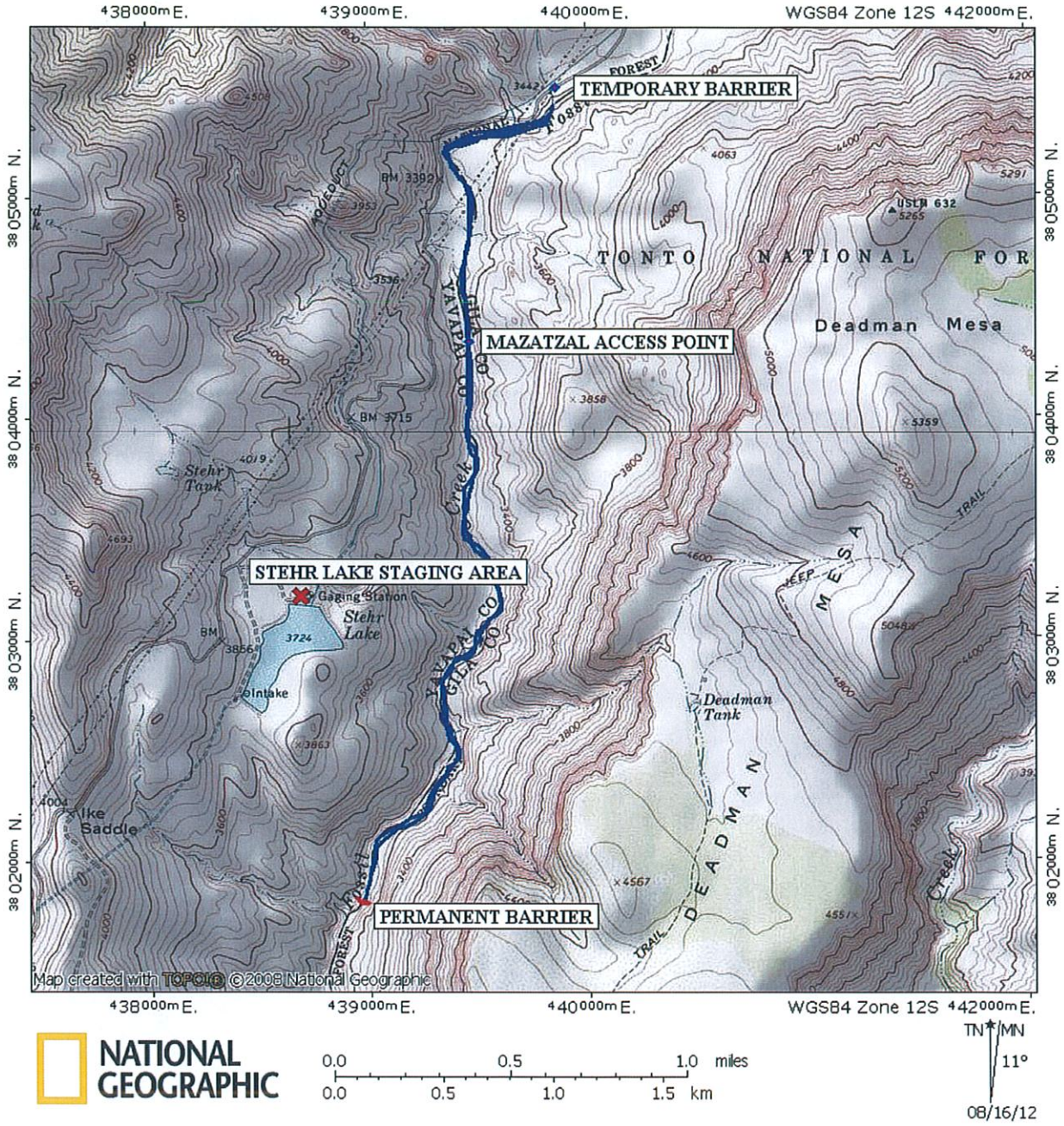
Hohl, R. 2012. Fossil Creek CRMP Recration Specialist Report. Draft unpublished report. Tonto and Coconino National Forests.

Robinson, A.T. and C.D. Crowder. 2012. Repatriation of native fishes to Fossil Creek: summary of monitoring and stocking during 2011. A Gila River Basin Native Fishes Conservation Program progress report for task 3-751, U.S. Fish and Wildlife Service Cooperative Agreement No. 201819J853. Arizona Game and fish Department, Phoenix.

Rotert, A.M. 2010. Fossil Creek Visitor Use Data Collection Project. Tonto and Coconino National Forests.

U.S. Department of Agriculture and U.S. Bureau of Reclamation. 2004. Final Environmental Assessment Native Fish Restoration in Fossil Creek, Coconino and Tonto National Forests, Arizona. 119 pages plus appendices.

Figure 1. Proposed treatment reach, Fossil Creek.



Forest Service
Southwestern Region
Regional Office
333 Broadway SE
Albuquerque, NM 87102
FAX (505) 842-3800
V/TTY (505) 842-3292

File Code: 2150/1950/2630 **Date:** August 30, 2012
Route To:

Subject: Request for review and approval of Fossil Creek Native Fish Restoration Section 18 Review and PUP

To: Forest Supervisor, Coconino National Forest, Forest Supervisor, Tonto National Forest

After reviewing your letter of July 28, 2012, requesting review and approval of the Section 18 Review and pesticide use for the Fossil Creek Native Restoration project to improve and support restoration of native fish, which will include part of the Mazatzal Wilderness Area, we approve the use of rotenone as proposed in the enclosed Pesticide-Use Proposal (PUP).

/s/ Corbin L. Newman, Jr.
CORBIN L. NEWMAN, JR.
Regional Forester

Enclosure

cc: Clifford Dils
David M Stewart

United States Department of the Interior

U.S. Fish and Wildlife Service
Arizona Ecological Services Office
2321 West Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
Telephone: (602) 242-0210 Fax: (602) 242-2513

In reply refer to:
AESO/SE
02EAAZ00-2012-F-0353

August 31, 2012

E-Mail Transmission
Memorandum

To: Chief, Wildlife and Sport Fish Restoration Program, Fish and Wildlife Service, Albuquerque, New Mexico (Attn: Nicole Jimenez)

From: Field Supervisor

Subject: Biological and Conference Opinion for Federal Funding to Arizona Game and Fish Department to Conduct Native Fish Salvage and Piscicide Application in Fossil Creek

Thank you for your request for formal consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544), as amended (Act). Your request for formal consultation and conference was dated August 28, 2012, and received by us via electronic mail on the same day. At issue are impacts that may result to listed and candidate species from the proposed Federal funding by Wildlife and Sport Fish Restoration (WSFR) for the Arizona Game and Fish Department (AGFD) to conduct fish salvage and apply the piscicide rotenone to a portion of Fossil Creek under the State Wildlife Grant (SWG) and Sport Fish Restoration (SFR) Grant. The proposed action may affect the endangered Gila topminnow (*Poeciliopsis occidentalis occidentalis*) and the candidate headwater (*Gila nigra*) and roundtail (*Gila robusta*) chubs.

You also requested our concurrence that the proposed project may affect, but is not likely to adversely affect, the endangered spikedace (*Meda fulgida*) and its critical habitat, the endangered loach minnow (*Tiaroga cobitis*) and its critical habitat, the endangered razorback sucker (*Xyrauchen texanus*), and the threatened Chiricahua leopard frog (*Lithobates chiricahuensis*).

This biological and conference opinion (BCO) is based on information provided in the project description and supporting information provided with your request for consultation, other materials provided subsequent to August 28, 2012, by AGFD and the Forest Service, and other sources of information. Literature cited in this BCO is not a complete bibliography of all literature available on the species of concern, fish salvage protocols and piscicide application, effects of such activities on aquatic species, or on other subjects considered in this opinion. A complete administrative record of this consultation is on file at this office.

Consultation History

Details of the consultation history are summarized in Table 1.

Table 1. Summary of Consultation History

Date	Event
Spring 2010 to present	AGFD has worked cooperatively with us and our Federal and state partners to address barrier repair and nonnative fish issues in Fossil Creek.
August 27, 2012	We participated in a conference call with WSFR and AGFD to determine how to proceed with consultation on the proposed fish salvage and re-application of piscicide in Fossil Creek.
August 28, 2012	We received a request from WSFR for a formal consultation and conference on the salvage of native fish and re-application of piscicide in Fossil Creek.

BIOLOGICAL AND CONFERENCE OPINION

DESCRIPTION OF THE PROPOSED ACTION

Background Information for the proposed action: Fossil Creek is a perennial, spring-fed tributary of the Verde River that forms the border between the Tonto and Coconino National Forests, near Strawberry, Arizona. In fall 2004, the AGFD, FWS, U.S. Bureau of Reclamation (BOR), and Forest Service (Coconino and Tonto National Forests) constructed a permanent concrete fish barrier and used a chemical piscicide to remove nonnative fishes from Fossil Creek. For seven years, monitoring showed that Fossil Creek remained free of nonnative fish above the permanent fish barrier. However, in July 2011, nonnative smallmouth bass (*Micropterus dolomieu*) were detected above the permanent barrier. The agencies collectively determined that during the winter of 2009-2010, a very large flood event resulted in the deposition of rocks and boulders below the left notch of the barrier (looking downstream). Additionally, one of the concrete abutments to the barrier was damaged. The damage below the left barrier notch likely provided the avenue for the nonnative smallmouth bass to swim up and over the fish barrier.

A temporary barrier made of wire gabion baskets filled with sandbags was installed in August 2011 upstream of the nonnative smallmouth bass invasion in order to contain the bass to as small of a reach of the stream as possible. The temporary barrier is located 2.8 miles upstream from the permanent fish barrier at the confluence with Sally May Wash. The AGFD, with assistance from FWS and others, manually removed as many of the smallmouth bass as possible but were unable to remove them all. Since then, the bass have reproduced within this reach and are now prevalent in this section of Fossil Creek.

In April 2012, nine large adult bass were observed in one location above the temporary fish barrier, but below Irving. Because of their size and indicators such as their location in one pool in

close proximity to the road, these nine smallmouth bass appear to have been illegally transported from another location and released into Fossil Creek. The AGFD has removed all but one of these bass. The remaining individual fish was re-detected in the same pool in late August 2012, and manual efforts will continue to remove this bass. It is important to note that comprehensive surveys since this time have not detected young-of-the-year bass in the reach between the temporary barrier and Irving. Therefore, it appears smallmouth bass have not reproduced in this reach, and application of rotenone is not necessary at this time.

Additionally, continuous monitoring of stock tanks in the uplands and tributaries that drain into Fossil Creek detected nonnative fish in two stock tanks that could be a potential source of contamination into Fossil Creek should these stock tanks overflow. The two stock tanks that were found to contain nonnative fish are Sandrock Tank and Soldier Mesa Tank, both of which have been treated with piscicide in the past to remove nonnative fishes.

The 2004 Environmental Analysis (EA) (USDA and USBOR 2004) conducted for the original renovation of Fossil Creek included the potential for additional applications of the piscicide antimycin A if nonnative fish were found in Fossil Creek in the future. The EA called for the Forest Service to prepare a supplemental information report (Section 18 review) to evaluate if these additional treatment(s) are consistent with the EA or not. The selected alternative in the 2004 EA also disclosed the potential for upland treatments based on surveys. The piscicide used for the stream treatment in 2004 was antimycin A, but it is no longer commercially available. The only approved piscicide currently available is rotenone. The Forest Service, with assistance from FWS and AGFD, has completed this Section 18 review of the 2004 EA and has determined that the proposed stream retreatment using rotenone instead of antimycin A is within the scope and range of effects of the 2004 decision.

Proposed Action: In order to protect the native fish assemblage in Fossil Creek, the nonnative bass currently located between the temporary and permanent fish barriers in Fossil Creek and the nonnative fishes found in the two stock tanks need to be completely removed. Because of the complexity of habitat, the amount of flow present in Fossil Creek, and the fact that the smallmouth bass have reproduced below the temporary barrier, manual removal methods have not been and would continue to be unsuccessful in removing bass. Therefore, AGFD, FWS, and the Forest Service determined that in order to completely remove the smallmouth bass and the threat they pose to the entire aquatic species community in Fossil Creek, treatment using the chemical piscicide rotenone is needed. Currently, the action area is the section of Fossil Creek located between the temporary and permanent fish barriers. However, if smallmouth bass are detected reproducing above the temporary barrier, the area of rotenone application could be extended to include Fossil Creek from Irving (where the next known barrier to bass movement is located) down to the permanent barrier.

Prior to application of rotenone to any section of Fossil Creek, native fish will be salvaged from the creek and placed upstream of the treated area. A combination of seines, baited hoop nets, dip nets and angling in appropriate habitat types of the treated reach may be used for salvaging native fish. Fish salvage activities will take place prior to piscicide application. Salvage efforts will focus on collection and transport of the following focal fish species: longfin dace, headwater chub, roundtail chub, Sonora sucker (*Catostomus insignis*), desert sucker (*Catostomus*

[*Pantosteus*] *clarki*), and Gila topminnow. Longfin dace (*Agosia chrysogaster*) and Gila topminnow of all size classes will be captured and moved; for the other species, only individuals greater than 200 millimeters (mm) total length will be translocated since there are likely a large number of these fish present in the 2.8 mile stretch of creek to be treated. Likewise, although other species have not been detected or encountered during past surveys within the treated reach, any other native fish captured will be moved. Captured fish will be held in live cars (i.e., in-stream fish containers) prior to transport and then taken via vehicle and released at appropriate locations and similar habitat in readily accessible portions of Fossil Creek above the treated reach.

The proposed rotenone retreatment will use the same techniques as were used during the 2004 project to apply chemical piscicide and potassium permanganate to detoxify the rotenone below the permanent fish barrier. Similar to the decision implemented in the 2004 EA (see USDA and USBOR 2004), a certified pesticide applicator will supervise rotenone and potassium permanganate application, following label requirements that will protect applicators and mitigate point and non-point source pollution of water quality. Rotenone will be applied to approximately 2.8 miles of stream (or 5.8 miles if the reach between Irving and the temporary barrier is found to contain smallmouth bass young-of-the-year). Rotenone will also be applied to the stock tanks in the uplands that have been illegally stocked with nonnative fishes. Potassium permanganate will only be applied below the permanent fish barrier to detoxify the rotenone and mark the end of the treatment.

STATUS OF THE SPECIES

Gila Topminnow

Listing: Gila topminnow was listed as endangered in 1967 without critical habitat (32 FR 4001, USFWS 1967). Only Gila topminnow populations in the United States, and not in Mexico, are listed under the Act.

Background: The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the Gila topminnow. This information was taken from the 1984 recovery plan (USFWS 1984), the draft revised Gila topminnow recovery plan (Weedman 1999), and the most recent CAP biological opinion (USFWS 2008a) and references cited therein. Information in these documents is incorporated by reference.

Life history: Gila topminnow is a live-bearing minnow species with females reaching two inches and males one inch. Breeding is primarily from March to August; however pregnant females may be found at any time of year in habitats supported by warm springs. Gila topminnows are opportunistic feeders on bottom debris, vegetation, amphipods, and insect larvae. Brood time is 24-28 days, and young Gila topminnow may take a few weeks to a few months to mature. Gila topminnows are short-lived, with an average life span of less than a year.

Habitat use: Gila topminnow use shallow shorelines and slackwater areas of small streams, springs, and marshes. They concentrate in protected inlets, shoreward of sandbars or debris, or are associated with aquatic or streamside vegetation. They are tolerant of a wide range of temperature and water chemistry.

Current distribution: As of 2008, Gila topminnow existed in 9 of the 16 recent natural populations and in 21 reintroduced localities (USFWS 2008b). Two of the natural populations are contaminated by nonnative fish species. Voeltz and Bettaso (2003) reported that 3 of 18 extant reintroduced populations (as of 2003) were contaminated by nonnative fish species. Additional reintroductions by the Gila River Basin Native Fishes Conservation Program of Gila topminnow have been made since 2008 (Robinson 2010).

Threats: The reasons for decline of this fish include past dewatering of rivers, springs and marshlands; impoundments, channelization, diversions, and regulation of flow; land management practices that promote erosion and arroyo formation; and the introduction of predacious and competing nonindigenous fishes.

Conservation actions: As part of their ongoing commitment to conservation for this species, AGFD is an active participant in implementation of the Gila topminnow recovery plan. Conservation measures under the Gila River Basin Native Fishes Conservation Program are underway in the range of the species and include creation of reestablishment areas through barrier construction and chemical renovation to remove nonnative species. Gila topminnow is also a covered species in the Horseshoe-Bartlett Habitat Conservation Plan (HCP) (SRP 2008) for the Verde River. In addition, the Safe Harbor Agreement for Gila topminnow and desert pupfish allows private individuals and non-Federal landowners in Arizona to establish and maintain populations of this species for conservation purposes (USFWS 2008b).

Previous consultations: Section 7 consultations on Gila topminnow include programmatic efforts for Forest Land and Resource Management Plans that address watershed management and multiple uses (livestock grazing, timber harvest, recreation, and other issues), and more site-specific efforts that are more focused on implementing recovery actions such as barrier construction and stream renovations. Biological opinions on actions potentially affecting Gila topminnow may be found at our website www.fws.gov/southwest/es/arizona in the Section 7 Biological Opinion page of the Document Library.

Headwater chub

Listing: Headwater chub became a candidate species in May, 2006 (71 FR 26007, USFWS 2006).

Background: The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the headwater chub. This information was taken from Voeltz (2002), the 12-month finding (USFWS 2006), the 2009 petition for emergency listing (Stefferud et al. 2009), and the most recent candidate assessment form (USFWS 2010a) and references cited therein. Information in these documents is incorporated by reference.

Life history: Spawning typically occurs in spring and has been observed in March in pool-riffle areas with sandy-rocky substrates. The diet of headwater chub includes aquatic insects, ostracods, and plant material.

The species is closely related to the Gila chub (*Gila intermedia*) and roundtail chub and has only recently been identified as a separate taxon (Minckley and DeMarais 2000).

Habitat: Headwater chubs occur in the middle to upper reaches of moderately-sized streams. Habitats containing headwater chubs consist of tributary and mainstem habitats in the Gila River at elevations of approximately 1,325 m (4,347 ft) to 2,000 m (6,562 ft). Maximum water temperatures for habitats of the Gila, headwater and roundtail chub vary from 20 to 27°C (68 to 81°F), with minimum water temperatures of 7° C (45°F). Typical adult habitats containing headwater chub consist of nearshore pools adjacent to swifter riffles and runs over sand and gravel substrate. Young-of-the-year and juveniles use smaller pools and areas with undercut banks and low velocity.

Current Distribution: The historical range of headwater chub is the Gila River basin in Arizona and New Mexico. The historical distribution of headwater chub in Arizona remains poorly understood due in part to the taxonomic confusion with other *Gila* species, the lack of early collections, and widespread manmade changes to habitats within the basin that likely affected distribution.

The species occupies the East, Middle, and West forks of the Gila River and may occupy lower Turkey Creek below a barrier and the Gila River below the forks area in New Mexico, although these fish have not been definitively identified (Stefferud et al. 2009). In Arizona, headwater chub occupy: tributaries of the Verde River including Fossil Creek, East Verde River (including Tributaries, The Gorge, Pine Creek, and Webber Creek), Wet Beaver Creek, Deadman Creek; and Tonto Creek and several of its tributaries (Buzzard Roost, Dinner, Gordon, Gunn, Haigler, Horton, Marsh, Rock, Spring, and Turkey creeks) (Voeltz 2002, Stefferud et al. 2009). Headwater chub may still occur in parts of the San Carlos River basin, although recent survey information for these streams is unavailable because San Carlos tribal survey information is proprietary and confidential (Voeltz 2002, Stefferud et al. 2009). The taxonomic status of chub in upper West Clear Creek has still not been resolved; however, the most recent findings do not place them clearly with either headwater or roundtail chub. Genetic and morphometric confirmation as headwater chub is also lacking for The Gorge and Pine Creek sites on the East Verde River, and for Wet Beaver Creek on the Verde River. Recently completed genetic research includes recommendations for management units for headwater chub, as well the closely-related Gila and roundtail chubs (Schwemm 2006, Dowling et al. 2008).

Threats: Threats to headwater chub include loss of habitat due to water withdrawals and other modifications to streamflow, channelization, improper livestock grazing, mining, roads, logging, and development activities. These threats have been significant and continue to occur. Climate change may also have an effect on the availability of habitat in the future if droughts continue. High-severity wildfires are also a risk to the species since it is found in isolated headwater streams with little ability for reoccupation of affected streams.

The introduction and spread of nonnative fish that can be predators or competitors on headwater chub has significantly affected the species.

Conservation Actions: As part of their ongoing commitment to conservation for this species, AGFD is an active participant in implementation of conservation actions for the headwater chub.

Survey and recovery work for the headwater chub is guided by a Recovery Plan in New Mexico (Carman 2006) and includes monitoring of the extant populations. In Arizona, headwater chub is covered by the Six Species Conservation Program (AGFD 2006). This program has provided administrative oversight on the species and is making progress on numerous projects planned for implementation over the next ten years. The conservation efforts of this program, led by the AGFD, have led to the completion of a considerable amount of genetic research as well as the documentation of two new occupied waters. The Fossil Creek restoration in 2004 (funded by the Gila River Basin Native Fishes Conservation Program) provided significant benefits for headwater chub; and further benefits could be realized from this funding program if the Spring Creek restoration project moves forward. However, the Spring Creek project may not be implemented for several years.

The recently completed sport fish stocking program consultation (USFWS 2011) contains a suite of required conservation measures for headwater chub that will be implemented over the next ten years. These measures include additional surveys and securing populations of headwater chub within its historical range in Arizona.

Previous consultations: Headwater chub is a candidate for listing under the Act and as such is not subject to the consultation requirements of section 7 for activities of Federal agencies. Federal agencies may, at their discretion, include consideration for candidate species in their environmental compliance under the Act. However, it is the policy of the FWS that candidate species are considered in intra-Service consultations on FWS actions, including funding activities of other entities, such as AGFD. The species was considered in the intra-Service consultation on Federal funding of sport fish stocking in Arizona (USFWS 2011).

Roundtail Chub

Listing: Roundtail chub in the Lower Colorado River basin became a candidate species under the Act on July 7, 2009 (74 FR 32352, USFWS 2009).

Background: The following information is a summary of life history, habitat use, current distribution, threats, and conservation actions for the roundtail chub. This information was taken from the 2010 report for the Candidate Notice of Review (USFWS 2010b), which was developed from the 2009, 12-month finding (USFWS 2009) and references therein. Information in these documents is incorporated by reference.

Life history: Spawning has been documented from 57 to 75 °F (14 to 24 °C) from February through June in pool, run, and riffle habitats, with slow to moderate water velocities. Roundtail chubs live for approximately five to seven years and begin spawning at age two. Roundtail chubs are omnivores, consuming foods proportional to their availability, including aquatic and terrestrial invertebrates, aquatic plants, detritus, and fish and other vertebrates; algae and aquatic insects can be major portions of their diet.

Habitat use: Roundtail chubs in the lower Colorado River basin are found in cool to warm waters of rivers and streams, and often occupy the deepest pools and eddy of large streams. Although roundtail chubs are often associated with various cover features such as boulders, vegetation, and undercut banks, they are less likely to use cover than other related species such as the headwater chub and Gila chub.

Current distribution: The roundtail chub is found in the upper and lower Colorado River basins; however, the candidate entity is the Distinct Population Segment (DPS) in the lower Colorado River basin of Arizona and New Mexico (USFWS 2009). Streams containing roundtail chub in the DPS are found in five separate drainages that are isolated from one another (the Little Colorado River, Bill Williams River, Gila River, Salt River, and Verde River), and occupied streams within the drainages have varying amounts of connectivity between them. Roundtail chub in the lower Colorado River basin in Arizona currently occurs in two tributaries of the Little Colorado River; eight tributaries of the Bill Williams River; the Salt River and 10 of its tributaries; the Verde River and five of its tributaries; Aravaipa Creek (a tributary of the San Pedro River); Eagle Creek (a tributary of the Gila River); and in New Mexico in the upper Gila River (USFWS 2010b). The Salt and Verde rivers are occupied in several reaches that are fragmented and isolated by two large dams and reservoirs on the Verde River, and four large dams and reservoirs on the Salt River. Roundtail chubs also occur in canals in Phoenix that are fed by the lower Salt and Verde rivers.

Threats: Threats to the roundtail chub are fully examined in the 12-month finding (USFWS 2009) and in the 2010 candidate assessment (USFWS 2010b). The information in those documents is incorporated herein by reference. Major threats include loss of habitat due to dewatering of rivers and streams and the introduction of nonnative predators and competitors.

Conservation actions: The AGFD initiated and leads the "Arizona Statewide Conservation Agreement for Roundtail Chub (*Gila robusta*), Headwater Chub (*Gila nigra*), Flannelmouth Sucker (*Catostomus latipinnis*), Little Colorado River Sucker (*Catostomus* spp.), Bluehead Sucker (*Catostomus discobolus*), and Zuni Bluehead Sucker (*Catostomus discobolus yarrowi*)" (AGFD 2006; also known as the Six Species Conservation Program). Recent conservation actions implemented by signatories to the plan are detailed in USFWS (2010b) and listed below:

- Acquisition of lands within the upper and middle Verde River by The Nature Conservancy and AGFD that assist in protection of instream flows and adjacent riparian areas.
- Acquisition of lands in Aravaipa Canyon by The Nature Conservancy to enhance flows and restore aquatic habitats for native fish including roundtail chub.
- Efforts by the U.S. Forest Service, AGFD, and Salt River Project (SRP) to protect stream flows in Cherry Creek and on the Verde River.
- Creation of two new roundtail chub populations in Ash Creek and Roundtree Canyon by AGFD.
- Establishment of broodstocks and refugia at AGFD's Bubbling Ponds State Fish Hatchery of Verde River and Eagle Creek roundtail chub for use in restoration projects funded through the agreement partners.
- The Gila River Basin Native Fishes Conservation Program projects such as Fossil Creek that provide benefits to roundtail chub as part of the benefits to target species.

- Roundtail chub is a covered species under the Horseshoe-Bartlett HCP (SRP 2008) and some recent conservation actions are related to this HCP and have been undertaken with SRP funding by AGFD.

The recently completed sport fish stocking program consultation (USFWS 2011) contains a suite of required conservation measures for roundtail chub that will be implemented over the next ten years. These measures include additional surveys and securing populations of roundtail chub within its historical range in Arizona.

Previous consultations: The roundtail chub is a candidate for listing under the Act and as such is not subject to the consultation requirements of section 7 for activities of Federal agencies. Federal agencies may, at their discretion, include consideration for candidate species in their environmental compliance under the Act. However, it is the policy of the FWS that candidate species are considered in intra-Service consultations on FWS actions, including funding activities of other entities such as AGFD. The species was considered in the intra-Service consultation on Federal funding of sport fish stocking in Arizona (USFWS 2011).

ENVIRONMENTAL BASELINE

The environmental baseline includes past and present impacts of all Federal, state, or private actions in the action area, the anticipated impacts of all proposed Federal actions in the action area that have undergone formal or early section 7 consultation, and the impacts of state and private actions which are contemporaneous with the consultation process. The environmental baseline defines the current status of the species and its habitat in the action area to provide a platform to assess the effects of the action now under consultation.

Status of the Species in the Action Area

Gila Topminnow

We have no historical records of Gila topminnow in Fossil Creek. However, since 2007, Gila topminnows have been stocked into multiple locations in Fossil Creek above the location of the temporary barrier at Sally May Wash. Suitable habitat, including vegetated stream margins and backwaters, exists from the perennial spring inflow in the upper-most reach of Fossil Creek to the permanent barrier. Though the greatest numbers of Gila topminnow occur above the temporary barrier in Fossil Creek (24 separate locations from the temporary barrier to Irving), surveys in 2012 observed topminnow downstream of the temporary barrier in eight locations. As Gila topminnow have survived and reproduced in Fossil Creek, it is logical that they would be expanding the extent of their use of Fossil Creek; surveys are beginning to document this expansion of occupied areas within the creek.

The Gila topminnow, as with many native fishes, is highly vulnerable to adverse effects from nonnative aquatic species (Johnson and Hubbs 1989). Predation and competition from species such as smallmouth bass have resulted in Gila topminnow declines and continue to be a major threat to the remaining populations (Meffe et al. 1983, Meffe 1985; Brooks 1986, Marsh and Minckley 1990, Stefferud and Stefferud 1994, Weedman and Young 1997). If smallmouth bass

are not removed from Fossil Creek, Gila topminnow would not be able to survive long-term, and could be extirpated from below the temporary barrier in as few as one or two years due to the piscivorous nature of smallmouth bass.

Headwater and Roundtail Chub

Following the removal of nonnative fishes from Fossil Creek and restocking of salvaged native fish in 2004, the chub population in Fossil Creek grew exponentially. Monitoring from 2004 to present day indicates that chub have not only recovered in Fossil Creek, but exist at incredibly high densities that are not known from any other location in Arizona. Genetic analysis indicates that the chub population in Fossil Creek consists predominantly of headwater chub or "intergrades" of headwater and roundtail chub, with only 25% of chub between Irving and the fish barrier genetically assignable as roundtail (Dowling and Marsh 2009). However, because there is no physical means for fish biologists to identify an individual chub as headwater or roundtail (other than through genetic analysis), we assume that both species are present within the action area (though headwater chub are likely much more predominant).

Both headwater and roundtail chub are vulnerable to predation and competition with smallmouth bass. When smallmouth bass first invaded Fossil Creek in the mid-1990s (prior to the 2004 renovation action), it took less than three years for the bass to completely reduce the ability of young-of-the-year chub to recruit into the population (pers. obs. Chuck Benedict, AGFD).

EFFECTS OF THE ACTION

Effects of the action means the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

Effects of the Action on the Gila topminnow, headwater chub, and roundtail chub

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family (Leguminosae). It has been used for centuries for capture of fishes by native peoples where the plants are naturally found. In North America, rotenone has been used for modern fishery management purposes since the 1930s and continues to be a valuable tool in fisheries management (Finlayson et al. 2000). Piscicide application is the only method other than dewatering that can consistently and completely eradicate undesirable fish communities.

Rotenone has several advantages for obtaining control of fish populations over other control techniques: 1) fish eradication using piscicides has been found to be more successful than control efforts for improving desirable aspects of a fishery; 2) adjustments in rotenone applications can result in spatially selective eradications; 3) rotenone can be used in large river systems to control all post-embryonic (fish) life stages; and, 4) the results are nearly immediate. The recognized disadvantages to rotenone use are: 1) temporary loss of potable water supplies and recreational

opportunities; 2) temporary effects on aquatic habitat and non-target species; and, 3) rotenone does not kill fish eggs.

Rotenone affects fish by inhibiting respiration by blocking biochemical pathways of cell metabolism, specifically the reduced nicotinamide adenine dinucleotide (NADH)-dehydrogenase segment of the respiratory chain (Mangum and Madrigal 1999). In other words, contact with the piscicide causes fish to suffocate and die. All fish that are not salvaged from the treated reach will be killed by the application of rotenone.

To reduce the impacts of the proposed action to native fish (including Gila topminnow, headwater chub, and roundtail chub), a salvage operation will be conducted as described in the proposed action. This action will allow for removing as many topminnow and chub (among other native fishes) as possible prior to applying the piscicide. In their management of aquatic wildlife, AGFD regularly implements fish salvage activities and has documented minimal losses to target species. By following established agency procedures for the salvage operations, we expect the number of fatalities to be minimal.

Effects of the Action on Recovery

The proposed action will not appreciably reduce the likelihood of Gila topminnow, headwater chub, and roundtail chub recovery in Fossil Creek based on the following:

- The section of Fossil Creek that contains smallmouth bass (above the barrier) is no longer a safe haven for native fish. Smallmouth bass are likely preying on and competing for resources with the native fishes, including topminnow and chub, within this reach. Removing the smallmouth bass will ensure that Fossil Creek continues to be a refuge for native fish, including the listed Gila topminnow and candidate headwater and roundtail chubs.

- Many Gila topminnow and chub will be salvaged prior to the rotenone application and released following treatment. Therefore, these fish will continue to contribute to recovery in Fossil Creek. The number of topminnow and chub killed through piscicide application will not reduce the existing populations of these fish to the point that they cannot recover the number of fish lost.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Fossil Creek Watershed is predominately managed by the Coconino and Tonto National Forests. Since the land within the action area is almost exclusively managed by the Forest Service, most activities that could potentially affect listed species are Federal activities and subject to additional section 7 consultations.

Future non-Federal actions within the project area that may be reasonably certain to occur include the potential development and/or modification of a private property in-holding along Fossil Creek and high-volume streamside recreation. These activities may result in increased overland flow and/or sedimentation into aquatic species habitat (from construction of impermeable surfaces) and the potential for further nonnative aquatic species introductions. There is only one private in-holding on Fossil Creek, and the landowners are cooperative and helpful in the management of Fossil Creek.

Unregulated activities on Federal and non-Federal lands, such as trespass livestock, inappropriate use of off-highway vehicles, and illegal introduction of nonindigenous aquatic species, are cumulative effects and can adversely affect the species through a variety of avenues.

CONCLUSION

After reviewing the current status of the endangered Gila topminnow and the candidate headwater and roundtail chubs, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is the FWS's opinion that the proposed action is not likely to jeopardize the continued existence of the Gila topminnow or the candidate headwater and roundtail chubs and will not risk the recovery or conservation of these fishes. Pursuant to 50 CRF 402.02, "jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat has been designated for the Gila topminnow; therefore, none will be affected.

The FWS anticipates that some unknown number of Gila topminnow, headwater chub, and roundtail chub will be killed as a result of this action. However, the FWS does not believe the impacts of the proposed action will rise to the level of jeopardy for the species. The FWS bases this conclusion on the following reasons:

- The proposed fish salvage will salvage as many Gila topminnow and chub as possible to reduce the number of fish killed by the piscicide and return salvaged fish to the creek, thus maintaining populations of these species in Fossil Creek.

- This action will remove a threat to the Gila topminnow, headwater and roundtail chub populations in Fossil Creek by eliminating smallmouth bass from the protected portion (above the permanent fish barrier) of Fossil Creek.

- Although Gila topminnow and chub will be killed as part of the proposed action, smallmouth bass occupying habitat between the temporary and permanent barriers are currently preying upon and competing with topminnow and chub. Without the proposed action, Gila topminnow and chub will be systematically removed by bass from this section of Fossil Creek and these populations may be lost. This action allows for long-term occupancy of Fossil Creek by these (and other) native fishes.

The conclusions of this biological opinion are based on full implementation of the project as described in the Description of the Proposed Action section of this document, including any Conservation Measures that were incorporated into the project design.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. "Harm" is further defined by the FWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. "Harass" is defined by the FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. "Incidental take" is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Amount or Extent of Take Anticipated

Despite the provisions for safe capture, transport, holding, and release of Gila topminnow and headwater and roundtail chub from the treatment reach, there is always a risk of mortality when handling fish in these situations. The proposed action includes standard AGFD provisions for safe handling of salvaged fish; however, conditions cannot always be controlled to eliminate the risk of mortality. Further, it is unlikely that all Gila topminnow and headwater and roundtail chub will be removed by the salvage operation, and any individuals remaining in the treatment area will die due to the effects of rotenone.

Incidental take of Gila topminnow and headwater and roundtail chub is reasonably certain to occur as a result of the proposed piscicide application in Fossil Creek to remove smallmouth bass. Incidental take will result as fish die from contact with the piscicide rotenone and from injuries acquired during capture or handling stress during salvage operations, and from harassment during capture, holding, and release.

The FWS anticipates incidental take of Gila topminnow, headwater, and roundtail chub from exposure to rotenone will be difficult to detect for the following reasons: finding a dead or impaired specimen is unlikely as fish that are exposed to rotenone typically disappear quickly as they are carried downstream, sink to the creek bottom, or are eaten by birds and mammals. Although we cannot estimate the number of individual fish that will be incidentally taken during treatment, based upon surveys conducted in the proposed action area and experience from past rotenone treatments, the number of topminnow and chub killed by rotenone will be significantly less than the number of topminnow and chub that remain above the treated reach and will re-colonize the area following the treatment.

We also anticipate incidental take of Gila topminnow and headwater and roundtail chub in the form of death, injury, and harassment from salvage activities. Based on experience during previous salvage operations, we do not expect mortality of salvaged fish to exceed 10% of those captured. The remaining fish will be subject to non-lethal harassment due to handling activities and stress prior to their release back into the creek.

Effect of the Take

In the accompanying BCO, the FWS determined that this level of anticipated take is not likely to result in jeopardy to the Gila topminnow or to the candidate headwater and roundtail chubs.

REASONABLE AND PRUDENT MEASURES

No reasonable and prudent measures are necessary for the action addressed in this biological opinion. The fish salvage effort prior to piscicide treatment will minimize take of topminnow and chub from rotenone treatment. The AGFD is following established protocols to minimize take of the topminnow and chub from the fish salvage effort.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. We recommend that AGFD continue to work with us and the Forest Service to continue monitoring Fossil Creek to ensure early detection of nonnatives should they invade or be illegally stocked in the future.

2. We recommend that AGFD continue to work with us and the Forest Service to evaluate potential stocking of native aquatic species in Fossil Creek. We are particularly interested in further discussions regarding stocking of Verde River roundtail chub above the permanent barrier to ensure that Fossil Creek provides a refuge for roundtail, as well as headwater chub.

In order for the FWS to be kept informed of action minimizing or avoiding adverse effects or benefiting listed species or their habitats, the FWS requests notification of the implementation of any conservation recommendations.

Disposition of Dead or Injured Listed Species

Upon locating a dead, injured, or sick listed species initial notification must be made to the FWS's Law Enforcement Office, 2450 W. Broadway Rd, Suite 113, Mesa, Arizona, 85202, telephone: 480/967-7900) within three working days of its finding. Written notification must be made within five calendar days and include the date, time, and location of the animal, a photograph if possible,

and any other pertinent information. The notification shall be sent to the Law Enforcement Office with a copy to this office. Care must be taken in handling sick or injured animals to ensure effective treatment and care, and in handling dead specimens to preserve the biological material in the best possible state.

REINITIATION NOTICE

This concludes the BCO for the SWG and SFR funded fish salvage and piscicide treatment in Fossil Creek and identified stock tanks. You may ask the FWS to confirm the conference opinion as a biological opinion issued through formal consultation if the candidate headwater and roundtail chub species are listed or critical habitat is designated. The request must be in writing. If the FWS reviews the proposed action and finds there have been no significant changes in the action as planned or in the information used during the conference, the FWS will confirm the conference opinion as the biological opinion for the project and no further section 7 consultation will be necessary.

After listing as threatened or endangered and any subsequent adoption of this conference opinion, the Federal agency shall request reinitiation of consultation if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect the species in a manner or to an extent not considered in the conference opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the species that was not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

This concludes formal consultation on the proposed action outlined in the request for consultation. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

We appreciate your efforts to assist in implementing this important conservation and recovery action. Funding provided by WSFR for conservation and sport fish management purposes results in significant benefits to many aquatic species.

If you have any questions about this consultation, or we can be of additional assistance, please contact Shaula Hedwall at (928) 556-2118 or Brenda Smith at (928) 556-2157. In future communications about this consultation please refer to consultation number 02EAAZ00-2012-F-0353.

Brenda H. Smith

for Steven L. Spangle

cc (electronic):

Regional Director, Fish and Wildlife Service, Southwest Region, Albuquerque, NM (ARD-ES, Permits)
Nongame Branch Chief, Arizona Game and Fish Department, Phoenix, AZ
Fisheries Branch Chief, Arizona Game and Fish Department, Phoenix, AZ
Assistant Field Supervisor, Fish and Wildlife Service, Phoenix, AZ
Assistant Field Supervisor, Fish and Wildlife Service, Flagstaff, AZ
Assistant Field Supervisor, Fish and Wildlife Service, Tucson, AZ
Aquatic Program Supervisor, Fish and Wildlife Service, Phoenix, AZ

W:\Brenda Smith\Fossil Creek Re-renovation BO Aug 2012 ver2.docx:cgg

LITERATURE CITED

Arizona Game and Fish Department (AGFD). 2006. Arizona Statewide Conservation Agreement for Roundtail chub (*Gila Robusta*), Headwater Chub (*Gila Nigra*), Flannelmouth Sucker (*Castostomus Latipinnis*), Little Colorado River Sucker (*Catastomus SPP.*), Bluehead Sucker (*Castostomus Discobolus*), and Zuni Bluehead Sucker (*Cataostomus Discobolous Yarrowi*): Arizona Game and Fish Department, Phoenix, Arizona.

Brooks, J.E. 1986. Status of natural and introduced Sonoran topminnow (Poeciliopsis o. occidentalis) populations in Arizona through 1985. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 19+pp.

Carman, S. M. 2006. Colorado River Basin chubs, roundtail chub *Gila robusta,* Gila chub *Gila intermedia*, headwater chub (*Gila nigra*), recovery plan. New Mexico Department of Game and Fish, Conservation Services Division, Sante Fe, New Mexico. 63 pp.

Dowling, T.E., P.C. Marsh, C.D. Anderson, M.S. Rosenberg, and A.T. Kelsen. 2008. Population structure in the roundtail chub (Gila robusta complex) of the Gila River basin as determined by microsatellites. Draft Final Report to Arizona Game and Fish Department, Contract # AGR 4/21/04. Arizona State University, School of Life Sciences, Tempe, AZ. 57 pp.

Dowling, T.E. and P.C. Marsh. 2009. Recent genetic information on Gila in Fossil Creek, Arizona. Arizona State University/Marsh and Assoc., LLC. Tempe, AZ.

Finlayson, B.J., R. Schnick, R. Cailteux, L. DeMong, W. Horton, W. McClay, C. Thompson, and G. Tichacekl. 2000. Rotenone use in fisheries management: administrative and technical guidelines. American Fisheries Society. Bethesda, Maryland.

Johnson, J.E., and C. Hubbs. 1989. Status and conservation of poeciliid fishes. Pages 301-331 in G. K. Meffe, and F. F. Snelson, eds., Ecology and Evolution of Livebearing Fishes (Poeciliidae). Prentice Hall, Englewood Cliffs, New Jersey. 453pp.

Mangum, F.A. and J.L. Madrigal. 1999. Rotenone effects on aquatic macroinvertebrates of the Strawberry River, Utah: a five-year study. Journal of Freshwater Ecology 14(1):125-135.

Marsh, P.C., and W.L. Minckley. 1990. Management of endangered Sonoran topminnow at Bylas Springs, Arizona: description, critique, and recommendations. Great Basin Naturalist 50(3):265-272.

Meffe, G.K. 1985. Predation and species replacement in American Southwestern stream fishes: A case study. Southwest Nat. 30:173-187.

Meffe, G.F., D.A. Hendrickson, W.L. Minckley, and J.N. Rinne. 1983. Factors resulting in decline of the endangered Sonoran topminnow Poeciliopsis occidentalis (Atheriniformes: Poeciliidae) in the United States. Biological Conserv. 25:135-159.

Minckley, W.L. and B.D. DeMarais. 2000. Taxonomy of chubs (Teleostei, Cyprinidae, Genus Gila) in the American Southwest with comments on conservation. Copeia 2000(1): 251-256.

Robinson, A. 2010. Arizona Native Fish Recovery and Nonnative Fish Control. Final Report, May 28, 2010. FWS Agreement No 201816J808. Arizona Game and Fish Department, Phoenix. 34 pp.

Salt River Project (SRP). 2008. Habitat Conservation Plan Horseshoe and Bartlett Reservoirs. Submitted to U.S. Fish and Wildlife Service by Salt River Project; Prepared by ERO Resources Corp. and Salt River Project, Phoenix, AZ.

Schwemm, M.R. 2006. Genetic variation in the Gila robusta complex (Teleostei: Cyprinidae) in the lower Colorado River. Masters Thesis, Arizona State University, Tempe, Arizona. 117 pp.

Stefferud, J.A., and S.E. Stefferud. 1994. Status of Gila topminnow and results of monitoring of the fish community in Redrock Canyon, Coronado National Forest, Santa Cruz County, Arizona, 1979-1993. Pages 361-369 in L. F. DeBano, P. F. Ffolliott, A. Ortega-Rubio, G. J. Gottfried, R. H. Hamre, and C. B. Edminster, tech. coords., Biodiversity and Management of the Madrean Archipelago: The Sky Islands of Southwestern United States and Mexico. U.S. Forest Service, Gen. Tech. Rept. RMGTR-264, Rocky Mtn. For. & Range Exp. Stn., Ft. Collins, Colorado. 669pp.

Stefferud, S.E., J.A. Stefferud, P.C. Marsh, and T.E. Dowling. 2009. Petition for Listing Priority Restoration and Emergency Listing of Headwater Chub (Gila Nigra) As An Endangered Species. Petition to U.S. Fish and Wildlife Service, Albuquerque, NM. 44 pp.

U.S. Department of Agriculture and U.S. Bureau of Reclamation (USDA and USBOR). 2004. Final Environmental Assessment Native Fish Restoration in Fossil Creek, Coconino and Tonto National Forests, Arizona. 119 pages plus appendices.

U.S. Fish and Wildlife Service (USFWS). 1967. Native Fish and Wildlife: Endangered Species. Federal Register. March 11, 1967. 32 FR 4001.

U.S. Fish and Wildlife Service (USFWS). 1984. Sonoran topminnow recovery plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 56 pp.

U.S. Fish and Wildlife Service (USFWS). 2006. 12-Month Finding on a Petition to List a Distinct Population Segment of the Roundtail Chub in the Lower Colorado River Basin and to List the Headwater Chub as Endangered or Threatened with Critical Habitat. Notice of 12-month petition findings. Federal Register. May 3, 2006. 71 FR 26007.

U.S. Fish and Wildlife Service (USFWS). 2008a. Reinitiated Biological Opinion on Transportation and Delivery of Central Arizona Project Water to the Gila River Basin in Arizona and New Mexico and its Potential to Introduce and Spread Nonindigenous Aquatic Species. U.S. Fish and Wildlife Service, Phoenix, AZ. 156 pp.

U.S. Fish and Wildlife Service (USFWS). 2008b. Intra-Service Biological and Conference Opinion on Issuance of an Enhancement of Survival Permit (TE-083686-0) to the Arizona Game and Fish Department. Arizona Ecological Services Office, Phoenix, AZ. 84 pp.

U.S. Fish and Wildlife Service (USFWS). 2009. 12-Month Finding on a Petition to List a Distinct Population Segment of the Roundtail Chub (*Gila robusta*) in the Lower Colorado River Basin; Proposed Rule. Federal Register. July 7, 2009. 74 FR 32352.

U.S. Fish and Wildlife Service (USFWS). 2010a. Species Assessment and Listing Priority Assignment Form for Headwater Chub. Arizona Ecological Services Office, Phoenix. 40 pp.

U.S. Fish and Wildlife Service (USFWS). 2010b. Species Assessment and Listing Priority Form for Roundtail chub. Arizona Ecological Services Office, Phoenix. 90 pp.

U.S. Fish and Wildlife Service (USFWS). 2011a. Biological and Conference Opinion for Wildlife and Sport Fish Restoration Funding of Arizona Game and Fish Department's Statewideand Urban Fisheries Stocking Program for 2011-2021. Consultation Number 22410-2008-F-0486. Arizona Ecological Services Office, Phoenix, AZ. 781 pp.

Voeltz, J.B. 2002. Roundtail chub (Gila robusta) status survey of the lower Colorado River basin. Nongame and Endangered Wildlife Program Technical Report 186. Arizona Game and Fish Department, Phoenix, Arizona.

Voeltz, J.B, and R.H. Bettaso. 2003. Status of the Gila Topminnow and Desert Pupfish in Arizona. Technical report #226. Nongame and Endangered Wildlife Program. Arizona Game and Fish Department, Phoenix. 128 pp.

Weedman, D.A. 1999. Revised Gila topminnow recovery plan. Arizona Game and Fish Department. Phoenix, Arizona. Fish and Wildlife Service. Albuquerque New Mexico. 89 pp.

Weedman, D.A, and K.L. Young. 1997. Status of the Gila topminnow and desert pupfish in Arizona. Ariz. Game and Fish Dept., Nongame and Endangered Wildl. Prog. Tech. Rept. 118, Phoenix. 141.

APPENDIX A - CONCURENCES

This appendix contains our concurrences with your "may affect, not likely to adversely affect" determinations for the endangered spikedace (*Meda fulgida*) and its critical habitat, the endangered loach minnow (*Tiaroga cobitis*) and its critical habitat, the endangered razorback sucker (*Xyrauchen texanus*), and the threatened Chiricahua leopard frog (*Lithobates chiricahuensis*).

Spikedace and critical habitat, loach minnow and critical habitat:

We concur with your determination that the proposed action may affect, but is not likely to adversely affect the spikedace and its critical habitat or the loach minnow and its critical habitat. We base this concurrence on the following:

- Repeated surveys indicate that there are no spikedace or loach minnow present within the action area. Therefore, if these fish should ever be reintroduced to or colonize this area from an upstream location, the action of removing smallmouth bass is wholly beneficial to these fish and their habitat.

- The invasion of smallmouth bass into Fossil Creek modified the designated critical habitat for loach minnow and spikedace as these fish cannot coexist with smallmouth bass. By implementing the proposed action and removing smallmouth bass from Fossil Creek, the primary constituent element of "No nonnative aquatic species, or levels of nonnative aquatic species that are sufficiently low as to allow persistence" will be restored for both species.

Razorback sucker:

We concur with your determination that the proposed action may affect, but is not likely to adversely affect the razorback sucker. We base this concurrence on the following:

- Repeated surveys indicate that there are no razorback suckers present within the action area. Therefore, if these fish should ever be reintroduced to or colonize Fossil Creek, the action of removing smallmouth bass is wholly beneficial to the razorback sucker.

Chiricahua leopard frog:

We concur with your determination that the proposed action may affect, but is not likely to adversely affect the Chiricahua leopard frog. We base this concurrence on the following:

- The stock tanks identified for rotenone application are not occupied by Chiricahua leopard frogs. However, these stock tanks occur in near proximity to areas in which the FWS, AGFD, and Forest Service are working to recover these frogs. Therefore, the removal of nonnative fishes from the identified stock tanks is wholly beneficial to the frog and is a reasonable and prudent measure in the biological opinion completed for the frog on the

Hackberry and Pivot Rock Allotment (USFWS 2009). This allotment contains the stock tanks identified for treatment.

LITERATURE CITED

U.S. Fish and Wildlife Service (USFWS). 2009. Biological opinion for the Hackberry and Pivot Rock Allotment Management Plans. Arizona Ecological Services Office, Phoenix, Arizona. 54 pp.

FS-2100-2 (8/79)

US DEPARTMENT OF AGRICULTURE – FOREST SERVICE	DEPARTMENT / AGENCY		CONTACT / PHONE #
PESTICIDE - USE PROPOSAL (submit to:) Corbin Newman, Regional Forester	USDA Forest Service		Laura P. Moser: Forest Pesticide Use Coordinator; Coconino N. F.; 928-527-3423 1824 S. Thompson St.; Flagstaff AZ 86004
(Reference FSM 2150)	REGION	FOREST	Date Submitted
	03	04	08/23/2012

1) OBJECTIVE a) Project No. b) Specific Target Pest c) Purpose	a) 030406_031204FossilCreekFishRestoration b) Smallmouth bass (*Microplerus dolomieui)*; green sunfish (*Lepomis cyanellus);* yellow bullhead *(Ameiurus natalis*); flathead catfish (*Pylodictis ovilaris).* a) To enhance and protect the native fish community and their habitat in the Fossil Creek watershed. Fossil Creek is part of the Verde River drainage and lies on the border between the Tonto and Coconino National Forests. A large portion of the treatment area lies within the Mazatzal Wilderness Area. For a complete analysis please reference the Final Environmental Assesment for Native Fish Restoration in Fossil Creek, Coconino and Tonto National Forests, Arizona (May 2004). American Fisheries Society has recently released a Rotenone Standard Operating Procedures (2010) which was referenced throughout the Fossil Creek Treatment Plan and this document as AFS-SOP. Collaborative agencies involved in this long term project include: Arizona Game and fish Department (AGFD), US Fish and Wildlife Service (USFWS) AZ Ecological Services, USFWS Fisheries Resources Office, Bureau of Reclamation, Arizona State University, Northern Arizona University, USDA Forest Service, Coconino and Tonto National Forests.
2) PESTICIDE a) Common Name b) Formulation c) % AI,AE,or lb / Gal. d) Registration No.	a) Rotenone 1: Prentox CFT Legumine ™ Fish Toxicant b) Liquid c) 5% w/w d) EPA Reg. # 75338-2 a) Rotenone 2: Prentox™ Rotenone Fish Toxicant Powder b) Powder c) 7.4% w/w (minimum guraranteed) d) EPA Reg. # 655-691
3) FORMULATION a) Form Applied b) Use Strength (%) or Dilution Rate c) Diluent	a) Liquid - Drip centers set up every 1 hr stream flow travel time along target stream reach. CFT Legumine can drain directly into the center of the stream at a rate of 0.85 to 3.4 cc per minute for each cfs (f^3/sec) of stream flow. This is equivalent to 0.5 – 2.0 ppm of product and .025 to 0.10 ppm rotenone. Powder - . Rotenone Fish Toxicant Powder will be utilized in sand /gelatin mix and placed in deep pools and in springs (AFS SOP:13.0). b) 0.5 – 4.0 ppm (stream target concentration is 1 ppm) (tank target concentration varies from 1 ppm to 4 ppm depending on site conditions) A bioassay will be conducted using fish from the treatment area and in accordance with procedures established by the manufacturer, to determmine the optimal concentration of piscicide to be deployed. In the Fossil Creek application the target concentration of CFT Legumine will be 1 PPM (two times the MED determined by bioassay, AFS SOP:5). c)Water

4) RATE
lbs. AI Per Acre
or Other Rate

a) Calculated stream application rate(X in cc/min) = F(53 f^3/sec- as of 8/22/2012) x R(1ppm) x Constant(1.699) = 90ml/min.

b) Total amount of Product for treatment is calculated with this formula: Y(gal) = X(application rate from above) x C(8 hours of stream treatment) x Conversion constant(0.0158)

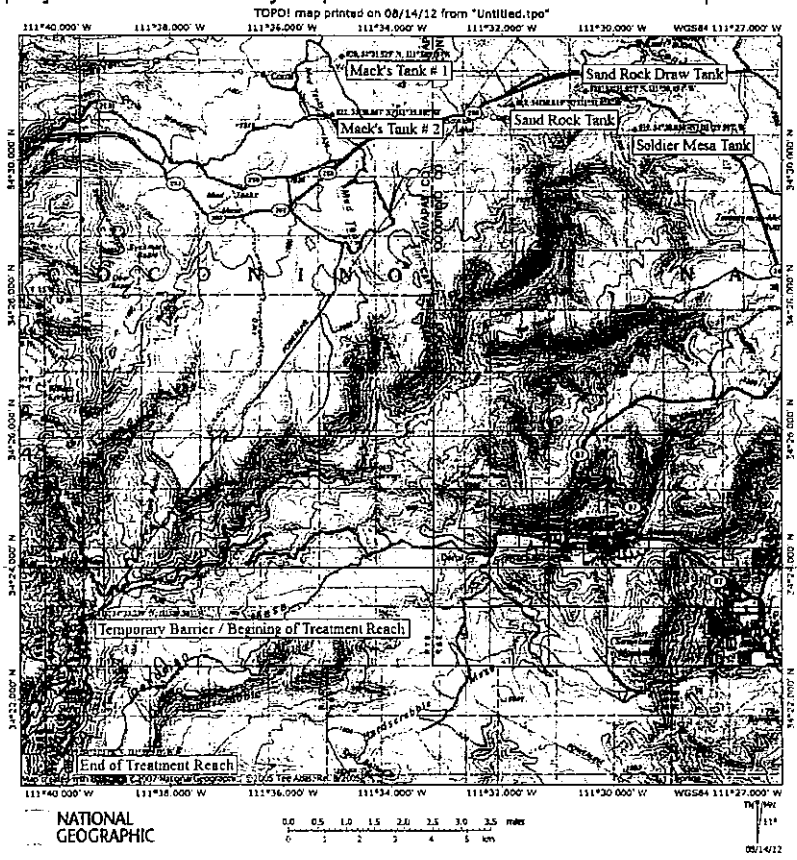
Rate will be calculated onsite and adjusted to daily fluctuations in stream flow, effectivenes monitoring and other variables. (see Fossil Creek Treatment Plan, AGFD)

CFT Legumine at 0.25ppm		*CFT Legumine at 0.5 ppm*		*CFT Legumine at 0.75 ppm*		*CFT Legumine at 1 ppm*	
(ft^3/s)	**rate ml/min**	**(ft^3/s)**	**rate ml/min**	**(ft^3/s)**	**rate ml/min**	**(ft^3/s)**	**rate ml/min**
40	17	40	34	40	51	40	68
41	17	41	35	41	52	41	70
42	18	42	36	42	54	42	71
43	18	43	37	43	55	43	73
44	19	44	37	44	56	44	75
45	19	45	38	45	57	45	76
46	20	46	39	46	59	46	78
47	20	47	40	47	60	47	80
48	20	48	41	48	61	48	82
49	21	49	42	49	62	49	83
50	21	50	42	50	64	50	85
51	22	51	43	51	65	51	87
52	22	52	44	52	66	52	88
53	23	53	45	53	68	53	90
54	23	54	46	54	69	54	92
55	23	55	47	55	70	55	93
56	24	56	48	56	71	56	95
57	24	57	48	57	73	57	97
58	25	58	49	58	74	58	99
59	25	59	50	59	75	59	100
60	25	60	51	60	76	60	102

5) APPLICATION
a) Method
b) Equipment

a) CFT Legumine can drain directly into the center of the stream at a rate of 0.85 to 3.4 cc per minute for each cfs (f^3/sec) of stream flow. This is equivalent to 0.5 – 2.0 ppm of product and .025 to 0.10 ppm rotenone. Backwater and stagnant areas of stream should be sprayed by hand with a 1-10% v/v solution of product in water. See the Fossil Creek Treatment Plan for details and locations of backwaters to be sprayed. **Rotenone Fish Toxicant Powder** will be utilized in sand /gelatin mix and placed in deep pools and in springs (AFS SOP:13.0). **Neutralization**: Fre-flowing stream sites will be neutralized using potasium permanganate in volumetric feeders ready to dispense powdered $KMnO_4$ at a starting target concentration of 6 ppm to the main stream channel. Hoppers will be located at the permanent barrier and will direct $KMnO_4$ into the barrier spillway to enhance mixing.

b) Calibrated drip containers will be 5 gallon plastic buckets with lids and an adjustable flow style valve placed at the bottom to titrate the appropriate rate of rotenone concentrate over the course of an 8 hour treatment. A copper breather tube near the valve is necessary to maintain a steady calibrated flow. Spray applications can be done with hand sprayers, backpack sprayers or by motorized boat mounted sprayers. Powder applications are mixed with sand and gelatin in a bucket then distributed by hand.

6) SITE a) Acres or Unit Treated b) # of Applications c) Number of Sites d) Site Description (soil type and nearest water bodies)	a) Up to 10 mi of stream reach and all bodies of water above this reach in the watershed (up to 8 stock tanks total). b) Up to 3 applications to each water body c) 9 d) The proposed treatment area of Fossil Creek is between the temporary barrier located at the confluence of Sally May Wash and Fossil Creek, and the original fish barrier located in the Mazatzal Wilderness about 2.6 miles (4.8 kilometers) downstream. The treatment reach of Fossil Creek is characterized by a steep narrow canyon with some braiding of the main channel and some backwater pools. The beginning of the treatment reach sits at an elevation of about 3,400 feet and descends about 400 feet over the course of 2.6 miles. A few deep fast moving pools are present within the reach with two slow moving pools located at major constriction points within the canyon. Two springs are also present in the treatment reach. Water in the creek is very clear, only getting turbid during runoff events. Sally May Wash, which is dry except during runoff events, is the only substantial tributary to Fossil Creek in the treatment reach. The confluence of Fossil Creek and the Verde River is located ~ 4.5 miles downstream of the treatment reach. Fossil Creek base flows within the treatment reach are about 42 cubic feet per second (cfs) with pH ranging from 8.9-9.2 and temperatures ranging from 20°C -25°C during summer. Fossil Creek drains a series of canyons and their tributaries originating on the Mogollon rim (Calf pen Canyon, Sand Rock Canyon, Tin Can Draw, Mud Tanks Draw, Boulder Canyon, Cimarron Creek, and Sally May Wash). The treatment area includes Soldier Mesa Tank, Sandrock Tank, and possibly Sandrock Draw Tank, (Figure 1). Currently, only Soldier Mesa and Sandrock Tank are known to hold nonnative fish. These tanks are located on the Coconino National Forest within the upper Fossil Creek watershed and have been treated in the past for illegally introduced fish species. Periodic treatment of these tanks is part of this project and necessary to prevent unwanted non-native species from re-invading. 

7) TIMING a) Month(s) of Year b) Stages (development of target species)	a) August – October for stream reaches or year round for stock ponds(see life stages below). b) Before spawning or after all eggs have hatched and developing fish have reached a size susceptible to rotenone and when water temperatures are warm enough to ensure piscicide effectiveness.
8) SENSITIVE AREAS a) Areas to be Avoided b) Areas to be Treated with Caution	a) All stream reaches below the project area, or below the fossil fish barrier. b) Recreation Sites -All project areas will be closed to swimming for 72 hours post treatment in flowing water applications. Wildlife Habitat Sites - All sites with tadpole stage native frogs, especially Chiricaua, Lowland and Northern Leopard frogs.
9) REMARKS a) Precautions & BMP's b) Use of Trained / Certified Personnel c) State and Local Coordination d) Other Pesticides Being Applied to Same Site e) Monitoring f) Other g) Reviewed by Pesticide Use Coordinator	a) AGFD will post appropriate signage at trailheads and primary access points to the affected stream segments or water bodies at least two days prior to treatment. Permittees who use the ponds will be notified of the specific treatmetn dates. Treatmetns will be planned to minimize interference with the permittees normal period of pond use. After treatment all target fish that are collected, living or dead, shall be properly disposed; none shall be salvaged resuscitated or transferred to another stream. The piscicide will be applied in accordance with all state and federal laws. Personnel mixing or applying piscicide will wear required PPE: long pants, long sleeve shirts, goggles or safety glasses, chemical resistant (nitrile) gloves, and a respirator with an organic-vapor-removing cartridge with a prefilter approved for penticides or a canister approved for pesticides. A site specific spill plan and relavent MSDS will be kept in the project area, immeadiately accessible to all project applicators and piscicide mixers. Emergency eye wash bottles will be carried by all personnel mixing or deploying piscicide. Spare parts and tools will be available for any needed repairs to application equipment. b) Applications will be made by trained USFWS and AGFD fisheries biologists. They are experienced in the application and neutralization of piscicides in the arid southwest environments as well as very familiar with the Fossil Creek Project and it's environs. Piscicide Application Crew Leads: Mike Lopez, Julie Carter, Matt Rinker of the Arizona Game and Fish Department, Shaula Hedwall, US Fish and Wildlife Service Certified applicators: Roland(Scott) Rogers AZ ADA# PUC60616(Project Lead Applicator) Laura Moser AZ ADA# PUC 373 (FS representative) c) Collaborative agencies involved in this long term project include: Arizona Game and fish Department (AGFD), US Fish and Wildlife Service (USFWS) AZ Ecological Services, USFWS Fisheries Resources Office, Bureau of Reclamation, Arizona State University, Northern Arizona University, USDA Forest Service, Coconino and Tonto National Forests. d) No other piscicide will be applied to this project area. Potassium permanganate ($KMnO_4$) will be applied to neutralize rotenone at end of treatment zone. e) Sentinel fish will be monitored throughout the treatment area and concentrations may be adjusted during an 8 hour treatment to successfully complete the treatment. Potassium permanganate ($KMnO_4$) will be used to chemically induce deactivation of rotenone at the downstream end of the treatment Area. The target concentration of $KMnO_4$ will be 6 PPM (4PPM for rotenone, 1PPM for organic

demand, 1PPM residual, AFS SOP: 7). Concentrations of KMnO4 will be monitored 30 minutes drift (contact) time downstream of the detoxification station and concentration of $KMnO_4$will be adjusted to maintain a minimum of 1 PPM residual. Two volumetric hoppers will be operated in tandem as primary detoxification and one hopper and generator will be utilized as backups. A four person crew will work the detoxification station (two per 12-hour shift: day and night).

f) This project will be accomplished by AGFD, USFWS and Forest Service. AGFD will keep a daily pesticide use log that includes date, quantity of pesticide applied, adjuvants used, application method, local weather data, and any other pertinent data. This information will be provided to the Forest Service by October 1 of each year during the project.

g) Pesticide Use Coordinator: RM Aquatics Biologist Ron Maes 8/28/2012 date

JAW R3 Coordinator Fort Apache Allen White 8/28/2012 date

10) Approval (Signatures of Approving Officials)	Date:
Regional Forester Corbin Newman C. L. Newman F	8-30-12

Preliminary Fossil Creek Renovation Plan

(August 24, 2012)

1:PROJECT SUPERVISORS

Administrative Lead: Kirk Young, Arizona Game and Fish Department

Project Manager: Scott Rogers, Arizona Game and Fish Department

Lead Applicator: Scott Rogers, Arizona Game and Fish Department

Piscicide Application Crew Leads: Mike Lopez, Julie Carter, Matt Rinker of the Arizona Game and Fish Department, Shaula Hedwall, US Fish and Wildlife Service

2. TREATMENT LOCATION AND PROJECT AREA

The proposed treatment area of Fossil Creek is between the temporary barrier located at the confluence of Sally May Wash and Fossil Creek, and the original fish barrier located in the Mazatzal Wilderness about 2.6 miles (4.8 kilometers) downstream. Fossil Creek is part of the Verde River drainage and lies on the border between the Tonto and Coconino National Forests. A large portion of the treatment area lies within the Mazatzal Wilderness.

Fossil Creek drains a series of canyons and their tributaries originating on the Mogollon rim (Calf pen Canyon, Sand Rock Canyon, Tin Can Draw, Mud Tanks Draw, Boulder Canyon, Cimarron Creek, and Sally May Wash). The treatment area includes Soldier Mesa Tank, Sandrock Tank, and possibly Sandrock Draw Tank, (Figure 1). Currently, only Soldier Mesa and Sandrock Tank are known to hold nonnative fish. These tanks are located on the Coconino National Forest and within the upper Fossil Creek watershed. These tanks have been treated in the past for illegally introduced fish species and their maintenance must be part of any native fish management plan for the drainage. Periodic treatment of these tanks may be necessary to prevent unwanted non-native species from inhabiting Fossil Creek.

The project area includes the treatment area and portion of the two Forest roads (502 and 708) that roughly parallel the creek. The project area also includes the Forest spur roads in the immediate vicinity of each of the six above mentioned tanks.

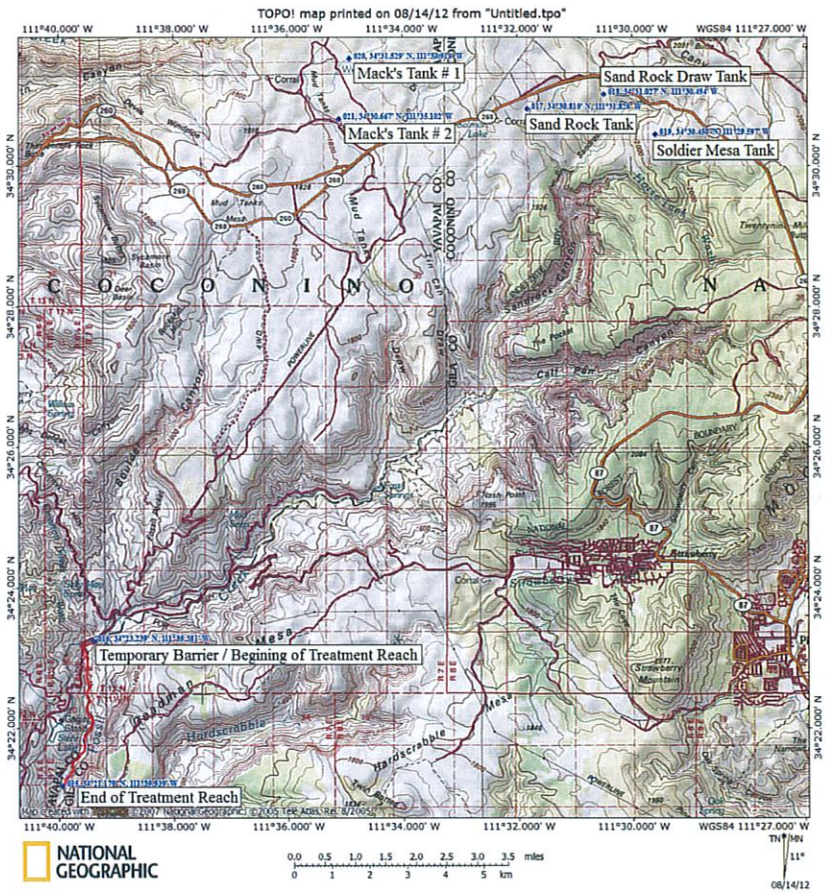


Figure 1: Treatment area (designated by red line) including known stock tanks within Fossil Creek Drainage previously treated for non-native fish and identified as potential illegal stocking locations.

3. PHYSICAL AND CHEMICAL CHARACTERISTICS OF WATER BODY

The treatment reach of Fossil Creek is characterized by a steep narrow canyon with some braiding of the main channel and some backwater pools. The reach is primarily characterized by fast moving runs and glides. The beginning of the treatment reach sits at an elevation of about 3,400 feet and descends about 400 feet over the course of 2.6 miles. A few deep fast moving pools are present within the reach with two slow moving pools located at major constriction points within the canyon. Two springs are present in the treatment reach as well.

Fossil Creek is spring fed year round, but base flows are augmented by significant runoff events during spring snowmelt and monsoonal events. Water in the creek is very clear, only getting turbid during runoff events. Sally May Wash, which is dry except during runoff events, is the only substantial tributary to Fossil Creek in the treatment reach. The confluence of Fossil Creek and the Verde River is located ~ 4.5 miles downstream of the treatment reach. Fossil Creek base flows within the treatment reach are about 42 cubic feet per second (cfs) with pH ranging from 8.9-9.2 and temperatures ranging from 20°C -25°C during summer.

4. BARRIERS, OWNERSHIP, AND OBSTRUCTIONS

Fossil Creek is the boundary between the Coconino and Tonto National Forests. Most of the treatment reach is located within the Mazatzal Wilderness. Land management authority is with the Forest Service. Water rights for Fossil Creek were transferred from Arizona Public Service (APS) to the Coconino National Forest and the Forest applied for in-stream flow water rights with the Arizona Department of Water Resources. Fish and wildlife are managed by Arizona Game and Fish Department and U.S. Fish and Wildlife Service in cooperation with the Forest Service. Currently two fish migration barriers exist within the treatment area: a temporary barrier made of wire gabion baskets filled with sandbags is located just upstream of the confluence with Sally May Wash. A permanent barrier (located ~ 2.5 miles downstream of the temporary barrier) is made of contoured concrete to match existing bedrock formations. Both barriers are designed to prevent the upstream movement of unwanted non-native fish species. After successful treatment of the area between barriers is completed, the temporary barrier will be removed to allow the movement of native fish upstream. Repairs and alterations to the permanent barrier have been made to address the cause of failure that allowed non-native fish to move upstream.

5. PISCICIDE AND NEUTRALIZATION FORMULATION

CFT Legumine will be the primary toxicant utilized in this proposed treatment. The target concentration of CFT Legumine will be 1 ppm (two times the MED determined by bioassay, AFS SOP:5). Application rates of CFT Legumine will be determined by the formula $X = F(1.699\ B)$, where X = ml/minute of CFT Legumine applied to the stream, F = the flow rate (cfs), and B = parts per million desired concentration of CFT Legumine (CFT Legumine label). Sentinel fish will be monitored throughout the treatment area and concentrations may be adjusted during an 8 hour treatment to successfully complete the treatment. Rotenone Fish Toxicant Powder will be utilized in a sand and gelatin mix and placed in deep pools and in springs (AFS SOP:13.0). Potassium permanganate ($KMnO_4$) will be used to chemically induce deactivation of rotenone at the downstream end of the treatment area. The target concentration of $KMnO_4$ will be 6 ppm (4 ppm for rotenone, 1 ppm for organic demand, 1ppm residual, AFS SOP: 7). Application rates of $KMnO_4$ will be determined by the formula $SF = Y(1.7\ Q)$ (AFS SOP: 7) where SF= flow of solid $KMnO_4$ (g/min), Y= desired $KMnO_4$ concentration in stream (ppm) and Q = stream discharge (cfs). Concentrations of $KMnO_4$ will be monitored 30 minutes drift (contact) time downstream of the detoxification station and concentration of $KMnO_4$ will be adjusted to maintain a minimum of 1 ppm residual.

6:PUBLIC AND COMMERCIAL INTERESTS (WATER USERS)

Fossil Creek, from its headwaters at the confluence of Sandrock and Calf Pen Canyons above Fossil Springs to its confluence with the Verde River (approximately 27.60 river kilometers, 17.15 river miles) is classified as an Outstanding Arizona Water. This area is used heavily for recreation because of its proximity to Maricopa County and the availability of beautiful swimming holes. One of the unique attributes of Fossil Creek is that prior to the invasion of smallmouth bass, Fossil Creek was the largest and one of only a few streams in Arizona with a pure native fish assemblage. Fossil Creek is managed by the Department as a native fishery.

After the decommissioning of the Irving Power Plant and Fossil Springs dam, water rights for Fossil Creek were transferred from APS to the Coconino Nation Forest and the Forest applied for in-stream flow water rights with the Arizona Department of Water Resources.

Fossil Creek will be closed to all public access during the chemical treatment (See Site Safety Plan) to ensure public safety and a successful treatment.

7: INTERAGENCY RESPONSIBILITIES

In general, land management authority of the treatment area is shared by the Tonto National Forest and the Coconino National Forest. Because listed species reside in this river, the USFWS and U.S. Bureau of Reclamation (Reclamation) are two of our important cooperators on this project. Reclamation has funded the reintroduction efforts for the listed fishes and the installation and repair of fish barriers in Fossil creek under the Gila River Basin Native Fishes Conservation Program. Numerous stakeholder groups and fishing clubs including the Fossil Creek Stakeholder Group, the Native fish Conservation Team and the Northern Arizona Flycasters also share interest in this resource.

- Administrative roles in planning, public outreach, and compliance documentation
    - AZGFD ,USFWS and USFS.

- Pre-treatment survey, barrier repair and fish salvage
    - AZGFD, USFWS, USFS and BOR

- Rotenone applications and detoxification
    - AZGFD and USFWS

- Post-treatment monitoring and reporting
    - AZGFD.

8: APPLICABLE LAWS AND REGULATIONS

- Arizona Revised Statutes, Title 17-Game and Fish. 17-201: The laws of the state relating to wildlife shall be administered by the game and fish department.
- National Environmental Policy Act (NEPA) of 1969; CEQ Guidelines, 40 CFR (1502.16 part e);
- Section 7, Endangered Species Act (ESA) of 1973, as amended;
- Executive Order 11987, Exotic Organisms; Executive Order 13112, Invasive Species; and 50 CFR 92;
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1970 (CFR Title 40);
- Clean Water Act (CWA) amendments of 1977, (P.L. 95-217);
- ADEQ standards (Arizona Administrative Code Title 18, Ch 11(401));
- Arizona Pesticide Contamination Prevention Program (ARS 49-301 through 310 and ACC R18-6-101 through 303);
- Aquifer Protection Permit Program (ARS 49-241 through 252 and ACC R18-9-101 through 303);
- AZPDES (ARS 49-255 through 265 and ACC R18-9-A901 through D905);
- Title 17 Game and Fish, Chapter 3 Taking and Handling Wildlife (ARS 17-301);
- Occupational Safety and Health Act (OSHA) (CFR 1155 Title 29)
- Wild and Scenic Rivers Act (P.L. 90-542); Wilderness Act (P.L. 88-577); National Trails Act (P.L. 90543);
- AZGFD's Pesticide Treatment Planning and Procedures Manual (PTPPM) and Environmental Assessment Checklist (EAC)
- Arizona Game and Fish Commission 2011 policy on rotenone use

9: PROTOCOLS AND MONITORING PLAN FOR GROUNDWATER OR SURFACE WATER

Fossil Creek is not used for drinking water and has no hydrologic connections to wells. However because of the high recreational use at Fossil Creek, which includes swimming and camping, water from the treatment area will be tested according to the methods outlined in Finlayson et al. (2010). Water from within the treatment area and downstream will be sampled and submitted to an independent lab for analysis. Water samples will be collected 4 hours after the initiation of the treatment and after the detoxification has ceased. Public reentry into treated area will not occur until after sentinel fish survive for a minimum of 24 hours .

Waters treated with rotenone and used for drinking or with hydrologic connections to wells, when application rate is >40 ppb (>0.04 ppm) rotenone, require the user to be advised against the consumption of water until: (1) active rotenone is <0.04 ppm as determined by analytical

chemistry, or (2) fish of the Salmonidae or Centrarchidae families can survive for 24 hours, or (3) dilution with treated water yields a calculation that active rotenone is <0.04 ppm, or (4) distance or travel-time from the application site are known to produce an active rotenone concentration that is <0.04 ppm.

10: LOGISTICS, METHODS OF OPERATION AND PRELIMINARY SCHEDULE

Pretreatment Fish Surveys

In April 2012 smallmouth bass were detected near the Homestead camping area, upstream of the temporary barrier and upstream of the proposed treatment area. After detection, multiple surveys were conducted above the temporary barrier to remove smallmouth bass and determine the extent of their distribution above the temporary barrier. The smallmouth bass were detected primarily in Homestead area, but one was observed about 600 m downstream above the Boulder Creek confluence. All of the smallmouth bass detected were large individuals. Because of the restricted distribution and size of fish observed, it is possible that these smallmouth bass were illegally stocked into Fossil Creek. Eight of the nine large smallmouth bass detected above the temporary barrier were removed; the other one eluded capture.

The section of stream between the permanent and temporary barriers (proposed treatment area) was surveyed in June 2012, and about 40 age-0 smallmouth bass were detected, indicating the species had reproduced in this section of Fossil Creek.

On July 24, 2012 a plecostomus (nonnative fish common to the pet trade) was also discovered near the homestead campground upstream of the proposed treatment area.

The primary goal of the pretreatment fish surveys is to detect the presence of smallmouth bass in the reach of Fossil Creek from Irving Falls to the temporary barrier (target reach; Figure 2). The secondary goal of this survey is to detect the presence of plecostomus in the target reach. The information derived from the surveys will be used to decide if the extent and timing of the proposed chemical treatment of lower Fossil Creek. If no bass or plecostomus are detected in the target reach, then nonnative fish eradication efforts will not be expended in that reach. If adult smallmouth bass are detected in the target reach, and if it seems likely that they can be removed by mechanical means, then mechanical means will be used to try eradicate them in the target reach. If adult plecostomus are detected in the target reach, and if it seems likely that they can be removed by mechanical means, then mechanical means will be used to try to eradicate them in the target reach. With either of the above two scenarios, the proposed treatment of the treatment reach could proceed as planned. If age-0 smallmouth bass or plecostomus are detected in the target reach, the chemical treatment scheduled for September 2012 may be postponed and the entire section of stream from Irving Falls down to the original fish barrier may be treated at a

later date. Any decision to postpone or expand the treatment area will require coordination with our partners (USFWS and USNFS).

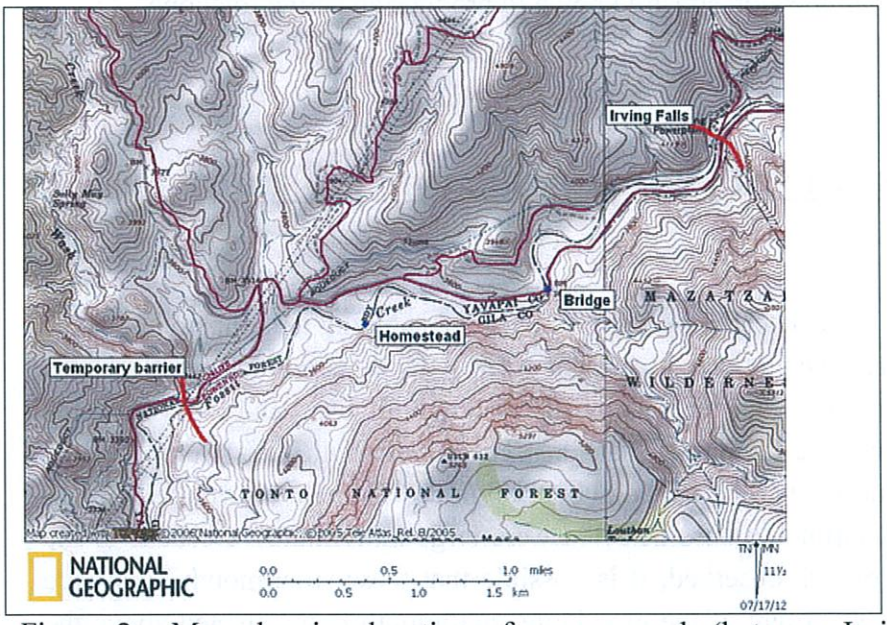


Figure 2. Map showing location of survey reach (between Irving Falls and the temporary barrier) in Fossil Creek targeted for smallmouth bass surveys.

Flow Rate, Flow Travel Time, Temperatures, pH

Flow rate, travel time, water temperature and pH are all necessary metrics for calculating the amount of chemical to be applied to the treatment area. The measurement of flow rates and flow travel time are legal requirements for any application of CFT Legumine as defined by the label. These metrics were all measured in August 2012 (Figure 4). Flow rate and temperature will be measured again just prior to the treatment and treatment rates may be adjusted accordingly. Travel time of flow from the temporary barrier to the permanent barrier was approximately 3.25 hours (Figure 5).

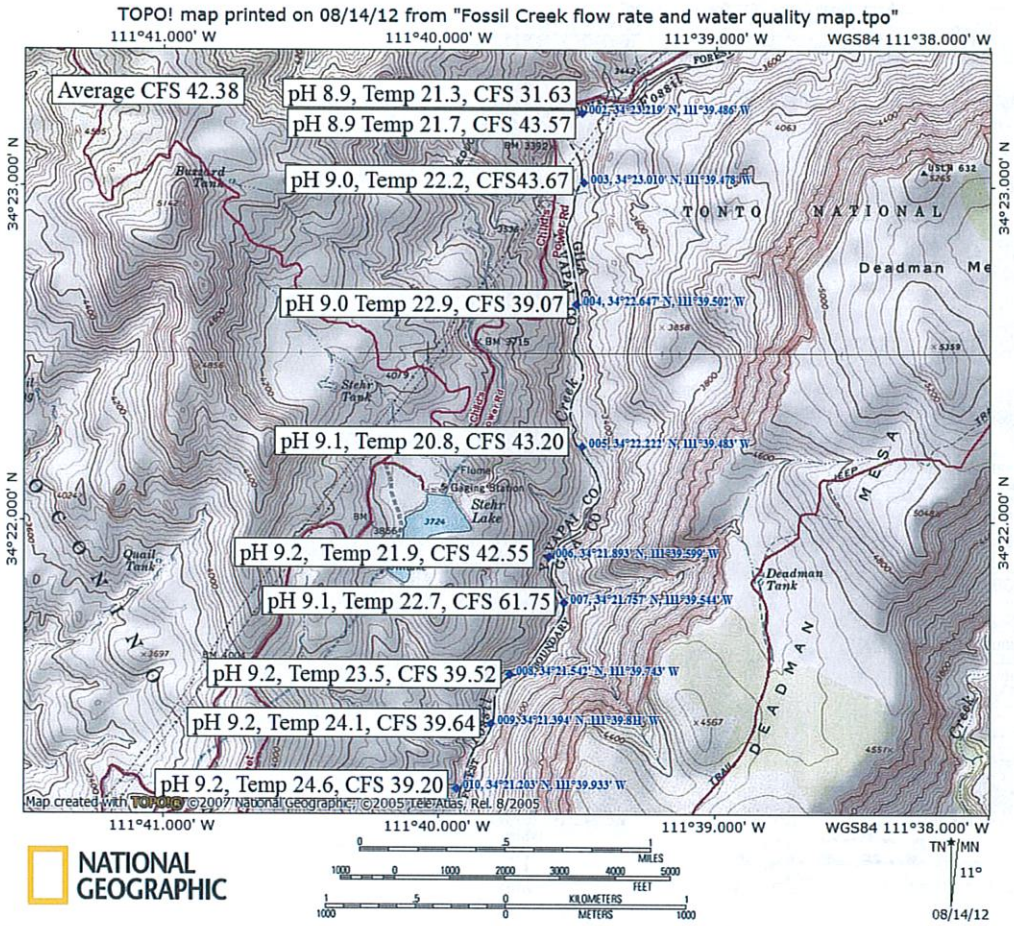


Figure 4. Flow rates and water quality parameters recorded on 8/14/12 within the treatment reach at 10 locations (Average flow, 42.38 CFS).

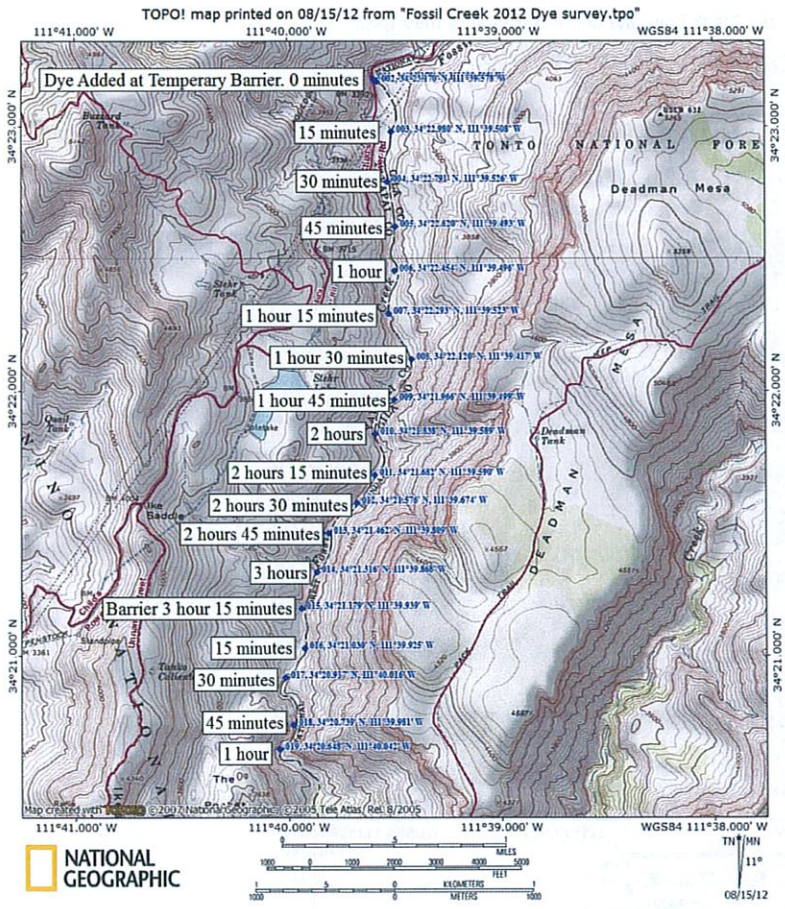


Figure 5. Flow travel time from the temporary barrier to 1 mile downstream of the permanent barrier at base flow (42 CFS).

Bioassay

Bioassays are necessary to calculate the minimum effective dose (MED) of piscicide for the target species within the treatment area. Bioassays are also a legal requirement as per the CFT Legumine label. Laboratory bioassays were completed for both bass and chub. Five bass from Wet Beaver Creek were placed into each of six aquaria (each with a different concentration of rotenone) that contained 40 liters of Fossil Creek water, and held for 4 hours. The same number of fish and tanks were used for roundtail chub. Water in the tanks was at ambient room temperature (74°F), and had a pH of 8.4. Although bass are the target species for this treatment, chub were included in bioassays because they will be used as sentinel fish within the treatment area to monitor the success of the treatment. An additional bioassay was also done for bass in the field at Fossil Creek downstream of the permanent barrier. Five bass were placed into each of six containers (each with a different concentration of rotenone) and held for four hours. Water in the tanks was 79°F with a pH of 8.7. The calculated MED for both chub and bass is 0.025 parts per million (ppm) active rotenone or 0.5 ppm CFT Legumine (Figures 6-8).

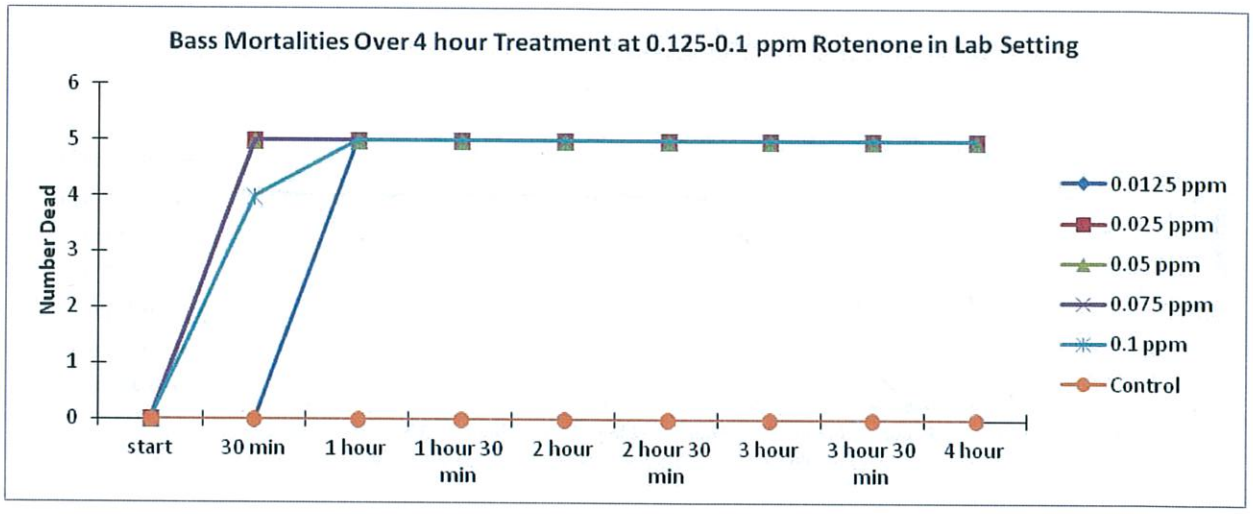


Figure 6. Bass mortality rate by concentration in parts per million (ppm) of active rotenone over a 4 hour period using Fossil Creek water in a laboratory environment.

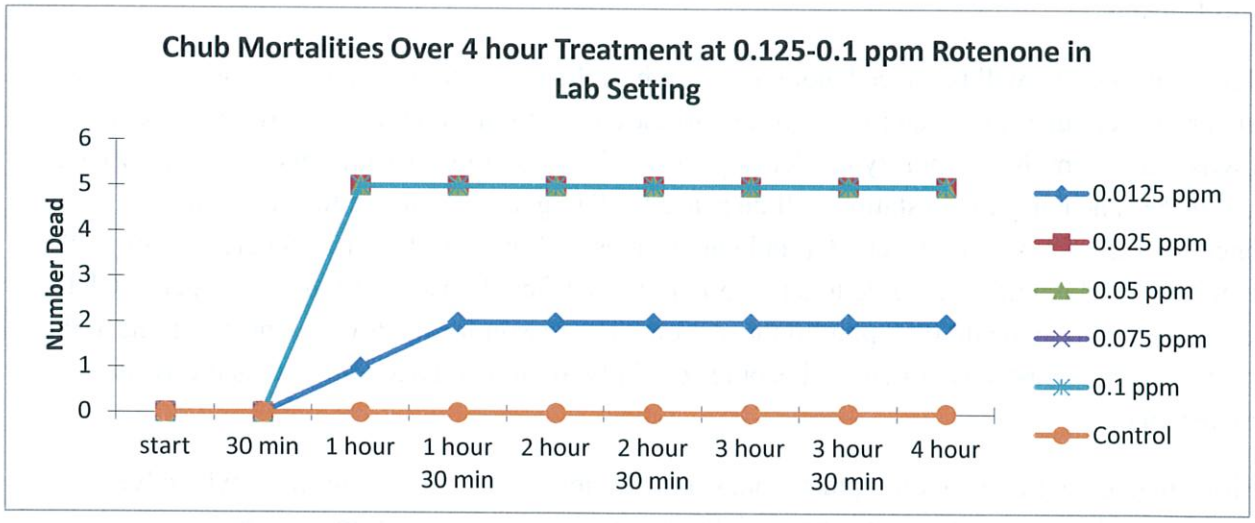


Figure 7. Chub mortality rate by concentration in parts per million (ppm) of active rotenone over a 4 hour period using Fossil Creek water in a laboratory environment.

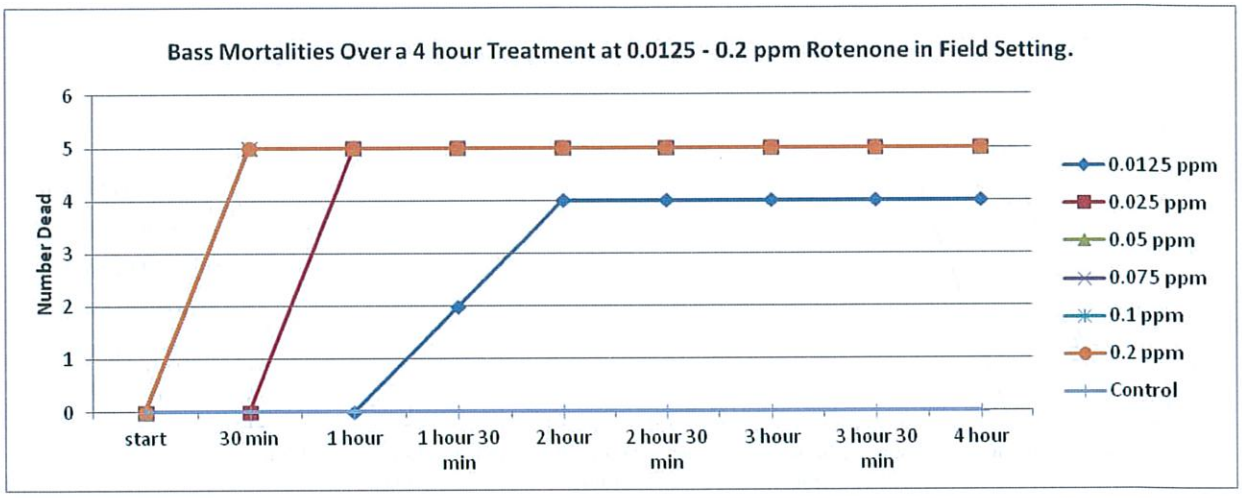


Figure 8. Bass mortality rate by concentration (parts per million (ppm) active rotenone) over 4 hour period at Fossil Creek.

Methods of Rotenone Application

Drip Buckets

Three drip stations will be placed along the length of the treatment reach, one at the temporary barrier, one about 1 hour water travel time downstream, and one about 2 hour water travel time downstream from the temporary barrier (Figure 9). Drip stations will administer undiluted CFT Legumine. The barrier drip station will dispense CFT Legumine at a rate to achieve a concentration of 1 ppm in the creek (application rates in Table 1). The first booster station will dispense CFT Legumine at a rate to add 0.50 ppm. The final booster station will dispense CFT Legumine at a rate to add 0.50 ppm to the stream. The reason for the lower concentrations at the booster stations is because rotenone becomes partially diluted and decomposed as it travels downstream.

Drip containers will be 5 gallon plastic buckets with lids and an adjustable flow style valve placed at the bottom to titrate the appropriate rate of rotenone concentrate over the course of an 8 hour treatment. Lids will be firmly placed on top to seal the container and reduce the likelihood of spills. A copper breather tube near the valve is necessary to maintain a steady calibrated flow.

Certified applicators will comply with safety standards by wearing appropriate PPE (goggles, gloves, cartridge style respirators, long sleeves, etc.). Drip buckets will be filled in a location where a spill is highly unlikely to occur and where spills can be contained. The drip buckets will be filled and the lid to the bucket will be firmly attached to the bucket and securely placed.

Drip Stations Locations

The following locations for drip stations were identified during reconnaissance (Figure 10):

- *Upper* – The first drip station will be located at the temporary barrier (N 34° 23.244' W 111° 39.378').
    - The drip bucket located at the temporary barrier will begin the treatment when the lead applicator says to begin or at a predetermined time. The application of rotenone will not begin until the detoxification station is calibrated and has been running for at least two hours. The target treatment concentration will be at 1ppm rotenone.

- *Middle (1hour)* – The first booster station will be located ~ 1 hour travel time downstream from the initial drip station (N 34° 22.474' W 111° 39.498').
    - The middle (first) booster station will be turned on one hour after the upper (initial) station. The target concentration will be at 0.50 ppm rotenone.

- *Lower* – The second booster station will be located ~ 2 hours travel time downstream from the initial drip station (N 34° 21.906' W 111° 39.585').
    - The lower (second) booster station will be turned on two hours after the upper (initial) station. The target concentration will be at 0.50 ppm rotenone.

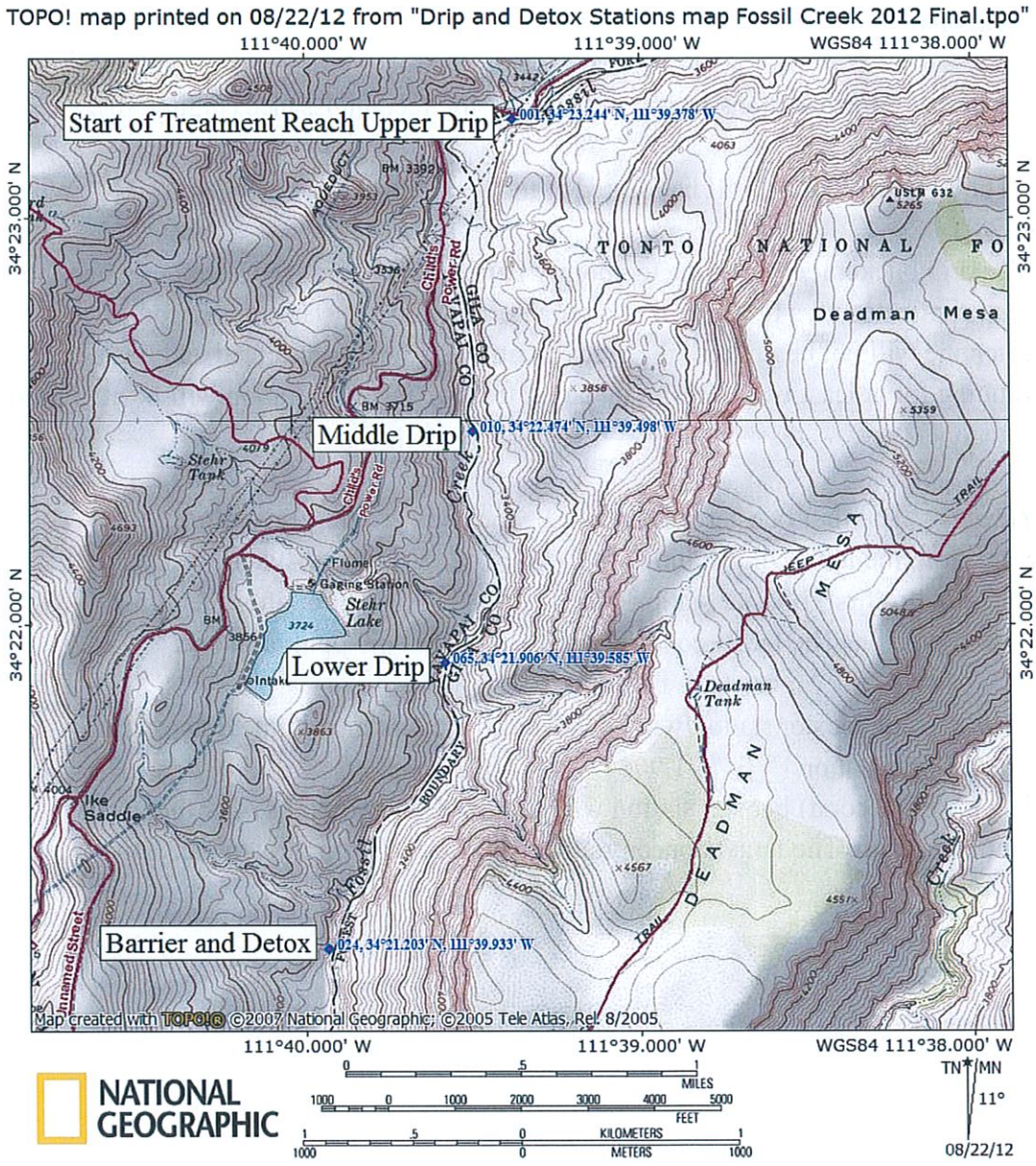


Figure 10. Initial drip station, booster drip stations and detoxification station locations

Table 1. Application rates of CFT Legumine 5% at 0.25-1 parts per million (ppm) and for stream flows 40-60 cubic feet per second (CFS).

CFT Legumine at 0.25ppm		***CFT Legumine at 0.5 ppm***		***CFT Legumine at 0.75 ppm***		***CFT Legumine at 1 ppm***	
Stream flow (ft^3/s)	**rate ml/min**	**Stream flow (ft^3/s)**	**rate ml/min**	**Stream flow (ft^3/s)**	**rate ml/min**	**Stream flow (ft^3/s)**	**rate ml/min**
40	17	40	34	40	51	40	68
41	17	41	35	41	52	41	70
42	18	42	36	42	54	42	71
43	18	43	37	43	55	43	73
44	19	44	37	44	56	44	75
45	19	45	38	45	57	45	76
46	20	46	39	46	59	46	78
47	20	47	40	47	60	47	80
48	20	48	41	48	61	48	82
49	21	49	42	49	62	49	83
50	21	50	42	50	64	50	85
51	22	51	43	51	65	51	87
52	22	52	44	52	66	52	88
53	23	53	45	53	68	53	90
54	23	54	46	54	69	54	92
55	23	55	47	55	70	55	93
56	24	56	48	56	71	56	95
57	24	57	48	57	73	57	97
58	25	58	49	58	74	58	99
59	25	59	50	59	75	59	100
60	25	60	51	60	76	60	102

Sprayers and Sand

Six people will spray rotenone throughout the treatment reach, two (one on each shore) in the upper sub-reach from the temporary barrier to the first natural constriction point of the canyon (N 34 21.542 W 111 39.743), two in the middle sub-reach from the 1st natural constriction point of the canyon to the second natural constriction (34 21.228 111 39.915), and two in the lower sub-reach from the second natural constriction to the permanent barrier.

Rotenone concentrate will be diluted (1 to 2 % solution, AFS SOP:12.0) on site using the following procedure. Crew members wearing the appropriate PPE (goggles, gloves, cartridge style respirators, long sleeves etc) will fill their sprayers ½ way with strained water from the creek. Concentrate rotenone will then be added to the sprayer using a graduated cylinder at the

appropriate amount to reach the desired concentration. The sprayer will then be completely filled with strained creek water. Once the lid to the sprayer is securely fastened, gentle agitation of the sprayer in a circular motion for ~ 30 seconds will adequately mix the solution.

Crew members (wearing appropriate PPE) will spray the solution into locations predetermined during the reconnaissance (Figures 11-17). Each spray crew will have a minimum of two members, one for each shoreline. Each crew member will receive a map with GPS locations of spray locations for their sub-reach. Each crew member will keep a log of the amount of concentrate chemical used and number of times the sprayer was filled.

Three people (the crew leaders from each of the spray crews) will be tasked with applying rotenone sand (AFS SOP:13) to large slow-moving pools and springs. Sand will be applied to predetermined locations identified during the reconnaissance. Sand will be packaged in buckets and labeled with the correct crew number along with the signal word WARNING, name of the chemical and safety contact information. Wearing the appropriate PPE, crew members will apply the sand by hand evenly to the area. If pools are extremely deep (over 6 feet) or have large undercuts, a PVC pipe and plunger system may be used to apply sand at depth. Springs will be treated at their confluence with the creek if possible to prevent potential negative impacts to native snails.

- *Upper sub-reach spray crew* – The upper sub-reach spray crew will spray from the temporary barrier (N 34° 23.244' W 111° 39.378') downstream to the first natural constriction point (N 34 21.542 W 111 39.743). Specific spray and sand application site locations will be provided on maps (Figures 11, 12, and 13).
    - *Spray Crew #1*- The crew spraying the upper sub-reach will begin spraying 1.5 hours after the start of the treatment.

- *Middle sub-reach spray crew* – The middle sub-reach spray crew will spray from the first natural constriction point (N 34 21.542 W 111 39.743) to the second natural constriction point (N 34° 21.228' W 111° 39.915'). Specific spray and sand application site locations will be provided on maps (Figures 14 and 15).
    - *Spray Crew #2* – The crew spraying the middle sub-reach will begin spraying 2.5 hours after the start of the treatment.

- *Lower sub-reach spray crew* – The lower sub-reach crew (N 34° 21.228' W 111° 39.915') downstream to the permanent barrier has no spray locations. Specific sand application site locations will be provided on a map (Figure 16 and 17)
    - *Spray Crew #3* – The crew will deploy sand 4 hours after the start of the treatment.

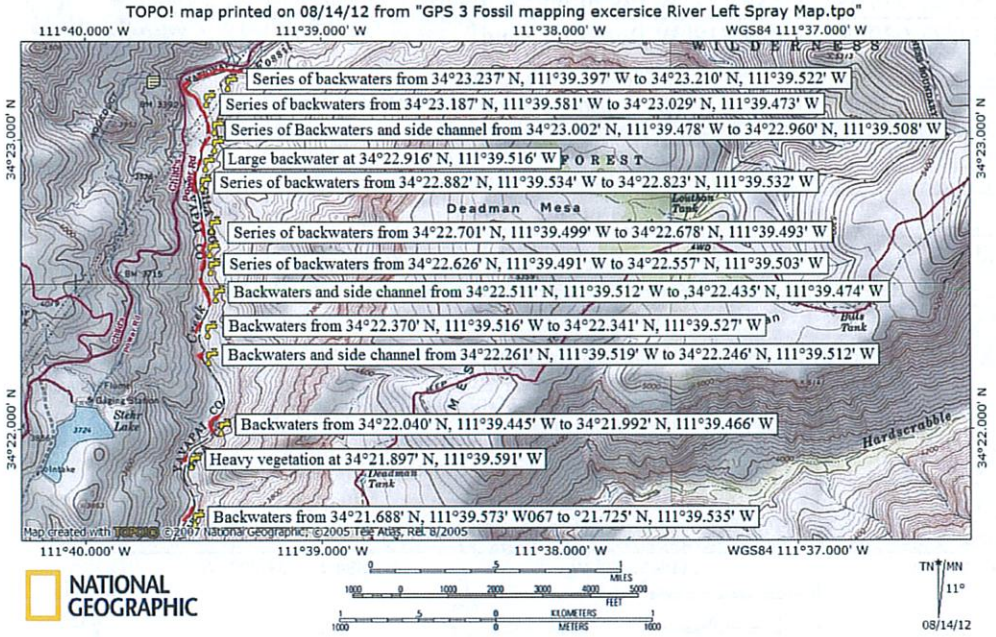


Figure 11. Upper sub-reach spray locations on river left.

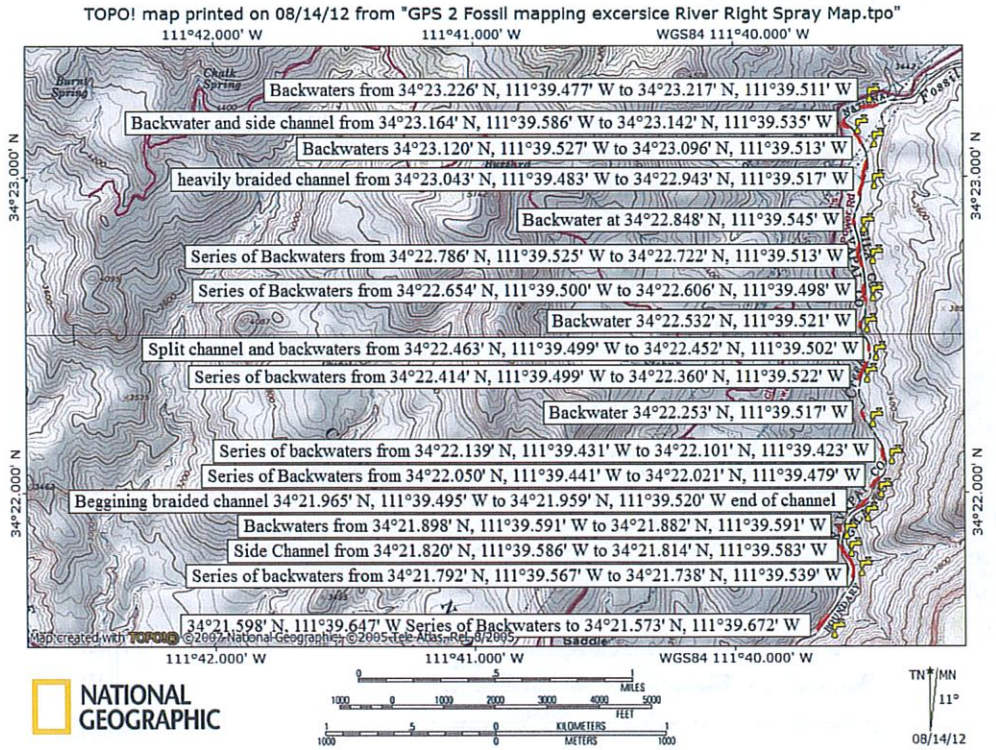


Figure 12. Upper sub-reach spray locations river right side.

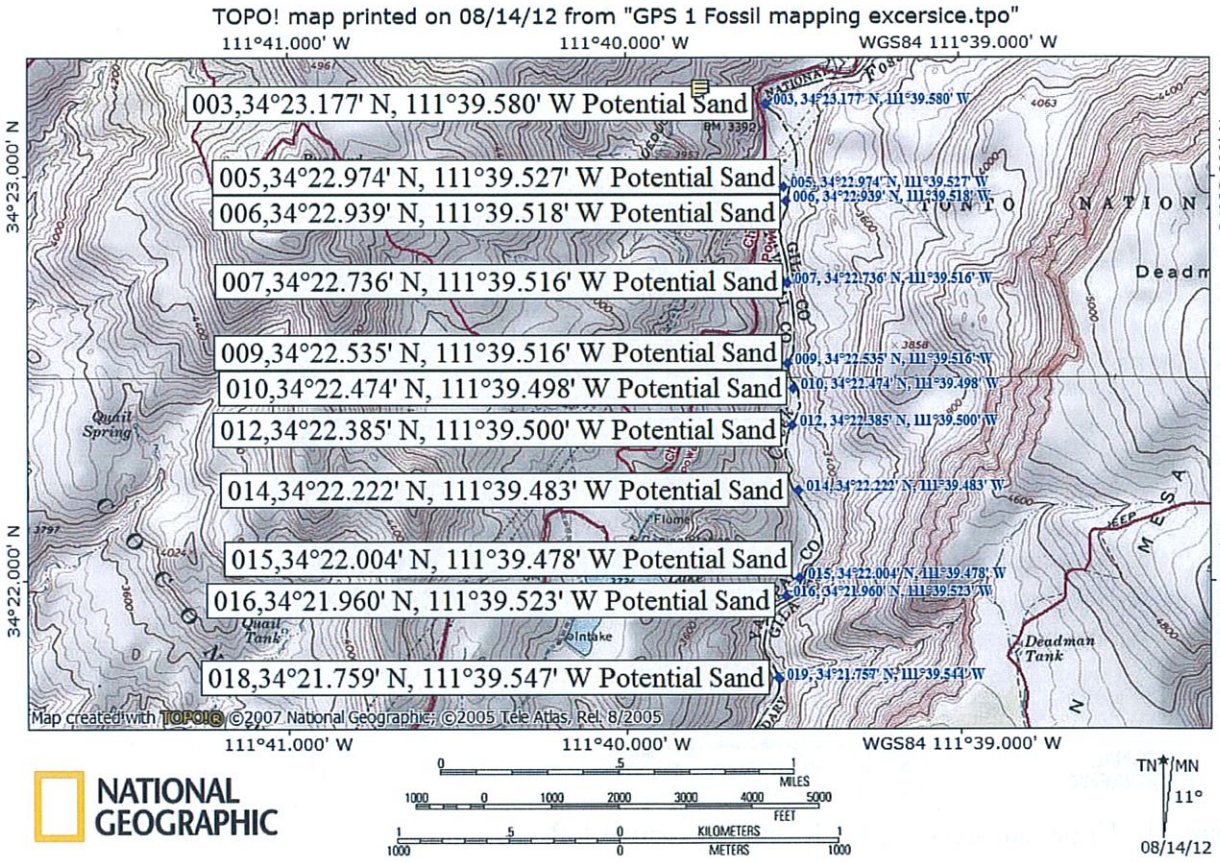


Figure 13. Sand locations in upper sub-reach.

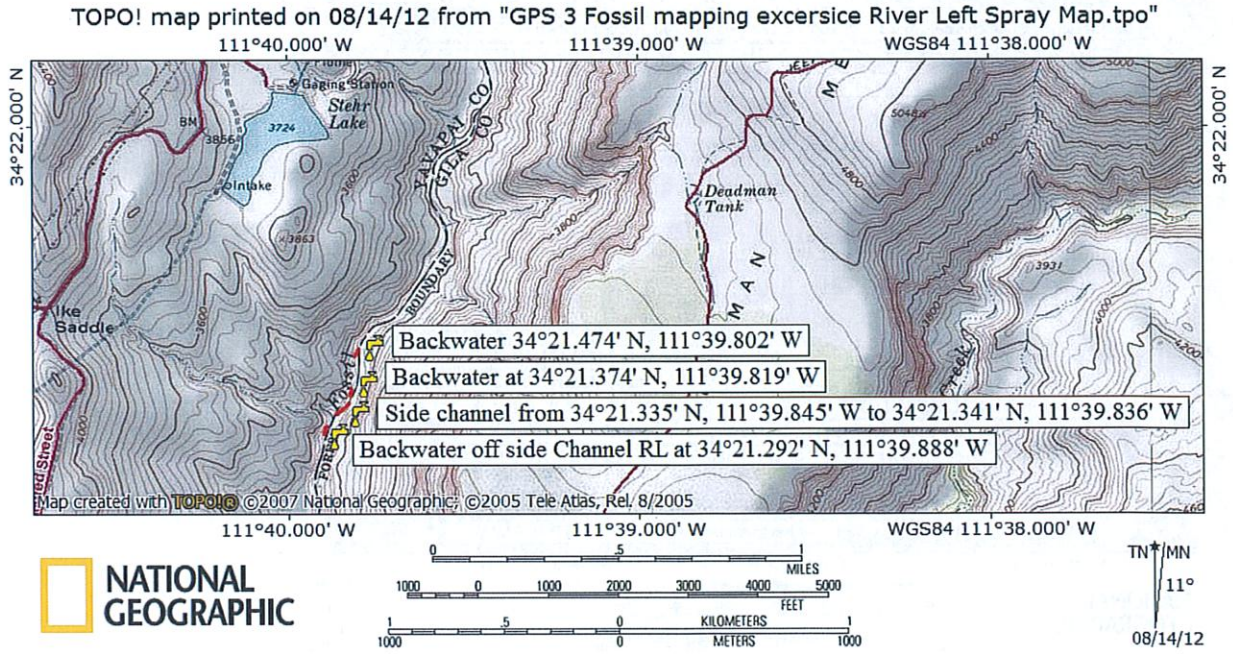


Figure 14. Spray locations in middle sub-reach, river Left.

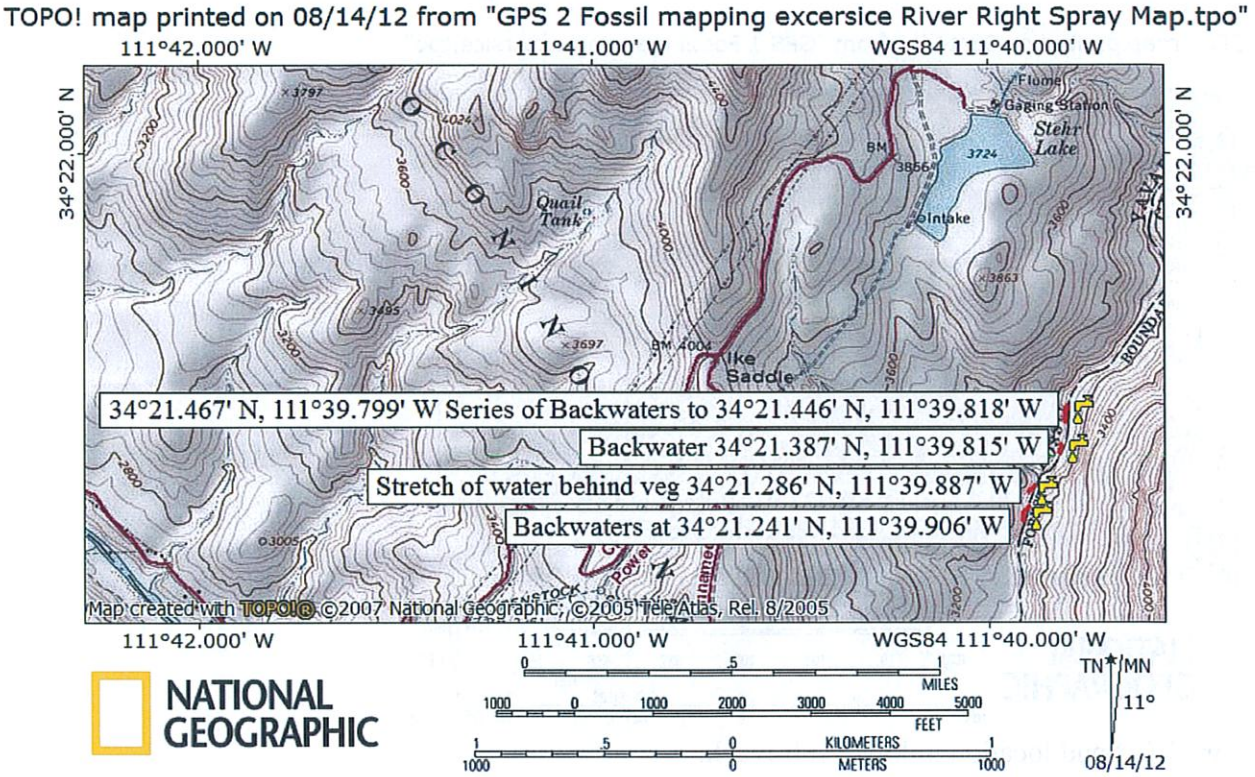


Figure 15. Spray locations in middle sub-reach, river right.

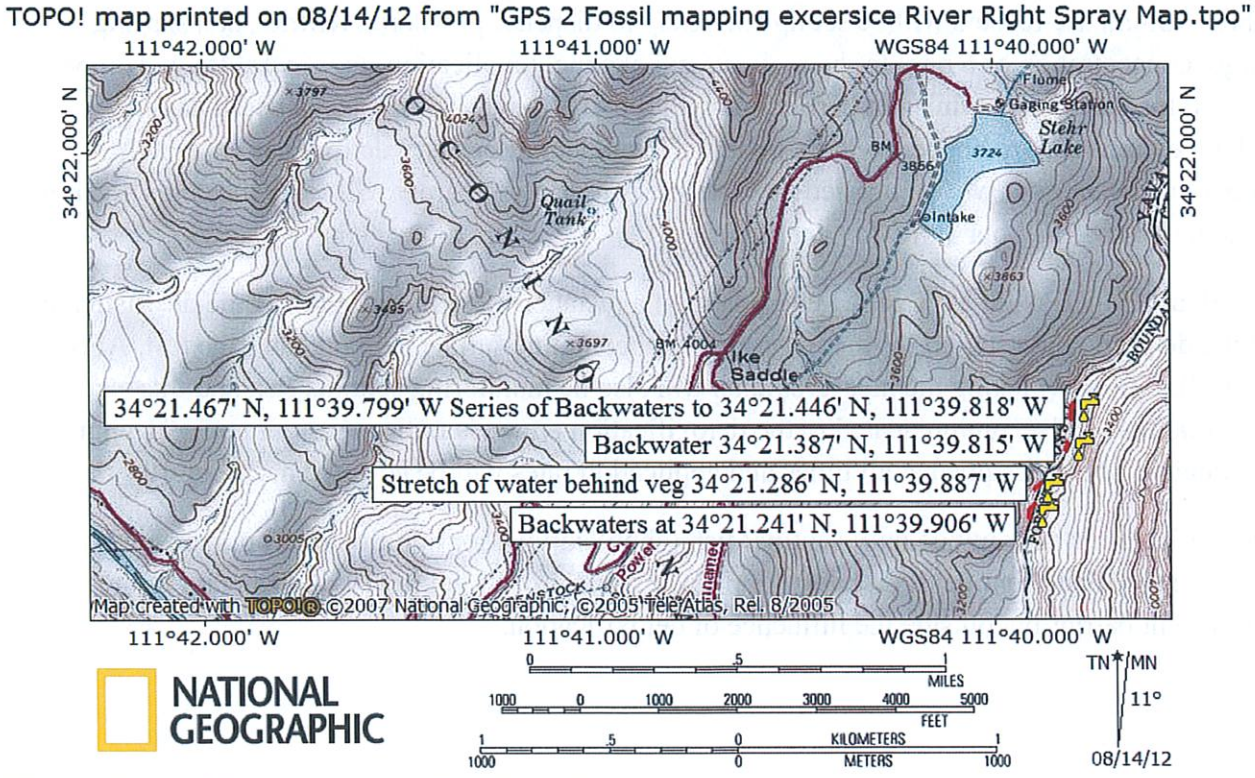


Figure16. Sand locations in middle sub-reach.

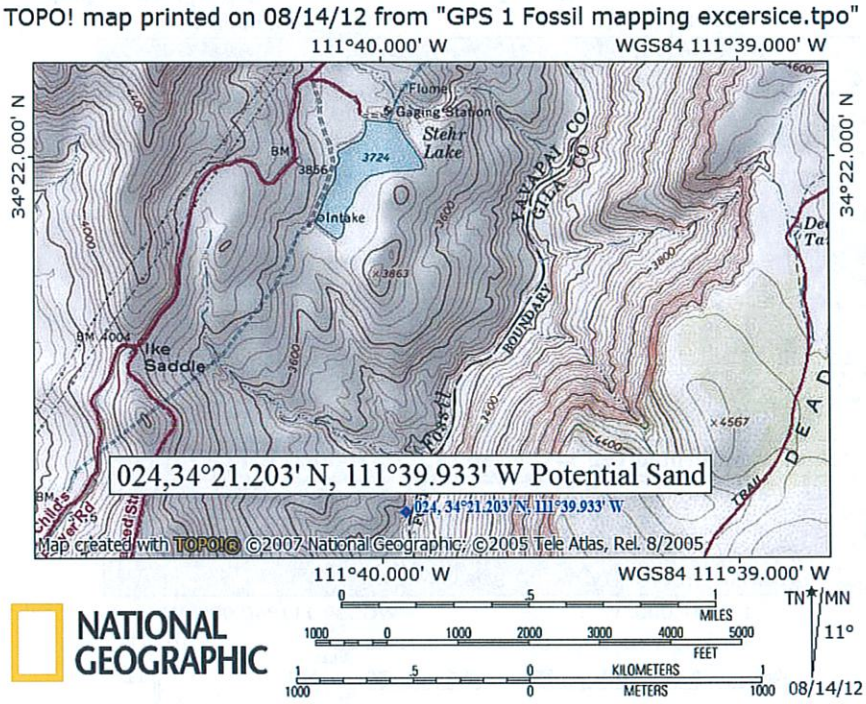


Figure 17. Sand location in lower sub-reach.

Detoxification

Three volumetric feeders will be set up and ready to dispense powdered $KMnO_4$ at a starting target concentration of 6 ppm to the main stream channel (application rates in Table 2). Hoppers will be located at the permanent barrier and will direct $KMnO_4$ into the barrier spillway to enhance mixing. Two hoppers will be operated in tandem as primary detoxification and one hopper and generator will be utilized as backups. A four person crew will work the detoxification station (two per 12-hour shift: day and night).

Residual $KMnO_4$ will be measured every hour at a distance of 30 minutes flow time downstream of the detoxification station (N-diethyl-p-phenylenediamine sulfate method, chlorine test, AFS SOP:7). The crew taking the measurements will also be monitoring sentinel fish and this information will be communicated to the detoxification crew via radio. A minimum of 1 ppm residual will be maintained at all times and application rates will be adjusted accordingly.

Detoxification will continue until sentinel fish (chub) survive for duration of 8 hours inside the treatment area and sentinel fish (bass) survive for duration of 8 hours just downstream of the permanent barrier but outside the influence of detoxification.

Table 2. Varying Application Rates of $KMnO_4$ at 4-6 parts per million (ppm) and 40-60 cubic feet per second (cfs).

$KMnO_4$ at *4 ppm*		$KMnO_4$ at *5 ppm*		$KMnO_4$ at *6 ppm*	
Stream flow (ft^3/s)	**Application rate g/min**	**Stream flow (ft^3/s)**	**Application rate g/min**	**Stream flow (ft^3/s)**	**Application rate g/min**
40	272	40	340	40	408
41	279	41	349	41	418
42	286	42	357	42	428
43	292	43	366	43	439
44	299	44	374	44	449
45	306	45	383	45	459
46	313	46	391	46	469
47	320	47	400	47	479
48	326	48	408	48	490
49	333	49	417	49	500
50	340	50	425	50	510
51	347	51	434	51	520
52	354	52	442	52	530
53	360	53	451	53	541
54	367	54	459	54	551
55	374	55	468	55	561
56	381	56	476	56	571
57	388	57	485	57	581
58	394	58	493	58	592
59	401	59	502	59	602
60	408	60	510	60	612

Timing of Application

Treatment will occur during late summer to early fall, late enough that bass spawning will have already occurred and eggs have already hatched but early enough that water is still at base flow and temperatures are warm enough to use minimal amounts of chemical. Two applications of rotenone are proposed for fall 2012. The first treatment is proposed for the week of September 10 – 14th. The second application is proposed for the week of September 17-21st. The week of September 24-28 will be an alternative week if one of the previous treatment weeks is delayed because of weather or other reasons.

Staff needs for rotenone treatment

- *Pre-treatment monitoring and bass removal upstream of treatment area*– (3 people) 28 days
- *Administrative, planning, necessary metrics* – (4 people) 20 days
- *Fish salvage* – (8 people) 4days
- *2 Treatments*– (24 people) 10days
    - *8 of these people need to be certified aquatic applicators.*
- *Post treatment evaluation* – (4 people) 6 days
- *Reporting* – (2 people) 5 days

Equipment needs for rotenone treatment

EQUIPMENT& SUPPLIES	NUMBER
Respirators	12
Dust Masks	60
nitrile gloves	250 pair
goggles/safety glasses	50
chemical aprons	6
gasoline	60 gallons
Augers	3
gas cans	10
generators	4
drip buckets	8
Sprayers	6
Water Jugs (Wash Stations)	6
First Aid Kits	4
radios	8
signs	12
buckets	20
CFT Legumine	60 gallons
$KMnO_4$	10000 lbs
Rotenone Sand	2 -5 gallon buckets
stop watches	4
scoops	4
1 liter chemical bottles	6
Barrel Pump	2
Live Cars	10
Fish holding tanks	4
Block seine	1

Required Permits and approval

- Arizona Game and Fish Department Fisheries and Nongame Branch Chief and Regional Supervisors approval at four points in the process and final approval by WMD and FOD Assistant Directors as per piscicide treatment planning and procedures manual
- AZPDES permit number AGF2011-002
- AZPDES permit Notice of Intent (NOI)
- Chapter 18 analysis of 2004 Fossil treatment EA
- Pesticide Use Permit

Biological and Chemical Monitoring Required

Sentinel fish will be utilized along the length of the treatment reach and below the detoxification station to monitor the efficacy of the treatment and detoxification. Fish will be placed in sealed hoop nets (cages) in the main channel of the stream in slower moving water. Five sentinel fish will be held in each cage during the treatment. Fresh sentinel fish will be caught prior to each treatment and held in portable tanks at each location. Spare hoop nets will be kept on site for use as additional cages. Chub will be used for sentinel fish upstream of the permanent barrier and smallmouth bass will be used downstream.

Chub will be held in cages just upstream of the 1-hour and 2-hour drip stations and just upstream of the permanent barrier to ensure that adequate concentrations of rotenone are carried through the treatment reach to effectively kill all fish species present. Smallmouth bass will be held just downstream of the barrier out of the main flow of detoxicant ($KMnO_4$) to determine if bass are being effectively killed by rotenone. Bass will also be held downstream of the barrier at the 30 minutes water travel time location to ensure that the detoxification station is functioning as intended

Fish behavior will be monitored during and after the treatment within and up to 1 hour drift time downstream of the barrier. The behavior of free swimming fish will also be observed.

The drip station crew leads and detoxification station crew leads will observe and record the behavior of the sentinel fish and the overall progress of the treatment. This information will be communicated to the lead applicator.

General fish behavior will include:

- Tipping – when fish begin to lose their equilibrium,
- Gilling - when fish have lost equilibrium and respiration becomes difficult,
- Death.

The times of the observed behaviors and the number of individuals observed displaying them will be recorded. Spray, drip, and detoxification crew leads will record the GPS locations and above mentioned behaviors of non-sentinel fish along the treatment reach. All information will be communicated to the lead applicator hourly and application rates will be adjusted accordingly.

Rotenone concentrations will also be monitored according to the procedures described above under Protocols and Monitoring of Groundwater or Surfacewater.

Sampling, Salvage, and Treatment Tentative Dates

- July 25-August 31, 2012 -- Pre-treatment monitoring
- September 4-7, 2012 -- Fish salvage
- September 10-17, 2012 -- First chemical treatment
- September 10-14, 2012 -- Second chemical treatment
- Septermber 17-21, 2012 – Alternative dates for treatment and/or cleanup

Fish Salvage

A combination of seines, baited hoop nets, dip nets and angling in appropriate habitat types of the treated reach (temporary barrier to permanent barrier; Figure 9) may be utilized for salvage efforts. Fish salvage activities will take place during the week of September 3, 2012.

Salvage efforts will focus on collection and transport focal fish species: longfin dace, headwater chub, roundtail chub, Sonora sucker, desert sucker, and Gila topminnow. Longfin dace and Gila topminnow of all size classes will be translocated, but for the other species, only individuals > 200 mm TL will be translocated. Likewise, although not detected or encountered during past surveys within the treated reach, any spikedace, loach minnow or razorback sucker captured will be translocated.

Captured fish that fit the size criteria will be held in live cars and then transported via vehicle and released at appropriate locations and similar habitat in readily accessible portions of Fossil Creek above the treated reach.

Staff Needs for Salvage

Personnel to conduct salvage operations starting Tuesday, September 4th-Sunday, September 9th

- Temporary barrier to Mazatzal (Sept 4-5):
    - Hoop net, seine and dipnet : (4 people)

- Hoop net, seine and dipnet: (4 people)
- Mazatzal to Permanent Barrier (Sept 5-7):
  - Seine, dipnet and angling: (4 people)
  - Hoopnet, seine and angling: (4 people)

Equipment Needs for Salvage:

Hoop nets (30): Region II, WMRS
Mini hoop nets (8): Region II, WMNG-NFP, WMRS
Seines,6ft x 4ft 8mm mesh (3): WMNG, WMRS?
Live cars (6-10): WMNG-NFP
Tear-drop dipnets (6): WMNG
Screw-lid buckets(12): WMNG-NFP
Bubblers(12-25): WMNG, WMRS
Large block seine,1/2" mesh by 30 ftx6 ft (2)
Bait (5 lb): WMRS, Region II
Bait bags (30): WMRS, Region II
Large fish transport coolers (2): WMNG
Fish transport tank (1): Region II

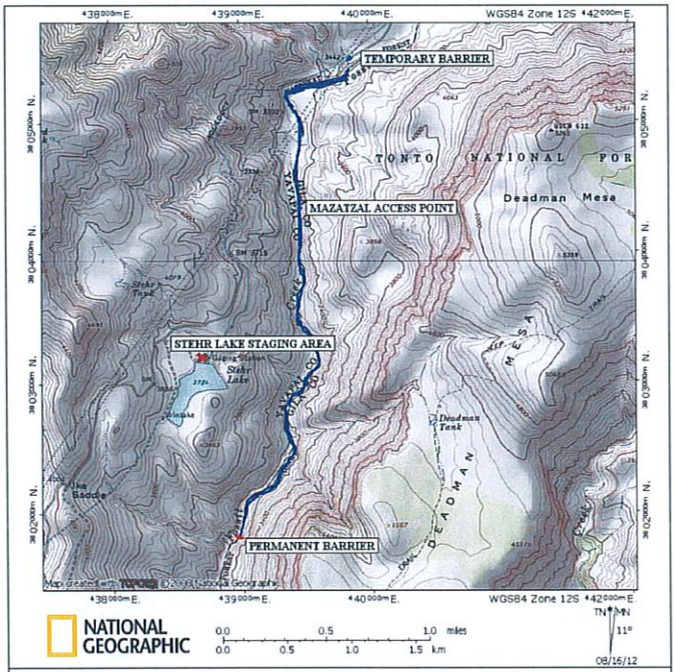


Figure 9: Map of Fossil Creek delineating temporary barrier (Sally May wash), Mazatzal access point, permanent barrier and Stehr Lake staging area. Reach that is tentatively planned for treatment is indicated in dark blue.

11: RESTOCKING PLAN

During salvage, fish are moved upstream into untreated areas of the river so that as the treatment is completed, native fish moved upstream and those already present upstream can move back downstream into the treated reach and re-establish a presence there. Given the high densities of native fish upstream of the treatment reach, we expect rapid re-establishment of the native fish community within the treatment reach. If necessary, post treatment efforts can be made to capture and move fish back into the target reach. Also, supplemental stocking of native fish including roundtail chub may be considered after discussion with USFWS, BOR and USFS. Stockings of longfin dace, spikedace, Gila topminnow, and razorback sucker into the Treatment Reach are planned after the renovation when the stream is considered suitable for fish. The razorback suckers would likely not be stocked until 2013.

12: ESTIMATED BUDGET

PERSONNEL	Pay periods	Cost	Total Cost
Pre-treatment surveys			
CAP Survey Crew	2.5	$4,200.00	$11,655.00
Interns	3	$2,000.00	$6,660.00
Aquatic Spec	3	$1,600.00	$5,328.00
Spec 2	1	$2,500.00	$2,775.00
Program Manager	3	$2,500.00	$8,325.00
Planning & purchasing			
Interns	0.5	$2,000.00	$1,110.00
Aquatic Spec	3	$1,600.00	$5,328.00
Spec 2	3	$2,500.00	$8,325.00
Program Manager	3	$2,500.00	$8,325.00
Office Manager	0.25	$1,600.00	$444.00
Purchasing Clerk	0.5	$1,200.00	$666.00
PHX Purchasing	0.5	$1,200.00	$666.00
Fish Branch Personnel	0.5	$2,000.00	$1,110.00
Treatment			
Salvage	0.5	$20,000.00	$11,100.00
Setup	0.5	$20,000.00	$11,100.00
Treatment	1	$40,000.00	$44,400.00
per diem		$600.00	$600.00
Post-treatment and report			
Aquatic Spec	0.5	$1,600.00	$888.00
Spec 2	0.25	$2,500.00	$693.75
Program Manager	0.25	$2,500.00	$693.75
		Total estimated cost (personnel)	**$130,192.50**

EQUIPMENT & MATERIALS	COST
$KMnO_4$	$29,848.00
generators	$2,590.00
new auger	$5,522.00
auger parts	$3,671.00
gelatin	$170.00
chlorine test kits	$293.00
Safety Gear	$1,050.00
gas cans	$140.00
chemical containment devices	$120.00
Misc Supplies	$214.00
Rotenone (estimate but uncertain)	$6,000.00
Total estimated cost (equipment)	**$49,618.00**

LITERATURE CITED

Finlayson, B., Schnick, R., Skaar, D., Anderson, J., Demong, D., Dueffield, D., Horton, W., and J. Steinkjer. Planning and standard operating procedures for the use of rotenone in fish management---Rotenon SOP Manual. American Fisheries Society Publication, 2010

SIGNATURE PAGE

REQUEST - I request approval (Stage II) of the Preliminary Treatment Plan for Fossil Creek that will allow PTPPM planning to continue to Stage 3: Intermediate Planning and Public Involvement Procedures.

Approved [ ] by Eric Gardner _____ Date: _____

Approved [ ] by Kirk Young _____ Date: _____

Approved [ ] Acting Reg II Supervisor _____ Date: _____