BIOLOGICAL OPINION SUMMARY
BLUE RIVER FISH HATCHERY NPDES PERMIT

Date of the opinion: December 21, 1998

Action agency: Environmental Protection Agency

Project: Issuance of an National Pollution Discharge Elimination System permit to the Blue River Fish Hatchery, a private facility (pages 3 and 4)

Location: Upper Blue River, Greenlee County, Arizona

Listed species affected:
Loach minnow (Tiaroga cobitis) threatened (pages 4-6)
Razorback sucker (Xyrauchen texanus) threatened with critical habitat (no critical habitat in project area) (page 6)

Biological opinion: Nonjeopardy (page 22)

Incidental take statement:

Anticipated take: *Exceeding this level may require reinitiation of formal consultation.* Anticipated take will be exceeded if the permitted levels are exceeded, any release of toxic materials into the Blue River or Bush Creek occurs, or any fish kill downstream from the hatchery occurs. (pages 22-23)

Reasonable and prudent measures: *Implementation of these measures through the terms and conditions is mandatory.* 1. Minimize direct mortality of loach minnow and razorback sucker. 2. Minimize loss and alteration of habitat of loach minnow and razorback sucker. 3. Monitor the fish community and level of incidental take. 4. Maintain complete and accurate records. (pages 23-24)

Terms and conditions: *Terms and conditions implement reasonable and prudent measures and are mandatory requirements.* Install a sand filter on hatchery discharge. Oil and grease standard should be nondetectable on a daily basis. Limit discharge volume to 50% or less of flow (discharge) in Blue River at point of discharge, with reevaluation after 2 years of monitoring. Monitor 11 parameters, including oxygen, turbidity, and water temperature above and below discharge. Install continuously monitoring flow (discharge) reader on hatchery discharge. Monthly report on compliance with incidental take statement on monthly basis to EPA and the Service. (pages 24-26)

Conservation recommendations: *Implementation of conservation recommendations is discretionary.* No conservation recommendations are provided. (page 26).

United States Department of the Interior
Fish and Wildlife Service
Arizona Ecological Services Field Office
2321 W. Royal Palm Road, Suite 103
Phoenix, Arizona 85021-4951
(602) 640-2720 Fax (602) 640-2730

In Reply Refer To:

AESO/SE
2-21-95-F-307

December 21, 1998

Felicia Marcus
Regional Administrator
Environmental Protection Agency
75 Hawthorne Street
San Francisco, California 94105-3901

Dear Ms. Marcus:

This biological opinion responds to your request of April 2, 1997, for formal consultation pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, on the issuance of a National Pollution Discharge Elimination System (NPDES) permit to the Blue River Fish Hatchery in Greenlee County, Arizona (permit no. AZ0023949). The species of concern in this consultation are the threatened loach minnow (Tiaroga cobitis) and endangered razorback sucker (Xyrauchen texanus). The consultation period began on April 7, 1997, the date your request was received in our office.

The following biological opinion is based on the information provided in the April 2, 1997, biological assessment (BA), an earlier biological assessment of March 6, 1996, in the May 1, 1995 draft NPDES permit, the November 18, 1998 revision of the draft permit, a November 12, 1998 letter from EPA, data in our files, and other sources of information. Literature cited in this biological opinion is not a complete bibliography of all literature available on the species of concern or other subjects considered in this opinion. A complete administrative record of this consultation is on file in this office.

INFORMAL CONCURRENCES

The Environmental Protection Agency (EPA) has made findings that the proposed project "is not likely to adversely affect" loach minnow and that it will have no effect on the endangered razorback sucker, southwestern willow flycatcher (Empidonax traillii extimus), and American peregrine falcon (Falco peregrinus anatum) (proposed for delisting on August 26, 1998), and threatened bald eagle (Haliaeetus leucocephalus). The Fish and Wildlife Service (Service) agrees with the findings for the southwestern willow flycatcher and American peregrine falcon, but not for the loach minnow, razorback sucker, and bald eagle.

Normally the findings made by EPA would not trigger formal consultation on any of these species. However, the BA included a request for initiation of formal section 7 consultation independent of the EPA findings of "is not likely to adversely affect" and "no effect." Therefore, we are providing this biological opinion for razorback sucker and loach minnow and the following informal consultation for bald eagle.

The bald eagle population along the Blue River is a wintering population and no nests are known from the drainage. Although the indirect effects and interrelated and interdependent actions for this project may have some slight effects, both detrimental and beneficial, to food base of bald eagle in this area, the Service believes that effect would be extremely small and that a finding of "is not likely to adversely affect" is appropriate.

CONSULTATION HISTORY

Informal consultation on this project began in 1995, when EPA requested from the Service a list of endangered and threatened species in the action area. That list was provided on May 18, 1995, and included all listed species discussed in later correspondence, BAs and other documents, with the exception of Mexican spotted owl (Strix occidentalis lucida). On March 6, 1996, EPA sent a biological assessment to the Service concluding that the proposed action "is not likely to adversely affect" loach minnow. No findings were made in that BA for any other listed species. The Service did not concur with that finding in a letter to EPA on March 21, 1996 and advised that findings should be made for southwestern willow flycatcher and Mexican spotted owl. On April 2, 1997, EPA submitted a second biological assessment to the Service in a letter entitled "Request to Initiate Formal Consultation for NPDES Permit No. AZ0023949, Blue River Fish Hatchery." Despite earlier nonconcurrence from the Service, this assessment again concluded the proposed action "is not likely to adversely affect" loach minnow, and in addition there would be no effect to razorback sucker, southwestern willow flycatcher, American peregrine falcon, and bald eagle. Such findings do not normally require initiation of formal consultation; however, the request for formal consultation supersedes the findings. It is not uncommon for an agency to request formal consultation, in conformance with the Service's nonconcurrence, without changing their original findings. EPA reconfirmed their request for formal consultation in a letter of March 24, 1998. Therefore, the Service is providing this biological opinion.

Issuance of a Service biological opinion on this project was delayed due to the section 7 consultation workload. The 135-day consultation period ended on August 20, 1997. Letters dated March 24, 1998 and June 25, 1998, from EPA inquired as to the status of the consultation and requested prompt completion.

A draft biological opinion was sent to EPA on August 28, 1998. On November 12, 1998, after telephone discussions between EPA, the Service, and the Hatchery owner regarding the conditions of the draft incidental take statement, EPA sent comments on the draft opinion to the Service. A revised draft of the proposed NPDES permit for the hatchery, incorporating many of the conditions discussed, was sent by EPA to the Service on November 18, 1998. Electronic mail discussions occurred between Service and EPA staff from December 1 to 9, 1998 to clarify some of the revisions.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed project is issuance of an NPDES permit to the Blue River Fish Hatchery in Greenlee County, Arizona. The permit would be valid for a period of five years. The hatchery is located approximately 22 miles south of the town of Alpine in T.3N., R.32E., Sec. 14 (figure 1). The hatchery is a privately-owned facility of the Blue River Fish Hatchery, Inc. Although it has been in operation since 1989 this is the first NPDES permit issued to the facility. Physical structures include 14 ponds and 4 raceways. In addition to the ponds and raceways, there are several buildings, including a residence. The facilities are located along the edge of the Blue River canyon at the confluence with Bush Creek. Although information furnished by EPA states that the hatchery is located entirely outside the 100-year floodplain, based on personal observation of Service biologists[1] at least some of the ponds and facilities are within the 100-year floodplain of the Blue River and/or Bush Creek. These ponds and facilities are located immediately adjacent to the county road which is immediately adjacent to the Blue River in this area.

The Blue River Fish Hatchery produces approximately 60,000 rainbow trout (Oncorhynchus mykiss) per year. The hatchery holds a license from the Arizona Department of Agriculture and is approved for raising rainbow trout, Kamloops trout (a form of Oncorhynchus mykiss gairdneri), and brown trout (Salmo trutta) (B.Hollar, AZ Dept. of Agriculture, pers. comm. August 26, 1998). The fish are sold to commercial and governmental organizations, including the Arizona Department of Game and Fish.

The hatchery has a water right for 365 acre-feet per year (af/yr) from the Blue River (about 0.5 cubic feet per second [cfs] at steady withdrawal). Water for the hatchery is drawn primarily from an infiltration gallery in the Blue River bed. The remainder is drawn directly

[1]Observations by Service biologists were made from the County road.

from the river or pumped from alluvial wells. Water is run through the hatchery at a rate of about 300-400 gallons per minute (gpm) or about 0.7 to 0.9 cfs.

The hatchery discharges approximately 432,000 gallons per day (about 0.7 cubic feet per second at steady discharge) of wastewater into the Blue River. This water will be routed through two settling ponds, where it is held for an unspecified period of time. No information was furnished as to the final disposition of accumulated materials from the settling pond. About 100 gpm (0.2 cfs) of the water is diverted on one weekend a month for irrigation on adjacent cropland. The remainder is discharged into the bed of Bush Creek just upstream from its confluence with the Blue River. Although temporally intermittent in this section, Bush Creek is a moderate-sized watershed and carries substantial flow during some periods.

The original draft permit provided standards for fecal coliform, pH, settleable solids, suspended solids, and total phosphates and contained monitoring and reporting requirements. The revised permit (appendix 1) also provides standards for Escherichia coli, total nitrogen, oil and grease, temperature, and dissolved oxygen as well as changing the standard for total phosphates to one for total phosphorus. Monitoring for flow was increased from once a month to continuously. Monitoring for pH was set at once a week, for total nitrogen and phosphorus at once every 3 months, and all other parameters for once a month. Monitoring reports must be submitted monthly to the Arizona Department of Environmental Quality (ADEQ) and EPA. The revised draft permit also requires a copy of those reports to be sent to the Service.

To address Service concerns, EPA incorporated some of other conditions into the revised draft permit. A sand filter to prevent escapement of nonnative species would be required. Design of the sand filter must be completed within 3 months after the effective date of the permit, with construction to start within 4 months. Construction must be completed by 10 months and must be in routine use by 12 months after the permit date. Quarterly reports of progress are required. In addition, requirements were placed into the draft revised permit for reporting use of disease and vegetation control chemicals and other water additives and a requirement for disposal of solid wastes in a manner that would not impact the stream.

SPECIES DESCRIPTIONS AND STATUS

Loach Minnow Description and Status

Loach minnow was listed as a threatened species on October 28, 1986 (USFWS, 1986). Critical habitat was designated for loach minnow on March 8, 1994, including portions of

the San Francisco, Tularosa, and upper Gila Rivers, Aravaipa Creek, and the Blue River from Campbell and Dry Blue Creeks downstream to the confluence with the San Francisco River (USFWS, 1994a). The critical habitat for loach minnow has been set aside by order of the federal courts in Catron County Board of Commissioners, New Mexico v. U.S. Fish and Wildlife Service, CIV No. 93-730 HB (D.N.M., Order of October 13, 1994). The United States District Court for the District of Arizona recognized the effect of the Catron County ruling as a matter of comity in the Southwest Center for Biological Diversity v. Rogers, CV 96-018-TUC-JMR (D. Ariz., Order of December 28, 1996). The critical habitat for loach minnow was subsequently revoked by the Service (USFWS, 1998). Therefore, no finding regarding the effects of the proposed project on the former critical habitat designation for loach minnow is required.

Loach minnow is a small, slender, elongate fish with markedly upwardly-directed eyes (Minckley, 1973). Historic range of loach minnow included the basins of the Verde, Salt, San Pedro, San Francisco, and Gila Rivers (Minckley, 1973; Sublette *et al.,* 1990). Habitat destruction plus competition and predation by nonnative species have reduced the range of the species by about 85 percent (%) (Miller, 1961; Williams *et al.,* 1985; Marsh *et al.,* 1989). Loach minnow remains in limited portions of the upper Gila, San Francisco, Blue, Black, Tularosa, and White Rivers; and Aravaipa, Eagle, Campbell Blue, and Dry Blue Creeks in Arizona and New Mexico (Barber and Minckley, 1966; Silvey and Thompson, 1978; Propst *et al.,* 1985; Propst *et al.,* 1988; Marsh *et al.,* 1990; Bagley *et al.,* 1995, Bagley *et al.,* 1998).

Loach minnow is a bottom-dwelling inhabitant of shallow, swift water over gravel, cobble, and rubble substrates (Rinne, 1989; Propst and Bestgen, 1991). Loach minnow uses the spaces between, and in the lee of, larger substrate for resting and spawning (Propst *et al.,* 1988; Rinne, 1989). It is rare or absent from habitats where fine sediments fill the interstitial spaces (Propst and Bestgen, 1991). Some studies have indicated that the presence of filamentous algae may be an important component of loach minnow habitat (Barber and Minckley, 1966). The life span of loach minnow is about 2 years (Britt, 1982; Propst and Bestgen, 1991). Loach minnow feeds exclusively on aquatic insects (Schreiber, 1978; Abarca, 1987). Spawning occurs in March through May (Britt, 1982; Propst *et al.,* 1988); however, recent reports have confirmed that under certain circumstances loach minnow also spawn in the autumn (Vives and Minckley, 1990). The eggs of loach minnow are attached to the underside of a rock that forms the roof of a small cavity in the substrate on the downstream side. Limited data indicate that the male loach minnow may guard the nest during incubation (Propst *et al.,* 1988; Vives and Minckley, 1990).

Recent biochemical genetic work on loach minnow indicate there are substantial differences in genetic makeup between remnant loach minnow populations (Tibbets, 1993). Remnant populations occupy isolated fragments of the Gila River basin and are isolated from each other. Based upon her work, Tibbets (1992, 1993) recommended that the genetically

distinctive units of loach minnow should be managed as separate units to preserve the existing genetic variation.

The status of loach minnow is declining rangewide. Although it is currently listed as threatened, the Service has found that a petition to uplist the species to endangered status is warranted. A reclassification proposal is pending, however work on it is precluded due to work on other higher priority listing actions (USFWS, 1994b).

Razorback Sucker Description and Status

The razorback sucker was listed as endangered on October 23, 1991 (USFWS, 1991). Critical habitat was designated for razorback sucker on March 21, 1994 (USFWS, 1994c). Within the Gila River basin, critical habitat includes portions of the Gila, Verde and Salt Rivers. Critical habitat includes the river and its 100-year floodplain.

Razorback sucker grows to over two feet in length and has a distinctive abrupt, sharp-edged dorsal ridge behind the head (Minckley, 1973). The species was once common throughout the Colorado River basin, but is now rare, occurring sporadically in about 750 miles of the upper basin (Bestgen, 1990). In the lower basin a substantial population exists only in Lake Mohave. Upstream from Lake Mohave, the razorback sucker occurs in Lake Mead and Grand Canyon. Downstream from Lake Mohave, it occurs sporadically in the mainstem and associated impoundments and canals (USFWS, 1991). Habitat alteration and destruction along with competition and predation from introduced nonnative fish species are responsible for the species' decline (Marsh and Brooks, 1989; Minckley *et al.,* 1991). As part of the recovery program, reintroduction of razorback sucker has been attempted through stocking into numerous locations in the Gila, Salt, and Verde River basins, including the Blue River (Creef *et al.,* 1992; Hendrickson, 1993).

Adult razorback sucker inhabit a wide variety of riverine habitats including mainstream and backwater areas such as slow runs, deep eddies, pools, and sloughs (Bestgen, 1990). It also inhabits reservoirs. Larval and juvenile razorback sucker habitat use is poorly understood, but is thought to be shallow, slow moving areas, backwaters and littoral zones (Langhorst and Marsh, 1986; Bestgen, 1990). Razorback sucker spawns from January to May and initiation of spawning appears to be tied to water temperature (Langhorst and Marsh, 1986; Tyus and Karp, 1990). Spawning occurs in shallow water over large gravel, cobble, or coarse sand with little or no fine sediment on wave-washed lakeshores or riverine riffles (Minckley *et al.,* 1991). Razorback sucker lives up to about 50 years (McCarthy, 1987). It feeds on plankton, algae and detritus in reservoirs, with riverine populations also consuming a large amount of benthic invertebrates (Bestgen, 1990).

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 impact 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.

General Environmental Baseline

The Blue River is a seriously degraded ecosystem. Aldo Leopold in 1921 called the Blue River "ruined" and cited it as an "extreme example" of the results of human-caused erosion in the Southwest (Leopold, 1921; Leopold, 1946). Human uses of the river and its watershed have resulted in extensive changes within the watershed and river channel. Although the proportional contribution of natural forces and human forces in stream channel erosion in the Southwest has been widely debated, there is substantial evidence that human activities have been a major contributing factor (Duce, 1918; Leopold, 1924a; Leopold, 1924b; Bryan, 1925; Leopold, 1946; Hastings, 1959; Hastings and Turner, 1980; Dobyns, 1981; Bahre, 1991). When European settlement of the Blue River occurred around 1885 or 1886, the floor of the Blue River canyon was "well sodded and covered with grama grass, hardwoods, and pine" (Miller, 1961) and the banks were "lined with willows and the river abounded with trout" (Leopold, 1921). By 1916, it had become a wide, eroded wash and Olmstead (1919) noted that "Portions of a few of the ranches lying below projecting dikes or in coves have escaped the general destruction of the flood of recent years, but they do not aggregate 200 acres in all and represent less than 8% of the original arable area." The bulk of the flood destruction Olmstead refers to occurred from 1900 to 1906 and was particularly devastating because it followed the severe drought period of the late 1800's and early 1900's (Bryan, 1925; Miller, 1961; Bahre, 1991). Periodic floods continue to erode remaining fields, homes, and roads (Coor, 1992).

Although the proximate cause of the channel erosion was flooding, the flood destruction was enabled and exacerbated by human activities on the watershed and streambanks (Chamberlain, 1904; Olmstead, 1919; Leopold, 1924; Bryan, 1925; Leopold, 1946; Miller, 1961; Dobyns, 1981; Coor, 1992). Overgrazing by cattle and goats depleted herbaceous cover of the watershed and streambanks thus increasing sedimentation; increasing the volume and decreasing the duration of high flows; and decreasing the volume and increasing the duration of low flows. Trapping of beaver contributed to channel degradation and depletion of water storage. Timber harvest, fuelwood, and railroad tie cutting depleted vegetative cover of the watershed, created eroding roads and tracks, and damaged the river

channel when logs were rafted downstream during high water. Development of fields on river terraces removed stabilizing riparian vegetation and irrigation canals, and headworks destabilized the channel and funneled floodwaters onto terraces causing them to erode. Roads and trails along the river destroyed riparian vegetation, eroded terraces, destabilized streambanks, and channeled floodwaters into new areas thus eroding new channels or widening the existing channel. Cattle drives along the river bottom broke down streambanks, cut erosion paths, and damaged riparian vegetation. Flood control and protection measures increased velocities, decreased habitat complexity, and destabilized the river through modification and constraint of natural channel geometry. The resulting stream channel is characterized by a wide shallow channel profile, high levels of sediment, eroding banks, braided shifting channels, and depauperate riparian vegetation (Chamberlain, 1904; Leopold, 1921; Leopold, 1924; Dobyns, 1981; Coor, 1992).

Today, much of the Blue River channel is a wide unvegetated expanse of cobble, gravel, boulder, and sand with a braided and shifting, wide, shallow low-flow channel (Papoulias *et al.*, 1989; Bagley *et al.*, 1995). River terraces or benches are small eroding remnants of former river banks. Riparian vegetation is sparse and lacking in structural diversity. It consists primarily of seep willow (Baccharis salicifolia), and cottonwood (Populus fremontii) seedlings and saplings. Some large cottonwoods and sycamore (Plantanus wrighti) are present, with willow increasingly common in the upper reaches where ponderosa pine (Pinus ponderosa) also enters the riparian corridor. Sedges (Carex sp.), which are a key element in healthy stable streambanks, are uncommon along much of the river. Local residents recall a much larger component of bushy willows along the upper Blue River earlier in the century (Coor, 1992). Over time, these were replaced by large cottonwood, boxelder, sycamore, and alder, although local accounts also describe the loss of these big trees in some areas to flooding.

In the area of the Blue River Fish Hatchery, the Blue River is a small stream in a relatively wide, unstable channel with extensive lateral migration of the low-flow channel and moderate floodplain development. Beaver activity is uncommon. Riparian vegetation is sparse to moderate, increasing in an upstream direction and decreasing in a downstream direction. Aquatic habitat complexity is low and consists primarily of shallow gravel-bottomed riffles. Damage to the stream channel from Forest Road 281 at the downstream end of the hatchery has been extensive. In 1997, a reroute of the road and restructuring of the Blue River Fish Hatchery discharge facility was designed to alleviate some of the ongoing channel disruption (USFWS, 1997).

There is little information on the hydrology of the Blue River. Only one U.S. Geological Survey (USGS) streamflow gauge exists on the Blue River. It is located at the Juan Miller or Stacy crossing (FR475) about 30 miles downstream from the project area. The gauge functioned on a continuous basis from 1969 to 1991, when it was discontinued. It was

maintained as a partial-record station, with only maximum annual discharges reported from 1992 to 1995, when it was reinitiated as a continuous record gauge. The records that exist show a bimodal high flow pattern; a snow-melt hydrograph with high flows in late-winter and spring, and a second high flow period associated with monsoon rains in later summer. The lowest flows generally occur in early summer. At the gauge, the maximum instantaneous discharge for the period of record was 30,000 cfs in 1972; minimum instantaneous discharge was 1.4 cfs in 1978; the median of the yearly mean is 43 cfs; and the 50% exceedance level is 12 cfs (USGS, 1991, 1996). The Blue River is "flashy" (see Gordon *et al.*, 1992) with summer storm discharge often an order of magnitude greater than the mean daily discharge on the day of the storm (USGS, 1978, 1991, 1996). No discharge data are available for the project area itself, but they would be substantially lower than the USGS gauge data due to the input of large areas of the watershed between the project area and the gauge. Table 1 relates longitudinal instantaneous discharge data taken by USGS on May 30 to June 26, 1978 to USGS gauge data to help in understanding the general relationship of flow in the Blue River at the USGS gauge to that at the Blue River Fish Hatchery, which is located about halfway between FR 567 and Lamphier Canyon (see Table 1). Using the relationships in Table 1 we would expect the median of the yearly mean discharge at the project area to be in the range of about 4-11 cfs and the 50% exceedance discharge to be in the range of about 1-3 cfs (2 to 6 times the hatchery diversion right). Thus, the river in the project area has a small flow and near the Blue River Fish Hatchery, the river has been observed to lose all surface flow in some areas during early summer (J. Copeland and C. Denton, U.S. Forest Service, pers. comm., 1996).

Although it is thought that human actions in the Blue River watershed and valley bottom have altered the hydrologic regime of the river, there are no discharge data available prior to the major changes to the river that occurred around the turn of the century. However, increased flashiness of flood flows and depletion of base flows are widely documented results of reduction of vegetative and soil cover from the watershed, loss of floodplain terraces and soils, and reduction of riparian vegetation (Ffolliott and Throud, 1975; Dunne and Leopold, 1978; DeBano and Schmidt, 1989; Gebhardt *et al.*, 1989; Meehan, 1991; Gordon *et al.*, 1992; Naiman, 1992; Belsky and Blumenthal, 1997). It is likely that these phenomenon are partially responsible for the low base flow that currently exists in the upper Blue River. Local residents recall that there was formerly a more dependable water supply in the Blue River and that over time many residents have been forced to drill wells to obtain dependable irrigation water (Coor, 1992). Geomorphic, hydrologic, and biologic changes in the Blue River are aptly summed up by Katherine M. Nunn, a former Blue River resident:

> *There used to be a lot more water in the Blue than there is now. There was enough water that at one time the miners in Clifton floated their logs down the river to Clifton from the Blue. They cut the logs above the Box and floated them clear to Clifton. Not*

TABLE 1. RELATIONSHIP OF DISCHARGE IN PROJECT AREA TO DATA FROM USGS GAUGE (data from USGS, 1978)

Location	Instantaneous Recorded Discharge (cfs)[2]	Discharge in Previous Column as Proportion of Discharge at USGS Gauge	Date	Time
Campbell Blue Ck at USFS gauge	0.10	2%	6/26/78	1640
Campbell Blue Ck at upper end of FR 281	1.0	18%	6/14/78	1100
Campbell Blue Ck at State Line	1.2	22%	6/13/78	0910
Dry Blue Ck at State Line	1.0	18%	6/13/78	1000
Blue River at upper Blue Campground	1.8	33%	6/13/78	1255
Blue River at FR 567	1.4	25%	6/13/78	1615
Blue River below Lamphier Canyon	0.5	9%	6/14/78	1300
Blue River at Blue Box	2.7	50%	6/14/78	1410
Blue River below Tornado Ck 2 miles below lower end of FR 281	1.8	33%	6/14/78	1615
Blue River below Oak Ck	0.37	7%	6/15/78	0930
Blue River below Bull Ck (HU Bar Ranch)	1.9	35%	6/15/78	1130
Blue River at Horse Canyon	3.8	69%	6/15/78	1630
Blue River at USGS gauge	5.5	-	6/16/78	0930
Blue River at mouth	7.1	1.30	5/30/78	1000

[2]Water diversion presently occurs in several places downstream to the end of FR 281. Information is not available on the location or amount of diversions in 1978. Water diversion may account for some of the losses of water in stretches of the Blue River.

> *only was there more water, but it wasn't so rocky. There are a lot more boulders now. There used to be lots more land. Willows grew along the banks, not so many cottonwoods and big trees the way it is now -- just willows. But now it has grown up so thick with big trees you can hardly get through it. It isn't at all the way it used to be. I guess that's what happened to the water. In fact it dries up sometimes in the summer in lots of places. It didn't used to ever, ever do that. We used to have plenty of water in the ditches for our cattle, for our farming, and for everything. We just took the irrigation water into the ditches out of the river.* (Coor, 1992)

Present uses of the Blue River watershed and valley bottom continue to contribute to the deteriorated condition of the river, although at a level much reduced from that of the late 1800's. Timber harvest, road, recreation, aquaculture, and grazing activities within the watershed continue to contribute erosion, vegetation change, and alteration of the hydrologic regime. Private lands in the system are concentrated in the upper 30 miles of river bottom. Some cropping and irrigated agriculture continues on remnant river terraces that have natural protection from flood erosion. There are a number of small diversion structures and irrigation canals and an unknown number of wells, at least some of which pump from the alluvial aquifer. Subdividing of ranch lands and construction of residences or summer homes has occurred, but at a fairly low level. The County road (Forest Road 281) is a continuous source of bank and channel damage and erosion, although efforts are underway to lessen this impact. Numerous low-water ford crossings exist in the upper Blue River contributing to localized destabilization. In the middle and lower Blue, unauthorized off-road-vehicle use in the river bottom continues to occur. Livestock grazing in the valley bottom continues on private lands in the upper Blue. There is livestock grazing on Forest Service lands within the watershed, but grazing along the river bottom is being curtailed.

Loach Minnow and Razorback Sucker Environmental Baseline and Status in Action Area

For many years, the fish fauna of the Blue River was poorly known. Surveys were few and tended to concentrate on the tributary streams (Chamberlain, 1904; Anderson and Turner, 1977; Silvey and Thompson, 1978; J.M.Montgomery Consulting Engineers, 1985; Sheldon and Hendrickson, 1988; Marsh *et al.*, 1989; Papoulias *et al.*, 1989). Anecdotal accounts from area residents recall that the Blue River formerly had "a lot" of fish, but now no longer does (Coor, 1992). Recently, surveys of the Blue River system were conducted by AGFD in 1994 on the upper Blue River and basin-wide fish surveys are ongoing by Arizona State University, under funding from the Apache-Sitgreaves National Forests (AGFD, 1994; Bagley *et al.*, 1995; Bagley *et al.*, 1998). These surveys found loach minnow distributed throughout the Campbell Blue, Dry Blue, and Blue River system, but found no razorback sucker. In addition to loach minnow and razorback sucker, the Blue River continues to support four other native fishes, the speckled dace (Rhinichthys osculus), longfin dace

(Agosia chrysogaster), desert sucker (Catostomus [Pantosteus] clarki), and Sonora sucker (Catostomus insignis).

The Blue River, like all streams remaining in the Gila River basin, has been subject to introduction of a number of nonnative fish and other aquatic species. Although the nonnative species present in the Blue River are relatively fewer than in most Gila basin streams, nonnatives adversely affect the native fish community through competition and predation (Courtenay and Stauffer, 1984; Marsh and Brooks, 1989; Marsh *et al.*, 1989; Propst *et al.*, 1992; Blinn *et al.*, 1993; Carmichael *et al.*, 1993; Douglas *et al.*, 1994). Nonnative species reported in the Blue River during recent survey efforts include rainbow trout (Oncorhynchus mykiss), brown trout (Salmo trutta), fathead minnow (Pimephales promelas), western mosquitofish (Gambusia affinis), and red shiner (Cyprinella lutrensis) (AGFD, 1994; Bagley *et al.*, 1995; Bagley *et al.*, 1998). Rainbow trout were stocked by Arizona Game and Fish Department until about 5 years ago. Earlier surveys also found channel catfish (Ictalurus punctatus) (Anderson and Turner, 1977; J.M.Montgomery Consulting Engineers, 1985). Local stories say that channel catfish are sometimes quite abundant in the lower Blue River (Stefferud, 1995; B. Csargo, Apache-Sitgreaves National Forests, pers. com., 1996). The scarcity of large pools, the paucity of habitat structure, and the flashiness of flooding in the Blue River may make nonnatives such as channel catfish susceptible to death or removal downstream during large flood events. Differential effects of flooding on native and nonnative fishes in southwestern streams have been observed (Rinne, 1975; Meffe, 1983; Minckley and Meffe, 1987; Pearson *et al.*, 1992).

Although the historical records of the Blue River fish fauna are few, those records, plus some from the San Francisco and Gila rivers downstream from the Blue, can be used to construct a list of native fish species that were most probably historically found in the Blue River. This information can be combined with early descriptions of the river and its valley bottom, from which it appears that the river was much narrower with more distinct streambanks and floodplain and a wider, denser riparian cover and that the aquatic habitat was much more varied and complex. From this information it can be concluded that up to nine species, or 65% of the native fish species, have been extirpated from the Blue River in the past century. Reintroduction of one of those, the razorback sucker, has been attempted with uncertain success. Of the other four remaining native species, loach minnow is the rarest.

The loach minnow was first documented from the Blue River in 1977 (Anderson and Turner, 1977). This was the first documented fish survey in the area since Chamberlain's work in 1904. Several efforts since then have located loach minnow distributed in suitable habitat from the middle reaches of Campbell Blue Creek and lower reaches of Dry Blue Creek downstream to the confluence with the Blue River (Silvey and Thompson, 1978; J.M.Montgomery Consulting Engineers, 1985; Hendrickson, 1987; Sheldon and Hendrickson,

1988; Marsh *et al.*, 1989; Papoulias *et al.*, 1989; AGFD, 1994; Bagley *et al.*, 1995; Bagley *et al.*, 1998). Until recently, loach minnow were not found in any tributaries other than Campbell Blue and Dry Blue Creeks and in KP Creek just above its confluence with the Blue River. During 1998, they were also found in two tributaries to Dry Blue Creek; Pace and Frieborn Creeks. Recent surveys have found loach minnow to be relatively common, although it is not present at all sites and is the least abundant of the four non-reintroduced native species, rarely constituting more than 10% and often less than 5% of the fish population (AGFD, 1994; Bagley *et al.*, 1995, Bagley *et al.*, 1998).

Although no historic records of razorback sucker exist from the Blue River, the 1887 type locality for the species is the Gila River at Fort Thomas and local residents reported that razorback sucker was common in the Gila River near Safford and Duncan in the early 1900's (Kirsch, 1888; Chamberlain, 1904). By 1904 when Chamberlain visited the area, the fish fauna of the lower San Francisco River and adjacent Gila River was seriously depleted, apparently due to human alterations of the rivers. Because of their historic presence in the nearby Gila River and the presence of apparently suitable habitat, the Blue River is presumed by species experts to have historically supported razorback sucker. Due to habitat alterations and losses and introduction and spread of nonnative species, the razorback sucker was extirpated from the Gila River and all of its tributaries. Between 1986 and 1989, razorback sucker was reintroduced into the Blue River using hatchery stock originating from Lake Mohave via Dexter National Fish Hatchery (Hendrickson, 1993). Stocking occurred at several places throughout most of the length of the Blue River. These stockings were made prior to listing of the razorback sucker and when the species was listed in 1991, equal protection was given to stocked and natural populations. Few recaptures of stocked razorbacks in the Blue River have occurred, due at least partly to infrequent and scattered sampling. Recaptures are limited to one at Juan Miller Crossing in 1986 and two at the Blue Box in 1987. No razorback sucker were found during recent surveys of the Blue River (AGFD, 1994; Bagley *et al.*, 1995; Bagley *et al.*, 1998). The Blue River is considered to be occupied by razorback sucker, although whether or not a self-sustaining population has been established is not known.

Section 7 Consultation Environmental Baseline in the Action Area

Eight formal consultations and nine informal concurrences with findings "is not likely to adversely affect" have been previously done on effects of Federal actions on the loach minnow and razorback sucker in the Blue River basin. These are summarized in Table 2.

TABLE 2. SECTION 7 CONSULTATIONS IN ACTION AREA			
Project	Date of Opinion or Concurrence	Species	Finding
FORMAL CONSULTATIONS			
Apache-Sitgreaves NF Land and Resources Management Plan	May 1986	loach minnow[3] bald eagle peregrine falcon razorback sucker[4]	net benefit nonjeopardy nonjeopardy none
Campbell and Isabelle Timber Sales	May 1993	loach minnow & critical habitat	nonjeopardy no adverse modification
Maintenance and repair of FR 475 low-water crossing	April 1995	loach minnow & critical habitat	nonjeopardy no adverse modification
Navopache Power powerline rerouting	March 1997	loach minnow razorback sucker bald eagle	nonjeopardy nonjeopardy nonjeopardy
Blue River road - emergency repairs and best management practices	June 16, 1997	loach minnow razorback sucker bald eagle SW willow flycatcher peregrine falcon	nonjeopardy nonjeopardy nonjeopardy nonjeopardy nonjeopardy
Rerouting of a portion of FR 281 near Bush Creek	October 14, 1997	loach minnow razorback sucker	nonjeopardy nonjeopardy
Land and Resource Management Plans, as amended, for 11 National Forests and Grasslands in the SW Region	Dec. 19, 1997	loach minnow razorback sucker bald eagle peregrine falcon SW willow flycatcher	nonjeopardy nonjeopardy nonjeopardy nonjeopardy nonjeopardy
Reconstruction of low-water crossing on FR 281 at the Blue Box	December 2, 1998	loach minnow	nonjeopardy

[3]Proposed at time of consultation.

[4]Not listed at time of consultation.

TABLE 2. SECTION 7 CONSULTATIONS IN ACTION AREA			
Project	Date of Opinion or Concurrence	Species	Finding
INFORMAL CONSULTATIONS - IS NOT LIKELY TO ADVERSELY AFFECT CONCURRENCES			
Repair of certain sites on FR 281	February 1996	loach minnow	concurrence
Repair of road crossing on Highway 191	August 1996	loach minnow	concurrence
Programmatic - Forest Service grazing permits[5] -- McCarty, Drachman, Wiltbank & Wiltbank, Heap, Lazy YJ, Downs, Coleman & Robart, ELC, & Voit/Rudd allotments	May 1995 (FWS programmatic concurrence) 1995/6 Forest Service use of programmatic concurrence on these allotments	loach minnow razorback sucker bald eagle SW willow flycatcher peregrine falcon	programmatic concurrence without site-specific Service involvement
East Castle prescribed burn	February 1997	loach minnow bald eagle peregrine falcon	concurrence concurrence concurrence
McKibben prescribed burn	February 1997	loach minnow bald eagle peregrine falcon	concurrence concurrence concurrence
KP trail reconstruction	February 1997	loach minnow razorback sucker	concurrence concurrence
Little Timber Sale	February 1997	loach minnow bald eagle peregrine falcon	concurrence concurrence concurrence
Tutt Creek Trailhead	May 2, 1997	loach minnow bald eagle peregrine falcon	concurrence concurrence concurrence
Ongoing livestock grazing activities on certain allotments - annual operating plans	1998[6]	loach minnow razorback sucker many other species	concurrence concurrence

[5]This was the *Non Site-Specific Biological Assessment for Threatened, Endangered, and Proposed Species on more than one Forest*, April 7, 1995.

[6]These concurrences were given verbally as part of a programmatic consultation using a team approach during spring-summer 1998.

DIRECT AND INDIRECT EFFECTS OF THE ACTION

Because of the deteriorated state of the Blue River, accumulating effects of all impacts are of serious concern. A large proportion of the adverse impacts to the Blue River and its aquatic and riparian ecosystem come from small actions that do not individually threaten the system, but cumulatively result in deterioration.

Adverse effects to loach minnow and razorback sucker from the proposed issuance of a NPDES discharge permit for the Blue River Fish hatchery are expected to occur through several direct and indirect mechanisms and several interrelated and interdependent actions. Direct effects are those by which the proposed action will cause immediate and firsthand effects to loach minnow and razorback sucker. Indirect effects are those that are caused by the proposed action but are later in time or which are secondhand; i.e. a direct effect to a habitat parameter which then has a direct effect on loach minnow or razorback sucker. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Interrelated and interdependent actions may be actions of a non-Federal entity that would not occur "but for" the Federal action.

Direct effects to loach minnow and razorback sucker would be primarily from quality parameters of the discharged water. Water quality deterioration as a result of discharges from aquaculture and hatchery facilities are well documented (Chen, 1998; Goldberg and Triplett, 1997). The only data existing on water quality parameters of the Blue River Fish Hatchery discharge furnished by EPA for this consultation were for total Kjeldahl nitrogen, total phosphorus, and biological oxygen demand taken by the permit applicant on January 26, 1995. All three were within what EPA and the ADEQ believe to be acceptable for the Blue River and are within the State water quality standards consulted on by the Service in 1994 and found to be non-jeopardy for loach minnow and razorback sucker (USFWS, 1994d). From this one-time sample, a slight decrease in nitrogen and slight increase in phosphorus was detected between river water above the hatchery and discharge water below the settling pond.

If the January 1995 levels of these parameters are representative of the ongoing levels in the Blue River Fish Hatchery discharge, then no adverse effects to loach minnow or razorback sucker is expected from nutrient loading due to the hatchery discharge. However, no data was furnished regarding whether these levels are representative of those during periods when river water is warmer and of lower quantity. Although algal mats are a common, and possibly desirable, feature of loach minnow habitat during warm portions of the year, if nutrient levels rise too high the levels of algae and other vegetation can become so great that there is physical blockage of habitat, rising water temperatures, and decreasing

velocity. Oxygen availability may drop to levels lethal to loach minnow and the incidence of fish diseases may increase. Propst and Bestgen (1991) reported finding fungus-infected loach minnow eggs in low-velocity water.

The standards for the five water quality parameters set forth in the original proposed NPDES permit and four additional ones in the revised permit are of levels that are considered acceptable by general water quality standards (USFWS, 1994d; Hoffman *et al.*, 1995). However, it is important to remember that there will be little, if any, dilution effect of these levels during extended periods in the early summer when the river below the hatchery diversion loses all or most of its flow. As there has been no previous permit and therefore, no past monitoring, we do not know what levels of these parameters have been experienced due to hatchery discharge in the past.

The revised permit provides for reporting use of disease and vegetation control chemicals and other water additives. Use of chemicals for disease and vegetation control is common in aquaculture (Goldberg and Triplett, 1997). No data are available on such uses at the Blue River Fish Hatchery. However, we must assume that over the 5 year permit life, some such usage may occur. Downstream effects in the river may vary substantially depending upon the kind and concentration of chemical used. Given the lack of data, we assume that some effects to the aquatic ecosystem may occur, through toxicity to invertebrate and plant life and through changes in fish disease and parasite patterns. While some of these changes may be beneficial, the Service believes that overall there are likely to be some adverse effects to the fish community and to loach minnow and razorback sucker.

During operation of a fish hatchery, there is extensive use in and around water of equipment powered and lubricated by petrochemicals. Use of such equipment in or near water carries with it a likelihood of introduction of petroleum-based products into the water where it is discharged into the river. These pollutants may enter on a chronic basis or as large point-in-time concentrations during accidents (e.g. overturning of a piece of equipment into a hatchery pond). The proposed permit requires that the discharge be "free from oil, grease, and other pollutants that float as debris, foam, or scum," and provides a standard of 15 milligrams/liter (mg/l) monthly average and 20 mg/l daily maximum for oil and grease. These standards are based on the levels at which present technology can detect oil and grease and are intended to be indicators of a spill. However, concentrations of oil in water of 0.5 mg/l or less have been found to be lethal to cutthroat trout and concentrations of 1 to 100 mg/l have been shown to have lethal effects (LC50 values) on various species of fish (Hoffman *et al.*, 1995). Such pollutants may result in chronic or acute adverse impacts to loach minnow, razorback sucker, and the entire aquatic ecosystem.

Another potential source of pollutants is the materials in the settling ponds. No information was provided on the rate of accumulation or disposal of these materials. For the purposes

of this consultation, we assume these materials would be properly disposed of in an authorized site outside of the 100-year floodplain of the Blue River. If this assumption is not correct, then additional section 7 consultation may be required. Depending upon the schedule on which the settling pond materials are removed, the potential exists for these materials to enter the Blue River during flood events. Although the biological assessment states that the entire facility lies outside of the 100-year floodplain, observations by Service personnel from FR 281 indicate that some of the ponds, including the settling ponds, lie well within the 100-year floodplain of the Blue River and probably Bush Creek. Severe flooding is expected to inundate the settling ponds and move any materials located in the ponds into the river. In addition to sediments, some pesticides and other chemicals bind to sediment which may result in an impaired benthic community.

No temperature data are provided for the hatchery discharge, and the proposed permit requires the discharge not raise ambient water temperature of the receiving water more than 1 degree celsius (1.8 degrees Fahrenheit). Because the water being diverted from the river for hatchery use is a larger quantity during many parts of the year than that remaining in the river to receive the discharge, and because the hatchery water spends time impounded in unshaded or lightly shaded ponds, therefore it is expected the hatchery discharge will raise ambient river water temperature significantly during some periods. Although loach minnow temperature tolerances are unknown, summer water temperatures in the upper Blue River are quite high, reaching at least into the mid 80's (USGS, 1978). The sparseness of riparian vegetation and open shallow character of the channel make the Blue River prone to both high water temperatures and high temperature fluctuations (Tait *et al.*, 1994; Li *et al.*, 1994). While both adult loach minnow and razorback sucker appear to be rather tolerant of high temperatures, temperature fluctuations may adversely affect larvae of both species. Larvae have a much more limited thermal range than adults and exhibit subtle habitat shifts to accomplish thermal regulation. Large temperature fluctuations in shallow edgewater habitats may cause larvae to die from thermal shock or may cause them to move into deeper, faster water where they are more vulnerable to predation or to being swept downstream. Failure to restore a more natural temperature regime through better management of the riparian and aquatic habitats, and thermal inputs such as the hatchery discharge, may be preventing loach minnow in the Blue River from establishing a larger and more robust population and razorback sucker from successfully establishing as a reintroduction.

Water diversion from the Blue River to the Blue River Fish Hatchery, directly or indirectly via alluvial wells, is an interdependent and interrelated action that has significant direct and indirect adverse effects to loach minnow and razorback sucker. Direct effects arise from reduction of available habitat due to removal of water, sometimes completely dewatering the river in the stretch between the hatchery diversion and discharge. While the diversion is not an action directly permitted by EPA, if the discharge is not permitted then the

diversion would not occur, thus meeting the "but for" test. Depletion of low flows, including complete loss of surface water, adversely affects loach minnow and razorback sucker. Individuals of both species present in the areas which are dewatered are killed. While loach minnow may move into runs and pools when riffles dry, those habitats are rare in the Blue River and loach minnow are unlikely to survive in those habitats for very long due to increased predation and unsuitable conditions. Loach minnow in areas where flow is severely reduced may die or become severely stressed due to overcrowding, disease, high water temperatures, and decreased oxygen levels. Razorback sucker, which prefer pool habitats, are less susceptible to dewatering mortality, although some mortalities, particularly among larval and juveniles may occur when edgewaters and shallow runs are dewatered.

Water diversion for the Blue River Fish Hatchery may also be contributing to modification of the Blue River channel. Installation and maintenance in the river of infiltration galleries, earthen dams, and ditch intakes disturbs and destabilizes the channel in the area. Cumulative human alterations of the upper Blue River channel, such as this, have significantly altered the overall channel morphology and have resulted in a predominance of wide, shallow, cobble-bottomed habitat. Although this is the preferred habitat type for adult loach minnow, the increase in quantity of adult habitat may be overwhelmed by decreases in larval habitat and microhabitat, habitat quality, and ecosystem instability alterations that may be seriously detrimental to loach minnow in the long run. For razorback sucker, such modifications of the river channel have removed most of the pool habitat needed by that species. Alteration of the Blue River watershed and simplification of the geomorphology of the Blue River affects loach minnow and razorback sucker habitats in many ways other than the availability of cobble/gravel riffles or pools. Discharge, velocity, instream water volume, water temperature, nutrient cycling, sedimentation, availability of larval backwater habitats, food availability, and other factors have been altered. Simplification of the system has reduced the natural resiliency and all elements become more susceptible to damage from new or increased adverse effects or environmental perturbations, thus increasing the likelihood of what Gilpin and Soule (chapter 2 in Soule, 1986) refer to as "stochastic extinction."

The periodic construction and repair of the Blue River Fish Hatchery infiltration gallery, diversion, and ditch may contribute excessive sediment into the Blue River. Sediment from such human activities tends to be generated in short, intense batches at low flow periods. Natural sediment tends to come in longer, more spread out periods during high flows. These different patterns means the deposition of sediment on the stream bottom is significantly different between human-caused and natural sediment events. Sediment from hatchery activities is accumulative to, and synergistic with, sediment created by the low-water road crossings of the Blue River and Bush Creek by FR 281 in the vicinity of the Blue River hatchery. Adverse effects of stream sedimentation to fish and fish habitat have been extensively documented (Murphy *et al.*, 1981; Wood *et al.*, 1990; Newcombe and MacDonald,

1991; Barrett, 1992; Megahan *et al.*, 1992; Waters, 1995; Newcombe and Jensen, 1996). Some riffle habitats in the Blue River that may otherwise be suitable loach minnow habitat may become unsuitable due to sediment deposition or compaction. Because of their benthic habit, loach minnow and their eggs are particularly vulnerable to substrate sedimentation which reduces available habitat and smothers eggs (Propst *et al.*, 1988). Razorback sucker habitat is altered when sediment fills and eliminates pools and backwaters.

As a biological pollutant, escapement via hatchery discharge of the nonnative fish species presently, or licensed for, culture in the Blue River Fish Hatchery is an adverse effect to loach minnow and razorback sucker that is a direct effect of issuance of a discharge permit (McKnight, 1993). As many authorities have noted, where aquaculture facilities are present, escapes into the wild are inevitable (Shelton and Smitherman, 1984; Welcomme, 1988; Courtenay, 1993). Information furnished by EPA indicates that some type of fish screening is used in the Blue River Fish Hatchery to inhibit fish escapement. However, fish screens are seldom completely effective at preventing fish passage (Guiver, 1976; Laurenson and Hocutt, 1985; Liston *et al.*, 1994) and rainbow trout are commonly found in the Blue River downstream from the hatchery (AGFD, 1994; USFWS, unpub. data).

While rainbow trout are not obligate piscivores and consume more aquatic invertebrates than fish, they do eat small fish on a regular basis (Moyle 1976; Behnke, 1992). Loach minnow and razorback sucker evolved in a fish community where they were largely free of predation and competition, thus increasing their vulnerability to introduced predators (Propst *et al.*, 1988). Direct predation by rainbow trout on razorback sucker larvae has been observed in the Colorado River (G. Mueller, Nat. Biological Survey, unpub. report). Rainbow trout have been shown to be a significant predator on Little Colorado spinedace (Lepidomeda vittata) and to consume large quantities of Apache trout fry (Oncorhynchus apache), two other rare native species in the general area of the Blue River (Blinn *et al.*, 1993, Rinne and Alexander, 1994). In fact, Blinn *et al.* (1993) found that even an occasional rainbow trout in Little Colorado spinedace habitat may damage the spinedace population. Rainbow trout may also compete with native fishes, like loach minnow, for invertebrate food supplies and with a continually augmented supply of rainbow trout, such as immediately below the Blue River Fish Hatchery, may deplete the food supply for loach minnow. Rainbow trout have been said, along with brown trout, to hold "one of the most consistent records for damaging stocks of endemic fish species" worldwide (Welcomme 1984). Fortunately, most hatchery escapement of stocked rainbows are not well adapted to life in natural streams like the Blue River, and perish quickly, although enough generally survive to adversely affect native fish species (Moyle, 1976; White *et al.*, 1995).

If the Blue River Fish Hatchery decides to use its existing license to raise Kamloops trout and/or brown trout, adverse effects to loach minnow would increase. Adverse effects of nonnative species on native species tend to be cumulative. The adverse effects of predation

by three nonnatives would be greater than for one. Brown trout is a more piscivorous species than rainbow (Moyle, 1976), but, particularly when larger and more piscivorous, prefers pools that are not used by loach minnow. Brown trout are occasionally found in the Blue River (AGFD 1994). Kamloops trout, a variety of the Columbia redband, is a lake-dwelling fish and individuals that escape from the Blue River Fish Hatchery are unlikely to survive in the Blue River.

This consultation considers only the effects of the culture in the Blue River Fish Hatchery of rainbow trout, Kamloops trout, and brown trout. If any other fish or other aquatic species (invertebrates, plants, etc.) are introduced into culture at the hatchery, either purposefully or accidentally, additional adverse effects would be expected and additional section 7 may be necessary. Accidental introduction of nonnative species into aquaculture facilities, through contamination of the imported stock of fish or eggs, is not uncommon (Carlton, 1992).

The Blue River Hatchery and its effects on water quality and nonnative pollutants, depletion of river flow, alteration of the stream channel, and alteration of floodplain function, are an incremental factor in the long-term degradation of loach minnow and razorback sucker populations in the Blue River.

CUMULATIVE EFFECTS

Cumulative effects are those effects of future non-Federal (State, local government, or private) activities on endangered or threatened species or critical habitat that are reasonably certain to occur during the course of the Federal activity subject to consultation. Future Federal actions are subject to the consultation requirements established in section 7 and, therefore, are not considered cumulative in the proposed action.

Most of the land within the Blue River watershed is under the jurisdiction of the U.S. Forest Service and activities affecting loach minnow and razorback sucker, such as grazing and timber harvest, would be Federal actions which are subject to section 7 consultation. Recreation in the area is light to moderate and in general has localized impacts on the river in the project area. The primary cumulative effects derive from the private lands in the valley bottom on the upper Blue River. Livestock grazing, cropping and residential development on the floodplain terraces remove water from the river and add to the instability of the river system. The role of these private activities has been discussed in more detail in the environmental baseline section of this opinion.

In 1991, the American Fisheries Society adopted a position statement regarding cumulative effects of small modifications to fish habitat (Burns, 1991). That statement concludes that accumulation of localized or small impacts, often from unrelated human actions, pose a

serious threat to fish communities. It also points out that some improvement efforts to fish habitat may not result in cumulative increases in the status of the species, but instead may simply mitigate cumulative habitat alterations from other activities. Although the adverse effects to loach minnow and razorback sucker from the Blue River Fish Hatchery are not believed to be serious enough to jeopardize the survival of loach minnow and razorback sucker, alleviation of part of those effects may only mitigate for past and future accumulating habitat alterations in the upper Blue River watershed, leaving substantial cumulative and accumulative impacts that must be ameliorated to provide for the continued survival and recovery of the two species in the Blue River ecosystem.

CONCLUSION

After reviewing the current status of the loach minnow and razorback sucker, the environmental baseline for the action area, the direct and indirect effects, and cumulative effects of the proposed action, it is the Service's biological opinion that issuance of the proposed NPDES permit to the Blue River Fish Hatchery in the upper Blue River drainage is not likely to jeopardize the continued existence of the loach minnow or razorback sucker.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, as amended, prohibits any taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish and wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. 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 a prohibited taking provided that such taking is in compliance with the incidental take statement. **The measures described below are nondiscretionary, and must be undertaken by the agency or made a binding condition of any grant or permit issued to the applicant, as appropriate.**

ANTICIPATED LEVEL OF INCIDENTAL TAKE

If, during the course of the action, the amount or extent of the incidental take anticipated is exceeded, EPA must reinitiate consultation with the Service immediately to avoid violation of section 9. Operations must be stopped in the interim period between the initiation and completion of the new consultation if it is determined that the impact of the additional taking will cause an irreversible and adverse impact on the species. The EPA should provide an explanation of the causes of the taking.

The Service anticipates that issuance of the proposed NPDES permit to the Blue River Fish Hatchery is likely to result in incidental take of loach minnow and razorback sucker through direct mortality and through indirect mortality resulting from habitat loss or alteration. Direct mortality will result from fish and eggs killed through release of toxic substances from the hatchery, changes in water quality parameters due to hatchery discharges, and consumption of adult, juvenile, larval, or egg loach minnow and razorback sucker by escaped hatchery fish. Direct mortality will also result from dewatering of the Blue River between the hatchery diversion and the discharge point. Indirect take may also potentially occur through destruction or alteration of habitat resulting from sedimentation and channel alteration and through depleted food resources due to altered water chemistry or competition with hatchery escapements.

The anticipated level of incidental take of loach minnow and razorback sucker cannot be directly quantified due to the low level of data on their populations in the area and the lack of specific data on long-term project effects. Because of their small size and benthic habitat and due to the velocity of the river, it is unlikely that loach minnow or razorback or their eggs killed as a result of the proposed project would be observed. Therefore anticipated levels of take for both species are indexed to the total fish community, habitat, and project parameters. Anticipated take for loach minnow and razorback sucker for the proposed action will be considered to have been exceeded if at any time during project activities:

1. any of the water quality parameters specified in the NPDES permit are exceeded,

2. any of the narrative portions of the permit specifications are not complied with,

3. any release of toxic materials not discussed in the permit occurs in the Blue River or Bush Creek or their floodplain due to hatchery operations, or

4. any fish kill occurs in the hatchery area (defined as 20 or more dead fish of any species found in or along the Blue River in one-half mile below the Blue River Fish Hatchery in a 1-day period).

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize the incidental taking authorized by this biological opinion. Some of the reasonable and prudent measures and their implementing terms and conditions are already an implicit or explicit part of the proposed project and their inclusion in this incidental take statement is only an affirmation of their importance in minimizing take. Where the proposed project already adequately fulfills the following reasonable and prudent

measures and terms and conditions, this incidental take statement does not imply any requirement for additional measures.

1. Conduct all proposed actions in a manner which will minimize direct mortality of loach minnow and razorback sucker.

2. Conduct all proposed actions in a manner which will minimize loss and alteration of loach minnow and razorback sucker habitat.

3. Monitor the fish community and habitat to document levels of incidental take.

4. Maintain complete and accurate records of actions which may result in take of loach minnow, razorback sucker and their habitat.

TERMS AND CONDITIONS FOR IMPLEMENTATION

In order to be exempt from the prohibitions of section 9 of the Act, EPA is responsible for compliance with the following terms and conditions, which implement the reasonable and prudent measures described above.

1. The following terms and conditions will implement reasonable and prudent measure 1.

   1.1 As provided for in the draft revised proposed NPDES permit, a sand filter shall be installed on all water discharge from the Blue River Fish Hatchery to prevent escapement of nonnative aquatic species (including all life stages that may be present) through the discharge. The filter will be installed according to the schedule in the draft revised permit and will be completed and in continuous use within 1 year after the permit effective date. Copies of the progress reports required by the NPDES permit will be furnished to the Service.

   1.2 The oil and grease standard of the NPDES permit shall be modified to indicate that on a daily basis, oil and grease in the discharge should be below detectable levels.

2. The following term and condition will implement reasonable and prudent measure 2.

   2.1 As an additional requirement of the NPDES permit, the instantaneous flow rate of water discharged from the Blue River Fish Hatchery will not exceed more than 50% of the instantaneous flow rate (discharge) of the Blue River immediately above the point of confluence of the hatchery discharge with the river. In other

words, as long as the instantaneous discharge in the Blue River just before its confluence with the hatchery discharge is above 1.4 to 1.8 cfs, then the usual hatchery flow-through discharge rate of 0.7 to 0.9 cfs would be allowed. However, if the instantaneous river flow drops below 1.4 cfs, then the hatchery discharge rate would also be required to drop, so that at a river discharge of 1 cfs, hatchery discharge would not be allowed to exceed 0.5 cfs; at a river discharge of 0.5 cfs, hatchery discharge would not be allowed to exceed 0.25 cfs; and so on.

After two years, the data from the monitoring requirements of the draft revised permit and this incidental take statement shall be evaluated to determine if the dilution levels provided for by this term and condition are satisfactory in achieving compliance with the water quality standards (both numeric and narrative). Based on this evaluation, the requirement for restricting instantaneous hatchery discharge flow rate as a proportion of instantaneous flow rate of the river may be adjusted, either upward or downward. This evaluation will be jointly conducted by EPA and the Service. Any changes to this term and condition as a result of the evaluation will be issued as an amendment to this biological opinion and incidental take statement.

3. The following terms and conditions will implement reasonable and prudent measure 3.

   3.1 As a requirement of the NPDES permit, require installation of a device to continuously measure the instantaneous volume or flow rate of the discharge from the Blue River Fish Hatchery.

   3.2 The draft revised NPDES permit requires monitoring of 11 parameters with effluent samples to be taken from the hatchery discharge above its confluence with the Blue River and ambient samples to be taken from the Blue River upstream and downstream of the hatchery. It should be clarified in the permit that the ambient samples above the hatchery should be taken upstream of the hatchery diversion and the samples below the hatchery should be taken downstream of the confluence with the hatchery discharge.

4. The following term and condition will implement reasonable and prudent measure 4.

   4.1 Reports on compliance with the NPDES permit and terms and conditions 1 through 3 will be submitted to EPA and the Service by the permittee on a monthly basis. If any exceedance of incidental take occurs, the permittee must report it immediately to EPA. As stated above, if anticipated take is exceeded, EPA must immediately reinitiate consultation with the Service and the discharge must be

stopped in the interim period if the impact of the continued exceedance will cause an irreversible adverse impact to loach minnow, razorback sucker and/or their habitats.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. The term conservation recommendations has been defined as Service suggestions regarding **discretionary agency activities** to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's 7(a)(1) responsibility for these species. The Service has no conservation recommendations for the Blue River Hatchery that would be within the authority of EPA.

REINITIATION NOTICE

This concludes formal consultation on issuance of a NPDES permit to the Blue River Fish Hatchery on the upper Blue River in Greenlee County, Arizona. As required by 50 CFR 402.16, reinitiation of formal consultation is required if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may impact 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 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.

If we can be of further assistance, please contact Sally Stefferud or Bruce Palmer.

Sincerely,

for David L. Harlow
Field Supervisor

cc: Fisheries Project Leader, U.S Fish and Wildlife Service, Pinetop, AZ
Field Supervisor, U.S. Fish and Wildlife Service, Albuquerque, NM
Regional Solicitor, Dept. of the Interior, Albuquerque, NM (Attn: Beverly Ohline)

District Ranger, Alpine Ranger District, Apache-Sitgreaves National Forest, Alpine, AZ
Forest Supervisor, Apache-Sitgreaves National Forest, Alpine, AZ
Chief, Regulatory Branch, U.S. Army Corps of Engineers, Phoenix, AZ
Director, New Mexico Department of Game and Fish, Santa Fe, NM
Director, Arizona Game and Fish Department, Phoenix, AZ

LITERATURE CITED

Abarca, F.J. 1987. Seasonal and diel patterns of feeding in loach minnow (Tiaroga cobitis) Girard). Proceedings of the Desert Fishes Council 20:20.

Anderson, R. and P.R. Turner. 1977. Stream survey of the San Francisco River. New Mexico Department of Game and Fish, Santa Fe, NM. 13 pp + figs.

Arizona Game and Fish Department. 1994. Distribution, abundance and habitat survey for loach minnow (Tiaroga cobitis) in the Blue River, Arizona. August, 1994. Arizona Game and Fish Department, Phoenix, AZ. 19 pp.

Bagley, B., B. Kesner, and C. Secor. 1998. Upper Blue River and tributaries. Fisheries survey. June-July 1998. Arizona State University, Tempe, AZ. 25 pp.

Bagley, B., G.W. Knowles, and T.C. Inman. 1995. Fisheries survey of the Apache-Sitgreaves National Forests, trip reports 1-9. May 1994 to September 1995. Arizona State University, Tempe, AZ. 50 pp.

Bahre, C.J. 1991. A legacy of change. Historic human impact on vegetation in the Arizona borderlands. University of Arizona Press, Tucson, AZ.

Barber, W.E. and W.L. Minckley. 1966. Fishes of Aravaipa Creek, Graham and Pinal Counties, Arizona. The Southwestern Naturalist 11(3):313-324.

Barrett, J.C. 1992. Turbidity-induced changes in reactive distance of rainbow trout. Transactions of the American Fisheries Society 121:437-443.

Behnke, R.J. 1992. Native trout of western North America. American Fisheries Society Monograph 6. Bethesda, MD. 275 pp.

Belsky, A.J. and D.M. Blumenthal. 1997. Effects of livestock grazing on stand dynamics and soils in upland forests of the interior west. Conservation Biology 11(2):315-327.

Bestgen, K.R. 1990. Status review of the razorback sucker, Xyrauchen texanus. Colorado State Univ. Larval Fish Laboratory, Contribution 44, Ft. Collins, CO. 92 pp.

Blinn, D.W., C. Runck, D.A. Clark, and J.N. Rinne. 1993. Effects of rainbow trout predation on Little Colorado spinedace. Transactions of the American Fisheries Society 122:139-143.

Britt, K.D. 1982. The reproductive biology and aspects of the life history of Tiaroga cobitis in southwestern New Mexico. New Mexico State University, Las Cruces. 56 pp.

Bryan, K. 1925. Date of channel trenching (arroyo cutting) in the arid southwest. Science 62(1607):338-344.

Burns, D.C. 1991. Cumulative effects of small modifications to habitat. Fisheries 16(1):12-17.

Carlton, J.T. 1992. Dispersal of living organisms into aquatic ecosystems as mediated by aquaculture and fisheries activities. Pages 13-46 *In*: A. Rosenfield and R. Mann, eds., Dispersal of living organisms into aquatic ecosystems. Maryland Sea Grant Program. College Park, Maryland.

Carmichael, G.J., J.N. Hanson, M.E. Schmidt, and D.C. Morizot. 1993. Introgression among Apache, cutthroat, and rainbow trout in Arizona. Transactions of the American Fisheries Society 122:121-130.

Chamberlain, F.M. 1904. "Notes on work in Arizona" Unpublished manuscript in the files of the U.S. Bureau of Fisheries, Dept. of Commerce and Labor, National Archives. U.S. National Museum, Washington, D.C.. 19 pp.

Chen, S. 1998. Aquacultural waste management. Aquaculture Magazine July/August:63-69.

Coor, C.C. 1992. Down on the Blue. Blue River, Arizona, 1878-1986. Blue River Cowbelles. Art Printing West, Goodyear, AZ.

Courtenay, W.R. 1993. Biological pollution through fish introductions. Pp. 35-61 *In:*B.N. McKnight, ed., Biological Pollution: The control and impact of invasive exotic species. Indiana Academy of Science. Indianapolis

Courtenay, W.R. and J.R. Stauffer,Jr.. 1984. Distribution, biology, and management of exotic fishes. Johns Hopkins University Press, Baltimore, Maryland. 430 pp.

Creef, E.D., R.W. Clarkson, and D.K. McGuinn-Robbins. 1992. Razorback sucker (Xyrauchen texanus) and Colorado squawfish (Ptychocheilus lucius) reintroduction and monitoring, Salt and Verde Rivers, Arizona, 1991-1992. Arizona Game and Fish Department, Special Report on Project E5-3, Job 7, Phoenix, AZ. 22 pp.

DeBano, L.F. and L.J. Schmidt. 1989. Interrelationships between watershed condition and health of riparian areas in southwestern United States. Pp. 45-52 In: Practical approaches to riparian resource management. An educational workshop. May 8-11, 1989. Billings, Mont. Gresswell, R.E., B.A. Barton, and J.L. Kershner, Eds. U.S. Bureau of Land Management, Billings, Mont.

Dobyns, H.F. 1981. From fire to flood: historic human destruction of Sonoran Desert riverine oasis. Ballena Press Anthropological Papers No. 20, 222 pp.

Douglas, M.E., P.C. Marsh, and W.L. Minckley. 1994. Indigenous fishes of western North America and the hypothesis of competitive displacement: Meda fulgida (Cyprinidae) as a case study. Copeia 1994(1):9-19.

Duce, J.T. 1918. The effect of cattle on the erosion of cañon bottoms. Science 47:450-452.

Dunne, T. and L.B. Leopold. 1978. Water in environmental planning. Freeman Press, San Francisco, CA.

Ffolliott, P.F. and D.B. Throud. 1975. Water yield improvement by vegetation management: focus on Arizona. U.S. Forest Service Rocky Mountain Forest and Range Experiment Station, Ft. Collins, CO.

Gebhardt, K.A., C. Bohn, S. Jensen, and W.S. Platts. 1989. Use of hydrology in riparian classification. Pp. 53-60 In: Practical approaches to riparian resource management. An educational workshop. May 8-11, 1989. Billings, Mont. Gresswell, R.E., B.A. Barton, and J.L. Kershner, Eds. U.S. Bureau of Land Management, Billings, Mont.

Goldberg, R., R. Triplett. 1997. Murky waters: environmental effects of aquaculture in the United States. Environmental Defense Fund. Washington, D.C. 195 pp.

Gordon, N.D., T.A. McMahon, B.L. Finlayson. 1992. Stream hydrology. An introduction for ecologists. John Wiley and Sons. Chichester, England. 526 pp.

Guiver, K. 1976. Implications of large-scale water transfers in the UK, the Ely Ouse to Essex transfer scheme. Chem. Ind. (London) 4:132-135.

Hastings, J.R. 1959. Vegetation change and arroyo cutting in southeastern Arizona. University of Arizona, Arid Lands Program Paper No. 3, Tucson, AZ. 60-67 pp.

Hastings, J.R. and R.M. Turner. 1980. The changing mile. University of Arizona Press, Tucson, AZ. 327 pp.

Hendrickson, D.A. 1987. Memo - update on nongame fish activities, August 26, 1987. Arizona Game and Fish Department, Phoenix, AZ. 3 pp.

Hendrickson, D.A. 1993. Evaluation of the razorback sucker (Xyrauchen texanus) and Colorado squawfish (Ptychocheilus lucius) reintroduction programs in central Arizona based surveys of fish populations in the Salt and Verde Rivers from 1986 to 1990. Arizona Game and Fish Department, Phoenix, AZ. 166 pp.

Hoffman, D.J., B.A. Rattner, G.A. Burton, Jr., and J. Cairns, Jr. 1995. Handbook of ecotoxicology. Lewis Publishers. Boca Raton, FL. 755 pp.

J.M.Montgomery Consulting Engineers, Inc. 1985. Wildlife and fishery studies, upper Gila water supply project. U.S. Bureau of Reclamation, Boulder City, NV. 127 pp.

Kirsch, P.H. 1888. Notes on a collection of fishes obtained in the Gila River at Fort Thomas, Arizona, by Lieut. W.L. Carpenter, U.S. Army. Proceedings of the U. S. National Museum XI:555-558.

Langhorst, D.R. and P.C. Marsh. 1986. Early life history of razorback sucker in Lake Mohave. U.S. Bureau of Reclamation, Boulder City, NV. 24 + figs pp.

Laurenson, L.B.J., and C.H. Hocutt. 1985. Colonization theory and invasive biota: the Great Fish River, a case history. Environmental Monitoring and Assessment 6(1985):71-90.

Leopold, A. 1921. A plea for recognition of artificial works in forest erosion control policy. Journal of Forestry 19:267-273.

Leopold, A. 1924a. Grass, brush, timber, and fire in southern Arizona. Journal of Forestry 22(6):1-10.

Leopold, A. 1924b. Pioneers and gullies. Sunset Magazine May 1924.

Leopold, A. 1946. Erosion as a menace to the social and economic future of the Southwest. A paper read to the New Mexico Association for Science, 1922. Journal of Forestry 44:627-633.

Li, H.W., G.A. Lamberti, R.N. Pearsons, C.K. Tait, J.L. Li, and J.C. Buckhouse. 1994. Cumulative effects of riparian disturbances along high desert trout streams of the John Day Basin, Oregon. Transactions of the American Fisheries Society 123:627-640.

Liston, C., P. Johnson, B. Mefford, and D. Robinson. 1994. Fish passage and protection considerations for the Tongue River, Montana, in association with the Tongue River Dam rehabilitation project. U.S. Bureau of Reclamation. Denver, CO.

Marsh, P.C., F.J. Abarca, M.E. Douglas, and W.L. Minckley. 1989. Spikedace (Meda fulgida) and loach minnow (Tiaroga cobitis) relative to introduced red shiner (Cyprinella lutrensis). Arizona Game and Fish Department, Phoenix, AZ. 116 pp.

Marsh, P.C. and J.E. Brooks. 1989. Predation by ictalurid catfishes as a deterrent to re-establishment of hatchery-reared razorback suckers. The Southwestern Naturalist 34(2):188-195.

Marsh, P.C., J.E. Brooks, D.A. Hendrickson, and W.L. Minckley. 1990. Fishes of Eagle Creek, Arizona, with records for threatened spikedace and loach minnow (Cyprinidae). Journal of the Arizona-Nevada Academy of Science 23(2):107-116.

McCarthy, M.S. 1987. Age estimation for razorback sucker (Pisces: Catostomidae) from Lake Mohave, Arizona and Nevada. Journal of the Arizona-Nevada Academy of Science 21:87-97.

McKnight, B.N. 1993. Biological pollution. The control and impact of invasive exotic species. Indiana Academy of Science. Indianapolis. 261 pp.

Meehan, W.R. 1991. Influences of forest and rangeland management on salmonid fishes and their habitats. American Fisheries Society Special Publication 19, Bethesda, Maryland. 751 pp.

Meffe, G.K. 1983. Ecology of species replacement in the Sonoran topminnow (Poeciliopsis occidentalis) and the mosquitofish (Gambusia affinis) in Arizona. Arizona State University, Tempe, AZ. 143 pp.

Megahan, W.F., J.P. Potyondy, and K.A. Seyedbagheri. 1992. Best management practices and cumulative effects from sedimentation in the South Fork Salmon River: an Idaho case study. Pp. 401-414 In: Watershed Management. Naiman, R.J., Ed. Springer-Verlag, New York, NY.

Miller, R.R. 1961. Man and the changing fish fauna of the American southwest. Papers of the Michigan Academy of Science, Arts, and Letters XLVI:365-404.

Minckley, W.L. 1973. Fishes of Arizona. Arizona Game and Fish Department, Phoenix, AZ. 293 pp.

Minckley, W.L., P.C. Marsh, J.E. Brooks, J.E. Johnson, and B.L. Jensen. 1991. Management toward recovery of the razorback sucker. Pp. 303-357 In: Battle against extinction; Native fish management in the American west. Minckley, W.L. and J.E. Deacon, Eds. University of Arizona Press, Tucson, AZ.

Minckley, W.L. and G.K. Meffe. 1987. Differential selection by flooding in stream fish communities of the arid American southwest. Pp. 93-104 In: Community and evolutionary ecology of North American stream fishes. Matthews, W.J. and D.C. Heins, Eds. University of Oklahoma Press, Norman, OK.

Moyle, P.B. 1976. Inland fishes of California. University of California Press. Berkeley, CA. 405 pp.

Murphy, M.L., C.P. Hawkins, and N.H. Anderson. 1981. Effects of canopy modification and accumulated sediments on stream communities. Transactions of the American Fisheries Society 110(4):469-478.

Naiman, R.J. 1992. Watershed management. Springer-Verlag, New York, NY. 542 pp.

Newcombe, C.P. and J.O.T. Jensen. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. North American Journal of Fisheries Management 16(4):693-727.

Newcombe, C.P. and D.D. MacDonald. 1991. Effects of suspended sediments on aquatic ecosystems. North American Journal of Fisheries Management 11:72-82.

Olmstead, F.H. 1919. A report on flood control of the Gila River in Graham County, Arizona. U.S. Congress. Sixty-fifth - third session. Senate Document 436., Washington, D.C.. 94 pp.

Papoulias, D., D. Valenciano, and D.A. Hendrickson. 1989. A fish and riparian survey of the Clifton Ranger District. Arizona Game and Fish Department, Phoenix, Az. 165 pp.

Pearson, T.N., H.W. Li, and G.A. Lamberti. 1992. Influence of habitat complexity on resistance to flooding and resilience of stream fish assemblages. Transactions of the American Fisheries Society 121:427-436.

Propst, D.L. and K.R. Bestgen. 1991. Habitat and biology of the loach minnow, Tiaroga cobitis, in New Mexico. Copeia 1991(1):29-38.

Propst, D.L., K.R. Bestgen, and C.W. Painter. 1988. Distribution, status, biology, and conservation of the loach minnow (Tiaroga cobitis) Girard in New Mexico. U.S. Fish and Wildlife Service Endangered Species Report 17, Albuquerque, NM. 75 pp.

Propst, D.L., P.C. Marsh, and W.L. Minckley. 1985. Arizona survey for spikedace (Meda fulgida) and loach minnow (Tiaroga cobitis): Fort Apache and San Carlos Apache Indian Reservations and Eagle Creek, 1985. U.S. Fish and Wildlife Service, Albuquerque, NM. 8 + maps pp.

Propst, D.A., J.A. Stefferud, and P.R. Turner. 1992. Conservation and status of Gila trout, Oncorhynchus gilae. The Southwestern Naturalist 37(2):117-125.

Rinne, J.N. 1975. Changes in minnow populations in a small desert stream resulting from naturally and artificially induced factors. The Southwestern Naturalist 20(2):185-195.

Rinne, J.N. 1989. Physical habitat use by loach minnow, Tiaroga cobitis (Pisces: Cyprinidae), in southwestern desert streams. The Southwestern Naturalist 34(1):109-117.

Rinne, J.N., and M. Alexander. 1995. Nonnative salmonid predation on two threatened native species: preliminary observations from field and laboratory studies. Proceedings of the Desert Fishes Council 26:114-116.

Schreiber, D.C. 1978. Feeding interrelationships of fishes of Aravaipa Creek, Arizona. Arizona State University, Tempe, AZ. 312 pp.

Sheldon, D.L. and D.A. Hendrickson. 1988. Report of the 1988 October Fish Count. Arizona Game and Fish Department, Phoenix, AZ. 26 pp.

Shelton, W.L., and R.O. Smitherman. 1984. Exotic fishes in warmwater aquaculture. Pp. 262-301 *In:* W.R. Courtenay, Jr. and J.R. Stauffer, Jr., eds., Distribution, biology, and management of exotic fishes. Johns Hopkins University Press. Baltimore, MD.

Silvey, W. and M.S. Thompson. 1978. The distribution of fishes in selected streams on the Apache-Sitgreaves National Forest. Completion report to USDA Forest Service. Arizona Game and Fish Department, Phoenix, AZ. 49 pp.

Soule, M.E. 1986. Conservation biology. The science of scarcity and diversity. Sinauer Associates, Inc. Sunderland, Mass.

Stefferud, S.E. 1995. Field notes, Blue River near Juan Miller road. May 27-28, 1995. U.S. Fish and Wildlife Service, Phoenix, AZ.

Sublette, J.E., M.D. Hatch, and M. Sublette. 1990. The fishes of New Mexico. University of New Mexico Press, Albuquerque, New Mexico. 393 pp.

Tait, C.K., J.L. Li, G.A. Lamberti, T.N. Pearsons, and H.W. Li. 1994. Relationships between riparian cover and the community structure of high desert streams. Journal of the North American Benthological Society 13(1):45-56.

Tibbets, C.A. 1992. Allozyme variation in populations of the spikedace Meda fulgida and the loach minnow Tiaroga cobitis. Proceedings of the Desert Fishes Council 24:37.

Tibbets, C.A. 1993. Patterns of genetic variation in three cyprinid fishes native to the American southwest. MS Thesis. Arizona State University, Tempe, AZ. 127 pp.

Tyus, H.M. and C.A. Karp. 1990. Spawning and movements of razorback sucker, Xyrauchen texanus, in the Green River basin of Colorado and Utah. The Southwestern Naturalist 35(4):427-433.

U.S. Fish and Wildlife Service. 1986. Endangered and threatened wildlife and plants; determination of threatened status for the loach minnow. Federal Register 51 (208):39468-39478. October 28, 1986.

U.S. Fish and Wildlife Service. 1991. Endangered and threatened wildlife and plants; the razorback sucker (Xyrauchen texanus) determined to be an endangered species. Federal Register 56(205):54957-54967. October 23, 1991.

U.S. Fish and Wildlife Service. 1994a. Endangered and threatened wildlife and plants; designation of critical habitat for the threatened loach minnow (Tiaroga cobitis). Federal Register 59(45):10898-10906. March 8, 1994.

U.S. Fish and Wildlife Service. 1994b. Notice of 90-day and 12-month findings on a petition to reclassify spikedace (Meda fulgida) and loach minnow (Tiaroga cobitis) form threatened to endangered. Federal Register 59(131):35303-35304. July 11, 1994.

U.S. Fish and Wildlife Service. 1994c. Endangered and threatened wildlife and plants; determination of critical habitat for the Colorado River endangered fishes: razorback sucker, Colorado squawfish, humpback chub, and bonytail chub. Federal Register 59(45): 13374-13400. March 21, 1994.

U.S. Fish and Wildlife Service. 1994d. Biological opinion on EPA approval of Arizona water quality standards for navigable waters. Feb. 16, 1994. USFWS. Phoenix, AZ. 76 pp. + app.

U.S. Fish and Wildlife Service. 1997. Biological opinion on rerouting of a portion of FR 281 near Bush Creek. October 14, 1997. USFWS. Phoenix, AZ. 30 pp + figs.

U.S. Fish and Wildlife Service. 1998. Endangered and threatened wildlife and plants: revocation of critical habitat for the Mexican spotted owl, loach minnow, and spikedace. Federal Register 63(57):14378-14379.

U.S. Geological Survey. 1978. Water resources data, Arizona, water year 1978. Water-data report AZ-78-1. Tucson, AZ.

U.S. Geological Survey. 1991. Water resources data, Arizona, water year 1991. Water-data report AZ-91-1. Tucson, AZ.

U.S. Geological Survey. 1996. Water resources data, Arizona, water year 1996. Water-data report AZ-96-1. Tucson, AZ

Vives, S.P. and W.L. Minckley. 1990. Autumn spawning and other reproductive notes on loach minnow, a threatened cyprinid fish of the American southwest. The Southwestern Naturalist 35(4):451-454.

Waters, T.F. 1995. Sediment in streams. Sources, biological effects, and control. American Fisheries Society, Monograph 7, Bethesda, MD. 251 pp.

Welcomme, R.L. 1984. International transfers of inland fish species. Pp. 8-21 *In:* W.R. Courtenay, Jr. and J.R. Stauffer, Jr., eds., Distribution, biology, and management of exotic fishes. Johns Hopkins University Press. Baltimore, MD.

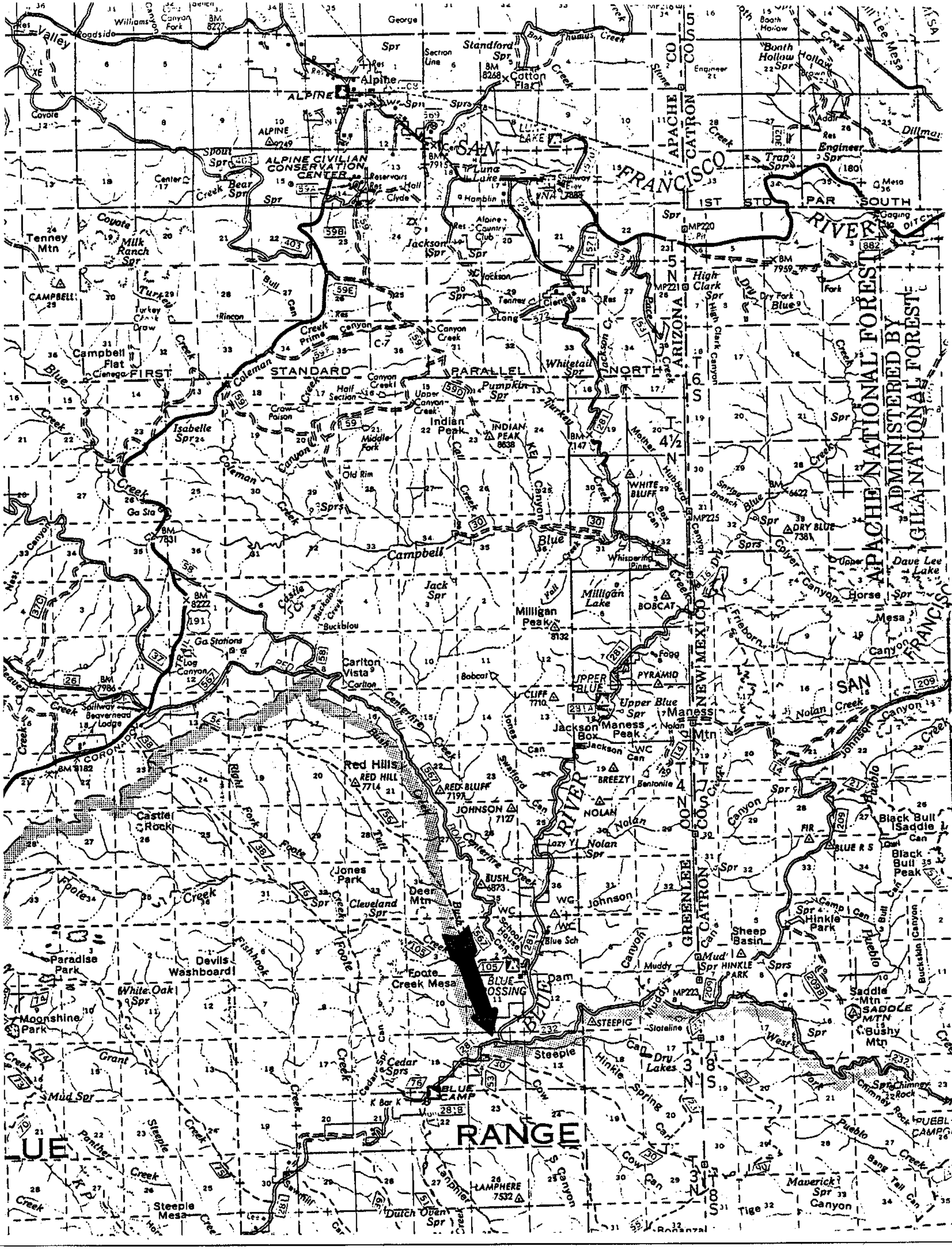
Welcomme, R.L. 1988. International introductions of inland aquatic species. Food and Agriculture Organization of the United Nations (FAO), FAO Fisheries Tech. Paper 294. Rome, Italy. 318 pp.

White, R.J., J.R. Karr, and W. Nehlsen. 1995. Better roles for fish stocking in aquatic resource management. American Fisheries Society Symposium 15:527-547.

Williams, J.E., D.B. Bowman, J.E. Brooks, A.A. Echelle, R.J. Edwards, D.A. Hendrickson, and J.J. Landye. 1985. Endangered aquatic ecosystems in North American deserts with a list of vanishing fishes of the region. Journal of the Arizona-Nevada Academy of Science 20(1):1-62.

Wood, D.J., S.G. Fisher, and N.B. Grimm. 1990. Pools in desert streams: limnology and response to disturbance. Journal of the Arizona-Nevada Academy of Science 26(2):171-182.

FIGURE 1 - UPPER BLUE RIVER AND PROJECT AREA


Alpine
ALPINE
ALPINE CIVILIAN CONSERVATION CENTER
SAN FRANCISCO RIVER
Luna Lake
Alpine Country Club
Tenney Mtn
Milk Ranch Spr
CAMPBELL
Campbell Flat
FIRST STANDARD PARALLEL NORTH
1ST STD PAR SOUTH
APACHE CO
CATRON CO
ARIZONA
NEW MEXICO
GREENLEE CO
CATRON CO
APACHE NATIONAL FOREST
ADMINISTERED BY
GILA NATIONAL FOREST
Coleman Creek
Isabelle Spr
Indian Peak
INDIAN PEAK 8638
Pumpkin Spr
WHITE BLUFF
Campbell
Jack Spr
Milligan Peak
Milligan Lake
BOBCAT
Whispering Pines
Carlton Vista
Centerfire Creek
Red Hills
RED HILL 7714
RED BLUFF 7197
JOHNSON 7127
CLIFF 7710
UPPER BLUE
PYRAMID
Upper Blue Spr
Maness Mtn
Maness Peak
Jackson Box
BREEZY
NOLAN
BLUE RIVER
Nolan Spr
Lazy Y
Castle Rock
Jones Park
Deer Mtn
Cleveland Spr
BUSH 6873
Blue Sch
BLUE CROSSING
Foote Creek Mesa
Devils Washboard
Paradise Park
White Oak Spr
Moonshine Park
Fishhook
STEEPIG
Steeple
Dry Lakes
Cedar Sprs
BLUE CAMP
K Bar K
RANGE
LAMPHERE 7532
Dutch Oven Spr
Steeple Mesa
Sheep Basin
HINKLE PARK
Hinkle Park
Mud Spr
SADDLE MTN
Saddle Mtn
Bushy Mtn
Black Bull Saddle
Black Bull Peak
BLUE R S
FIR
Chimney Rock
PUEBLO CAMPGROUND
Maverick Spr
Canyon
Tige
Dave Lee Lake
Horse Spr
Mesa
DRY BLUE 7381
High Clark Spr
Engineer Spr
Trap Spr
Booth Hollow Spr
Cotton Flat
Standford Spr
George
Roadside
Valley
Coyote
Spout Spr
Bear Spr
Beaverhead Lodge
CORONADO
TRAIL
Log Canyon
BM 7986
BM 8222
BM 7831
Nolan Creek
Johnson Canyon
Pueblo Creek
Bang Tail Can
Cow Can
Hinkle Spring Can
Grant Creek
Mud Spr
Panther Creek
Lanphier
Sawmill
Bonanza

APPENDIX 1 - REVISED DRAFT NPDES PERMIT FOR BLUE RIVER FISH HATCHERY

Inventory No. 102 941

Permit No. AZ0023949

AUTHORIZATION TO DISCHARGE UNDER THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C. 1251 et seq., the "Act"),

Blue River Fish Hatchery, Inc.
P. O. Box 67
Blue, Arizona 85922

is authorized to discharge from the Blue River Fish Hatchery located 22 miles south of Alpine in Greenlee County, Arizona (Discharge Serial No. 001: effluent from fish hatchery) to the Blue River at:

Discharge No.	Latitude	Longitude
001	+ 33° 36' 21"	- 109° 06' 41"

Township 03N, Range 31E, Section 14

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein, and in the attached 16 pages of EPA Region 9 "Standard Federal NPDES Permit Conditions," dated May 10, 1990.

This permit shall become effective on

This permit and the authorization to discharge shall expire at midnight,

Signed this _____ day of _____ 199 .

For the Regional Administrator

Alexis Strauss, Acting Director
Water Division

6. cause the growth of algae or aquatic plants that inhibit or prohibit the habitation, growth or propagation of other aquatic life or that impair recreational uses;

7. cause or contribute to a violation of an aquifer water quality standard prescribed in A.A.C. R18-11-405 or A.A.C. R18-11-406; or

8. change the color of the navigable water from natural background levels of color.

C. The discharge shall be free from oil, grease and other pollutants that float as debris, foam, or scum; or that cause a film or iridescent appearance on the surface of the water; or that cause a deposit on a shoreline, bank or aquatic vegetation.

D. Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location:

Effluent samples shall be taken downstream from the last treatment process and prior to mixing with the receiving waters.

E. The discharge shall not:

1. Raise the natural ambient water temperature of the receiving water more than one (1) degree celsius;

2. cause the turbidity of the receiving water to exceed 10 nephelometric turbidity units; or

3. lower the dissolved oxygen concentration of the receiving water to less than seven (7) mg/l or 90% saturation, whichever is less.

F. If construction or modification of the discharge point or any other part of the treatment facility is within the jurisdictional area of the US Army Corps of Engineers, a Section 404 Permit may be required. For information please call the Arizona Department of Environmental Quality, Engineering Review Desk at (602) 207-4677 and ask for the Surface Water Quality Certification Engineer.

G. Reopener

This permit may be modified in accordance with the requirements set forth at 40 CFR Parts 122 and 124, to include appropriate conditions or limits to address potential impacts of the discharge (including nitrogen) from this facility on downstream receiving waters.

II. MONITORING AND REPORTING

A. Reporting of Monitoring Results

and record data more often than twice the frequencies listed in the monitoring requirements. If there is no discharge, monitoring is not required.

C. Monitoring Modification

Monitoring, analytical, and reporting requirements may be modified by the Regional Administrator upon due notice.

III. SPECIAL CONDITIONS

A. Construction Schedule

The permittee shall design and construct a sand filter to prevent the escapement of nonnative aquatic species through the discharge in accordance with the following reportable milestone:

Activity	Completion Date
1. Complete design of sand filter	3 months after permit effective date
2. Start Construction	4 months after permit effective date
3. Complete Constsruction of sand filter	10 months after permit effective date
4. Start routine use of sand filter	12 months after permit effective date

B. Construction Reporting Schedule

The permittee shall shall report progress of activities in a quarterely report to be submitted along with the DMRs (See Part II.A) that correspond to the months of January, April, July, October. The report shall include a summary of activities initiated and completed with corresponding dates. A discussion of progress and anticipated completion should also be included.

C. Ambient Monitoring Program

The permittee shall monitor water quality upstream and downstream of the Hatchery. Monitoring shall be conducted quarterely (January, April, July, October) for two (2) years starting the first monitoring month after the effective date of the permit. The permittee shall take grab samples from the same locations during each sampling month. Sampling and testing shall be in conformance with procedures outlined in 40 CFR Part 136. The permittee shall sample for the following parameters: dissolved oxygen, temperature, turbidity, and pH. Results shall be reported with the corresponding monthly DMR submittal as outlined in Part II.A. above.

D. Incidental Take

Incidental take of the Loach minnor or Razorback sucker may be exceeded if any of the following situations occur:

measurements were made.

2. A "discrete" sample means any individual sample collected in less than 15 minutes.

3. The "daily maximum" mass limit means the total discharge by mass during any calendar day.

4. The "monthly or weekly average" concentration, other than for fecal or total coliform bacteria, means the arithmetic mean of consecutive measurements made during calendar month or weekly period, respectively. The "monthly or weekly average" concentration for fecal or total coliform bacteria means the geometric mean of measurements made during a monthly or weekly period, respectively. The geometric mean is the nth root of the product of n numbers.

5. The "daily maximum" concentration means the measurement made on any single discrete sample or composite sample.

6. A "composite sample" means, for flow rate measurements, the arithmetic mean of no fewer than eight (8) individual measurements taken at equal intervals for eight (8) hours or for the duration of discharge, whichever is shorter. A composite sample means, for other than flow rate measurement, a combination of eight (8) individual portions obtained at equal time intervals for eight (8) hours or for the duration of the discharge, whichever is shorter. The volume of each individual portion shall be directly proportional to the discharge flow rate at the time of sampling. The sampling period shall coincide with the period of maximum discharge flow.

position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) and,

3) The written authorization is submitted to the Director.

c. Changes to Authorization. If an authorization under paragraph (b) of this section is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of paragraph (b) of this section must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

d. Certification. Any person signing a document under paragraph (a) or (b) of this section shall make the following certification:

I certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

3. Duty to Comply [40 CFR 122.41(a)]

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

a. The permittee shall comply with the effluent standards or prohibitions established under section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulation that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

b. The Clean Water Act provides that:

1) Any person who causes a violation of any condition in this permit is subject to a civil penalty not to exceed $25,000 per day of each violation. Any person who negligently causes a violation of any condition in this permit is subject to a fine

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

8. Property Rights [40 CFR 122.41(g)]

This permit does not convey any property rights of any sort, or any exclusive privilege.

9. Duty to Provide Information [40 CFR 122.41(h)]

The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit or to determine compliance with this permit. The permittee shall also furnish to the Director upon request, copies of records required to be kept by this permit.

10. Inspection and Entry [40 CFR 122.41(i)]

The Permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and such other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the terms of the permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring equipment or control equipment), practices or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

11. Monitoring and Records [40 CFR 122.41(j)]

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of

subject to a fine of not more than $20,000 per day of violation, or imprisonment of not more than four years, or both. [Updated pursuant to the Water Quality Act of 1987]

13. Reporting Requirements [40 CFR 122.41(l)]

a. Planned changes. The permittee shall give notice to the Director as soon as possible of any planned physical alterations of additions to the permitted facility. Notice is required only when:

1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR 122.29(b); or

2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR 122.42(a)(1).

3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

b. Anticipated noncompliance. The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

c. Transfers. This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Clean Water Act. (See 40 CFR 122.61; in some cases, modification or revocation and reissuance is mandatory).

d. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.

2) If the Permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 40 CFR Part 136 or in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise

application or in any report to the Director, it shall promptly submit such facts or information.

14. Bypass [40 CFR 122.41(m)]

a. Definitions

1) "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

2) "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of paragraphs (3) and (4) of this section.

c. Notice.

1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of bypass.

2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph (a)(6) of section 13 (24-hour notice).

d. Prohibition of bypass.

1) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:

a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment down time. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgement to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

1) One hundred micrograms per liter (100 µg/l);

2) Two hundred micrograms per liter (200 µg/l) for acrolein and acrylonitrile; five hundred micrograms per liter (500 µg/l) for 2,4-dinitrophenol and for 2-methyl-4,6-dinitrophenol; and one milligram per liter (1 mg/l) for antimony;

3) Five times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7); or

4) The level established by the Director in accordance with 40 CFR 122.44(f).

b. That any activity has occurred or will occur which would result in any discharge, on a nonroutine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels":

1) Five hundred micrograms per liter (500 µg/l);

2) One milligram per liter (1 mg/l) for antimony;

3) Ten (10) times the maximum concentration value reported for that pollutant in the permit application in accordance with 40 CFR 122.21(g)(7);

4) The level established by the Director in accordance with 40 CFR 122.44(f).

17. Publicly Owned Treatment Works [40 CFR 122.42(b)]

This section applies only to publicly owned treatment works as defined at 40 CFR 122.2.

a. All POTW's must provide adequate notice to the Director of the following:

1) Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to section 301 or 306 of the CWA if it were directly discharging those pollutants; and

2) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

3) For the purposes of this paragraph, adequate notice shall include information on (i) the quality and quantity of effluent introduced into the POTW, and (ii) any

c. Should a user of the privately owned treatment works desire authorization to discharge non-domestic wastes, the permittee shall submit a request for permit modification and an application, pursuant to 40 CFR 122.44(m), describing the proposed discharge. The application shall, to the extent possible, be submitted using EPA Forms 1 and 2C, unless another format is requested by the permitting authority. If the privately owned treatment works or collection system user is different from the permittee, and the permittee agrees to allow the non-domestic discharge, the user shall submit the application and the permittee shall submit the permit modification request. The application and request for modification shall be submitted at least 6 months before authorization to discharge non-domestic wastes to the privately owned treatment works or collection system is desired.

20. Transfers by Modification [40 CFR 122.61(a)]

Except as provided in section 21, a permit may be transferred by the permittee to a new owner or operator only if the permit has been modified or revoked and reissued (under 40 CFR 122.62(b)(2)), or a minor modification made (under 40 CFR 122.63(d)), to identify the new permittee and incorporate such other requirements as may be necessary under the CWA.

21. Automatic Transfers [40 CFR 122.61(b)]

An alternative to transfers under section 20, any NPDES permit may be automatically transferred to a new permittee if:

a. The current permittee notifies the Director at least 30 days in advance of the proposed transfer date in paragraph (2) of this section;

b. The notice includes a written agreement between the existing and new permittee containing a specific date for transfer of permit responsibility, coverage, and liability between them; and

c. The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify or revoke and reissue the permit. A modification under this subparagraph may also be a minor modification under 40 CFR 122.63. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph (2) of this section.

22. Minor Modification of Permits [40 CFR 122.63]

Upon the consent of the permittee, the Director may modify a permit to make the corrections or allowances for changes in the permitted activity listed in this section, without following the procedures of 40 CFR Part 124. Any permit modification not processed as a minor modification under this section must be made for cause and with 40 CFR Part 124

c. A determination that the permitted activity endangers human health or the environment and can only by regulated to acceptable levels by permit modification or termination; or

d. A change in any condition that requires either a temporary or a permanent reduction or elimination of any discharge controlled by the permit (for example, a plant closure or termination of discharge by connection to a POTW).

24. Availability of Reports [Pursuant to Clean Water Act Section 308]

Except for data determined to be confidential under 40 CFR Part 2; all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Regional Administrator. As required by the Act, permit applications, permits, and effluent data shall not be considered confidential.

25. Removed Substances [Pursuant to Clean Water Act Section 301]

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

26. Severability [Pursuant to Clean Water Act Section 512]

The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and remainder of this permit, shall not be affected thereby.

27. Civil and Criminal Liability [Pursuant to Clean Water Act Section 309]

Except as provided in permit conditions on "Bypass" (Section 14) and "Upset" (Section 15), nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance.

28. Oil and Hazardous Substance Liability [Pursuant to Clean Water Act Section 311]

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Clean Water Act.

29. State or Tribal Law [Pursuant to Clean Water Act Section 510]

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the operator from any responsibilities, liabilities, or penalties established pursuant to