

**BIOLOGICAL ASSESSMENT  
FOR THE  
GRAND VALLEY PROJECT  
DIVERSION DAM  
ENDANGERED FISH PASSAGE FACILITIES**



**prepared by  
U.S. Bureau of Reclamation  
Western Colorado Area Office**

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**EXECUTIVE SUMMARY**

This biological assessment was prepared to evaluate anticipated project effects on federally listed threatened and endangered species and their habitats resulting from the construction of fish passage facilities at the Grand Valley Project Diversion Dam in Mesa County, Colorado. The project is located on the Colorado River approximately 7 miles northeast of Palisade, Colorado (see Figure 1). The facilities will consist of a selective fish passage structure to allow endangered fish, as well as other native fishes, to move upstream of the diversion dam. A fish screen will also be installed in the Government Highline Canal to prevent fish entrainment. The Upper Colorado River Endangered Fishes Recovery Implementation Program has identified this diversion dam as a barrier to fish movement and the need to restore passage to connect 44 river miles of endangered fish critical habitat upstream with 193 river miles of critical habitat downstream.

Informal consultation with the U.S. Fish and Wildlife Service and subsequent evaluations resulted in the identification of five (5) endangered and one (1) threatened species that may occur within the project area. This biological assessment also evaluates one additional species, Uinta Basin hookless cactus, known to occur in the area, but not included on the Service list. The species and anticipated effects are listed below.

<b>Species (Common Name)</b>	<b>Status</b>	<b>Anticipated Effects</b>
Uinata Basin Hookless Cactus	Threatened	No effect
Razorback Sucker	Endangered	May effect, not likely to adversely effect (Beneficial)
Colorado Pikeminnow	Endangered	May effect, not likely to adversely effect (Beneficial)
Humpback Chub	Endangered	No effect
Bonytail Chub	Endangered	May effect, not likely to adversely effect (Potentially Beneficial)
Bald Eagle	Threatened	No effect
Southwestern Willow Flycatcher	Endangered	No effect

The project would result in no additional water depletions. Water needed to operate the fish passage structure and fish screen is non-consumptive and would be immediately returned to the river. The project area is located 8.5 river miles upstream of the “15-miles reach”, a sensitive reach of the Colorado River. The “15-Mile Reach includes the section of the Colorado River from the Grand Valley Irrigation Company Diversion Dam to the confluence of the Colorado and Gunnison Rivers. The Upper Colorado River Endangered Fishes Recovery Implementation

Program identified three diversion dams at the upstream end of the “15-Mile Reach” as barriers to endangered fish movement. Restoring fish passage at these structures would connect 53 river miles of critical habitat (Grand Valley Irrigation Company Diversion Dam to Rifle, Colorado) with 185 river miles of critical habitat downstream (Lake Powell to Grand Valley Irrigation Company Diversion Dam).

A final Programmatic Biological Opinion was issued by the U.S. Fish and Wildlife Service in 1999 that addressed Bureau of Reclamation’s operations, depletions, other depletions, and funding and implementation of Recovery Program actions in the Upper Colorado River above the confluence with the Gunnison River. It was determined that recovery actions including fish passage structures and fish screens would likely benefit endangered fish.

The proposed project is not expected to impact bald eagle and southwestern willow flycatcher and is expected to be beneficial to three listed Colorado River fishes.

## TABLE OF CONTENTS

### EXECUTIVE SUMMARY

#### 1.0 INTRODUCTION

	<u>Pg.</u>
1.1 Purpose	01
1.2 Recovery Program	01
1.2 Agency Coordination	02

#### 2.0 PROJECT DESCRIPTION

2.1 Project Design	02
2.2 Construction	04
2.3 Operation, Maintenance and Replacement Measures	04

#### 3.0 FEDERALLY LISTED SPECIES

3.1 Uinta Basin Hookless Cactus	05
3.2 Razorback Sucker	06
3.3 Colorado Pikeminnow	09
3.4 Bonytail Chub	11
3.5 Humpback Chub	13
3.6 Bald eagle	15
3.7 Southwestern willow flycatcher	16

#### 4.0 CONCLUSIONS

#### 5.0 LITERATURE CITED

#### 6.0 FIGURES

Figure 1 - Three Diversion Dams on the Colorado River	23
Figure 2 - Drawing of Grand Valley Project Fish Facilities	24
Figure 3 - Conceptual Design for Fish Ladder	25

#### 7.0 ATTACHMENTS

U.S. Fish and Wildlife Service Memorandum

## **1.0 INTRODUCTION**

### **1.1 Purpose**

The Grand Valley Project (GVP) Diversion Dam and Government Highline Canal are major features of the Bureau of Reclamation's Grand Valley Project. The project was constructed from 1912 to 1917 and provides irrigation water to approximately 26,000 acres in the Grand Valley. The Grand Valley Project Dam and the Government Highline Canal have been operated and maintained by the Grand Valley Water Users Association since 1949. The Grand Valley Project provides irrigation water to four irrigation districts (Grand Valley Water Users Association and the Orchard Mesa, Palisade, and Mesa County Irrigation Districts), and water is used for hydropower production for the Grand Valley Project and as cooling water for the Public Service Company of Colorado Cameo Coal Generating Plant.

The Bureau of Reclamation is proposing to construct a selective fish passage structure at the Grand Valley Project (GVP) Diversion Dam and install a fish screen in the Government Highline Canal. A need has been identified to allow endangered fish to move upstream past the GVP Diversion Dam and to prevent endangered fish from becoming entrained in the Government Highline Canal. The Purpose of the project is help restore native Colorado pikeminnow and razorback sucker populations in the 44 miles of river between the diversion and the city of Rifle, Colorado. Other purposes include the protection of existing water rights and uses.

### **1.2 Recovery Program**

The Colorado pikeminnow and razorback sucker are only found in the Colorado River Basin and are listed as endangered under the Endangered Species Act of 1973. The Colorado River has been highly developed for human use, resulting in significant habitat changes. The introduction of non-native fish into the river system further impacted the endangered fish with predation and competition for food and habitat. The U.S. Fish and Wildlife Service maintains that the endangered fish risk extinction unless timely actions are taken to reverse habitat losses.

As a result of listing and the need to meet current and future water needs within the Upper Colorado River Basin, the Recovery Implementation Program for Endangered Fishes in the Upper Colorado River Basin (Recovery Program) was established. This cooperative effort includes the States of Colorado, Utah and Wyoming; Bureau of Reclamation, U.S. Fish and Wildlife Service, Western Area Power Administration, water development interests and

environmental organizations. The Recovery Program's goal is to allow water development to proceed to meet the needs of the basin while recovering the endangered fish (U.S. Fish and Wildlife Service, 1987a). So long as progress is being made under the Recovery Program, the program serves as the best method of averting confrontations between resource protection and water development.

The Recovery Program consists of five (5) major elements (U.S. Fish and Wildlife Service 1987a and 1987b):

- 1) Protection of in-stream flows for habitat.
- 2) Habitat development and maintenance.
- 3) Native fish stocking.
- 4) Management of non-native species and sport fishing.
- 5) Research, monitoring, and data management.

## **1.2 Agency Coordination and Consultation**

A list of Federally threatened or endangered species was requested from the U. S. Fish and Wildlife Service on June 16, 2000. The Service responded on July 17, 2000 with a list of six species that may occur within the project area.

The species list included the bald eagle (*Haliaeetus leucocephalus*), Southwestern willow flycatcher (*Empidonax traillii extimus*), Colorado Pikeminnow (*Ptychocheilus lucious*), Razorback sucker (*Xyrauchen texanus*), Humpback chub (*Gila cyphia*), and Bonytail (*Gila elagans*). One additional threatened species, Uinta Basin hookless cactus (*Sclerocactus glaucus*) is also evaluated in this biological assessment.

## **2.0 PROJECT DESCRIPTION**

### **2.1 Project Design**

#### **Fish Ladder**

The proposed project was designed based on the behavior of the endangered fish, their swimming habits, dam operations and maintenance needs, and the need to limit impacts to diversions for irrigation and hydropower uses.

The fish passage structure would be built through the dam roller bay closest to Interstate 70 (Figure 1). The structure would consist of a fish ladder with a series of baffles or boulders to reduce flows to allow endangered fish to swim upstream of the diversion dam.

An instream boulder pool-rifle type design was used to restore fish passage at the Grand Valley Irrigation Company Diversion Dam in 1998, and a side channel concrete ladder type design was constructed at the Redlands Diversion Dam in 1996. Both fish passage structures appear to be successful and are being used by endangered and native fishes. Because of the close proximity of Interstate 70 and the Union Pacific Railroad, an instream type structure is needed.

Approximately 25 to 35 cfs would be needed to operate the ladder. An additional 100 to 150 cfs would be needed to serve as an attraction flow to help fish find the ladder. The water should always be available without effecting existing water rights.

A selective passage facility is also being considered in the preliminary design at the GVP fish ladder. The selective passage facility would consist of a fish trap similar to the one at the Redlands Diversion Dam to allow the sorting of native and nonnative fishes. The U.S. Fish and Wildlife Service would operate the selective passage facility from April to October of each year. Selective fish passage at the GVP is being considered because the Bureau of Reclamation's preferred alternative at the Price-Stubb Diversion Dam is to remove the structure (U.S. Bureau of Reclamation 1999). The Price-Stubb Diversion Dam is approximately 5 miles downstream from the GVP Dam and 3 miles upstream from the GVIC Diversion Dam (see Figure 1). A Federal Energy Regulatory Commission (FERC) permit is being reviewed by FERC for a proposed hydropower plant at the Price-Stubb Diversion Dam. If the permit is approved, a fish ladder would be constructed at Price-Stubb with selective passage. Selective fish passage would be constructed at either the GVP or Price-Stubb diversion dams, but not both.

### Fish Screen

A fish screen to prevent fish from entering the Government Highline Canal is also included in the project designs for the fish passage facilities. Two fish screen locations are being evaluated at this time.

Screening option 1 would be located in the canal about 2,000 feet downstream from the headworks. The screen would prevent fish from becoming entrained in the canal further downstream and would direct fish to a pipe chute which would return them to the river. A flow of 80 to 120 cfs would be needed to operate the chute. Therefore, it would be necessary to divert this additional flow into the canal so the amount of water remaining for irrigation and hydropower purposes is unchanged. The fish screen and chute would be located upstream from the existing gage that measures flow in the canal. Fish screens would be removed for maintenance and during times of heavy icing in the canal. An additional gage would be installed to measure flow of water to the chute.

Screening option 2 would involve removing the inlet gates at the diversion dam and replacing them with screens. This option would also include installing a check structure in the canal somewhere downstream. This option would not require additional flows to be diverted to

operate a fish return chute. The western most roller gate could be operated to maintain sweeping flows across the screens. For this option, the canal entrance width would need to be enlarged to allow sufficient screen area to prevent fish impingement, and prevent trash and debris from collecting on the screen. This option would also allow for removable screens.

With both screen options, the fish screen would be operated from April to November of each year.

## **2.2 Construction**

The fish passage facilities would be completed under a construction contract. The Grand Valley Water Users Association would participate in the design process to ensure the facility does not conflict with the operations and maintenance of the diversion dam and canal system. Temporary construction easements and permits would also be acquired from all affected land owners prior to construction. Following construction, any damaged area would be restored, as near as possible, to its original condition.

Access to the project area would be via westbound Interstate 70. Construction staging and material storage would be on the bank upstream from the dam and on a gravel bar downstream of the dam. A cofferdam would be used to direct the river around the work area and river flows would not be affected. Reclamation would request Clean Water Act, Section 404 approval under Regional General Permit No. 057 for projects that benefit recovery of endangered fish. The contractor or Reclamation would request water quality certification under Section 401. If discharging water from dewatering is needed, the contractor would obtain a Section 402 permit. Construction would begin after post-peak runoff (July-August) of 2001 to 2002 and take one to two years to complete both the ladder and screen.

Total project cost estimates for the selective fish passage and the fish screens are approximately \$8,000,000.00.

## **2.3 Operations, Maintenance and Replacement Measures**

The U.S. Fish and Wildlife Service would operate the fish passage structure from April through October each year. The Service would monitor native and endangered fish use of the ladder. The fish screen would be operated from April through November. The Grand Valley Water Users Association will operate the fish screen.

A total of 125 to 345 cfs of Colorado River flow would be needed to operate the fish passage structure and fish screen. Because the water is immediately returned to the river and normally at least 640 cfs passes over the dam in this reach, no measures are need to augment existing water supplies for the fish passage or fish screen. Approximately 1,620 cfs is diverted into the Government Highline Canal for a prolonged period during the irrigation season. Due to physical



limitations of the diversion dam, a river flow of approximately 2,600 cfs is necessary to maintain sufficient upstream water surface elevation in the river. When the river flow drops below that level, it is not possible to divert a full supply into the canal.

Additional flow required for either Fish Screen Option 1 or fish ladder would aggravate this problem. Therefore, when natural flows in the river falls below 2,600 cfs, GVWUA may elect to cease use of the fish screen and/or fish ladder. Since canal entrainment could potentially be more detrimental to fish survival than temporary inability to pass the diversion dam, fish passage will be terminated before fish screening. Therefore, if the fish ladder requires a total of 125 cfs to operate and the fish screen requires 100 cfs, both facilities will be operated down to a river flow of 2,825 cfs. At flows below 2,825 cfs, the flow to the fish ladder will decrease until ladder flow is completely off at a river of 2,700 cfs. The 100 cfs for the Fish Screen Option 1 is necessary to return the fish and debris to the river through the chute. If the flow is not available and debris is heavy, it may be necessary to remove the fish screens as soon as the river flow drops below 2,700 cfs. At river flows below 2,600 cfs, both Fish Screen Option 1 and the fish ladder would not be operational.

Since Fish Screen Option 2 would not require additional flows, therefore it may be possible to operate the screen at river flows below 2,700 cfs. However, the screens would restrict some flow into the canal. This could require removal of the screens at flows at or near 2,600 cfs.

### **3.0 FEDERALLY LISTED SPECIES**

The U.S. Fish and Wildlife Service identified six (6) federally listed threatened or endangered species that could potentially occur within the project area in a memorandum dated July 17, 2000 (see attachment). These species are listed in Table 1 of the Executive Summary. Although the Service did not include Uinta hookless cactus, a Federally threatened plant, it is known to occur within the upper Colorado River basin and was also evaluated in this biological assessment. The known distribution and status of these species in the project area are discussed below.

Inventories were conducted by Reclamation biologists in June/July 2000. Inventories included visual surveys for Uinta Basin hookless cactus, bald eagle nesting habitat and Southwestern willow flycatcher habitat. Literature research and personal communications were used to evaluate effects on the Colorado River endangered fishes.

#### **3.1 Uinta Basin Hookless Cactus**

The Uinta Basin hookless cactus (*Sclerocactus glaucus*) was listed by the U.S. Fish and Wildlife Service as threatened in 1979 (U.S. Fish and Wildlife Service 1979). The plant is also protected in Colorado as threatened.

### Life History:

Little is known about the life history of the Uinta Basin hookless cactus. It is a small cactus usually only visible when flowering. Pinkish colored flowering occurs in April-May. After blooming, the cactus may shrink below the ground or become a dull grayish-green color.

### Habitat Preferences / Details:

Uinta Basin hookless cactus generally occurs on cobbly, gravelly, or rock surfaces on river terrace deposits and lower mesa slopes. An exception is the clay badlands population of Pariette Draw near Myton, Utah. This population is morphologically distinct. The cactus is found at elevations between 4,000 and 5,900 feet. Typical slope is between 5-30%. Vegetation associations include desert scrub dominated by shadscale (*Atriplex confertifolia*), galleta (*Hilaria jamesii*), black-sage (*Artemisia nova*), and Indian Rice grass (*Stipa hymenoides*) (U.S. Fish and Wildlife Service 1990a).

### Distribution and Abundance:

The plants' distribution is known to occur in three major population centers in portions of the Uintah Basin in Utah and the Upper Colorado River and Gunnison Basins in Colorado (Delta, Garfield, Mesa and Montrose Counties). Inventories have documented 22,000 plants and the total population number is estimated at 50,000 plants (U.S. Fish and Wildlife Service, 1990a).

### Impacts of the Proposed Project:

The Bureau of Reclamation surveyed the project area for Uinta Basin hookless cactus. No cactus were found within the project area. The project area has been highly altered with the construction of the Grand Valley Project Diversion Dam and Government Highline Canal in 1918, construction of Interstate 70, and the Union Pacific Railroad. The closest known population occurs in Plateau Creek Basin south of the project area (U.S. Dept. of Interior 1985).

## **3.2 Razorback Sucker**

The Razorback sucker (*Xyrauchen texanus*) was listed as endangered by the U.S. Fish and Wildlife on October 23, 1991 (U.S. Fish and Wildlife Service 1991). Critical habitat was designated on March 21, 1994 (U.S. Fish and Wildlife Service 1999).

### Life History:

The razorback sucker is an endemic species unique to the Colorado River Basin. Razorback sucker were historically abundant and widely distributed within warmwater reaches throughout the Colorado River Basin. The species can be identified by its large fleshy subterminal mouth

and is the only sucker with an abrupt sharp-edged dorsal keel behind its head. Adults often exceed 3 kg (6 pounds) in weight and 600 mm (2 feet) in length.

Males are smaller and slimmer than females but have larger fins and a more exaggerated predorsal keel. In late winter to spring, both sexes exhibit breeding colors of dark brown to black dorsally and yellow ventrally with a lateral band that can be orange, reddish, or violet. Riverine spawning is linked to the ascending limb of the hydro graph, generally during May or June in the upper Colorado River Basin (Minckley et al 1991). Spawning appears to be ritual.

#### Habitat Preference/Details:

Razorback suckers occupy a variety of habitats during their lives. In general, razorback suckers prefer calmer, flatwater reaches over higher velocity whitewater or canyon reaches (Minckley et al. 1991). Adults occupy shoreline and mainline channel habitats including slow runs, shallow to deep pools, backwaters, eddies, and other slow velocity habitats associated with sand substrates (Tyus and Karp, 1990; Osmundson and Kaeding 1991). During spawning, preference appears to consist of gravel and cobble substrates clear of fine materials. The fish create depressions of 20 cm or more for spawning. All documented spawning in rivers occur in broad, flatwater areas (Minckley et al. 1991). Young fish remain along shorelines in embayments and tributaries and then disperse into channels or larger backwaters. Juveniles appear to drift downstream into these habitat types (Minckley 1991). Tyus and Karp (1990) and Osmundson and Kaeding (1991) describes these habitat preferences in greater detail.

#### Distribution and Abundance:

Historically, razorback suckers were found in the mainstem Colorado River and major tributaries in Arizona, California, Colorado, Nevada, New Mexico, Utah, Wyoming and in Mexico (Minckley 1983). Population declines can be attributed to constructions of dams and reservoirs, introduction of nonnative fishes, and dewatering of the Colorado River system (U.S. Fish and Wildlife Service 1999). Reproduction may also be affected by selenium contamination in the Upper Colorado River.

The current distribution and abundance of razorback sucker has been significantly reduced throughout the Colorado River system (U.S. Fish and Wildlife Service 1999). In the upper Colorado River basin, razorback sucker populations are the largest in the Green River and lower Yampa River. In the Colorado River, most razorbacks are found in the Grand Valley near Grand Junction, Colorado (U.S. Fish and Wildlife Service 1999). In 1991 and 1992, 28 adults were collected from isolated ponds adjacent to the Colorado River near DeBeque, Colorado (Burdick 1992).

Razorback sucker's range in the Colorado River currently extend upstream to Rifle, Colorado. Most razorbacks have been documented in flooded gravel pit ponds adjacent to the river.

Razorback suckers have been documented as far upstream as river mile 183.6 and in 1988 as far as river mile 235 near Rifle, Colorado (U.S. Fish and Wildlife Service 1999; Burdick 1992).

To date, the Service has stocked 10,998 4- to 11-inch razorback sucker in the upper Colorado River near Parachute, Colorado. Razorback sucker have been documented drifting over all three diversion structures (Burdick 2000). The Recovery Program approved plans to stock 102,100 6-inch and 30,600 12-inch razorback sucker between Rifle and DeBeque Canyon, Colorado within the next five years (U.S. Fish and Wildlife Service 1999).

Critical habitat was designated for the razorback sucker by the U.S. Fish and Wildlife Service on March 21, 1994. The three designated areas encompass 1) Colorado, Mesa and Garfield Counties, 2) Colorado, Delta and Mesa Counties and 3) Utah, Grand, San Juan, Wayne, and Garfield Counties (U.S. Fish and Wildlife Service 1994).

The project area is within the critical habitat designation for Colorado, Mesa and Garfield Counties and reads as follows:

Colorado, Mesa and Garfield Counties. The Colorado River and its 100-year flood plain from the Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6<sup>th</sup> Principal Meridian) downstream to Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Principal Meridian) including the Gunnison River and its 100 year flood plain from the Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian) to the confluence with Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).

#### Impact from the Proposed Project:

It is anticipated that the proposed project will have a positive effect on the distribution and abundance of razorback sucker. The Recovery Program identified three diversion structures on the Upper Colorado River as barriers to endangered fish movement. Restored passage at all three diversion structures would connect the sensitive “15-Mile Reach” with a total of 53 river miles of upstream critical habitat. Fish passage at the GVP Diversion Dam will connect the last 44 river miles of critical habitat (GVP to Rifle).

The Programmatic Biological Opinion issued by the U.S. Fish and Wildlife Service considers fish passage and fish screening at the Grand Valley Project Diversion Dam as a reasonable and prudent alternative for development on the Upper Colorado River (U.S. Fish and Wildlife Service 1999). Fish passage was restored at the GVIC Diversion Dam in 1998 and it is anticipated that fish passage at the Price-Stubbs Diversion Dam will be restored in 2002.

Because the proposed project will not require additional depletions from the Colorado River and is designed to restore endangered fish passage and prevent canal entrainment, the Grand

Valley Project Fish Passage Facilities may effect, but is not likely to adversely effect the Razorback sucker. Project effects would be beneficial to the recovery of the Razorback sucker.

### **3.3 Colorado Pikeminnow**

The Colorado Pikeminnow (*Ptychocheilus lucius*) was listed as endangered by the U.S. Fish and Wildlife on March 11, 1967 (U.S. Fish and Wildlife Service 1967). Critical habitat was designated on March 21, 1994 (U.S. Fish and Wildlife Service 1994).

#### **Life History:**

The Colorado pikeminnow (formerly known as the Colorado squawfish) is an endemic species unique to the Colorado River Basin. It is the largest cyprinid fish native to North America. It is a streamlined riverine fish that can reach lengths of 1.8 m and weights of 45 kg (Minckley 1973). The Colorado pikeminnow is a long-lived (50 + yrs.), large, elongated fish with large nearly horizontal mouth and long, slender pharyngeal teeth adapted for grasping and holding prey (Minckley 1973, Osmundson et al 1997).

Once Colorado pikeminnows reach a size of 3 or 4 inches, their diet consists almost exclusively of other fishes. Males become sexually mature earlier and at a smaller size than females. All fish mature by age 7 and 500 mm (20 inches) in length (Vanicek and Kramer 1969).

Spawning is linked to the descending limb of the natural hydrograph as waters reach or exceed 20° C (U.S. Fish and Wildlife Service 1999). Spawning generally occurs between late June and late August.

#### **Habitat Preference/Details:**

Spawning sites are comprised of clean-cobble substrate with deep interstitial voids (U.S. Fish and Wildlife Service 1999). The Colorado pikeminnow is believed to migrate to pool/riffle areas near the spawning sites. The fish appear to use deep pools, eddies, or mixing zones as resting areas near the spawning sites (Holden 1999). Warm water temperature, discharge, and photoperiod (on or near Spring Solstice) are possible spawning and/or spawning migration cues (Holden 1999).

Young of year Colorado pikeminnow are found most frequently in backwaters. These waters appear to be important nursery habitat until the fish reaches approximately 100 mm total length (Holden 1999).

Adult Colorado pikeminnow have been collected from all habitat types but most frequently from low-velocity areas including runs, eddies, backwaters, and pooled canyon mouths. During spring (pre-runoff and runoff) adults tend to use backwaters, flooded mouths of washes, and

other low-velocity habitats that are warmer than main channel habitats. As warm waters and flows recede, they use eddies and other low-velocity habitats associated with the main channel. During the fall and winter they continue to use lower-velocity shoreline habitats (Holden 1999).

#### Distribution and Abundance:

Historically, Colorado pikeminnow were distributed throughout warm water reaches of the Colorado River Basin from Wyoming to Mexico. By the 1970's, the fish was extirpated from the lower basin below Glen Canyon Dam and from portions of the upper basin. Colorado pikeminnow are currently restricted to the Upper Colorado River Basin and inhabit warm water reaches in the Colorado, Green, and San Juan Rivers and their associated tributaries. Population declines can be attributed to constructions of dams and reservoirs, introduction of nonnative fishes, dewatering of the Colorado River system and the loss of natural hydrology (U.S. Fish and Wildlife Service 1999).

In the Colorado River, Colorado pikeminnow are found in low numbers with recruitment in pulses from infrequent strong year classes (Osmundson and Burnham 1998). In the spring of 2000, sixty-five 14- to 18-inch adult Colorado Pikeminnow were stocked in the upper Colorado River near Parachute, Colorado. These fish were fitted with radio-transmitters to monitor movements. Fish have been documented drifting over the Grand Valley Project Dam. One of the tagged Colorado pikeminnow was recently moved into the Government Highline Canal. This fish passed through the first canal siphon and was located in the canal near Island Acres State Park. Later this fish was located above the Grand Valley Project Dam near the Interstate 70 tunnel. This fish apparently swam back up the canal, through the siphon, and back through the headgates at the diversion dam (Burdick 2000).

Critical habitat was designated for the Colorado pikeminnow by the U.S. Fish and Wildlife Service on March 21, 1994 (U.S. Fish and Wildlife Service 1994). The six designated areas encompass 1) Yampa River, 2) Green River, 3) White River, 4) Gunnison River, 5) Colorado River and 6) San Juan River (U.S. Fish and Wildlife Service 1994).

The project area is within the critical habitat designation for Colorado, Mesa and Garfield Counties and reads as follows:

Colorado, Mesa and Garfield Counties; and Utah, Grand, San Juan, Wayne, and Garfield Counties. The Colorado River and its 100-year flood plain from the Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6<sup>th</sup> Principal Meridian) downstream to North Wash, including the Dirty Devil arm of Lake Powell up to the full pool elevation, in T. 33 S., R 14 E., section 29 (Salt Lake Principal Meridian).

#### Impact from the Proposed Project:

It is anticipated that the proposed project will have a positive effect on the distribution and abundance of Colorado pikeminnow. The Recovery Program identified three diversion structures on the Upper Colorado River as barriers to endangered fish movement. Restored passage at all three diversion structures would connect the sensitive "15-Mile Reach" with approximately 53 miles of upstream critical habitat. Fish passage at GVP Diversion Dam would reconnect the last 44 river miles of critical habitat (GVP to Rifle).

The Recovery Program has stocked 65 14- to 18-inch Colorado pikeminnow so far in 2000 and has approved a plan to stock 800 6-inch and 400 10-inch Colorado Pikeminnow within the next five years in the Colorado River between Rifle and DeBeque Canyon. The basic philosophy used by the Service for stocking is to stock fish upstream and allow the fish to drift downstream into suitable habitat (Burdick 2000). Construction of the fish passage facility and fish screen would allow drifting Colorado pikeminnow to move back upstream of the dam and would prevent entrainment in the Government Highline Canal.

The Programmatic Biological Opinion issued 1999 considers fish passage and fish screening at the Grand Valley Project Diversion Dam as a reasonable and prudent alternative for development on the Upper Colorado River ( U.S. Fish and Wildlife Service 1999).

Because the proposed project will not required additional depletions from the Colorado River and is designed to restore endangered fish passage and prevent canal entrainment, the Grand Valley Project Fish Passage Facilities may effect, but is not likely to adversely effect Colorado pikeminnow. Project effects would be beneficial to the recovery of the Colorado pikeminnow.

### **3.4 Bonytail**

The bonytail (*Gila elegans*) was classified as endangered by the U.S. Fish and Wildlife Service on April 23, 1980 (U.S. Fish and Wildlife Service 1980). Critical habitat was designated on March 21, 1994 (U.S. Fish and Wildlife Service 1994).

#### **Life History:**

Bonytail are considered big or mainstream river species that prefer pools and eddies. It has an elongated body with a thin caudal peduncle, which gives the bonytail its name. Adult bonytail have been described as gray or olivaceous on the back with silvery sides and a white belly. Breeding males exhibit bright red-orange lateral slashes between the paired fins, and small tubercles on the head and anterior of the body. Breeding females are more subdued and tubercles are less well developed. A slight orange coloration at the base of the fins is present in both sexes throughout most of the year (U.S. Fish and Wildlife Service 1990b).

Bonytail generally reach total lengths of 300-350 mm, however specimens up to 600 mm have been documented (Minckley 1973). Bonytail are closely related to humpback chub (*Gila cypha*) and roundtail chub (*Gila robusta*).

#### Habitat Preference/Detail:

Bonytail have always been considered big- or mainstream species, but little is known about the habitat preferences of the bonytail, primarily because the fish is so rare. Bonytail appear to prefer pools and eddies rather than areas with more current (U.S. Fish and Wildlife Service 1990b). Bonytail in Lake Mohave appear to occupy lacustrine habitat rather than upstream riverine habitat near Hoover Dam. Cold water releases from Lake Mead are believed to limit the use of the riverine habitat (U.S. Fish and Wildlife Service 1990b).

#### Distribution and Abundance:

Historically, the bonytail was distributed throughout the Upper and Lower Colorado River Basin. Currently the bonytail is restricted to portions of Lake Mohave and Lake Mead and small non-reproducing populations in upper basin in Desolation and Cataract Canyons (U.S. Fish and Wildlife Service 1990b).

Extensive work since 1974 to develop hatchery stock primarily from Lake Mead was conducted by the U.S. Fish and Wildlife Service. Stocking in the Upper Colorado River between Palisade and Loma, Colorado is being considered by the Recovery Program.

Critical habitat was designated by the U.S. Fish and Wildlife Service in 1994 consisting of portions of the Yampa, Green and Colorado Rivers (U.S. Fish and Wildlife Service 1994). The project area is approximately 57 river miles upstream of the critical habitat area. The critical habitat area is describe as:

Utah, Grand County; and Colorado, Mesa County. The Colorado River from Black Rocks (river mile 137) in T. 10 S., R. 104 W., section 25 (6<sup>th</sup> Principal Meridian) downstream to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Principal Meridian).

#### Impact from the Proposed Project:

It is anticipated that the proposed project may have a beneficial effect on the distribution and abundance of bonytail. The Upper Colorado River Recovery Implementation Program identified three diversion structures on the Upper Colorado River as barriers to endangered fish movement. Restored passage at all three diversion structures may provide for expansion of the distribution of bonytail.



Designated critical habitat for bonytail is approximately 57 river miles downstream of the project area, however, the Recovery Program has approved a stocking plan that would stock 25,600 4-inch and 12,800 8-inch bonytail within the next 5 years within the Palisade-Loma stretch of the Colorado River (Nesler 1995, U.S. Fish and Wildlife Service 1999). Stocking plans are currently under review and may be canceled because of concerns with potential hybridization with other chub species and the limited availability of bonytail for stocking (Nesler 2000). The Yampa River in Dinosaur National Monument below Warm Springs is rated as a higher priority for stocking than the Colorado River (Nesler 1998). The Palisade-Loma reach of the Colorado River is approximately 9 river miles downstream of the Grand Valley Project Diversion Dam.

Because the proposed project will not require additional depletions from the Colorado River, the Grand Valley Project Fish Passage Facilities will have no effect for bonytail. If the Recovery Program stocks bonytail in the Colorado River from Palisade to Loma, Colorado in the future, the Project may be beneficial. The proposed project would eliminate barriers to bonytail movement and prevent entrainment in the Government Highline Canal.

### **3.5 Humpback Chub**

The humpback chub (*Gila cypha*) was classified as endangered by the U.S. Fish and Wildlife Service on March 11, 1967 (U.S. Fish and Wildlife Service 1967). Critical habitat was designated on March 21, 1994 (U.S. Fish and Wildlife Service 1994).

#### **Life History:**

The humpback chub is a medium-sized fish (<500 mm) that is endemic to the Colorado River Basin. The humpback is closely related to the bonytail (*Gila elegans*) and the roundtail chub (*Gila robusta*). Humpback chub have a laterally-compressed and tapering fusiform body, short narrow caudal peduncle with deeply forked tail fin, and large falcate paired fins. Adults have a narrow flattened head with small eyes and a long fleshy snout and inferior subterminal mouth (Valdez and Rayel 1995).

Humpbacks spawn in March to June depending on locality and water temperature. Spawning has been documented to occur soon after the highest spring flow when water temperatures approach 20° C. Juvenile fish are found in low velocity shorelines and backwaters. Recruitment beyond the 2-year age class is extremely rare. Low water temperatures and predation by non-native fish are believed to be the primary factors influencing recruitment (U.S. Fish and Wildlife Service 1999).

#### **Habitat Preference/Detail:**

The humpback chub requires warmer water to induce spawning (>20° C). Adult humpback appear to prefer white water canyons, however its original distribution is not known. Data in

Black Rocks and Westwater Canyon indicates that young utilize shallow areas (U.S. Fish and Wildlife Service 1999).

#### Distribution and Abundance:

The original distribution of humpback chub is unknown. Fossil records trace humpback chub to about 4000 B.C. but the species was not described until the 1940's. Until the 1950's, humpback chub was known only to occur in the Grand Canyon. Specimens were later documented from the Upper Green River, the lower Yampa, the White River, and the Colorado River near Moab, Utah.

The largest populations occur in the Little Colorado and Colorado Rivers in the Grand Canyon, and in Black Rocks and Westwater Canyon in the upper Colorado River. Fish have also been documented in DeBeque Canyon and one fish collected in the Gunnison River (U.S. Fish and Wildlife Service 1999).

Critical Habitat was designated on March 21, 1999 (U.S. Fish and Wildlife Service 1999) and includes a portion of the Colorado River approximately 57 river miles downstream from the project area. The designation is as follows:

Utah, Grand County; and Colorado, Mesa County. The Colorado River from Black Rocks in T. 10 S., R. 104 W., section 25 (6<sup>th</sup> Principal Meridian) downstream to Fish Ford in T. 31 S., R. 24 E., section 35 (Salt Lake Principal Meridian).

#### Impact from the Proposed Project:

It is anticipated that the proposed project have no impact on the distribution and abundance of Humpback Chub. Humpback chub have been documented to show fidelity for the canyon reaches and move very little. Movements of adult chub in Black Rocks were usually restricted to 1 mile or less. Movements have been documented from Black Rocks to Westwater Canyon (approximately 14 miles), but these movements are rare (U.S. Fish and Wildlife Service 1999). The proposed project is not expected to effect humpback chub because the Black Rocks population is approximately 57 miles downstream of the project area, the Service does not plan to stock humpback chub upstream of Black Rocks, and the Colorado River above Palisade does not provide the needed white water canyon type habitat used by the humpback chub.

Because the proposed project will not require additional depletions from the Colorado River and known populations of humpback chub are found 57 miles downstream of the project area, the project is not expected to effect humpback chub.

### **3.6 Bald Eagle**

The bald eagle (*Haliaeetus leucocephalus*) was classified as endangered in 43 of the 48 contiguous states on February 14, 1978. The species was reclassified threatened by the U.S. Fish and Wildlife Service August 11, 1995 (U.S. Fish and Wildlife Service 1995b).

#### Life History:

The bald eagle is distinctive by its white head, white tail plumage, dark brown to charcoal black wing and body plumage, and massive yellow bill. The bald eagle ranges from 30-43 inches (75-108 cm) in height and has a wing span between 7-8 ft. Males often appear darker than females. Females are larger than males. Immature bald eagles (6 months to 2 years old) have a dusky head and tail plumage (Peterson 1990; U.S. Bureau of Reclamation 1994).

Feeding habitats are eclectic, reflecting the opportunistic behavior of large raptors. Prey include fishes, ground dwelling squirrels, waterfowl, ungulate carrion and lagomorphs (U.S. Bureau of Reclamation 1994).

Age of first breeding is commonly assumed to be coincident with acquisition of definitive adult plumage. Breeding commonly occurs between ages 6 and 7 years old. Nest building and repair occur every year. Both male and females build stick nests used over many years. Nests can be as large as 3 m (10 ft.) high and 2.1 m (7 ft.) wide. Alternate nests may be present in the breeding area, but pairs usually use one nest until it either falls from the tree or the tree is lost (U.S. Bureau of Reclamation 1994).

Egg laying normally occurs in early February to mid-April depending on elevation. Average clutch size is two eggs. Incubation averages 31 to 35 days. Eggs hatch in mid-March to mid-May and the nesting period lasts 11 to 14 weeks. Both genders incubate, brood and feed young but the female performs most of the tasks. Fledglings are dependent on adults for 6 to 10 weeks and adults will feed juveniles other than their own (U.S. Bureau of Reclamation 1994).

#### Habitat Preference/Detail:

Bald eagles occupy riparian or lacustrine habitats almost exclusively during the breeding season, but occasionally exploit upland areas for food and roost sites, especially during the winter. Nesting sites are mostly commonly distributed around the periphery of lakes and reservoirs larger than 80 acres in size. Nesting also occurs linearly along forested corridors of major rivers, usually within 1 mile of shore, however cases have been reported of birds nesting as far as 9.3 miles from water while exploiting locally abundant prey such as prairie dogs (U.S. Bureau of Reclamation 1994).

#### Distribution and Abundance:

The bald eagle is the only species of *Haliaeetus* occurring in and restricted to North America. Historic bald eagle distribution included every state (except Hawaii) and Canadian province and portions of northern and eastern Mexico (Brown 1976). Populations became depressed in the 1960's from effects of use of the pesticide DDT.

The Colorado Division of Wildlife considers the Colorado River to be bald eagle winter range. Eagles have been observed in concentrations at the mouth of DeBeque Canyon and usage observed throughout the riparian corridor. The closest known nest site is Westwater (CDOW 2000). A major roosting site was recorded on the south side of Plateau Creek (UTM 750850, 4341250) approximately 10 miles southeast of the project site (Bureau of Land Management 1996).

#### Impacts from the Project:

No roosting or nesting habitat was found on the eastside of the project area, however bald eagles may use the area during winter for foraging. Three large cottonwoods are found across the river near the Dam facilities buildings. One large cottonwood trees also occurs along the river near the proposed Option 1 fish screen. Larger stands of cottonwood trees occur further south of this site, approximately 1/4 mile downstream. No cottonwood trees would be removed during construction.

Construction activities during the winter season in the may result in the birds avoiding the area during the construction period, however the project is not expected to affect wintering bald eagle habitat. No known wintering concentrations of bald eagle are known within 1 mile of the project area, therefore, the project is not expected to impact bald eagles.

### **3.7 Southwestern Willow Flycatcher**

The southwestern willow flycatcher (*Empidonax traillii extimus*) was listed by the U.S. Fish and Wildlife Service as endangered on February 27, 1995 (U.S. Fish and Wildlife Service 1995). Critical habitat was designated on July 22, 1997 (U.S. Fish and Wildlife Service 1997).

#### Life History:

The southwestern willow flycatcher is a small riparian obligate neotropical migrant, approximately 15 cm (5.75 inches) long. It has a greyish green back and wings, whitish throat, light grey-olive breast, and pale yellowish belly. Two wingbars are visible; the eye ring is faint or absent. The upper mandible is dark, the lower is light. The Southwestern willow flycatcher is an insectivore and feeds in dense riparian vegetation (U.S. Fish and Wildlife Service 1995).

The southwestern willow flycatcher normally nests in late May or early June and fledges young in early to mid-July. Birds typically arrive onsite in May, build nests in late May to June, lay

eggs and incubate in June and July, and fledge in late June to early August (Sogge et al. 1997). The presence and status is often confused by the presence of migrating individuals of the northern subspecies passing through southwestern willow flycatcher breeding habitat. The nest is a compact cup of fiber, bark and grass, typically rimmed with feathers and lined with layers of grass or other fine, silky material. Material dangling from the bottom of the nest is often seen (U.S. Fish and Wildlife Service 1995).

#### Habitat Preference/Detail:

The Southwestern willow flycatcher occurs in riparian habitats along water bodies, wetlands and streams, where dense vegetation growths of willows (*Salix sp.*), *Baccharis*, arrowweed (*Plucea sp.*), buttonbush (*Cephalanthus sp.*), tamarisk (*Tamarix sp.*), Russian olive (*Eleagnus sp.*) or other plants are present. Scattered overstory of cottonwood (*Populus sp.*) are often also present. Flycatchers use these riparian communities for both nesting and foraging (U.S. Fish and Wildlife Service 1995). Nesting habitat is described in detail in Sogge et al. (1997).

#### Distribution and Abundance:

The breeding range of the Southwestern willow flycatcher includes southern California, Arizona, New Mexico, southwestern Colorado, extreme southern portions of Nevada and Utah and Western Texas. The Southwestern willow flycatcher is currently known to breed in only about 75 sites in riparian habitats in the southwest. The known breeding population is estimated between 300 and 500 pairs (Sogge et al. 1997).

Population declines are believed to be contributed primarily from habitat loss and modification, however Black-headed cow bird parasitism is also believed to make a significant contribution.

Two territorial males were documented in Plateau Creek approximately 10 miles southeast of the project area. These birds were documented in 1995 by WestWater Engineering. Both sites were described as a thick, narrow band of willows with one or more tall trees or shrubs adjoining with open country on each side of the band (U.S. Bureau of Land Management 1996).

#### Impact from the Project:

No habitat described in Sogge et al. occurs within the proposed fish passage project area. The Colorado River is riprapped along both banks to protect Interstate 70 and the Union Pacific Railroad. The bank is nearly vertical with large boulders. North of the dam, a large (>2 acres), dense patch of reed canary grass (*Phalaris arundinacea*) occurs along the southern bank where seasonal flooding occurs. One mature tamarisk (6 ft.) is located approximately 100 yards downstream of the diversion dam on the south bank.

Several patches (<50 ft.) of salt cedar (*Tamarix pentandra*) occur along the river near the proposed Option 1 fish screen outlet channel. These patches may provide some limited habitat for southwestern willow flycatcher, but these areas will not be modified by construction activities. Scouring rush (*Equistum hyemale*), skunkbush (*Rhus trilobata*), canary reed grass, and poison ivy (*Rhus radicans*) are the predominate vegetation within the Option 2 fish screen area. No habitat for Southwestern willow flycatcher habitat occurs within or in close proximity of the Option 2 fish screen site.

Because Fish Screen Option 1 would be constructed during the winter months, outside the nesting season for Southwestern willow flycatcher, and the project would not remove or disturb nesting habitat, the proposed project is not expected to impact Southwestern willow flycatchers.

Constructing the fish ladder and Fish Screen Option 2 (replacing the existing intake gates with screens) would not impact Southwestern willow flycatcher habitat and, therefore is expected to have no effect.

#### **4.0 CONCLUSIONS**

No new depletions would occur from the proposed project. The proposed project would be beneficial to razorback sucker and Colorado Pikeminnow by restoring fish passage to reconnect 44 miles of critical habitat upstream of the diversion dam. Constructing selective fish passage at either the GVP Diversion Dam or Price-Stubb Dam would be beneficial to razorback sucker and Colorado pikeminnow by restricting movement and removing non-native fish which compete with or are predators of the endangered fish. Installing fish screens in the Government Highline Canal would also be beneficial to the razorback sucker and Colorado pikeminnow because it would reduce the risk of these endangered fish becoming entrained in the canal.

The proposed project could be beneficial to the bonytail if stocking occurs in the Colorado River between Palisade and Loma. Bonytail would have to move some 7 miles upstream from Palisade to use the ladder, but with fish passage restored at the Diversion Dam, bonytail could continue to expand their range. In addition, if bonytail use the fish ladder, screening at the Government Highline Canal would prevent potential entrainment.

Because the proposed project is some 57 river miles above the Black Rocks population of humpback chub and the proposed project will not impact flows or water quality in the Black Rocks portion of the Colorado River, the proposed project is not expected to effect humpback chub.

The proposed project is also not expected to effect Uinta hookless cactus, bald eagle, and Southwestern willow flycatcher.

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**FIGURES 6.0**

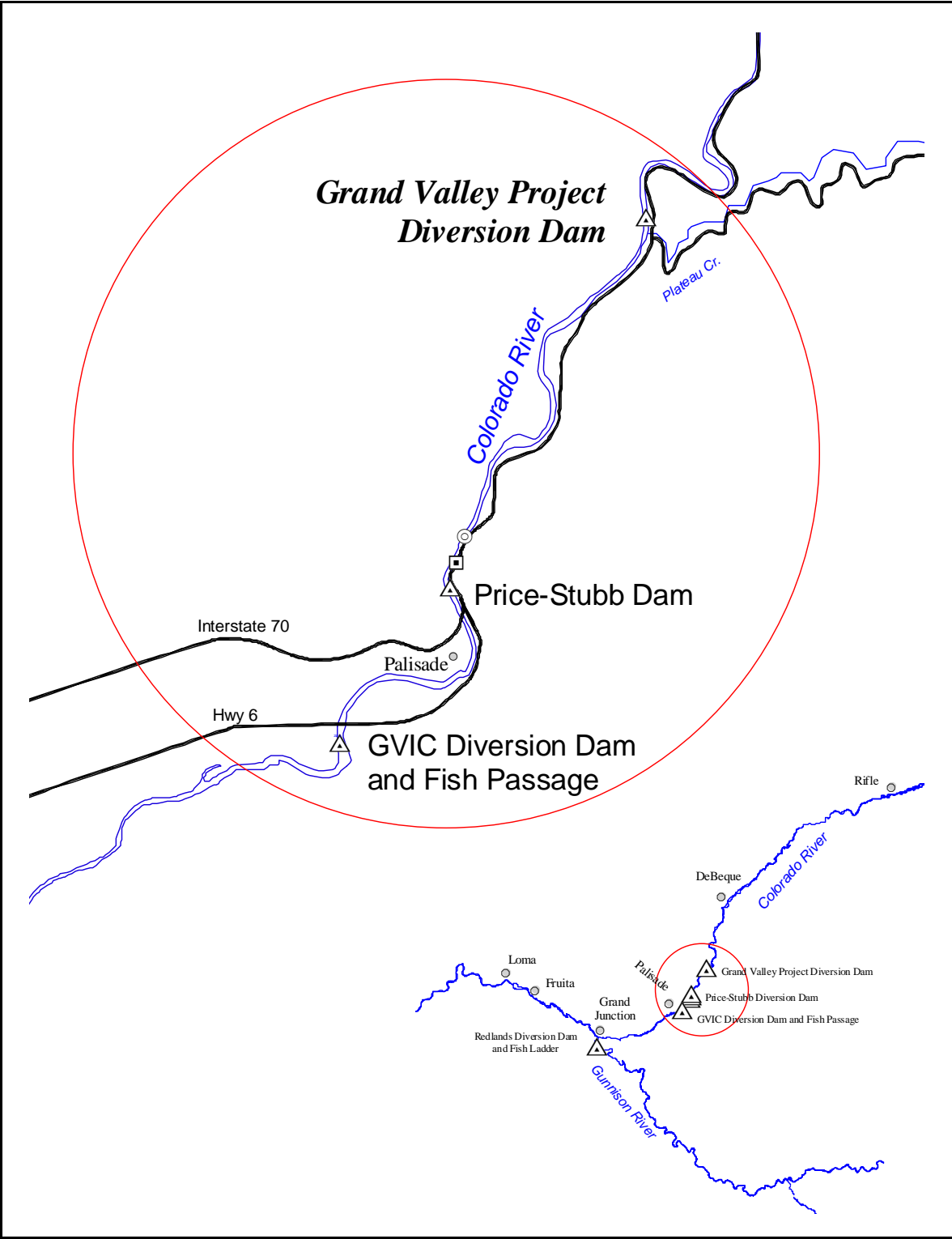


FIGURE 1 -Three Diversion Dams on the Colorado River

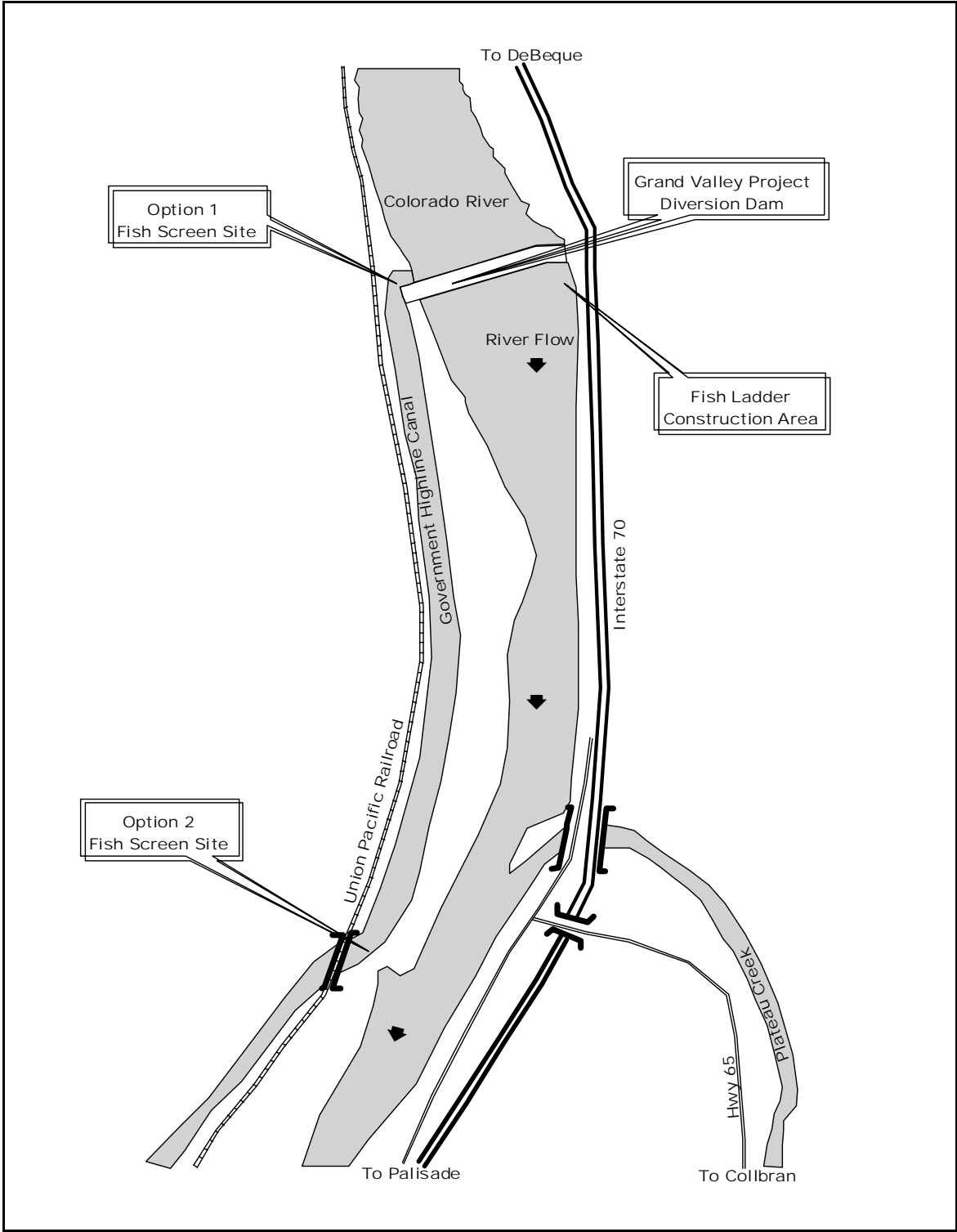


FIGURE 2 - Drawing of Grand Valley Project Fish Facilities

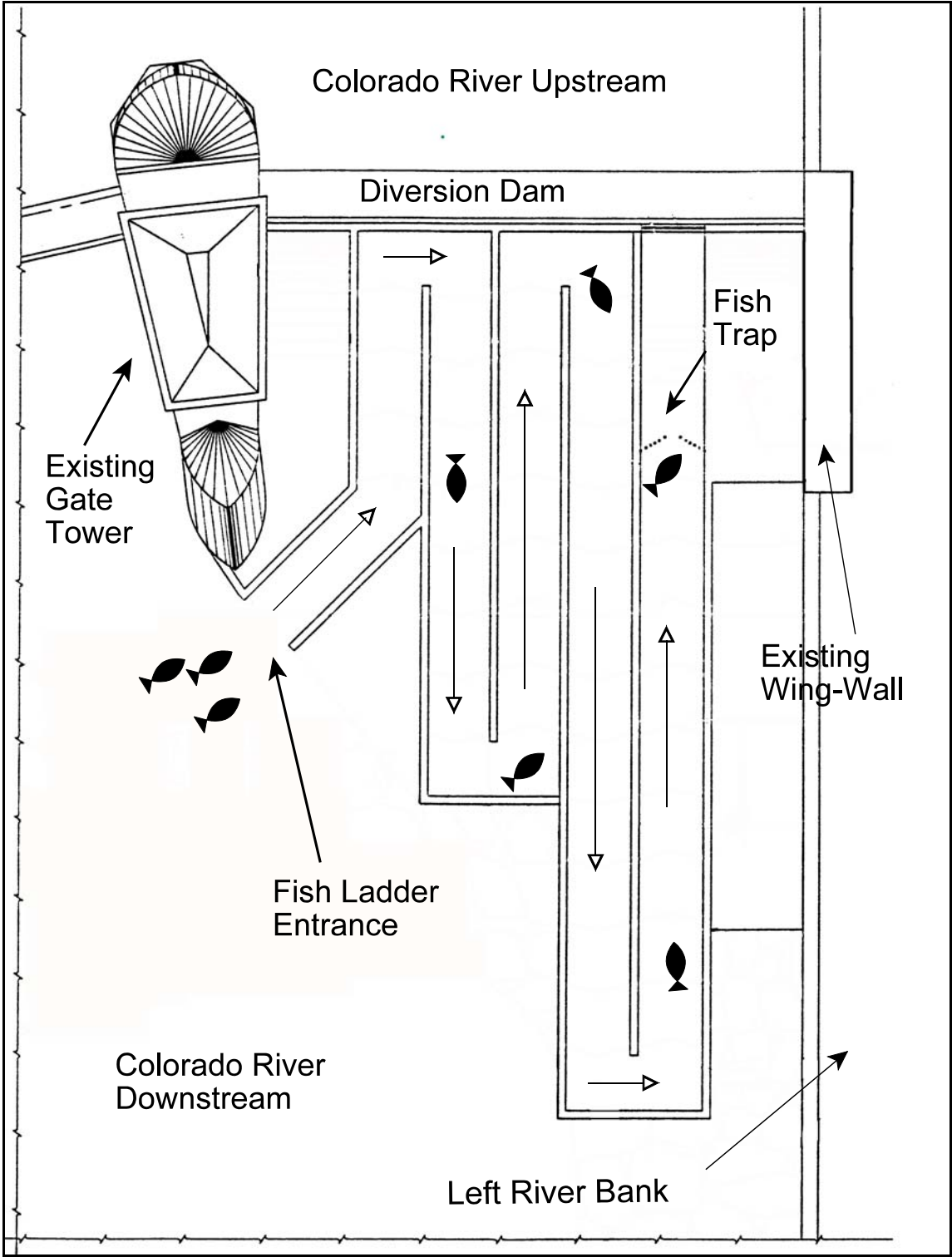


FIGURE 3 - Conceptual Design for Fish Ladder

## **7.0 ATTACHMENTS**

