# Appendix D-Biological Opinion

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
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November 6, 2003

Memorandum

To: Deputy Area Manager, Western Colorado Area Office, Bureau of Reclamation, Grand Junction, Colorado

From: Western Colorado Supervisor, Fish and Wildlife Service, Ecological Services, Grand Junction, Colorado

Subject: Final Biological Opinion for Restoring Fish Passage at the Price-Stubb Diversion Dam

In accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), and the Interagency Cooperation Regulations (50 CFR 402), this transmits the Fish and Wildlife Service's final biological opinion for impacts to federally listed endangered species for fish passage at the Price-Stubb Dam.

Reference is made to your June 16, 2003, correspondence transmitting your biological assessment for the subject project. The Service concurs with your conclusion that, overall, providing fish passage at the Price-Stubb Dam will benefit the endangered Colorado pikeminnow (formerly squawfish) (*Ptychocheilus lucius*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*). However, we do not concur that the project has no adverse affects associated with it and cannot concur with your determination that the proposed project is not likely to adversely affect the endangered fishes. The Service concludes that the proposed project may adversely affect the endangered fishes and has prepared this biological opinion to comply with the Endangered Species Act. The Service concurs with your conclusion that the project will have no effect on humpback chub (*Gila cypha*), bald eagle (*Haliaeetus leucocephalus*), or southwestern willow flycatcher (*Empidonax traillii extimus*).

## Consultation History

On August 4, 2000, the Service issued a biological opinion (ES/GJ-6-CO-00-F-05) to the Federal Energy Regulatory Commission on the Jacobson Hydro #1 Project, which is a proposed hydroelectric project at the Price-Stubb Dam. The conclusion of that biological opinion was that the proposed action is likely to jeopardize the continued existence of the Colorado pikeminnow, razorback sucker, and bonytail, and adversely modify critical habitat. Reasonable and prudent alternatives were provided to avoid the likelihood of jeopardy and adverse modification of critical habitat. These alternatives included providing fish passage at the Price-Stubb Dam. On

September 13, 2001, FERC issued an order granting an amendment to the subject hydropower license with specific time requirements for commencement of construction. On July 15, 2002, FERC terminated the hydropower license because the timeframes for construction were not met.

## BIOLOGICAL OPINION

### DESCRIPTION OF THE PROPOSED ACTION

The Price-Stubb Dam on the Colorado River upstream of Palisade, Colorado, was constructed in 1911 by the Palisade and Mesa County Irrigation Districts to divert water for irrigation. In 1919, the irrigation districts began diverting water at the Grand Valley Project Dam and the Price-Stubb Dam ceased to divert water. The Price-Stubb Dam has blocked upstream fish passage for almost 100 years. The Upper Colorado River Endangered Fish Recovery Program (Recovery Program) was established in 1988 to recover the endangered fishes of the upper Colorado River. The Recovery Program developed a Recovery Action Plan that outlines actions necessary for fish recovery. The Recovery Action Plan identifies providing fish passage at the Price-Stubb Dam as necessary action for species recovery.

The Bureau of Reclamation acting on behalf of the Recovery Program is proposing to construct a fish passage channel along the left riverbank below the dam. A notch would be cut in the dam and an 800-foot rock lined channel would be constructed below the dam. The design would allow the first 100 cfs to flow down the fish passage channel, allowing for fish passage during low water periods. The remaining portion of the dam face would be filled in with rock for a length of 400 feet and at a 4 percent slope. This rock fill would provide stability to the fish passage channel and address a boating safety issue.

The proposed design allows unrestricted upstream passage of fish past the dam. Selective passage will be provided at the Grand Valley Project Diversion Dam by means of a fish trap and only native fish species will be permitted to continue upstream. The Price-Stubb fish passage channel would require minimal maintenance and would operate year round.

Construction of the subject project would require de-watering of the site by construction of a coffer dam. There is the possibility that the old diversion gates may be able to be used to divert water during construction. Construction is planned to begin in the fall of 2004, being completed prior to spring runoff of 2005.

### STATUS OF THE SPECIES

#### Colorado Pikeminnow

##### Species/Critical Habitat Description

The Colorado pikeminnow is the largest cyprinid fish (minnow family) native to North America and it evolved as the main predator in the Colorado River system. It is an elongated pike-like fish that during predevelopment times may have grown as large as 6 feet in length and weighed nearly 100 pounds (Behnke and Benson 1983). Today, fish rarely exceed 3 feet in length or weigh more than 18 pounds; such fish are estimated to be 45-55 years old (Osmundson et al.

1997). The mouth of this species is large and nearly horizontal with long slender pharyngeal teeth (located in the throat), adapted for grasping and holding prey. The diet of Colorado pikeminnow longer than 3 or 4 inches consists almost entirely of other fishes (Vanicek and Kramer 1969). Males become sexually mature earlier and at a smaller size than do females, though all are mature by about age 7 and 500 mm (20 inches) in length (Vanicek and Kramer 1969, Seethaler 1978, Hamman 1981). Adults are strongly countershaded with a dark, olive back, and a white belly. Young are silvery and usually have a dark, wedge-shaped spot at the base of the caudal fin.

Based on early fish collection records, archaeological finds, and other observations, the Colorado pikeminnow was once found throughout warmwater reaches of the entire Colorado River Basin down to the Gulf of California, and including reaches of the Upper Colorado River and its major tributaries, the Green River and its major tributaries, and the Gila River system in Arizona (Seethaler 1978). Colorado pikeminnow apparently were never found in colder, headwater areas. Seethaler (1978) indicates that the species was abundant in suitable habitat throughout the entire Colorado River Basin prior to the 1850s. No historic records exist that would indicate how far upstream Colorado pikeminnow once occurred in the Colorado River. The only reliable account of the species occurring upstream of the Price Stubb Dam near Palisade, Colorado is from a Service biologist who reports having captured Colorado pikeminnow 2-3 miles up Plateau Creek while angling there around 1960 (Robert Burdick, Fish and Wildlife Service, pers. comm.).

Critical habitat is defined as the areas that provide physical or biological features that are essential for the recovery of the species. Critical habitat was designated in 1994 within the 100-year floodplain of the Colorado pikeminnow's historical range in the following area of the Upper Colorado River (59 F.R. 13374).

> Colorado, Mesa and Garfield Counties; and Utah, Grand, San Juan, Wayne, and Garfield Counties. The Colorado River and its 100-year floodplain from the Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) 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 Meridian).

The Service has identified water, physical habitat, and the biological environment as the primary constituent elements of critical habitat. This includes a quantity of water of sufficient quality that is delivered to a specific location in accordance with a hydrologic regime that is required for the particular life stage for each species. The physical habitat includes areas of the Colorado River system that are inhabited or potentially habitable for use in spawning and feeding, as a nursery, or serve as corridors between these areas. In addition, oxbows, backwaters, and other areas in the 100-year floodplain, when inundated, provide access to spawning, nursery, feeding, and rearing habitats. Food supply, predation and competition are important elements of the biological environment.

Status and Distribution

Colorado pikeminnow were historically distributed throughout warmwater reaches of the Colorado River Basin from Wyoming and Colorado south to the Gulf of California. By the

1970s they were extirpated from the entire lower basin (downstream of Glen Canyon Dam) and from portions of the upper basin as a result of major alterations to the riverine environment. Having lost some 75-80 percent of its former range, the Colorado pikeminnow was federally listed as an endangered species in 1967 (Miller 1961, Moyle 1976, Tyus 1991, Osmundson and Burnham 1998).

Colorado pikeminnow are presently restricted to the Upper Colorado River Basin and inhabit warmwater reaches of the Colorado, Green, and San Juan rivers and associated tributaries. The species inhabits about 350 miles of the mainstem Green River from its confluence with the Colorado River upstream to the mouth of the Yampa River. In the Yampa River, its range extends upstream an additional 160 miles. Colorado pikeminnow also occur in the lowermost 104 miles of the White River, another tributary to the Green River. In the mainstem Colorado River, distribution of the species extends 201 miles upstream from the upper end of Lake Powell to Palisade, Colorado (Tyus 1982). Current distribution on the San Juan River extends from Lake Powell upstream 158 miles.

Major declines in Colorado pikeminnow populations occurred during the dam-building era of the 1930s through the 1960s. Behnke and Benson (1983) summarized the decline of the natural ecosystem, pointing out that dams, impoundments, and water use practices drastically modified the river's natural hydrology and channel characteristics throughout the Colorado River Basin. Dams on the mainstem broke the natural continuum of the river ecosystem into a series of disjunct segments, blocking native fish migrations, reducing temperatures downstream of dams, creating lacustrine habitat, and providing conditions that allowed competitive and predatory nonnative fishes to thrive both within the impounded reservoirs and in the modified river segments that connect them. The highly modified flow regime in the lower basin coupled with the introduction of nonnative fishes decimated populations of native fish.

Major declines of native fishes first occurred in the lower basin where large dams were constructed from the 1930s through the 1960s. In the Upper Basin, the following major dams were not constructed until the 1960s: Glen Canyon Dam on the mainstem Colorado River, Flaming Gorge Dam on the Green River, Navajo Dam on the San Juan River, and the Aspinall Unit Dams on the Gunnison River. To date, some native fish populations in the Upper Basin have managed to persist, while others have become nearly extirpated. River segments where native fish have declined more slowly than in other areas are those where the hydrologic regime most closely resembles the natural condition, where adequate habitat for all life phases still exists, and where migration corridors are unblocked and allow connectivity among life phases.

In the mainstem Colorado River, the magnitude of spring flows has declined by 30-45 percent since the early part of the century (Osmundson and Kaeding 1991, Van Steeter 1996, Pitlick et al. 1999). Such flow reduction might negatively affect Colorado pikeminnow in four ways: 1) reducing the river's ability to build and clean cobble bars for spawning; 2) reducing the dilution effect for waterborne contaminants from urban and agricultural sources that may interfere with reproductive success; 3) reducing the connectivity of main-channel and bottomland habitats needed for habitat diversity and productivity; 4) providing a more benign environment for nonnative fish and invasive, nonnative, bank-stabilizing shrubs (salt cedar) to persist and flourish (Osmundson and Burnham 1998). In general, the existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Osmundson and Burnham (1998) summarized the status and trend of the Colorado River population of Colorado pikeminnow. They found that numbers were low but new individuals were actively recruiting to the adult population, and recruitment largely occurs in pulses from infrequent strong year classes. These investigators concluded that low adult numbers and infrequent pulsed recruitment make this population vulnerable to extirpation over time from both natural fluctuations in numbers as well as from continued changes in habitat.

Life History

The life-history phases that appear to be most critical for the Colorado pikeminnow include spawning, egg hatching, development of larvae, and the first year of life. These phases of Colorado pikeminnow development are tied closely to specific habitat requirements. Natural spawning of Colorado pikeminnow is initiated on the descending limb of the annual hydrograph as water temperatures approach or exceed 20 °C (Vanicek and Kramer 1969, Hamman 1981, Haynes et al. 1984, Tyus 1990, McAda and Kaeding 1991). Temperature at initiation of spawning varies somewhat by river: in the Green River, spawning begins as temperatures exceed 20-23 °C; in the Yampa River, 16-23 °C (Bestgen et al. 1998); in the Colorado River, 18-22 °C (McAda and Kaeding 1991). Spawning, both in the hatchery and under natural riverine conditions, generally occurs in a 2-month time frame between late June and late August. However, in the natural system, sustained high flows during wet years may suppress river temperatures and extend spawning into September (McAda and Kaeding 1991). Conversely, during low flow years, when the water warms earlier, spawning may commence in mid June. Temperature also has an effect on egg development and hatching success. In the laboratory, egg development was tested at five temperatures and hatching success was found to be highest at 20 °C, lower at 25 °C, and mortality was 100 percent at 5, 10, 15, and 30 °C. In addition, larval abnormalities were twice as high at 25 °C than at 20 °C (Marsh 1985).

Experimental tests of temperature preference of yearling (Black and Bulkley 1985a) and adult (Bulkley et al. 1981) Colorado pikeminnow indicated that 25 °C was the most preferred temperature for both life phases. Additional experiments indicated that optimum growth of yearling Colorado pikeminnow also occurs at temperatures near 25 °C (Black and Bulkley 1985b). Although no such tests were conducted using adults, the tests with yearlings supported the conclusions of Jobling (1981) that the final thermal preferendum provides a good indication of optimum growth temperature, i.e., 25 °C.

Most information on Colorado pikeminnow reproduction was gathered from spawning sites on the lower 20 miles of the Yampa River and in Gray Canyon on the Green River (Tyus and McAda 1984; Tyus 1985; Wick et al 1985; Tyus 1990). Colorado pikeminnow spawn after peak runoff subsides and is probably triggered by several interacting variables such as photoperiod, temperature, flow level and perhaps substrate characteristics. Spawning generally occurs from late June to mid-August with peak activity occurring when water temperatures are between 18 ° and 23 °C (Haynes et al. 1984; Archer et al. 1985; Tyus 1990, Bestgen et al. 1998).

Spawning has been confirmed in the Colorado River by the presence of Colorado pikeminnow larvae in all years sampled. Larvae are distributed throughout the river although most have been found downstream of Grand Junction (McAda and Kaeding 1991, Osmundson and Burnham 1998). Aggregations of ripe adults have been found near Clifton and Grand Junction, Colorado

and near the Colorado-Utah State line (Osmundson and Kaeding 1989, McAda and Kaeding 1991, USFWS unpublished data). Suitable spawning habitat (defined below) in the Colorado River near Cataract Canyon, Professor Valley, and upstream from the Dolores River confluence indicate spawning may occur in or near these areas as well (Archer et al. 1985; Valdez 1990).

Known spawning sites in the Yampa River are characterized by riffles or shallow runs with well-washed coarse substrate (cobble containing relatively deep interstitial voids (for egg deposition) in association with deep pools or areas of slow laminar flow used as staging areas by adults (Lamarra et al. 1985, Tyus 1990). Recent investigations at a spawning site in the San Juan River by Bliesner and Lamarra (1995) and at one in the Upper Colorado River (USFWS unpublished data) indicate a similar association of habitats. The most unique feature at the sites actually used for spawning, in comparison with otherwise similar sites nearby, is the degree of looseness of the cobble substrate and the depth to which the rocks are devoid of fine sediments; this appears consistent at the sites in all three rivers (Lamarra et al. 1985, Bliesner and Lamarra 1995).

Data indicates that clean cobble substrates that provide interstitial spaces for eggs are necessary for spawning and egg incubation (Tyus and Karp 1989). Several studies on the cobble cleaning process have been conducted at a known spawning location in Yampa Canyon. O'Brien (1984) studied the hydraulic and sediment transport dynamics of the cobble bar within the Yampa River spawning site and duplicated some of its characteristics in a laboratory flume study. O'Brien (1984) concluded that incipient motion of the cobble bed is required to clean cobbles for spawning and estimated that this takes discharges of about 21,500 cfs. However, Harvey et al. (1993) concluded that since flows required for incipient motion of bed material are rare (20 year return period event) and spawning occurs annually, another process must be cleaning the cobbles. Their study found that in Yampa Canyon recessional flows routinely dissect gravel bars and thereby produce tertiary bars of clean cobble at the base of the riffles. These tertiary bars are used by Colorado pikeminnow for spawning. The importance of high magnitude, low frequency discharge is in forming and maintaining the midchannel bars. Dissection of bars without redeposition by high magnitude flows would lead to conditions where spawning habitat is no longer available (Harvey et al. 1993).

It is unknown whether tertiary bars similar to those used for Colorado pikeminnow spawning in Yampa Canyon are available in the 15-mile reach of the Colorado River. There, significant motion of bed material occurs at near bankfull discharge of 22,000 cfs (Van Steeter 1996). These flows occur on average once in 4 years. Van Steeter (1996) concluded that flows of this magnitude are important because they generally remove fine sediment from the gravel matrix which maintains the invertebrate community and cleans spawning substrate.

Although the location of spawning areas in the Colorado River is not as defined as in the Yampa River, the annual presence of larvae and young-of-the-year downstream of the Walker Wildlife Area, in the Loma to Black Rocks reach and near the confluence of the Dolores River, demonstrates that spawning occurs every year. Osmundson and Kaeding (1989, 1991) reported that water temperatures in the Grand Junction area were suitable for Colorado pikeminnow spawning. In 1986, a year of high runoff, suitable temperatures for spawning (20 °C) occurred in mid-August; in 1989, a year of low runoff, the mean temperature reached 20 °C during the last week of June. Tyus (1990) demonstrated that Colorado pikeminnow often migrate considerable

distances to spawn in the Green and Yampa rivers, and similar though more limited movement has been noted in the mainstem Colorado River (McAda and Kaeding 1991).

Collections of larvae and young-of-year downstream of known spawning sites in the Green and Yampa rivers indicates that downstream drift of larval Colorado pikeminnow occurs following hatching (Haynes et al. 1984; Nesler et al. 1988; Tyus 1990, Tyus and Haines 1991). During their first year of life, Colorado pikeminnow prefer warm, turbid, relatively deep (averaging 1.3 feet) backwater areas of zero velocity (Tyus and Haines 1991). After about 1 year, young are rarely found in such habitats, though juveniles and subadults are often located in large deep backwaters during spring runoff (USFWS, unpublished data; Osmundson and Burnham 1998).

Larval Colorado pikeminnow have been collected in the Gunnison River up- and downstream of the Redlands Diversion Dam (Anderson 1998; Osmundson and Burnham 1998). Burdick (1997) reports that the capture of larval Colorado pikeminnow in 1995 and 1996 upstream of the Redlands Diversion Dam coupled with aggregations of adult fish during the spawning season confirms that spawning occurs upstream of the dam.

Information on radio-tagged adult Colorado pikeminnow during fall suggests that fish seek out deepwater areas in the Colorado River (Miller et al. 1982, Osmundson and Kaeding 1989), as do many other riverine species. River pools, runs, and other deep water areas, especially in upstream reaches, are important winter habitats for Colorado pikeminnow (Osmundson et al. 1995).

Very little information is available on the influence of turbidity on the endangered Colorado River fishes. Osmundson and Kaeding (1989) found that turbidity allows use of relatively shallow habitats ostensibly by providing adults with needed cover; this allows foraging and resting in areas otherwise exposed to avian or land predators. Tyus and Haines (1991) found that young Colorado pikeminnow in the Green River preferred backwaters that were turbid. Clear conditions in these shallow waters might expose young fish to predation from wading birds or introduced, sight-feeding, piscivorous fish. It is unknown whether the river was as turbid in the past as it is today. For now, it is assumed that these endemic fishes evolved under natural conditions of high turbidity; therefore the retention of these highly turbid conditions is probably an important factor in maintaining the ability of these fish to compete with nonnatives that may not have evolved under similar conditions.

Population Dynamics

Osmundson (2002) investigated population dynamics of Colorado pikeminnow from 1991 to 2000. These years were divided into two study periods: 1991 to 1994 and 1998 to 2000. The results of the investigation found that annual estimates of whole-river (the Colorado River from the confluence with the Green River upstream to the Price-Stubb Dam, including the lower 3.5 km of the Gunnison River downstream of the Redlands Diversion Dam) population size (all fish $\geq$ 250 mm) averaged 582 fish during the earlier study period and 742 fish during the more recent study period. This represents a 27 percent increase based on these estimates. Estimates of adult fish ($\geq$ 500 mm) averaged 362 during the earlier study period and 490 during the more recent study period, representing a 35 percent increase in adult fish.

Colorado pikeminnow reproduce each year, however, strong year classes that recruit fish to the adult population are relatively rare (Osmundson and Burnham 1998). A distinct increase of subadult fish was found below Moab in 1991 and within a few years these fish were distributed throughout the Colorado River. Osmundson and Burnham (1998) concluded that these fish were the result of one or more strong year classes produced during the mid-1980s. McAda and Ryel (1999) have identified another strong year-class that occurred in 1996. In both cases, the common hydrologic conditions that led to successful reproduction and first year survival was a spring and summer of moderately high flows following a year of exceptionally high flood flows (McAda and Ryel 1999).

Analysis of Species/Critical Habitat Likely to be Affected

The Price-Stubb Dam has been a barrier to upstream fish movement since 1911. No wild Colorado pikeminnow have been captured above the dam since scientific studies of the endangered fishes began in 1979. In 2000 and 2001, wild and domestic-reared Colorado pikeminnow were fitted with radio transmitters and released upstream of the Price-Stubb Dam near Parachute, Colorado (Burdick 2003). One radio-tagged Colorado pikeminnow was documented at the base of the Price-Stubb Dam in 1986 (Osmundson and Kaeding 1989). During recent studies, 10 Colorado pikeminnow were captured above the Grand Valley Irrigation Company Diversion Dam 3 miles downstream of the project site (Burdick 1999). The Recovery Program began stocking juvenile Colorado pikeminnow (100-200 mm long) in the Colorado River between Rifle and De Beque Canyon in the year 2000. This is expected to result in the occurrence of stocked Colorado pikeminnow in the immediate project vicinity.

**Razorback Sucker**

Species/Critical Habitat Description

The razorback sucker, an endemic species unique to the Colorado River Basin, was historically abundant and widely distributed within warmwater reaches throughout the Colorado River Basin. The razorback sucker is the only sucker with an abrupt sharp-edged dorsal keel behind its head. It has a large fleshy subterminal mouth that is typical of most suckers. Adults often exceed 3 kg (6 pounds) in weight and 600 mm (2 feet) in length.

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 (Ellis 1914; Minckley 1983). Bestgen (1990) reported that this species was once so numerous that it was commonly used as food by early settlers and, further, that commercially marketable quantities were caught in Arizona as recently as 1949. In the Upper Basin, razorback suckers were reported in the Green River to be very abundant near Green River, Utah, in the late 1800s (Jordan 1891). An account in Osmundson and Kaeding (1989) reported that residents living along the Colorado River near Clifton, Colorado, observed several thousand razorback suckers during spring runoff in the 1930s and early 1940s. In the San Juan River drainage, Platania and Young (1989) relayed historical accounts of razorback suckers ascending the Animas River to Durango, Colorado, around the turn of the century.

A marked decline in populations of razorback suckers can be attributed to construction of dams and reservoirs, introduction of nonnative fishes, and removal of large quantities of water from the Colorado River system. Dams on the mainstem Colorado River and its major tributaries have segmented the river system, blocking migration routes. Dams also have drastically altered flows, temperatures, and channel geomorphology. These changes have modified habitats in many areas so that they are no longer suitable for breeding, feeding, or sheltering. Major changes in species composition have occurred due to the introduction of numerous nonnative fishes, many of which have thrived due to man-induced changes to the natural riverine system.

Critical habitat was designated in 1994 within the 100-year floodplain of the razorback sucker's historical range in the following area of the Upper Colorado River (59 FR 13374). The primary constituent elements are the same as critical habitat for Colorado pikeminnow described above.

> Colorado, Mesa and Garfield Counties. The Colorado River and its 100-year floodplain from Colorado River Bridge at exit 90 north off Interstate 70 in T. 6 S., R. 93 W., section 16 (6th Principal Meridian) to Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) including the Gunnison River and its 100-year floodplain from the Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian) to the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian).
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> Colorado, Delta and Mesa Counties. The Gunnison River and its 100-year floodplain from the confluence with the Uncompahgre River in T. 15 S., R. 96 W., section 11 (6th Principal Meridian) to Redlands Diversion Dam in T. 1 S., R. 1 W., section 27 (Ute Meridian).
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> Utah, Grand, San Juan, Wayne, and Garfield Counties. The Colorado River and its 100-year floodplain from Westwater Canyon in T. 20 S., R. 25 E., section 12 (Salt Lake Meridian) to full pool elevation, upstream of North Wash, and including the Dirty Devil arm of Lake Powell in T. 33 S., R. 14 E., section 29 (Salt Lake Meridian).

Status and Distribution

The current distribution and abundance of the razorback sucker have been significantly reduced throughout the Colorado River system, due to lack of recruitment to the adult population (McAda 1987; McAda and Wydoski 1980; Holden and Stalnaker 1975; Minckley 1983; Marsh and Minckley 1989; Tyus 1987). The only substantial population exists in Lake Mohave, where population estimates have dropped from 60,000 adults in 1991, to 25, 000 in 1993, to approximately 9,000 in 2000 (USFWS 2002). They do not appear to be successfully recruiting. While limited numbers of razorback suckers persist in other locations in the Lower Colorado River, they are considered rare or incidental and may be continuing to decline.

In the Upper Basin, above Glen Canyon Dam, razorback suckers are found in limited numbers in both lentic and lotic environments. The largest population of razorback suckers in the Upper Basin is found in the upper Green River and lower Yampa River (Tyus 1987). Lanigan and Tyus (1989) estimated that from 758 to 1,138 razorback suckers inhabit the upper Green River. Modde et al. (1996) report no significant decrease in the population between 1982 and 1992, and the continued presence of fish smaller than 480 mm during the study period suggest some level

of recruitment. In the Colorado River, most razorback suckers occur in the Grand Valley area near Grand Junction, Colorado; however, they are increasingly rare. Osmundson and Kaeding (1991) report that the number of razorback sucker captures in the Grand Junction area has declined dramatically since 1974. In 1991 and 1992, 28 adult razorback suckers were collected from isolated ponds adjacent to the Colorado River near De Beque, Colorado (Burdick 1992). The existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Razorback suckers are in imminent danger of extirpation in the wild. The razorback sucker was listed as endangered October 23, 1991 (56 FR 54957). As Bestgen (1990) pointed out:

> "Reasons for decline of most native fishes in the Colorado River Basin have been attributed to habitat loss due to construction of mainstream dams and subsequent interruption or alteration of natural flow and physio-chemical regimes, inundation of river reaches by reservoirs, channelization, water quality degradation, introduction of nonnative fish species and resulting competitive interactions or predation, and other man-induced disturbances (Miller 1961, Joseph et al. 1977, Behnke and Benson 1983, Carlson and Muth 1989, Tyus and Karp 1989). These factors are almost certainly not mutually exclusive, therefore it is often difficult to determine exact cause and effect relationships."

The virtual absence of any recruitment suggests a combination of biological, physical, and/or chemical factors that may be affecting the survival and recruitment of early life stages of razorback suckers. Within the Upper Basin, recovery efforts endorsed by the Recovery Program include the capture and removal of razorback suckers from all known locations for genetic analyses and development of discrete brood stocks if necessary. These measures have been undertaken to develop refugia populations of the razorback sucker from the same genetic parentage as their wild counterparts such that, if these fish are genetically unique by subbasin or individual population, then separate stocks will be available for future augmentation. Such augmentation may be a necessary step to prevent the extinction of razorback suckers in the Upper Basin.

Life History

McAda and Wydoski (1980) and Tyus (1987) reported springtime aggregations of razorback suckers in off-channel habitats and tributaries; such aggregations are believed to be associated with reproductive activities. Tyus and Karp (1990) and Osmundson and Kaeding (1991) reported off-channel habitats to be much warmer than the mainstem river and that razorback suckers presumably moved to these areas for feeding, resting, sexual maturation, spawning, and other activities associated with their reproductive cycle. Prior to construction of large mainstem dams and the suppression of spring peak flows, low velocity, off-channel habitats (seasonally flooded bottomlands and shorelines) were commonly available throughout the Upper Basin (Tyus and Karp 1989; Osmundson and Kaeding 1991). Dams changed riverine ecosystems into lakes by impounding water, which eliminated these off-channel habitats in reservoirs. Reduction in spring peak flows eliminates or reduces the frequency of inundation of off-channel habitats. The absence of these seasonally flooded riverine habitats is believed to be a limiting factor in the successful recruitment of razorback suckers in their native environment (Tyus and Karp 1989; Osmundson and Kaeding 1991). Wydoski and Wick (1998) identified starvation of larval

razorback suckers due to low zooplankton densities in the main channel and loss of floodplain habitats which provide adequate zooplankton densities for larval food as one of the most important factors limiting recruitment.

While razorback suckers have never been directly observed spawning in turbid riverine environments within the Upper Basin, captures of ripe specimens, both males and females, have been recorded (Valdez et al. 1982; McAda and Wydoski 1980; Tyus 1987; Osmundson and Kaeding 1989; Tyus and Karp 1989; Tyus and Karp 1990; Osmundson and Kaeding 1991; Platania 1990) in the Yampa, Green, Colorado, and San Juan rivers. Sexually mature razorback suckers are generally collected on the ascending limb of the hydrograph from mid-April through June and are associated with coarse gravel substrates (depending on the specific location).

Outside of the spawning season, adult razorback suckers occupy a variety of shoreline and main channel habitats including slow runs, shallow to deep pools, backwaters, eddies, and other relatively slow velocity areas associated with sand substrates (Tyus 1987; Tyus and Karp 1989; Osmundson and Kaeding 1989; Valdez and Masslich 1989; Osmundson and Kaeding 1991; Tyus and Karp 1990).

Habitat requirements of young and juvenile razorback suckers in the wild are not well known, particularly in native riverine environments. Prior to 1991, the last confirmed documentation of a razorback sucker juvenile in the Upper Basin was a capture in the Colorado River near Moab, Utah (Taba et al. 1965). In 1991, two early juvenile (36.6 and 39.3 mm TL) razorback suckers were collected in the lower Green River near Hell Roaring Canyon (Gutermuth et al. 1994). Juvenile razorback suckers have been collected in recent years from Old Charley Wash, a wetland adjacent to the Green River (Modde 1996). Between 1992 and 1995 larval razorback suckers were collected in the middle and lower Green River and within the Colorado River inflow to Lake Powell (Muth 1995). In 2002, larval razorback suckers were collected from the Gunnison River near Delta and Whitewater (Doug Osmundson, pers. comm.). No young razorback suckers have been collected in recent times in the Colorado River.

Populations Dynamics

There are no current population estimates of razorback sucker in the Upper Colorado River due to low numbers captured in recent years.

Analysis of Species/Critical Habitat Likely to be Affected

The current range of the razorback sucker in the Colorado River extends upstream to Rifle, Colorado. Osmundson and Kaeding (1989) found that 76 percent of the razorback suckers captured in the Colorado River between 1979 and 1985 were captured in the Grand Valley area. Most razorback suckers captured in the Grand Valley area have been located in flooded gravel-pit ponds adjacent to the river. However, Osmundson and Kaeding (1989) documented razorback sucker movement in various river habitats in the Grand Valley area. Additional surveys since 1988 have documented razorback suckers in riverside ponds as far upstream as river mile 235 near Rifle, Colorado (Burdick 1992). The Recovery Program currently stocks juvenile and subadult razorback suckers (150-300 mm long) upstream of the Price-Stubb Dam.

**Bonytail**

Species/Critical Habitat Description

Bonytail are medium-sized (less than 600 mm) fish in the minnow family. Adult bonytail are gray or olive colored on the back with silvery sides and a white belly. The adult bonytail has an elongated body with a long, thin caudal peduncle.

Critical habitat was designated in 1994 within the bonytail's historical range in the following sections of the Upper Colorado River (59 FR 13374). The primary constituent elements are the same as those described for the Colorado pikeminnow.

> 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 (6th Principal Meridian) to Fish Ford in T. 21 S., R. 24 E., section 35 (Salt Lake Meridian).
>
> Utah, Garfield and San Juan Counties. The Colorado River from Brown Betty Rapid in T. 30 S., R. 18 E., section 34 (Salt Lake Meridian) to Imperial Canyon in T. 31 S., R. 17 E., section 28 (Salt Lake Meridian).

Status and Distribution

The bonytail is the rarest native fish in the Colorado River. It was listed as endangered April 23, 1980. Formerly reported as widespread and abundant in mainstem rivers (Jordan and Evermann 1896), its populations have been greatly reduced. The fish is presently represented in the wild by a low number of old adult fish in Lake Mohave and perhaps other lower basin reservoirs (USFWS 1990). The last known riverine area where bonytail were common was the Green River in Dinosaur National Monument, where Vanicek (1967) and Holden and Stalnaker (1970) collected 91 specimens during 1962-1966. From 1977 to 1983, no bonytail were collected from the Colorado or Gunnison Rivers in Colorado or Utah (Wick et al. 1979, 1981; Valdez et al. 1982; Miller et al. 1984). However, in 1984, a single bonytail was collected from Black Rocks on the Colorado River (Kaeding et al. 1986). Several suspected bonytail were captured in Cataract Canyon in 1985-1987 (Valdez 1985, 1987, 1988).

The existing habitat has been modified to the extent that it impairs essential behavior patterns, such as breeding, feeding, and sheltering.

Life History

The bonytail is considered a species that is adapted to mainstem rivers, where it has been observed in pools and eddies (Vanicek 1967; Minckley 1973). Spawning of bonytail has never been observed in a river, but ripe fish were collected in Dinosaur National Monument during late June and early July suggesting that spawning occurred at water temperatures of about 18 °C (Vanicek and Kramer 1969).

Population Dynamics

The number of bonytail in the Upper Colorado River are so low that it is not possible to do a population estimate.

Analysis of Species/Critical Habitat Likely to be Affected

Black Rocks and Cataract Canyon, which are many miles downstream of the proposed project, are the only areas where bonytail have been found in the Upper Colorado River in the last 20 years. However, bonytail are currently being stocked in the Colorado River between Palisade and Loma. Therefore, these fish could occupy the project area.

ENVIRONMENTAL BASELINE

The environmental baseline includes the past and present impacts of all Federal, State, and private actions and other human activities in the action area; the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal section 7 consultation; and the impact of State or private actions contemporaneous with the consultation process. The action area is the Colorado River from Rifle to Lake Powell, including the construction zone at the Price-Stubb Dam.

In formulating this opinion, the Service considered adverse and beneficial effects likely to result from cumulative effects of future State and private activities that are reasonably certain to occur within the Project area, along with the direct and indirect effects of the Project and impacts from actions that are part of the environmental baseline (50 CFR 402.02 and 402.14 (g)(3)).

Status of the Species within the Action Area

The Colorado pikeminnow is the only endangered fish species that has been found in the immediate project area. However, razorback sucker have been found upstream of the project area in ponds adjacent to the Colorado River near De Beque. The Recovery Program is stocking razorback suckers both upstream and downstream of the Price-Stubb Dam and Colorado pikeminnow upstream of the dam. Bonytail are also being stocked in the Colorado River between Palisade and Loma. Humpback chub are not known to occupy the project area.

Factors Affecting the Species Environment within the Action Area

The physical and biological features that were the basis for designating the critical habitat for the endangered fishes are water, physical habitat, and biological environment. These primary constituent elements were determined necessary for survival and recovery of the endangered fishes in the Colorado River. The primary constituent element water is described as a quantity of sufficient quality and with a hydrologic regime that is required for each life stage. Physical habitat includes areas of the river that are inhabited or potentially habitable by endangered fishes for use in spawning, nursery, feeding, and rearing or corridors between these areas. Biological environment includes food supply, predation, and competition.

Water Quantity

The environmental baseline for water quantity includes all historical depletions in the Upper Basin, depletions resulting from projects which have previously undergone section 7 consultation, and depletions resulting from private projects contemporaneous with this consultation.

Water Quality

Some of the contaminants of concern within waters of the Upper Basin include heavy metals, selenium, salts, polycyclic aromatic hydrocarbons, and pesticides. Selenium is of particular concern because of its documented effects on fish (and wildlife) reproduction. Many chemical, physical, and biological factors affect the toxicity of environmental contaminants to biological organisms. Chemical and physical factors include contaminant type, chemical species or form, pH, water temperature, dissolved oxygen, hardness, salinity, and multiple-chemical exposure (antagonism and synergism). Duration of exposure, quantity of contaminant, and exposure pathways from the environment to the organism also affect toxicity. Some trace elements are beneficial to organisms at low concentrations but may be toxic at higher concentrations. Biological and physiological factors affecting toxicity include species, age, sex, and health of the organism.

Selenium concentrations can be elevated in areas where irrigation occurs on soils which are derived from or which overlie Upper Cretaceous marine sediments. Percolation of irrigation water through these soils and sediments leaches selenium into receiving waters. Other sources of selenium include powerplant fly ash and oil refineries. Water depletions, by reducing dilution effects, have increased the concentrations of selenium and other contaminants. Recent United States Geological Survey data collected in the Colorado River from 1990 to 1996 show that selenium concentrations under existing conditions (current level of development, not section 7 baseline) have been as high as 2 µg/L in the 15-mile reach and as high as 6 µg/L below the 15-mile reach. The current chronic selenium standards for the State of Colorado are 4.6 µg/L. The Service believes that to be fully protective of all aquatic life the chronic selenium standards should be set at 2 µg/L.

Physical Habitat

Physical habitat of the Colorado River in the project area has been greatly altered by changes in the timing and volume of flows, bank stabilization, diking, and diversion dams. Barriers to fish movement have been identified as a factor in the decline of the endangered fishes because they block migration routes and prevent fish from reaching spawning grounds and other important habitat.

Within the 9-mile reach of the Colorado River above the Town of Palisade, Colorado, there are three diversion dams. These barriers have fragmented habitat and prevented access to spawning, feeding, and winter habitats. Studies have shown Colorado pikeminnow exhibit migrations associated with spawning (Tyus and McAda 1984, Tyus 1985, Tyus 1990, McAda and Kaeding 1991). The larvae produced drift downstream long distances (Haynes et al. 1984, Nesler et al. 1988, Tyus 1990, Tyus and Haines 1991). Early life stages of Colorado pikeminnow are

primarily in the lower reaches of the Colorado River (below Westwater Canyon) and adults are primarily found in the upper reaches (Valdez et al. 1982, Osmundson and Burnham 1996). Recent studies have found that as Colorado pikeminnow mature, most move upstream, indicating adult fish prefer the habitat in the upper reaches of river. Osmundson (1999a) concludes that these distributional patterns of different life stages indicate these fish need long contiguous sections of river to meet the needs of all life stages. Providing access to habitat that has been blocked by dams could increase the number of Colorado pikeminnow the Colorado River can support (Osmundson 1999a). Increasing the number of adults above the dam provides more opportunities for spawning and increased larval production. The habitat above the dam provides a good food supply to support an adult population of Colorado pikeminnow. Razorback suckers are known to utilize bottomland habitat. Bottomland habitat occurs above the dam and above the major Grand Valley water diversions. These bottomlands could provide adult and nursery habitat for razorback sucker, helping to increase the population numbers of this very rare fish. Increasing population numbers is essential for the survival and recovery of species with low population numbers such as the Colorado pikeminnow and razorback sucker. Therefore, the Recovery Program plans to restore passage at the three dams. Three miles downstream of the project site is the Grand Valley Irrigation Company Diversion Dam that has been in place since 1883. The diversion dam was a barrier to upstream fish passage during low water periods until 1998 when a notch was cut in the dam and a series of pools and riffles were constructed below the notch to allow fish passage at low flows. Currently the Price-Stubb Dam is a complete barrier to upstream fish movement at all flow levels. Six miles upstream of the project area is the Grand Valley Project Diversion Dam, which has been a complete barrier to upstream fish movement since 1917. Fish passage for this dam is in the planning process.

The reach of the Colorado River between the Grand Valley Irrigation Company Diversion and the confluence with the Gunnison River is known as the 15-mile reach. The 15-mile reach is affected more than any of the other reaches by water depletions because it is located downstream of several large diversions and upstream of the Gunnison River confluence. Extremely low water conditions that occur during the late summer and early fall months reduce habitat for Colorado pikeminnow and razorback sucker. Reduced flows during spring runoff reduces the ability for many habitats to be created and maintained. Therefore, many of the recovery actions are targeted for the 15-mile reach. Colorado pikeminnow and razorback sucker occur in the 15-mile reach, humpback chub and bonytail currently are not known to occur there. The 15-mile reach is a particularly important section of river for Colorado pikeminnow and razorback sucker; it is critical to the recovery of each species' Colorado River populations (Osmundson 1999b). The following section summarizes the attributes of this reach and puts in context its importance in relation to the rest of the river.

Colorado pikeminnow require a variety of specific habitat types to fulfill their life history needs. Some of these required habitats are found only in certain areas of the river and are separated from other required habitats by long distances. The 15-mile reach provides spawning habitat; spawning by Colorado pikeminnow was documented within the 15-mile reach in 1982 and in 1995 by the capture of pikeminnow larvae. The cleaner cobble bars found in upstream reaches, such as the 15-mile reach, provide the most suitable sites for spawning. Larvae hatched from eggs deposited in these upstream reaches drift downstream with the current. In downstream reaches, primarily below Moab, Utah, deposits of silt and sand provide many warm backwater sites where young Colorado pikeminnow feed upon the abundant zooplankton and chironomid

larvae. When they become piscivorous, young Colorado pikeminnow feed upon the abundant small fishes found in these areas.

Osmundson et al. 1995 reported that backwater area in the 15-mile reach is the greatest when the river is flowing around 7,620 cfs. Adult Colorado pikeminnow use backwaters in the 15-mile reach all year long, however, backwaters are used most frequently during spring runoff. Backwaters provide warm, off-channel, quiet water when main-channel velocities are high and temperatures are low (Osmundson et al. 1995).

Osmundson et al. (1998) documented the upstream dispersal of subadult and adult Colorado pikeminnow. As the young fish in the downstream nursery areas grow and approach adulthood, they require larger forage fish to maintain growth rates. However, larger forage fish are scarce in these downstream reaches and maturing Colorado pikeminnow begin to move up and down the river seeking better feeding grounds. Eventually, adult Colorado pikeminnow discover the abundant supplies of native fish, primarily bluehead and flannelmouth sucker, in the upper river including the 15-mile reach and remain in these upper reaches for the remainder of their lives. Forage fish are generally more abundant in these upper reaches because food for these fishes, algae and aquatic insects, is more abundant (Lamarra 1999). Algae, phytoplankton (free-floating algae) and periphyton (algae that grows on rock surfaces), is more abundant because the higher water clarity allows deeper light penetration necessary for its growth. Aquatic insects are more abundant because the swifter currents resulting from generally higher gradients flush gravel and cobble substrates providing silt-free crevices required by many aquatic insects. Because of the increasing abundance of forage fish as one moves up river, the average size of Colorado pikeminnow increases upstream with the 15-mile reach containing the greatest proportion of large adult Colorado pikeminnow.

The 15-mile reach appears to provide the optimum balance between temperature and food abundance for adult Colorado pikeminnow (Osmundson et al. 1998, Osmundson 1999a).

Razorback suckers also are found in the 15-mile reach and use the reach as a spawning area (Osmundson and Kaeding 1989, 1991). The complete life cycle of the razorback sucker, in terms of its entire river habitat use pattern, is largely unknown but may be similar to that of Colorado pikeminnow because adults are generally concentrated in upstream reaches of the Colorado and Green rivers and larvae from spawning sites in the upper Green River have been found to drift long distances down river. Other evidence suggests that bottomlands in both upstream and downstream reaches historically served as nursery areas for larvae when these habitats flooded during the historically higher spring runoff period.

The 15-mile reach also is important for the survival and recovery of Colorado pikeminnow and razorback sucker because it provides a refuge for the Colorado River Basin populations should a catastrophic event such as an oil spill or chemical spill affect the Gunnison River or the Colorado River below the Gunnison River confluence.

In summary, the 15-mile reach is important for several reasons:

1. The 15-mile reach provides valuable spawning habitat for Colorado pikeminnow and razorback sucker.

2. The 15-mile reach provides an optimum balance between temperature and food availability for adult Colorado pikeminnow in the Colorado River.

3. The 15-mile reach provides an important refuge for endangered fishes should a catastrophic event cause a loss of populations in the Gunnison River or in the Colorado River below the Gunnison River confluence.

Biological Environment

Food supply, predation, and competition are important elements of the biological environment. Food supply is a function of nutrient supply and productivity, which could be limited by the presence of contaminants. The modification of flow regimes, water temperatures, sediment levels, and other habitat conditions caused by water depletions has contributed to the establishment of nonnative fishes. Predation and competition from nonnative fishes have been clearly implicated in the population reductions or elimination of native fishes in the Colorado River Basin (Dill 1944, Osmundson and Kaeding 1989, Behnke 1980, Joseph et al. 1977, Lanigan and Berry 1979, Minckley and Deacon 1968, Meffe 1985, Propst and Bestgen 1991, Rinne 1991, and others). Data collected by Osmundson and Kaeding (1991) indicated that during low water years nonnative minnows capable of preying on or competing with larval endangered fishes greatly increased in numbers.

Nonnative fishes compete with native fishes in several ways. The capacity of a particular area to support aquatic life is limited by physical habitat conditions. Increasing the number of species in an area usually results in a smaller population of most species. The size of each species population is controlled by the ability of each life stage to compete for space and food resources and to avoid predation. Some nonnative fishes' life stages appear to have a greater ability to compete for space and food and to avoid predation in the existing altered habitat than do some native fishes' life stages.

Nonnative fishes are often stocked in and enter rivers from off-channel impoundments. The periodic introduction of these nonnative fishes into a river allows them to bypass limitations to reproduction, growth, or survival that they might encounter in the river. Consequently, populations of nonnative fishes in the river are enhanced. Endangered and other native species in the river experience greater competition and predation as a result.

Because the Price-Stubb Dam is a complete barrier to fish movement, nonnative fish are less abundant above the dam then below the dam. The biomass of the main channel fish community between Government Highline Dam and Rulison consists primarily of native flannelmouth sucker (*Catostomus latipinnnis*), bluehead sucker (*C. discobolus*), roundtail chub (*Gila robusta*), and nonnative white sucker (*C. commersoni*) (Anderson 1997). The predominant fish in backwaters in this reach were flannelmouth sucker, bluehead sucker, roundtail chub, and nonnative fathead minnow (*Pimephales promelas*) (Anderson 1997). Very few fishery surveys have been conducted between the Government Highline Dam and the Price-Stubb Dam.

## EFFECTS OF THE ACTION

### Factors to be Considered

The proposed fish passage will not divert water from the river and will be operated as a "run-of-the-river" facility, so no water depletions or changes in the flow regime are anticipated. The proposed project is not expected to affect water quality, except for increased turbidity on a temporary basis during project construction. The project will fill in the pool at the base of the existing dam that currently provides fish habitat. The fish passage channel will also allow nonnative fishes access to approximately 3 miles of critical habitat that have not been accessible by upstream fish movement for almost 100 years.

### Analysis of the Effects of the Action

The effects of the proposed action are primarily beneficial because it will provide fish passage past a dam that has blocked upstream fish migration for almost 100 years. Once fish passage is established at the Price-Stubb Dam, some of the attributes of the 15-mile reach that occur above this barrier, such as appropriate temperatures, spawning habitat and food availability, would be accessible to the endangered fishes. Also, more water is in the river above the Government Highline Dam than in the 15-mile reach, because it is above two major agricultural diversions.

There are several adverse affects associated with the subject project. The filling of the pool at the base of the dam with rock as part of the 400-foot long riprap rock ramp will eliminate this pool as habitat for endangered fishes. One Colorado pikeminnow was documented using this pool in 1986 (Osmundson and Kaeding 1989). Nonselective fish passage, as proposed at the Price-Stubb Dam, would provide passage for nonnative fishes as well as native fishes. An increase in nonnative fishes between the Price-Stubb Dam and the Government Highline Dam could adversely impact the endangered fishes because they are known to prey upon and compete with the endangered fishes.

### Species Response to the Proposed Action

Osmundson (1999) estimated the carrying capacity of the Colorado River for Colorado pikeminnow between Palisade and Westwater Canyon to be 5 to 7 adult fish per mile. Osmundson (1999) also concluded that the Colorado River upstream of the project would provide forage levels equaling those used by Colorado pikeminnow below the Price-Stubb Dam and water temperatures would be suitable upstream to the town of De Beque. Therefore, Osmundson (1999) predicts when passage is provided at the Price-Stubb Dam and the Grand Valley Project Diversion Dam, at least 10.4 miles of suitable year-round habitat will be available to Colorado pikeminnow. Assuming that because the forage levels are similar, the carrying capacity would also be similar between Price-Stubb and De Beque. Therefore, the estimated carrying capacity would be 5 to 7 adult fish per mile or approximately 50 to 70 adult fish could reside above the Price-Stubb Dam. It is unknown whether these fish would spawn above the dams or travel downstream to spawn. There are no current population estimates for razorback sucker in the Colorado River due to the low numbers of remaining fish. The current management objective is to have 5,316 adult razorback suckers in the Colorado River, in Colorado. Juvenile and subadult razorback suckers (150-300 mm) are being stocked above the

Price-Stubb Dam and could use the fish passage facility for up and downstream movement. Bonytail (100-200 mm) are being stocked in the Colorado River between Palisade and Loma within the next 5 years. After stocking these fish could occupy the project area and use the fish passage facility for up and downstream movement.

Osmundson (1999a) estimates that by providing passage at the Price-Stubb and Grand Valley Project Diversion dams, and considering the passage that has already been provided at the Redlands Diversion Dam on the Gunnison River, the population of Colorado pikeminnow could increase from 700 adults to 1,000-1,200 adults. Osmundson (1999a) concludes that providing passage at these dams will collectively increase the available habitat above Westwater Canyon by 74 percent. Increasing the available habitat would support more adult fish, provide more opportunities for spawning, increase larval production and increase the population numbers in the Colorado River. Increasing population numbers is essential for the survival and recovery of species with low population numbers.

When the pool at the base of the Price-Stubb Dam is filled in with rock, as outlined in the description of the proposed action, this habitat will no longer be available for fish. Because a channel will be created as part of the fish passage facility, it is likely that Colorado pikeminnow, and other endangered fishes that once used the pool at the base of the dam, will continue upstream by way of the fish passage channel or over the rock ramp during higher flows.

## CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Endangered Species Act. The Service is not aware of any future non-Federal actions not included in this action under consultation that are reasonably certain to occur in the action area.

## CONCLUSION

After reviewing the current status of the endangered fishes, the environmental baseline for the action area, and the effects of the proposed action, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Colorado pikeminnow, razorback sucker, or bonytail chub nor destroy or adversely modify their designated critical habitat.

## INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to

listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are nondiscretionary, and must be undertaken so that they become binding conditions of any Federal discretionary activity, for the exemption in section 7(o)(2) to apply. The lead Federal agency has a continuing duty to regulate the activity covered by this incidental take statement. If the lead Federal agency 1) fails to assume and implement the terms and conditions or 2) fails to retain oversight to ensure compliance with the terms and conditions, the protective coverage of section 7(o)(2) may lapse.

AMOUNT OR EXTENT OF TAKE

The Service anticipates that take of endangered fishes may occur when nonnative fishes have access to habitat between the Price-Stubb Dam and the Government Highline Dam. Take would occur when nonnative fishes eat endangered fishes and when nonnative fishes cause harm to endangered fishes by competing with them for food and space. Also, take could occur when Colorado pikeminnow consume nonnative fishes with spines, such as channel catfish or black bullheads. Dead Colorado pikeminnow have been found with channel catfish lodged in their throats.

The Service anticipates incidental take of endangered fishes will be difficult to detect for the following reasons: 1) finding a dead specimen is unlikely, 2) finding remains of endangered fish in the stomachs of nonnative fish is unlikely because digestion makes fish hard to identify, 3) documenting competition is difficult, and 4) fish sampling is rarely conducted between Government Highline Dam and Price-Stubb Dam. The Service anticipates the amount of take to be small because the proposed fish passage project would only allow nonnative fishes access to approximately 3 miles of critical habitat.

EFFECT OF TAKE

In the accompanying biological opinion, the Service determined that the level of anticipated incidental take described above, is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURE

The Service believes the following reasonable and prudent measure is necessary and appropriate to minimize take of Colorado pikeminnow, razorback sucker, and bonytail:

> The Bureau of Reclamation through the Recovery Program shall determine the number and species of nonnative fishes moving upstream in the Colorado River above the Price-Stubb Dam.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the following terms and conditions must be complied with, which implement the reasonable and prudent measure described above. These terms and conditions are nondiscretionary.

1. The Recovery Program shall monitor the numbers and species of nonnative fishes entering the future fish passage facilities at the Government Highline Dam and provide an annual report to the Service.

2. The Recovery Program shall prevent farther upstream travel of nonnative fishes by removing nonnative fishes from the river at the Government Highline Dam when the fish passage facility, with selective passage, is completed.

The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize incidental take that might otherwise result from the proposed action. Incidental take statements exempt action agencies and their permittee from the Act's section 9 prohibitions if they comply with the reasonable and prudent measures and the implementing terms and conditions of incidental take statements.

REINITIATION NOTICE

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

cc: COE, Grand Junction

PGelatt:BRPrice-StubbDiversionDamFBO.doc:110603

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