APPENDIX B
BIOLOGICAL OPINION

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May 5, 2004

Memorandum

To: Program Supervisor South, Ecological Services, Region 6, Regional Office, Denver, Colorado, Mail Stop 60120

Area Manager, Bureau of Reclamation, Western Colorado Area Office, Grand Junction, Colorado

From: Regional Director, Region 6,
U.S. Fish and Wildlife Service
Denver, Colorado

Subject: Final Biological Opinion for the Redlands Water and Power Company's Canal Fish Screen, Mesa County, Colorado

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 the proposed fish screen on the Redlands Water and Power Company's (RWPC) Canal. Copies of this opinion should be provided to the applicant because the Service has incorporated reasonable and prudent alternatives that should be included as conditions of any authorization issued by the Bureau of Reclamation or the Fish and Wildlife Service for this project.

Reference is made to your November 24, 2003, correspondence and biological assessment (received in our Grand Junction Field office on December 15, 2003) requesting initiation of formal consultation for the subject project. Additional information regarding water depletions, water diversions, and flows below the Redlands Diversion Dam was received via e-mail on February 17, 2004. Based on the information provided the Service concurs that the annual depletion of water from the Colorado River Basin may adversely affect the endangered Colorado pikeminnow (formerly squawfish) *(Ptychocheilus lucius*), humpback chub (*Gila cypha*), bonytail (*Gila elegans*), and razorback sucker (*Xyrauchen texanus*) and may adversely affect their critical habitat.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

On January 21-22, 1988, the Secretary of the Interior; Governors of Wyoming, Colorado, and Utah; and the Administrator of the Western Area Power Administration cosigned a Cooperative Agreement to implement the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (USFWS 1987). In 2001, the Recovery Program was extended until September 30, 2013. Current participants in the Recovery Program include: the Service, Reclamation, Western Area Power Administration, National Park Service, Colorado, Utah, Wyoming, Western Resource Advocates, The Nature Conservancy, Colorado Water Congress, Utah Water Users Association, Wyoming Water Association, and the Colorado River Energy Distributors Association. The goal of the Recovery Program is to recover the listed species while providing for new and existing water development in the Upper Colorado River Basin. All participants agreed to cooperatively work toward the successful implementation of a recovery program that will provide for recovery of the endangered fish species, consistent with Federal law and all applicable State laws and systems for water resource development and use. Each signatory assumed certain responsibilities in implementing the Recovery Program.

In order to further define and clarify processes outlined in sections 4.1.5, 4.1.6, and 5.3.4 of the Recovery Program, a Section 7 Agreement and a Recovery Implementation Program Recovery Action Plan were developed (USFWS 1993). The Agreement established a framework for conducting section 7 consultations on depletion impacts related to new projects and impacts associated with existing projects in the Upper Basin. Procedures outlined in the Agreement are used to determine if sufficient progress is being accomplished in the recovery of endangered fishes to enable the Recovery Program to serve as a reasonable and prudent alternative to avoid the likelihood of jeopardy and/or adverse modification of critical habitat. The Recovery Action Plan was finalized on October 15, 1993, and has been reviewed and updated annually. Also, the Recovery Goals for the four endangered Colorado River fishes (USFWS 2002 a, b, c, d) include minimization of entrainment of subadult and adult fish at diversion structures as management actions necessary for recovery.

The Redlands Diversion Dam is located on the Gunnison River approximately 2.3 miles upstream from its confluence with the Colorado River. One element of the Recovery Action Plan was to provide fish passage at the Redlands Diversion Dam. The Redlands Diversion Dam was constructed in 1918 and was a complete barrier to fish passage until 1996, when the Recovery Program, in cooperation with the RWPC, constructed a fish passageway around the Redlands Diversion Dam. Reclamation owns the fish passage facility and the Service has operated the facility since 1996.

The dam diverts up to 850 cubic feet per second (cfs) of water into the RWPC Canal. The water flows through a power plant approximately 4 miles downstream from the dam. During the

irrigation season (April - October) approximately 70 cfs is pumped up 120 feet to the shareholder's service area. When fish enter canals they are lost from the river, either by being injured or killed in hydropower turbines or by being transported to irrigated lands. Therefore, the Recovery Program in cooperation with RWPC is proposing to install a fish screen in the Redlands Canal. The RWPC would assume ownership of the fish ladder and fish screen, and be responsible for the operation and maintenance of the screen. The Service would continue to operate the fish ladder. The Recovery Program will provide funding to RWPC to maintain the fish ladder and operate and maintain the screen. An agreement among RWPC, Reclamation, and the Service outlines the responsibility of each party in regards to the proposed fish screen and existing fish ladder (Appendix A). This agreement facilitates the transfer of ownership from Reclamation to RWPC. The Recovery Program identified the construction and operation of a fish screen at the Redlands Canal as a necessary action in their Recovery Action Plan.

The proposed fish screen will be configured in a "V" shape in the canal with each leg of the screen 160 feet long. The screen is designed for a total diversion flow of 890 cfs, with 40 cfs returning fish and debris back to the Gunnison River. The fish return pipeline will be a 36-inch diameter PVC pipe approximately 460 feet long. A bypass channel would be constructed around the section of the canal where the screen would be placed. The purpose of the bypass channel is to have the ability to continue to operate the canal if the screen is not functioning because of icing, clogging, mechanical failure, or other reasons. Gates will be installed in the canal to direct flows either into the fish screen or into the bypass canal.

Water depletions associated with RWPC's operations include an average annual diversion from the Gunnison River of 734 cfs or 503,429 acre-feet. Approximately 490,410 acre-feet of water is returned to the Colorado River downstream of the Gunnison and Colorado River confluence below the power plant tailrace 4.5 miles downstream of the confluence. Approximately 7 cfs is delivered to properties along the Gunnison River with return flows to the Gunnison of approximately 3.5 cfs. In addition, 63 cfs is pumped and delivered to properties up on the Redlands. Water depletions associated with irrigation are approximately 11,737 acre-feet/year.

This large diversion from the Gunnison River significantly reduces flows under certain hydrologic conditions in the lower 2.3 miles of the Gunnison River and several miles of the Colorado River below the confluence. RWPC holds a very senior water right, which provides water for endangered fish in the Gunnison River down to their point of diversion. Also, the large return flow to the Colorado River below the power plant contributes flow to critical habitat. The overall water depletion below the tailrace return on the Colorado River is approximately 11,737 acre-feet/year.

Conservation Measures

Conservation measures are actions that the action agency and applicant (Redlands Water and Power) agree to implement to further the recovery of the species under review. The beneficial effects of conservation measures were taken into consideration for determining jeopardy, adverse

modification of critical habitat and incidental take analyses. Reclamation agrees to implement the following conservation measure and include it as a condition of any issued permit required for the proposed action.

> Reclamation will to the extent allowable under State and Federal law, attempt to release from the Aspinall Unit sufficient water to maintain a minimum flow of 300 cfs during the months of July, August, September and October in the Gunnison River from the Redlands Diversion Dam to the confluence of the Gunnison River with the Colorado River. Said flows include water necessary to maintain fish access to critical habitat in the Gunnison River below Redlands Diversion Dam for authorized fish and wildlife purposes (providing suitable endangered fish habitat). During periods of drought when the 300 cfs below Redlands cannot be met, Reclamation will work with the Service and water users to attempt to maintain flows lower than 300 cfs below Redlands for endangered fish. The operation will remain in place until the Aspinall Operations Environmental Impact Statement is complete and Reclamation has issued a Record of Decision on Aspinall Operations to address endangered fish flows in the Gunnison and Colorado rivers. Operations developed through the environmental impact statement and Endangered Species Act section 7 consultation process will address long term flow requirements below the Redlands Diversion Dam.
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> RWPC, Reclamation, and the Service agree to take specific responsibilities in the operation and maintenance of the fish passage facility and fish screen (Appendix A).

STATUS OF THE SPECIES AND CRITICAL HABITAT

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) indicated 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 in Plateau Creek approximately 2-3 miles upstream from the Colorado River confluence while angling there around 1960 (Bob Burdick pers. comm.).

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).
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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 the confluence with the Colorado River in T. 1 S., R. 1 W., section 22 (Ute Meridian). The subject project occurs within this reach of critical habitat.

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).

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 negatively affects 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; and 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 discharges 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 1999; 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 radio-tagged 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 deep water 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 2.3 miles 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 Redlands Diversion Dam restricted upstream travel of Colorado pikeminnow in the lower Gunnison River between 1917 and 1996. A small remnant population persisted upstream of the dam. Five adult Colorado pikeminnow were captured in the Gunnison River between 1992 and 1994 (Burdick 1995). Earlier studies captured four adult Colorado pikeminnow in the Gunnison River between River Mile 22.1 and 31.4 (Valdez et al. 1982a). In 1996 the fish ladder was constructed around the Redlands Diversion Dam and 62 Colorado pikeminnow have ascended the fish ladder. Also, 1,050 Colorado pikeminnow (150-300 mm long) were stocked in the Gunnison River at Delta in 2003.

Colorado pikeminnow are found in the Gunnison River as far upstream as the Hartland Diversion Dam, which is a barrier to upstream fish passage, located approximately 57 miles upstream of

the Redlands Diversion Dam (Burdick 1995). Colorado pikeminnow movement was monitored in the Gunnison River and it was found that the fish used most of the Gunnsion River between the Redlands Diversion and the Hartland Diversion (Burdick 1995). A suspected spawning area was located between River Mile 32 and 33 (Burdick 1995; McAda 2003).

Colorado pikeminnow larvae were collected in the Gunnison River in 1995 and 1996 (Anderson 1999). Collection of larval fish provides evidence of spawning, but does not locate specific spawning locations.

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 F.R. 13374). The primary

constituent elements are the same as critical habitat for Colorado pikeminnow described previously.

> 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). The subject project occurs within this reach of critical habitat.
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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 (Holden and Stalnaker 1975; McAda and Wydoski 1980; Minckley 1983; McAda 1987; Tyus 1987; Marsh and Minckley 1989). The only substantial population exists in Lake Mohave with an estimated population of 25,000 adult razorback suckers in 1995 (Chuck Minckley pers. comm.) down from an earlier estimate of 60,000 adult razorback suckers (Minckley et al. 1991). 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 last wild razorback sucker was caught in the Grand Valley area in 1995; however, stocked

razorback suckers are now captured on a regular basis in the Grand Valley area during ongoing survey efforts (C. McAda, pers. comm.). 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. 1982b; McAda and Wydoski 1980; Tyus 1987; Osmundson and Kaeding 1989; Tyus and Karp 1989; Tyus and Karp 1990; Platania 1990; Osmundson and Kaeding 1991) 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; Tyus and Karp 1990; Osmundson and Kaeding 1991).

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). 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

Anecdotal information indicates razorback sucker were once common in the Gunnison River (Kidd 1977, Quartrone 1993), and two specimens from the 1940s are in the University of Michigan Museum of Zoology (Wiltzius 1978). One razorback sucker was collected near Delta in 1975 (Wilzius 1978) and three were collected in the vicinity in 1981 (Holden et al. 1981). No razorback suckers were collected during sampling by Valdez et al. (1982a) or Burdick (1995).

A stocking program was initiated by the Recovery Program and between April 1994 and October 2001, 18,423 juvenile, sub-adult, and adult razorback suckers were stocked in the Gunnison River and 31,531 juvenile, sub-adult, and adult razorback suckers were stocked in the Colorado River (Burdick 2001a). Razorback suckers were not stocked in the Gunnison River in 2002 or 2003 due to the low water conditions, which increase the chance of fish being lost in the unscreened Redlands Canal. The goal of the stocking program is to establish a self-sustaining population of 600 individuals between Hartland Diversion and Redlands Diversion. In 2001 and 2002, six razorback suckers used the Redlands fish ladder. Razorback suckers did not use the Redlands fish ladder in 2003. In 2002, eight larval razorback suckers were collected in the Gunnison River (Osmundson 2002b). These are the first larval razorbacks suckers collected from the Colorado or Gunnison Rivers and confirm that spawning is taking place in the Gunnison River.

Humpback Chub

Species/Critical Habitat Description

The humpback chub is a medium-sized freshwater fish (less than 500 mm) of the minnow family. The adults have a pronounced dorsal hump, a narrow flattened head, a fleshy snout with an inferior-subterminal mouth, and small eyes. It has silvery sides with a brown or olive colored back.

The humpback chub is endemic to the Colorado River Basin and is part of a native fish fauna traced to the Miocene epoch in fossil records (Miller 1946; Minckley et al. 1986). Humpback chub remains have been dated to about 4000 B.C., but the fish was not described as a species until the 1940s (Miller 1946), presumably because of its restricted distribution in remote white water canyons (USFWS 1990b). Because of this, its original distribution is not known. The humpback chub was listed as endangered on March 11, 1967.

Until the 1950s, the humpback chub was known only from Grand Canyon. During surveys in the 1950s and 1960s humpback chub were found in the upper Green River including specimens from Echo Park, Island Park, and Swallow Canyon (Smith 1960, Vanicek et al. 1970). Individuals were also reported from the lower Yampa River (Holden and Stalnaker 1975b), the White River in Utah (Sigler and Miller 1963), Desolation Canyon of the Green River (Holden and Stalnaker 1970) and the Colorado River near Moab (Sigler and Miller 1963).

Critical habitat was designated in 1994 within the humpback chub's historical range in the following sections of the upper Colorado River (59 F.R. 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 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

Today the largest populations of this species occur in the Little Colorado and Colorado Rivers in the Grand Canyon, and in Black Rocks and Westwater Canyon in the upper Colorado River. Other populations have been reported in De Beque Canyon of the Colorado River, Desolation and Gray Canyons of the Green River, Yampa and Whirlpool Canyons in Dinosaur National Monument (USFWS 1990b). One individual was recently captured in the Gunnison River (Burdick 1995).

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

Life History

It is known that these chubs spawn soon after the highest spring flows when water temperatures approach 20 °F (Kaeding et al. 1990; Karp and Tyus 1990; USFWS 1990b). The collection of ripe and spent fish indicated that spawning occurred in Black Rocks during June 2-15, 1980, at water temperatures of 11.5 ° to 16 °C; in 1981, spawning occurred May 15-25, at water temperatures of 16 ° to 16.3 °C (Valdez et al. 1982b). Humpback chub spawned in Black Rocks on the Colorado River in 1983 when maximum daily water temperatures were 12.6 ° to 17 °C (Archer et al. 1985). In the Grand Canyon, humpback chub spawn in the spring between March and May in the Little Colorado River when water temperatures are between 16 ° and 22 °C. Swimming abilities of young-of-year humpback chub were determined to be significantly reduced when laboratory water temperatures were reduced from 20 ° to 14 °C. Many young-of-year humpback chub are displaced from the Little Colorado River into the mainstem by monsoonal floods from July through September (Valdez and Ryel 1995). Young humpback chub are found in low velocity shorelines and backwaters. Survival rates are extremely low and believed to be less than 1 in 1,000 to 2 years of age. Low water temperatures and predation are believed to be the primary factors. Valdez and Ryel (1995) estimated that 250,000 young humpback chub are consumed annually by brown trout, rainbow trout, and channel catfish.

Backwaters, eddies, and runs have been reported as common capture locations for young-of-year humpback chub (Valdez and Clemmer 1982). These data indicate that in Black Rocks and Westwater Canyon, young utilize shallow areas. Habitat suitability index curves developed by Valdez et al. (1990) indicate young-of-year prefer average depths of 2.1 feet with a maximum of 5.1 feet. Average velocities were reported at 0.2 feet per second.

Population Dynamics

The number of humpback in the Gunnison River is so low that it is not possible to do a population estimate.

Analysis of Species/Critical Habitat Likely to be Affected

The only record of humpback chub in the Gunnison River was documented by Burdick (1995) when he captured one individual in a canyon-bound reach at River Mile 22.

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 F.R. 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 on 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 1990a). 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. 1982b; 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 1990).

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 and its tributaries is so low that it is not possible to do a population estimate.

Analysis of Species/Critical Habitat Likely to be Affected

Prior to 2003, there were no records of bonytail occurring in the Gunnison River. However, in 2003 one formerly stocked bonytail was captured in the Redlands fish ladder and released upstream. This is the first record of a bonytail in the Gunnison River.

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.

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 action area includes the immediate project site as well as the Gunnison and Colorado Rivers from the Redlands Dam to Lake Powell, because these river reaches are affected by water depletions caused by RWPC. Also, the action area includes the Gunnison River upstream from the Redlands Dam to the confluence of the Uncompahgre River (critical habitat for Colorado pikeminnow and razorback sucker), because screening the Redlands Canal will protect populations of Colorado pikeminnow and razorback sucker upstream of the dam.

Colorado pikeminnow, razorback sucker, and bonytail are all known to occur in the immediate vicinity of the Redlands Canal. All three species have used the Redlands fish ladder. Humpback chub are not known to occupy the immediate project area, but one humpback chub was found upstream in the Gunnison River. Colorado pikeminnow currently occur more frequently in the project vicinity than the other endangered fishes. All four species occur downstream of the Redlands Dam in the Colorado River (see "status and distribution" section for each species above). Populations of Colorado pikeminnow and razorback sucker occur upstream of the Redlands Dam in critical habitat.

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 (excluding depletions associated with RWPC), depletions resulting from projects, which have previously undergone section 7 consultation, and depletions resulting from projects contemporaneous with this consultation.

Water Quality

Some of the contaminants of concern within waters of the Upper Basin include heavy metals, selenium, salts, PAHs, 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 power plant fly ash and oil refineries. Water depletions, by reducing dilution effects, have increased the concentrations of selenium and other contaminants. In 1995, Colorado's Water Quality Control Commission reduced the chronic selenium standard from 17 µg/L to 5 µg/L. The Service recommended the level be lowered to 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. The Redlands Diversion Dam has been in place since 1918 and completely blocked upstream fish movement until 1996 when a fish ladder was installed. Large quantities of water are diverted into the RWPC Canal for power production and irrigation. Large diversions are known to divert many species of fish into canals, including the Colorado River endangered fishes (Burdick 2003). Once fish enter the Redlands Canal, they likely enter the power turbines and are injured or killed. Fish could also be lost in the electric pumps, during canal dewatering, or transported through ditches to irrigated fields. Fish have likely been lost in the RWPC Canal since 1918.

Historically, during certain hydrological conditions, RWPC diverted almost all the water in the Gunnison River. RWPC has senior water rights for 750 cfs, and a junior water right for an additional 100 cfs. In 1996, Reclamation entered into a temporary agreement with the Colorado Water Conservation Board to deliver water from the Aspinall Unit to ensure that a 300 cfs minimum flow was maintained downstream of the Redlands Diversion Dam in the months of July through October to maintain sufficient flow for access to the fish ladder for endangered fishes.

Water depletions, by affecting the quantity and timing of flows, have reduced the ability of the river to create and maintain habitats and have reduced the frequency and duration of availability of certain habitats.

Habitat Formation

The formation of a variety of channel habitats, including gravel/cobble bars and substrates used by Colorado pikeminnow for spawning, is essential to ensure the availability of the range of habitats required by all endangered fish life stages to fulfill daily requirements (foraging, resting, spawning, avoiding predation, etc.) under various flow conditions. The number and distribution of these channel habitats can be described as channel habitat complexity, diversity, or heterogeneity. Osmundson and Kaeding (1991) found that adult Colorado pikeminnow in the Grand Valley prefer river segments with a complex morphometry over those that are simple.

Some important habitats, such as inundated floodplain depressions used by razorback suckers for spawning, are located outside the channel. Floodplain depressions are principally derived from abandoned main channels, side-channels, backwaters, and meander cutoffs.

The creation of complex channel habitat and the formation and eventual abandonment of channel features from which floodplain depressions are formed occur primarily during spring runoff when flows are of sufficient size and duration to cause major changes in channel morphology through significant erosion and deposition of bed and bank materials. The reduction in the magnitude, duration, and frequency of high spring flows has slowed the rate at which channel morphology changes. Consequently, the creation of complex channel habitat and floodplain depressions has slowed. The placement of riprap and other bank stabilization measures and the construction of dikes and levees impede changes in channel morphology and contribute to the slowed creation of complex channel habitat. In addition, the construction of dikes and levees reduces existing channel habitat complexity by causing channelization of the river. Dikes and levees also isolate existing floodplain depressions from the channel during high flows. The slowed creation of complex channel habitats and new floodplain depressions, the reduction of existing channel habitat complexity, and the isolation of existing floodplain depressions have acted to reduce the quantity and quality of important habitat for endangered fishes.

Habitat Maintenance

Backwaters, used by various life stages of endangered fish, are damaged by the deposition of fine sediments which reduces their depth and consequently their duration and frequency of inundation. Gravel and cobble substrates, used by pikeminnow for spawning, are damaged by the infiltration of fine sediments. The establishment of vegetation on backwater sediments and on bars further reduces the value of these habitats for endangered fishes. Furthermore, higher flows are required to flush sediments from vegetated backwaters than from unvegetated ones. Osmundson and Kaeding (1991) reported observations that, on the 15-mile reach during the drought years of 1988 to 1990, backwaters were filling in with silt and spring flows were not sufficient to flush out the fine sediment. Also, they reported that tamarisk colonized sand and cobble bars. Therefore, the lower frequency of high water years decreases the frequency at which silt and sand is flushed from backwaters, fine sediments are flushed from gravel/cobble substrates, and vegetation is scoured from backwaters and bars. As a result, the frequency at which these habitats are suitable for use by endangered fishes has decreased. Flow recommendations recently developed for the Gunnison River (McAda 2003) are intended to restore and maintain in-channel habitats used by all life stages: 1) spawning areas for adults; 2) spring, summer, autumn and winter habitats used by subadults and adults; and 3) nursery areas used by larvae, young of year, and juveniles.

Seasonal Habitat Availability

Summer (August-October)--Osmundson et al. (1995) reported that, in the 15-mile reach, availability of habitats did not differ significantly between periods of moderate flows and low flows. Though absolute area of habitat decreases with declining flows, relative area or percent

composition of habitat types changes little. However, pikeminnow habitat use patterns did change. The fish used a greater variety of habitats during moderate flows than during low flows. During moderate flows, the fish used primarily backwaters, eddies, and pools. During low flows, the fish used slow and fast runs almost exclusively. The change in habitat use without a corresponding change in relative habitat availability indicates that other factors also influence habitat selection. These factors could include changes in quality of physical habitat features such as diversity, depth, dissolved oxygen, etc., or changes in biotic interactions. Osmundson et al. (1995) interpreted the pikeminnow behavioral changes as reflective of suboptimal conditions; the behavioral changes demonstrate the ability of the species to modify their habitat use patterns to temporarily cope with adverse conditions and do not demonstrate habitat preferences under optimum conditions.

Winter (November-March)--Osmundson et al. (1995) reported that, in the 15-mile reach, flows during the winter are usually moderate because no water is diverted for irrigation and because additional water is released through upstream dams to increase reservoir storage capacity in anticipation of spring runoff. The relative availability of slow runs and riffles during the winter was very similar to their availability during summer. As in the summer, backwaters, eddies, and pools were the preferred types of habitat in the winter. However, whereas eddies were most preferred in summer, pools were most preferred in winter. Adult pikeminnow used fewer habitat types overall during winter than during summer. Although fast runs and riffles were used during the summer, they were not used during the winter. The colder water temperatures in winter which cause lower metabolic rates may account for the avoidance of high velocity sites. Absolute area of pools increases as flows decrease and slow runs lose velocity. Because Osmundson et al. (1995) did not sample low flows in the winter, they could not determine if pools would still be preferred in the winter at lower flows.

Spring (April-July)--Osmundson and Kaeding (1989) reported that pikeminnow use of low velocity habitats such as backwaters and flooded gravel pits is greatest during the spring runoff. It is believed that pikeminnow use these habitats during the runoff to escape the high velocity, low temperature flows of the main channel. Because backwaters, flooded gravel pits, and other low velocity habitats are considerably warmer than the main channel during the runoff, these habitats allow pikeminnow to extend their growing season substantially. The earlier warming of these habitats also may be important in enabling pikeminnow to reach spawning condition by the time flow and temperature in the main channel are optimum for spawning. Osmundson et al. (1995) reported that, in the 15-mile reach, the numbers of backwaters and flooded gravel pits increases with increasing spring flows. (Although the number of backwaters eventually decreases as increasing flows convert backwaters to side channels, the number of other low velocity habitats likely increases as increasing flows inundate additional bottomlands.) The decrease in the magnitude, duration, and frequency of high spring flows, then, decreases the quantity and the duration and frequency of availability of important low velocity, higher temperature habitat in the spring. This could be affecting pikeminnow growth and spawning success.

Also, the quantity and frequency of availability of inundated floodplain depressions used by razorback suckers for spawning is dependent on the magnitude and frequency of spring flows necessary to inundate these areas. The decrease in the magnitude and frequency of spring flows necessary to inundate floodplain depressions is believed to be largely responsible for poor razorback sucker spawning success.

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; Minckley and Deacon 1968; Joseph et al. 1977; Lanigan and Berry 1979; Behnke 1980; Meffe 1985; Osmundson and Kaeding 1989; Propst and Bestgen 1991; Rinne 1991). 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.

EFFECTS OF THE ACTION

Factors to be Considered

The RWPC Dam and Canal is currently in place and diverting significant quantities of water into the canal. The Recovery Program has identified the construction and operation of a fish screen as an element in their Recovery Action Plan. Therefore, the Recovery Program in cooperation with RWPC is proposing to install a fish screen in the Redlands Canal. The RWPC would assume ownership of the fish ladder and fish screen, be responsible for the maintenance of the ladder, and be responsible for the operation and maintenance of the screen. The Recovery

Program will provide funding to RWPC to maintain the ladder and operate and maintain the screen. An agreement among RWPC, Reclamation, and the Service outlines the responsibility of each party in regards to the proposed fish screen and existing fish ladder (Appendix A). The construction of the fish screen will take place in the Redlands Canal when it is dewatered after irrigation season. The screen will be located 1,500 feet down the canal from the diversion dam. Therefore, we do not anticipate adverse affects from fish screen construction. The construction of the fish return pipe will require temporary disturbance several feet into the river. A temporary coffer dam will be required to dewater the area around the outlet pipe. The area is located within critical habitat but the temporary nature of disturbance and the small area of disturbance are not anticipated to adversely affect critical habitat.

Water Quantity

Water depletions associated with RWPC's operations include an average annual diversion from the Gunnison River of 734 cfs or 503,429 acre-feet. Approximately 490,410 acre-feet of water is returned to the Colorado River downstream of the Gunnison and Colorado River confluence below the power plant tailrace. This large water depletion has its greatest effect on the Gunnison River from the Redlands Dam to the confluence with the Colorado River (2.3 miles). It also depletes a substantial amount of flow between the confluence and the canal return flow on the Colorado River approximately 4.5 miles down stream of the confluence. Approximately 7 cfs is delivered to properties along the Gunnison River with return flows to the Gunnison of approximately 3.5 cfs. In addition, 63 cfs is pumped and delivered to properties up on the Redlands. The overall depletion to the Colorado River basin below the power canal return and return flows from Redlands irrigation is approximately 11,737 acre-feet/year.

Water Quality

The Project's depletion would cause a proportionate decrease in dilution, which in turn would cause a proportionate increase in heavy metal, selenium, salts, PAHs, pesticides, and other contaminant concentrations in the Colorado River. An increase in contaminant concentrations in the river would likely result in an increase in the bioaccumulation of these contaminants in the food chain which could adversely affect the endangered fishes, particularly the predatory Colorado pikeminnow. Selenium is of particular concern due to its effects on fish reproduction and its tendency to concentrate in low velocity areas that are important habitats for Colorado pikeminnow and razorback suckers.

Physical Habitat

High spring flows are very important for creating and maintaining complex channel geomorphology and suitable spawning substrates, creating and providing access to off-channel habitats, and possibly stimulating Colorado pikeminnow spawning migrations. Adequate summer and winter flows are important for providing a sufficient quantity of preferred habitats for a duration and at a frequency necessary to support all life stages of viable populations of all endangered fishes. To the extent that the Project will reduce flows, the ability of the river to

provide these functions will be reduced. The RWPC depletions can substantially dewater the Gunnison River between the Redlands Dam and the confluence with the Colorado River (2.3 miles) during low flow conditions. This affects habitat availability and habitat quality. The subject depletions can also substantially reduce flows between the confluence and the power canal return (4.5 miles), which reduces habitat on the Colorado River in this reach. Below the power plant return flow and the return flows from irrigation, impacts to habitat are not as significant.

Biological Environment

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. To the extent that it would reduce flows and contribute to further habitat alteration, the Project would contribute to an increase in nonnative fish populations. Endangered fishes within the action area would experience increased competition and predation as a result.

Species Response to the Proposed Action

Construction and operation of the proposed fish screen is anticipated to substantially reduce the numbers of endangered fishes lost in the RWPC facilities.

CUMMULATIVE 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

Based upon the best scientific and commercial information that is currently available, it is the Service's biological opinion that the water depletions associated with RWPC operations, as described herein, are likely to jeopardize the continued existence of the Colorado pikeminnow, humpback chub, bonytail, and razorback sucker and result in the destruction or adverse modification of their critical habitat. The Service has developed reasonable and prudent alternatives to avoid the likelihood of jeopardy to the endangered fishes and to avoid destruction or adverse modification of their critical habitat.

REASONABLE AND PRUDENT ALTERNATIVE

Regulations (50 CFR 402.02) implementing section 7 of the Act define reasonable and prudent alternatives as alternative actions, identified during formal consultation, that: 1) can be

implemented in a manner consistent with the intended purpose of the action; 2) can be implemented consistent with the scope of the action agency's legal authority and jurisdiction; 3) are economically and technologically feasible; and 4) would, the Service believes, avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.

On January 21-22, 1988, the Secretary of the Department of the Interior; the Governors of Wyoming, Colorado, and Utah; and the Administrator of the Western Area Power Administration were cosigners of a Cooperative Agreement to implement the "Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin" (USFWS 1987). In 2001, the Recovery Program was extended until September 30, 2013. An objective of the Recovery Program was to recover the listed species while providing for new water development in the Upper Basin.

In order to further define and clarify processes outlined in sections 4.1.5, 4.1.6, and 5.3.4 of the Recovery Program, a Section 7 Agreement and a Recovery Implementation Program Recovery Action Plan was developed (USFWS 1993). The Agreement establishes a framework for conducting all future section 7 consultations on depletion impacts related to new projects and all impacts associated with historic projects in the Upper Basin. Procedures outlined in the Agreement will be used to determine if sufficient progress is being accomplished in the recovery of the endangered fishes to enable the Recovery Program to serve as a reasonable and prudent alternative to avoid jeopardy. The Plan was finalized on October 15, 1993, and has been reviewed and updated annually.

In accordance with the Agreement, the Service assesses the impacts of projects that require section 7 consultation and determine if progress toward recovery has been sufficient for the Recovery Program to serve as a reasonable and prudent alternative. If sufficient progress is being achieved, biological opinions are written to identify activities and accomplishments of the Recovery Program that support it as a reasonable and prudent alternative. If sufficient progress in the recovery of the endangered fishes has not been achieved by the Recovery Program, actions from the Plan are identified which must be completed to avoid jeopardy to the endangered fishes. For historic projects, these actions serve as the reasonable and prudent alternative as long as they are completed according to the schedule identified in the Plan. For new projects, these actions serve as the reasonable and prudent alternative so long as they are completed before the impact of the project occurs.

In determining if sufficient progress has been achieved, the Service considers: a) actions which result in a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction; b) status of fish populations; c) adequacy of flows; and d) magnitude of the project impact. In addition, the Service considers support activities (funding, research, information and education, etc.) of the Recovery Program if they help achieve a measurable population response, a measurable improvement in habitat for the fishes, legal protection of flows needed for recovery, or a reduction in the threat of immediate extinction. The Service evaluates progress

separately for the Colorado River and Green River subbasins; however, it gives due consideration to progress throughout the Upper Basin in evaluating progress toward recovery.

The following excerpts summarize portions of the Recovery Program that address depletion impacts, section 7 consultation, and project proponent responsibilities:

> "All future section 7 consultations completed after approval and implementation of this program (establishment of the Implementation Committee, provision of congressional funding, and initiation of the elements) will result in a one-time contribution to be paid to the Service by water project proponents in the amount of $10.00 per acre-foot based on the average annual depletion of the project . . . This figure will be adjusted annually for inflation [the current figure is $15.93 per acre-foot] . . . Concurrently with the completion of the Federal action which initiated the consultation, e.g., . . . issuance of a 404 permit, 10 percent of the total contribution will be provided. The balance . . . will be . . . due at the time the construction commences . . ."

It is important to note that these provisions of the Recovery Program were based on appropriate legal protection of the instream flow needs of the endangered Colorado River fishes. The Recovery Program further states:

> ". . . it is necessary to protect and manage sufficient habitat to support self-sustaining populations of these species. One way to accomplish this is to provide long term protection of the habitat by acquiring or appropriating water rights to ensure instream flows. Since this program sets in place a mechanism and a commitment to assure that the instream flows are protected under State law, the Service will consider these elements under section 7 consultation as offsetting project depletion impacts."

Thus, the Service has determined that depletion impacts, which the Service has consistently maintained are likely to jeopardize the listed fishes, can be offset by: a) the water project proponent's one-time contribution to the Recovery Program in the amount of $15.93 per acre-foot of the project's average annual depletion; b) appropriate legal protection of instream flows pursuant to State law; and c) accomplishment of activities necessary to recover the endangered fishes as specified under the Plan. The Service believes it is essential that protection of instream flows proceed expeditiously, before significant additional water depletions occur.

The project's average annual historic depletion to the upper Colorado River basin of 11,737 acre-feet is greater than the current sufficient progress threshold of 4,500 acre-feet. According to the Agreement, if sufficient progress is not being achieved by the Recovery Program, actions from the Plan will be identified which must be completed to avoid jeopardy to the endangered fishes and destruction or adverse modification of critical habitat.

The Service has determined that the Recovery Program can serve as the reasonable and prudent alternative to avoid jeopardy to the endangered fishes and destruction or adverse modification of critical habitat caused by the project's historic depletion provided that the following RIPRAP

items from the Colorado River Action Plan: Gunnison River are implemented or continue to be implemented.

1. RIPRAP II.B.1.g – Screen Redlands diversion structure to prevent endangered fish entrainment. This recovery element is the proposed action under consultation and includes water depletions associated with the RWPC operations. Recovery elements are intended to offset impacts associated with water depletions.

2. RIPRAP II.B.1.c – Operate and maintain Redlands fish ladder. The Redlands fish ladder has been in operation since 1996. The Service will continue to operate the ladder and the RWPC will assume ownership of the ladder and will be responsible for maintenance as identified in cooperation with the Service.

3. RIPRAP I..C.3. – Provide interim flows from the Aspinall Unit as determined through the continued annual coordination (meeting 3 times/year) of Aspinall operation until the record of decision on Aspinall Operation is completed and implemented.

According to the Agreement, for historic depletions, these actions will serve as the reasonable and prudent alternative as long as they are completed according to the schedule identified in the Plan. Also, according to the Agreement, if the Service determines that a recovery action(s) specified in a previously rendered biological opinion can no longer serve as a reasonable and prudent alternative (because a critical recovery action deadline is missed, a recovery action is determined to be infeasible, significant new information about the needs or population status of the fishes becomes available, etc.), the Service will work with the Management Committee to restore the Recovery Program as a reasonable and prudent alternative (by adjusting a recovery action so that it can be achieved, developing a supplemental recovery action, shortening the timeframes on other recovery actions, etc.). The Agreement exempts historic depletions from the depletion charge.

It should also be noted that the following conservation measures are included in the project description for this project.

> Reclamation will to the extent allowable under State and Federal law, attempt to release from the Aspinall Unit sufficient water to maintain a minimum flow of 300 cfs during the months of July, August, September and October in the Gunnison River from the Redlands Diversion Dam to the confluence of the Gunnison River with the Colorado River. Said flows include water necessary to maintain fish access to critical habitat in the Gunnison River below Redlands Diversion Dam for authorized fish and wildlife purposes (providing suitable endangered fish habitat). During periods of drought when the 300 cfs below Redlands cannot be met, Reclamation will work with the Service and water users to attempt to maintain flows lower than 300 cfs below Redlands for endangered fish. The operation will remain in place until the Aspinall Operations Environmental Impact

Statement is complete and Reclamation has issued a Record of Decision on Aspinall Operations to address endangered fish flows in the Gunnison and Colorado rivers. Operations developed through the environmental impact statement and Endangered Species Act section 7 consultation process will address long term flow requirements below the Redlands Diversion Dam.

RWPC, Reclamation, and the Service agree to take specific responsibilities in the operation and maintenance of the fish passage facility and fish screen (Appendix A).

In order to more efficiently implement the reasonable and prudent alternatives, RWPC and the Service will sign a Recovery Agreement (Appendix B) that outlines the responsibility of each party.

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

Adult and Subadult Fish

The Service anticipates that with the implementation of the proposed action, take of adult and subadult Colorado pikeminnow, razorback sucker, and bonytail by the hydropower turbines and/or being lost in the canal will be avoided when the screen is operating. Colorado pikeminnow, razorback sucker, and bonytail have shown to be more active and mobile during the warmer months between April and October. Conversely, during the colder months from October to March, these fish are less active and movement is minimal. Also, the Service anticipates that the fish screen should be operational most of the time that coincides with when these native fishes tend to move the most in the river. The Service believes that any endangered fish entering the canal should be bypassed unharmed back to the river when the fish screen is operating correctly. However, the fish screen may not be operational during certain circumstances which include but are not limited to: 1) inadequate river flows, 2) mechanical failure of the fish screen, 3) debris that fouls the screen, 4) icing, or 5) maintenance. During these situations when the screen is not operational, take of the subject adult and subadult endangered fishes could occur. In this situation the incidental take is expected to be in the form of harm to the species by removing them from riverine habitat and in the form of killing by encountering the hydropower turbine. Take may also occur when adult or subadult fish become impinged on the fish screen or stranded in the fish return pipe when the fish screen is in operation, or stranded in the fish ladder when it is dewatered.

When Screen is Not Operating

It is difficult to predict how many days a year the screen will not be in operation. The Service anticipates the fish screen would only be shut down due to inadequate river flows during severe drought conditions. The fish screen could be shut down each winter due to icing conditions, however, fish movement during the winter is minimal, and therefore, the Service anticipates that only a few fish of any species may swim into the canal during the winter. Maintenance and screen fowling cannot be predicted until the screen has actually been in operation. Therefore, until the screen is operating and further information is obtained regarding situations when the fish screen cannot be operated, the Service used the following information to estimate potential take. The total number of Colorado pikeminnow caught in the fish ladder between 1996 and 2000 was 43 individuals (Burdick 2001b). A fallback rate (the number of fish that fall back over the dam after ascending the fish ladder) was estimated to be 31 percent (Burdick 2001b). Therefore, approximately 13 Colorado pikeminnow (31 percent of 43) are likely to be traveling downstream in the vicinity of the Redlands Dam. Studies conducted on the Colorado River found that 47 percent of Colorado pikeminnow traveling past the Government Highline Dam were lost in the canal (Burdick 2003). Therefore, the Service estimates that, under the worst case scenario (significant number of fish traveling through the fish ladder and the screen is not operating) six Colorado pikeminnow could be lost in the canal per year. Similar data is not available for razorback sucker, but based on these numbers, the Service estimates six razorback suckers could be lost in the canal per year. Since only one bonytail has been observed in the fish ladder, the Service estimates only one bonytail might be lost in the canal per year when the

screen is not operating. When the screen is not operating, the amount of take described in this paragraph is permitted.

As populations of endangered fishes increase in the Gunnison River above the Redlands Diversion Dam, the possibility of fish being taken by the canal and power turbines increases when the screen is not operating. As populations increase and information on the frequency of the operation of the fish screen becomes available, the Service may reevaluate the amount of anticipated take. If the Service finds the amount of anticipated take is greater than what is currently anticipated, the Service will coordinate with RWPC to determine alternatives for increasing the frequency of screen operation and issue an updated incidental take statement.

When the Fish Screen is Operating

When either or both the ladder and screen are operating, the Service anticipates that one Colorado pikeminnow and one razorback sucker may become impinged on the fish screen or stranded in the fish return pipe or fish ladder annually. The Service does not anticipate bonytail will become impinged on the screen or stranded on the fish return pipe, or fish ladder because so few bonytail occur in the project area.

After a Stocking Event

There is some mortality associated with stocked fish shortly following stocking. After stocking razorback suckers on the Gunnison River, dead or dying fish were reported on the trash grates of the Redlands fish ladder in 5 out of 8 years of stocking. Between 1996 and 2003 a total of 18,395 razorback suckers were stocked in the Gunnison River and 101 dead or dying fish from the recent stockings were found on the trash grates (Burdick 2003, Burdick and Pfeifer 1999, Service unpublished data), or 0.5 percent of the stocked fish. It is not known if these fish died prior to coming in contact with the trash grates or if the trash grates caused the mortality. After a stocking event on the Gunnison River, the Service anticipates an increase of endangered fishes getting diverted into the Redlands Canal, especially during low-flow periods (i.e., July-September). The rate of flow diverted at the Redlands fish ladder is approximately 80 cfs, and the rate of flow at the Redlands Canal is approximately 850 cfs, therefore, the rate of flow diverted is approximately 10 times more in the canal than in the ladder. Based on rates of diverted flow, the Service estimates the canal could take 5 percent of the fish stocked in a given year. Between 1996 and 2003 an average of 2,300 razorback suckers were stocked per year. The current stocking plan for the Gunnison River calls for stocking 3,310 razorback suckers per year (Nesler et al. 2003). Therefore, the Service anticipates between approximately 115 (5 percent of 2,300) and 166 (5 percent of 3,310) stocked razorback suckers could be diverted into the canal following a stocking event. The Service also anticipates between approximately 12 (0.5 percent of 2,300) and 17 (0.5 percent of 3,310) of the stocked razorback suckers could be found dead or dying on the trash grates of the fish ladder. When the screen is operating, fish entering the canal should be diverted into the fish return pipe and returned to the Gunnison River below the dam. When the screen is not operating, take of 5 percent of the recently stocked fish is

permitted in the canal for six months after a stocking event. Also, take of 5 percent of the recently stocked fish is permitted when the screen is operating and stocked fish are impinged on the screen or get stuck in the fish return pipe for six months following a stocking event. Take of 0.5 percent of stocked razorbacks at the fish ladder is permitted for six months following a stocking event.

In 2003 approximately 1,050 Colorado pikeminnow were stocked in the Gunnison River upstream of the Redlands Dam. Colorado pikeminnow have not been found on the trash grates of the fish ladder. Based on the information presented above the Service estimates approximately 5 percent of stocked Colorado pikeminnow could be diverted into the Redlands Canal. If bonytails are stocked in the Gunnison River in the future, the Service also anticipates 5 percent of the stocked fish could be lost in the canal. When the screen is operating the stocked fish should be returned to the river alive through the fish return pipe. When the screen is not operating, take in the canal of 5 percent of the stocked fish is permitted for six months following a stocking event. Also, the anticipated amount of take is permitted when the screen is operating, and stocked fish are impinged on the screen or get stuck in the fish return pipe. Take of 0.5 percent of stocked Colorado pikeminnow at the fish ladder is permitted for six months following a stocking event.

The Service anticipates that endangered fish could again be impinged on the trash grates at the fish ladder after a stocking event at a similar rate of occurrence as happened in the past. Therefore, we anticipate 0.5 percent of stocked fish could be impinged on the trash grates or enter the fish passage channel injured or dead. Also, it could be possible for a fish to become stranded and caught on a baffle within the fish passage channel. This is anticipated to be an extremely rare event; therefore, we only anticipate one Colorado pikeminnow, one razorback sucker, and one bonytail per year could be injured or die in such an event.

Young Fish

After the construction of the RWPC facilities in 1918, it is likely that significant populations of Colorado pikeminnow and razorback sucker occurred in the Gunnison River upstream of the Redlands Diversion Dam. It is likely that larval and small-bodied fishes have always drifted into the Redlands Diversion Canal. In recent years the decline of these species reduces the probability of larval endangered fishes being diverted into the canal. The Service anticipates the take of larvae and young of the year (YOY) will continue to occur with the fish screen in place, because the openings in the screen will be 3/32 of an inch and larval and some YOY fishes will fit through the openings. No evidence of bonytail spawning has been documented. However, as stocking programs continue the likelihood of bonytail spawning increases. At this time, the Service does not anticipate bonytail larvae being taken at the Redlands Canal. There is evidence, by the collection of larvae, that Colorado pikeminnow and razorback sucker have spawned in the Gunnison River in recent years. The Service finds it is difficult to define take associated with irrigation diversions because detecting a dead or impaired specimen is unlikely, as larval fish are

extremely small, the river is very turbid, and fish of any size are not easily observed. The Service assumes that because there is evidence that Colorado pikeminnow and razorback sucker are spawning in the Gunnison River, that there is a possibility that larval fish are diverted into the Redlands Canal. Some larval fish that enter the canal could survive because some could be diverted into the fish return pipe and returned to the river and some could survive traveling through the hydropower turbines. Some larval fish entering the canal will not survive because they will be pumped up and be distributed to irrigated lands on the Redlands or they will be injured or killed when traveling through the hydropower turbines. The Service anticipates some larval fish will remain in the river because there is a target minimum flow of 300 cfs below the Redlands Diversion Dam. At this time the level of take of larval fishes is undeterminable and techniques for monitoring take of larval fish in irrigation canals have not yet been developed.

The Service does not anticipate take of larval or young of the year fishes to occur at the fish passage facility because these small fishes would pass through the trash grates and travel in the water through the fish passage channel unharmed.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated incidental take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat with full implementation of the reasonable and prudent alternatives.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of Colorado pikeminnow, razorback sucker, and bonytail.

1. Obtain more information about larval, subadult and adult endangered fishes in the Gunnison River to further understand the extent of take in the Redlands Canal.

2. Monitor operations of the fish screen to determine the number of days and the reasons the screen cannot be operated, report the results of the monitoring, and continue to enhance the overall operation of the fish screen.

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 measures described above. These terms and conditions are nondiscretionary.

1. The Recovery Program shall continue to monitor larval endangered fishes on the Gunnison River through larval fish sampling. The Recovery Program shall continue to

obtain information on location of spawning sites. The Recovery Program shall continue to monitor the status of the adult and subadult endangered fishes in the Gunnison River.

2. The RWPC shall provide a report to the Service annually that enumerates the number of days the fish screen was not operated and the reasons the fish screen was not operated. If during the first year of operation, major problems are encountered, RWPC shall contact the Service and cooperatively determine a course of action to resolve the problem. Meeting should be held periodically to continue enhancing the operation of the fish screen.

3. The RWPC shall report any dead or injured endangered fishes found in the vicinity of RWPC to the Project Leader, Fish and Wildlife Service, Colorado River Fishery Project, Grand Junction, Colorado (970/245-9319). As required by protocol, the Service will report any dead or injured listed species to the Service's Division of Law Enforcement.

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. Therefore, Reclamation and RWPC are exempt from section 9 prohibitions if they comply with the above reasonable and prudent measures and the implementing terms and conditions.

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; 3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action.

Thank you for your cooperation in the formulation of this biological opinion and your interest in conserving endangered species.

cc: FWS/UCREFRP, Denver
FWS/ES/FO, Lakewood

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APPENDIX A

AGREEMENT CONCERNING FISH PASSAGE FACILITIES and FISH SCREEN FACILITIES

AT THE REDLANDS WATER AND POWER COMPANY FACILITIES

Contract No._____

AGREEMENT
AMONG
REDLANDS WATER AND POWER COMPANY,
U.S. BUREAU OF RECLAMATION, AND
U.S. FISH AND WILDLIFE SERVICE
CONCERNING FISH PASSAGE FACILITIES and FISH SCREEN FACILITIES
AT THE REDLANDS WATER AND POWER COMPANY FACILITIES
TO
FACILITATE RECOVERY OF ENDANGERED FISH SPECIES IN THE COLORADO RIVER BASIN

THIS AGREEMENT, is made this ____ day of _____, 2004, pursuant to the Reclamation Act of June 17, 1902 (32 Stat. 388), and acts amendatory thereof or supplementary thereto, particularly the Colorado River Storage Project Act of April 11, 1956 (70 Stat. 105), the Fish and Wildlife Coordination Act, 16 U.S.C. 661 et seq., the Endangered Species Act, 16 U.S.C. 1531 et seq., and the Act to Authorize the Bureau of Reclamation to Provide Cost Sharing for the Endangered Fish Recovery Implementation Programs for the Upper Colorado and San Juan River Basins, (October 30, 2000, 114 Stat. 1602, Public Law 106-392) , among the **UNITED STATES BUREAU OF RECLAMATION (Reclamation)**; **the UNITED STATES FISH AND WILDLIFE SERVICE (Service); and the REDLANDS WATER AND POWER COMPANY (Company)**, a Colorado nonprofit corporation;

WITNESSETH, that:

WHEREAS, the Company owns, operates, and maintains the Redlands Power Canal, Redlands Diversion Dam, and appurtenant facilities (collectively the "Company Facilities") for the purpose of diverting and conveying the Company's decreed water rights from the Gunnison River to the Company's power plant and shareholders; and

WHEREAS, the Gunnison River below its confluence with the Uncompahgre River has been designated critical habitat for two endangered fish species (Colorado pikeminnow and razorback sucker), and the Company's Diversion Dam is situated within such critical habitat; and

WHEREAS, the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin dated September 29, 1987, ("Recovery Program") is implemented by a Cooperative Agreement, entitled " Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin," signed in January of 1988 by the Secretary of the Department of the Interior, the Governors of the States of Colorado, Utah, and Wyoming and the Administrator of the Western Area Power Administration ("Cooperative Agreement"). The goal of the Recovery Program is to recover the four species of endangered fish (Colorado pikeminnow, humpback chub, bonytail, and razorback sucker) within the Colorado River Basin, while allowing water development to proceed consistent with state water law and in compliance with the Federal Endangered Species Act ("ESA") in the Upper Basin states of Colorado, Utah, and Wyoming; and

WHEREAS, Public Law 106-392, enacted on October 30, 2000, authorizes the Bureau of Reclamation to, among other things, provide cost sharing for capital construction projects under the Recovery Program. Public Law 106-392 also authorizes Reclamation to use power revenues to provide up to $6 million per year to fund recovery monitoring and research and operation, maintenance, and replacement of capital project features through the year 2011. Furthermore the law provides for monitoring, operation, maintenance and replacement funding beyond 2011; and

WHEREAS, on April 11, 1995 Reclamation and the Company entered into that certain agreement described as Contract No. 5-LA-40-L0930 ("Easement Contract"), under which Reclamation acquired a perpetual easement from the Company for the construction, reconstruction, operation and maintenance of a fish passage facility ("Fish Passage") situated adjacent to the Company's diversion dam. A copy of the Easement Contract was recorded in the official records of the Mesa County Recorder's Office in Book 2155, pages 397 through 403; and

WHEREAS, on December 18, 1995 Reclamation, the Service and the City of Grand Junction ("City") entered into that certain agreement described as Contract No. 5-LM-40-01170 ("Construction Contract"), which among other things provided that Reclamation would construct and maintain the Fish Passage, the Service would operate the Fish Passage, and the City would have access over the Fish Passage to perform operation, maintenance, or replacement of its pumping plant and intake structure. A copy of the Construction Contract is attached as Exhibit A to this Agreement and by this reference made a part hereof; and

WHEREAS, pursuant to the above-referenced Easement and Construction Contracts, Reclamation constructed the Fish Passage, which is located adjacent to the right abutment of the Company's Diversion Dam; and

WHEREAS, the Recovery Program desires to take whatever steps it considers necessary (with funds authorized by Public Law 106-392 for construction, operation, maintenance, modification and replacement) to minimize the potential for incidental take by implementing the Recovery Program Activity (design and construction of fish screen and appurtenant facilities) ("Fish Screen") as outlined in the Recovery Implementation Program's Recovery Action Plan

("RIPRAP"). The Recovery Program has approved the construction of the Fish Screen at the Company Facilities; and

WHEREAS, Reclamation is willing to transfer ownership of the Fish Passage to the Company pursuant to Public Law 106-392 and the Company is willing to accept ownership and responsibility for the maintenance of the Fish Passage, with the Service continuing to operate the Fish Passage Facilities, pursuant to the terms and conditions of this Agreement as set forth herein; and

WHEREAS, Reclamation, the Service, and the Company are willing for Reclamation, on behalf of the Recovery Program and pursuant to Public Law 106-392, to construct the Fish Screen, which would become part of the Company's Facilities and be owned, operated, and maintained by the Company to minimize the risk of fish becoming entrained in the Company's canal system, pursuant to the terms and conditions of this Agreement as set forth herein; and

NOW, THEREFORE, for the promises set forth herein, and other good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, the parties hereto agree as follows:

1. Definitions. As used in this Agreement:

(a) "Recovery Program" shall mean the signatory participants to the January 1988 Cooperative Agreement, the National Park Service and Colorado River Energy Developers Association, their successors or assigns.

(b) "Fish Screen" shall mean the Fish Screen, Bypass Channel, Fish Return Pipeline, Trash Rack, and associated structures described in Reclamation's construction plans and specifications No. 04-SP-40-810, which are incorporated into this Agreement by reference and manufacturer and construction as-built drawings.

(c) "Fish Passage" shall mean the fish passage structure and associated facilities constructed by Reclamation within the perpetual easement acquired by the United States pursuant to the Easement Contract and in accordance with Reclamation's construction plans and specification No. 1425-5-CC-40-1850, and manufacturer and construction as-built drawings.

(d) "Maintenance" shall mean reasonable and necessary care, repair and/or replacement, including unanticipated, extraordinary or emergency care, repair, and/or replacement that are necessary for long-term operation of the Fish Passage and/or Fish Screen in good and efficient condition and for the purposes for which they were constructed. Maintenance does not include replacement of a substantial portion of either the Fish Passage or Fish Screen.

(e) "Operation" shall mean the day-to-day control and operation of the Fish Passage and/or Fish Screen necessary to ensure that these facilities function as intended and designed.

(f) "Modification" shall mean any major change, alteration, or addition to or removal from the Fish Passage and/or Fish Screen as originally constructed that will accomplish at least one of the following: 1) Improve fish passage; 2) Decrease injury to fish; 3) Reduce long-term operation and maintenance expenses; 4) Improve water flows; 5) Improve personal safety; and/or 6) Increase security.

(g) "Operation and Maintenance Year" shall mean October 1 through September 30.

2. Transfer of Ownership of Fish Passage to the Company.

(a) Upon execution of this Agreement, Reclamation shall provide copies of the plans and specifications, Designer's Operating Criteria, final construction report, and associated manufacturer and construction as-built drawings for the Fish Passage to the Company.

(b) Prior to the transfer of ownership of the Fish Passage from Reclamation to the Company, the parties to this Agreement shall inspect the Fish Passage and jointly prepare a punch list of items needing repair, replacement and/or Modification and the estimated costs of such activities. The punch list shall be submitted to the Recovery Program for review and approval.

(c) Upon notification from the Recovery Program of its approval of the punch list, the Company shall complete the needed repairs, replacements and/or Modification and shall be compensated for all costs incurred for such activities, with funds authorized by Public Law 106-392, as provided in Paragraph 6 herein.

(d) Upon completion of the procedures set forth in Paragraphs 2(b) and 2(c) herein, Reclamation shall transfer to the Company and the Company shall accept ownership of the Fish Passage, in the form attached as Exhibit B, as previously constructed in accordance with Reclamation's plans and specifications No. 1425-5-CC-40-1850. Upon the Company's acceptance of ownership of the Fish Passage, the Company shall be responsible for Maintenance and/or Modification of the Facilities.

(e) Following the completion of the transfer of ownership provided for in Paragraph 2(d) herein:

(1) Reclamation shall cause to be recorded in the Mesa County Recorder's Office a Release of Easement releasing the perpetual easement granted by the Company to the United States in the Easement Contract. A copy of the form Release of Easement is attached hereto as Exhibit C. Reclamation shall provide a copy of the recorded Release of Easement to the Service and the Company.

(2) Reclamation shall notify the City of Grand Junction of the transfer and provide the City a copy of this Agreement.

(3) The Service shall continue to operate the Fish Passage Facilities as set forth in the Construction Contract and provided in Paragraph 9 herein.

3. Right of Reasonable Access to Fish Passage.

(a) The Company hereby grants to the Service, its representatives, employees, contractors, agents, successors, and/or assigns, effective as of the completion of the transfer of ownership of the Fish Passage to the Company provided for in Paragraph 2(d) herein, the right of reasonable ingress to and egress from Company Facilities and the Fish Passage for the Service's continued Operation of the Fish Passage and to observe the Company's Maintenance and/or Modification of the Fish Passage.

(b) The Company hereby grants to Reclamation, its representatives, employees, contractors, agents, successors, and/or assigns, effective as of the completion of the transfer of ownership of the Fish Passage to the Company provided for in Paragraph 2(d) herein, the right of reasonable ingress to and egress from Company Facilities and the Fish Passage to observe the Service's Operation or the Company's Maintenance and/or Modification of the Fish Passage.

(c) The parties agree to communicate and cooperate with the other parties in the event of any situation that may interfere with any party's reasonable access to the Fish Passage.

(d) If determined necessary by the Service, the Company shall grant the Service, its representatives, employees, contractors, agents, successors and/or assigns, the right of reasonable ingress to and egress from Company Facilities, not to exceed the term of this Agreement, to install, operate, maintain, repair and/or replace fish monitoring and/or tracking instrumentation on the Fish Passage. In such case, location and access for the instrumentation will be coordinated with and approved by the Company.

(e) Nothing herein shall diminish or modify in any way the City's right of reasonable access over the Company's Facilities to perform operation, maintenance, or replacement of the City's pumping plant and intake structure pursuant to the Construction Contract.

4. Construction of Fish Screen.

(a) Reclamation, in furtherance of the Recovery Program's goal of minimizing the risk of fish subadult and adult fish becoming entrained in the Company's canal system, shall, without cost to the Company, construct the Fish Screen on the Company's Facilities, in accordance with Reclamation's construction plans and specifications No. 04-SP-40-8102, which must be approved by the Company prior to the commencement of construction.

(b) Upon completion of construction of the Fish Screen, Reclamation shall provide the Company with copies of the construction plans and specifications, Designer's

Operating Criteria, final construction report, and associated manufacturer and construction as-built drawings.

(c) Completion of construction of the Fish Screen shall be deemed to have occurred after the following steps are completed to the satisfaction of Reclamation, the Service, and the Company:

(1) Prior to Reclamation releasing the Construction Contractor from his/her obligations as defined in the construction plans and specifications**,** Reclamation, the Service, the Company, and the Construction Contractor shall jointly inspect the Fish Screen and prepare the Construction Punch List, a list of construction items to be completed by the Construction Contractor.

(2) After the Construction Contractor completes the required items set forth in the Construction Punch List, the Construction Contractor, Reclamation, the Service and the Company will complete the final inspection of the Fish Screen.

(3) At such time that Reclamation, the Service, and the Company approve the final inspection provided for in Paragraph 4(c)(2) herein, construction of the Fish Screen shall be deemed complete, the Company shall own and be responsible for Operation, Maintenance and/or Modification of the Fish Screen. In the event that Reclamation, the Service, or the Company do not approve the final inspection, the parties shall identify what steps shall be completed to lead to a final inspection approved by the parties and ensure that such steps are completed in a timely manner.

5. Right of Reasonable Access to Fish Screen.

(a) The Company hereby grants to Reclamation, its representatives, employees, contractors, agents, successors, and/or assigns, the right of reasonable ingress to and egress from Company Facilities to construct the Fish Screen and, after the completion of such construction, to observe the Company's Operation, Maintenance, and/or Modification of the Fish Screen during reasonable working hours and days except in the event of an emergency, unless the Company is notified and approves in advance.

(b) The parties agree to communicate and cooperate with the other parties in the event of any situation that may interfere with any party's reasonable access to the Fish Screen.

(c) If determined necessary by the Service, the Company shall grant the Service, its representatives, employees, contractors, agents, successors and/or assigns, the right of reasonable ingress to and egress from the Company Facilities, not to exceed the term of this Agreement, to install, operate, maintain, repair and/or replace fish monitoring and/or tracking instrumentation on the Fish Screen. In such case, location and access for the instrumentation will be coordinated with and approved by the Company.

6. Reimbursement of the Company's Operation and/or Maintenance Expenses.

(a) Upon completion of construction of the Fish Screen, Reclamation and the Company shall prepare an initial Operation and Maintenance work plan to cover the Company's short-term expenses for its Maintenance of the Fish Passage and its Operation and Maintenance of the Fish Screen until the Company's first annual work plan has been submitted and approved pursuant to Paragraph 10(c) herein. Reclamation shall reimburse the Company in accordance with the initial work plan.

(b) Upon written notification to the Company by the Recovery Program of its approval of the Company's annual work plan or approval of the initial work plan, Reclamation shall reimburse the Company for its Maintenance of the Fish Passage and Operation and Maintenance of the Fish Screen and its as follows:

(1) Quarterly, the Company shall prepare and submit to Reclamation an itemized bill including, but not limited to, copies of all invoices, bills, and receipts for the Company's Operation and/or Maintenance expenditures under this Agreement.

(2) Within 60 days of its receipt of the quarterly itemized bill Reclamation shall reimburse the Company.

7. Interruption in Operation of Fish Screen.

(a) The Company may temporarily discontinue the operation of the Fish Screen if any one of the following conditions occurs:

(1) Insufficient water in the Gunnison River to operate the Fish Screen fish return pipeline and allow the Company to utilize its decreed water rights.

(2) Mechanical failure of the Fish Screen, or any portion thereof that prevents normal operation of the Fish Screen and/or utilization of the Company's decreed water rights.

(3) The Fish Screen becomes fouled to the extent that the Company cannot divert its decreed water rights.

(4) Ice clogs the Screen to the extent that the Company cannot divert its decreed water rights.

(5) Maintenance activities for the Fish Screen and/or the Company's Facilities.

(b) In the event the Company temporarily discontinues operation of the Fish Screen pursuant to Paragraph 7(a) herein, the Company shall resume operations when flows have increased and/or the condition causing the temporary cessation in operations has been corrected.

(c) The Company, shall notify the Service (Project Leader, Colorado River Fishery Project, Grand Junction, Colorado - 970/245-9319) by telephone no later than the next working day of any activity affecting the operation of the Fish Screen bypass channel for periods of 4 hours or greater.

8. Reclamation's Duties and Responsibilities.

(a) Reclamation shall be solely responsible for constructing the Fish Screen and acquiring all permits, and licenses necessary for such construction.

(b) If requested to by the Company, Reclamation shall assist the Company in preparing the Company's annual work plan for its Maintenance of the Fish Passage and Operation and Maintenance of the Fish Screen as set forth in Paragraph 10 herein.

(c) Reclamation shall assist the Service in seeking and obtaining long-term funding for the Recovery Program to fulfill the funding obligations under this Agreement.

(d) Reclamation, in consultation with the Service, and to the extent that storage water supplies are physically and legally available, may make releases of water from Blue Mesa Reservoir to enhance the flow of the Gunnison River below the Redlands Diversion Dam in the event there is insufficient natural flow in the Gunnison River for Operation of the Fish Passage and/or Fish Screen.

(e) Reclamation and its representatives, employees, contractors, agents, successors, and/or assigns shall take all reasonable precautions not to disturb or damage the Company Facilities and will not interfere with the Operation and Maintenance of the Company Facilities or the diversion of its decreed rights. To the extent provided for by law, Reclamation shall be liable for damages to real property and personal property of the Company resulting from Reclamation's activities pursuant to this Agreement.

9. The Service's Duties and Responsibilities

(a) The Service shall be responsible for the Operation of the Fish Passage as set forth in the Construction Contract, and for securing funding for such Operation.

(b) The Service shall assist Reclamation in seeking and obtaining long-term funding for the Recovery Program to fulfill the funding obligations under this Agreement.

(c) In the event fish monitoring and/or tracking instrumentation is needed, the Service shall purchase, install, and maintain such equipment at no expense to the Company. All equipment installation activities shall be coordinated with the Company and shall not interfere with the Company's operations and ability to divert its decreed water rights. If any of the above

equipment is to be located on property that is not owned by the Company, the Service shall be responsible for acquiring any necessary access.

(d) The Service shall consult with and obtain approval from the Company concerning any Modification to the Fish Passage and/or the Fish Screen that the Service reasonably determines is necessary to protect the two endangered species and/or to improve personal safety. If possible, the Service shall provide any such recommended Modification to the Company prior to the preparation of the Company's annual work plan as set forth in Paragraph 10 herein.

(e) The Service and its representatives, employees, contractors, agents, successors, and/or assigns shall take all reasonable precautions not to disturb or damage the Company Facilities and will not interfere with the Operation and Maintenance of the Company Facilities or the diversion of its decreed rights. To the extent provided for by law, the Service shall be liable for damages to real property and personal property of the Company resulting from its activities under or pursuant to this Agreement.

10. The Company's Duties and Responsibilities

(a) Upon completion of the transfer of ownership of the Fish Passage to the Company pursuant to Paragraph 2 herein, the Company shall be responsible for Maintenance and/or Modification of the Fish Passage and ensure that it remains in good and efficient condition for the purposes for which they were constructed.

(b) Upon completion of construction of the Fish Screen pursuant to Paragraph 4 herein, the Company shall own and be responsible for Operation, Maintenance, and/or Modification of the Fish Screen and ensure that such the Screen remains in good and efficient condition for the purposes for which it was constructed.

(c) Annually, the Company shall prepare and submit its annual work plan to the Recovery Program for review and approval. The annual work plan shall show the Company's anticipated Maintenance and/or Modification of the Fish Passage and Operation and Maintenance and/or Modification of the Fish Screen for the following Operation and Maintenance year. The annual work plan shall include estimated labor, materials, equipment, utility, and any other costs necessary for such Operation, Maintenance, and/or Modification. Also included in the annual work plan shall be the Company's incremental cost, if any of adding the Fish Passage and Fish Screen to the Company's property damage and liability insurance policies. Attached hereto as Exhibit D is a draft work plan spreadsheet, a draft labor-rate spreadsheet, and a sample list of work activities and items that may be used by the Company in preparing its annual work plan. Preparation of the annual work plan shall include the following steps:

(1) Prior to the Company's preparation and submission of its annual work plan to the Recovery Program, the Company shall schedule a meeting with the parties hereto and the City of Grand Junction to discuss and coordinate with each other their respective

Operation and Maintenance plans and activities for the following Operation and Maintenance year.

(2) The schedule for and steps involved in the preparation, submission, and approval of the annual work plan shall include the following:

(a) A meeting among the parties and the City of Grand Junction to discuss plans for Operation and Maintenance;

(b) The Company's work plan shall be submitted to the Director, Colorado River Recovery Implementation Program, on or before April 30 or within 45 days of the Director's request for submittal, whichever is later;

(c) The Recovery Program Committee will review the work plan between May 1 and August 31, and;

(d) The Director of the Recovery Program will issue his approval of the work plan on or before September 10.

(3) The Company may request additional funding from the Recovery Program in the event the Company's actual costs exceed the annual work plan estimates. Except for emergency situations, the Company shall request additional funds from the Recovery Program prior to incurring expenditures.

(d) The Company shall obtain approval from the Recovery Program prior to making any Modification to the Fish Passage and/or the Fish Screen that the Company reasonably determines are necessary to keep these facilities in good and efficient condition for the purposes for which they were constructed. The Company may request funding for any approved Modification through its annual work plan.

(e) The Company shall prepare and submit to the Recovery Program and the parties hereto an annual Fish Passage Maintenance report and Fish Screen Operation and Maintenance report on or before December 31 of each year hereafter. An example of an annual Operation and Maintenance report is attached hereto as Exhibit E.

11. Responsibilities. To the extent provided by law, the parties hereto shall each be responsible and liable for their own acts, omissions, and negligence; provided, however, that nothing in this Agreement shall be construed to be an admission of fault or liability, and nothing herein shall limit the defenses and immunities legally available to each party as against each other party or others. No party hereto shall be considered to be the agent or representative of any other party.

12. Resolution of Disagreements. In the event of a disagreement among the parties involving the application or the interpretation of any provision of this Agreement, any determination or finding made by a party under this Agreement, or any performance hereunder,

the matters involved in the disagreement shall, upon demand of any party be discussed at a meeting between the parties to be held within forty-five (45) days of the demand. Attempted resolution of the disagreement through such a meeting shall be a condition precedent to any party's effort to have the disagreement resolved through alternative dispute resolution or other proceedings. In the event the parties are unable to resolve their disagreement following such meeting or meetings, any party may request that the matter be submitted to alternative dispute resolution and/or, in the event the other parties do not wish to submit the matter to alternative dispute resolution, seek resolution by any means legally available. Each party shall bear its own costs and expenses incurred in this process.

13 Funding.

(a) The performance by Reclamation and/or the Service of their respective duties under this Agreement shall be contingent upon appropriation or allotment of funds. The absence of such appropriations or allotment of funds shall relieve the obligations of Reclamation and/or the Service with respect to the activity that is dependent on such funds, and no liability shall accrue to Reclamation or the Service in the event funds are not appropriated or allotted for such activity.

(b) The performance by the Company of its respective duties under this Agreement shall be contingent upon the availability of funds from the Recovery Program. The absence of available funding shall relieve the obligations of the Company with respect to the activity that is dependent on such funds, and no liability shall accrue to the Company in the event funds are not made available for such activity.

14. Term of Agreement.

(a) This Agreement shall be effective upon execution by the parties and shall remain in effect for a period of twenty-five (25) years from the date hereof unless an earlier amendment occurs in accordance with this Agreement.

(b) Prior to the expiration of its term, this Agreement may be renewed, or amended and renewed, for an additional period of up to 25 years upon agreement by all the parties, subject to the policies and laws in effect at that time.

(c) In the event the Recovery Program determines that the Fish Passage and/or Fish Screen are no longer needed, the Company may elect to keep the facilities in place with the option to remove or make adjustments to the facilities as deemed necessary by the Company.

15. Notice. Except for the notice by telephone provided for in Paragraph 7(c) herein notice, demand, or request authorized or required by this Agreement shall be deemed to have been given on behalf of all parties to this Agreement when mailed first class, postage prepaid, to the following:

Director, Colorado River Recovery Implementation Program
US Fish and Wildlife Service
P.O. Box 25486
Denver Federal Center
Denver, Colorado 80225
Telephone: (303) 969-7322
Facsimile: (303)-969-7327

Superintendent
Redlands Water and Power Company
2148 Broadway
Grand Junction, Colorado 81503
Telephone: (970) 243-2173
Facsimile: (970) 256-1320

Assistant Field Supervisor
Fish and Wildlife Service
Ecological Services
Western Colorado Office
764 Horizon Drive, Building B
Grand Junction Colorado 81506-3948
Telephone: (970) 243-2778
Facsimile: (970) 245-6933

Area Manager
Bureau of Reclamation
2764 Compass Drive, Suite 106
Grand Junction, Colorado 81506
Telephone: (970) 248-0600
Facsimile: (970) 248-0601

The designation of the respective addressee, address, telephone and/or facsimile or number may be changed by written notice given in the same manner as provided herein.

16. Entire Agreement. This Agreement constitutes the entire agreement between the parties and supersedes any prior understanding, representation, or agreement of the parties regarding the subject matter hereof, and may not be amended or terminated except by an instrument in writing signed by the parties hereto.

17. Interpretation of Agreement. This Agreement was produced as a result of negotiations between the parties and shall not be construed against either party as the drafter of this Agreement.

18. Binding Agreement. This Agreement shall inure to the benefit of and be binding upon the parties hereto and their employees, contractors, agents, successors, and/or assigns .

19. Assignment. Notwithstanding any other provisions of this Agreement, it is understood and agreed by the parties hereto that the Recovery Program, Reclamation, the Service, and the Company may each, at their sole discretion, transfer or assign, in whole or in part, their respective duties and responsibilities under this Agreement to a willing federal, state, or other entity who, in their judgment is qualified to fulfill said responsibilities; provided, however, that any such transfer or assignment shall not be effective until it is approved in writing by the other parties hereto, which approval shall not be unreasonably withheld.

20. No Waiver. No waiver of any provision of this Agreement shall be deemed to constitute or shall constitute a waiver of any other provisions hereof, whether or not similar, nor shall any waiver constitute a continuing waiver. No waiver shall be binding unless executed in writing by the party making the waiver.

21. Rights and Remedies. The parties shall have all rights and remedies provided under law for a breach or threatened breach of this Agreement.

22. Restriction on Benefits. No Member or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this Agreement or to any benefit that may arise hereunder, but this restriction shall not be construed to extend to this Agreement if made with a corporation or company for its general benefit.

23. Necessary Acts and Cooperation. The parties hereby agree to do any act or thing and to execute any and all instruments required by this Agreement and which are necessary and proper to make effective the provisions of this Agreement.

24. Execution of Agreement. This Agreement may be executed in counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same Agreement.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the day and year herein above written.

REDLANDS WATER AND POWER COMPANY
A Colorado nonprofit corporation

_____
President

ATTEST

_____

Secretary, Redlands Water and Power Company

UNITED STATES
FISH AND WILDLIFE SERVICE

_____
Regional Director
Mountain-Prairie Region, Region 6

UNITED STATES
BUREAU OF RECLAMATION

_____
Regional Director, Upper Colorado Region

Approved

_____
Office of the Regional Solicitor

APPENDIX B
RECOVERY AGREEMENT

Redlands Water and Power Company
RECOVERY AGREEMENT

This RECOVERY AGREEMENT is entered into this ___ day of _____, _____, by and between the United States Fish and Wildlife Service (Service) and Redlands Water and Power Company.

WHEREAS, in 1988, the Secretary of Interior, the Governors of Wyoming, Colorado and Utah, and the Administrator of the Western Area Power Administration signed a Cooperative Agreement to implement the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program); and

WHEREAS, the Recovery Program is intended to recover the endangered fish while providing for water development in the Upper Basin to proceed in compliance with state law, interstate compacts and the Endangered Species Act; and

WHEREAS, the Redlands Water and Power Company authorized the Recovery Program to construct and operate a fish passage facility at the Redlands Diversion Dam in 1996, and has authorized the Recovery Program to construct a fish screen in the Redlands Power Canal ; and

WHEREAS, the Redlands Water and Power Company has agreed to assume ownership of the Redlands Fish Passage and Fish Screen Facilities, and agreed to operate and maintain the Redlands Fish Passage and Fish Screen Facilities with assistance from the Recovery Program, under the terms and conditions of the agreement titled *Agreement Among Redlands Water And Power Company, U.S. Bureau Of Reclamation, And U.S. Fish And Wildlife Service Concerning Fish Passage Facilities And Fish Screen Facilities At The Redlands Water And Power Company Facilities To Facilitate Recovery Of Endangered Fish Species In The Colorado River Basin*, hereafter referred to as the Operations and Maintenance Agreement, and

WHEREAS, the Redlands Water and Power Company is the owner/operator of the Redlands Diversion Dam, Redlands Power Canal, and associated features (Water Project), which causes or will cause water depletions to the Gunnison River subbasin within Colorado,; and

WHEREAS, the Redlands Water and Power Company desires certainty that its water depletions can occur consistent with section 7 and section 9 of the Endangered Species Act (ESA); and

WHEREAS, the Service desires a commitment from the Redlands Water and Power Company to the Recovery Program so that the Program can actually be implemented to recover the endangered fish and to carry out the Recovery Elements of the Recovery Action Plan (also described in the plan as recovery actions, recovery activities, and tasks).

NOW THEREFORE, Redlands Water and Power Company and the Service agree as follows:

1. The Service agrees that implementation of the Redlands Fish Passage and Redlands Fish Screen (two of many Recovery Elements identified in the Recovery Implementation Program Recovery Action Plan) will avoid the likelihood of jeopardy and adverse modification under section 7 of the ESA, for depletion impacts caused by Redlands Water and Power Company Project. Any consultations under section 7 regarding Redland Water and Power Company's depletions are to be governed by the provisions of the Redlands Fish Screen Biological Opinion (ES/GJ-6-CO-04-F-003). The Service agrees that, except as provided in the Redlands Fish Screen Biological Opinion, no other measure or action shall be required or imposed on Redlands Water and Power Company to comply with section 7 or section 9 of the ESA with regard to Redland Water and Power Company's depletion impacts or other impacts covered by the Redlands Fish Screen Biological Opinion. Redlands Water and Power Company is entitled to rely on this Agreement in making the commitments described in paragraphs 4 - 6.

2. The Fish and Wildlife Service working on behalf of the Recovery Program agrees to operate the Redlands Fish Passage.

3. The Fish and Wildlife Service working on behalf of the Recovery Program agrees to work with Redlands Water and Power Company to identify maintenance requirements for the fish passage facility.

4. Redlands Water and Power Company agree to operate the fish screen at all times unless one of the following occurs:

    a) Insufficient water in the Gunnison River to allow the Company to utilize its decreed water rights and operate the Fish Screen fish return pipeline.

    b) Mechanical failure of the Fish Screen or any portion thereof that prevents normal operation of the Fish Screen and/or utilization of the Company's decreed water rights.

    c) The Fish Screen becomes fouled to the extent that the Company cannot divert its decreed water rights.

    d) Ice clogs the screen to the extent that the Company cannot divert its decreed water rights.

    e) Maintenance activities for the Fish Screen or the Company's facilities preclude operation of the Fish Screen.

5. Redlands Water and Power Company agrees to maintain the fish passage and fish screen facilities according to the terms and conditions of the Operations and Maintenance Agreement.

6. Redlands Water and Power Company has actively cooperated and will continue to actively cooperate with the implementation of the Redlands Fish Passage and Fish Screen Facilities. The Redlands Water and Power Company agrees to cooperate in the implementation of the other Recovery Elements of the Recovery Action Plan, in addition to the Redlands Fish Passage and Fish Screen Facilities. Redlands Water and Power Company will not be required to take any action that would violate its decrees or the statutory authorization for Redlands Water and Power Company Project, or any applicable limits on Redlands Water and Power Company's legal authority. Not withstanding the foregoing, Redlands Water and Power Company may take any action to protect its legal rights. Redlands Water and Power Company will not be precluded from undertaking good faith negotiations over terms and conditions applicable to implementation of the Recovery Elements.

7. The Service and Redlands Water and Power Company agree to enter into good faith negotiations to resolve any issues related to this recovery agreement, including but not limited to, any claimed violations of this Recovery Agreement. The Service reserves the right to request reinitiation of Endangered Species Act, section 7 consultation when the reinitiation criteria outlined in the Redlands Fish Screen biological opinion have been met.

8. Nothing in this Recovery Agreement shall be deemed to affect the authorized purposes of Redlands Water and Power Company Project or The Service' statutory authority.

9. This Recovery Agreement shall be in effect until one of the following occurs.

   a. The Service removes the listed species in the Upper Colorado River Basin from the endangered or threatened species list and determines that the Recovery Elements are no longer needed to prevent the species from being relisted under the ESA; or

   b. The Service determines that the Recovery Elements are no longer needed to recover or offset the likelihood of jeopardy to the listed species in the Upper Colorado River Basin; or

   c. The Service declares that the endangered fish in the Upper Colorado River Basin are extinct; or

   d. Federal legislation is passed or federal regulatory action is taken that negates the need for [or eliminates] the Recovery Program.

   e. Redlands Water and Power Company withdraws from this Recovery Agreement upon written notice to the Service.

10. If Redlands Water and Power Company withdraws, the Service may request reinitiation of consultation as required by the "Reinitiation Notice" section of the Redlands Fish Screen Biological Opinion.

_____	_____
Redlands Water and Power Company	Date
_____	_____
Regional Director, Region 6 U.S. Fish and Wildlife Service	Date