SUMMARY OF POTENTIAL EFFECTS TO HABITAT AND SPECIAL-STATUS SPECIES IN MEXICO

POTENTIAL EFFECTS TO HABITAT IN MEXICO

RIPARIAN CORRIDOR

The historic reduction in Colorado River flows below the NIB has had an affect on the ecosystem of the delta. Except for periods of high flow or flood control operations, little Colorado River water reaches the delta and the upper Gulf. It is not within Reclamation's discretionary authority to make unilateral adjustments to water deliveries to the international border. As discussed previously, the potential magnitude of these excess flows is little affected by interim surplus criteria. Under baseline conditions, the frequency of excess flows of any magnitude declines over the next 25 years. Those frequencies under the Basin States Alternative follow this trend, with the maximum difference of 8% occurring in 2007.

Riparian habitat, along the Colorado River between the NIB and the Gulf of California, requires scouring flood events for regeneration. Both the frequency and magnitude of excess flows are important for this regeneration. As discussed previously, the potential magnitude of these excess flows is little affected by interim surplus criteria. Under baseline conditions, modeling indicates that the frequency of excess flows to Mexico will decrease over the next 25 years. The probable frequencies for flows under the Basin States Plan are one year in five through 2017 and one year in six thereafter.

The majority of the existing cottonwood-willow habitat regenerated during the 1983-87 Colorado River and 1993 Gila River flood events. This habitat has been sustained by a variety of potential water sources, including high groundwater and agricultural runoff. Probabilities of future magnitude and frequencies of excess flows indicate little or no change to habitat in Mexico resulting from implementing the Basin States Alternative.

The reaches of the riparian corridor would be expected to benefit differentially from flows of lesser magnitude. The Limitrophe Division (lower Colorado River between Morelos Dam and the SIB) would benefit from any excess flows past Morelos Dam, however slight. This is where the majority of the habitat for the southwestern willow flycatcher is known to occur. The reach from a few miles below the SIB to the mouth of the Rio Hardy would benefit less than the Limitrophe Division from lesser flows past Morelos Dam due to percolation effects in the riverbed. Data is lacking to adequately model flows in this reach of the river. Primarily ground water, or adjacent agricultural practices maintain the riparian vegetation in these reaches of the river.

Special status species that utilize riparian habitat along the Mexican reach of the Colorado River are not likely to be affected by the decrease in frequency of flood control releases and amounts of flow past Morelos Dam. Existing habitat in Mexico will be threatened by wildfire, agricultural clearing, and clearing for channel maintenance and flood control. These events are likely to occur whether surplus criteria are implemented or not. U.S. actions in the Limitrophe Division including clearing for flood control and channel maintenance are subject to existing U.S. Environmental regulations. Both the Basin States Alternative and baseline indicate a decrease in frequency of flood control releases and flow amounts. These potential effects of the Basin States Alternative for interim surplus criteria are negligible compared to the decreases stated above.

The Cienega de Santa Clara is the largest wetland in the delta. This action will not affect the habitat occurring there, as the Cienega is sustained by irrigation return flows from the United States. The Rio Hardy wetlands occurring at the confluence of the Rio Hardy are also not expected to be affected by the action. These wetlands are also sustained by agricultural runoff from the west side of the Mexicali Valley.

SEA OF CORTEZ ESTUARY

Effects to the estuary at the mouth of the lower Colorado River in the Sea of Cortez from implementing the Basin States Plan would result from the change in frequency of flows greater than 250 kaf annually. These flows would change from a probability under the baseline condition of one in four through 2017 and one in five thereafter to one in five through 2017 and one in six thereafter under the Basin States Plan.

During periods when flows from the lower Colorado River do not reach the Sea of Cortez the estuary is a negative estuary and behaves like a fertile coastal lagoon. This is because, throughout the year, salinity in the estuarine basin is always higher than in the adjacent ocean (Carriquiry and Sanchez, 1999). It is only during periods of flows from the mainstem Colorado River that the conditions characteristic of an estuary occur.

When these flows occur there is a benefit to the estuary because salinity is reduced which favors certain species for growth and reproduction. There is a strong correlation between flows from the lower Colorado River reaching the Sea of Cortez and shrimp landings (Galindo-Bect and Glenn, 2000), for instance. Cisnereos-Mata et al. (1995) suggests fresh water inflow to the estuary may be a factor in the reproduction of the totoaba (*Totoaba macdonaldi*).

The interface between fresh water and salt water in the estuary is controlled by two factors. The primary factor influencing the interface is the tides that occur in the upper end of the Sea of Cortez. The tidal range occurs up to 36 feet at the mouth of the Colorado River. The second factor influencing the interface is the inflow from the Rio

Hardy River, which is primarily agricultural return flow. This flow is presumed to be relatively constant. This interface would be affected to some degree (by moving south) during periods when flows from the lower Colorado River reach the estuary.

Potential Effects to Special Status Species in Mexico

Desert pupfish (*Cyprinodon macularius*)

The desert pupfish is a small killifish with a smoothly rounded body shape. Adults generally range from 2-3 inches in length. Males are smaller than females and during spawning the males are blue on the head and sides and have yellow edged fins. Most adults have narrow, dark, vertical bars on their sides. The species was described in 1853 from specimens collected in San Pedro River, Arizona. There are two recognized subspecies and possibly a third form (yet to be described). The nominal subspecies, *Cyprinodon macularius macularius*, occurs in both the Salton Sea area of southern California and the Colorado River delta area in Mexico and is the species of concern, herein. The other subspecies is *C.m. eremus* and is endemic to Quitobaquito Spring, Arizona.

The desert pupfish was listed as an endangered species on March 31, 1986. Critical habitat for the species was designated at the time of listing and included the Quitobaquito Spring which is in Organ Pipe Cactus National Monument, and San Felipe Creek along with its two tributaries Carrizo Wash and Fish Creek Wash in southern California. All of the former and parts of the latter were in Federal ownership at the time of listing. Reclamation purchased the remaining private holdings along San Felipe Creek and its tributary washes and turned them over to California Department of Fish and Game in 1991. All designated critical habitat is now under State or Federal ownership.

Desert pupfish are adapted to harsh desert environments and are extremely hardy. They routinely occupy water of too poor quality for other fishes, most notably too warm and too salty. They can tolerate temperatures in excess of 110 F; oxygen levels as low as 0.1 ppm; and salinity nearly twice that of sea water (over 70,000 ppm). In addition to their absolute tolerance of these parameters, they are able to adjust and tolerate rapid, extreme changes to these same parameters (Marsh and Sada 1993). Pupfish have a short life span, usually only 2 years, but they mature rapidly and can reproduce as many as three times during the year.

Desert pupfish inhabit desert springs, small streams, creeks, marshes and margins of larger bodies of water. The fish usually inhabit very shallow water, often too shallow for other fishes. Present distribution of the subspecies *C. m. macularius* includes

natural populations in at least 12 locations in the United States and Mexico, as well as over 20 transplanted populations.

One of the natural populations in Mexico is in the Cienega de Santa Clara, a 100,000 acre bowl on the Colorado River delta 60 miles south of the U.S./Mexico border. The area is about 90 percent unvegetated salt flats with a number of small marsh complexes along the eastern edge of the bowl where it abuts an escarpment. The area is disconnected from both the Colorado River and the Gulf (Sea of Cortez), however extreme high tides result in the lower half of the bowl becoming inundated to a level of one foot or less of salt water from the gulf. The marsh areas on the east side are small and are spring fed. The largest marsh complex is on the northeast side where two agricultural drains provide relatively fresh water inflows. The desert pupfish occur in a number of these marsh complexes.

Reclamation biologists discovered this population of desert pupfish in 1974 during pre-project investigations for a feature of the Colorado River Basin Salinity Control Project. At that time, the Cienega was being fed by agricultural return flows from the Riito Drain in Mexico, which provided about 35 cfs flow. The project feature being investigated was construction of a bypass canal for drain water from the Wellton-Mohawk Irrigation and Drainage District in the United States.

Desert pupfish were found in the marsh along with mosquitofish, sailfin mollies, carp and red shiners. The bypass canal that resulted in formation of the greater portion of the marsh was completed in 1978 and provided a steady flow of over 150 cfs. Based upon aerial surveys, the added inflow caused the marsh to grow from an estimated 300 acres of vegetated area in 1974 to roughly 10,000 acres in 1985. Recent aerial surveys show that while the inflows have continued, the marsh has not continued to grow in size. Desert pupfish continue to exist in the marsh. The fish tend to inhabit the shallow edges of the marsh in vegetated areas. Desert pupfish from the Cienega were transported to Dexter National Fish Hatchery during May 1983, and many of the transplanted populations in the United States are of this subspecies and stem from this initial transplant.

Desert pupfish would not be affected by the Basin States Alternative. The main population exists in the Cienega de Santa Clara, which is not dependent on flows in the lower Colorado River. The other populations of desert pupfish are not found in the Colorado River in Mexico. Any populations that may have existed have been extirpated due to baseline conditions.

Vaquita (*Phocaena sinus*)

The Vaquita is a small porpoise and is widely believed to be the most endangered marine cetacean in the world (Klinowska 1991; Taylor and Gerrodette 1993). It is also

the only endemic species of marine mammal from the Gulf.

The vaquita was listed as "Vulnerable" in 1978 by IUCN-The World Conservation Union [formerly the International Union for Conservation of Nature and Natural Resources (IUCN)] in their Red Data Book and also in the Mexican list of wild vertebrates in danger of extinction. The vaquita was also listed in Appendix I of the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora on 28 June 1979, and in February 1985 as an endangered species under the U.S. Endangered Species Act. Recently, this porpoise was classified as "Endangered" in the IUCN Cetacean Red Data Book. The Vaquita is very similar in external morphology to the harbor porpoise (Phocaena phocaena). Based on a very small sample and a maximum recorded total length of about 5 feet, the Vaquita may be the smallest of all the delphinoids (Brownell et al. 1987). The pectoral fins are larger and the dorsal fin is higher proportionally to the body length than in any other extant porpoise species (Brownell et al. 1987). The coloration of adult vaquitas is unique. On the dorsal portion, the color is dark gray, the sides are pale gray, and the ventral surface is white with some pale-gray elongated spots. The porpoise has a large, dark eye spot and lip patches that contrast with the gray background (Ramirez 1993).

The life history of the vaquita appears, in many ways, to be similar to its better-studied congener, the harbour porpoise, *Phocoena phocoena*, from the Bay of Fundy, Canada and the Gulf of Maine. Both species have a maximum longevity of about 20 years (Hohn, et al, 1996). Little is known about the reproductive biology of the species. It has been suggested that calving occurs in the spring and mating in late spring or soon thereafter (Vidal 1990). Food habits are also practically unknown; Fitch and Brownell (1968) reported small fish such as grunt (*Orthopristis reddingi*) and croaker (*Bairdiella icistia*) from stomach contents and Brownell (1982) also reported squid. More details regarding the life history of the vaquita are documented in Vidal (1995) and Hohn, et al. (1996).

The range of the Vaquita is restricted to the northwestern corner of the Gulf of California, Mexico (Jaramillo-Legorreta, et al, 1999), representing the most restricted range for any cetacean species (Ramirez 1993). Stranding data, mortalities in fishing nets and sightings of live animals all confirm that the present distribution of vaquita is concentrated in a small area rear Rocas Consag in the northwestern Gulf of California (Gerrodette, et al, 1995). Sightings outside of this region (south of 30E 45' N latitude) may represent occasional departures by some individuals from the center of distribution (Silber and Norris 1991) or temporary extensions in distribution due to climatic changes (Vidal 1990). The region south of Puerto Penasco, Sonora, Mexico, remains insufficiently monitored to further increase the accuracy of population estimates and to establish the southern limit of the geographic range of the species (Ramirez 1993). The range of the Vaquita overlaps that of the endangered totoaba, to which it may be linked ecologically (Ramirez 1993).

A number of factors make the Vaquita an extremely difficult species to survey; habitat characteristics such as turbid water, fraction of the time spent at the surface, elusive behavior, and its erratic surfacing mode (Ramirez 1993). Despite these difficulties, and biases in collection of survey data, it is clear that the species is rare. The total population size is estimated to be 567 animals, with a 95% confidence interval from 177 to 1,073 (Jaramillo-Legorreta, et al, 1999).

The vaquita is particularly vulnerable to incidental mortality in gillnets. The vaquita has probably been incidentally caught in gillnets since the mid-1920's. It can be assumed the significant expansion of the fishing industry during the early 1940's further reduced the population (Vidal, 1995). Vaquita bycatch in gillnet fisheries was identified as a defining factor which may drive the species to extinction. The total estimated incidental mortality caused by the fleet of El Golfo de Santa Clara was 39 vaquitas per year, over 17% of the most recent estimate of population size. El Golfo de Santa Clara is one of three main ports that support gillnet fisheries throughout the range of the vaquita. The fishing effort for San Felipe, Baja California appears to be similar to that of El Golfo de Santa Clara, suggesting that this estimate of incidental mortality of vaquitas represents a minimum (D'Agrosa, et al, 2000).

Ramirez (1993) identified three actual and potential impacts to the Vaquita: incidental mortality caused by fishery activities including recreational, commercial and shrimping; reduced Colorado River flows into the Gulf of California; and pollution from various sources associated with Colorado River flows into the Gulf.

Rojas-Bracho and Taylor (1999) concluded habitat alteration from reduced flow of the Colorado River does not currently appear to be a risk factor because productivity remains high in vaquita habitat. Pollutant loads are low and pose low to no risk. Reduced fitness from inbreeding depression and loss of genetic variability are unlikely to pose high risk currently, though risk will increase if vaquitas remain at low abundance over long periods of time. Mortality resulting from fisheries is the greatest immediate risk for vaquitas. As a result, Reclamation concludes the Basin States Alternative will have no effect on the vaquita.

Totoaba (*Totoaba macdonaldi*)

The totoaba is a fish endemic to the Gulf of California. In 1976 the species was listed as threatened under the Convention on International Trade in Endangered Species (CITES). On May 21, 1979, the totoaba was listed in the U.S. as endangered pursuant to the Endangered Species Act (44 FR 99).

Totoaba are large schooling fish that undertake a seasonal migration within the Gulf and may live to 25 years of age (Cisneros-Mata et al. 1995). Totoaba are the largest of the sciaenid fish, with a maximum reported weight of over 100 kg and a length of over 2 meters (Flanagan and Hendrickson 1976). Adults spawn in the shallow waters of the Colorado River delta in the upper Gulf where they remain for several weeks before migrating south. Spawning originally occurred from February to June. More recently, it has been determined that spawning takes place from February through April (Cisnereo-Mata, et al, 1995). Juveniles are thought to emigrate south after spending 2 years in the upper Gulf, which is considered their nursery ground (Flanagan and Hendrickson 1976).

Juvenile fish eat small benthic organisms, mainly crabs and fish, amphipods, and shrimp; adults eat larger more pelagic items, such as sardines and adult crabs (Flanagan and Hendrickson 1976, Cisneros-Mata et al. 1995). Many aspects of the biology and ecology of this species are unknown.

The totoaba is thought to have ranged from the mouth of the Colorado River to Bahia Concepcion on the west coast of the Gulf and to the mouth of the El Fuerte River in the east (Jordan and Everman 1896 cited in Berdegue 1955). Historically, millions of totoaba migrated north in the spring to spawn at the mouth of the Colorado River (Gause 1969). A more thorough description of the life history of the totoaba is found in Cisneros-Mata, et al, 1995.

The first commercial harvesting of totoaba began in the early 1890s and by 1942, annual catches peaked at 2.3 million kg. In 1975, the catch had declined to 59,142 kg (Lagomarsino 1991). Beginning as early as 1940, the Mexican government imposed restrictions on the commercial fishery for totoaba, and in 1975, the government designated totoaba as endangered and declared an indefinite prohibition on all types of commercial and recreational fishing (Flanagan and Hendrickson 1976).

In April-June 1994, the School of Marine Sciences of the Autonomous University of Baja California developed a field technique that permitted successful capture and transport of totoaba broodstock from the Upper Gulf to the laboratory at Ensanada (True et al. 1997). They were able to keep these specimens of totoaba alive and successfully spawned them. In October of 1997 they released 250 juveniles, back into the upper gulf. These were four months old and 20-25 cm long.

Despite conservation efforts the totoaba population has continued to decline. Cisneros-Mata et al. (1995) reviewed a variety of human activities that may have affected the totoaba population. Prerecruits (egg to 1 year) may have been affected by decreased fresh-water input from the Colorado River, juveniles (1 to 2 years of age) by shrimp harvesting, preadults (3 to 5 years) by sport fisherman, and adults (6 years of age and older) by commercial fishing and poaching.

Despite the closure of the fishery, illegal exploitation continues. It is believed that the incidental catch of juvenile totoaba in the shrimp trawling fishery is the principal factor effecting the recovery of the species (Barrera-Buevara, 1990). Much of the illegal gillnetting for totoaba occurs during the spawning migration. As a result, gravid fish are being fished out of the population. Current knowledge indicates that decrease of the adult stock may be responsible for the decline experienced by the totoaba population (Cisneros-Mata, et al, 1995).

Cisneros-Mata, et al, (1995) concluded that a negative impact on totoaba due to decreased flow from the Colorado River may be questionable because the claimed effects would have caused extinction of totoaba over 40 years time. Flanagan and Hendrickson (1976) concluded that recruitment and over-fishing explained the decline better than habitat alteration. It is estimated that a steady flow of water reaching an annual total of 1.6 million acre-feet would be necessary to restore the brackish water conditions that historically occurred in the estuary (US Bureau of Reclamation file data and pers. com. Dave Hemphill, USBR, Boulder City, NV). Estimations were based on salinity factors in both the Sea of Cortez and the Lower Colorado River along with the estimated area of impact. A static condition was assumed, and tidal currents and other influences were not factored, thus the estimated amount may be conservative (Carriquiry and Sanchez, 1999). Even if that amount of water were available at present, releases of such a nature would be impractical, and Reclamation has no control over Colorado River water once it reaches the Northerly International Boundary.

Therefore, based on the minor, insignificant reduction in the probable magnitude and probability of flows past Morelos Dam until 2018; the continued exploitation of the species and inadvertent mortality resulting from commercial fishing as described above; and Reclamation's lack of discretion over Colorado River water in Mexico; Reclamation concludes that the Basin States Alternative may affect but is not likely to adversely affect the totoaba.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

Willow flycatchers are found throughout North America and are further divided taxonomically into four subspecies, *E.t. brewseri, E.t. adastus, E. t. traillii,* and *E.t. extimus.* The latter, *E.t. extimus*, the southwestern willow flycatcher, breeds on the Lower Colorado River and its tributaries (McKernan and Braden, 1997, 1998, 1999). In January 1992, the Service was petitioned to list the southwestern willow flycatcher, *Empidonax traillii extimus* as an endangered species. In July 1993, the species was proposed as endangered with critical habitat (58FR39495). On February 27, 1995, the Service listed the southwestern willow flycatcher as an endangered species

(60FR10694). There are no recovery plans to date and the designated critical habitat does not include the lower Colorado River (60FR10694).

As a member of the genus *Empidonax,* Willow Flycatchers are known for the difficulty in identifying individuals to species in the field (Phillips et al. 1964; Peterson 1990; Sogge et al. 1997). The southwestern willow flycatcher is a small bird, approximately 5.75 inches in length, with a grayish green back and wings, whitish throat, light grey olive breast, and pale yellowish body. Two white wing bars are visible. The upper mandible is dark, the lower light. The most distinguishable taxonomic characteristic of the Southwestern Willow Flycatcher is the absent or faintly visible eye ring. The southwestern willow flycatcher can only be positively differentiated in the field from other species of its genus by its distinctive "fitzbew" song.

Southwestern willow flycatchers nest in riparian habitat characterized by dense stands of intermediate sized shrubs or trees. Most southwestern willow flycatcher nests are located in the fork of a shrub or tree from 4 to 25 feet above the ground (Unitt 1987; Sogge et al. 1997). These trees are either in or adjacent to soils that are either saturated or have surface water (Phillips et al. 1964; Muiznieks et al. 1994, McKernan and Braden, 1998). The southwestern willow flycatcher is an insectivore, foraging within and above dense riparian habitat, catching insects in the air or gleaning them from the surrounding foliage. It also forages along water edges, backwaters, and sandbars adjacent to nest sites. Details on specific prey items can be found in Drost et al (1998). On the Lower Colorado River, Southwestern willow flycatchers begin arriving on breeding territories in early May and continue to be present until August, with some records into early September (McKernan and Braden, 1998). Recent studies have documented nest building as early as May 1 (McKernan and Braden, 1997) and fledging dates as late as September 9 (McKernan, and Braden, 1998).

A long-distance migrant, the southwestern willow flycatcher winters in Mexico from Nayarit and southwestern Oaxaca south to Panama and possibly extreme northwestern Columbia. The flycatcher migrates widely through the southern U.S. occurring as a regular migrant south to the limits of the wintering range (Peterson 1990; Sogge et al. 1997, AOU 1998). Recent field studies in Costa Rica by Koronkiewicz and Whitfield (1999) and studies of museum specimens by Phil Unitt (1999) collaborate previous information on the species' range. One specimen of willow flycatcher captured in Costa Rica during the winter of 1999 was banded at the Ash Meadows National Wildlife Refuge (NWR) in southern Nevada in July 1998 (Koronkiewicz and Whitfield 1999). The Ash Meadows NWR is within the identified breeding range of this southwestern subspecies and thus the capture in Costa Rica is the most recent confirmed wintering site of *E.t. extimus*. Breeding range for the species as a whole extends as far south as northern Sonora, and northern Baja California (AOU 1998) and north into Canada.

Breeding range for the southwestern subspecies of the willow flycatcher, *E. t. extimus*, extends from extreme southern Utah and Nevada, through Arizona, New Mexico, and southern California, but records from west Texas and extreme northern Baja California and Sonora, Mexico remain lacking to date (Unitt 1987). Molina (1998) observed the species in exotic plantings in the El Golfo de Santa Clara fishing village, and in the saltcedar-mesquite-acacia woodland corridor along the pozos near El Doctor in 1997. The species has also been documented at El Doctor wetlands, Colorado River delta, Sonora, Mexico June 7 and 8, 1999 (Huerta, University of Arizona, pers. comm.). These sightings confirm the area is used for migration, but does not confirm breeding. The presence of the subspecies after June 15 is required to confirm breeding (Sogge et al 1997; Braden and McKernan 1998). A survey for southwestern willow flycatcher was conducted on the Copopah Indian Reservation in the Limitrophe Division on the Colorado River near Yuma, Arizona in 2000. Twenty six birds were detected on May 22 and June 6, 2000, and none later. It was concluded the riparian habitat on the Reservation was being used as a stopover area during the migration (Garcia-Hernandez, et al, 2000).

The majority of southwestern willow flycatchers found during the past five years of surveys on the Lower Colorado River have been found in saltcedar, *Tamarix rammosissima*, or a mixture of saltcedar and native cottonwood and willow, especially Gooddings willow, *Salix gooddingii*, coyote willow, *S. exigua* and Fremont cottonwood, *Populus fremontii*. Based on available information at the time of this writing, aside from the presence of water and dense structure of vegetation, no clear distinctions can be made based on perennial species composition or foliage height profiles, as to what constitutes appropriate southwestern willow flycatcher habitat.

Historically, the southwestern willow flycatcher was widely distributed and fairly common throughout its range, especially in southern California and Arizona (Unitt 1987; Schlorff 1990). Nest and egg collections by Herbert Brown suggest that the southwestern willow flycatcher was a common breeder along the lower Colorado River near Yuma in 1902 (Unitt 1987).

Grinnell (1914) also believed that the southwestern willow flycatcher bred along the lower Colorado River due to the similarities in habitat between the lower Colorado River and other known breeding sites. He noted the abundance of southwestern willow flycatchers observed in the willow association and possible breeding behavior. However, the date of his expedition corresponds more to the migration season of the southwestern willow flycatcher with only a small overlap with the beginning of the breeding season.

In 1993, the U.S. Fish and Wildlife Service estimated that only 230 to 500 nesting pairs existed throughout its entire range (58FR39495). However, since extensive surveying has been implemented, this number has likely increased, especially on the lower

Colorado River where the species was thought to have been extirpated (Hunter et al. 1987; Rosenberg et al. 1991; McKernan and Braden, 1999). Sixty-four nesting attempts were documented on the lower Colorado River from southern Nevada to Needles, California in 1998 (McKernan and Braden, 1999).

Several factors have caused the decline in southwestern willow flycatcher populations. Extensive areas of suitable riparian habitat have been lost due to river regulation and channelization, agricultural and urban development, mining, road construction, and overgrazing (Phillips et al. 1964; Johnson and Haight 1984; Unitt 1987; Rosenberg et al. 1991; Sogge et al. 1997). The total acreage of riparian vegetation has changed little in the last 20 years (Anderson and Ohmart 1976; Younker and Anderson 1986.), although there is less native vegetation and more non-native present (Rosenberg et al. 1991). The most recent estimate of historical, potentially suitable willow flycatcher habitat as delineated from 1938 aerial photography from the Grand Canyon to Mexico is 89, 203 acres (USBR 1999). Only some portion of this potentially suitable habitat can be assumed to have been suitable habitat for the flycatcher, as the microclimate and other factors required which existed at the time are undeterminable. The total amount of occupied habitat along the lower Colorado River in the U.S. today is estimated to be slightly over 6,000 acres (USBR 1999). A certain amount of habitat that exists along the lower Colorado River in the U.S. apparently has the necessary components to be utilized as breeding habitat by southwestern willow flycatchers is not always being used (McKernan and Braden, 1998). This could indicate that lack of breeding habitat may not be what is limiting the southwestern willow flycatcher's population.

In December, 1998, biologists from the Bureau of Reclamation, San Bernardino County Museum, and the Upper Gulf of California and Colorado River delta Biosphere Preserve conducted an aerial survey of the Rio Hardy and the Colorado River to determine potentially suitable southwestern willow flycatcher breeding habitat. Results of this survey indicate suitable habitat is present in the vicinity of Campo Mosqueda and Cucapa El Mayor and San Luis, Sonora along the Rio Colorado. Southwestern willow flycatchers utilize dense riparian habitat with moist soil or standing water present.

Flood control releases and Gila River flows are the primary condition under which riparian habitats are established in the delta, and a high ground water table is needed to maintain this habitat. Therefore, the potential impacts resulting from the Basin States Alternative would be due to the minor decrease in the frequency and magnitude of excess flows into the Gulf compared to the baseline conditions. These decreases are not expected to significantly reduce the opportunity for regeneration of riparian habitat on the Colorado River in Mexico. The probability of the average magnitudes of flows greater than 250 kaf over time indicates there will not be a significantly less probability for excess flows to Mexico than what exists currently under baseline conditions. Also, due to the uncertainty of what discretionary actions Mexico may take with excess flows, impacts of implementing the Basin States Plan are uncertain. Therefore, Reclamation

concludes the Basin States Alternative may affect but is not likely to adversely affect the southwestern willow flycatcher.

Yuma Clapper Rail (*Rallus longirostris yumanensis*)

Yuma clapper rails are found in emergent wetland vegetation such as dense or moderately dense stands of cattails (*Typha latifolia* and *T. domingensis*) and bulrush (*Scirpus californicus*) (Eddleman 1989; Todd 1986). They can also occur, in lesser numbers, in sparse cattail-bulrush stands or in dense reed (*Phragmites australis*) stands (Rosenberg et al. 1991). The most productive clapper rail areas consist of a mosaic of uneven-aged marsh vegetation interspersed with open water of variable depths (Conway et al. 1993). Annual fluctuations in water depth and residual marsh vegetation are important factors in determining habitat use by Yuma clapper rails (Eddleman 1989).

Yuma clapper rails may begin exhibiting courtship and pairing behavior as early as February. Nest building and incubation can begin by mid-March, with the majority of nests being initiated between late April and late May (Eddleman 1989, Conway et al 1993). The rails build their nests on dry hummocks, on or under dead emergent vegetation and at the bases of cattail or bulrush. Sometimes they weave nests in the forks of small shrubs that lie just above moist soil or above water that is up to about 2 feet deep. The incubation period is 20-23 days (Ehrlich et al 1988, Kaufman 1996) so the majority of clapper rail chicks should be fledged by August. Yuma clapper rails nest in a variety of different micro habitats within the emergent wetland vegetation type, with the only common denominator being a stable substrate. Nests can be found in shallow water near shore or in the interior of marshes over deep water (Eddleman 1989). Nests usually do not have a canopy overhead as surrounding marsh vegetation provides protective cover.

Crayfish (*Procambarus clarki*) are the preferred prey of Yuma clapper rails. Crayfish comprise as much as 95 percent of the diet of some Yuma clapper rail populations (Ohmart and Tomlinson 1977). Availability of crayfish may be a limiting factor in clapper rail populations and is believed to be a factor in the migratory habits of the rail (Rosenberg et al. 1991). Eddleman (1989), however, has found that crayfish populations in some areas remain high enough to support clapper rails all year and that seasonal movement of clapper rails can not be correlated to crayfish availability.

One issue of concern with the Yuma clapper rail is selenium. Eddleman (1989) reported selenium levels in Yuma clapper rails and eggs and in crayfish used as food were well within levels that will cause reproductive effects in mallards. Rusk (1991) reported a mean of 2.24 ppm dry weight selenium in crayfish samples from six lower Colorado River backwaters from Havasu National Wildlife Refuge, near Needles, CA to Mittry

Lake, near Yuma, AZ. Over the past decade, there has been an apparent two to five fold increase in selenium concentrations in crayfish, the primary prey species for the Yuma clapper rail (King et al 2000). Elevated concentrations of selenium (4.21- 15.5 ppm dry weight) were present in 95 percent of the samples collected from known food items of rails. Crayfish from the Cienega de Santa Clara in Mexico contained 4.21 ppm selenium, a level lower than those in the U. S., but still above the concern threshold. Recommendations from this latest report on the subject conclude that if selenium concentrations continue to rise, invertebrate and fish eating birds could experience selenium induced reproductive failure and subsequent population declines (King et al 2000).

Yuma clapper rail may be impacted by man-caused disturbance in their preferred habitat. In recent years the use of boats and personal watercraft has increased along the lower Colorado River. This has led to speculation that the disturbance caused by water activities such as those may have a negative impact on species of marsh dwelling birds.

This subspecies is found along the Colorado River from Needles, California, to the Gulf, at the Salton Sea and other localities in the Imperial Valley, California, along the Gila River from Yuma to at least Tacna, Arizona, and several areas in central Arizona, including Picacho Reservoir (Todd 1986; Rosenberg et al. 1991). In 1985, Anderson and Ohmart (1985) estimated a population size of 750 birds along the Colorado River north of the International Boundary. Current estimates of Yuma clapper rail in Mexico were made in 1999 (Hinojosa-Huerta, et al., 2000). These indicate over 6,000 Yuma clapper rail occur in Mexico, with the majority of the population (6,294) occurring in the Cienega de Santa Clara. Based on call count surveys, the population of Yuma clapper rail in the United States appears to be holding steady (U.S. Fish and Wildlife Service, Phoenix, Arizona, unpublished data). Due to the variation in surveying over time, these estimates can only be considered the minimum number of birds present (Eddleman 1989; Todd 1986).

The range of the Yuma clapper rail has expanded in the past 25 years and continues to do so (Ohmart and Smith 1973; Monson and Phillips 1981; Rosenberg et al. 1991, SNWA 1998, McKernan And Braden, 1999), so there is a strong possibility that population size may increase. Yuma clapper rails are known to expand into desired habitat when it becomes available. This is evidenced by the colonization of the California Department of Fish and Game Department Finne-Ramer habitat management unit in Southern California. This unit was modified to provide marsh habitat specifically for Yuma clapper rail and a substantial resident population exists there. There is also recent documentation of the species in Las Vegas Wash, Virgin River and the lower Grand Canyon (McKernan and Braden, 1999).

A substantial population of Yuma clapper rail exists proximate to the Colorado River delta in Mexico. Eddleman (1989) estimated a total of 450 to 970 Yuma clapper rails

were present there in 1987. The birds were located in the Cienega de Santa Clara, Sonora, Mexico (200-400 birds), along a dike road on the delta proper (35-140 birds), and at the confluence of the Rio Hardy and Colorado River (200-400 birds). Piest and Campoy (Arizona Game and Fish Dept, Yuma, Arizona and Upper Gulf of California and Colorado River delta Biosphere Reserve, unpublished report) detected a total of 240 birds responding to taped calls in the Cienega. From these data, they estimate a total population of approximately 5,000 rails in the cattail habitat the Cienega. As mentioned earlier, 1999 estimates of the Yuma clapper rail in the Cienega are 6,249. Other Yuma clapper rail were detected at Laguna del Indio, the eastern drains at Ayala-Aacatecas, Rio El Mayor, the Cupapa Wetland Complex at the confluence of the Rio Hardy and Colorado River, and along the Rio Hardy. Interestingly enough, no Yuma clapper rail were detected along the riparian corridor of the Colorado River in Mexico (Hinojosa-Huerta, et. al., 2000).

Crayfish were introduced into the lower Colorado River about 1934. This food source and the development of marsh areas resulting from river control such as dams and river management helped to extend the breeding range of the Yuma clapper rail. The original range of the Yuma clapper rail was primarily the Colorado River delta. The southernmost confirmed occurrence of Yuma clapper rail in Mexico was three birds collected at Mazaltan, Sinaloa; Estero Mescales, Nayarit; and inland at Laguna San Felipe, Puebla (Banks and Tomlinson 1974).

Yuma clapper rail were thought to be a migratory species, the majority of them migrating south into Mexico during the winter, with only a small population resident in the United States during the winter. Eddleman (1989) concluded the Yuma clapper rail was not as migratory as once thought and estimated approximately 70 percent remained in or near their home range during the winter.

A Recovery Plan was implemented in 1983 for the Yuma clapper rail. The criteria for downlisting of the species states there must be a stable breeding population of 700-1000 individuals for a period of 10 years. Other goals to be met include:

- Clarifying the breeding and wintering status in Mexico.
- Obtaining an agreement with Mexico for management and preservation of the species.
- Development of management plans for Federal and State controlled areas where the rails are known to breed.
- Written agreements are made with Federal and State agencies to protect sufficient wintering and breeding habitat to support the proposed population numbers.

Currently, not all of the above recovery actions had been met, and the Service recommends the Yuma clapper rail remain classified as endangered.

Yuma clapper rail use dense stands of cattail marsh habitat in the delta. Changes in water availability that helps to maintain this habitat would have the potential for impacting the species by slightly lowering the groundwater and surface water and possibly altering the prey availability. The currently known populations of Yuma clapper rail in Mexico are found in areas supported primarily by agricultural drainage and are expected to be affected little, if any by implementing the Basin States Alternative. Therefore, Reclamation concludes Yuma clapper will not be affected by the Basin States Alternative.