NATURAL RESOURCES JOURNAL

Volume 42
Issue 4 *Fall 2002*

Fall 2002

Andrade Mesa Wetlands of the All-American Canal

Osvel Hinojosa-Huerta

Pamela L. Nagler

Yamilett Carrillo-Guerrero

Enrique Zamora-Hernandez

Jaqueline Garcia-Hernandez

See next page for additional authors

Andrade Mesa Wetlands of the All-American Canal

Authors

Osvel Hinojosa-Huerta, Pamela L. Nagler, Yamilett Carrillo-Guerrero, Enrique Zamora-Hernandez, Jaqueline Garcia-Hernandez, Francisco Zamora-Arroyo, Kara Gillon, and Edward P. Glenn

OSVEL HINOJOSA-HUERTA, PAMELA L. NAGLER, YAMILETT CARRILLO-GUERRERO, ENRIQUE ZAMORA-HERNÁNDEZ, JAQUELINE GARCÍA-HERNÁNDEZ, FRANCISCO ZAMORA-ARROYO, KARA GILLON, & EDWARD P. GLENN*

Andrade Mesa Wetlands of the All-American Canal

ABSTRACT

Seepage from the All-American Canal has created a series of wetlands totaling over 6200 hectares (15,500 acres) along the U.S.–Mexico border. Over half of these are in Mexico, east of the portion of the canal that is proposed for lining, and will therefore be impacted by lack of further seepage. The Andrade Mesa Wetlands are extensive and provide high-quality bird habitat in an isolated part of the northern Colorado River delta where replacement habitat is non-existent. The loss of this critical habitat should be considered in assessing the potential environmental impacts of the canal lining project.

INTRODUCTION

The lower Colorado River has been so altered by dams, water diversions, and invasion of exotic species that 45 native species of wildlife depending on the river are now listed as sensitive, threatened, or endangered.[1] Natural wetland habitat has been reduced due to channelization of the river, which prevents the formation of backwaters

---

* Hinojosa-Huerta & Carrillo-Guerrero, School of Renewable Natural Resources, University of Arizona, Tucson, AZ and Pronatura Sonora, Guaymas, Sonora, México; Nagler & Glenn, Environmental Research Laboratory, The University of Arizona, Tucson, AZ; Zamora-Hernández, Pronatura Sonora; García-Hernández, Centro de Investigación en Alimentación y Desarrollo, A.C., Unidad Guaymas, Guaymas, Sonora, Mexico; Zamora-Arroyo, Sonoran Institute, Tucson, AZ; Gillon, Defenders of Wildlife, Albuquerque, NM. The authors gratefully acknowledge financial support from the National Aeronautics and Space Administration (Applications Program), the U.S. Fish and Wildlife Service (Sonoran Joint Venture Program), the University of California (UC-Mexus Program), the Sonoran Institute, and Environmental Defense.

1. U.S. Bureau of Reclamation, Description and Assessment of Operations, Maintenance, and Sensitive Species of the Lower Colorado River, Boulder City, Nev. (1996). *See generally* for discussion of ecology of the river; see Table 2 (no page number) for list of species.

where aquatic and emergent vegetation can become established.[2] Much of the remaining wetland habitat is supported by anthropogenic water sources, such as canal seepage or agricultural drainage water.[3] For example, Cienega de Santa Clara, the largest cattail marsh in the Sonoran Desert, is supported by the discharge of U.S. drain water into the delta of the Colorado River in Mexico.[4]

Managing these manmade wetlands for maximum wildlife value must be part of any successful ecosystem recovery program.[5] Here we describe a set of little-known wetlands along the Mexico-U.S. border that are supported by seepage from the All-American Canal in the United States. These wetlands, in turn, support a critical but previously unrecognized bird habitat. The future of these wetlands and bird habitat is in question due to the proposed lining of the canal, and they should be taken into account in assessing the environmental impacts of the lining project.

The All-American Canal has conveyed water from the Colorado River to farmland in Imperial Valley, California, since 1940[6] (Figure 1). Considered an engineering marvel of its time, it replaced earlier gravity canals across Andrade Mesa dating as far back as 1901. The modern canal carries up to 300 cubic meters per second of water through highly permeable dune sand. Because it is unlined, some of this is lost to seepage. Seepage water flows southwest under the dunes into the Mexicali Valley, where much of it is recovered by pumps and then redistributed for irrigation in Mexico. Some of the seepage, however, supports the wetlands' bird habitat.

The U.S. government has proposed to line a 38-kilometer stretch of the canal from the Pilot Knob Hydroelectric Generating Station to Drop 3 (see Figure 2) to recover 90 million cubic meters per year of this seepage

---

2. *See generally* Juliet C. Stromberg, *Restoration of Riparian Vegetation in the South-Western United States: Importance of Flow Regimes and Fluvial Dynamism*, 49 J. ARID ENV'TS 17, 17-18 (2001).

3. *See generally* Edward P. Glenn et al., *Effects of Water Management on the Wetlands of the Colorado River Delta, Mexico*, 10 CONSERVATION BIOLOGY 1175 (1996).

4. *See generally* Edward P. Glenn et al., *Cienega de Santa Clara: Endangered Wetland in the Colorado River Delta, Sonora, Mexico*, 32 NAT. RESOURCES J. 817 (1992); Scott Zengel et al., *Cienega de Santa Clara, A Remnant Wetland in the Rio Colorado Delta (Mexico): Vegetation Distribution and the Effects of Water Flow Reduction*, 4 ECOLOGICAL ENGINEERING 19 (1995); J. Garcia-Hernandez et al., *Bioaccumulation of Selenium (Se) in the Cienega de Santa Clara Wetland, Sonora, Mexico*, 45 EXOTOXICOLOGY & ENVTL. SAFETY 298 (2000); Osvel Hinojosa-Huerta, Stephan DeStefano & William W. Shaw, *Distribution and Abundance of the Yuma Clapper Rail* (Rallus longirostris yumanensis) *in the Colorado River Delta, Mexico*, 49 J. ARID ENV'TS 171 (2001).

5. Glenn et al., *supra* note 3, at 1184. This paper makes the point that most of the remaining wetlands in the Colorado River delta are dependent on managed water flows.

6. For information on the All-American Canal, including its history and operations and plans for its lining, *see* Imperial Irrigation District, *The All-American Canal: How It Works*, *at* http://www.iid.com/water/works-allamerican.html (last visited Nov. 5, 2002).

(about two percent of the total canal flow).[7] While the fairness of recovery by the United States of water that has traditionally flowed to Mexico has been debated,[8] this article addresses the environmental impacts of the proposed canal lining on the wetlands and bird habitat in Mexico, which has not been considered,[9] as well as the legal framework for the proposed canal lining.

DESCRIPTION OF WETLANDS

We have designated the total set of wetlands supported by seepage from the All-American Canal as the Andrade Mesa Wetlands (*Humedales de la Mesa de Andrade*). The majority of the wetlands are in Mexico, where some of them are referred to as Las Pangas. We mapped them using satellite and aerial imagery[10] and then conducted ground surveys to document bird

---

7. BUREAU OF RECLAMATION, RECORD OF DECISION FOR FINAL ENVIRONMENTAL IMPACT STATEMENT/FINAL ENVIRONMENTAL IMPACT REPORT FOR ALL-AMERICAN CANAL LINING PROJECT (1994) (selecting the parallel canal alternative to conserve 67,700 acre-feet/year).

8. *See generally* J. Roman Calleros, *The Impact on Mexico of the Lining of the All-American Canal*, 31 NAT. RESOURCES J. 829 (1991); Alfonso Cortéz-Lara & Maria Rosa García-Acevedo, *Lining of the All-American Canal: The Forgotten Voices*, 40 NAT. RESOURCES J. 261 (2000); Douglas L. Hayes, *The All-American Canal Lining Project: A Catalyst for Rational and Comprehensive Groundwater Management on the United States–Mexico Border*, 31 NAT. RESOURCES J. 803 (1991).

9. *See* BUREAU OF RECLAMATION, FINAL ENVIRONMENTAL IMPACT STATEMENT/FINAL ENVIRONMENTAL IMPACT REPORT, ALL-AMERICAN CANAL LINING PROJECT (1994) [hereinafter BUREAU OF RECLAMATION, FINAL ENVIRONMENTAL IMPACT STATEMENT/FINAL ENVIRONMENTAL IMPACT REPORT]; BUREAU OF RECLAMATION, *supra* note 7; Memorandum from Gary Bryant, Area Manager, Bureau of Reclamation, to Regional Director, Bureau of Reclamation (July 2, 1999) (on file with author); Memorandum from Robert W. Johnson, Regional Director, Bureau of Reclamation, to Area Manager, Bureau of Reclamation (Nov. 22, 1999) (on file with author) (concurring that neither a supplement nor new Environmental Impact Statement (EIS) is required). The lining project was shortened to avoid dewatering a 560-hectare wetland complex occurring along the canal in the United States after Drop 3 (see Figure 2), but no environmental impacts in Mexico were identified.

10. We used a 30 meter resolution, Thematic Mapper 7 satellite image (Path 38, Row 37) taken May 18, 2002, to map the location and size of the wetlands, which were clearly visible as black (water) and red (vegetation) areas in the light colored dunes using false color display of reflectance in the red, green, blue, and near infrared bands. However, the satellite image could not be used to distinguish marsh vegetation from shrubs or trees due to its low resolution.

We surveyed the wetlands in Mexico in more detail using oblique (300 meter elevation) and vertical (1000 meter elevation) visible-band aerial photographs taken in April and June 2002, respectively. These photos had 0.5-meter resolution and could be used to distinguish land cover classes and plant types. We were not able to photograph all the wetlands but concentrated on the largest group in Mexico, which was mainly east of Drop 3 and would therefore be impacted by the lining project. Mosaics of vertical photos covering two separate areas within this group, covering approximately 500 hectares, were georeferenced to the TM image and analyzed for land cover features using ERDAS software (see Figure 3). We

usage and vegetation structure at two wetland sites in Mexico in July and August 2002.[11] While our preliminary observations are inadequate to completely describe the structure, wildlife value, and hydrology of these wetlands, our objective is to document their potential importance while they still exist.

Based on satellite imagery, there are at least six wetland groups along the All-American Canal, in the Andrade Mesa dunes south of the canal or along the southern escarpment of the dunes in Mexico, that appear to be fed by seepage from the canal (see Figure 2). These wetlands vary from 111 hectares to 3025 hectares in area, totaling 6200 hectares. The largest group of connected wetlands (3025 hectares) extends along the southern edge of the dunes in Mexico from the approximate longitude of Drop 3 and eastward for approximately 15 kilometers in the direction of Algodones, Mexico. We conducted aerial photography and ground surveys in this group (Figure 3). Additional, isolated wetlands are found as far east as Algodones on the southern escarpment (not shown in Figure 2). Approximately 3500 hectares of the total wetland area are east of the proposed lining and would therefore be impacted by the project.

While we refer to these areas as wetlands, they are actually low areas in the dunes where seepage water surfaces, and they support three types of habitat: (1) marshes, consisting of open water surface and emergent vegetation; (2) playas, consisting of dry lakebeds, sometimes vegetated and sometimes bare; and (3) vegetated dunes, colonized by phreatophytic shrubs that appear to be reaching to the water table with their roots (Figure 4). Based on analysis of aerial photographs taken in June 2002, 18 percent of the wetland area consisted of marshes, 31 percent playas, and 51 percent dunes. The dunes within the wetland area have much thicker vegetative cover than dunes outside the wetland area: 514 shrubs or trees per hectare (58 percent vegetation cover) compared to 92 shrubs per hectare (six percent vegetation cover) on dune areas outside the wetlands.

The vegetation structure of the two wetlands we visited was quite simple (Figures 5 and 6). The wetlands consisted of individual or connected

---

placed a grid pattern over the photos such that 1 square was approximately equal to 0.5 hectare of ground coverage (n = 991 squares). We scored each grid intersection as dune, marsh, or playa habitat type (see text). For the dune habitat type, we compared shrub density and vegetation cover for dunes inside and outside the wetland areas by counting the number of shrubs or trees visible within 20 grids of each type and by scoring the intersections of the grids as either vegetated or unvegetated.

11. The two lagoons we visited were at UTM 3612012.12, 676727.23 and UTM 3611762.19, 6766255.15 (see Figures 2 and 3). On each visit we set up an observation post in the dunes overlooking the lagoons and with the aid of binoculars (10x50 and 8x42) and a spotting scope (15x to 40x) counted all birds observed and heard at each lagoon and surrounding dunes during a period of 30 minutes. Surveys were conducted on July 8 and August 15, 2002, between 0830 and 1000 hours.

lagoons in low spots, separated by dunes. There were three distinct zones differentiated by elevation in each lagoon. At the lowest elevation was a dry playa or a shallow, saline pond where seepage water accumulated and concentrated by evaporation. Surrounding the low spot was a saltgrass (*Distichlis spicata*) and cattail (*Typha domengensis*) zone with saturated soil and numerous seeps where water entered from the surrounding dunes. Saltgrass grew in thick beds, usually less than 0.5 meters in height but sometimes growing in mounds up to one meter. Cattails grew up to two meters in height in standing water or water-logged soil.

Saltcedar (*Tamarix ramosissima*) shrubs and honey mesquite trees (*Prosopis glandulosa*) were found in the higher parts of the saltgrass and cattail zone, but these plants were sparse in the water-logged soil that characterized the low areas of the wetlands. At the back of this zone and extending part way up the dunes was a halophyte zone, thickly vegetated with saltcedar, arrowweed (*Pluchea sericea*), and chenopod shrubs (*Sueada torreyana, Allenrolfia occidentalis,* and *Atriplex canescens*). These plants were apparently rooted into the water table. The tops of the dunes, up to 10 meters above the lagoons, were dominated by creosote (*Larreta tridentata*) and prostrate-growing honey mesquites, which we also presumed to be rooted into the water table. Dunes outside the wetlands were sparsely populated with creosote.

In August 2002, the salinity in two evaporation ponds we visited ranged from a salinity of 14 parts per thousand to 21 parts per thousand (six samples), about half the salinity of seawater. On the other hand, the salinity level of water seeping into the cattails from the dunes was two to five parts per thousand. Based on the measured salinity gradient, we surmise that water percolates from the dunes into the depressions at low salinity, but that salinity increases due to evapotranspiration as the water works its way downhill to the central evaporation basin.

The water level in the wetlands is dynamic. On the July field survey, the water level in the ponds was higher than in August and, from a salt rim that was visible along the edges of the cattails, it appears that water level decreases by at least one meter over the summer season. Many of the playas that were dry in the vertical photos taken in June were flooded in the oblique photos taken in April. The water levels reportedly vary in response to rates of evapotranspiration as well as to water levels in the All-American Canal.[12] Seasonal study of these wetlands is needed to confirm

12. Interviews with Dr. Francisco Oyarzabal, former regional director of Comision Nacional del Agua, Mexicali, Baja California, México. Dr. Oyarzabal is currently a water policy expert with Conservation International, México. Authors Glenn and Zamora-Arroyo interviewed Dr. Oyarzabal during four meetings in Mexicali, Hermosillo, and Yuma, from August to September 2002.

the patterns of water level and salinity variability, as well as vegetation cover and wildlife usage.

BIRD SURVEYS

During bird surveys in July and August, we detected 591 individuals from 43 species in these lagoons. Twenty of these species were breeding, 16 were non-breeding summer visitors, and seven were fall transients. While 31 of these species are common throughout the Colorado River delta, such as American Coots (*Fulica americana*), Black-necked Stilts (*Himantopus mexicanus*), American Avocets (*Recurvirostra americana*), and Western Sandpipers (*Calidris mauri*), these wetlands also provide breeding habitat for some species that rarely breed elsewhere in the region, including Least Bitterns (*Ixobrychus exilis*), Cinnamon Teals (*Anas cyanoptera*), and Ruddy Ducks (*Oxyura jamaicensis*).[13]

These lagoons also provide habitat for protected or sensitive species, including the Yuma Clapper Rail (*Rallus longirostris yumanensis*), which is listed as endangered in the United States[14] and threatened in Mexico,[15] and the Long-billed Savannah Sparrow (*Passerculus sandwichensis rostratus*), listed as a species under special protection in Mexico.[16] Gull-billed Terns (*Sterna nilotica*) also visit the area to forage, probably from nearby colonies at the Salton Sea or Cerro Prieto Geothermal Ponds.[17] Western populations of this bird have declined over the last decades, and it is a Species of Special Concern in California.[18] Other non-breeding summer visitors that are rare throughout the region and observed at the lagoons

---

13. For general discussion on the status of these birds, *see* Michael A. Patten et al., *Status and Taxonomy of the Colorado Desert Avifauna of Baja California*, *in* BIRDS OF THE BAJA CALIFORNIA PENINSULA: STATUS, DISTRIBUTION, AND TAXONOMY 29 (Richard A. Erickson & Steve N.G. Howell, eds. 2001) (Am. Birding Ass'n, *Monographs in Field Ornithology No. 3*, 2001).

14. 32 Fed. Reg. 4001 (Mar. 11, 1967). *See also* William R. Eddleman & Courtney J. Conway, *Clapper Rail* (Rallus longirostris), *in* THE BIRDS OF NORTH AMERICA No. 340 (A. Poole & F. Gill eds., 1998).

15. Diario Oficial de la Federación (2002). Norma Oficial Mexicana NOM-059-ECOL-2002, Protección Ambiental-Especies Nativas de México de Flora y Fauna Silvestres-Categorías de Riesgo y Especificaciones para Su Inclusión, Exclusión o Cambio-Lista de Especies en Riesgo. Secretaría de Medio Ambiente, Recursos Naturales y Pesca. México, D.O.F. Marzo 6, 2002.

16. *Id.*

17. For a description of the birds of Cerro Prieto Ponds, see Kathy C. Molina & Kimball L. Garrett, *The Breeding Birds of the Cerro Prieto Geothermal Ponds, Mexicali Valley, Baja California*, *in* BIRDS OF THE BAJA CALIFORNIA PENINSULA: STATUS, DISTRIBUTION, AND TAXONOMY 23 (Richard A. Erickson & Steve N.G. Howell eds., 2001) (Am. Birding Ass'n, *Monographs in Field Ornithology No. 3*, 2001).

18. The bird is discussed in J. Parnell, R.M. Erwin & K.C. Molina, *Gull-billed Tern* (Sterna nilotica), *in* THE BIRDS OF NORTH AMERICA No. 140 (A. Poole & F. Gill eds., 1995). *See also Gull-Billed Tern* at http://www.ncaudubon.org/wb_05.html (revised 5/21/98).

include Mallards (*Anas platyrhynchos*), Northern Pintails (*Anas acuta*), Redheads (*Aythya americana*), White-Tailed Kites (*Elanus leucurus*), and Black Terns (*Chlidonias niger*). Enhanced by the groundwater, scrub vegetation in the dunes surrounding the wetlands and lagoons also provides habitat for desert birds, including the White-winged Dove (*Zenaida asiatica*), Loggerhead Shrike (*Lanius ludovicianus*), Verdin (*Auriparus flaviceps*), Black-tailed Gnatcatcher (*Polioptila melanura*), and Northern Mockingbird (*Mimus polyglottos*).

Based on their environmental features, the Andrade Mesa Wetlands might also provide breeding habitat for the California Black Rail (*Laterallus jamaicensis coturniculus*),[19] which is listed as endangered in Mexico,[20] threatened in California, and as a species of concern in the United States,[21] and of which only about 50 pairs breed in the Colorado River delta.[22] Breeding for this species has been confirmed in the seepage wetlands of the All-American Canal in California.[23] We probably failed to detect Black Rails because the species is extremely secretive, we did not conduct call-response surveys, and the date was not optimal for detection of these rails.[24] Call-response surveys during breeding season (March to May) should be performed in order to assess the status of the subspecies in these wetlands.

The presence in the lagoons of protected, sensitive, and rare species is probably due to the isolation of the wetlands, which grants them protection against human disturbance and activities such as cattle grazing. The constant presence of open water over the last decades has probably played a role in the setting of small breeding populations of water and marsh birds. Yet, the dynamics of water levels through the seasons maintain patches of emergent vegetation of different ages along the open water, allowing for a diversity of habitat types and providing the ideal habitat features for species such as the Yuma Clapper Rail.

---

19. *See* Ronald E. Flores & William R. Eddleman, *California Black Rail Use of Habitat in Southwestern Arizona*, 59 J. WILDLIFE MGMT. 357 (1995).

20. Diario Oficial, *supra* note 15.

21. California Department of Fish and Game, Birds in the List of Special Animals, http://www.dfg.ca.gov/endangered/birds.html (1999). *See also* W.R. Eddleman, R.E. Flores, & M.L. Legare, *Black Rail* (Laterallus jamaicensis), No. 123 (1994).

22. *See generally* Osvel Hinojosa-Huerta, Wiliam W. Shaw, & Stephen DeStefano, *Detections of California Black Rails in the Colorado River Delta, Mexico*, 32 W. BIRDS 228 (2001).

23. Interview with Courtney Conway, Arizona Cooperative Fish and Wildlife Research Unit, The University of Arizona (Nov. 2001 & Mar. 2002); *see also* Jules G. Evens et al., *Distribution, Relative Abundance and Status of the California Black Rail in Western North America*, 93 THE CONDOR 952, 954, 958 (1991); BUREAU OF RECLAMATION, FINAL ENVIRONMENTAL IMPACT STATEMENT/FINAL ENVIRONMENTAL IMPACT REPORT, *supra* note 9, at B-4.

24. *See generally* Larry B. Spear et al., *Effects of Temporal and Environmental Factors on the Probability of Detecting California Black Rails*, 70 J. FIELD ORNITHOLOGY 465 (1999).

LEGAL IMPLICATIONS

The wetlands and bird habitat are threatened because in 1988 Congress authorized the lining of the All-American Canal.[25] In 1994, pursuant to the National Environmental Policy Act (NEPA),[26] the U.S. Bureau of Reclamation (Reclamation) and Imperial Irrigation District (IID) released a Final Environmental Impact Statement/Environmental Impact Report (Final EIS) and a Record Of Decision (ROD). In 1999, Reclamation recertified the Final EIS;[27] however, the discovery of the Andrade Mesa wetlands requires that Reclamation prepare a supplement to the Final EIS because significant new information has arisen. NEPA regulations require supplementation if "[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts."[28] Factors to be considered include the environmental significance of the new information, the degree of care with which the agency considered the information and its impact, and the degree to which the agency supported its decision with a statement of explanation or additional data.[29] Essentially, the decision to supplement is based on the same consideration of "significance" as the initial EIS.[30]

The destruction of up to 3500 hectares of rare wetland habitat that also shelters threatened and endangered species is a significant impact that requires analysis in a supplemental EIS. Significance is measured in the context and by the intensity of the action and includes consideration of the degree to which the action affects unique wetlands and threatened or endangered species and whether the action violates federal law.[31]

The significance of the Andrade Mesa wetlands can be extrapolated from the precaution taken by Reclamation in preserving a 560 hectare wetland and mitigating for over 40 additional hectares of wetlands when it chose the parallel canal alternative.[32] In a region where man has already

---

25. San Luis Rey Indian Water Rights Settlement Act, Pub. L. No. 100-675, Title II, § 203, 102 Stat. 4000, 4006-4008 (1988).

26. 42 U.S.C. §§ 4321-4370 (2000).

27. According to the Council on Environmental Quality's NEPA guidelines, federal agencies must reexamine EISs that are over five years old. *See* Forty Most Asked Questions Concerning CEQ's NEPA Regulations, 46 Fed. Reg. 18026, 18036 (Mar. 23, 1981).

28. 40 C.F.R. § 1502.9(c)(1)(ii) (2002). Reclamation's own NEPA guidelines call for supplementation after five years. *See* BUREAU OF RECLAMATION, NATIONAL ENVIRONMENTAL POLICY ACT HANDBOOK 7-19 to 7-20 (Public Review Draft 2000), *available at* http://www.usbr.gov/nepa/documents.htm. *See also* Sierra Club v. Slater, 120 F.3d 623, 632 (6th Cir. 1997).

29. Warm Springs Dam Task Force v. Gribble, 621 F.2d 1017, 1024 (9th Cir. 1980).

30. *See* Marsh v. Oregon Natural Res. Council, 490 U.S. 360, 374 (1989).

31. 40 C.F.R. § 1508.27 (2002).

32. *See* Memorandum from Lawrence F. Hancock, Reg. Dir., Bureau of Reclamation, to All Interested Persons, Organizations, and Agencies (July 29, 1999) (on file with authors).

destroyed most of the wetland habitat, leading to the endangerment of many bird and riparian species, the presence of over 6200 hectares of rare wetland habitat is important.[33]

Second, by completely failing to investigate the existing environment and the potential for adverse impacts in Mexico, Reclamation may violate federal law, increasing the project's signficance. The act authorizing the lining of the canal also authorizes the Secretary of the Interior to "implement measures for the replacement of incidental fish and wildlife values adjacent to the canals foregone as a result of the lining of the canal or mitigation of resulting impacts on fish and wildlife resources from construction of a new canal, or a portion thereof. Such measures shall be on an acre-for-acre basis, based on ecological equivalency...."[34] Irreplaceable fish and wildlife resources may be lost as a result of this project, and Reclamation has not attempted to avoid, minimize, or mitigate for them.

Thirdly, the presence of threatened and endangered species speaks to the need for a supplemental EIS.[35] What is more, a meaningful assessment of environmental impacts in Mexico, performed to show that Reclamation has taken a "hard look" at the effects of its actions, may also raise Endangered Species Act (ESA) compliance concerns.[36] The ESA requires all agencies to "insure that any action authorized, funded, or carried out by such agency...is not likely to jeopardize the continued existence of any endangered species or threatened species."[37] Reclamation has not investigated whether endangered species are present in these wetlands or in other areas in Mexico that may be affected by lining the canal. These preliminary findings show that the Yuma Clapper Rail, an endangered species, finds habitat there, and further research may show that

33. It is also consistent with Exec. Order No. 12,114, 3 C.F.R. 356 (1979) (*Environmental Effects Abroad of Major Federal Actions*), and with the CEQ Memorandum to Heads of Agencies on the Application of NEPA to Proposed Federal Actions of the United States with Transboundary Effects (July 1, 1997) (on file with author).

34. San Luis Rey Indian Water Rights Settlement Act, Pub. L. No. 100-675, § 203(a)(2), 102 Stat. 4000, 4006-4007 (1988).

35. 40 C.F.R. § 1508.27(b)(9). *See also* Portland Audubon Society v. Babbitt, 998 F.2d 705 (9th Cir. 1993) (holding that agency disregard of new scientific information that would affect an endangered species requires a supplemental EIS).

36. Baltimore Gas and Elec. Co. v. Natural Res. Def. Council, 462 U.S. 87, 97 (1983) (requiring the agency to make a "substantial good faith effort at studying analyzing and expressing the environmental issues in the EIS").

37. 16 U.S.C. § 1536(a)(2) (2000). Federal agencies consult with the Fish and Wildlife Service and National Marine Fisheries Service in order to avoid jeopardizing species.

additional threatened or endangered species live, breed, or forage there. If so, Reclamation must consult with the Fish and Wildlife Service.[38]

Inclusion of this project into the larger Quantification Settlement Agreement (QSA), a regional water conservation plan for California, calls for a supplemental EIS, one that evaluates the cumulative impacts of all actions comprising the QSA.[39] Faced with a similar situation,

---

38. *See* Defenders of Wildlife v. Lujan, 911 F.2d 117 (8th Cir. 1990), *rev'd on other grounds*, 504 U.S. 555 (1992); Plaintiffs' Complaint for Declaratory and Injunctive Relief at 11-12, Defenders of Wildlife v. Norton, (D.D.C. filed June 28, 2000) (No. Civ. 00-1544) (challenging the geographic scope of Reclamation's consultation on the impacts of its operations and maintenance activities in the Lower Colorado River basin) *available at* http//www.defenders.org/habitat/lowercol.html.

39. *See* Greenpeace v. National Marine Fisheries Service, 55 F. Supp.2d 1248, 1273 (W.D. Wash. 1999). The QSA constitutes further quantification of water rights among holders of contracts for Colorado River water. Reclamation must complete environmental compliance for the following components of the QSA by December 31, 2002: the QSA and associated Secretarial Implementation Agreement (IA), Inadvertent Overrun and Payback Policy (IOP Policy), Interim Surplus Guidelines (ISG), All-American and Coachella Canal linings, and the Imperial Irrigation District water conservation and transfer agreements. *See* QSA Article 6.1, 6.2(2)(a), *available at* http://www.cvwd.org/Public_Docs/Quantification_Settlement_Agreement.pdf.

Reclamation has issued separate EISs for each of the above in violation of NEPA because these actions are connected and require a single EIS. "Proposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement." 40 C.F.R. § 1502.4(a) (2002). These actions are connected because they "[a]*utomatically trigger other actions which may require environmental impact statements" and "[c]annot or will not proceed unless other actions are taken previously or simultaneously.*" 40 C.F.R. § 1508.25(a)(1)(i)-(ii) (2002) (emphasis added). The QSA and related environmental documents are replete with statements demonstrating that the actions are connected because each triggers others and because one cannot proceed without the others.

First, the QSA and the actions in it are connected—each triggers one or more actions that require EISs. *See* 40 C.F.R. § 1508.25(a)(1)(i) (2002). Unlike the situation in *Kleppe v. Sierra Club* where "[i]n the absence of a proposal for a regional plan of development, there is nothing that could be the subject of the analysis envisioned by" NEPA, 427 U.S. 390, 401 (1976), the QSA is "an agreement...[that] establishes a framework of conservation measures and water transfers within southern California." Implementation Agreement, Inadvertent Overrun and Payback Policy and Federal Actions, Colorado River Lower Basin, 67 Fed. Reg. 1988 (Jan. 15, 2002). "[T]he QSA sets forth the approved parameters of various water transfers and exchanges, including the conservation by IID of up to 300 KAFY for transfer to SDCWA, CVWD, and/or MWD. The QSA allocates the water to be conserved by the AAC and Coachella Canal lining projects. The QSA also incorporates a consensual limit by IID on its total Priority 3 diversions of Colorado River water at 3.1 MAFY." BUREAU OF RECLAMATION, DRAFT ENVIRONMENTAL IMPACT REPORT/ENVIRONMENTAL IMPACT STATEMENT AND HABITAT CONSERVATION PLAN, IMPERIAL IRRIGATION DISTRICT WATER CONSERVATION AND TRANSFER PROJECT, App. C 1-4 (2002), *available at* http://www.is.ch2m.com/iidweb/currents [hereinafter Transfer DEIS].

Secondly, the QSA cannot be implemented unless each QSA Action is also implemented, generating the need for a single EIS. 40 C.F.R. § 1508.25(a)(1)(ii). *See* QSA Art. 6.1, 6.2(2)(a). In some cases, the QSA action is a condition precedent to the QSA, in others, to another QSA action. As Reclamation has acknowledged, without the IA, there will be no QSA,

Reclamation reissued the Draft EIS for the lining of the Coachella Canal lining, with the purpose of updating the document to "incorporate updated information on the proposed project's physical, human, and regulatory environment,...and provide an opportunity for public comment on this new information."[40] Elements changed or updated include the "purpose and need" (to reflect the project's inclusion in the QSA); "affected environment" (to reflect current conditions of wetlands, phreatophyte, desert riparian, and marsh habitat along the canal, to revise the mitigation plan, to reflect changes in special status species and include survey data, to reflect reinitiation of consultation, and to explicitly address laws relating to cultural resources); "cumulative impacts" (to include a more current list of past, present, and reasonably foreseeable impacts, such as the QSA); and "environmental commitments."[41] As a closely related project, Reclamation must follow the same procedure with a suplemental EIS.[42] Lastly, the government of Mexico is very concerned about the impacts of the canal lining on its citizens and its environment. Approximately 10 to 12 percent of the recharge to the aquifer in the Mexicali Valley comes from canal seepage and is of better quality than other recharge. This could impact nearly 20,000 hectares of productive farmland in the Valley. According to the International Boundary and Water Commission (IBWC), seepage from the canal does not belong to Mexico.[43] Mexico may decide to legally

---

see, e.g., Implementation Agreement for Proposed Quantification Settlement Agreement, Lower Colorado River, 66 Fed. Reg. 14211 (Mar. 9, 2001). Or, without the IOP Policy, there is no QSA. *See* BUREAU OF RECLAMATION, IMPLEMENTATION AGREEMENT, INADVERTENT OVERRUN AND PAYBACK POLICY, AND RELATED FEDERAL ACTIONS, DRAFT ENVIRONMENTAL IMPACT STATEMENT, 2-22 (2002) ("The IOP is a condition precedent to the IA and QSA...."). Or, without the ISG, there is no QSA. *See* Transfer DEIS, *supra*, 1-31 (adoption of the ISG is a condition precedent to the QSA).

The same holds true in reverse: without the QSA, these projects will be difficult, if not impossible, to implement. *See* Tony Perry, *Water Deal Hits Snag on Effort to Save Salton Sea*, L.A. TIMES, Aug. 22, 2001, at B-6; Steve LaRue, *Quick OK Urged for Water from Imperial Valley*, SAN DIEGO UNION-TRIB., Aug. 11, 2001, at A-3; BUREAU OF RECLAMATION, REVISED AND UPDATED DRAFT ENVIRONMENTAL IMPACT STATEMENT/FINAL ENVIRONMENTAL IMPACT REPORT FOR COACHELLA CANAL LINING PROJECT, RIVERSIDE AND IMPERIAL COUNTIES, CALIFORNIA, 1-12 (2001) [hereinafter Coachella DEIS] (explaining that without quantification of the third priority QSA, it would be difficult to implement these water conservation and exchange programs in the Plan).

40. Coachella DEIS, *supra* note 39, at 1-1.

41. *Id.* at Attachment A.

42. Also, to comply with the California Environmental Quality Act, the Coachella Canal Draft EIS lists the revisions made to the previous draft. This suplemental EIS must do the same. CAL. CODE REGS. tit. 1, § 15088.5(2)(g).

43. BUREAU OF RECLAMATION, RECORD OF DECISION, *supra* note 7, at 7. The canal lining falls within the purview of a water treaty—Treaty Between the United States and Mexico Respecting the Utilization of Water of the Colorado and Tijuana Rivers and of the Rio Grande—and Minute 242 to the treaty. Resolution Six of Minute 242 requires Mexico and the

challenge the U.S. action.[44] Regardless, given the strained relationship between the two customarily friendly neighbors, the United States should consider reevaluating and redesigning this project.

An argument can also be made that lining the All-American Canal west of Drop 2 will recover relatively little water for U.S. agriculture and may reduce the flow of water into the Salton Sea. Most of the seepage water recovered in Mexico is pumped well to the east of these wetlands, from the section of canal between Pilot Knob and Drop 2.[45] Hence, relatively little of the seepage in the wetland stretch of the canal is used by Mexican agriculture. At the southern end of the wetlands in Mexico the Mesa Drain intercepts the water table and carries water westward to Mexicali.[46] Some of this water is redistributed for irrigation, but the drain also receives irrigation return flows and becomes too saline for reuse as it flows westward. Eventually most of the drain empties into the New River, which flows northward to the Salton Sea in the United States. The Salton Sea is currently approaching an ecological turnover point due to increasing salinity, and any diminution in water supply will exacerbate that problem.[47]

CONCLUSIONS

The All-American Canal currently supports a unique set of wetlands in Mexico, wetlands that combine characteristics of freshwater and saltwater marshes in addition to heavily vegetated dune habitat between lagoons. Our brief explorations show they provide valuable bird habitat; much more study is needed to define their role on the Pacific Flyway. As mentioned, the flow of subsurface water from the All-American Canal is to the southwest in this section. Hence, lining the canal to Drop 3

United States to consult with one another on matters related to groundwater that could affect the other party.

44. It is possible that Mexico could file a complaint with the IBWC. *See* Jeffrey Kishel, *Lining the All-American Canal: Legal Problems and Physical Solutions*, 33 NAT. RESOURCES J. 697, 711 n.61 (1993); Haley Nolde, *Canal Cutoff*, MOTHER JONES, May 30, 2001, *available at* http://www.motherjones.com/web_exclusive/features/news/canal.html.

45. Oyarzabal interviews, *supra* note 12.

46. *Id.* The mesa drain can be seen in Figure 2 between the wetland areas and the agricultural fields to the south.

47. *See* Jeffrey P. Cohn, *Saving the Salton Sea: Researchers Work to Understand Its Problems and Provide Possible Solutions*, 50 BIOSCIENCE 295 (2000). The need to keep flows to the Salton Sea constant is so serious that the proposed transfer of water from Imperial Irrigation District to San Diego may require that a compensating flow of water be provided to the sea. *See Hearing on H.R. 5123 Before the House Committee of Resources, Subcommittee on Water and Power*, 107th Cong. (July 25, 2002) (testimony of Tom Kirk, Executive Director, Salton Sea Authority), *available at* http://www.saltonsea.ca.gov/press/testimony/7-25-02.htm (last visited Nov. 20, 2002).

would presumably cut off the flow of water to over half of these wetlands. There appears to be legal justification to require a supplement to the original EIS, because the existence of these wetlands and bird habitat certainly constitutes significant new information regarding the environmental consequences of the lining project.

The Andrade Mesa Wetlands are extensive and provide high-quality bird habitat in an isolated part of the northern delta where replacement habitat is non-existent. The wetlands have presumably serviced birds on the Pacific Flyway since 1940, and perhaps since 1901 when the Alamo Canal was completed. Given the critical need for wetland habitat and the presence of endangered bird species in the Andrade Wetlands, we recommend that the overall wisdom of lining the canal in this section be reexamined.

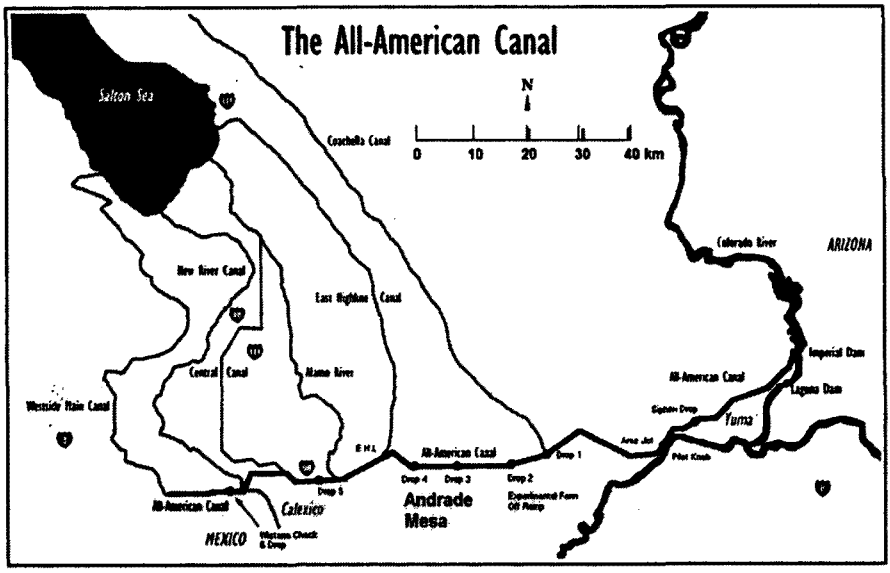

Figure 1. Map of the All-American Canal

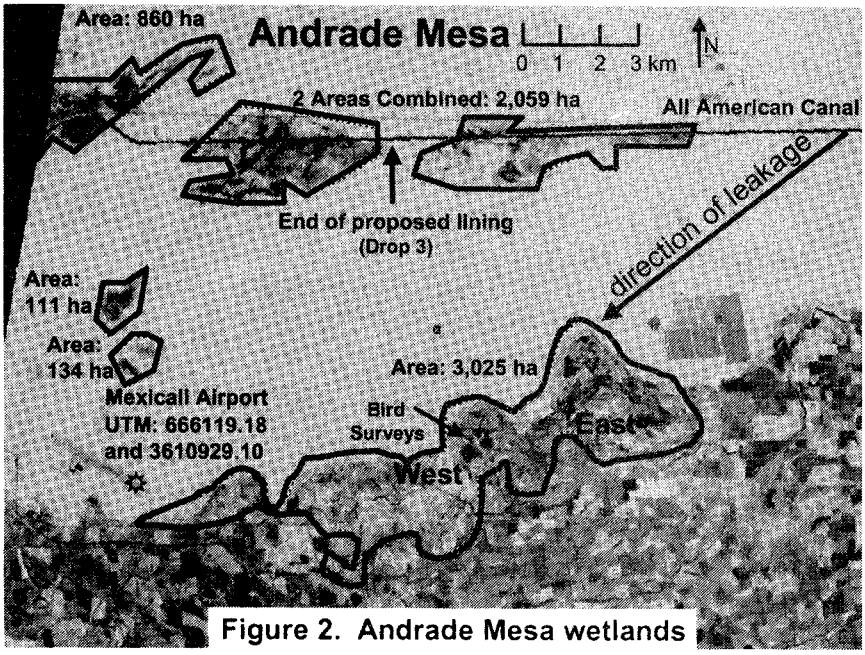

Figure 2. Andrade Mesa wetlands

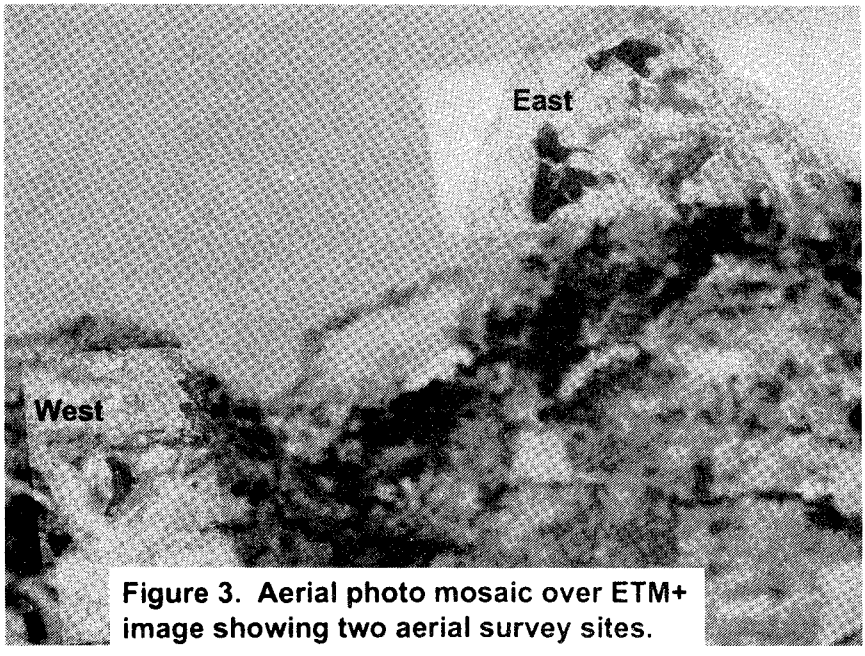

Figure 3. Aerial photo mosaic over ETM+ image showing two aerial survey sites.

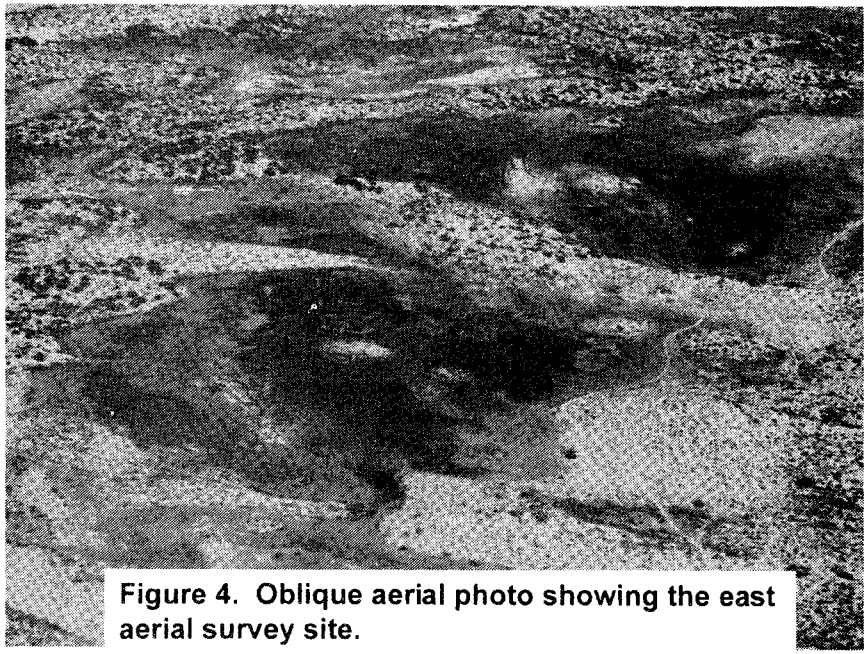

Figure 4. Oblique aerial photo showing the east aerial survey site.

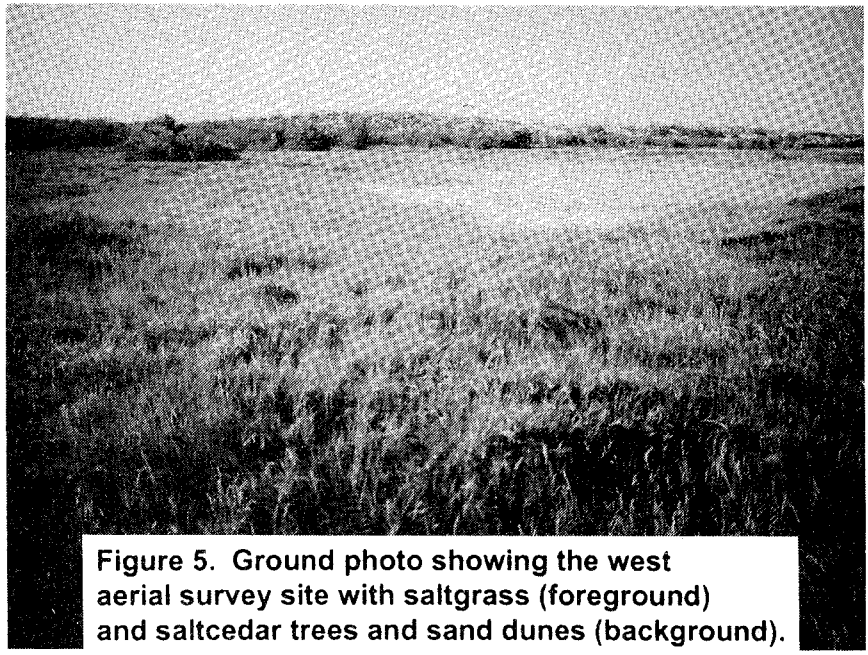

Figure 5. Ground photo showing the west aerial survey site with saltgrass (foreground) and saltcedar trees and sand dunes (background).

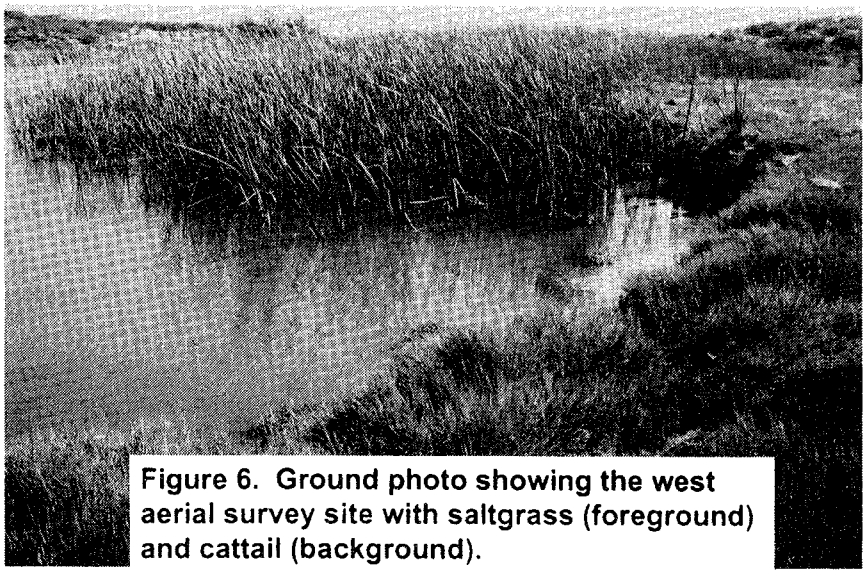

Figure 6. Ground photo showing the west aerial survey site with saltgrass (foreground) and cattail (background).