

GENERAL REEVALUATION REPORT AND
SUPPLEMENTAL ENVIRONMENTAL
IMPACT STATEMENT II:

RIO GRANDE FLOODWAY,
SAN ACACIA TO BOSQUE DEL APACHE UNIT,
SOCORRO COUNTY, NEW MEXICO

APPENDIX D

**Final Supplemental Environmental Impact
Statement, Rio Grande Floodway, San Acacia
to Bosque del Apache Unit, Socorro County,
NM (July 1992)**

**FINAL
SUPPLEMENTAL ENVIRONMENTAL
IMPACT STATEMENT**

RIO GRANDE FLOODWAY



**San Acacia to Bosque del Apache Unit
Socorro County, NM**



**US Army Corps
of Engineers**
Albuquerque District

JULY 1992

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FINAL
SUPPLEMENTAL ENVIRONMENTAL
IMPACT STATEMENT

RIO GRANDE FLOODWAY
SAN ACACIA TO BOSQUE DEL APACHE UNIT
SOCORRO COUNTY, NEW MEXICO

U.S. ARMY
CORPS OF ENGINEERS
ALBUQUERQUE DISTRICT

July 1992

**FINAL
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT**

Rio Grande Floodway
San Acacia to Bosque del Apache Unit
Socorro County, New Mexico

The responsible lead agency is the U.S. Army Engineers District, Albuquerque.

Abstract. The Supplemental Environmental Impact Statement addresses the perceived effects of alternative plans developed to provide higher levels of flood protection to floodplain communities, development, and wildlife habitat from flood flows in the Rio Grande, extending from San Acacia, New Mexico, to the headwaters of Elephant Butte Reservoir. Also evaluated is the no action alternative. These alternatives consist of four levels of flood protection (50-, 100-, 200-year and Standard Project Flood) which would be provided by reconstructing an existing earthen embankment that parallels the west bank of the Rio Grande to form a structurally superior levee. The recommended level of flood protection is the 100-year frequency level. The length of the reconstructed levee would be about 54 miles. The construction of a protective levee was authorized by the Flood Control Act of 1948 (Public Law 80-858).

The recommended plan would provide a high degree of flood protection to life and property in the Socorro area, to the low-flow conveyance channel, and to Bosque del Apache National Wildlife Refuge (NWR). The project is designed to minimize the removal of riparian vegetation from the riverward side of the levee. Unavoidable removal of salt cedar, cottonwood, and willow trees would be compensated, as would the filling of a small acreage of wetland. A lower level of flood protection would generally lower the degree of project effects while higher levels of protection, especially the Standard Project Flood, would correspondingly expand project effects. Impacts to endangered wildlife utilizing Bosque del Apache NWR and vicinity would be avoided by scheduling construction of certain levee segments during their absence and close coordination with monitoring personnel. Any cultural resources potentially affected by project construction would be avoided or salvaged.

SEND YOUR COMMENTS TO THE
DISTRICT ENGINEER BY _____

For additional information
PLEASE CONTACT:

Mr. Mark Sifuentes
U.S. Army Corps of Engineers
Albuquerque District
P.O. Box 1580
Albuquerque, NM 87103
(505) 766-3577

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36. Comment 36 continued.

36. The precise location detail that is requested is not normally provided in an Environmental Impact Statement. An Environmental Impact Statement has never been intended as the forum for presentation of detailed technical data, but rather as a concise document used to plan actions, make decisions, and inform the public of the rationale used in formulation of alternatives and the analysis of associated effects. The plant communities and associated wildlife that were described in the draft SEIS were based on vegetation surveys and studies done in the middle Rio Grande valley (both field survey and literature review). In addition, areas that would be affected or possibly affected were defined in the field, together with the Fish and Wildlife Service. This level of analysis was considered highly sufficient to analyze the major effects of the recommended plan and associated alternatives. The draft SEIS recognized that as design features were refined, the level of impact analysis would also be refined. This document reflects this refined analysis. Effects of levee rehabilitation on riparian vegetation were analyzed at 264-foot intervals along the planned levee alignment, except on Bosque del Apache, where one-tenth mile increments were used.

37. The impact statement should provide an acceptable standard to determine the adequacy of mitigation over time. Specifically, we recommend that all mitigation dealing with reestablishment of mature riparian communities be directed toward ensuring 80 percent survival of vegetation 5 years hence.

As stated on page 70 (paragraph 5.04) of the document, a major benefit of the recommended action is increased protection to the low-flow conveyance channel and its water conveyance and salvage functions. Indeed, the benefits of that protection alone account for approximately 75 percent of the total benefits accrued to the proposed project. The primary function of the low-flow conveyance channel is the removal of all low flows from the natural river bed for transport downstream. For these reasons, we view the proposed project and the potential to once again dewater the Rio Grande downstream from the San Acacia diversion dam as inextricably linked. The discussion of those secondary, or indirect, impacts of the project must be included in the impact statement.

38. We believe that, in order to be a complete analysis of impacts, the document should be expanded to address these secondary impacts of operation of the low-flow channel in relationship to the increased commitment of state, local, and Federal agencies to conserve the high natural resource values of the Rio Grande corridor. The specific and very real threats to the river's ecosystem of developmental pressures, habitat fragmentation, and lack of regeneration to replace senescent trees, do not appear to have been addressed in the consideration of impacts for this proposed project. Incorporation of such goals as diversification of present flood control and water conveyance purposes to encourage regeneration of the cottonwood-dominated riparian forest, wetland restoration, vegetation management, and biological diversity; improvement of aquatic habitat, and the increase of public awareness of the significance and ecological and cultural values of the river corridor would greatly enhance the impact statement.
39. During a September 26, 1990, meeting with the Army Corps of Engineers and other interested agencies, the Town of Socorro expressed an interest in identifying areas along the riverine corridor (including the Rio Grande floodway and levee) to serve as "greenways." We are supportive of this concept. However, before a commitment in the SEIS to a "greenway" can be made, the issue and identification of who, or what authority will provide the funding for O&M, administration, and management of these areas for public use must be determined. Additionally, since public access would be permitted and encouraged, the issue of Government liability must be fully addressed and resolved prior to finalizing the SEIS. Finally, the proposed greenways themselves and public accessibility must be compatible with requirements to maintain the levee and floodway.
40. We are concerned about the criteria utilized in determining relative values of existing vegetative habitats for selection of borrow areas. On page 14, the greatest value is attributed to mature native habitats while early growth stages of the same native habitat is considered a suitable borrow selection site. These young stands are very important as they will one day replace mature senescent stands. The major objective of avoidance of the more mature cottonwood- and willow-dominated plant communities to focus

37. Current research and experience with re-establishment of native riparian vegetation is not sufficient to develop standards for establishment. Ongoing re-establishment programs by the Service, Bureau of Reclamation, and the Corps are being monitored and this information will be used to provide the highest establishment rate possible. Density of plantings will assist in achieving an establishment goal.

38. This statement reflects a misunderstanding of the purpose of the recommended plan, the purpose of the low-flow conveyance channel, and the current condition of the conveyance channel. As stated, the purpose of the proposed project is to provide a higher level of flood protection to floodplain developments than the current spoil bank levee (or embankment). Protected development does include the conveyance channel and its function to minimize water transmission losses by diverting flows up to 2,000 c.f.s. from the Rio Grande. Protection of this facility is a major project benefit. However, the proposed action has no "potential to once again dewater the Rio Grande downstream from the San Acacia diversion dam..." The reason the conveyance channel has not been in operation for several years is because of ongoing repair, both of the conveyance channel proper and the spoil bank levee. This repair is needed to remove extensive sedimentation caused by high water storage in Elephant Butte Reservoir and to reconstruct breaks in the spoil bank levee caused by flood flows in the Rio Grande. Operation of the conveyance channel will resume once repairs are made - independent of the planned action. A reconstructed, engineered levee would appreciably reduce the potential for levee failure and associated damage to the conveyance channel from the Rio Grande. Relevant discussions in the draft SEIS have been refined in this document to reflect these facts.

39. This final SEIS has been expanded to include a discussion of an Initiative began by Senator Pete Domenici since public review of the draft SEIS to develop measures to "perpetually protect and wisely manage" the resources of the Middle Rio Grande corridor. Many of the goals of the planned action are shared by the Initiative - a reasonable parallel, since the Corps assisted in the development of the Initiative. Consistent with the added discussion of the Initiative, this document addresses the inter-relationship of the proposed action and alternatives with the Initiative. However, this EIS will not be the forum for an exhaustive discussion of the environmental effects of the low-flow conveyance channel. The effects of this facility are reflected only to the extent that they are related to the planned action - directly, indirectly, and cumulatively.

40. The Corps' participation in the development of a "greenway" in the Socorro area would consist of assisting in the identification of potential areas for greenway establishment, incorporating features (access ramps, gates, parking, etc.) into levee design that would contribute to the greenway plan, possible wetland creation, and construction of cost-shared (50/50) recreation facilities (e.g., trails). The O&M administration and management of these areas and facilities, including associated funding, would be the responsibility of the local sponsor (who may work with another governmental agency). This extent of Corps' participation is reflected in this document. Concur that the greenway development must be compatible with requirements to maintain the levee and floodway.

41. As reflected in the draft SEIS, wildlife use of the various community/structure types was based on many riparian studies, primary among which was Hink and Ohmart and Rait, et al.. These two studies are most pertinent to this reach of the Rio Grande. Some areas with young cottonwood were selected as candidate

Comment 41 continued.

borrow areas above Tiffany not only because of their low wildlife use, but because of the ability to rapidly restore or enhance their growth stages by revegetation with cottonwood and willow poles...Also, the potential for natural revegetation would still exist. Since the need for borrow areas above Tiffany has largely disappeared, no disturbance in previously proposed borrow areas would occur.

impacts on open, sparsely vegetated areas and early growth stages would save old stands, but would accomplish nothing for early seral stages or natural regeneration processes. By including no action that would increase opportunities for seed bed creation and seed germination, the proposal would limit future riparian communities to merely survivors of the construction and "one-shot" mitigation operations. "Open" areas should be described in more detail. These could consist of saltgrass meadow openings which constitute some of the rarer habitat types in the entire riparian system. However, the impact statement provides insufficient information to judge.

42. Although the document repeatedly states that impacts to the river itself would not occur (see our comment No. 5 regarding secondary impacts), it does refer to construction in the river bed. All necessary steps should be taken to ensure the survival of diminishing populations of aquatic life native to the river. Of primary consideration should be the Rio Grande silvery minnow (*Hybognathus amarus*).
43. We believe that, as they are phrased, the references to the required compatibility determination on the Bosque del Apache Refuge are somewhat misleading (page 23, (12)(c); page 30, Table 5; page 50, 1st incomplete paragraph). As indicated in coordination meetings with your staff, the Service has not yet completed an assessment of compatibility; they were awaiting project details to be provided in this document. As indicated in the comments provided, they will require further and more detailed information on vegetative impacts of levee construction, borrow site development, and spoil disposal prior to assessing compatibility of your proposal with the purpose for which the Refuge was established.
44. It is somewhat disturbing to note that, although this project would entail continuing annual funding and staff for operation and maintenance of the levee, mitigation is only considered on a one-time basis. Commitment to continued maintenance of riparian communities required to mitigate habitats destroyed or degraded through project construction and operation is considered essential.

SPECIFIC COMMENTS

45. Summary page, 2nd Paragraph: Is the figure 171 acres inclusive of the 46 acres discussed in the succeeding sentence?
46. Page 12, Item (e): The figures 3.0 to 3.5 acres of disturbance on the Bosque del Apache National Wildlife Refuge (Refuge) do not reflect the 22 acres discussed on page 14. The discussion of 3.0 to 3.5 acres of disturbance should be clarified to indicate disturbance caused by specific construction actions as opposed to borrow or spoil areas.
47. Service reconnaissance of the current levee right-of-way on the Refuge indicates that the 3.0 to 3.5 acres of impacted vegetation estimated in this document is unrealistic and should be expanded. Based on that reconnaissance, we question the accuracy of the quantification throughout

42. Since more refined design has largely eliminated the need for borrow on disposal sites near the river, no direct or indirect impact on the silvery minnow should occur.

43. Since a Compatibility Determination has been provided by the U.S. Fish and Wildlife Service, this wording is no longer necessary and has been removed.

44. Part of the rationale developed by the U.S. Fish and Wildlife Service and the Corps for putting much of the mitigating on Bosque del Apache NWR was to include mitigation as part of an ongoing maintenance program. Its incorporation into an ongoing program would have reduced maintenance costs while maximizing benefits (for the Refuge also). However, maintenance of established mitigation areas outside of Bosque del Apache NWR would be made an O&M requirement.

45. (This comment addresses the Abstract rather than the Summary). Yes. This final SEIS reflects revised acreage figures as well as improved sentence clarity.

46. Correct. The 3.0 to 3.5 acreage figure was specific to edge disturbance as well as salt cedar. Correspondingly, the 22 acres discussed on page 14 (and elsewhere) of the draft SEIS was discussed under the heading of "Fill and Borrow Requirements." The material was in the format suggested.

47. A detailed assessment (one-tenth mile intervals) of the amount and composition of vegetation that would be lost on Bosque del Apache NWR as a result of the project, showed that 3.47 acres of vegetation, primarily salt cedar, would be lost due to project construction. An additional acre was added as a buffer to compensate for any unforeseen losses. This assessment was jointly accomplished by Refuge and Corps' personnel. The refined figure demonstrates that the original assessment and estimate were accurate.

the proposed project area. Additionally, the impact statement categorizes this acreage as salt cedar vegetation. It is our observation that much of the levee toe vegetation on the Refuge that would be impacted consists of desirable cottonwood, black willow, and associated understory species in varying stages of maturity.

48. Page 14, Item 2(a): The discussion within the first three sentences is unclear. If the project total is 7,300,000 cubic yards, 90 percent of this figure is 6,570,000 cubic yards. The remaining 10 percent of this total would be 730,000 cubic yards - the 3,848,000 figure of the next sentence far exceeds this 10 percent figure.

The addition of the specific cubic yardage figures in this paragraph sums to 2,835,000. This figure coincides with neither the 3,848,000 figure listed in this paragraph nor the figure of 2,848,000 in Table 2, page 15.

Addition of the acres needed for borrow areas discussed in this paragraph yield a total of 219 - this conflicts with the figure of 272 acres in Table 2, page 15.

49. Page 15, 1st paragraph: The total of 221 acres for borrow areas (171 from riparian zones and 50 from upland terraces) does not agree with either the 219 acres on page 14 or the 272 acres in Table 2.
50. Page 22, 1st paragraph: The discussion provided in this paragraph confuses riparian restoration techniques with moist soil management. The latter is a very different management action aimed at producing natural wetland foods for wildlife.
- We recommend that this paragraph be deleted.
51. Page 46, (2) Land Ownership: The Bureau of Land Management administers considerable acreage in Socorro County and should be included in this discussion.
52. Page 48, Footnote: This should be corrected to state that the Refuge is managed for migratory birds rather than waterfowl.
53. Page 62, Items (b) (1) and (2): Refuge data indicated that white-faced ibis and ferruginous hawk occurrences are more common and populations larger than indicated here.
54. Page 63, Item (9): The Bosque del Apache Refuge is currently considering an investigation of the distribution, abundance, and habitat needs of the meadow jumping mouse. It may be possible to expand the research with Corps of Engineers funding to address the project area.

48. Confusion resulted from the fact that 9,124,000 cu. yds. should have been used rather than 7,300,000 cu. yds. The former figure is the uncompacted volume, the latter figure is the compacted, in place, volume. Also, the amount of required borrow should have been 2,848,000 cu. yds, not 3,848,000 cu. yds. - a regrettable typographical error. Refined quantities are presented in this document.

49. The acreages stated in the draft SEIS are correct. When adding separate acreage figures, the excavation depth (in parenthesis to the right of the given acreage) must be taken into consideration - especially the 50-acre figure used for borrow from the terraces. Fifty acres are required for an excavation depth of 13.5 feet. Twice this area, 100 acres, are necessary for an excavation depth of 6.5 feet. This document reflects refinements to these figures.

50. Concur.

51. This paragraph has been modified to include the Bureau of Land Management, as well as other Federal land administrators.

52. The wording has been changed.

53. Additional data supplied by Bosque del Apache NWR has been included.

54. The possibility of a joint investigation of the distribution, abundance, and habitat needs will be coordinated with Bosque del Apache NWR. Multiple agency participation in studies maximizes data collection while lowering individual agency costs.

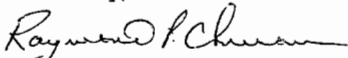
SUMMARY COMMENTS

In summary, we recommend that the Draft Supplemental Environmental Impact Statement be revised to:

- 55. a. specify impact areas and quantify all analyses of impacts and effects.
- 56. b. correct identified discrepancies of acreage figures for all impacts.
- 57. c. commit mitigation efforts to all areas throughout the proposed project area, not just the Bosque del Apache Refuge.
- 58. d. discuss the relationship and possible conflicts of the proposed action with increased commitment of resource agencies to conserve and enhance the resources of the Middle Rio Grande corridor.
- 59. e. provide adequate information of sufficient detail to the Fish and Wildlife Service for use in determining the compatibility of the proposed project with the purposes for which the Bosque del Apache Refuge was established.

If the above concerns are adequately addressed, we believe the final statement will satisfactorily describe the existing resources of the project area and the expected impacts that would be realized by the proposed activities.

Sincerely,



Raymond P. Churan
Regional Environmental Officer

55. The refined design features reflected in this document will correspondingly define affected areas and quantify effects.

56. The final SEIS reflects refined project design and data.

57. This change in the position of the Fish and Wildlife Service from what was expressed to the Corps during plan formulation is agreeable.

58. Concur.

59. This recommendation has been accomplished with the Service's issuance of a Compatibility Determination to the Corps.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6

1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202-2733

OCT 15 1990

Mr. Mark S. Sifuentes
Albuquerque District
U.S. Army Corps of Engineers
P.O. Box 1580
Albuquerque, New Mexico 87103

Dear Mr. Sifuentes:

In accordance with our responsibilities under Section 309 of the Clean Air Act, the National Environmental Policy Act (NEPA), the Council on Environmental Quality Regulations for Implementing NEPA, and Section 404 of the Clean Water Act, the Region 6 Office of the U.S. Environmental Protection Agency (EPA) has completed its review of the Draft Supplemental Environmental Impact Statement (SEIS) for the proposed levee rehabilitation project planned to increase security for communities and human welfare, water conveyance facilities, and the Bosque del Apache National Wildlife Refuge from flood flows within the Rio Grande, extending from San Acadia, New Mexico, to the upper reaches of Elephant Butte Reservoir.

This enhanced flood protection would be achieved by rehabilitation of the existing levee embankment that parallels the west side of the Rio Grande with a designed, competent levee, capable of containing the 100-year flood event. The existing earthen levee will be removed and rebuilt. The levee will be approximately 73 feet wide at the base and 16 feet high having a trapezoidal cross-section with 1V:2.5H side slopes.

The majority of the levee rehabilitation work will be outside waters of the United States and not subject to regulation under the Clean Water Act. For those areas of unavoidable impact, mitigation is provided which includes revegetation of disturbed areas and expansion of old and creation of new wetland habitats. Coordination has been performed with the U.S. Fish and Wildlife Service under both the Fish and Wildlife Coordination Act and Section 7 of the Federal Endangered Species Act. The Service has concluded that the project with the proposed mitigation measures should adequately minimize and compensate unavoidable environmental impacts.

60. We classify your Draft SEIS as Lack of Objections (LO). Specifically, we have no objection to the levee rehabilitation project as proposed. Sufficient screening has occurred to insure environmental impacts will be avoided, minimized, and properly mitigated where unavoidable.

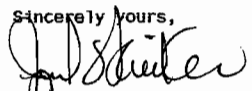
60. No response required.

Our classification will be published in the Federal Register according to our responsibility to inform the public of our views on the proposed Federal

actions, under Section 309 of the Clean Air Act.

We appreciate the opportunity to review the Draft SEIS. Please send our office one copy of the Final SEIS at the same time it is sent to the Office of Federal Activities, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460.

Sincerely yours,



Robert E. Layton Jr., P.E.
Regional Administrator



GOVERNOR
GARREY CARRUTHERS

DIRECTOR AND SECRETARY
TO THE COMMISSION
BILL MONTOYA

State of New Mexico



DEPARTMENT OF GAME AND FISH

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October 16, 1990

Lt. Colonel Steven M. Dougan
Albuquerque District Engineer
U. S. Army Corps of Engineers
P. O. Box 1580
Albuquerque, New Mexico 87103-1580

Dear Colonel Dougan:

61. The Department of Game and Fish (Department) has reviewed the Section 404 permit application (NM-OYT-0631) by the Army Corps of Engineers (ACOE) for authorization to construct and rehabilitate 55 miles of levees between the Rio Grande and the Low Flow Conveyance Channel (LFCC) from San Acacia to Elephant Butte Reservoir in Socorro County. Fills associated with the project are proposed to be placed in the Rio Grande channel, the old LFCC, adjacent wetlands and in Elephant Butte Reservoir. The stated purpose of the project is to provide protection against the 100-year frequency flood to the city of Socorro, rural transportation, irrigation facilities, the Bosque del Apache National Wildlife Refuge (NWR) and the LFCC operated by the Bureau of Reclamation. The Department has also reviewed the ACOE's draft Supplemental Environmental Impact Statement (SEIS) for the Rio Grande Floodway, and our comments are based on the information provided in that document.
62. The Department has had little input in the development of the levee project. Attached are our February 17, 1989 comments on the draft Fish and Wildlife Coordination Act Report for this project. In neither the final Coordination Act Report by the U.S. Fish and Wildlife Service (USFWS) or in the draft SEIS are
63. the Department's concerns fully addressed. The issue of mitigation has been apparently settled between the ACOE and the USFWS with most mitigation measures accruing to Bosque del Apache NWR's "ongoing program of replacing monotypic stands of salt cedar with native riparian species" (p. SEIS 19). Successful re-establishment of the native vegetation is beneficial to wildlife; however, funding by the ACOE of operation and maintenance costs on the refuge does not mitigate habitat loss from the levee project, it only accelerates an existing program.

61. Although the Department of Game and Fish (Department) cites the Corps' Section 404 Permit Application under the Clean Water Act, a majority of comments made are in response to the draft SEIS; therefore, these comments are included as part of the final EIS.

62. The Corps of Engineers has relied heavily on the joint coordination of the Department and the U.S. Fish and Wildlife Service through the Fish and Wildlife Coordination Act. However, this dependence on a combined response does not relieve the Corps of its responsibility to insure that the Department has direct input into project formulation. Subsequent to field-level review of the draft SEIS, meetings were held with Department representatives on October 23 and November 5, 1990, and January 5, 1991. Concerns expressed at these meetings have been considered in project plans and are reflected in this document.

63. The location of sites for mitigation is flexible, consistent with good management of public funds. A recent change in the position of the Fish and Wildlife Service not to necessarily put a majority of mitigation features on Bosque del Apache NWR has resulted in their relocation in the riparian zone.

- 64. The Department requests that areas outside of the refuge be purchased, protected and/or enhanced as habitat for fish and wildlife. The success of the proposal to create higher value in existing wildlife habitat on the refuge is speculative and at best, may only meet the habitat requirements of those wildlife species targeted by the refuge. The justification for mitigating on the refuge (pp. SEIS 19-20) highlights the need for additional protection of wildlife habitat outside of the
- 65. refuge boundaries. The entire Rio Grande corridor should be emphasized for protection and management, not just the convenient areas already managed.

Flood protection for the Bosque del Apache NWR is stated as a justification for the levee project throughout the SEIS. In fact, flooding at the refuge is described as a potential

- 66. biological disaster (p. SEIS 71). The Department does not agree with this scenario, especially since waterfowl, cranes and other wildlife derive benefit from flood events. An active floodplain and its vegetative expression are the reasons why the high concentration of wildlife is found along the Rio Grande and on the refuge.
- 67. The greatest biological impacts will occur upon completion of the levee project, when the LFCC is in full operation. The SEIS on page 26 states, "A major objective of levee reconstruction is to provide higher degrees of flood and associated sediment production to the low-flow conveyance channel, thereby providing higher levels of insurance that its critical water salvage and delivery functions are maintained."
- 68. Although these are associated projects, no discussion of the long-term or cumulative impacts derived from these projects are discussed. The National Environmental Policy Act and the Council for Environmental Quality regulations require the incorporation of related actions into one impact statement [40 CFR 1502.4(a), 1508.7, 1508.25(a)]. Issues associated with the combined projects are the periodic drying up of the Rio Grande, elimination of aquatic habitat diversity, the loss of recently developed wetlands and the establishment of a 55-mile barrier to terrestrial wildlife movement across the floodplain.

The above issues, and those found in the attachment, need to be addressed by the ACOE. Until these issues can be resolved, the Department cannot support the Rio Grande Floodway Levee Project as it has been presented in this permit application.

Sincerely,



Bill Montoya
Director

BM/CSP/mlm
Att.

64. This request is consistent with refined mitigation objectives and plans. Elements of this request will likely be implemented.

65. Concur. The Corps supports this goal and is a partner in promoting its protection, conservation, and enhancement. The recently recommended project can make some small contribution toward this goal, but it is of such magnitude that only a coalition of parties can begin to handle its implementation.

66. Concur that waterfowl, cranes, and other wildlife can benefit from flooding. However, Bosque del Apache NWR is a highly developed facility, having an extensive irrigation and water delivery system, appreciable cropland, and numerous ponding areas. The time and monetary expenditures in constructing and maintaining these systems is appreciable and a significant part of the wildlife value of the Refuge is dependent on water delivery and management. As stated in the draft SEIS, the sedimentation that accompanies major flooding events could seriously impair Refuge operations and wildlife benefits, requiring significant expenditure of funds to restore the function of this facility.

67. Reconstruction of the spoil bank levee and resumed use of the low-flow conveyance channel are not related. The conveyance channel has not been used for several years due to its filling with sediment at its terminal end, which was caused by high water storage at Elephant Butte Reservoir. Resumed operation will occur with or without levee reconstruction.

68. The projects are associated to the same degree that every other development (and person) in the 100-year floodplain is, i.e., the reconstructed levee will provide a higher level of protection from large magnitude flood flows in the Rio Grande. This protection will preserve development, life, and normal functions, and conserve the tremendous cost of repairing flood damage. The continued presence and function of the conveyance channel is not dependent on the project. The project would serve to save the tremendous costs of restoring the function of the conveyance channel should flood waters enter the channel, as well as maintaining water deliveries required by the Rio Grande Compact and the 1906 treaty with the Republic of Mexico.

The association of levee rehabilitation with the low-flow conveyance channel and the cumulative and long-term effects of this association are reflected in this final SEIS.

GOVERNOR
GARREY CARRUTHERS

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DELL CITY, TX

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ALBUQUERQUE

November 26, 1990

Lt. Colonel Steven M. Dougan
Albuquerque District Engineer
U.S. Army Corps of Engineers
P.O. Box 1580
Albuquerque, New Mexico 87103-1580

Dear Colonel Dougan:

This letter serves to summarize the comments of the Department of Game and Fish as discussed in the two meetings conducted by your staff regarding the Draft Supplemental Environmental Impact Statement for the Rio Grande Floodway. These meetings, held on October 23 and November 5, 1990, were also attended by the New Mexico Environment Improvement Division and U.S. Fish and Wildlife Service, respectively. These comments are provided to support and further clarify those issues presented in our October 16, 1990 correspondence.

69. **Additional alternatives should be evaluated.** Recommended are measures that address just the "weak points" in the levee, not total levee reconstruction. Weak point analyses should include 25, 50, 75 and 100-year flood protection increments. Also, these actions could be incorporated with zoning measures to provide added long-term protection in development areas. The benefits of weak point and non-structural flood control measures include less physical and biological disturbance, and are more cost effective.

70. **Minimize width of levee wherever rehabilitated and realigned.** This was proposed in the DEIS; however, the ACOE has since proposed spoiling excess levee material adjacent to the levee in those locations previously occupied by the wider structure. The placement of the spoil material adjacent to the levee is opposed by the Department. The unconsolidated spoil material will have the potential to erode into the Rio Grande floodplain during flood events if placed east of the levee. Also, the potential of a narrower levee to provide additional

69. The Corps is required, by regulation, to examine alternatives which provide various levels of flood protection and select the plan which provides the greatest net benefit. For this project, the 100-year level of protection provides the greatest net benefit. The entire existing embankment was examined for areas which may be adequate to provide this level of protection and not require rehabilitation. It was determined the entire length needed some type of reconstruction; however, most of the reconstruction is only a partial removal and replacement of the existing landside embankment. This was done in an effort to minimize impacts to the riverside slopes of the existing levee.

70. The refined design retains a significant amount of vegetation that is on the riverside slope for approximately 44 of the levee's 54.3 miles. The disposal of surplus earth on the riverward sideslope of the reconstructed levee and adjacent to the riverward levee toe to form a riverbank were two of several possible disposal sites discerned in the draft SEIS (page SEIS-16, third paragraph). These sites would have been limited in extent and located only where no vegetation existed. Also, protection against scouring would have been provided by planting native riparian vegetation. Since more refined design accommodates surplus material as an integral part of the levee, the reason for this concern no longer exists.

November 26, 1990

- area for bosque development (a benefit given in the DEIS) will not be realized. It is incumbent upon the ACOE to minimize the detrimental biological impacts whenever the opportunity exists. This is particularly relevant to
71. this project, the goal of which is to protect and perpetuate the operation of the Low Flow Conveyance Channel which has significantly impaired the biological integrity of the Rio Grande and its floodplain.
 72. **All staging and temporary spoil storage areas need to be identified.** Inherent in the method of reconstructing the levee in one mile increments is the development of temporary areas of storage and equipment access. These areas can be significant depending upon the habitat, acreage and duration of impact.
 73. **Long-term monitoring and maintenance of mitigation measures need to be incorporated into the project.** This is especially important for revegetation and artificial wetland creation. The uncertainties of climate, flow regimes and anthropogenic influences mandate establishing a contingency for mitigation failure during the life-time of the levee. Contingency planning and costs should be incorporated within the operation and maintenance program for the levee.
 74. **Mitigation actions should be employed along the length of the levee and as close to site impacts as feasible.** Situations may exist whereby this will not be possible and off-site mitigation will be required. The Department will continue to work with the ACOE and USFWS to locate suitable mitigation sites. Also, non-structural mitigation measures such as conservation easements need to be explored. Measures that protect and enhance the Rio Grande corridor will provide greater long-term benefits.
 76. **Include an evaluation of the Low Flow Conveyance Channel (the primary beneficiary) as it relates to this project.** Again, this is required under NEPA for related or synergistic projects. The cumulative impacts of the two projects, both for the near and long-term, need to be presented.

Please contact Chris Pease (827-9907) of this office should you have any questions or require further coordination.

Sincerely,



Bill Montoya
Director

BM/csp

A-22

71. The objective of the project is to provide a higher level of flood protection to development and life in the 100-year floodplain. The low-flow conveyance channel is a major feature that would be protected, as is Bosque del Apache NWR. However, the continued functioning of the conveyance channel is not dependent on the project. The project would save the expenditure of large sums of money to restore the channel in the event a large flood event breached the existing spoil bank, as well as preventing the interrupted delivery of water to downstream owners as required by law. Continued operation of the conveyance channel is an institutional concern. These facts are reflected in this document.

72. Temporary storage areas for earth (fill or excess) should be accommodated within the construction area between the conveyance channel and the edge of the riparian zone. No areas within the riparian zone are envisioned. Staging areas may be located within the construction zone or the contractor may, at his discretion, select areas west of the conveyance channel that are privately owned. Since the contractor may elect to find his own staging area, identification of these areas is not possible.

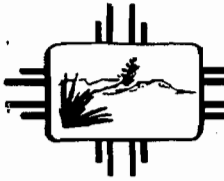
73. Concur that monitoring and maintenance of mitigation measures should be an integral part of the project. Therefore, the maintenance of established mitigation measures will be made an operation and maintenance requirement.

74. A change in the position of the Fish and Wildlife Service regarding the use of Bosque del Apache NWR for a majority of mitigation measures and subsequent meetings has resulted in a combined decision to locate most mitigation measures within the riparian zone and as close to the area affected as feasible.

75. The purchase of land south of Bosque del Apache NWR, or purchase of conservation easements, or both, and incorporation into the Refuge would enhance the wildlife value of the Refuge, as well as increasing its management flexibility. However, under the current administration, the purchase of land for mitigation is not encouraged if other options are available that avoid the taking of land. Further discouraging land purchase is the complex land ownership below the Refuge. Conservation easements above the Refuge holds promise and this measure has been included as an objective of the mitigation plan.

76. Please refer to response number 71.

A-22



New Mexico Health and Environment Department

GARREY CARRUTHERS
Governor
DENNIS BOYO
Secretary
MICHAEL J. BURKHART
Deputy Secretary
RICHARD MITZELFELT
Director

CERTIFIED MAIL # P 612 425 408
RETURN RECEIPT REQUESTED

16 October 1990

Mr. Mark R. Andrews
Albuquerque District Corps of Engineers
P.O. Box 1580
Albuquerque, NM 87013

SUBJECT: Water Quality Certification for Activity Proposed Under Permit
Application No. NM-OYT-0631, Dated August 17, 1990

Dear Mr. Andrews:

Pursuant to section 401(a)(1) of the federal Clean Water Act, the Surface Water Quality Bureau has examined an application from the Army Corps of Engineers for State certification of a section 404 permit to place dredged material into the mainstem of the Rio Grande and Elephant Butte Reservoir. The proposed project is located in Socorro County, on the Rio Grande mainstem the project extends for 55 miles from the San Acacia Diversion works to the head of Elephant Butte reservoir and within the reservoir at the mouth of Milligan Gulch. The proposed project involves rehabilitation of existing spoilbank levees and reconstruction of 4.8 miles of levees below the maximum water surface of Elephant Butte Lake. The stated purpose of the project is to provide protection against the 100-year frequency flood event.

The Bureau has determined that the proposed project is located in segments 2-105 and 2-104 of the Rio Grande Basin as described in the "Water Quality Standards for Interstate and Intrastate Streams in New Mexico as Amended Through March 8, 1988". Designated uses for which the mainstem is protected include irrigation, limited warmwater fishery, livestock and wildlife watering and secondary contact recreation. Elephant Butte reservoir is protected for irrigation storage, livestock and wildlife watering, primary contact recreation and warmwater fishery.

- ENVIRONMENTAL IMPROVEMENT DIVISION -
Harold Runnels Building
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

A-23

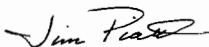
A-23

Mr. Mark R. Andrews
16 October 1990
Page Two

The Bureau has reviewed the description of the proposed activity and is concerned that, as proposed, this activity may adversely affect surface water quality to an extent which will impair the fishery and primary contact recreation designated uses. This concern is due to potential and likely exceedances of State water quality standards at section 2-102.A., 2-102.J. and 2-104.B. Information was not presented on methods or techniques which will be used to limit sedimentation and turbidity during construction. Under authority delegated to the Environmental Improvement Division by the New Mexico Water Quality Control Commission, the State of New Mexico finds that this discharge, as proposed, will not comply with any or all of the applicable provisions of the federal Clean Water Act (i.e., sections 301, 302, 303, 306, or 307) and with appropriate requirements of State law. The State of New Mexico therefore issues section 401 certification for application NM-OYT-0631 on a conditional basis subject to our later review and approval of the following items which are specifically included in this certification: 1) The Corps shall develop a plan to limit stream bottom alteration due to sedimentation resulting from the filling operations, 2) The Corps shall develop a water quality monitoring plan and implementation strategy which will assure attainment of State water quality standards for turbidity, and 3) The Corps shall provide detailed information on the methods to be used in the proposed mitigation of wetland losses or alteration. The Bureau will be happy to work with Corps staff in these efforts.

The State of New Mexico specifically reserves the right to amend or revoke this certification if such activity is necessary to insure attainment of the designated uses for this surface water. Please address any questions concerning this permit to Mr. David Coss of my staff at (505) 827-2829.

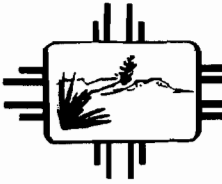
Sincerely,



Jim Piatt
Chief
Surface Water Quality Bureau

xc: Members of the New Mexico Water Quality Control Commission
District Manager, Environmental Improvement Division
District Engineer, U.S. Army Corps of Engineers
Susan Alexander, NPS Coordinator, Region VI, EPA

77. Refinements in project design since public review of the draft SEIS will largely remove situations whereby any direct or indirect contact would be made with water in the Rio Grande or conditions created that would degrade water quality during the life of the project. Therefore, no project-associated activity is anticipated that would adversely effect surface water quality to an extent that would impair the fishery and primary contact recreation designated uses. Coordination will be maintained with the Surface Water Quality Bureau to insure these concerns are adequately satisfied.



New Mexico Health and Environment Department

See following letter.

GARREY CARRUTHERS
Governor
DENNIS BOYD
Secretary
MICHAEL J. BURKHART
Deputy Secretary
RICHARD MITZELFELT
Director

December 10, 1990

Mr. James White
Albuquerque District
U.S. Army Corps of Engineers
P.O. Box 1580
Albuquerque, NM 87103

Dear Mr. White:

My staff reviewed your Draft Supplemental Environmental Impact Statement, Rio Grande Floodway: San Acacia to Bosque del Apache Unit (Corps of Engineers, Albuquerque District: August 1990), and expressed a number of concerns, as stated in the attached memorandum from the Surface Water Quality Bureau.

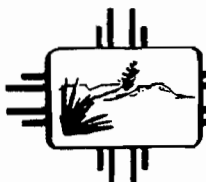
I concur in full with the views expressed by my staff. Please let me know if you have any questions.

Sincerely,

Richard Mitzelfelt
Director

RM:GC/mdg
Attachment

cc: Jim Piatt
David Coss
Gedi Cibas



New Mexico Health and Environment Department

GARREY CARRUTHERS
Governor

DENNIS BOYD
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

MEMORANDUM

TO: Gedi Cibas, Program Support Bureau

THROUGH: Jim Piatt, Acting Chief, Surface Water Quality Bureau

FROM: *DC* David Coss, WRS II, Surface Water Quality Bureau

RE: Draft Supplemental Environmental Impact Statement, Rio Grande
Floodway: San Acacia to Bosque del Apache Unit. EID File # 567
ER

DATE: November 21, 1990

Staff of the Surface Water Quality Bureau have reviewed the above referenced draft environmental impact statement (EIS) prepared by the US Army Corps of Engineers, Albuquerque District. The project discussed in the EIS involves construction and rehabilitation of approximately 55 miles of existing levee along the Rio Grande. The existing earthen embankment will be removed and rebuilt to produce a facility capable of withstanding high volume flows in the Rio Grande.

78. As described in the draft document, the proposed project would not meet State water quality requirements. Although the Corps states on page 85 that there will be no water quality impacts, staff believes that in a project of this magnitude, operating near and, in some cases, within the Rio Grande channel, there is significant potential for water quality impairment. The Corps of Engineers has received conditional Section 401 certification from EID for a Section 404 permit needed to undertake this project. Conditions imposed by EID included the following:
79. 1. The Corps shall develop a plan to limit stream bottom alteration due to sedimentation resulting from the filling operations.
80. 2. The Corps shall develop a water quality monitoring plan and implementation strategy which will assure attainment of State water quality standards for turbidity.
81. 3. The Corps shall provide detailed information on the methods to be used in the proposed mitigation of wetland losses or alteration.

Staff has met with Corps representations to discuss these conditions. The Corps is in the process of revising the EIS supplement to better address water quality concerns raised by the Division. Until these concerns are fully satisfied, the Division should continue to oppose the project.

78. The Corps of Engineers has reassured the potential of the planned project (as refined) to affect water quality and has concluded that water quality in the Rio Grande, the low-flow conveyance channel, and irrigation canals would not be affected. This conclusion is based on minimal contact with surface water, minimal (if any) borrow needs in the riparian and floodplain zones, design measures to prevent scouring of levee sideslopes, and stringent contractual requirements to prevent contamination of surface water. In essence, the fact that construction efforts would be away from the main channel and construction activities have to be accomplished in relatively dry conditions, essentially removes the opportunity for construction activities to have any effect on water quality.

79. Refined project design does not include disposal of surplus earth in or near the stream channel. The current plan will be coordinated with the Environment Department prior to construction to insure all concerns are resolved.

80. As stated, the construction plans will be coordinated with the Environment Department prior to construction to access the need for water quality monitoring and to insure State concerns are addressed.

81. Concur.

82. As stated, the potential to degrade water quality is low and the Corps will continue to coordinate with the Environment Department to insure all concerns are resolved. All water quality concerns raised by the State are addressed in this document.

NEW MEXICO

SCR-2

STATE CLEARINGHOUSE FINAL REVIEW CERTIFICATION

DATE: September 14, 1990

TITLE: Rio Grand Floodway-US Army Corps of Engineers Albq.

APPLICANT: San Asacia to Bosque del Apache Unit Socorro Cnty NM
Socorro County, New Mexico

STATE APPLICANT IDENTIFIER (SAI) NUMBER: NM 90-08-22-368

FEDERAL CATALOG NO: _____

FEDERAL AGENCY: _____

FINAL REVIEW

83. PROPOSED ACTION IS SUPPORTED.

PROPOSED ACTION IS NOT IN CONFLICT WITH STATE, AREAWIDE OR LOCAL PLANS.

COMMENTS ARE ATTACHED FOR SUBMISSION WITH THIS PROPOSED ACTION.

TO THE APPLICANT:

YOU MAY NOW SUBMIT YOUR APPLICATION PACKAGE, THIS FORM, AND ALL REVIEW COMMENTS TO THE FEDERAL OR STATE AGENCY (IES) FROM WHOM ACTION IS REQUESTED.

PLEASE NOTIFY THE STATE CLEARINGHOUSE (SINGLE POINT OF CONTACT) OF ANY CHANGES IN THIS PROJECT. REFER TO THE SAI NUMBER ON ALL CORRESPONDENCE PERTAINING TO THIS PROJECT.

Aurilia Hernandez
 STATE-POINT-OF-CONTACT

9/14/90
 DATE

83. No response required.

COLLEGE OF AGRICULTURE AND HOME ECONOMICS

DEPARTMENT OF FISHERY AND WILDLIFE SCIENCES
P.O. Box 30003, Campus Box 4901
Las Cruces, New Mexico 88003-0003
Telephone (505) 646-1544



October 12, 1990

Mr. Mark S. Sifuentes
Albuquerque District
U.S. Army Corps of Engineers
P.O. Box 1580
Albuquerque, NM 87103

Dear Mark:

I have reviewed your draft Supplement Environment Impact Statement (SEIS) with interest.

84. I am concerned about disturbance of high value to wildlife young and old stages of cottonwoods and meadows and would hope that vegetation disturbance would be almost entirely be restricted to salt cedar sites (low quality wildlife habitat).
85. Sandbars and adjacent shallow water in the river are important night roost sites for wintering sandhill and whooping cranes. I would hope that some of this habitat would be perpetuated particularly in the vicinity of the Bosque del Apache National Wildlife Refuge.
86. The projected area to be impacted seems to be too low and therefore mitigation acreage would be inadequate.
87. Overall I commend you for your obvious concern to avoid wildlife habitat losses.

Sincerely yours,

A handwritten signature in cursive script that reads 'S.D. Schemnitz'.

S.D. Schemnitz
Professor
Wildlife Science

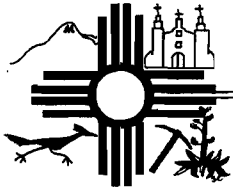
SDS:taj

84. A primary planning objective is to avoid or minimize disturbance to vegetation communities/structures that have high wildlife use. Lower value salt cedar stands would be selected over native plant communities with the objective of restoring these areas with the higher value cottonwood and willow communities. The decreased need for borrow reduced the potential for disturbing cottonwoods and meadows, but correspondingly reduced the opportunity to replace salt cedar with higher value cottonwood and willow.

85. Project construction would not likely affect river channel characteristics and associated night roosting of wintering sandhill and whooping cranes. The scheduling of project construction in the immediate vicinity of Bosque del Apache NWR to avoid the cranes' overwintering stay should further reduce any project-associated disturbance.

86. The area of habitat that could be affected that was presented in the draft SEIS was carefully calculated based on project requirements. Where refined data was not available, then a worst reasonable analysis was employed. Area figures presented in this document are based on refined design features and detailed analysis of affected vegetation, e.g., effects of levee reconstruction were assessed at 200- and 264-foot intervals.

87. No comment necessary.



CITY OF SOCORRO

RAVI BHASKER
MAYOR

111 SCHOOL OF MINES ROAD
P.O. DRAWER K
SOCORRO, NEW MEXICO 87801
(505) 835-0240

GEORGE PATRICK SALOME, JR.
CITY CLERK

October 15, 1990

Mr. Mark S. Sifuentes
Albuquerque District
U.S. Army Corps of Engineer
P.O. Box 1580
Albuquerque, New Mexico 87103

Re: Middle Rio Grande Floodway, San Acacia to Bosque del Apache
Unit Levee Project

Dear Mr. Sifuentes:

Pursuant to your correspondence of August 15, 1990 regarding the distribution of the Corps' Draft Supplemental Environmental Impact Statement on subject Levee project, and subsequent to our meeting at the Bosque Del Apache Wildlife Game Refuge on September 26, 1990, submitted herewith are the City's views on the EIS and comments regarding the meeting.

In order to be consistent with the activity by The City of Socorro regarding the project, I need to refer to City Clerk Pat Salome's and my meeting with you in Albuquerque on August 2, 1988 for input to the EIS. As I stated at the September 26th meeting, the City's concerns were very well addressed in the draft EIS.

On August 23, 1990, Mayor Ravi Bhasker, City Clerk Pat Salome, Felix Torres and I met with Mr. Phil Norton and John Taylor of the Bosque Del Apache Wildlife Game Refuge at City Hall in Socorro. Several issues concerning the EIS were discussed including the suggestion by The City that another meeting with representatives from the Army Corps of Engineers, The City of Socorro, Bosque Del Apache Wildlife Game Refuge, County of Socorro, Bureau of Land Management, Bureau of Reclamation, Middle Rio Grande Conservancy District and others was needed prior to responding to the EIS.

Mayor Bhasker agreed that Mr. Norton of the Bosque Del Apache take the lead and call the meeting for the Bosque Del Apache facility.

The following comments as addressed in August 1988 by City Clerk Salome and myself, and again on September 26, 1990 and as addressed in the draft EIS reflect the City's views and needs.

1. FLOOD HAZARDS, August 2, 1988

88. Cleaning and/or removal of all obstructions from the existing flood control channel. Materials removed will be utilized for the rehabilitating of the present earthen embankment on the west side of the river.

September 26, 1990

89. a. In addition to cleaning and/or removing all obstructions, I recommended that a borrow-pit be located within the flood control channel to effect removal of all re-usable materials for construction of the new levee.
90. b. Re-align the eastern-most part of the channel in a south-easterly direction so as to effect a self-cleaning process from all run-off.

2. COMMENTS ON THE 50/100 YEAR RAINFALL, FLOOD PLAIN

a. August 2, 1988

91. The need to provide for proper drainage facilities upon implementation of the work plan as provided for in the City's City-Wide Drainage Study that was prepared in September 1982 at a cost to the City of \$45,165.45 - Subject work plan having been estimated at (1982 prices) \$2,320,000.00

b. September 26, 1990

Mr. Mark Sifuentes' remarks alluded to the need to include in the EIS, the recommendation the City-Wide Drainage Study provide for future implementation of the project by the City of Socorro.

c. September 26, 1990

I again addressed, and complemented Mr. Sifuentes for the inclusion of all of the issues as presented by the City in the EIS, and added that the recently established Flood Plain by the Federal Emergency Management Agency (FEMA) were causing some concerns and problems to City Government and some citizens of Socorro, such as in the construction of homes as an example, and that hopefully, with the construction of the levee, that the Flood Plain would change.

88. There will be some removal of accumulated sediment and obstructions from the mouth of the flood control channel as part of the construction of tie-back levees at this location. However, removal of any remaining sediment and obstructions is an operation and maintenance feature to be accomplished by the city of Socorro.

89. As stated, some material would be removed from the mouth of the channel. However, the need for additional material to reconstruct this segment of levee is negligible, largely eliminating the need to develop any borrow sources.

90. The channel was intentionally designed to decrease flow velocities entering the Rio Grande. Accompanying a reduction in velocity is sediment deposition. Periodic removal of accumulated sediment as an operation and maintenance feature was a component of the flood control channel.

91. The Corps of Engineers does not have the authority to address local storm drainage problems and, consequently, is outside the scope of the planned action.

Corps of Engineers, San Acacia to Bosque Del Apache Leeve. Page 3

Some discussion was held regarding the level of our streets versus the level of the Rio Grande. The level of Manzanares Street in front of the Val Verde Hotel was discussed as well as El Camino Real and other areas in the Flood Plain.

3. LAND USE AND RECREATIONAL RESOURCES, OPPORTUNITIES AND NEEDS.

August 2, 1988

92. a. Implementation by the City of Socorro in it's Comprehensive Plan's Land Use Policy, the provision for recreational facilities such as walk-ways, bike, horse trails, picnic grounds, etc;, in the Bosque, and;

The provision of additional ponds for recreational use, such as the Escondida (4-mile) lake could be developed during the construction of the Rio Grande Leeve.

September 25, 1990

93. As reported at the meeting at the Bosque Del Apache, the City of Socorro has contacted the State Highway and Transportation Department, The State Forestry Division and State Park and Recreation Division of the Energy, Minerals and Natural Resources Department on the possibility of implementating the "Adopt A Highway" Program, "Beautification Program", and "Open Space Program" which have to do with the planting of trees, shrubbery and plants along our Highway and by-ways.

Additionally, it's concievable that such programs could be integrated with the Army Corps of Engineers' construction project of the Rio Grande Leeve, within the City's jurisdictional areas..

92. As reflected in the EIS, cost-shared recreational features such as those mentioned can be an integral part of the flood control project. Because refined project design largely eliminates the need for additional material for levee construction, the potential to develop ponds in this reach has appreciably decreased. If a need does arise, the Escondida area will receive high priority.

93. A certain amount of landscaping/beautification can be included as a part of the planned action. However, this feature would have to be within the general project area.

Corps of Engineers, San Acacia to Bosque Del Apache Leeve. Page 4

4. COST SHARING PER SECTION 103, WATER RESOURCES ACT OF 1986


Subsequent to a correspondence to Ravi Bhasker, Mayor, City of Socorro dated September 17, 1990 from Mr. Carl L. Slingerland, Secretary, New Mexico Interstate Streams Commission, and same subject issue of cost sharing as addressed on September 26, 1990 by Mr. Mark Andrews of the Corps of Engineers at the Bosque Del Apache meeting:

Bennie Barreras, speaking for the City of Socorro suggested that the City could participate by joining the Interstate Stream Commission and/or U.S. Army Corps of Engineers in a lobbying effort to either the New Mexico Legislature and/or our Congressional Delegation in Washington for the cost-sharing funds needed by the New Mexico Interstate Stream Commission

On May 26, 1987 The City of Socorro contacted the Honorable Jeff Bingaman, Pete Domenici, Bill Richardson, Joseph Skeen, and Manuel Lujan asking for their assistance in the construction of subject levee. The same could take place now.

Thank you again for offering the City the opportunity to comment. If we can be of further assistance, please do not hesitate to call.

Sincerely,


Ravi Bhasker,
Mayor, City of Socorro

ATTEST:

Pat Salome, City Clerk

cc: Carl L. Slingerland, Secretary
New Mexico Interstate Stream Commission
Felix Torres, City of Socorro

RB/PS:bb

LAW OFFICES
HUBERT & HERNANDEZ, P.A.

STEPHEN A. HUBERT
STEVEN L. HERNANDEZ
BEVERLY J. SINGLEMAN
LEE E. PETERS

2100 NORTH MAIN STREET
SUITE 1
R.O. DRAWER 6220
LAS CRUCES, NEW MEXICO 88006-6220
TELEPHONE (505) 526-2101

No response necessary

August 28, 1990

District Engineer
U.S. Army Corps of Engineers
ATTN: CESWA-ED-PE
P.O. Box 1580
Albuquerque, New Mexico 87103

RE: Draft Supplemental Environmental Impact Statement Regarding
Enhanced Flood Protection in Rio Grande From San Acacia to
Elephant Butte Reservoir

To Whom It May Concern:

Pursuant to the notice published in the Las Cruces Sun News on
August 24, 1990, please send to this office a copy of the Draft
Supplemental Environmental Impact Statement for the planned
measures to provide enhanced flood protection to flood plain
communities, water conveyance facilities and Bosque del Apache
National Wildlife Refuge from large magnitude flows in the Rio
Grande extending from San Acacia to the upper reaches of Elephant
Butte Reservoir. Thank you for your assistance.

Sincerely,

HUBERT & HERNANDEZ, P. A.



Lee E. Peters

LEP/srd

MEETINGS HELD IN RESPONSE

TO

REVIEW OF DRAFT SEIS

Issues and Responses

September 26, 1990, Multiple Agency Meeting at Bosque del Apache NWR.

Agencies with representatives are as follows:

U.S. Fish and Wildlife Service (Bosque del Apache NWR)
City of Socorro
New Mexico Interstate Stream Commission
Bureau of Reclamation
Middle Rio Grande Conservancy District
Bureau of Land Management
Corps of Engineers

Concerns and recommendations expressed at this meeting are as follows and are reflected in this document.

Comment: Include floodplain maps and various flood frequencies in the SEIS.

Response: The large number of maps precludes their inclusion, but can be obtained on request.

Comment: Discuss project effects on FEMA (Federal Emergency Management Authority) building restrictions.

Response: These effects are discussed in this document.

Comment: Discuss the alternative of a dam on the Rio Puerco.

Response: This issue is discussed in this document.

Comment: Consider leaving structurally competent sections of the existing embankment and using surplus to overbuild levees.

Response: This alternative is evaluated in this document.

Comment: Expand the discussion of operations and maintenance features and associated funding.

Response: This discussion has been expanded.

Comment: Discuss the open space plan being developed by the city of Socorro.

Response: This plan and the inter-relationship of the planned action are included.

Comment: Consider incorporating access and egress features for livestock use into levee design.

Response: This issue is currently being coordinated with the Bureau of Reclamation and the Middle Rio Grande Conservancy District.

Comment: Address public use of the reconstructed levee and associated public safety.

Response: These issues have been addressed in this document.

Comment: Provide more detailed discussion on the funding of operation and maintenance activities for the completed project.

Response: This discussion has been expanded.

October 23 and November 5, 1990, Meetings with New Mexico Health and Environment Department, New Mexico Department of Game and Fish, and Corps of Engineers.

Concerns and recommendations expressed at these meetings are as follows and are reflected in this document.

Comment: Include approximate number of processing sites and acreage.

Response: Any need for processing sites could largely be accommodated in the area between the riparian woodland and conveyance channel. Therefore, the riparian area should not be affected.

Comment: Include wording regarding the inclusion of construction methods to meet water quality standards.

Response: While project construction should have little, if any, water contact and project features are designed to resist erosion, appropriate wording has been included in this document.

Comment: Avoid placing surplus soil on the riverward side of the levee.

Response: The refined levee design does not include this disposal measure.

Comment: Avoid any disturbance to the river channel that could potentially have an adverse effect on the silvery minnow.

Response: Concur. No project features should affect the silvery minnow.

Comment: Increase coordination of state endangered and threatened species.

Response: Updating of State endangered and threatened species for the final SEIS was accomplished with the N.M. Department of Game and Fish.

Comment: Prior to the filling of any wetland, a survey for the New Mexico jumping mouse should be performed.

Response: This commitment was made in the draft SEIS and would be accomplished prior to construction.

Comment: Include wording in EIS that measures will be taken to insure State water quality standards are maintained.

Response: Appropriate wording has been included in this document.

Comment: Consider moving mitigation (compensation) from Bosque del Apache NWR to the riparian zone, preferably close to Bosque del Apache NWR. Consider acquiring a conservation easement within the riparian zone and land purchase south of Bosque del Apache NWR, with management by the Refuge. Consider combining conservation easement with Socorro Valley Park, Bosque del Apache NWR, or both.

Response: These recommendations have been considered, made part of the compensation plan where possible, and are reflected in this document.

Comment: Evaluate effects of providing structural (levee) protection to only selected areas of floodplain development.

Response: This subject is discussed in this document.

Comment: Mitigation for wetland losses should be at a two-for-one ratio.

Response: Because of the low quality of wetlands that would be filled and the anticipated higher value of replacement wetlands, a one-for-one replacement ratio was selected. Wildlife use of replacement wetlands should more than double.



STATE OF TEXAS
RIO GRANDE COMPACT COMMISSION
EL PASO

JACK HAMMOND
COMMISSIONER

October 10, 1990

Lt. Col. Steven M. Dougan
District Engineer
U S Army Corps of Engineers
Albuquerque District
P.O. Box 1580
Albuquerque, New Mexico 87103-1580

Dear Colonel:

In response to the public notice regarding the proposed construction and rehabilitation of the levees adjacent to the Rio Grande from San Acacia to Elephant Butte Reservoir I request that a public hearing be held regarding this proposed project. The site of this meeting should be in the Las Cruces/ El Paso area.

Sincerely,

A handwritten signature in black ink, appearing to read "Jack", written over the word "Sincerely,".

Jack Hammond

JH/tlb

A meeting was held in Las Cruces, New Mexico, on December 11, 1990, in response to this request by Mr. Jack Hammond for a public hearing to discuss the proposed project and draft Supplemental Environmental Impact Statement. Major concerns expressed at this meeting and accompanying responses are summarized and presented in the following pages. Federal, State, and local governmental agencies represented are as follows:

- Corps of Engineers
- Fish and Wildlife Service
- Bureau of Reclamation
- International Boundary and Water Commission
- New Mexico Interstate Stream Commission
- State of Texas Rio Grande Compact Commission
- New Mexico Department of Agriculture
- Middle Rio Grande Conservancy District
- El Paso, Texas, City/County Health District
- Elephant Butte Irrigation District
- El Paso County Water Irrigation District No. 1
- Elephant Butte Lease Lot Association

Mr. Jack Hammond, Commissioner for State of Texas Rio Grande Compact Commission

Comment: The 100-year level of flood protection is not adequate and should be greater.

Response: The Corps is required, by regulation, to examine alternatives which provide various levels of flood protection and select the plan which provides the greatest net benefit. For this project, the 100-year level of protection provides the greatest net benefit.

Comment: Trace heavy metals and radionuclides resulting from mining in the Grants' uranium belt could be present in the sediment carried by the Rio Puerco and pollute the water supply in Elephant Butte Reservoir. In addition to flood hazard problems and quantity of sediment, the quality of sediment being deposited into Elephant Butte Reservoir should be of major concern.

Response: Concur with this concern. Coordination among the New Mexico Environment Department and U.S. Geological Survey demonstrates a similar concern and need for related testing to determine if any threat to human health exists. Coordination among concerned parties is ongoing to investigate this concern.

Comment: The proposed project would accelerate the rate of sediment deposition in Elephant Butte Reservoir by increasing stream velocities and scouring of the streambed. This scouring will move potentially contaminated sediments at the mouth of the Rio Puerco into Elephant Butte Reservoir, potentially endangering the water supply for almost two million people and contaminating extensive farmland below the Reservoir.

Response: The planned project would not have any significant effect on sediment transport in the Rio Grande nor the rate of sediment deposition in Elephant Butte Reservoir. While there would be localized changes in sediment transport characteristics in the Rio Grande relative to pre-project conditions, there would not be any significant increase in sedimentation within Elephant Butte Reservoir. The short duration of major flood events transports insignificant amounts of sediment relative to normal flows of long duration, which are the prime conveyors of sediment.

Comment: A dam on the Rio Puerco (and on the Rio Salado, if possible) in concert with the proposed levee project, would appreciably reduce continuing sediment transport into Elephant Butte Reservoir, as well as reduce potential health hazards.

Response: In response to this request and the support of the Texas Congressional Delegation, steps are being taken to initiate a reconnaissance-level study into these concerns. These concerns and resultant measures to address these concerns are reflected in this document.

Comment: Evaluate the potential of borrow material to release any contaminants present.

Response: Little potential exists for any contaminants to be released since relatively little borrow would be obtained from the riparian zone or contiguous floodplain.

Comment: Evaluate the effect of acid rain on radionuclides and heavy metal concentrations in runoff and subsequent effects on crops downstream of Elephant Butte.

Response: This concern will be evaluated as part of a reconnaissance-level study for the Rio Puerco. As stated, the planned action would not appreciably affect sediment transport and water quality.

Mr. Ed Fifer, El Paso County Irrigation District No. 1

Comment: A lot of money has been spent getting water to El Paso and the City is currently developing the Rio Grande as a source of municipal water supply. If water delivery and quality could be affected, then the City may have to change its direction.

Response: As stated, the planned action would not affect water delivery or quality. A planned reconnaissance study of the feasibility of a dam on the Rio Puerco would address potential threats to human health and welfare from any heavy metals and radionuclides contributed by the Rio Puerco.

Comment: How does the project benefit water users below Elephant Butte Dam?

Response: The planned action, through its increased protection of the conveyance channel and its water delivery and salvage function, would appreciably assist in perpetuating the agricultural economy of southern New Mexico and the El Paso and Juarez areas that are critically dependent on water storage at Elephant Butte Reservoir for irrigation. The conveyance channel salvages, on the average, 71,000 acre-feet of water annually that also helps fulfill water delivery commitments to Texas and Mexico.

Mr. W.O. Gary, Elephant Butte Irrigation District

Comment: The District has to comply with the Clean Water Act and if there is a potential to degrade water quality, then the District has to address this issue.

Response: Please see first response to Mr. Ed Fifer.

Mr. Conrad Keys, Jr., International Boundary and Water Commission

Comment: All concerned downstream water users need to make a financial commitment to support any additional study proposals that are suggested.

Response: Concur. Cost sharing would not be required for a reconnaissance-level study, but 50-50 (Federal/Non-Federal) cost sharing for any subsequent feasibility study would be necessary.

Mr. Gary Esslinger, Elephant Butte Irrigation District

Comment: A dam on the Rio Puerco would reduce sedimentation of Elephant Butte Reservoir and resultant depletion of storage capacity for irrigation water and eventual need to raise Elephant Butte Dam.

Response: As stated, a reconnaissance-level study into the feasibility of a dam on the Rio Puerco is being addressed. This study will address continuing storage depletion at Elephant Butte Reservoir.

January 5, 1991, Meeting with Fish and Wildlife Service, New Mexico Department of Game and Fish, and Corps of Engineers

Concerns and recommendations expressed at this meeting are as follows and are reflected in this document.

Comment: Locate mitigation measures near areas where losses occurred.

Response: This will be done to the extent practicable. As stated, the mitigation area that was mutually decided upon during project formulation by the Service and the Corps was to use Bosque del Apache NWR. The mitigation plan subsequently developed by the Department of Game and Fish, Fish and Wildlife Services, and Corps of Engineers is to utilize the riparian zone throughout most of the project area for mitigation purposes.

Comment: Include maintenance of mitigation measures as a part of operation and maintenance responsibilities, including a replacement level that should be attained.

Response: Concur. The operation and maintenance responsibilities will include the mitigation measures.

Comment: Evaluate alternate plans for disposal of surplus earth.

Response: Refined project plans incorporate surplus earth into levee design.

Comment: Include a section in the EIS discussing irreversible or irretrievable commitment of resources which will be involved in the development of the project.

Response: This topic has been included in this final SEIS.

Comment: Consider design alternatives of reconstructing only critical sections of levee and a combination of structural and non-structural alternatives.

Response: These alternatives were included in the draft EIS and have been revisited for clarity and accuracy.

Comment: Refrain from disposing of surplus earth on the riverward levee sideslope and in the channel.

Response: Refined levee design incorporates the relatively small amount of surplus earth into the reconstructed levee.

Comment: Put details of pole planting technique into EIS.

Response: While detailed technical descriptions are not normally a part of an EIS, a concise description of this technique has been included in this final SEIS.

Comment: Include conservation easements as a component of mitigation.

Response: An easement for wildlife conservation has been made an objective compensation plan, primarily upstream of Bosque del Apache NWR. This objective would be implemented if possible. Complex land ownership below the Refuge seriously discourages any opportunity to pursue this option.

Comment: Emphasis should be placed on finding the best place to locate mitigation measures.

Response: The objective of mitigation measures and sites has been to maximize riparian ecological attributes on both a short- and long-term basis. This objective continues, consistent with economic, social, and institutional constraints.

Comment: Address the effects of confined flows on the regeneration of cottonwoods.

Response: These effects have been addressed in this final SEIS.

Comment: Address effects of stockpiling earth.

Response: The general absence of need for stockpile areas outside the levee footprint and intervening area toward the conveyance channel was described in the draft SEIS. Refined design has substantiated this and further describes an even lower probability. This final SEIS reiterates this fact.

Comment: Include a statement in the EIS that a biologist would monitor construction.

Response: Concur. This statement has been included in the final SEIS.

Comment: Operation and maintenance requirements should include provisions to insure mitigation measures are successful, including joint agency reviews.

Response: Mitigation measures are based on the best available technology and experience to insure the desired results will be achieved. Experience gained with large-scale establishment of cottonwood and other native riparian plants at Bosque del Apache NWR will greatly assist in designing planting plans for this project. This issue will be discussed with the operations and maintenance entity as a feature of O&M needs.

APPENDIX B
DETERMINATION OF COMPATIBILITY



United States Department of the Interior

FISH AND WILDLIFE SERVICE
POST OFFICE BOX 1306
ALBUQUERQUE, N.M. 87103



In Reply Refer To:
Region 2/RF

OCT 21 1991

Lieutenant Colonel Michael J. Debow
District Engineer
U.S. Army Corps of Engineers
P.O. Box 1580
Albuquerque, New Mexico 87103-1580

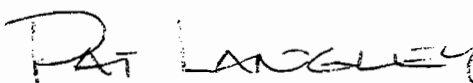
Dear Colonel Debow:

Enclosed for your information and use is the *Determination of Capability* for the portion of the proposed Rio Grande Floodway, San Acacia to Bosque del Apache Unit, that traverses the Bosque del Apache National Wildlife Refuge (Refuge). Based on additional project data provided on May 31, 1991, by your office, and on the conditions and constraints imposed for on-Refuge activities, the segment of levee reconstruction within the boundaries of the Refuge has been found to be compatible with the purposes for which the Refuge was established. However, it should be noted that this determination in no way alleviates the concerns of this agency expressed during planning meetings and set forth in the Department of Interior's letter dated November 19, 1990, for the extremely limited analysis of impacts that could be caused by the proposed project exterior to Refuge boundaries and for the lack of adequate mitigation of those impacts. A copy of that letter has been enclosed for your information. We require that those concerns be adequately addressed before concurrence by this office is provided for the project in its entirety.

Based on the recognized value of the middle Rio Grande corridor and the increased commitment of State, local, and Federal entities to conserve the resources of the river, we look forward to working with you in the planning of the San Acacia to Bosque del Apache Unit. This project not only accomplishes the purposes of flood control and protection of lives and property, but will also aid in the conservation of the river, its flows, and the living corridor.

Should you have any questions concerning the issues raised in this letter or in previous comments on the proposed project, please do not hesitate to contact Jennifer Fowler-Propst, Field Supervisor, New Mexico Ecological Services Office at (505) 883-7877 or FTS 474-7877.

Sincerely,


Acting Regional Director

Enclosures

memorandum

DATE: August 15, 1991

REPLY TO
ATTN OF: Refuge Manager, Bosque del Apache NWR

SUBJECT: Determination of Compatibility with Refuge Purposes and Objectives for the San Acacia to Bosque del Apache, New Mexico Continuous Levee Project, Socorro County, New Mexico

TO: Regional Director, Region 2, Albuquerque, New Mexico
THRU: Associate Manager AZ/NM

By authority of the National Wildlife Administration Act of 1966, the Endangered Species Act of 1973 and Executive Order 8289 dated November 22, 1939, establishing Bosque del Apache National Wildlife Refuge as "a refuge and breeding ground for migratory birds and other wildlife", I am directed to determine the compatibility of the San Acacia to Bosque del Apache, New Mexico Continuous Levee Project proposed by the U.S. Army Corps of Engineers with refuge purposes for establishment. U.S. Fish and Wildlife Service policy also requires that this project be consistent with refuge objectives. These objectives are listed below in priority order.

1. To provide habitat and protection for endangered species, with special emphasis on the whooping crane.
2. To provide habitat and protection for migratory birds during the winter, with special emphasis on sandhill cranes, dabbling ducks, snow geese and Canada geese.
3. To provide habitat and protection for resident animals.
4. To provide the general public an opportunity to see and understand wildlife, and provide visitors with a high-quality wildlife and educationally oriented experience.

In formulating our compatibility statement we have reviewed several documents pertaining to the proposed project including:

- Project Reevaluation Report: San Acacia to Bosque del Apache, New Mexico, October, 1989.
- Draft Environmental Impact Statement: Rio Grande Floodway San Acacia to Bosque del Apache Unit - Socorro County, New Mexico, October 1989.

- Draft Supplemental Environmental Impact Statement: Rio Grande Floodway San Acacia to Bosque del Apache Unit - Socorro County, New Mexico, August, 1990.
- Final Fish and Wildlife Coordination Act Report for San Acacia to Bosque del Apache, New Mexico Continuous Levee Project, Socorro County, New Mexico, November 1989.
- Review of Draft Supplemental Environmental Statement for the Rio Grande Floodway, Socorro County, New Mexico (ER 90/790).
- Letter dated May 31, 1991 from the ACE Engineering and Planning Division Planning Branch to FWS Regional Director, Region 2 providing final construction design.

Project Description

The proposed levee will be located just east of the low flow conveyance channel at the site of the present spoil bank levee. Overall project information indicates the dike top would be 16' wide with side slopes of 1:3. The overall height of the dike will be 11-12'. Toe drains will be constructed along the dike's western toe draining into the low flow conveyance channel to provide seepage control. The existing spoil bank levee would be scraped to the base elevation and stockpiled at one-half to one-mile intervals. This material would then be mixed with heavier soil obtained from borrow areas and used to construct the new levee. On Bosque del Apache NWR (Refuge), there will not be any excavation or deposition of surplus earth without the request or permission of the U.S. Fish and Wildlife Service (Service). Also, no need is foreseen for turn-around or stockpile areas. Jetty jacks or other protective structures may be placed at potential erosion sites at the discretion of the Service.

Local Impacts to Refuge Purposes Resulting from Construction of the Continuous Levee

Riparian vegetation adjacent to the existing low flow conveyance channel spoil bank provides significant habitat for migrating and breeding birds and other wildlife. Construction of the levee will require removal of a portion of this habitat resulting in a permanent negative impact. Disturbance during the construction phase of the project will temporarily displace wildlife species unique to the area.

-General Species Impacts

Typical species include those listed in Tables 1 and 2. In addition to these species commonly associated with cottonwood/willow/saltcedar communities are several species of

special concern on the refuge. Raptor species including the red-tailed hawk (Buteo jamaicensis), northern harrier (Circus cyaneus), Swainson's hawk (Buteo swainsoni), rough-legged hawk (Buteo lagopus), sharp-shinned hawk (Accipiter striatus), ferruginous hawk (Buteo regalis) and golden eagle (Aquila chrysaetos) roost and forage within riparian habitats and along productive edge habitat which would be most affected through construction. High small mammal concentrations on which many of these raptor species depend would also be affected. Resident wildlife species including the Rio Grande turkey (Meleagris gallopavo) and mule deer (Odocoileus virginianus) are also commonly seen species. Sandbars along the river are important loafing and roosting sites for sandhill cranes, waterfowl and waterbirds. The adjacent low flow conveyance channel also supports numerous waterfowl and waterbirds seasonally. There would be temporary disturbance to these species due to actual construction work. A delay in the construction time period to avoid peak wildlife winter use periods will aid in lessening impacts to raptors and waterfowl and waterbirds when population concentrations are highest. Overall, mentioned species should have adjacent areas of similar habitat available temporarily during construction phases.

-Endangered and Threatened Species Impacts

Federally endangered species which are common in the impact area include the whooping crane (Grus americana) and bald eagle (Haliaeetus leucocephalus). Less common species include the peregrine falcon (Falco peregrinus) and the interior least tern (Sterna antillarum). Again, a delay in the construction time period to avoid peak wildlife winter use periods will reduce or eliminate temporary impacts to whooping cranes and bald eagles as these species are winter visitors. Use by peregrine falcons is seasonal generally occurring during migration periods and consists of use by two or three individuals. Sightings of the interior least tern are rare with no prolonged stay yet recorded on the refuge. Adjacent similar habitat is available which can be used temporarily by these species during construction phases. A category 2 candidate species, the meadow jumping mouse (Zapus hudsonius luteus) may also occur in the impacted area although wet meadow and ditch bank habitats used by the species are uncommon along the existing levee.

-Permanent Impacts

The scope of permanent impacts occurring as a result of construction reflect separate and joint reconnaissance of existing vegetation and value classifications by Army Corps of Engineers and Refuge staff. Additional project data presented to the Director, FWS Region 2, dated May 31, 1991, show revisions to original designs based on this reconnaissance. The project now indicates that about 4.47 acres of vegetation will be removed as a result of cuts from the top of the river side of the current spoil bank levee and the extension of the base width of the dike

Table 1. Common Wildlife Species found in the Cottonwood or Deciduous Tree Habitat Type (Hink and Ohmart 1984)

Common Name	Scientific Name
Mourning dove	<u>Zeniada macroura</u>
Black-chinned hummingbird	<u>Archilochus alexandri</u>
Gambel quail	<u>Callipepla gambelii</u>
Northern flicker	<u>Colaptes auratus</u>
Ash-throated flycatcher	<u>Myiarchus cinerascens</u>
European starling	<u>Sturnus vulgaris</u>
American robin	<u>Turdus migratorius</u>
Black-headed grosbeak	<u>Pheucticus melanocephalus</u>
Dark-eyed junco	<u>Junco hyemalis</u>
White-crowned sparrow	<u>Zonotrichia leucophrys</u>
Cooper hawk	<u>Accipiter striatus</u>
American kestrel	<u>Falco sparverius</u>
Eastern fence lizard	<u>Sceloporus magister</u>
New Mexico whiptail lizard	<u>Sceloporus magister</u>
White-footed mouse	<u>Peromyscus leucopus</u>
Western harvest mouse	<u>Reithrodontomys montanus</u>
House mouse	<u>Mus musculus</u>
Botta pocket gopher	<u>Thomomys bottae</u>
Rock squirrel	<u>Spermophilus variegatus</u>
Beaver	<u>Castor canadensis</u>
Muskrat	<u>Ondatra zibethicus</u>
Raccoon	<u>Procyon lotor</u>
Porcupine	<u>Erethizon dorsatum</u>
Striped skunk	<u>Mephitis</u>
Desert cottontail	<u>Sylvilagus auduboni</u>
Coyote	<u>Canis latrans</u>

Table 2. Common Wildlife Species found in the Wetland Habitat Type. (Hink and Ohmart 1984).

Common Name	Scientific Name
Pied-billed grebe	<u>Podilymbus podiceps</u>
Virginia rail	<u>Rallus limicola</u>
Sora	<u>Porzana carolina</u>
American coot	<u>Fulica americana</u>
Yellow-headed blackbird	<u>Xanthocephalus xanthocephala</u>
Red-winged blackbird	<u>Agelaius phoeniceus</u>
Killdeer	<u>Charadrius vociferus</u>
Spotted sandpiper	<u>Actitis macularia</u>
Black phoebe	<u>Sayornis nigricans</u>
Marsh wren	<u>Cistothorus palustris</u>
Song sparrow	<u>Melospiza melodia</u>
Swamp sparrow	<u>Melospiza georgiana</u>
Woodhouse toad	<u>Bufo woodhousei</u>
Chorus frog	<u>Pseudacris triseriata</u>
Bullfrog	<u>Rana catesbeiana</u>
Tiger salamander	<u>Ambystoma tigrinum</u>
Common gartersnake	<u>Thamnophis sirtalis</u>

in excess of the current spoil bank levee base. Of the 300 survey stations taken at 200' intervals through the refuge, 81 or 27% will have some vegetation removed. Of the 81 stations affected, 33 or 41% will involve vegetative impacts through cuts made at the top of the current spoil bank levee at or between stations 1614-1620, 1678-1686, 1690-1692, 1712, 1724-1728, 1732-1734, 1752, 1766-1768, 1820-1829, 1847-1853, 1887-1891 and 2105. Larger amounts of vegetation will be removed through extension of the base width of the current spoil bank where essentially the entire existing levee will be reconstructed. This will occur at 48 or 59% of all affected stations. Specifically, this will occur at or between stations 1640, 1776-1778, 1792, 1905, 1937, 1941-1949, 1953-1959, 1963, 1969, 1977-1991, 1995, 1991-2005, 2009-2013, 2019-2021 and 2027-2035. Vegetation removal may or may not extend to the existing spoil bank toe at stations 1939, 1961, 1965, 1993, 1997, 2023 and 2041-2043 depending on construction constraints. Although many jetty jacks are included in the construction proposal which would substantially alter impact acreage figures, ACE personnel indicate these will be installed subject to FWS discretion. Additional project data outlining this agreement will be forwarded to the FWS Regional Director. To compensate for unknown losses or over-clearing by the contractor one acre has been added to the stated acreage compensation figure. Construction of turn around, haul roads and stockpile areas will not occur on the refuge. Excess spoil will not be deposited on the refuge. Vegetation impacted through the project would result in the loss of habitat to migratory birds,

breeding birds and other wildlife including federally listed endangered and threatened species. Presumably mitigation measures for habitat loss would compensate any impact to existing riparian habitat.

Overall Impacts to Refuge Purposes Resulting from Construction of the Continuous Levee

A broader view of the impacts the proposed construction would have on refuge purposes reveals generally positive factors. The natural flooding regimes of the Rio Grande which sustained and perpetuated associated riparian flora and subsequently the rich fauna of the cottonwood/willow bosque have been altered or eliminated with the construction of dams above and below the Middle Rio Grande Valley. In addition, a generally continuous levee is already in place within the Middle Rio Grande reach which has eliminated periodic flooding of the valley floor. Further damage to the natural flooding events of the Rio Grande is unlikely as a result of this project, an indication that most of the damage has already been done. Strictly speaking, construction of the continuous levee is actually a revamping and upgrading of an existing spoil bank levee already in place to protect urban and agricultural developments including Bosque del Apache NWR from flooding.

Historically, Bosque del Apache NWR was constructed in the late 1930's and early 1940's within the Middle Rio Grande floodplain. Although some diking was constructed early to protect impoundments and agricultural areas from possible flooding, many of the accomplishments of this period were completely destroyed during severe flooding in 1941. Construction and maintenance efforts were again initiated after World War II and continue today. The investment in the creation and maintenance of riparian and wetland areas served by the Bosque del Apache NWR irrigation system west of existing spoil bank levees is staggering with habitats supported by this system irreplaceable. Although the existing Riverside Canal spoil bank dike and the low flow conveyance channel spoil bank dike provide some flood protection, losses due to a flood comparable with that which occurred in 1941 would be devastating to developments and populations of waterfowl and cranes utilizing the refuge. From this standpoint the continuous levee project has a positive impact to current refuge resources.

East of the current low flow conveyance channel spoil bank levee, native flora conditions along the current river channel are alarming. Decadent older stands now dominate with an increasing degree of invasion by exotic species. Regeneration through natural means although still possible is limited due to generally regulated stream flows on the Rio Grande by the Bureau of Reclamation and the U.S. Army Corps of Engineers. To reverse these conditions, properly timed periodic river flooding which provides regenerative capabilities and maintenance of native riparian flora must resume. Construction of the continuous levee

project would provide the containment of flood flows to meet native flora regenerative and maintenance needs currently not possible with existing spoil bank levee conditions.

Determination

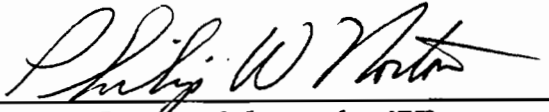
Reviewing both local and overall impacts detailed above, the continuous levee project through Bosque del Apache NWR is deemed compatible with the purposes for which the refuge was established and consistent with refuge objectives providing the following stipulations are met:

1. Construction will occur during lower wildlife use seasons.
2. The basal width of the new levee shall be oriented as close as possible to the low flow channel to reduce the loss of riparian/wetland habitat.
3. Existing roads shall be used to move equipment or haul fill.
4. Stockpile and equipment turn around areas will not be located on the refuge.
5. Borrow excavation sites or fill deposition sites will not be located on the refuge.
6. All impacted areas should be thoroughly evaluated for suitability as revegetation sites prior to revegetation. Evaluation must include water table fluctuation monitoring and ground water salinity monitoring for at least one year prior to revegetation and complete soils analysis stressing soil texture profiles and salinity determination.
7. Large cottonwoods that might die as a result of root damage from the placement of the levee toe shall be left in place, creating snags that provide a valuable habitat component for a variety of wildlife.
8. In agreement with the coordination act report, any cottonwood/willow/Russian olive habitat that is impacted will be mitigated at a 5:1 ratio. Monotypic salt cedar areas will be mitigated at a 2:1 ratio. Saltgrass habitats are recognized as some of the rarer habitat types in the Middle Rio Grande riparian zone. This habitat should be mitigated at a higher than 2:1 ratio.
9. The Bosque del Apache NWR refuge manager shall reserve the right to halt construction activities if the U.S.

Army Corps of Engineers or their contractor do not abide by the agreed upon construction design and compatibility statement conditions.

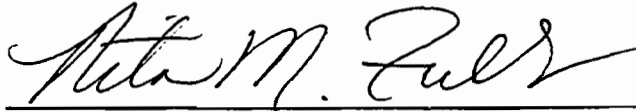
10. The Bosque del Apache NWR refuge manager will be present at the preconstruction conference which will include Army Corps of Engineers personnel and the contractor to assure compliance with construction designs and compatibility statement conditions.

Prepared by:



Philip W. Norton, Refuge Manager, Bosque del Apache NWR

Reviewed by:

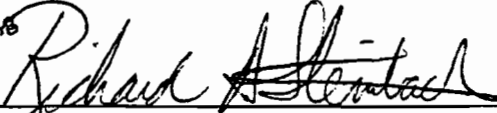


10/7/91

Nita M. Fuller, Associate Manager, AZ/NM

Concurrence:

Active



10/10/91

for Joseph P. Mazzoni, Assistant Regional Director - ARW, Region 2

APPENDIX C
FISH AND WILDLIFE COORDINATION ACT REPORT
AND
CORPS OF ENGINEERS RESPONSE



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services
Suite D, 3530 Pan American Highway, NE
Albuquerque, New Mexico 87107

November 7, 1989

District Engineer
Corps of Engineers, U.S. Army
P. O. Box 1580
Albuquerque, New Mexico 87103-1580

Re: Final Fish and Wildlife Coordination Act Report for San Acacia to
Bosque del Apache, New Mexico Continuous Levee Project, Socorro
County, New Mexico (CE)

Dear Colonel Dougan:

This completes the U.S. Fish and Wildlife Service's (Service) Final Fish and Wildlife Coordination Act Report on the U.S. Army Corps of Engineers (Corps) project, San Acacia to Bosque del Apache, New Mexico Continuous Levee Project, Socorro County, New Mexico. The report was prepared by the Service' Albuquerque Ecological Services Field Office, under the authority of and in accordance with the requirements of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e). It has been coordinated with the New Mexico Department of Game and Fish and Bosque del Apache National Wildlife Refuge. Subsequent to the September 18, 1989 completion date of this report, new information was made available by the Corps. Changes have been incorporated in response to the latest engineering data.

The project was authorized for construction as a unit of the Rio Grande Floodway by the Flood Control Act of 1948 (Public Law 80-858, Section 203). Funds for construction were never appropriated. In 1961, the U. S. Senate directed a further review of the 1948 comprehensive flood control plan, with particular reference to the Rio Puerco and Rio Salado. As a result of this review, the construction of flood and sediment control dams on the Rio Puerco and Rio Salado was recommended in 1972 in lieu of the originally authorized levee rehabilitation. Subsequent advanced engineering and design studies were terminated when the State of New Mexico withdrew its support for the project because of costs and potential inundation of 300 acres of the Sevilleta National Wildlife Refuge. As a consequence of the unfeasibility of dam construction, the rehabilitation of existing levees was again evaluated.

STUDY AREA DESCRIPTION

The Rio Grande within the project flows through a broad floodplain bordered on the west by the Magdalena Mountains and on the east by the Chupadera Mesa and encompasses approximately 34,840 acres within Socorro County, New Mexico. The proposed levee would stretch 58 miles from San Acacia to the upper end of Elephant Butte Reservoir (Figure 1).

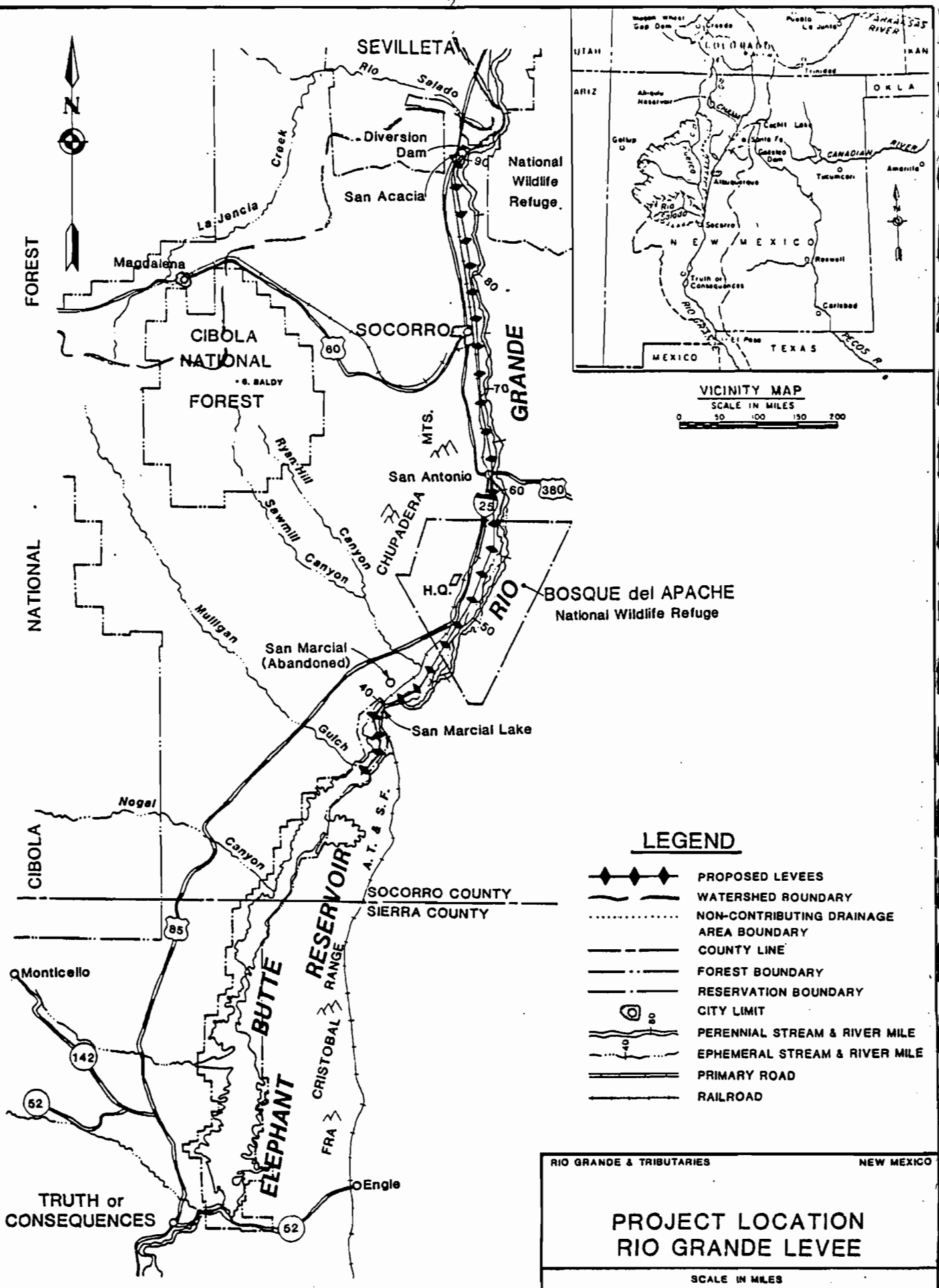


Figure 1. General project location map.

RIO GRANDE & TRIBUTARIES NEW MEXICO

PROJECT LOCATION RIO GRANDE LEVEL

SCALE IN MILES

0 2 4 8 12 18 24

U.S. ARMY ENGINEER DISTRICT, ALBUQUERQUE, N.M.

Figure 1

In the project area, the channel of the Rio Grande is paralleled on the west side by the Bureau of Reclamation's low flow conveyance channel from San Acacia to the upper end of Elephant Butte Reservoir. The existing levee is the spoil bank resulting from the construction of the low flow conveyance channel and lies between the channel and the Rio Grande. It is this levee that would be rebuilt to provide greater flood protection for the low flow conveyance channel or water conveyance ditch. During normal water years, the low flow conveyance channel can handle the entire river flow, allowing water managers the option of dewatering the historic Rio Grande channel (Figure 2).

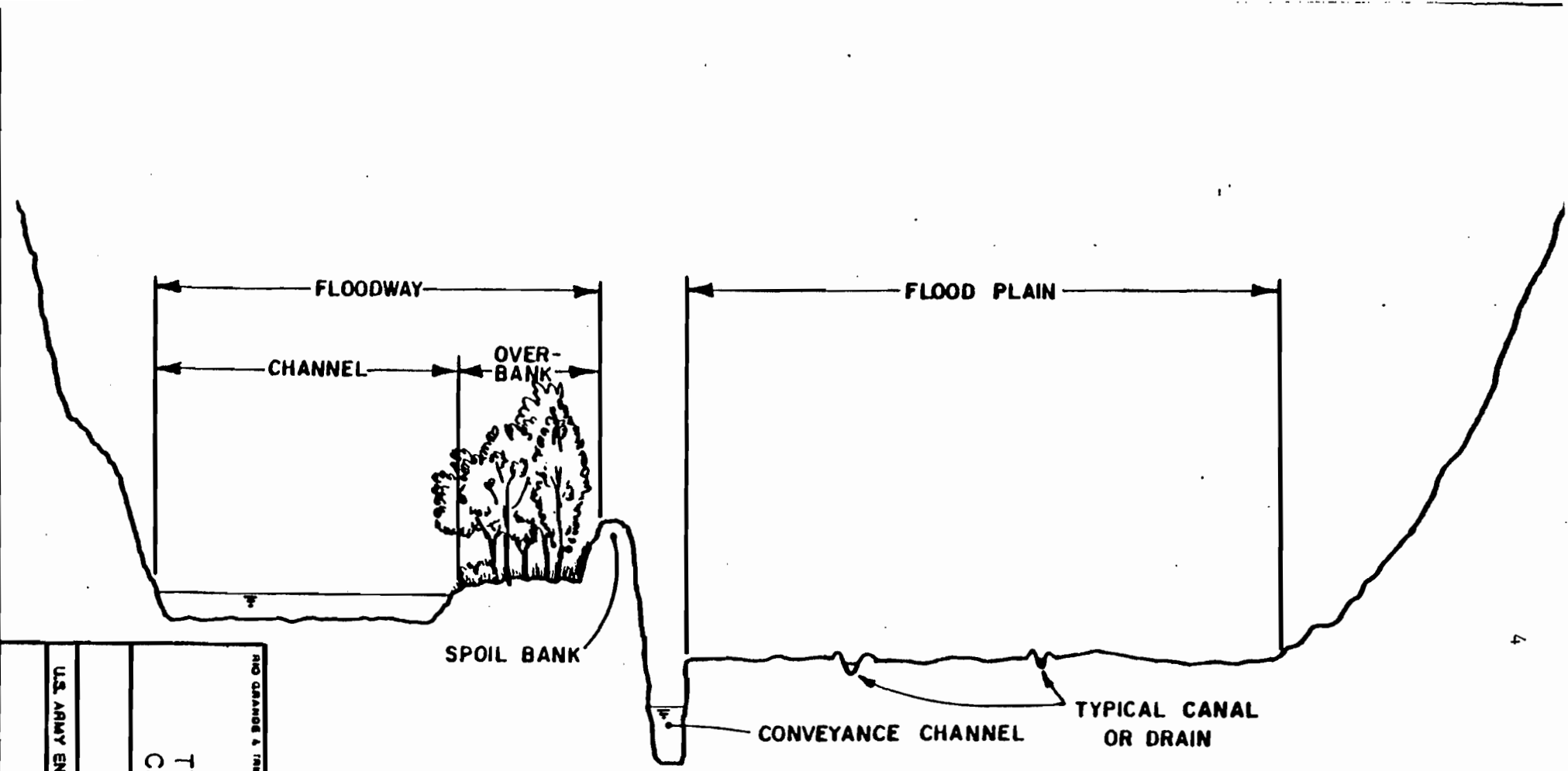
PROJECT DESCRIPTION

The proposed levee would closely follow the alignment of the existing spoil bank levee. Preliminary design information for the 100-year protection levee is provided in the Decision Document (U.S. Army Corps of Engineers, November 1988). This document specifies that the top of the levee would be 12 feet wide, the side slopes of approximately 2.5:1 and an average height of 11.6 feet. Toe drains that discharge into the low flow conveyance channel would provide seepage control. Subsequent to the Decision Document, refined project engineering data was provided by the Corps.

As shown in Figure 2, the existing spoil bank levee parallels the low flow conveyance channel and is immediately adjacent to the overbank or riparian/wetland habitat area. This existing spoil bank levee would be scraped down to the base elevation and stockpiled at one-half to one-mile intervals. The preliminary design assumes that 90 percent of the original spoil material could be combined with finer materials (i.e., silts, clays), obtained from suitable borrow areas and then be utilized to construct the new levee. In addition, jetty jacks or other protective structures may be placed at certain locations to prevent erosion to the new levee from possible high river flows.

Fish and Wildlife Resources Without the Project

Historically the Rio Grande was a meandering multi-channeled river with oxbows, emergent wetlands and gallery-type cottonwood forests (U.S. Fish and Wildlife Service 1978, Campbell and Dick-Peddie 1964). Agricultural developments, particularly the draining and ditching activities of Federal and local project entities, have changed the character of the river. Today, water in the Rio Grande channel is intermittent and confined within a developed pilot channel with only a small portion of the original riparian woodlands and wetlands remaining. Continuous regulation of the river has facilitated the invasion of saltcedar, which has displaced native vegetation in many areas. Despite these impacts, the existing riparian habitat of the Rio Grande floodway provides significant habitat for wildlife, especially birds.



TYPICAL VALLEY CROSS-SECTION
 NOT TO SCALE

NO DAMAGE & IMPAIRMENT NEW MEXICO

TYPICAL VALLEY
 CROSS-SECTION

NOT TO SCALE

U.S. ARMY ENGINEER DISTRICT, ALBUQUERQUE, N.M.

FIGURE 2

Terrestrial Resources

Table 1 shows areas and vegetative descriptions of riparian woodlands and wetlands on both sides of the Rio Grande from San Acacia to San Marcial. The most extensive habitat on the west side of the river, where impacts are likely to occur, is palustrine scrub-shrub wetland. A large portion of this scrub-shrub habitat is composed of nearly pure stands of saltcedar. Large areas of palustrine scrub-shrub/palustrine emergent wetland are found on Bosque del Apache National Wildlife Refuge. The habitats on the refuge are composed largely of saltcedar in association with cattails, bulrushes and salt grass.

In some of the project area, the palustrine forest/scrub-shrub wetland habitat is dominated by mature Rio Grande cottonwoods with saltcedar as a dominant understory. In a few locations, Russian olive is found as the dominant understory shrub. Another common association of this habitat is the combination of Rio Grande cottonwood with saltcedar as the dominant overstory and understory.

The wildlife use most likely to occur along the Rio Grande from Española to San Acacia, New Mexico, within the cottonwood-Russian olive habitat, is a high density of birds, averaging over 900 birds per 100 acres. Some densities were as high as 2,159 birds per 100 acres. The number of different bird species or species richness (defined as the number of species present with a density greater than .5 per 100 acres) was also very high for cottonwood areas, with as many as 55 species found in one community structural type. The highest species richness values were found along drains. The most abundant species in cottonwood habitats were the mourning dove and black-chinned hummingbird. Other common species include Gambel quail, northern flicker, ash-throated flycatcher, European starling, American robin, black-headed grosbeak, dark-eyed junco, white-crowned sparrow, Coopers hawk and American kestrel (Table 2). Hink (1984) observed 277 species of birds in the study area, which represent over 60 percent of the bird species known to occur in New Mexico.

The wetland type habitat supports high bird densities but fewer bird species than the deciduous tree type. Bird densities were as high as 1,327 birds per 100 acres, but the highest species richness values were 20. Species found in cattail marshes are usually restricted to that specific habitat. Common wetland wildlife species from the Rio Grande corridor are listed in Table 3.

Endangered Species

The value of riparian habitat to Federally listed threatened and endangered species is important. Four Federally endangered species, the whooping crane, bald eagle, peregrine falcon and interior least tern, utilize the Rio Grande floodplain in the project area. Approximately 10 of the experimental Rocky Mountain whooping crane population presently winter in the area. They are most frequently found at Bosque del Apache National

Table 1. Areas and vegetative description of the categories of riparian woodlands and wetlands along the Rio Grande from San Acacia to San Marcial, New Mexico.

TYPE ^{1/} (Map symbol keyed to Figure)	DESCRIPTION ^{1/}	AREA (in acres) ^{2/}	
		East Side of Channel	West Side of Channel
<u>Palustrine System</u>	Includes all non-tidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens. The Palustrine System was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog and fen. It also includes the small, shallow, permanent or intermittent water bodies often called ponds.		
Palustrine Scrub/Shrub (PSS)	Areas dominated by woody vegetation less than 6 m (20 ft.) tall. The species include trees, shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. Salt cedar (<u>Tamarix pentandra</u>) predominates over most of this area with young coyote willow (<u>Salix exigua</u>) and Rio Grande cottonwood (<u>Populus fremontii wislizenii</u>) occurring. Four-wing saltbush (<u>Atriplex canescens</u>), various berry bushes (<u>Ribes</u> spp.), and New Mexico olive (<u>Forestiera neomexicana</u>) are shrubs found.	2,560	11,172
Palustrine Open Forest (PFO)	Area characterized by woody vegetation that is 6 m (20 ft.) tall or taller. Principally Rio Grande cottonwood with occasional patches of coyote willow.	126	437
Palustrine Emergent (PEI)	The emergent wetland areas are characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. Vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants. Characteristic plant species in this area are rushes (<u>Juncus</u> spp.) and cattails (<u>Typhus</u> spp.).	0	0
Palustrine Open Water (POW)	Ponded water with no emergent plant growth. Located outside of river channel.	0	27
Palustrine Open Forest// Palustrine Scrub/Shrub (PFO/PSS)	Combination with canopy of trees and understorey of scrub/shrubs.	2,360	3,058
Palustrine Scrub/Shrub/ Palustrine Emergent (PSS/PEI)	Combination of scrub/shrub and emergent vegetation.	47	8,065
Palustrine Scrub/Shrub// Palustrine Flats (PSS/PFL)	Combination of scrub/shrub and mud flats.	0	250
Palustrine Open Forest// Palustrine Emergent (PFO/PEI)	Combination of forested canopy over emergent vegetation.	0	52
<u>Riverine System</u>	Includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 o/oo.		
Riverine Open Water (R2OW and R4OW)	Areas of open water within the riverine system.	0	916

1. Source: USFWS 1980.

2. Source: Cowardin et al. 1979.

Table 2. Common Wildlife Species found in the Cottonwood or Deciduous Tree Habitat Type (Hink and Ohmart 1984)

Common Name	Scientific Name
Mourning dove	<u>Zeniada macroura</u>
Black-chinned hummingbird	<u>Archilochus alexandri</u>
Gambel quail	<u>Callipepla gambelii</u>
Northern flicker	<u>Colaptes auratus</u>
Ash-throated flycatcher	<u>Myiarchus cinerascens</u>
European starling	<u>Sturnus vulgaris</u>
American robin	<u>Turdus migratorius</u>
Black-headed grosbeak	<u>Pheucticus melanocephalus</u>
Dark-eyed junco	<u>Junco hyemalis</u>
White-crowned sparrow	<u>Zonotrichia leucophrys</u>
Cooper hawk	<u>Accipiter striatus</u>
American kestrel	<u>Falco sparverius</u>
Eastern fence lizard	<u>Sceloporus magister</u>
New Mexico whiptail lizard	<u>Sceloporus magister</u>
White-footed mouse	<u>Peromyscus leucopus</u>
Western harvest mouse	<u>Reithrodontomys montanus</u>
House mouse	<u>Mus musculus</u>
Botta pocket gopher	<u>Thomomys bottae</u>
Rock squirrel	<u>Spermophilus variegatus</u>
Beaver	<u>Castor canadensis</u>
Muskrat	<u>Ondatra zibethicus</u>
Raccoon	<u>Procyon lotor</u>
Porcupine	<u>Erethizon dorsatum</u>
Striped skunk	<u>Mephitis mephitis</u>
Desert cottontail	<u>Sylvilagus auduboni</u>
Coyote	<u>Canis latrans</u>

Table 3. Common Wildlife Species found in the Wetland Habitat Type.
(Hink and Ohmart 1984).

Common Name	Scientific Name
Pied-billed grebe	<u>Podilymbus podiceps</u>
Virginia rail	<u>Rallus limicola</u>
Sora	<u>Porzana carolina</u>
American coot	<u>Fulica americana</u>
Yellow-headed blackbird	<u>Xanthocephalus xanthocephala</u>
Red-winged blackbird	<u>Agelaius phoeniceus</u>
Killdeer	<u>Charadrius vociferus</u>
Spotted sandpiper	<u>Actitis macularia</u>
Black phoebe	<u>Sayornis nigricans</u>
Marsh wren	<u>Cistothorus palustris</u>
Song sparrow	<u>Melospiza melodia</u>
Swamp sparrow	<u>Melospiza georgiana</u>
Woodhouse toad	<u>Bufo woodhousei</u>
Chorus frog	<u>Pseudacris triseriata</u>
Bullfrog	<u>Rana catesbeiana</u>
Tiger salamander	<u>Ambystoma tigrinum</u>
Common gartersnake	<u>Thamnophis sirtalis</u>

Wildlife Refuge. Eight bald eagles, which were also winter residents, utilized the riparian habitat on and near the refuge during the past winter. Two sightings of the interior least tern have been confirmed at Bosque del Apache National Wildlife Refuge. The terns are spring/fall migrants and were possibly vagrants. A determination has been made that the project will not adversely impact the whooping crane, bald eagle or interior least tern. The construction time period will be delayed during the winter months when the animals are present and resume during the spring-fall months of each year when the animals are absent.

The project may have an impact on the Federally endangered peregrine falcon. The peregrine falcon, a spring/fall migrant along the Rio Grande, is a predator on waterfowl inhabiting the low flow conveyance channel. Presently, the low flow conveyance channel has low to moderate flows. This is a result of flows being diverted at San Acacia into the historic Rio Grande channel (the reason for this diversion is the "wet" cycle experienced during the last five years and the deterioration of the low flow conveyance channel at its juncture with Elephant Butte Reservoir). The reduced flows in the low flow conveyance channel enable emergent vegetation to become established, attracting waterfowl which in turn attract the peregrine falcon. Depending on future flows in the conveyance channel and their relation to construction activity from the project, there may be an impact on the peregrine falcon's hunting activity. Importantly, there exists an opportunity for this project to provide additional critical

habitat for these Federally endangered animals by providing habitat improvement on adjacent Bosque del Apache National Wildlife Refuge as well as adjacent state refuges.

Aquatic Resources

On July 26-27, 1988, Service personnel conducted a project-wide electrofishing survey on the low flow conveyance channel and collected one water quality sample at the Elmendorf Drain outfall (approximately eight miles south of the Bosque bridge) (Table 4). The water quality test was conducted to assess the quality of irrigation return water. Fish surveys were conducted at five mile increments for the entire project area, using the Bosque Bridge as a reference point (Table 5). These data are included in the report to address the fishery in the waters of the low flow conveyance channel and not because of perceived or anticipated impacts on the conveyance ditch from the levee project. Fish surveys were also conducted on ponds at Bosque del Apache National Wildlife Refuge. The species, in order of abundance collected on the refuge were carp, mosquito fish, sunfish and bullheads. No fish surveys were conducted in the historic Rio Grande channel.

Data collected at the Elmendorf Drain are presented in Table 4. One water quality sample and fish survey were conducted at this site.

Table 4. Water quality test at the Elmendorf Drain (approximately eight miles south of Bosque bridge).

Water Quality		Fish Species	Amount
Turbidity	80 NTU	Carp	9
Total chlorine	0.10 mg/l	Sunfish	3
Free chlorine	0.05 mg/l	Gambusia	50+
Ammonia	ND	Channel catfish	2
Hardness	(Ca CO ₃) 420 mg/l	Bullhead	1
Temperature	60°F		
Ph	7.8 at temperative of 6.5°C		
Conductivity	700 micromhs		

Future Fish and Wildlife Without the Project

No significant change in fish and wildlife habitat is expected in the future without the project. Residential development should not impact this area because of its distance from major metropolitan areas. Additionally, agricultural practices presently being managed adjacent to this area should remain stable.

Table 5. Fish Species in Low Flow Conveyance Channel.

Site	Habitat Type	Conductivity (Micromhos)	Water Temp (°F)	Time Sur- veyed (Sec.)	Distance covered (Ft.)	Carp	Sunfish	Mosquito- fish	Channel catfish	Bullhead	Long-nosed dace	Bluegill	Shiner	Shad	White Bass	Sucker
Bosque Bridge	Rock bottom pool/riffle swift current	90	78	386	225	25			6		15					
1.5 miles south of Bosque Bridge	Sand bottom pool/riffle swift current	90	78	209	150	6						1				
3.0 miles south of Bosque Bridge	Sand bottom pool/riffle swift current	90	78	188	150	1	2	2								
5 miles south of Bosque Bridge	Sand bottom pool/riffle moderate current	Not taken	Not taken	261	150	1	10						1			
9 miles south of Bosque Bridge further travel possible because of lake level).	Sand bottom almost no current	710	70	324	200	1	8						6	12	1	
1.5 miles north of Bosque Bridge (unit 6 outlet)	Rocky bottom swift current	100	62	486	150	13			3	4			3		3	1
0 miles north of Bosque Bridge	Rocky bottom swift current	Not taken	Not taken	217	150	9						2			1	
5 miles north of Bosque Bridge	Rocky bottom swift current	100	72	229		1	1									23
1 miles north of Bosque Bridge	Rocky bottom swift current	70	72	205	150			1	14	2			2			
5 miles north of Bosque Bridge	Rocky bottom emergent vegetation swift current	130	80	234	150	10	3	20								
1 miles north of Bosque Bridge	Rocky bottom emergent vegetation swift current	100	74	262	150	24										21

10

Impacts to Fish and Wildlife With the Project

The plan being evaluated for increasing the level of flood protection to floodplain improvements from San Acacia to Elephant Butte Reservoir, consists of rehabilitating the existing spoil bank that is located on the west bank of the Rio Grande. Four flood frequency levels of protection have been evaluated, the 50-, 100-, and 200-year, as well as the Standard Project Flood frequency. Of these flood frequencies, the 100-year level of protection has been selected as the recommended plan.

Terrestrial Resources

Major aspects of project construction were focused upon during the analyses of impacts on wildlife habitat. These features include the new levee alignment, spoil areas, borrow areas, haul roads, Kellner Jack placements and armoring of the riverside toe of the levee. Each of these construction activities will impact riparian habitat. Depending upon the location of these activities, impacts will range from adverse affects on high value cottonwood forests to simple disturbance of unvegetated soil. However, without knowing the exact location of construction activities, site specific mitigative measures cannot be provided.

Based upon discussions with Corps personnel and analysis of the Decision Document and subsequent refined data, we assume the levee will be constructed with the following specifications. In reconstructing the levee, the Corps will use the material that presently exists in the levee, mixing it with some additional soil when necessary. The Corps assumes that 10-15 percent of the existing levee soil might be unsuitable, thus necessitating the construction of borrow areas. Haul roads and turn-around sites would also be necessary. The Corps estimates that 117 acres will be necessary for these features.

The proposed alignment of the levee will be closely positioned to its present location or slightly aligned to the west. Based upon reconnaissance of the project area, we believe it is possible to reconstruct the levee so there will be no impact to the adjacent riparian habitat. Every effort should be made to avoid wetland areas. However, as stated by the Corps in their refined data, impact to 42 acres could occur from the new levee alignment.

Final engineering data has highlighted a feature of this project that has just recently been developed. Based upon the latest engineering design, the existing levees are much larger than necessary. Therefore, the disposal of excess material will be required. The spoil will be used to build up banks, in locations where the river channel is close to the levee. Some construction activity would take place in the river, which could cause an increase in sediment loading. Acreage figures from the deposition of this spoil have not been converted to mitigation acreage figures. Depending upon the size of this activity mitigation acreage may be substantially increased.

Aquatic Resources

Originally, the project data indicate that there would be no construction impact to the waters in the Rio Grande or in the low flow conveyance channel. Groundwater and surface watered wetlands that presently exist, because of the elevation of Elephant Butte Reservoir, would also be avoided. With the latest engineering feature, spoil deposition, these will probably be an impact to the Rio Grande channel. This feature has not been discussed in the mitigation plan.

Endangered Species

The construction of the proposed levee could impact the Federally endangered peregrine falcon. Agreement has been reached that construction would be halted during the winter (November-February) months, insuring no disturbance to the bald eagle and whooping crane. The likelihood of disturbing the interior least tern is remote, based on frequency of sightings in the Rio Grande.

As discussed previously in this report, the peregrine falcon is a spring/fall migrant in the Rio Grande valley and because of existing conditions in the low flow conveyance channel, there is a possibility of project impacts to the bird.

DISCUSSION

During the review of the project, a determination was made that significant riparian/wetland habitat impacts will occur. However, we believe that project impacts to these resources could be mitigated, by management activities in the Rio Grande riparian area and on adjacent wildlife refuges.

Project features, borrow and spoil areas, haul roads and turn-around sites will impact 117 acres of Rio Grande riparian area. Additionally, using a worst case scenario, another 42 acres of riparian area will be impacted by the new levee alignment. As presently planned, a total of 159 acres of riparian habitat will be modified by the levee construction. Depending upon the kind of riparian habitat type impacted, mitigation can offset this figure. Because of the scarcity and high wildlife value of cottonwood, willow and Russian olive habitat in the Rio Grande, a high mitigative ratio of 5:1 has been used. A variation of this type of habitat, i.e., cottonwood/willow, cottonwood, willow, Russian olive, if impacted, it should be mitigated at no less than 4:1 ratio. Salt cedar and open riparian areas should be mitigated on a 2:1 ration.

The mitigation for riparian impacts can be accomplished using cottonwood/willow pole plantings, and the planting of understory riparian species. Understory riparian species should include wolfberry, skunkbush sumac, screwbean mesquite, silver buffaloberry and fourwing saltbush.

Grasses such as blue grama, galleta, western wheatgrass, little bluestem, spike muhly, sheep fescue, Indian ricegrass, side oats grama and alkali sacaton should also be included in the plantings. We suggest that at least one study be initiated using the above grass species in conjunction with an erosion blanket on the face of the existing spoil levee.

Modification of borrow areas should be accomplished for wildlife. Considerable data and expertise on construction and management of borrow areas for wildlife is available from previous Corps studies. Borrow areas, if properly constructed, add habitat variety and structure to riparian areas. We believe a small site within the influence of the low flow channel should be constructed for study purposes.

Severe impacts to wildlife and fisheries presently result from the management of the low flow conveyance channel during normal and "wet" cycle years. A detailed study, similar to the Hink and Ohmart study conducted in the middle Rio Grande is needed for this area. The study should be performed during different management regimes of the low flow conveyance channel (normal versus wet cycles) to provide data on the Rio Grande during watered and dewatered conditions. This study should focus on riparian wildlife species with special emphasis on Federally endangered species.

A recent survey conducted by the New Mexico Department of Game and Fish found approximately 40 bald eagles in and around Elephant Butte Reservoir (immediate vicinity of Bosque del Apache National Wildlife Refuge). These birds were taking advantage of the fish and waterfowl prey base that is available at the reservoir. The reservoir, at its present elevation, is ideal for these birds since they prefer to roost and perch in trees located in the vicinity of their food source.

Proposed management practices on adjacent Bosque del Apache National Wildlife Refuge as well as State refuges in the immediate vicinity would result in a benefit to the eagles. Presently these refuges are converting their unproductive lands to moist soil management. This practice will expand the eagle's prey base. Moist soil management also involves some acreage conversion to cottonwood/willow habitat to provide roosting and perching trees for eagles.

Bosque del Apache National Wildlife Refuge personnel have developed a plan for converting the monotypic salt cedar habitat on the refuge to moist soil habitat. This plan involves clearing the salt cedar habitat within certain leveed areas and applying controlled water management. This should convert lands vegetated with salt cedar to habitat that will attract large numbers of waterfowl. Management of the moist soil lands will also enlarge fishery habitat, thus, providing an additional prey base for the eagle. This water management plan, in conjunction with tree plantings, will create a situation similar to the one presently available at Elephant Butte Reservoir. Moist soil management on the refuges will also enlarge habitat

potential for feeding, loafing and nesting for benefit of the other Federally endangered species i.e., the interior least tern, whooping crane and American peregrine falcon.

This project provides an excellent opportunity to enhance lands for fish and wildlife purposes. Public Law 99-662, dated Nov. 17, 1986, cited as the Water Resources Development Act of 1986, provides an avenue to enhance lands for species of national concern as well as Federally endangered plants and animals. As previously discussed, the Bosque del Apache National Wildlife Refuge is situated in the project area and offers the chance for project funds to enhance refuge lands. This authority is cited as follows in Sec 906 (e) (1) (2) (3) of the Act:

In those cases when the Secretary, as part of any report to Congress, recommends activities to enhance fish and wildlife resources, the first costs of such enhancement shall be a Federal cost when:

- 1) such enhancement provides benefits that are determined to be national, including benefits to species that are identified by the National Marine Fisheries Service as of national economic importance, species that are subject to treaties or international convention to which the United States is a party, and anadromous fish;
- 2) such enhancement is designed to benefit species that have been listed as threatened or endangered by the Secretary of the Interior under the terms of the Endangered Species Act, as amended (16 U.S.C. 1531, et seq.), or
- 3) such activities are located on lands managed as a national wildlife refuge.

With species of national concern, waterfowl, the presence of numerous Federally endangered species and the location of a national refuge in the project area, the provisions of the Act are fully met for enhancement.

New Mexico Department of Game and Fish personnel are also studying the conversion of unproductive refuge lands to wetland or moist soil habitat. Due to inadequate water control structures, the refuges at La Joya and Bernardo (immediately north of the project area) are presently underutilized. With an upgrade in these water structures, moist soil management areas can be developed to enhance State lands for wildlife.

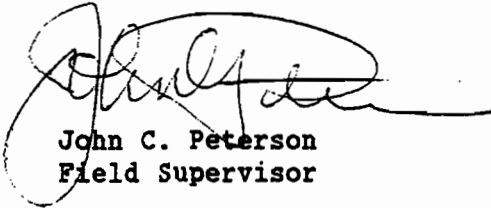
Additional wetlands at Bosque del Apache National Wildlife Refuge and State refuges should be created to compensate for any possible disturbances to the peregrine falcon, the bald eagle and whooping crane. This would create an additional food base, loafing and hunting areas for the peregrine falcon, bald eagle, whooping crane and waterfowl species.

Recommendations

1. The basal width of the new levee shall be oriented as close as possible to the low-flow channel to reduce the loss of riparian/wetland habitat.
2. Existing roads shall be used to move equipment or haul fill. In areas where it is necessary to construct new roads, they shall be located on barren ground, areas where vegetation is sparse, or in monotypic saltcedar habitat. Palustrine forest and scrub-shrub habitats where cottonwood trees are a major component as well as any palustrine emergent habitats shall be avoided.
3. Stockpile and equipment turnaround areas should be placed in barren areas. If barren areas are not available, monotypic stands of saltcedar shall be used.
4. If needed, borrow excavation sites shall be located in open areas or in monotypic stands of salt cedar. These borrow areas shall be modified for benefit of wildlife.
5. All areas designated as temporary impact areas (haul roads, stockpile areas, turnarounds, etc.) shall be revegetated with cottonwood, willow, Russian olive and native shrubs. Because these disturbed areas are often invaded rapidly by saltcedar, it may be necessary to suppress saltcedar until the planted vegetation is established. A study should be conducted on the vegetative techniques, using pole plantings, rainfall harvesting and erosion blankets.
6. Large cottonwoods that might die as a result of root damage from the placement of the levee toe shall be left in place, creating snags that provide a valuable habitat component for a variety of wildlife.
7. Any cottonwood/willow/Russian olive habitat that is impacted will be mitigated at a 5:1 ratio. Additionally, any combination of these habitat, cottonwood, willow and Russian olive shall be mitigated at a 4:1 ratio. Barren and monotypic salt cedar areas will be mitigated at a 2:1 ratio.
8. A detailed wildlife analysis, similar to the Hink/Ohmart study, shall be conducted for the entire project reach.
9. Financial participation in modifying Bosque del Apache National Wildlife Refuge and local State refuges for the benefit of waterfowl and Federally endangered species,

shall be accomplished. Plans for converting low value habitat at Bosque del Apache to high value riparian wetland habitat will cost 1.5 million 1989 dollars. Additionally, conversion of similar land at Bernardo or La Joya State Refuge will cost \$200,000 1989 dollars.

Sincerely yours,



John C. Peterson
Field Supervisor

cc:

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Refuge, Manager, Bosque del Apache National Wildlife Refuge, Socorro,
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Regional Director, U.S. Fish and Wildlife Service, Fish and Wildlife
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CORPS OF ENGINEERS' RESPONSE
TO
FINAL FISH AND WILDLIFE COORDINATION ACT REPORT

1. Recommendation No. 1. The basal width of the new levee shall be oriented as close as possible to the low-flow channel to reduce the loss of riparian/wetland habitat.

Response: Concur

2. Recommendation No. 2. Existing roads shall be used to move equipment or haul fill. In areas where it is necessary to construct new roads, they shall be located on barren ground, areas where vegetation is sparse, or in monotypic saltcedar habitat. Palustrine forest and scrub-shrub habitats where cottonwood trees are a major component as well as any palustrine emergent habitats shall be avoided.

Response: Concur to the extent possible.

3. Recommendation No. 3. Stockpile and equipment turnaround areas should be placed in barren areas. If barren areas are not available, monotypic stands of saltcedar shall be used.

Response: Concur. However, few, if any, stockpile areas are anticipated.

4. Recommendation No. 4. If needed, borrow excavation sites shall be located in open areas or in monotypic stands of salt cedar. These borrow areas shall be modified for benefit of wildlife.

Concur. Planned measures to benefit wildlife are conversion to wetlands and revegetation with native riparian plants.

5. Recommendation No. 5. All areas designated as temporary impact areas (haul roads, stockpile areas, turnarounds, etc.) shall be revegetated with cottonwood, willow, Russian olive and native shrubs. Because these disturbed areas are often invaded rapidly by saltcedar, it may be necessary to suppress saltcedar until the planted vegetation is established. A study should be conducted on the vegetative techniques, using pole plantings, rainfall harvesting and erosion blankets.

Response: Generally concur. There is probably no need to study vegetation techniques such as rainfall harvesting and use of erosion control blankets since the techniques are well known.

6. Recommendation No. 6. Large cottonwoods that might die as a result of root damage from the placement of the levee toe shall be left in place, creating snags that provide a valuable habitat component for a variety of wildlife.

Response: Concur. This recommendation would be made a requirement upon the agency that assumes the operation and maintenance responsibility of the project.

7. Recommendation No. 7. Any cottonwood/willow/Russian olive habitat that is impacted will be mitigated at a 5:1 ratio. Additionally, any combination of these habitats, cottonwood, willow and Russian olive shall be mitigated at a 4:1 ratio. Barren and monotypic salt cedar areas will be mitigated at a 2:1 ratio.

Response: The Corps can agree to a replacement ratio no greater than 2 to 1, utilizing native trees for unavoidable saltcedar removal. The basis for this replacement ratio is the long-term removal of "edge" which generally has the higher wildlife use, the uncertainty of the extent of replacement success at this time (pole planting at Bosque del Apache should help clarify this uncertainty), and the appreciably lower cost of compensation at Bosque del Apache National Wildlife Refuge. No compensation will be made for vegetation removal in association with wetland creation.

The replacement ratio for cottonwood and willow dominated plant associations is excessive based on the two definitive wildlife studies conducted in the area and the appreciable higher wildlife use of replacement vegetation anticipated (even by the Service itself) on Bosque del Apache National Wildlife refuge due to intense management and protection from fire and grazing. However, since the acreage of these plant associations will likely be small, an equitable agreement is anticipated. We have coordinated this issue informally with our higher authority reviewers.

8. Recommendation No. 8. A detailed wildlife analysis, similar to the Hink/Ohmart study, shall be conducted for the entire project reach.

Response: Do not concur. The effects of the various water management practices on riverine and riparian fish and wildlife resources are largely outside the scope of the project and its influence of the present ecosystem. Present studies, i.e., Hink and Ohmart and Raitt et al. are providing necessary planning guidance to preserve, conserve, and enhance riparian resources.

9. Recommendation No. 9. Financial participation in modifying Bosque del Apache National Wildlife Refuge and local State refuges for the benefit of waterfowl and Federally endangered species, shall be accomplished. Plans for converting low value habitat at Bosque del Apache to high value riparian wetland habitat will cost 1.5 million 1989 dollars. Additionally, conversion of similar land at Bernardo or La Joya State Refuge will cost \$200,000 1989 dollars.

Response: The Corps of Engineers involvement with State and Federal refuges can only be in association with compensation and enhancement as specified in the Water Resources Development Act of 1986. Compensation measures accomplished on refuges would largely have to be "in kind" for resources or ecosystems adversely affected. As currently envisioned, the replacement cost for resources adversely affected would be transferred to the U. S. Fish and Wildlife Service for compensation work at Bosque del Apache. This federal refuge is the likely compensation location since any adverse project effects would be in this general area and restoration should generally be in the area affected. The Corps will recommend riparian habitat enhancement

at Bosque del Apache NWR in accordance with the Water Resources Development Act of 1986. The amount of enhancement and cost will be developed in coordination with the Service.

Additional responses to issues presented in the main text of the Coordination Act Report are as follows:

1. Page 3, Project Description, General. The project description should recognize the planned creation of about 40 acres of wetlands from borrow areas.
2. Page 3, second paragraph, third sentence. The current design is for a 16-foot-wide crest width; 2.5:1 side slopes for the first 42 miles and 3:1 for the lower 13 miles; and a average levee height of 9.8-feet.
3. Page 8, second paragraph. Section 7 consultation under the Endangered Species Act has determined that there would not be any significant interaction between the planned action and the peregrine falcon.
4. Page 11, 4th paragraph, last sentence. Forty-two acres is used as a reasonable worst case figure, recognizing that no vegetation is present along some reaches of the "spoil bank levee".
5. Page 11, last paragraph. The disposal of surplus earth has not been finalized. Likely disposal measures at this planning stage consist of adding more earth to the riverward side of the reconstructed levee if sufficient room is available and the extension of river banks in areas where the river channel is next to the levee. Earth placed in the river channel is next to the levee. Earth placed in the river channel to extend the river banks would be stabilized with Kellner jacks and riparian vegetation to preclude or minimize its erosion by streamflow. An indirect consequence of bank extension could be to expand riparian vegetation.
6. Page 12, third paragraph. Please refer to comment 3.
7. Page 12, penultimate paragraph, first and second sentences. The use of the subjunctive mood might be more appropriate since figures given to the Service represent a reasonable worst case analysis.
8. Page 12, last paragraph. The recommended mitigation ratios are discussed later in association with the Service's recommendation.
9. Page 13, fist paragraph. Revegetation techniques are known sufficiently that this recommendation is not necessary.
10. Page 13, second paragraph. The Corps concurs that prior to the creation of a large number of wetlands the underground hydraulic regime should be evaluated in relation to the development of "healthy" marshes.
11. Page 13, third paragraph. These effects of a modified flow regime are largely independent of the planned effort. Existing wildlife studies by Hink and Ohmart and Raitt et al. are providing appreciable guidance for project planning.

12. Page 14, first complete paragraph. The Corps concurs with this potential opportunity to enhance resources at Bosque del Apache National Wildlife Refuge in association with the proposed action. This potential will be pursued as part of the project.

13. Page 14, first paragraph. Measures to avoid adverse effects to potentially endangered species were established in Section 7 coordination under the Endangered Species Act. The Corps concurs that Bosque del Apache National Wildlife Refuge would serve as an excellent location for compensation measures for unavoidable loss of wildlife habitat associated with project construction. However, these measures relate to enhancement rather than compensation for endangered species. The creation of wetlands as now planned would very likely enhance the bald eagle and peregrine falcon but a majority of these would not be on the refuge.

APPENDIX D
FISH AND WILDLIFE MITIGATION
INCREMENTAL COST ANALYSIS

APPENDIX D

FISH AND WILDLIFE MITIGATION INCREMENTAL COST ANALYSIS

INTRODUCTION

Incremental analysis is a Corps of Engineers' policy mandated procedure that describes the process followed and factors considered in selecting fish and wildlife mitigation features. This procedure identifies cost differences for mitigation features that address a mitigation objective and help select the most cost effective mitigation features. The opportunity to incorporate management options or various levels of management within a given plan or alternative for this particular project is limited because of the type of mitigation measures considered, by existing land use, or both.

RESOURCE INVENTORY AND CATEGORIZATION

The plant and animal communities which characterize the study area have been described in Section III of the final SEIS to which this Incremental Analysis is appended. Plant communities that could or would be affected by the planned action consist of the following dominant vegetation or areas: cottonwood/willow edge; salt cedar edge; salt cedar non-edge; wetland; open-area mixture of grasses, forbs, shrubs; sapling trees of cottonwood, salt cedar, and willow; and open-area sparse grasses and salt cedar. Upland grass and shrub habitat would also be affected by borrow activities. However, this plant community is not included in the mitigation analysis since borrow area revegetation with similar or higher wildlife value grasses and shrubs is an integral part of project construction. Of these plant communities, the native plant associations of cottonwood and willow and cattail marsh have the highest priority in terms of wildlife values and regional importance. Ranking of habitat is based on quantitative wildlife use referenced and discussed in the main body of the final SEIS, as well as resilience and time to reestablish a community of comparable composition and structure.

AMOUNT OF HABITAT TYPES REMOVED

The draft SEIS employed a reasonable, worst case estimate of acreage affected because design features were still general at that stage of planning. Subsequent refinement of design features has enabled a corresponding refinement of project effects and acreage affected. An assumption is made that recently developed wetlands, caused by high water storage in Elephant Butte Reservoir, would persist, following reservoir drawdown and rehabilitation of sediment-filled water conveyance facilities. Mitigation in the form of compensation would be accomplished for vegetation and wetland losses incurred primarily as a result of levee enlargement and reconstruction. A reasonable, worst case analysis is still employed where the extent of disturbance is unknown, e.g., abandoned conveyance channel.

Survey results showed that about 14.5 acres of various aged salt cedar, 200 cottonwood trees with a 6-inch dbh (diameter at breast height) or greater, 38 tree willows (Salix goodingii or S. amygdaloides), 10 Russian olive trees, and

about 0.1 acre of a combination of salt cedar, cottonwood, and tree willow saplings could be removed from the first 43.8 miles of embankment. The remaining 10.5 miles, most of which is within Elephant Butte Reservoir or affected by high water storage, could lose about 17.5 acres of various aged salt cedar, 360 cottonwood trees, 109 tree willows, and 3.5 acres of a combination of salt cedar, cottonwood, and willow saplings. Many cottonwood trees are located in relatively dense, discontinuous stands at the toe of the embankment. Total combined acreage or number that could be removed are about 32 acres of salt cedar (mostly edge), 560 cottonwood trees, 147 tree willows, 10 Russian olive trees, and 3.6 acres of a combination of salt cedar, cottonwood and tree willow saplings (see Table 1).

Table 1

<u>Plant Community</u>	<u>Acreage or Number</u>
Salt Cedar	
Edge	32 (ac.)
Non-Edge	Small acreage possibly used for wetland mitigation
Cottonwood Edge	560 (ea.)
Tree Willow Edge	147 (ea.)
Mixture of Salt Cedar, Cottonwood, and Willow Saplings	3.6 (ac.)
Russian Olive Edge	10 (ea.)
Upland Grassland and Shrub	60 (ac.)
Wetlands	
Abandoned Conveyance Channel	6 to 7 ac. max.
Levee Toe Marsh	6 to 7 ac.

Cottonwood and willow forest and woodland rank high in wildlife species diversity and require several decades to establish. Also, the high wildlife use of this community is more pronounced along the levee edges where contributions from adjacent and different habitat types compliment wildlife use of this zone. Because of these characteristics any temporary, and especially permanent, removal of mature cottonwood- and willow-dominated communities is a major mitigation objective.

Salt cedar communities rank relatively low in species diversity although density of those species utilizing salt cedar is relatively high. Salt cedar is very resilient and is capable of rapidly re-establishing. The selective clearing of salt cedar stands, followed by revegetation with native trees, has shown significant potential for increasing bird density and richness. Also, the relatively low wildlife use of salt cedar makes stands of this plant species prime candidates for constructing high value wetlands or planting compensatory cottonwood/willow vegetation.

Open, early age communities have moderate to high wildlife density and diversity. They are commonly located in or near the active river channel, side channels, or areas where riparian vegetation has been eliminated by long-term inundation. They frequently follow a pattern of removal by high flows followed by re-establishment. Although these community types are resilient, those with a dominance of cottonwood and willow have the potential to develop into higher wildlife use acres and, consequently, would be avoided to the extent possible. This community type would be considered as a candidate area for wetland creation.

Sparsely vegetated, dry openings have both low wildlife diversity and density. This community type would be used for any needed construction-related activity. These areas would be prime compensation sites for establishment of cottonwood/willow trees or wetland compensation.

Wetlands are particularly valuable habitat for a diversity of wildlife because of their relative scarcity in the arid Southwest, their productivity, and because many wildlife species are directly dependent on aquatic habitat. Wildlife use of wetlands that could be affected by project construction is limited by a lack of standing water, disturbance, size and configuration, and grazing. Wetland compensation may include rehabilitation of the Mulligan Gulch Wetland.

Upland grassland, and especially creosotebush-dominated shrubland, are candidate borrow locations because of the potential to re-establish vegetation rapidly, as well as the potential to improve ground cover and associated uses in the case of creosotebush.

COMPENSATION MEASURES AND QUANTITIES

Measures to compensate for the reduction of wildlife habitat have been recommended by the U.S. Fish and Wildlife Service (Service) during the development of the recommended plan and were reflected in the draft SEIS (see Appendix C). The Service's recommended replacement ratios are: two acres of cottonwood tree plantings (poles) for each acre of salt cedar removed and five acres of cottonwood tree plantings for each acre of cottonwood, willow, or Russian olive removed. While Bosque del Apache NWR was initially selected by the Service and the Corps as the site where a majority of compensation measures (replacement of removed vegetation with cottonwood and willow trees) would be accomplished, the Service and the New Mexico Department of Game and Fish asked that a different compensation strategy be utilized following the distribution of the draft SEIS. This strategy involves relocating the compensation site from Bosque del Apache NWR to within the riparian zone at selected sites throughout the project area (generally above Elephant Butte Reservoir). The rationale for this change is to compensate for losses closer to affected areas, thereby maintaining the overall wildlife use of the riparian zone and using an existing program of salt cedar replacement on Bosque del Apache NWR to enhance wildlife habitat on the Refuge proper.

An additional element of this modified strategy is to reserve a portion of the riparian zone for wildlife conservation via a conservation easement. The primary goal of a conservation easement would be to improve habitat with management - primarily by excluding grazing. Used in tandem, the amount of planted acreage could be reduced commensurate with the extent of the conservation easement. As stated in the main text, coordination will continue with the Middle Rio Grande Conservancy District, the land-managing agency. If not feasible, then

compensation by the use of replacement vegetation and associated management would be the prime method of compensation. These compensation strategies are discussed in the following paragraphs.

The Corps has conducted a quantitative assessment of potential loss of habitat use by wildlife compared to wildlife use of replacement vegetation through time to develop compensation ratios. Replacement vegetation would be cottonwood and willow utilizing the pole planting technique, which consists of planting a dormant pole in a small diameter hole that is excavated to the water table. This quantitative evaluation compared avian use of the various community/structure types, since birds are the largest animal group utilizing riparian vegetation and are good indicators of habitat quality. Where specific quantitative data were not available, use figures that were thought to insure conservation of use were selected. Compensation ratios developed by the Corps for the major community/structure types that could be affected utilizing cottonwood/willow replacement vegetation are presented in Table 2. Compensation for lost wetlands will be at a one-for-one replacement ratio. This compensation ratio for affected wetlands is considered highly adequate because of the anticipated higher quality that can be achieved through constructed wetlands. Replacement of affected wetlands would be accomplished by their improvement, expansion, replacement, or all three.

Table 2

<u>Community Affected</u>	<u>Replacement Ratio</u>
Cottonwood/Willow Edge	1:2 Ratio (Removal considered permanent)
Salt Cedar Edge	1:1.6 Ratio (Removal considered permanent)
Salt Cedar Non-Edge	Possible use for wetland compensation. No replacement.
Open Areas - mixture of salt cedar, cottonwood, & tree willow saplings	1:1.1 (Removal considered permanent)
Wetlands	
Abandoned Conveyance Channel	Improvement of affected areas or 1:1 replacement.
Levee Toe Wetlands	1:1
Upland Grass & Shrubland	1:1 (Temporary removal, mechanical revegetation)

Although the developed replacement ratio for the removal of cottonwood and willow edge is 1:2, a ratio of 1:4 is conditionally adopted. This increase has been accomplished because of the lack of long-term data for the establishment and developmental success of plantings. While short-term data at Bosque del Apache NWR demonstrates good to excellent results, the success of the program will be monitored and, if necessary, the stated ratio modified. Presented in Table 3 is the estimated compensation acreage by revegetation category. A planting density of approximately 100 cottonwood/tree willow pole plantings per acre is utilized.

Acquisition of a wildlife conservation easement within the riparian zone and subsequent fencing and management would enhance plant diversity and structure and, correspondingly, enhance fauna diversity and density. This enhancement would be maximized in those plant communities with demonstrated high wildlife use, e.g., cottonwood/willow. Therefore, a strategy of selecting existing cottonwood stands and managing for wildlife can be an effective compensation measure. A conservative estimate of the increase in wildlife value that would occur utilizing a conservation easement is 25 percent, realizing that the exclusion of grazing in some southwestern riparian zones has far exceeded this figure. Therefore, a ratio of 4 acres of easement lands can be substituted for every acre of planned planted acreage. Arbitrarily using one-half (46.3) of the 92.6 acres that would be planted, about 185 acres could be acquired for a wildlife conservation easement. As stated, the acreage figures for planting and conservation easements may be adjusted, depending on actual site conditions, increasing easement lands while decreasing planted acreage or visa versa.

Table 3

Estimated Number of Compensation Acres by Vegetation Category

<u>Category</u>	<u>Compensation Ratio</u>	<u>Acres or Numbers Affected</u>	<u>Compensation Acreage*</u>
Cottonwood/Willow Edge (includes Russian olive)	1:2 (ultimately 1:4)	707 ea.	28.3 ($\frac{4 \times 707}{100}$)
Salt Cedar Edge	1:1.6	32 ac.	51.2 (1.6 x 32)
Salt Cedar	Possible use of small acreage for wetland compensation - no compensation		
Open Area (early growth stage consisting of sparse grasses, shrubs, & saplings of cottonwood, willow & salt cedar)	1:1.1	3.6 ac.	4 (1.1 x 3.6)
Wetlands			
Abandoned Conveyance Channel	Improvement of Affected Areas	6-7	6-7 (1 x 6-7)
Levee Toe Wetlands	1:1	6-7	6-7 (1 x 6-7)

Estimated Compensation Requirements Specific to Bosque del Apache NWR

<u>Category</u>	<u>Compensation Ratio</u>	<u>Acres or Numbers Affected</u>	<u>Compensation Acreage</u>
Cottonwood Edge	1:5	0.1	0.5 (0.1 x 5)
Salt Cedar Edge	1:2	4.26	8.5 (2 x 4.26)
Open Areas (mixed saplings)	1:1	0.1	0.1 (1 x 0.1)

*100 cottonwood/tree willow plantings per acre

COMPENSATION ALTERNATIVES (STRATEGIES)

Several alternative measures were formulated and evaluated to select a compensation plan that was both cost effective and accomplished the objectives established for the project. As stated, the alternative that was recommended in the draft SEIS, use of Bosque del Apache NWR, was removed from consideration following public review of the draft SEIS and subsequent meetings with the Fish and Wildlife Service and the New Mexico Department of Game and Fish. The Service requested that their previously recommended use of Bosque del Apache NWR for accomplishing project compensation be changed to accomplishing compensation within the riparian zone of the Rio Grande throughout the length of the project. Consequently, this alternative is no longer a viable option and is not included in the following discussion of alternatives. Also, a major compensation feature of alternatives presented in the draft SEIS was that of borrow area creation. Since more refined design has largely eliminated the need for the creation of borrow areas within the riparian zone, this feature is not reflected in the following discussion of alternatives. In-kind compensation for the removal of salt cedar as an option was not consistent with the stated mitigation objective of improving wildlife habitat and, consequently, was not considered as an option.

Alternative 1 (The Recommended Plan)

- a. Use of public land within the riparian zone.
- b. Combination of planting of native riparian vegetation and wildlife conservation easement.
- c. Wetland replacement on public land.
- d. Management of compensation lands.

Alternative 2

- a. Use of public land within the riparian zone.
- b. Use of open areas and monotypic salt cedar stands and replacement with native riparian vegetation.
- c. Wetland replacement on public lands.
- d. Management of compensation lands.

Alternative 3

- a. Combination of using public and private land within the riparian zone.
- b. Use of open areas and monotypic salt cedar stands and replacement with native riparian vegetation.
- c. Wetland replacement on public lands.
- d. Management of compensation lands.

Alternative 4

- a. Purchase of private, cultivated floodplain land located near the riparian zone.
- b. Site preparation and planting of compensatory native riparian vegetation.
- c. Wetland replacement on private land.
- d. Management of compensation lands.

COSTS ASSOCIATED WITH COMPENSATION ALTERNATIVES

Costs associated with converting monotypic salt cedar stands to native vegetation are largely based on costs obtained from Bosque del Apache NWR, which is conducting large-scale replacement of salt cedar. Refuge costs have been adjusted to reflect probable contract costs for any mitigation work accomplished on purchased land or public land. Costs associated with obtaining a wildlife conservation easement are based on grazing rates used by the Bureau of Land Management and associated fees.

Alternative 1 (Recommended Plan)

<u>Feature</u>	<u>Quantity (acs.)</u>	<u>Cost</u>	
		<u>Unit Cost (per ac.)</u>	<u>Total Cost</u>
Planting of native riparian vegetation on public land (includes 10 ac. on Bosque del Apache NWR) (purchase & planting)	46.3*	\$5,000	\$242,500
Conservation Easements - Public Land	185 (approx.)	28	5,180
Fencing	85 ac.	\$2/ft.	105,600
Wetland Replacement on Public Land (includes water rights of 6.5 ac. ft./ac. @ \$3,000/ac. ft.)	14 (max.)	5,000	70,000
Management	111 (Job-10 yrs.)	100	<u>11,100</u>
TOTAL			\$434,380

*Assumes about one-half of calculated 92.6 acres of replacement vegetation necessary to compensate for vegetational loss, i.e., 46.3 acres.

Alternative 2

<u>Feature</u>	<u>Quantity (acs.)</u>	<u>Cost</u>	
		<u>Unit Cost (per ac.)</u>	<u>Total Cost</u>
Use of Public Land Within Riparian Zone (including 10 ac. on Bosque del Apache NWR)	92.6	-0-	-0-
Site Preparation, Plant Purchase & Planting	92.6	\$5,000	\$485,000
Wetland Development (includes water rights of 6.5 ac. ft. per ac. @ \$3,000/ac. ft.)	14 (max.)	5,000	70,000
Management	111 (Job-10 yrs.)	100	11,100
Fencing	15,000 ft.	\$2/ft.	<u>30,000</u>
TOTAL			\$574,100

Alternative 3

<u>Feature</u>	<u>Quantity (acs.)</u>	<u>Cost</u>	
		<u>Unit Cost (per ac.)</u>	<u>Total Cost</u>
Use of Public & Private Land Within the Riparian Zone	47 Public/47 Private	(-0-) (\$500)	\$ 23,500
Site Preparation, Plant Purchase & Planting	92.6	\$5,000	\$463,000
Wetland Replacement on Public Land	14 (max.)	5,000	70,000
Management	111 (Job-10 yrs.)		11,100
Fencing	15,000 ft.	\$2/ft.	<u>30,000</u>
TOTAL			\$597,600

Alternative 4

<u>Feature</u>	<u>Quantity (acs.)</u>	<u>Cost</u>	
		<u>Unit Cost (per ac.)</u>	<u>Total Cost</u>
Purchase Private, Cultivated Land in Floodplain	92.6	\$3,500	\$324,100
Site Preparation, Plant Purchase & Planting	92.6	3,000	277,800
Wetland Replacement on Public Land	14	5,000	70,000
Management	111 (Job-10 yrs.)	100	11,100
Fencing	15,000 ft.	\$2/ft.	<u>30,000</u>
TOTAL			\$713,000

ANALYSIS AND SUMMARY OF COMPENSATION ALTERNATIVES

Alternative number one, consisting of 46.3 acres of compensatory planting of cottonwood and willows and acquisition of a conservation easement on about 185 acres of high wildlife use riparian vegetation, satisfies the objective resulting from multiple agency coordination. In addition, it also is the lowest cost alternative. Alternative number two is also a viable alternative and would be utilized in the event acquisition of a wildlife conservation easement is not feasible.

APPENDIX E

ENDANGERED SPECIES CORRESPONDENCE



DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103-1580

REPLY TO
ATTENTION OF:

January 26, 1988

Engineering and Planning Division
Planning Branch

Mr. John Peterson
Field Supervisor
Ecological Services, USEWS
P.O. Box 4487
Albuquerque, New Mexico 87196

Dear Mr. Peterson:

The Albuquerque District is currently studying a plan to reduce the effects of flooding and sediment deposition on farmlands, urban areas, the Bosque del Apache National Wildlife Refuge, and major water conveyance and storage facilities in the Middle Rio Grande Valley from runoff contributed by the Rio Puerco and Salado drainages. This plan consists of the rehabilitation of the existing levee system which extends from the San Acacia Diversion Dam to the head of Elephant Butte Reservoir.

In accordance with Section 7(a) of the Federal Endangered Species Act, as amended, we request a list of any listed endangered or threatened species, critical habitat, or those proposed for listing that could be affected by the planned action.

Your continued coordination in this endeavor is appreciated.

Sincerely,

Samuel N. Aiken, P.E.
Chief, Engineering and Planning Division



**UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE**

Ecological Services
Suite D, 3530 Pan American Highway NE
Albuquerque, New Mexico 87107

Cons. #2-22-88-I-035

February 12, 1988

District Engineer
Corps of Engineers, U.S. Army
Attn: Chief, Engineering and Planning Division
P. O. Box 1580
Albuquerque, New Mexico 87103

Re: Río Grande Floodway - San Acacia to Bosque del Apache

Dear Mr. Aiken:

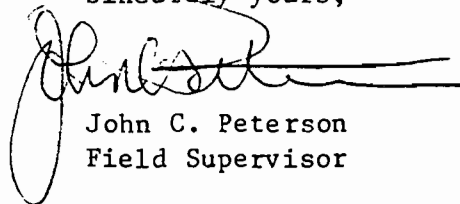
This responds to your letter dated January 27, 1988 requesting a list of species Federally listed or proposed to be listed as threatened or endangered. The proposed action involves rehabilitating the existing levee system which extends from the San Acacia Diversion Dam to the head of Elephant Butte Reservoir. Your geographic area of interest is Socorro County, New Mexico.

We have used the information in your request to narrow the enclosed list of species occurring in the project area to those which may be affected by your proposed action. We find that the bald eagle, whooping crane and the interior least tern may be found in the project area.

Information relating to the Section 7 consultation process has been enclosed for your use in project planning. We suggest you contact the New Mexico Department of Game and Fish and the New Mexico Energy, Minerals and Natural Resources Department for information concerning fish, wildlife and plants of State concern.

If we can be of further assistance, please call Chuck Mullins at (505) 883-7877 or FTS 474-7877.

Sincerely yours,



John C. Peterson
Field Supervisor

Enclosures

cc: (w/cy encl)
Director, New Mexico Department of Game and Fish, Santa Fe, New Mexico
Director, Energy, Minerals and Natural Resources Department, Forestry
Division, Santa Fe, New Mexico
Regional Director, U.S. Fish and Wildlife Service, Fish and Wildlife
Enhancement, Albuquerque, New Mexico

Species List

Proposed Rio Grande Floodway San Acacia to Bosque del Apache,
Socorro County, New Mexico

February 12, 1988

Listed Species

Whooping Crane (Grus americana) - Occupies the project area October through February. Roosts on gravel bars and islands in the Rio Grande. Feeds in cultivated fields and wetlands within several miles of the Rio Grande.

Authorities: James Lewis, U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, NM 87103, (505) 766-3974 and Roderick Drewien, c/o Bosque del Apache National Wildlife Refuge, P.O. Box 1246, Socorro, NM 87801, (505) 835-1828.

Interior Least Tern (Sterna antillarum athalassos) - This species nests on sandy beaches on shorelines of streams, rivers and lakes and is found on Bitter Lake National Wildlife Refuge.

Authority: John P. Hubbard, New Mexico Department of Game and Fish, State Capitol, Santa Fe, New Mexico 87503, (505) 827-2438.

Bald Eagle (Haliaeetus leucocephalus) - Winters in the project area and is also a migrant. Roosts in large trees which may or may not be close to their feeding areas. These include rivers, reservoirs, and ponds.

Authorities: John P. Hubbard, New Mexico Department of Game and Fish, Villagra Bldg., Santa Fe, New Mexico 87503, (505) 827-7438.



DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103-1580

REPLY TO
ATTENTION OF:

April 19, 1988

Engineering and Planning Division
Planning Branch

Mr. John Peterson
Field Supervisor
United States Fish and
Wildlife Service
Ecological Service
Suite D, 3530 Pan American
Highway Northeast
Albuquerque, New Mexico 87107

Dear Mr. Peterson:

I have reviewed your letter of February 12, 1988 which states that the endangered whooping crane (Grus americana), interior least tern (Sterna antillarum athalassos), and the bald eagle (Haliaeetus leucocephalus) may be found in the vicinity of the spoil bank levee that extends from the San Acacia irrigation diversion to the headwaters of Elephant Butte Lake. We have taken the liberty of adding the peregrine falcon (Falco peregrinus anatum) since it is present in the subject area during migration. For the consultation procedures of the Endangered Species Act of 1973 and Section 7(c) of the 1978 amendments, the U.S. Army Corps of Engineers, Albuquerque District, has compiled information on these species in order to assess possible effects that rehabilitation of the spoil bank may have on them. This information was derived from an on-site inspection of the areas affected, consultation with knowledgeable persons, in-house data and expertise, current literature, and a review of related studies and reports. The results of these studies and assessment of potential effects are presented in the enclosed Biological Assessment.

Based on this assessment the Corps of Engineers has determined that rehabilitation of the existing spoil bank could have an effect on the whooping crane and the bald eagle and associated critical habitat. The flood protection function of the project would provide a high degree of protection to habitat, including critical habitat, from the damaging effects of flooding, accompanying sedimentation, and habitat modification or loss. The potential for flooding to adversely affect the continued recovery of the whooping crane would be significantly reduced. Measures that would be taken

to prevent adverse effects due to construction related activity consist of scheduling construction during the absence of affected species, concentrating construction activities to localize disturbances, and close coordination with U.S. Fish and Wildlife Service personnel that monitor the whooping cranes in the middle Rio Grande Valley. Implementation of the project, combined with measures to avoid potential adverse effects, should result in a net benefit to endangered species. Therefore, I feel no further coordination is required.

Should you have any questions or require additional information, please contact Mr. Mark Sifuentes of my staff at 766-3577.

Sincerely,

Samuel N. Aiken, P.E.
Chief, Engineering and Planning Division

Enclosure

BIOLOGICAL ASSESSMENT OF THE PROBABLE EFFECTS
OF LEVEE REHABILITATION MEASURES ON ENDANGERED
BIRDS IN THE SAN ACACIA TO ELEPHANT BUTTE
RESERVOIR REACH OF THE RIO GRANDE

INTRODUCTION

The Albuquerque District is currently reevaluating a flood and sediment control plan authorized by the Flood Control Act of 1948 (Public Law 80-858, 203). This reevaluation is being accomplished because of institutional problems with the recommended detention reservoirs on the Rio Puerco and Rio Salado drainages. Its objective is to reduce the effects of flooding and sediment deposition on farmlands, urban areas, a national wildlife refuge, and major water conveyance and storage facilities in the middle Rio Grande Valley resulting from drainage from the Rio Puerco and Rio Salado.

MEASURES BEING EVALUATED

The authorized plan currently being evaluated consists of rehabilitating the existing spoil bank that is located on the west bank of the Rio Grande from San Acacia to the headwaters of Elephant Butte Lake. The rehabilitated levee would follow the alignment of the spoil bank. The levee embankment would average about 11.6 feet high, have 2 1/2 horizontal to 1 vertical side slopes, and have a 12-foot-wide crown. As currently envisioned material from the present spoil bank would be used to construct the engineered levee. About 10 percent of the spoil bank material would be unsuitable and would be disposed of at presently unknown sites. If soils analysis finds a greater percentage of spoil bank material unsuitable, then suitable material would have to be obtained elsewhere. Alternative borrow sources have not been identified at this planning stage but potentially could be located in the riparian zone, in the flood plain, or on the bordering terraces. Seepage under the levee would be controlled with drains in the landward toe of the levee. These toe drains would consist of 12-inch diameter, perforated pipe that would discharge into the conveyance channel. Sections of levee subject to water erosion would be protected with Kellner jetties, riprap, or vegetation. Restorative or mitigative measures would consist of revegetation with high quality riparian vegetation, enhancement of riparian vegetation, and conversion of borrow areas into wetlands.

PERCEIVED INTERRELATIONSHIP WITH ENDANGERED SPECIES

General There are four species currently classified as Federally endangered that could be present in the general vicinity of the proposed action and could possibly be affected. These are the interior least tern (*Sterna antillarum athalassos*), bald eagle (*Haliaeetus leucocephalus*), whooping crane (*Grus americana*), and peregrine falcon (*Falco peregrinus*),

Species Account

a. Interior Least Tern. The least tern breeds from California, South Dakota, and Maine southward locally to Chiapas and the Caribbean, with the major inland population in the Mississippi Basin; the species winters from the Pacific Coast of Mexico and the U.S. Gulf Coast southward. In New Mexico the terns breed in the vicinity of Roswell, including regularly at Bitter

Lake National Wildlife Refuge which is the key habitat area in the state. The species occurs in migration in Eddy County and as a vagrant elsewhere, including Espanola, Bosque del Apache National Wildlife Refuge, near Glenwood, Las Cruces, and Alamogordo (NMDCF, 1985). The tern has not been recorded at Bosque del Apache National Wildlife Refuge in recent years (Taylor, 1988). The least tern is a colonially-nesting waterbird, nesting on the ground, typically on sites that are sandy and relatively free of vegetation. In New Mexico and other parts of the southern Great Plains, alkali flats are selected nesting areas. Elimination and degradation of nesting habitat has been the primary reason for its decline and range reduction (NMDGF, 1985a).

b. Bald Eagle. The bald eagle migrates and winters [in New Mexico] from the northern border southward regularly to the Gila, lower Rio Grande, Middle Pecos, and Canadian valleys. This species is found occasionally elsewhere in summer, and is a breeding bird -- with nests report in "San Juan, Colfax, and Catron Counties". These habitat areas include winter roost and concentration areas such as Navajo Lake, Elephant Butte Lake, Caballo Lake, and the Upper Gila Basin. Winter and migrant populations seem to have increased in New Mexico apparently as the result of reservoir construction and the expansion of fish and waterfowl populations. In New Mexico and adjacent areas, optimal habitats center on riparian and lacustrine environments -- where food, shelter, and potential nest sites are in the greatest supply for the species. The major food items of bald eagles in New Mexico appear to be waterfowl, fish and carrion. (NMDGF, 1985b)

At Bosque del Apache National Wildlife Refuge the bald eagle is a migrant and winter resident. Eight to ten eagles commonly roost overnight at the refuge (Taylor, 1988). There is no nesting. The eagles arrive about mid-November and depart about mid-March. Waterfowl are a major prey item with emphasis on snow geese. Cottonwood trees in the riparian zone and in the flood plain are used for perches and night roosts. Bald eagles habitually use roosts in Units 18c and 18bw and 18d, which are located outside the riparian zone. Other habitually occupied spots include Unit 12b and borders along Units 9, 5, 6, 14, 13 and 16 as well as Unit 24c, all outside the riparian zone. The extent to which bald eagles use cottonwood trees in the riparian zone is not known, but primary use areas are around the ponds and fields west of the conveyance channel. The number of cottonwood trees in the riparian zone is very small relative to the area covered by salt cedar. Also, recent fires have further depleted the number of cottonwood trees.

Bald eagles also utilize the head waters of Elephant Butte Lake. Presence and use of any given area likely varies, depending on water elevations.

c. Whooping Crane. This species was formerly rather widespread in North America, but through historic times it has declined to the point that at present, it breeds only in Wood Buffalo National Park in the Northwest Territories; from there it migrates through the Great Plains to winter on the Texas coast at Aransas National Wildlife Refuge. Beginning in 1975, an experimental population has been produced at Grays Lake National Wildlife Refuge, Idaho, and these birds migrate southward to winter in New Mexico in the autumn, and most winter in the middle Rio Grande Valley (NMDGF, 1985c). Here whooping cranes occupy the same habitats as their foster-parent

sandhill cranes. Foraging areas are generally agricultural fields and valley pastures, particularly where there is waste grain or sprouting crops. Both species of cranes roost together, typically on sand bars in the Rio Grande (NMDGF, 1985c). So far, none of the Idaho whooping cranes have paired and bred. Whooping cranes do not readily tolerate disturbance to themselves or their habitat.

Within Bosque del Apache National Wildlife Refuge, all areas at or below 4,600 feet in elevation are critical habitat* for the whooping crane. This area includes most of the flood plain, including the riverine and riparian zone. This classification provides Federal protection to this area under Section 7 of the Endangered Species Act of 1973 and is an official notification to federal agencies of their responsibilities pursuant to this act. The existing spoil bank is generally not used by the whooping cranes (Taylor, 1988). Like most cranes, whoopers on and off the refuge are sensitive to disturbances.

During the winter of 1987 to 1988, whooping cranes used sand bars in the Rio Grande both within the refuge and at isolated areas outside the refuge, e.g., at the San Acacia Diversion, for night roosting. A factor that is thought to be discouraging pair formation among the whooping cranes is the general absence of isolation in the valley, which is a prime requisite by the cranes.

d. Peregrine Falcon. The peregrine falcon is a spring and fall migrant in the middle Rio Grande Valley. Prey consists almost entirely of birds ranging in size from swallows to ducks and large shore birds. Jays, woodpeckers, swifts, mourning doves, and pigeons are among the commonly taken prey species in the state. Up to three falcons have been recorded annually at Bosque del Apache. Habitat use on Bosque del Apache is similar to that of the bald eagle.

PERCEIVED EFFECTS OF PROJECT IMPLEMENTATION ON ENDANGERED SPECIES

Interior Least Tern. The presence of this species in the proposed project area is doubtful. Consequently, project implementation should not affect this bird.

Bald Eagle. The proposed project could have an effect on the small number of bald eagles that overwinter at Bosque del Apache National Wildlife Refuge. The enhanced level of flood protection provided the refuge and its

*Critical habitat means any air, land, or water area (exclusive of those existing man-made structures or settlements which are not necessary to the survival and recovery of a listed species) and constituent elements thereof, the loss of which would appreciably decrease the likelihood of the survival and recovery of a listed species or a distinct segment of its population. The constituent elements of critical habitat include, but are not limited to: physical structures and topography, biota, climate, human activity, and the quality and chemical content of land, water, and air. Critical habitat may represent any portion of the present habitat of a listed species and may include additional areas for reasonable population expansion.

wildlife resources would benefit this species by protecting and perpetuating habitat, including habitat for prey species. Conversely, construction activities during the winter months could disturb the eagles and their prey, perhaps requiring them to modify their use of the refuge. Since the primary use areas appear to be away from the riparian zone, any use change would likely be small and temporary. Depending on water levels at Elephant Butte Lake which would determine where the head of the lake was, and construction during the period of eagle presence, eagles could possibly be disturbed. If eagles were present, disturbances would likely be localized and overall eagle presence and use of the lake should not be affected.

The scheduling of construction to avoid that period of the year when whooping cranes are present (discussed later in this section) would simultaneously avoid any possible adverse effects of construction on bald eagles. The basal width of the rehabilitated levee should be within that of the existing spoil bank and few, if any, of the bordering trees should be affected. However, at this stage in project planning, precise design, distances, and construction requirements are not known precisely enough to definitely state the extent to which cottonwood trees near the riverward toe of the rehabilitated levee would be affected. While the avoidance of cottonwood trees would be a major objective in the alignment of the levee, the possibility exists that some trees could be affected. If a tree, or trees, were removed from the toe of the levee that received bald eagle use, other trees in the vicinity would likely be substituted by the eagle. Although there could be a local redistribution of eagle use within the immediate area, no decline in bald eagle use is anticipated. Any needed borrow areas would be strategically located to avoid cottonwood trees that could potentially be used by eagles for roosting.

Whooping Cranes. The proposed project would have an effect on the experimental flock of whooping cranes and their designated critical habitat. The enhanced level of flood protection afforded the refuge by the project would correspondingly provide a high level of insurance that critical habitat for the whooping cranes would be perpetuated as well as substantially improving future chances of whooping crane survival and expansion. The physical rehabilitation of the spoil bank should not affect the whooping cranes. However, if construction were to occur during the October 15 to March 1 period that the cranes are present, the activity and sounds associated with construction could disturb the whoopers especially on the refuge and contiguous areas. Isolated roosting areas could also be disturbed by construction activities and sounds. An effective precautionary measure that could be employed to prevent any possible adverse effects to whooping cranes in this general area of the refuge would be to schedule construction activities from March 1 to October 15 (Brown, 1988). Since crane use of areas outside the general refuge area changes frequently, consultation with the whooping crane monitoring team prior to contract award would determine avoidance measures. These measures could range from constructing only short sections of the levee at a time to minimize widespread disturbance to scheduling construction during the absence of the whoopers.

Peregrine Falcon. The peregrine falcon should not be affected by the proposed project. The migratory status of the peregrine falcon, combined with the confined construction area, should preclude any significant interaction.

CONCLUSIONS

The proposed project would affect two endangered species, the bald eagle and the whooping crane. Primary area of effect is the Bosque del Apache National Wildlife Refuge. The flood protection function of the project would provide a high degree of protection to habitat, including critical habitat from the damaging effects of flooding, accompanying sedimentation, and habitat modification or loss. The potential for flooding to adversely affect the continued recovery of the whooping crane would be significantly reduced. Measures that would be taken to prevent adverse effects due to construction-related activity and sound consist of scheduling construction during the absence of affected species, concentrating construction activities to localize disturbances, and close coordination with U.S. Fish and Wildlife Service personnel that monitor the whooping cranes in the middle Rio Grande Valley. Modifications of levee alignment would be accomplished, if necessary, to avoid critical roost areas. Maximum avoidance of cottonwood trees in the riparian zone, especially along the riverward side of the levee, would assist in perpetuating continued bald eagle use of the Refuge. The use of these measures to avoid adverse effects would result in a net benefit to endangered species.

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- Taylor, John. 1988. U.S. Fish and Wildlife Service-Bosque del Apache National Wildlife Refuge. Personal Communication, March 1988.



UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Ecological Services

Suite D, 3530 Pan American Highway, NE
Albuquerque, New Mexico 87107

March 9, 1990

District Engineer
Corps of Engineers, U.S. Army
P. O. Box 1580
Albuquerque, New Mexico 87103

Dear Colonel Dougan:

This responds to your Biological Assessment Of The Probable Effects Of Levee Rehabilitation Measures On Endangered Birds In The San Acacia To Elephant Butte Reservoir Reach Of The Rio Grand. The Albuquerque District is currently reevaluating a flood and sediment control plan authorized by the Flood Control Act of 1948 (Public Law 80-858, 203). The objective of the plan is to reduce the effects of flooding and sediment deposition from the Rio Puerco and Rio Salado on farmlands, urban areas, a national wildlife refuge, and major water conveyance and storage facilities in the middle Rio Grande Valley. The plan currently being evaluated proposes to rehabilitate the existing spoil bank that is on the west side of the Rio Grande from San Acacia to the head of Elephant Butte Reservoir. The rehabilitated levee would generally follow the alignment of the existing spoil bank.

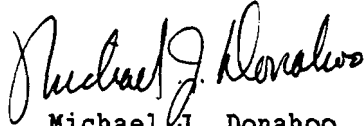
There are four species currently classified as Federally endangered that could be present in the vicinity of the proposed action and could possibly be impacted. These species are the interior least tern (*Sterna antillarum athalassos*), bald eagle (*Haliaeetus leucocephalus*), whooping crane (*Grus americana*), and peregrine falcon (*Falco peregrinus*). However, as stated in the biological assessment, measures that would be taken to prevent adverse impacts due to construction related activity include but are not limited to the following:

1. Schedule construction during the absence of the species;
2. Concentrate construction activities to localize disturbance;
3. Coordinate closely with U.S. Fish and Wildlife Service personnel, especially when construction is taking place on Bosque del Apache National Wildlife Refuge and;
4. Avoid impacts to cottonwood trees that would be used by roosting bald eagles even to the extent of shifting alignment of the levee.

It is our opinion that this biological assessment addresses the issues associated with the stated Federally listed species. With the above-mentioned provisions, there should be no adverse impact to any Federally endangered species from the proposed Corps project.

If you need additional information please call Chuck Mullins at (505) 883-7877 or FTS 474-7877.

Sincerely yours,



Michael J. Donahoo
Acting Field Supervisor

cc:

Regional Director, U.S. Fish and Wildlife Service, Fish and Wildlife
Enhancement, Albuquerque, New Mexico

APPENDIX F
CULTURAL HISTORY OVERVIEW

CULTURAL HISTORY OVERVIEW

The following cultural history overview focuses on the immediate study area within the Rio Grande riverine corridor. Most of the information presented derives from the central New Mexico cultural resources overview prepared by Joseph Tainter and Frances Levine (1987).

The valleys of the Rio Grande and its tributaries have served human habitation and travel from the time of the earliest occupation of New Mexico, dating from at least 12,000 years ago. Early populations were largely nomadic hunters and foragers. Until approximately 1,000 years ago, the population of the study area was sparse and dispersed. Known sites predating that time are rare, due partly to a paucity of archeological research in the area, and partly to their having been buried well below the existing ground surface by geological processes.

Dating from about the time of Christ, the Anasazi or "ancient ones" flourished in the Rio Grande valley, developed agriculture, and established permanent settlements. The majority of the discovered sites date to the ceramic period, with two phases particularly well represented: Basketmaker III/Pueblo I and Pueblo II/Pueblo III. Throughout prehistory in the riverine corridor, there tends to be a preference for settlement along the east river margin versus the west.

Within the study area, the earliest substantial evidence for riverine occupation occurs during the San Marcial Phase (A.D. 300 -800). A recent survey by Marshall and Walt (1984) identified a concentration of Basketmaker III (San Marcial Phase) sites in the Fra Cristóbal area where a concentration of Archaic sites had been found (Tainter and Levine 1987:35). The settlements of this period tend to be small and are characterized by pit structures west of the river and masonry-based jacals east of the river.

The subsequent Pueblo I period (Tajo Phase A.D. 800 - 950 or 1000) marks the first substantial occupation of the riverine zone. Most of the sites of this period tend to cluster on the eastern gravel benches of the Rio Grande in the La Joya and San Acacia areas, near the confluence of the Rio Salado and Rio Grande. Tajo Phase sites are small villages of one to ten surface rooms, with occasional pit structures (Tainter and Levine 1987:37).

The local Pueblo II period (Early Elmendorf Phase A.D. 950 or 1000 - 1100) sites are distributed from the lower Rio Puerco south to Bosque del Apache. During this time, settlement expanded into areas that were essentially unoccupied during the preceding Tajo Phase. Structural sites tend to be located on riverine gravel benches; nonstructural sites are situated on sandy benches or riverbanks (Tainter and Levine 1987: 38). Village aggregation is noted during this phase, perhaps indicating increased social, economic, and ritual organization.

During the subsequent Pueblo III period (Late Elmendorf Phase A.D. 1100 -1300), the aggregated villages coalesced into large fortified sites situated on elevated, defensible buttes, knolls, and benches along the river. Marshall and Walt (1984) attribute the defensive settlement pattern and apparent increased social integration of the Late Elmendorf Phase to the regional unrest of the time. Temporally this period corresponds to the Chacoan collapse and the

general migration and regional depopulation occurring in much of the Anasazi homeland to the west and northwest (Tainter and Levine 1987:39).

The Late Puebloan Period (Ancestral Piro Phase A.D. 1300 - 1540) in the riverine corridor is characterized by a dramatic population increase, with the population aggregating into large, plaza-oriented villages constructed of puddled adobe (Tainter and Levine 1987:43). The increase in village size is clearly seen when comparing fourteenth and fifteenth century sites. Fourteenth century sites average around 100 ground floor rooms, contrasted with 200 to 600 for fifteenth century sites. This period marks the first major settlement of the southern riverine area and the first major expansion to the west bank of the Rio Grande, with villages paired on the east and west riverbanks (Tainter and Levine 1987).

The Early Historic Period (Colonial Piro Phase A.D. 1541 to 1680) spans the time from the Spanish entrada and period of Spanish cultural domination, particularly along the Rio Grande, until the Pueblo Revolt. At the time of the first Spanish contacts, much of the study area was uninhabited. Former residents of the lower Rio Puerco and Rio Salado may have moved to the Rio Grande and formed the large Piro villages noted by the Spanish explorers. During this period, ten Ancestral Piro villages were occupied; nine had been abandoned; and nine new villages were established. Sites generally conformed to one of two settlement patterns: large plaza communities of Ancestral Piro form, with large square rooms laid out in grid-like fashion on masonry footings, and with a chapel; and smaller pueblos of variable form more typical of the earlier time periods (Tainter and Levine 1987:43).

The period from 1540 to 1598 marks the epoch of Spanish colonial exploration, beginning with Coronado's entrada into the southwest and ending with the founding of the first Spanish colony near the confluence of the Rio Chama and the Rio Grande in the area designated, Rio Arriba. European presence in the area began in 1540 with the Coronado expedition, which ventured north through Arizona, then east into New Mexico. The first European penetration of southern New Mexico took place in August of 1581, when a dozen Spaniards of the Chamuscado-Rodriguez missionary expedition followed the Rio Grande northward. The first village reached on the Rio Grande was probably the abandoned Piro village of San Felipe, located ca. three miles south of Socorro (Tainter and Levine 1987:78). The Chamuscado-Rodriguez party passed through at least 16 Piro pueblos, five situated on the west bank and 11 on the east bank of the Rio Grande. The west bank villages were Taxumulco, Piquinaguatento (Chiquinagua), Pina, Piasla, and Santiago; the east bank villages included Tomatlan, Mexicalcingo, Caxole, Pueblo Nuevo, Ponsitlan, La Pedrosa, El Hosso (El Osso), Elota, San Juan, San Miguel, and San Felipe (San Phelipe) (Tainter and Levine 1987:80). Paired east and west bank villages include Taxumulco and Tomatlan; Piquinaguatento and Caxole; Pina and San Juan; and Piastla and San Miguel.

In early 1583, the Franciscan Order of Mexico sent a rescue party to return to Mexico the friars, whom the Chamuscado-Rodriguez party had left behind to missionize the Tiwa village of Puaray, located near present day Bernalillo. While enroute to Puaray, the expedition leader, Don Antonio de Espejo, learned of the friars murder. Rather than quit the expedition and return immediately to Mexico, Espejo trekked east to explore the Manzano Mountains, where he visited and documented eleven Margrias (Xumana) pueblos along the east flank of the mountains.

In 1598, the first Spanish settlement and colonial capitol was established near the northern Rio Grande Tewa villages, near present day Santa Cruz. Enroute to the Rio Arriba, the Don Juan de Oñate party apparently camped for more than a month among the Piro. The chronicles document eight Piro settlements: San Juan Baptista, Sevilleta, Alamillo, Pilabó, Teypama or Teypana, Qualacú, San Pascual, and Senecú (Tainter and Levine 1987:82).

Spanish settlement of the Rio Grande and its tributaries proceeded slowly and was limited to military outposts and missionary developments. The Spanish missionization program pitted church against state for the control of limited resources, including labor. Between 1626 and 1629, several missions had been established in the Piro pueblos (Socorro, San Antonio de Padua at Senecú, Nuestra Señora del Socorro de Pilabó, San Luis Obispo de Sevilleta at Seelocú, and Alamillo. The decade of the 1630's and early 1640's were stressful years, witnessed by increased raiding of Hispanic villages and Indian pueblos by nomadic Apaches. Contributing to the stress were European demands for native labor and native goods, drought which led to crop failures and famine, and smallpox epidemics which took their toll on the young adult (reproductive) segment of the population. In her study of Piro subsistence, Earls (1985) suggests that raiding was facilitated by more accessible (e.g., concentrated) goods and the mobility of livestock. The growing conflict between encomenderos and clergy over the disposition of agricultural products and livestock created shortages within the Pueblos, and flagrant violations of Spanish law regarding tribute and land use eventually led to the Pueblo Revolt. In 1680, the Pueblos successfully united to drive the clergy and Hispanic colonists and soldiers from New Mexico, thereby ending the first phase of Spanish colonization (Tainter and Levine 1987:87).

It appears that the Piro pueblos were abandoned during the revolt, with some Piro and Isleta occupants joining the Hispanos in their retreat from New Mexico south to the El Paso District. Along the way the refugees filed past the burned and abandoned villages of Sevilleta, Alamillo, Socorro, and Senecú (Marshall 1984:237). Those Piro who remained behind took refuge at Isleta, Acoma, and settlements in the Fra Cristóbal Mountains. Those who fled with the Hispanos to El Paso established two villages, Senecú del Sur and Socorro del Sur, on the east bank of the Rio Grande and were quickly assimilated into Mexican village life (Tainter and Levine 1987:91).

In 1681, Governor Otermín attempted to reconquer the New Mexico pueblos and reestablish Spanish rule. Although the attempt was thwarted, he did succeed in attacking Isleta Pueblo, and taking 385 Isletans to El Paso. The Pueblo of Isleta del Sur was established near the two El Paso Piro villages.

Weakened by inter- and intra-factionalism, the scarcity of food, and continual Apache raids, the Rio Grande pueblos were no longer unified. In 1692, Don Diego de Vargas won the allegiance of 10 of the 23 occupied pueblos and within two years had subdued the northern pueblos and reestablished Spanish rule; however, it was not until the early eighteenth century that the productive Rio Abajo would be resettled.

Throughout the Colonial period unsuccessful efforts were made to induce the nomadic populations to establish permanent settlements, for it was the easiest way for the Spanish to impose their authority over native populations. Because

of the constant raiding on Hispanic villages by nomads, christianized Indians (genízaros) were often sent to settle frontier communities to buffer the Hispanic colonies against attacks. Cerro de Tomé and Valencia were genízaro communities for Albuquerque. Other efforts to curb raiding were attempted, such as the reinstatement of the Taos and Pecos pueblo trade fairs in Comanche territory, and stationing troops at the ruins of Quarai and Tajique in the abandoned Salinas Province to thwart the Apache (Tainter and Levine 1987:94-95).

In 1800 Governor Fernando Chacón was officially instructed to begin resettlement in the vicinity of Socorro, in part to relieve overcrowding along the Rio Grande to the north and in part to populate and protect the lower portion of the Camino Real, the principal artery for information and goods exchange with Mexico. Through the issuance of a series of land grants, the communities of Alamillo, Socorro, Sevilleta, and Senecú were resettled. The Lo de Padilla land grant located near Isleta pueblo had already been issued in 1718, when Diego de Padilla reclaimed land owned by his family prior to the Pueblo Revolt. The Town of Socorro grant was issued in 1818, followed by the Nuestra Señora de los Dolores de Sevilleta grant in 1819. In 1819, Pedro Ascue de Armendaris petitioned for and was granted a tract of land at Valverde, situated along the Camino Real. The following year, he petitioned for additional lands to the south in the Jornada del Muerto. In 1820 the lands were granted to him as the Fray Cristóbal grant, along with additional lands northwest of the Valverde grant (Tainter and Levine 1987:99-100). The Armendaris grant was abandoned in 1824 due to Navajo raids.

In 1821 the era of Spanish rule ended when New Mexico became part of the Independent Republic of Mexico under the Treaty of Cordova. In the brief 27 years of Mexican occupation, settlement in New Mexico expanded well beyond the Rio Grande corridor, and trade and commerce with the outside world was encouraged.

During the entire Spanish occupation, encompassing approximately 300 years, most trade and information exchange took place between New Mexico and the Spanish headquarters in Mexico City via the Camino Real (Royal Road). Established in the 1500's, the 1200-mile long El Camino Real de Tierra Adentro connected the colonial centers of Chihuahua, El Paso, and Santa Fe to Mexico City (Figure 1), and was the primary thoroughfare used by missionaries, colonists, soldiers, and commercial caravans. The route entered the Provincia de Nuevo Mexico below El Paso del Norte at a place called La Toma del Rio. At El Paso, the trail crossed the Rio Grande, following the river north to Las Cruces. From Las Cruces the trail left the meandering river, crossing the 125-mile long barren, waterless stretch of desert known as the Jornada del Muerto, and rejoined the river near present day San Marcial. The trail then continued along the east bank of the Rio Grande northward to Santo Domingo, where it headed overland to Santa Fe (U.S. Fish and Wildlife Service 1987).

Among the first to blaze the trail was the missionary party led by Francisco Sanchez Chamuscado. After the founding of Santa Fe in 1610, the trail terminus was established. Within the study area, ruins of Piro pueblos and pre-revolt haciendas were among some of the stopping places (parajes) along the route. After the founding of Albuquerque in 1706 and Chihuahua City in 1709, merchants in Chihuahua operated the ox-drawn carreta (wooden cart) caravans for commercial

gains. By the end of the eighteenth century, the annual Chihuahua fair had changed the pattern of trade and the northern Camino Real became known as the Camino de Chihuahua (U.S. Fish and Wildlife Service 1987).

With Mexican independence from Spain in 1821, New Mexico became part of Mexico. Under Spanish rule, the New Mexico Province had been isolated from foreign trade and peoples, and solely dependent on the Camino for its outside contacts. During the Mexican period, this was to change when a second trail, the Santa Fe Trail, which linked Missouri to Santa Fe was opened. For the first time, Santa Fe was no longer a terminus, but rather a midpoint for two important commercial trails, the Santa Fe and Chihuahua. A stage coach line to El Paso followed the Camino until 1880, when the Atchison Topeka and the Santa Fe (AT&SF) railroad constructed its transcontinental line on the trail (U.S. Fish and Wildlife 1987).

Today, traces of the Camino Real are visible from the air in the northern Rio Grande, on the east bank of the Rio Grande within the Bosque del Apache wildlife refuge, in the Jornada del Muerto, in the El Paso area, and in Mexico. However, most trail segments await ground verification.

Between 1823 and 1845, 11 land grants were made in the general study area, most in the former province of the Salinas (Xumanas) pueblos, east of the Manzano Mountains. Two, the Bosque del Apache and Jornada del Muerto grants, are within the study area. In 1845, Antonio Sandoval, a wealthy citizen of Albuquerque, petitioned for and was granted three tracts of land, two grazing tracts and a farming tract. The farming tract requested was the Bosque del Apache grant located along the Rio Grande south of Socorro. The two grazing tracts, the Estancia Springs grant and the Agua Negra grant, were issued as repayment for loans he had made to the government (Tainter and Levine 1987:105).

The Jornada del Muerto grant issued in 1846 overlapped with the Armendaris Fray Cristóbal grant. Armendaris who held claim to his lands even after they had been abandoned due to Navajo raids in 1824 protested the Jornada del Muerto grant boundaries. The petitioners, Juan Bautista Vigil-Alarid and Antonio Jose Rivera were prohibited from making any improvements of the land until the suit had been settled. The matter was not resolved until some years later when the Court of Private Land Claims rejected the Jornada del Muerto land grant (Tainter and Levine 1987:105).

On August 15, 1846, General Stephen Watts Kearny and the Army of the West marched into Las Vegas, New Mexico and claimed the territory of New Mexico for the United States. However, the New Mexico takeover appears to have been negotiated long before Kearny marched into New Mexico. Most scholars believe that James Magoffin, an influential American trader and liaison to Mexico, arranged the terms of the "conquest" with Governor Armijo, for Armijo offered no resistance. Mexican rule of the New Mexico province came to an end in 1848 with the annexation of New Mexico and California to the United States under the terms of the Treaty of Guadalupe Hidalgo. Texas had been annexed earlier (Tainter and Levine 1987:112-113). With the acquisition of new territories, the United States began its westward expansion in fulfillment of the "manifest destiny"; however, the conquest of New Mexico would not be completed until the nomadic Indians had been subdued.

Even as late as the mid 1850's, incessant raids by Apaches and Navajos impeded extensive settlement in the Rio Abajo. In February, 1852, 143 citizens of Socorro County petitioned the Territorial Governor for protection. In response, garrisons were sent to Doña Ana, Socorro, Tomé, and Albuquerque. Fort Conrad, built in 1851 just east of the ruins of Valverde offered some protection, but was abandoned in 1854 when Fort Craig was built.

On February 21, 1862 one of two Civil War battles fought in New Mexico was staged at Valverde, north of the Union-held Fort Craig. In a one-day battle, General H.H. Sibley, commander of the Confederate forces, defeated Colonel E.R.S. Canby's Union detachment. The Union troops under the command of Colonel Nicholas Pino surrendered Socorro to Sibley. However, after waging an indecisive battle at Glorieta, Sibley's forces retreated to Texas, bypassing the still Union-held Fort Craig (Tainter and Levine 1987:115,118).

After the Civil War battles in New Mexico had ended, military action against the Navajos and Apaches intensified. Lemitar was attacked in 1863 and 1864 by Navajos encamped in nearby Ojo de Cibola, 15 miles to the west. In 1862, Colonel Christopher (Kit) Carson was ordered by Commander James H. Carleton to round up Mescalero Apaches and Navajos and confine them to an internment camp at Bosque Redondo near Fort Sumner. The Mescaleros fled Bosque Redondo in 1865, and in 1873 were resettled on a reservation south of Fort Stanton in southeastern New Mexico. In 1868 the Navajos were returned to their homeland in northeastern Arizona and northwestern New Mexico on a newly established reservation. By the mid 1860's the Indian wars in central New Mexico had ended, and the area began to exhibit some economic and social stability (Tainter and Levine 1987:118-119).

In order to resolve the conflict between Hispanic and American land values and to clear land titles, the Office of the Surveyor General was established in New Mexico in 1854. One of the major goals was to survey the public domain and establish the township grid by which tracts of land could be legally described. The 1855 New Mexico cadastral survey fixed the central meridian control point, which established the principal meridian and baseline from which the townships and ranges within the state have been surveyed, within a roomblock of the Cerro Indio Pueblo archeological site (Marshall 1984:147). Between 1854 and 1860, the Rio Grande from Santa Fe to El Paso was surveyed (Tainter and Levine 1987:119).

In 1880, the AT&SF transcontinental railroad reached San Marcial, New Mexico. In 1908, the Belen cutoff was constructed to shorten the route. The cutoff crossed the Texas panhandle entering New Mexico at Clovis, then continued westward to Vaughn, joining the main trunk of the Santa Fe at Belen. With the coming of the railroad, the mining industry boomed. Socorro County experienced a minor boom between 1870 and 1893 when silver was discovered in the Socorro Peak mining district. The boom ended in 1893 with the demonetization of silver. A smelter was opened in Socorro in 1881 to refine lead carbonate ore extracted from the Magdalena mining district. In 1883, a railroad spur was constructed from Socorro to Magdalena, and then south to Kelly to the lead mines. By the 1880's decreasing lead prices forced a closure of the mining and smelting industry in the Socorro area. The only profitable mine in the immediate area was the Carthage coal field, which was probably mined as early as the 1850's to supply Fort Conrad and Fort Craig. The coal field, located ca. 10 miles south

of San Antonio, supplied the Socorro smelter with coke. In 1882 the AT&SF constructed a spur line from San Antonio to Carthage to haul the coke. The spur was in use until 1894 or 1895, at which time the mine was temporarily shut down. In the early 1900's the mine was reopened for large scale commercial production and a new railroad, the New Mexico Midland Railroad, was constructed on the old AT&SF route. It was in use from 1906-1936. When the Carthage field was closed down, the railroad continued to haul coal from the Tokay mine, located two miles south of Carthage. The Tokay field was in operation from 1915 to about 1950; during the last 15 years of operation, coal was trucked to San Antonio (Tainter and Levine 1987:130).

On January 6, 1912, New Mexico was admitted to the Union as the 47th state. In 1916 the Bureau of Reclamation began construction of Elephant Butte Dam and reservoir. In 1923 the Middle Rio Grande Conservancy District was created to develop an efficient irrigation system and to ensure drainage and flood protection for the towns and communities located along the Rio. The Conservancy conveyance channel parallels the Rio Grande levee in the study area. A major flood along the Rio Grande in 1929 caused extensive damage to the towns and facilities of Old and New San Marcial, Valverde, and La Mesa, located upstream of the dam. After the flood, the AT&SF railroad relocated all its facilities from San Marcial to Belen. This action sent the local economy into a downward spiral, forcing many residents to move from the area in search of work. Today the Middle Rio Grande valley continues to be an important agricultural area. Within the study area, the larger towns of Socorro and San Antonio supply goods and services to the neighboring communities and travelers. And Socorro, the seat of Socorro County, hosts the New Mexico Institute of Mining and Technology, formerly the New Mexico School of Mines, established in 1889 during the mining boom.

APPENDIX G

CULTURAL RESOURCES CORRESPONDENCE



STATE OF NEW MEXICO
OFFICE OF CULTURAL AFFAIRS
HISTORIC PRESERVATION DIVISION

ARREY CARRUTHERS
GOVERNOR

VILLA RIVERA, ROOM 101
228 EAST PALACE AVENUE
SANTA FE, NEW MEXICO 87503
(505) 827-8320

HELMUTH J. NAUMER
CULTURAL AFFAIRS OFFICER

THOMAS W. MERLAN
DIRECTOR

June 20, 1988

Lt. Colonel Kent R. Gonser, CE
District Engineer
Albuquerque District
US Army Corps of Engineers
Post Office Box 1580
Albuquerque, New Mexico 87103-1580

Rc: Rio Grande Floodway, San Acacia to Bosque del Apache Unit

Attn: Mr. William E. Huntley, Study Manager

Dear Colonel Gonser:

Thank you for informing this office of the study of flood protection for flood plain development and wildlife on the Rio Grande between San Acacia and the Head of Elephant Butte reservoir being initiated by the Albuquerque District.

From the preliminary description of the proposed plan, it appears that the rehabilitation of the existing levee on the west bank of the Rio Grande between the low flow conveyance and the river has little potential to affect significant cultural resources within this heavily disturbed area. However, many of the associated activities, such as material source, disposal, and stockpile areas, access and haul roads, equipment parks, and other land disturbing undertakings, do have the potential to affect properties entered in or eligible for inclusion in the National Register of Historic Places adversely.

Since plans for the proposed levee rehabilitation project are not yet sufficiently developed to determine the locations of such activities, it is impossible to comment at this time on the potential effects. Therefore, I will look forward to consulting with the Albuquerque District in accordance with the provisions of 36 CFR Part 800 as your study progresses. In the meantime, please contact this office if you require any information regarding register, or recorded archaeological and historical resources within the study area.

Sincerely,

Thomas W. Merlan
State Historic Preservation Officer

TWM:DER:bc/Log 14709

cc: John Schelberg
Mike Pitel

APPENDIX H
COMPLIANCE WITH
THE
CLEAN WATER ACT

PREFACE

Refinements to project design since preparation of the Section 404 (b) (1) evaluation have eliminated some project features presented in this evaluation. These consist of the need for borrow areas within the riparian zone, the disposal of surplus material in the river channel, and any construction activities in Mulligan Gulch Wetland. An exception to the latter site is the possible deposition (temporary) of dredged or fill material due to construction activities if measures are taken to restore and improve this wetland as compensation for the filling of other wetlands. The net effect of these design refinements is to reduce the number of discharge sites and, correspondingly, the extent of wetland disturbance.

August 2, 1990

Deputy District Engineer for
Project Management

Mr. Jim Piatt
Surface Water Quality Bureau
Environmental Improvement Division
Harold Runnels Building
1190 St. Francis Dr.
Santa Fe, New Mexico 87503

Dear Mr. Piatt:

Enclosed is an application for State Water Quality Certification for a project now under design by the U. S. Army Corps of Engineers. The project is the Rio Grande Floodway, San Acacia to Bosque del Apache Unit, New Mexico and involves rehabilitating approximately 55 miles of existing spoilbank levee along the west bank of the Rio Grande and parallels the Bureau of Reclamation's Rio Grande Conveyance Channel.

We have just completed the general design stage and a Draft Environmental Impact Statement (DEIS) for the project. Very shortly, a copy of the DEIS will also be provide for your review and comment.

If we can provide further information, please contact Mr. Mark Andrews, Project Manager at (505) 766-1239.

Sincerely,

John J. Cunico, P.E.
Deputy District Engineer for
Project Management

Enclosures

Describe any adverse water quality impacts that would result from the proposed activity (immediate and long range): _____

~~The project plan would not affect water quality in the Rio Grande or Elephant Butte Lake. The fill material is described below. (See Appendix F of the Draft Environmental Impact Statement).~~

7. Describe the methods to be used to prevent water quality impacts which could interfere with the attainment of the state's water quality standards. If those actions include constructing ponds, dams, or other structures please attach plans, schedules, and other information as appropriate: _____

~~During construction, contract specifications would contain measures to protect surface water quality from erosional products, chemical and fuel spills, oil disposal, and other potentially toxic wastes. (See Page SEIS-85 of the Draft Environmental Impact Statement).~~

8. Describe the physical and chemical characteristics of the dredged or fill material (such as rock size, mineral content or man-made materials). Be as specific as possible: _____

See attached table.

9. Project Schedule:

Beginning Date February 1992

Completion Date March 1995

10. I certify that the information contained in this application, to the best of my knowledge, is true, complete and accurate.

Authorized Agent or
Applicant

Mark L. Andrews

Date: 2 August 1990



Public Notice

US Army Corps
of Engineers

Albuquerque District

P.O. Box 1580
Albuquerque, NM 87103-1580

FAX No. 505-766-2770

Permit Application No:
NM-OYT-0631

Date: August 17, 1990

Phone: (505) 766-2776

Suspense Date: October 16, 1990

In Reply Refer to District Engineer, ATTN: CESWA-CO-R

Interested parties are notified that the District Engineer has received an authorization application under Section 404 of the Clean Water Act (33 USC 1344). The application is for an authorization to **construct and rehabilitate levees** adjacent to the **Rio Grande** and in **Elephant Butte Reservoir** from San Acacia to Elephant Butte in Socorro County, New Mexico; Application No. NM-OYT-0631.

Name of Applicant: Albuquerque District Corps of Engineers, P.O. Box 1580, Albuquerque, New Mexico 87103-1580.

Location: The proposed project is located on the west bank of the Rio Grande with fills to be placed in the river channel, the old conveyance channel, adjacent wetlands, and Elephant Butte Reservoir.

The project will extend 55 miles from the U.S. Bureau of Reclamation's low-flow conveyance channel (at the San Acacia Diversion Works) to the end of the conveyance channel at the head of Elephant Butte Reservoir near San Antonio, Socorro County, New Mexico.

Levee rehabilitation will be performed in Townships 1, 2, and 3 South, Ranges 1 East and 1 West; Townships 4 and 5 South, Range 1 East; Townships 5 and 6 South, Range 1 West; and Townships 7 and 8 South, Range 2 West.

Description of Work: The project involves construction and rehabilitation of approximately 55 miles of existing levee along the Rio Grande. Disposal of clean waste fill material and construction of portions of the levee will involve discharges into waters of the United States.

The existing earthen embankment will be removed and rebuilt to produce a facility capable of withstanding high volume flows in the Rio Grande. The levee will be approximately 73 feet wide at the base and 16 feet high having a trapezoidal cross-section with 1V:2.5H side slopes. The southern 20 miles of levee will have 1V:3H side slopes. Sections of the reconstructed levee will contain a drainage system to provide positive seepage control, and will be protected by Kellner jetty jacks at locations vulnerable to erosion from high stream velocities.

Five areas within waters of the U.S. may be filled during construction of the project:

- **River channel, Rio Grande:** Surplus earth may be used to widen the existing streambank and refill any borrow excavations located below the ordinary high water mark. Any

NEWS RELEASE

August 17, 1990

fill material in the channel will be stabilized by mechanical means (Kellner jacks) and establishment of native riparian vegetation.

- **Abandoned section of the low-flow conveyance channel** near Tiffany and San Marcial which contains wetlands: Temporary fills will be used to create work roads and platforms to support levee reconstruction in an area approximately 1.5 miles long by 40 feet wide. The toe of 88-foot wide levee may partially extend into the wetland. All temporary fills will be removed upon levee completion.

- **Levee toe wetland¹**, located in Elephant Butte Reservoir between spoil bank and conveyance channel: The widened levee base and/or construction roads will extend across this strip of wetland about 1.3 miles long and 40 feet wide.

- **Elephant Butte Reservoir below elevation 4450.30** m.s.l. (USGS datum): Levee reconstruction along existing spoil bank (approximately 4.4 miles). The levee in this location will be 12 feet high with an 88 foot wide base (trapezoidal section), using approximately 600,000 cubic yards of random fill (silty sands).

- **Mulligan Gulch wetland¹**, an 18 acre area within Elephant Butte Reservoir west of the conveyance channel: Tie-back levee will follow the existing dike alignment, but will be wider which may cause the loss of a 900 foot by 40 foot area of wetland. Any loss of wetland at the terminal end of the project will be compensated by wetland expansion in conjunction with borrow activities.

Note¹: Wetlands in Elephant Butte Reservoir may have developed only recently due to long-term water storage in the reservoir. Low water levels could dry these areas.

The stated purpose of the project is to provide protection against the 100-year frequency flood to the city of Socorro, rural transportation and irrigation facilities, the Bosque del Apache National Wildlife Refuge, and the Bureau of Reclamation's low-flow conveyance channel. A project objective is to avoid or minimize the removal and disturbance of edge vegetation along the riverward toe of the existing embankment, particularly native, cottonwood-dominated communities. The planned levee base width will be smaller than present existing levee throughout a majority of the project area.

Proposed mitigation of unavoidable impacts to waters of the United States includes revegetation of areas disturbed by construction, and expansion-of-old/creation-of-new wetland habitat in borrow areas.

Proposed dates of construction are from February 1992 to March 1995.

August 17, 1990

Related Work: The majority of the levee rehabilitation work will be outside waters of the United States and is not subject to regulation under the Clean Water Act.

Plans and Data: Drawings showing the location of the work site and other data are enclosed with this notice. If additional information is desired, it may be obtained from the applicant or from:

Ms. Jean Manger
Albuquerque District Corps of Engineers
P.O. Box 1580
Albuquerque, NM 87103-1580
telephone (505) 766-2776

Statement of Findings: Depending on the placement of borrow pits, there is a potential to impact known and previously undiscovered archeological sites and portions of the Camino Real. Once candidate borrow areas have been identified, cultural resources surveys would be conducted. Should it be determined that significant cultural resources would be impacted, consultation with the New Mexico State Historic Preservation Office (NMSHPO) and Advisory Council on Historic Preservation would be conducted pursuant to 36 CFR 800 to determine appropriate mitigation measures. This constitutes the extent of cultural resource investigations by the District Engineer.

There are four species currently classified as Federally endangered that could be present in the vicinity of the proposed project and could possibly be impacted. These species are the interior least tern (Sterna antillarum), bald eagle (Haliaeetus leucocephalus), whooping crane (Grus americana), and peregrine falcon (Falco peregrinus). Section 7 consultation has been completed with the U.S. Fish and Wildlife Service. Measures that would be taken to prevent adverse impacts due to construction related activity include, but are not limited to, the following:

- Schedule construction during the absence of the species;
- Concentrate construction activities to localize disturbance;
- Coordinate closely with U.S. Fish and Wildlife Service personnel especially when construction is taking place on Bosque del Apache National Wildlife Refuge; and
- Avoid impacts to cottonwood trees that would be used by roosting bald eagles even to the extent of shifting alignment of the levee.

The Service states that with the above provisions, there should be no adverse impact to any Federally endangered species from the proposed project.

August 17, 1990

The applicant has applied to the New Mexico Environmental Improvement Division for certification that this work is in compliance with applicable State water quality standards.

The applicant is responsible for obtaining all other required Federal, State and local authorizations for this work.

In accordance with environmental procedures and documentation required by the National Environmental Policy Act of 1969, an environmental impact statement (EIS) will be prepared for this project. The draft Supplementary EIS is available for review and comment concurrent with the present public notice comment period. The EIS may be seen at the office of the Albuquerque District, U.S. Army Corps of Engineers, Room 8419, 517 Gold Avenue SW, Albuquerque, NM.

Comments: Any comments concerning this project should be received by the District Engineer no later than October 16, 1990. Comments received after the end of the Public Notice comment period will not be considered. However, more time may be given if a request, with a valid reason, is received prior to the suspense date.

The decision whether to issue an authorization will be based on an evaluation of the probable impact, including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments.

The evaluation of the impact of this activity will include application of the guidelines promulgated by the Administrator, EPA, under authority of Section 404(b) of the Clean Water Act.

All factors relevant to the proposal and the cumulative effects will be considered; including:

- conservation
- economics
- aesthetics
- wetlands
- flood hazards
- land use
- navigation
- recreation
- water quality
- safety
- mineral needs
- general environmental concerns
- historic properties
- fish and wildlife values
- flood plain values
- shoreline erosion and accretion
- water supply and conservation
- energy needs
- food and fiber production
- consideration of property ownership
- and, in general, the needs and welfare of the people.

An authorization will be granted for this activity unless it is found to be contrary to the public interest.

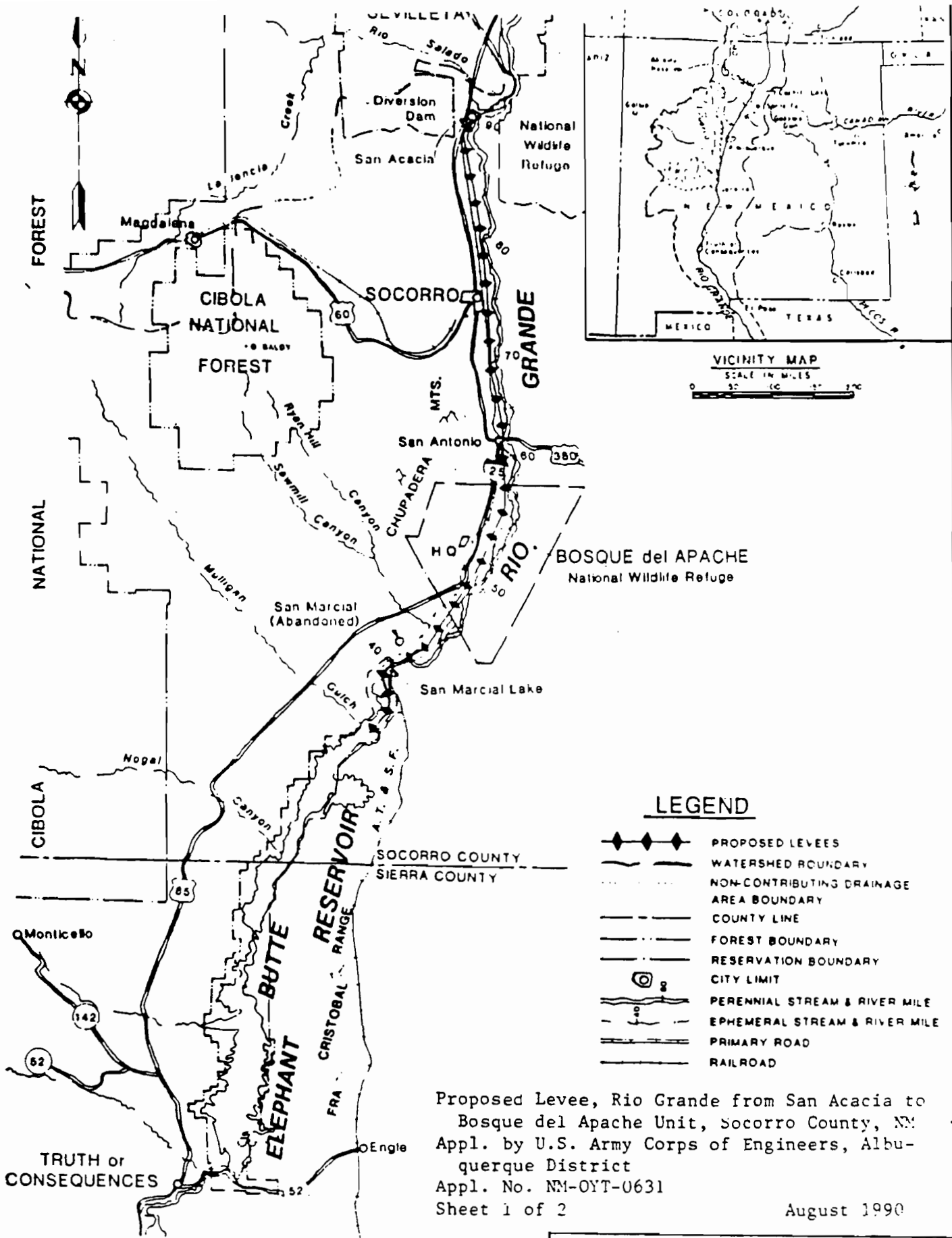
August 17, 1990

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition, or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

Any person may request a public hearing. The request must be submitted, in writing, to the District Engineer within 60 days of the date of this notice and must clearly set forth the reasons for holding a public hearing.

Steven M. Dougan
Lieutenant Colonel, EN
District Engineer

Enclosure



**RIO GRANDE FLOODWAY
 SAN ACACIA TO BOSQUE DEL APACHE UNIT**

SCALE IN MILES
 0 2 4 6 8 12 16 24

U.S. ARMY ENGINEER DISTRICT, ALBUQUERQUE, N.M.

General Project Location	Figure 1
--------------------------	----------

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1580
ALBUQUERQUE, NEW MEXICO 87103-1580
OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE, \$300
SWACO-R

AN EQUAL OPPORTUNITY EMPLOYER

PUBLIC NOTICE



New Mexico Health and Environment Department

GARREY CARRUTHERS
Governor

DENNIS BOYO
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

CERTIFIED MAIL # P 612 425 408
RETURN RECEIPT REQUESTED

16 October 1990

Mr. Mark R. Andrews
Albuquerque District Corps of Engineers
P.O. Box 1580
Albuquerque, NM 87013

SUBJECT: Water Quality Certification for Activity Proposed Under Permit
Application No. NM-OYT-0631, Dated August 17, 1990

Dear Mr. Andrews:

Pursuant to section 401(a)(1) of the federal Clean Water Act, the Surface Water Quality Bureau has examined an application from the Army Corps of Engineers for State certification of a section 404 permit to place dredged material into the mainstem of the Rio Grande and Elephant Butte Reservoir. The proposed project is located in Socorro County, on the Rio Grande mainstem the project extends for 55 miles from the San Acacia Diversion works to the head of Elephant Butte reservoir and within the reservoir at the mouth of Milligan Gulch. The proposed project involves rehabilitation of existing spoilbank levees and reconstruction of 4.8 miles of levees below the maximum water surface of Elephant Butte Lake. The stated purpose of the project is to provide protection against the 100-year frequency flood event.

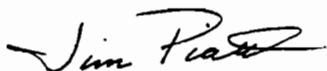
The Bureau has determined that the proposed project is located in segments 2-105 and 2-104 of the Rio Grande Basin as described in the "Water Quality Standards for Interstate and Intrastate Streams in New Mexico as Amended Through March 8, 1988". Designated uses for which the mainstem is protected include irrigation, limited warmwater fishery, livestock and wildlife watering and secondary contact recreation. Elephant Butte reservoir is protected for irrigation storage, livestock and wildlife watering, primary contact recreation and warmwater fishery.

Mr. Mark R. Andrews
16 October 1990
Page Two

The Bureau has reviewed the description of the proposed activity and is concerned that, as proposed, this activity may adversely affect surface water quality to an extent which will impair the fishery and primary contact recreation designated uses. This concern is due to potential and likely exceedances of State water quality standards at section 2-102.A., 2-102.J. and 2-104.B. Information was not presented on methods or techniques which will be used to limit sedimentation and turbidity during construction. Under authority delegated to the Environmental Improvement Division by the New Mexico Water Quality Control Commission, the State of New Mexico finds that this discharge, as proposed, will not comply with any or all of the applicable provisions of the federal Clean Water Act (i.e., sections 301, 302, 303, 306, or 307) and with appropriate requirements of State law. The State of New Mexico therefore issues section 401 certification for application NM-OYT-0631 on a conditional basis subject to our later review and approval of the following items which are specifically included in this certification: 1) The Corps shall develop a plan to limit stream bottom alteration due to sedimentation resulting from the filling operations, 2) The Corps shall develop a water quality monitoring plan and implementation strategy which will assure attainment of State water quality standards for turbidity, and 3) The Corps shall provide detailed information on the methods to be used in the proposed mitigation of wetland losses or alteration. The Bureau will be happy to work with Corps staff in these efforts.

The State of New Mexico specifically reserves the right to amend or revoke this certification if such activity is necessary to insure attainment of the designated uses for this surface water. Please address any questions concerning this permit to Mr. David Coss of my staff at (505) 827-2829.

Sincerely,



Jim Piatt
Chief
Surface Water Quality Bureau

xc: Members of the New Mexico Water Quality Control Commission
District Manager, Environmental Improvement Division
District Engineer, U.S. Army Corps of Engineers
Susan Alexander, NPS Coordinator, Region VI, EPA

APPENDIX H

SECTION 404(b)(1) EVALUATION AND COMPLIANCE
DETERMINATION

I. Project Description

a. Location. The recommended action would be located in Socorro County, New Mexico and would parallel the west bank of the Rio Grande from the San Acacia Diversion Dam to the head of Elephant Butte Reservoir.

b. General Description. The existing "spoil bank" levee that currently borders the west bank of the Rio Grande would be reconstructed to provide 100-year-level flood protection to urban development, water conveyance facilities, Bosque del Apache National Wildlife Refuge (NWR), and irrigated farmland. The length of spoil bank that would be reconstructed is approximately 55 miles. Its alignment would be about the same as that of the existing spoil bank. Approximately 90 percent of earth required would be obtained from the existing embankment with the remainder obtained from the riparian zone, adjacent flood plain, bordering terraces, or a combination of these sources. An estimated 1.2 million cubic yards of earth would be unusable and would be disposed of by layering on the rehabilitated levee, widening riverbanks in areas where the river is adjacent to the levee and associated stabilizing with Kellner jetties (jacks) and riparian vegetation, upland disposal, or a combination of these measures. Riparian habitat removed or disturbed would be replaced with high value native riparian vegetation and wetlands. A major portion of mitigation measures would be accomplished on Bosque del Apache NWR by expanding an existing program of replacing monotypic salt cedar with native riparian vegetation.

c. Authority and Purpose. The planned project is authorized by the Flood Control Act of 1948 (Public Law 80-858). Its purpose is to provide 100-year flood protection to flood plain improvements, human welfare and security, water conveyance facilities, and Bosque del Apache NWR from San Acacia to the head of Elephant Butte Reservoir.

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material - Alluvial materials of sands, sandy silts, silty sands, sandy clay, and clayey sands.

(2) Quantity of Materials - variable from a few thousand cubic yards to a hundred thousand cubic yards depending on which of the five areas is involved.

e. Description of the Proposed Discharge Sites. There are five areas where material would or could be placed, either permanently or temporarily, into a water of the United States, including wetlands. These are described as follows and shown on the accompanying map.

(1) River Channel. Locations within the ordinary high water mark where banks are very narrow and their widening and stabilization would help protect levee from water scour.

(a) Size. Likely less than 50 acres.

(b) Type of Site. Confined river channel.

(c) Type of Habitat. Sandy, sparsely vegetated or barren river channel.

(d) Timing and Duration of Discharge. Variable, any time of year and duration of several days to several weeks.

(2) Abandoned Conveyance Channel. Short section of channel below Tiffany, portions of which are now wetlands. Some earth could be placed in channel during construction of this levee segment.

(a) Size. About 40 to 50 feet wide and one and one-half miles long.

(b) Type of Site. Abandoned water conveyance channel.

(c) Type of Habitat. Narrow band of continuous to discontinuous growth of cattails with some bulrush. No standing water. Heavily grazed.

(d) Timing and Duration of Discharge. Variable, any time of year and duration of several days to several weeks.

(3) Levee Toe Wetland. Located in Elephant Butte Reservoir between spoil bank levee and conveyance channel.

(a) Size. Narrow strip approximately 1.3 miles long and 40 to 50 feet wide. Approximately six to seven acres.

(b) Type of Site. Confined wetland.

(c) Type of Habitat. Marsh.

(d) Timing and Duration of Discharge. Variable, any time of year and duration of several weeks to several months. Placement permanent.

(4) Elephant Butte Reservoir. That part of the reservoir below elevation 4450.30 (USGS datum) is classified as a water of the United States. The existing spoil bank extends into the reservoir below this elevation and will be reconstructed and enlarged.

(a) Size. Approximately 4.4 miles of levee would require varying degrees of additional fill below this elevation.

(b) Type of Site. Zone of reservoir fluctuation.

(c) Type of Habitat. Existing "spoil bank" and adjacent woodland.

(d) Timing and Duration of Discharge. Variable, any time of year and duration of several weeks to several months. Permanent placement.

(5) Mulligan Gulch Wetland. The Mulligan Gulch Wetland is an approximately 18-acre wetland that is located within Elephant Butte Reservoir. It is at the terminus of the project and west of the conveyance channel. This wetland was indirectly created by the USBR as a result of construction activities and is maintained by flows from the conveyance channel. Lengthy inundation of this area from recent, abnormally high water storage has significantly modified the general area, primarily because of sedimentation. The extent to which the wetland has been modified is unknown because of continued inundation of the general area from river flows and from the conveyance channel. Its continued presence or existence is currently unknown, because of a variety of factors including possible physical alteration, effects caused by planned rehabilitation of the now sediment-filled conveyance channel, and needed water rights to sustain the wetland. For purposes of this evaluation, the assumption is made that this wetland would be present in the future.

The alignment of the terminal, tie back section of levee would be about the same as the existing dike that detains water to help form this wetland. As such, there is some potential that a small part of the wetland could be affected. Also, the possible expansion of this wetland as a part of borrow excavation could involve some temporary fill being placed in the wetland.

(a) Size. About 18 acres.

(b) Type of Site. Confined wetland with water largely derived from conveyance channel.

(c) Type of Habitat. Marsh, open water, and flooded salt cedar.

(d) Timing and Duration of Discharge. Variable, any time of year and duration of several weeks to several months.

f. Description of Disposal Method. Placement by track or rubber tire machinery.

II. Factual Determination.

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope.

(a) River Channel. Increase in elevation and no change in slope.

(b) Abandoned Conveyance Channel. Increase in invert elevation if filled or a decrease in elevation if further excavated for wetland development, or both. Little change in slope.

(c) Levee Toe Wetland. Increase due to fill placement.

(d) Elephant Butte Reservoir. No changes.

(e) Mulligan Gulch Wetland. No significant change anticipated.

(2) Sediment Type. Little change.

(3) Fill Material Movement. Measures would be taken to stabilize.

(4) Physical Effects on Benthos.

(a) River Channel. None.

(b) Levee Toe Wetland. Loss due to permanent fill placement.

(c) Abandoned Conveyance Channel. None.

(d) Elephant Butte Reservoir. No effect.

(e) Mulligan Gulch Wetland. Possible removal of a narrow strip of land at base of dike for a distance of about 900 feet.

(5) Other Effects. None foreseen.

(6) Action taken to Minimize Impacts. Minimizing construction zone along terminal tie-back levee (if in contact with wetland fringe). Any compensation required would be accomplished by proportionately expanding size of wetland.

b. Water Circulation, Fluctuation, and Salinity Determinations. The following water features would not apply to the Levee Toe Wetland since it would be completely filled.

(1) Water

(a) Salinity. No change.

(b) Water Chemistry. No change.

(c) Clarity

[1] River Channel. No change.

[2] Abandoned Conveyance Channel. Not applicable.

[3] Elephant Butte Reservoir. Levee would exclude water storage from a small part of reservoir area. Possible increase in clarity of impounded water.

[4] Mulligan Gulch Wetland. Possible minor and temporary increase in turbidity along base of levee.

(d) Color. No effect.

(e) Odor. No effect.

(f) Taste. No effect.

(g) Dissolved Gas Levels. No effect.

(h) Nutrients. No effect.

(i) Eutrophication. No effect.

(2) Current Patterns and Circulation.

(a) Current Patterns and Flow.

[1] River Channel. Reduce meander in immediate disposal areas.

[2] Abandoned Conveyance Channel. No effect.

[3] Elephant Butte Reservoir. Storage excluded from a small part of reservoir area.

[4] Mulligan Gulch Wetland. Inundation prevented from highly infrequent high water storage in reservoir. However, water would still be impounded during reservoir storage due to detention of flows in conveyance channel.

(b) Velocity. No effect.

(c) Stratification. No effect.

(d) Hydrologic Regime.

[1] River Channel. No effect.

[2] Abandoned Conveyance Channel. No effect.

[3] Elephant Butte Reservoir. No effect.

[4] Mulligan Gulch Wetland. No significant effect although water from the reservoir would not directly enter reservoir during high storage periods.

(3) Normal Water Level Fluctuation. No effects. Exclusion of reservoir water storage into Mulligan Gulch Wetland compensated by impoundment of flows in conveyance channel.

(4) Salinity Gradients. No effect.

(5) Actions That Will Be Taken to Minimize Effects. No foreseeable actions required.

c. Suspended Particulate/Turbidity Determination.

(1) Expected Changes in Suspended Particulates and Turbidity levels. No significant changes foreseen.

(2) Effects (degree and duration) on Chemical and Physical Properties of the Water Column.

(a) Light Penetration. No significant effect.

(b) Dissolved Oxygen. No effect.

(c) Toxic Metals and Organisms. No effect.

(d) Pathogens. No effect.

(e) Aesthetics. No significant effect.

(3) Effects on Biota.

(a) Primary Production, Photosynthesis. No significant effects foreseen.

(b) Suspension/Filter Feeders. No significant effects foreseen.

(c) Sight Feeders. No significant effects foreseen.

(4) Action Taken to Minimize Impacts. Contractual requirements to minimize activities near or in water that would increase turbidity.

d. Contaminant Determinations. The material proposed for discharge should not introduce, relocate, or increase contaminants. Also, contract specifications contain provisions for the protection of water quality from such pollutants as petrochemicals used for fuel, lubrication, etc.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton. No significant effect except at Levee Toe Wetland which would be filled with a resultant loss of plankton.

(2) Effects on Benthos. No significant effects foreseen except at Levee Toe Wetland which would be filled with a resultant loss of benthos.

(3) Effects on Nekton. No significant effects foreseen except at Levee Toe Wetland which would be filled with a resultant loss of nekton.

(4) Effects on Aquatic Food Web. No effects foreseen except at Levee Toe Wetland which would be filled with a resultant loss of interacting biota.

(5) Effects on Special Aquatic Sites. The abandoned conveyance channel, Levee Toe Wetland, and Mulligan Gulch Wetland are wetlands and, therefore, fall under the classification of Special Aquatic Sites within the context of waters of the United States.

(a) Abandoned Conveyance Channel. A narrow, continuous to discontinuous band of wetland vegetation (primarily cattails) is located in the channel bottom and provides little wetland habitat. The possible temporary placement of fill would likely depress what wetland habitat is provided but would not have a significant adverse effect on associated wildlife use. Conversely, the possibility of excavating accumulated sediment from the channel to provide levee fill would greatly improve wetland features and use.

(b) Levee Toe Wetland. Compensation for the displacement of this wetland with fill would be accomplished by the creation of additional wetlands in association with borrow activities. Judicious siting, design, and permanent water would enhance wildlife use.

(c) Mulligan Gulch Wetland. If the alignment of the terminal tie-back levee section is near the southern fringe of this wetland, a narrow strip of marsh vegetation could be displaced with associated loss of wildlife use. Conversely, the levee would reduce sedimentation of the wetland during high water storage. Combined with possible expansion of the wetland in association with borrow excavation, wetland values would be appreciably enhanced.

(6) Threatened and Endangered Species. Wetland expansion, creation, or both would benefit the threatened and endangered species.

(7) Other Wildlife. All project features affecting waters of the United States have features incorporated into them to preserve and, where possible, enhance wildlife habitat. These features include planting of native riparian vegetation and creation of wetlands.

(8) Actions to Minimize Impacts. Actions taken to minimize impacts include design accommodations, contractual restrictions, revegetation, and wetland expansion and creation features.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. No effects.

(2) Determination of Compliance with Applicable Water Quality Standards. See EIS for water quality standards. Based on an evaluation of planned project activities associated with waters of the United States there is no indication that State water quality standards would be violated. Most of the planned action consists of rehabilitating an existing structure using much of the same material. Combined with contractual environmental protection specifications, state water quality should be preserved.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supply. No effect.

(b) Recreational and Commercial Fisheries. Potential to enhance recreational fishing by creating wetlands.

(c) Water Related Recreation. In addition to having the potential to provide additional fishing opportunities the potential to provide increased waterfowl hunting opportunities as well as educational opportunities.

(d) Aesthetic. Possible long-term improvement in visual quality.

(e) Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. The upper part of Elephant Butte Reservoir (among other parts of the reservoir) is administered for recreation by the State of New Mexico. However, there is no active management in this reach. The possible provision of wetlands would make recreational opportunities available to the State if they and USBR elected to manage these areas for public recreation.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. The direct cumulative effects of placing fill in several wetlands should be relatively small. Accompanied by planned improvement or compensatory measures, as well as more extensive wetland development, the aquatic ecosystem should be enhanced. However, indirect cumulative effects of the project as a whole would be to reinforce the continued containment of overbank flows which, in a natural riverine ecosystem, would create meanders, oxbows, and depressions which would give rise to a diversity of wetlands and associated wildlife use. A higher level of flood protection to Bosque del Apache NWR would continue the regional high wildlife, educational, and recreational use that aquatic resources on this refuge provide.

h. Determination of Secondary Effects on the Aquatic Ecosystem. No significant secondary effects either positive or negative, are foreseen.

FINDING OF COMPLIANCE
FOR
RIO GRANDE FLOODWAY
SAN ACACIA TO BOSQUE DEL APACHE UNIT
SOCORRO COUNTY, NEW MEXICO

1. No significant adaptation of the Section 404(b)(1) guidelines were made relative to this evaluation.
2. Practical alternatives exist for two of the five discharge (placement) sites associated with the planned action. These sites are the river channel and Mulligan Gulch Wetland. As stated in the EIS, placement of clean fill in the river channel to increase bank width, and associated stabilization with native riparian vegetation is one of several disposal sites that would likely be used. Other disposal sites would not affect aquatic sites. The judicious use of the river channel would substitute very poor and abundant sandbar habitat with high wildlife use riparian forest, resulting in an overall gain in wildlife density and diversity.

There is some flexibility in determining the alignment for the terminal tie-back levee and maximum emphasis is being placed on avoiding the Mulligan Gulch Wetland during advanced design. If avoidance is neither practicable or feasible the extent of impact will be minimized and any adverse effects compensated by expanding this wetland. Given the anticipated minor impact on this wetland, the ease of compensating for any infringement, and the opportunity to enhance wildlife habitat, this alternative is considered to be in the interest of the aquatic ecosystem.

Alternatives to avoid discharge (or potential to) into the abandoned conveyance channel are limited by high costs and physical constraints. The alternative of utilizing the alignment of the spoil bank that parallels the relocated section of the conveyance channel has both higher costs and severe space limitations. Also, this alternative would leave the wetland vulnerable to heavy sedimentation from high river flows. To move the alignment riverward decreases channel capacity, requires an increase in levee height, removes more habitat, requires more habitat compensation, and substantially increases costs. Moving the alignment just west of the conveyance channel would require land acquisition and would leave the wetland vulnerable to sedimentation from the river. The chosen alternative accommodates levee design, minimizes riparian removal, has lower costs, and maximizes the potential to improve this wetland.

There is no reasonable alternative for rehabilitating that section of the spoil bank levee that extends into Elephant Butte Reservoir other than no construction. Use of the present alignment would result in the least disturbance of aquatic as well as terrestrial habitat, and compensation measures would expand aquatic habitat.

The alignment of the levee could be moved into the riparian zone to bypass the Levee Toe Wetland. However, this would result in a considerable increase in riparian vegetation removed, both from the new alignment and from increased

borrow requirements. Also, this change in alignment would change the hydraulic characteristics of the channel and could require an increase in upstream levee height. A change in levee alignment to avoid the wetland is not being pursued because of increased habitat disturbance, increased construction costs, and the ability to compensate for these wetlands by constructing higher use wetlands in association with borrow activities.

3. State Water Quality Standards would not be violated by planned (or potential) placement actions. Also, placement will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

4. Use of planned placement sites will not adversely affect any endangered species or their critical habitat.

5. The proposed placement of earth will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic life and other wildlife will not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values will not occur.

6. Appropriate measures to avoid or minimize adverse effects of placed material on aquatic ecosystems include compatible feature designs, avoidance of high flow periods in the Rio Grande, contractual guidance or restrictions, avoidance of riparian aquatic sites to the extent practicable, and implementation of mitigation and compensation measures presented in Section 3.05a(11) of the SEIS.

7. Application of Section 404(b)(1) guidelines demonstrates that the proposed sites for the placement of earth comply with the provisions of the Clean Water Act. Integral to this determination is the inclusion of appropriate measures to avoid, minimize, or compensate for any unavoidable adverse effects.