FINAL ECONOMIC ANALYSIS
OF CRITICAL HABITAT DESIGNATION
FOR THE SOUTHWESTERN WILLOW FLYCATCHER

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Prepared for:

Division of Economics
U.S. Fish and Wildlife Service
4401 N. Fairfax Drive
Arlington, VA 22203

Prepared By:

Industrial Economics, Incorporated
2067 Massachusetts Avenue
Cambridge, MA 02140

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EXECUTIVE SUMMARY

1. The purpose of this report is to identify and analyze the potential economic impacts associated with the proposed critical habitat designation (CHD) for the southwestern willow flycatcher (flycatcher) *(Empidonax traillii extimus*). This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service's (Service) Division of Economics.

KEY FINDINGS[1]

- **Total impacts**: $32.7 to $38.0 million annually using water management Scenario 1, the most likely scenario.
- **Activities most impacted:** 77 percent, or $29.0 million annually, of forecast future costs are related to water management activities (under Scenario 1), 14 percent to administrative efforts, four percent to grazing activities, three percent to transportation activities, one percent to development activities, one percent to Tribal activities, and one percent to all other activities. Impacts under Scenario 2 are even more heavily weighted to water management and use. Within Management Units (MUs), impacts are concentrated at water management facilities.
- **Management Units with highest impacts:** The areas with the highest forecast costs are within the Lower Colorado MUs: Hoover to Parker (21 percent of total costs), Parker to Southerly (21 percent), Middle Colorado (12 percent). These costs derive primarily from implementation costs related to the Lower Colorado Multi-Species Conservation Program (MSCP), including costs that are coextensive with other species. The Lower Colorado River units have highest impacts under both water management scenarios**.**
- **Water Management**: Water management impacts are concentrated at water management facilities (specifically, reservoir areas) that fall in CHD areas. Future costs to water management activities are presented under two scenarios:
  - Under Scenario 1 water operators are assumed to pursue and successfully obtain an Incidental Take Permit. Costs under this scenario are estimated at $29.0 million annually. These costs are principally associated with the implementation of the Lower Colorado MSCP, and are distributed among the Lower Colorado Units on the AZ, CA, and NV boundaries.
  - Scenario 2 considers the potential costs of changes in water management activities that may be imposed on water managers and users. Considerable uncertainty surrounds the quantification of estimates under Scenario 2, as the probability of these outcomes occurring is unknown. Costs are quantified for 8 facilities across 5 MUs, and are principally associated with the facilities themselves. Costs of flycatcher conservation under this scenario are substantially higher: 6 to over 200 times as high as Scenario 1, depending on the facility. These costs principally result from an assumed reduction in reservoir storage capacity that results in a loss of water from human beneficial use. Scenario 2 also considers impacts on hydroelectric production, flood control capability and groundwater pumping. Total impacts related to hydropower activities could be $2.7 million annually. This impact would be borne by two facilities: Parker Dam, AZ, and Roosevelt Dam, AZ. This analysis does not account for any windfall downstream use of water following spillage. Because USBR takes the position that it lacks discretion to release water from Lake Mead to benefit flycatcher habitat, operational changes under Scenario 2 at Lake Mead are not reasonably foreseeable.
- **Administrative costs**: The administrative costs of flycatcher conservation activities are significant. Costs of consultation efforts and administrative time are forecast to range from $1.6 to $5.4 million annually. Highest administrative costs are anticipated in the Santa Ana and San Diego MUs, CA.

[1] All estimates included in the Key Findings section have been discounted to 2004 dollars, assuming a discount rate of seven percent.

KEY FINDINGS (continued)

- **Livestock grazing:** The analysis considers the economic impacts that could result from a reduction in grazing activity within the proposed designation. Economic efficiency losses resulting from reductions in AUMs grazed are forecast to range from $0.2 million to $1.7 million annually. This represents lost permit value as well as other project modifications. These costs are primarily borne by private ranchers who graze livestock within the proposed CHD, but also include costs to ranchers who hold Federal grazing permits. Depending on the scenario assumed, the 37 affected counties may lose due to grazing restrictions a total of 3,385 head of beef cattle, or 0.6 percent of the total number of beef cattle in the affected region. Under a scenario in which livestock grazing activity is limited, future regional economic impacts include up to $5 million in annual lost regional economic output, as well as the loss of up to 64 jobs. Grazing impacts are distributed across the 6 states in proposed CHD, but are highest in the units in San Luis Valley, CO; Middle Rio Grande, NM; and Owens Valley, CA.
- **Development**: The total cost of future project modifications (including on-site set-aside and "other" project modifications), CEQA, and delay impacts related to flycatcher conservation efforts are estimated to be approximately $0.5 million annually. These impacts are expected to occur in the Mohave and Santa Ana MUs, CA.
- **Tribes:** Socioeconomic data suggest that the fifteen potentially affected Indian Tribes are economically vulnerable to future impacts from flycatcher conservation efforts. The total cost to Indian Tribes is estimated to be approximately $0.2 million annually, although there is a great deal of uncertainty regarding future activities on these reservations. Tribal activities potentially affected by flycatcher conservation efforts include development, vegetation clearing and restoration activities. The absence of cost information on some potential impacts of flycatcher conservation activities on Tribal economies suggests that future costs to Tribes estimated in this report are likely underestimates of actual costs that may be incurred once critical habitat for the flycatcher is designated.
- **Mining:** While few active mineral mining activities occur within proposed CHD areas, several mines located near the proposed CHD could be affected if they are required to modify their water use to avoid adverse impacts on the flycatcher. However, it is unclear to what extent water withdrawals by mining operations will impact the flycatcher and its habitat. Because the hydrologic connection between mining activities and flycatcher CHD is poorly understood, impacts on mining activities are not quantified.
- **Other effects:**
  - Transportation: Project modification costs related to transportation are forecast to total $ 0.7 million annually.
  - Recreation: Restrictions (primarily already in place) on certain recreational activities in Tonto NF, AZ; San Bernardino NF, CA; and Lake Isabella, CA, will result in reduced opportunities for fishing, hunting, and picnicking and will require additional enforcement efforts. Estimated welfare losses associated with these restrictions are $0.2 million annually. These restrictions may also result in regional economic impacts totaling approximately $0.4 million in regional economic output and the loss of six jobs.
- Fire management: Flycatcher conservation efforts are most likely to impact fire management activities where Wildland-Urban Interface (WUI) areas overlap with the proposed CHD. This overlap occurs in 26,000 acres, or approximately 7 percent of proposed CHD.

2. Section 4(b)(2) of the Endangered Species Act (Act) requires the Service to designate critical habitat on the basis of the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.[2] In addition, this analysis provides information to allow the Service to

[2] 16 U.S.C. §1533(b)(2).

address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).[3] This report also complies with direction from the U.S. 10th Circuit Court of Appeals' ruling that, when deciding which areas to designate as critical habitat, the economic analysis informing that decision should include consideration of "co-extensive" effects.[4]

3. This analysis considers the potential economic effects of efforts to protect the flycatcher and its habitat (hereinafter referred to collectively as "flycatcher conservation activities") in the proposed CHD. Actions undertaken to meet the requirements of other Federal, State, and local laws and policies may afford protection to the flycatcher and its habitat, and thus contribute to the efficacy of critical habitat-related conservation and recovery efforts. Thus, the impacts of these activities are relevant for understanding the full impact of the proposed CHD.

4. This analysis considers both economic efficiency and distributional effects. In the case of habitat conservation, efficiency effects generally reflect the opportunity costs associated with the commitment of resources to comply with habitat protection measures (e.g., lost economic opportunities associated with restrictions on land use). This analysis also addresses how potential economic impacts are likely to be distributed (distributional effects), including an assessment of any local or regional impacts of flycatcher conservation and the potential effects of conservation activities on small entities and the energy industry. This information can be used by decision-makers to assess whether the effects of the designation might unduly burden a particular group or economic sector. Also, this analysis looks retrospectively at costs that have been incurred since the date the species was listed and considers those costs that may occur after the designation is finalized.

5. To conduct the analysis, best available data are gathered from a variety of sources, including public comments from the scoping process for the National Environmental Policy Analysis (NEPA), government agencies, industry associations, potentially affected private parties, Tribes and municipalities, and other stakeholders. Specifically, data were gathered from the following public entities: the Bureau of Reclamation (USBR); Army Corps of Engineers (USACE), Bureau of Land Management (BLM); Bureau of Indian Affairs (BIA); U.S. Forest Service (USFS); National Park Service (NPS); Nevada Department of Wildlife; Arizona Game and Fish Department; other state agencies, including departments of water resources, natural resources, agriculture, energy, recreation, and transportation; as well as county and city governments. Data were also gathered from the following private entities: the Salt River Project; other private stakeholder groups, including water facility owners and water distributors, farming and ranching associations, and development companies; and the fifteen potentially affected Tribes. Finally, Census Bureau and other Department of Commerce data were used to characterize the regional economy.

6. The proposed CHD for the flycatcher includes approximately 1,555 river miles or 376,000 acres in Arizona, California, Colorado, New Mexico, Nevada and Utah. Approximately 40 percent of

[3] Executive Order 12866, "Regulatory Planning and Review," September 30, 1993; Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001; 5. U.S.C. §§601 *et seq*; and Pub Law No. 104-121.

[4] In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

the proposed CHD acreage is under federal ownership, 40 percent is under private ownership, and the remaining 20 percent is under state and other ownership. Exhibit ES-1 shows the current ownership of the proposed CHD.

7. Within the 376,000 acres identified as essential habitat for the flycatcher across six states, approximately 102,000 acres are excluded from CHD, proposed for exclusion from CHD, or considered for exclusion from CHD.[5] These areas include Tribal lands, lands managed by the Department of Defense, National Wildlife Refuges, private lands with legally operative HCPs or draft HCPs, State lands with conservation plans, and other lands with management plans in place for the southwestern willow flycatcher. The main body of this analysis considers impacts associated with the 376,000 acres identified as essential habitat for the flycatcher. Costs associated with areas that are excluded from CHD, proposed for exclusion from CHD, or considered for exclusion from CHD are presented in Appendix C.

Exhibit ES-1

SUMMARY OF ESTIMATED LAND OWNERSHIP IN PROPOSED FLYCATCHER CRITICAL HABITAT
(Acres within CHD boundaries)

Ownership	**Total**
Federal	152,741
State	24,255
Private	155,444
Other	43,655
TOTAL	**376,095**

Source: Service estimates included in the Proposed Rule (69 FR 60706).

Results of the Analysis

8. This analysis addresses the impacts of flycatcher conservation efforts on activities occurring in areas proposed for designation. This analysis uses a number of economic impact measures: lost economic efficiency (including the cost of administrative measures, project modifications, reductions in the value of grazing permits, and the value of water lost from beneficial use), impacts to regional economic output and jobs (quantified for lost livestock grazing and recreation opportunities), reductions in hydroelectric production, and estimates of the potential for reduced effectiveness of fire management efforts (measured as the number of acres of overlap between the proposed CHD and WUIs).

9. It is important to note that flycatcher conservation measures may accelerate and compound ongoing trends in natural resource use in the Southwest. For example, many potentially affected areas are currently experiencing population growth, and a long-term, severe drought is ongoing in much of the southwest. As a result, numerous plans for acquiring additional or alternate water supplies are under development, additional power supply facilities have been proposed, and reductions in

[5] For a detailed review of various exclusions under consideration, see pages 60724-60731of the proposed rule to designate critical habitat for the flycatcher (69 FR 60706).

permitted grazing use have occurred. Flycatcher conservation measures impose costs and changes on top of these significant ongoing trends.

Efficiency Impacts

10. Efficiency impacts can be broken down into costs associated with implementing flycatcher and flycatcher habitat conservation activities and administrative costs associated with section 7 consultations. Costs associated with flycatcher conservation efforts have been estimated for a variety of activities, including: water management, livestock grazing, transportation, development, recreation, fire management, and other activities. Exhibits ES-2, ES-3, and ES-4 present the distribution of efficiency impacts by activity. As shown, water management activities account for 75 percent of total costs (utilizing costs under Scenario 1), followed by administrative efforts at 16 percent, grazing activities at five percent, development activities at one percent, Tribal activities at one percent, and the remaining other activities at one percent. The efficiency impacts resulting from flycatcher conservation efforts include:

- ***Costs associated with water management activities*.** This analysis identifies past, ongoing, and future costs related to flycatcher management at affected water facilities. Past costs associated with flycatcher management are estimated to be approximately $58.6 million (2004 dollars). Mitigation activities at Roosevelt Dam in Arizona, Isabella Dam in California, and along the Middle Rio Grande in New Mexico account for approximately 72 percent of past costs. All of these areas were subject to biological opinions that resulted in extensive mitigation efforts. In addition, water operators at Roosevelt Dam developed a complex HCP to mitigate (offset) and minimize the taking of threatened and endangered species, including the flycatcher.

  Because uncertainty exists regarding potential future costs that may be associated with flycatcher conservation, this analysis considers two scenarios:

  Scenario 1: This scenario assumes that each impacted water facility pursues and attains an incidental take permit (ITP), either through a section 7 consultation or Habitat Conservation Plan (HCP). Development and approval of an ITP for current water operations with associated mitigation measures is the historical pattern for water operations that affect flycatchers and their habitat. Costs under this scenario are estimated to be approximately $366 million over 20 years, or $29.0 million annually (2004 dollars), and are principally associated with implementation of HCPs, including the Lower Colorado MSCP and the Roosevelt HCP.

  Scenario 2: This scenario assumes that water operators are forced to change the management regime of their facilities to avoid adverse effects on flycatchers and their habitat. This represents a scenario in which the Service or operators do not cooperate on an ITP, or where a third party intervenes to force an operator to avoid habitat destruction prior to receipt of an ITP. Costs under this scenario are driven by the assumed inability of impacted reservoirs to maintain water levels above current levels in order to avoid inundation of flycatcher habitat,

leading to a loss of storage capacity at these facilities.[6] Specifically, water levels are assumed to be maintained at an elevation that is at or below habitat areas, where such actions are legally or physically feasible. A drawback of this method is that is does not account for any windfall downstream use of water following spillage. For example, one of the largest groundwater storage facilities in the United States is found downstream of Lake Isabella in the Kern MU. Additional releases from there are likely to provide some benefit to groundwater storage. However, these benefits are not quantified in the analysis. Also note that it is possible that management agencies lack legal discretion to release water for flycatcher management purposes.[7] In the Middle Colorado MU, the analysis assumes that because USBR takes the position that it lacks discretion to release water from Lake Mead to benefit flycatcher habitat, operational changes under Scenario 2 at Lake Mead are not reasonably foreseeable.

Costs of flycatcher conservation under this scenario are substantially higher than Scenario 1: 6 to over 200 times as high as Scenario 1, depending on the facility in question. These costs principally result from an assumed reduction in reservoir storage capacity, resulting in a loss of water from beneficial use. Flood control and potential impacts on groundwater use are also considered under this scenario. Impacts related to this scenario are presented in ES-4.

- ***Reduced livestock grazing resulting from flycatcher-related restrictions.*** This analysis considers a scenario in which livestock grazing activity is limited on private and public lands within the proposed designation. The potential reduction in grazing effort on Federal lands is expected to range from 311 to 1,270 AUMs over the next 20 years. Grazing activity losses on non-Federal lands could range from zero to 89,000 AUMs, depending on the extent to which the designation limits grazing on these lands.[8] Total potential costs associated with impacts on grazing activity are estimated at $159,000 to $1,685,000 annually.

- ***Impacts on development activities.*** Future economic impacts to development activities as a result of flycatcher conservation efforts could occur within the Mohave and Santa Ana MUs. The total cost of future project modifications (including on-site set-aside and "other" project modifications), CEQA, and delay is estimated to be approximately $0.5 million in the proposed CHD.

- ***Impacts on Tribes.*** The economies of Tribes within the proposed CHD are poorer than their respective regional economies, thereby making these communities particularly vulnerable to economic impact associated with increased regulatory burden. Future impacts resulting from flycatcher conservation efforts on Tribal lands, include administrative costs of consultations, surveys and monitoring, development of management plans, modifications to development

[6] Note that the Recovery Plan states that both extended inundation and extended desiccation of flycatcher habitat should be avoided. This scenario would likely result in extended desiccation of habitat.

[7] For example, currently there is no legal requirement for USBR to maintain water levels below flycatcher habitat at the lake created by Hoover Dam, Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation, 143 F.3d 515 (9th Cir. 1998). Service and USBR Solicitors further state that the Department of Interior has interpreted the U.S. Supreme Court's injunction in Arizona v. California, 376 U.S. 340 (1964) as precluding the release of water from Lake Mead for the sole purpose of protecting flycatcher habitat. Congress has also enacted legislation to prohibit USBR from releasing San Juan/Chama water for flycatcher management purposes at Heron Reservoir. Comments of the Southwest Regional Solicitor's Office, December 15, 2004.

[8] This analysis did not identify any past flycatcher consultations for livestock grazing activities on non-federal lands.

activities, and potential project modifications to restoration activities and water projects. As specific plans are unavailable for many of these activities, costs are largely unknown. Flycatcher conservation activities for which costs are known, however are anticipated to result in a future impact of approximately $0.2 million per year. Overall, the absence of cost information related to the potential impacts of flycatcher conservation on Tribal lands results in a probable underestimate of future costs to Tribal entities in this section.

- **Mining:** While few active mineral mining activities occur within proposed CHD areas, several mines located near the proposed CHD could be affected if they are required to modify their water use to avoid adverse impacts on the flycatcher. However, it is unclear to what extent water withdrawals by mining operations will impact the flycatcher and its habitat. Because the hydrologic connection between mining activities and flycatcher CHD is poorly understood, impacts on mining activities are not quantified.

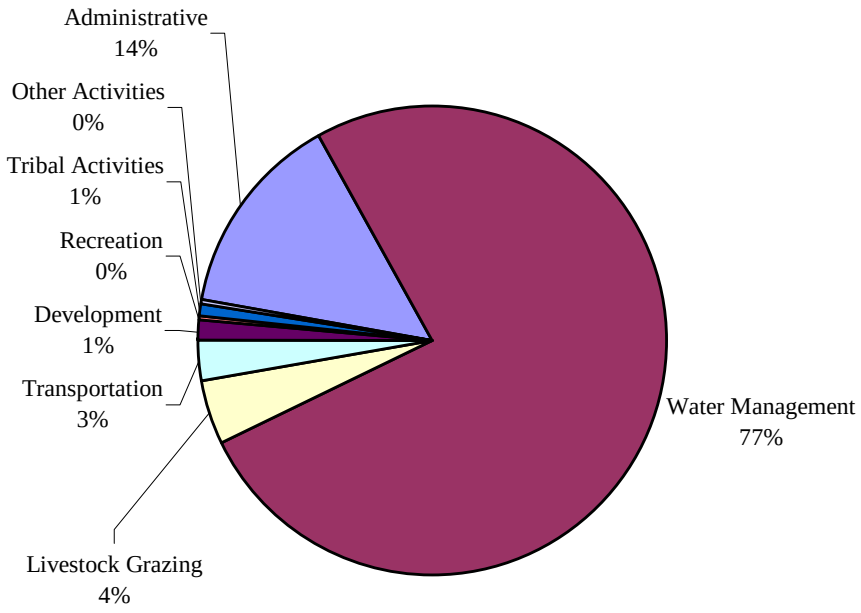
- ***Impacts on transportation activities.*** Transportation projects in the proposed CHD may incur costs related to timing restrictions, fencing, survey and monitoring, and habitat conservation and restoration. The future average cost of flycatcher conservation measures for transportation projects is calculated based on historical costs per-project-mile, and could cost approximately $1.24 million annually, particularly if the proposed Transportation Corridor project in the San Diego MU is approved.

- ***Impacts to recreation activities***. Restrictions on fires, smoking, and vehicle use in Tonto NF, San Bernardino NF, and at Lake Isabella will result in reduced opportunities for fishing, hunting, and picnicking. Additional enforcement measures will also be needed at Lake Isabella. Estimated welfare losses associated with these restrictions are $ 0.2 million annually.

- ***Impacts on fire management activities***. Impacts on fire management activities are likely to be greatest in areas where WUI areas overlap with flycatcher CHD. The proposed CHD overlaps with 26,128 WUI acres. The acreage of overlap between WUI areas and the proposed CHD represents seven percent of the total 376,000 acres included in the proposed CHD. The majority of WUI area overlap occurs in San Diego, San Bernardino Counties, CA; Pinal, Yavapai, and Gila Counties, AZ; Rio Arriba, NM; and Washington County, UT.

- ***Administrative costs borne by the Service, action agencies, and third parties associated with flycatcher conservation activities.*** Administrative costs are costs associated with attending meetings, preparing letters, biological assessments and management plans, and in the case of formal consultations, the development of a biological opinion. Administrative costs resulting from flycatcher conservation activities are expected to range from $1.6 to $5.4 million annually.

Exhibit ES-2
ANNUALIZED COSTS OF FLYCATCHER CONSERVATION ACTIVITIES
BY ACTIVITY TYPE (SEVEN PERCENT DISCOUNT RATE)*



*This chart utilizes Scenario 1 estimates for Water Management activities and high end estimates for all other activities.

Exhibit ES-3

SUMMARY OF FUTURE EFFICIENCY EFFECTS
(Annual, 2004 dollars, discounted at 7 percent) Thousands of Dollars ($1000's)

Recovery Unit	Management Unit	Administrative Costs		Water Management Impacts		Grazing Impacts		Transportation	Development	Recreation	Mining **	Other	Fire management (WUI acres)
		Low	High	Facility(ies)	Scenario 1	Low	High						
Coastal California	Santa Ynez	$14	$45	n/a	$0	$0	$60	$8	$0	$0	$0	$0	418
	Santa Ana	$203	$651	Seven Oaks Dam	$1,264	$0	$106	$0	$88	$3	Sec. 9	$2	1,437
	San Diego	$259	$830	Hodges Dam, Cuyamaca Dam, Vail Dam	$1,099	$13	$39	$225	$0	$0	Sec. 9	$21	3,735
Basin and Mohave	Owens	$14	$45	Pleasant Valley Dam	$6	$0	$158	$387	$0	$0	$0	$0	2
	Kern	$42	$135	Lake Isabella	$350	$13	$88	$0	$0	$14	$0	$0	0
	Mohave	$56	$180	Mohave Dam	$14	$0	$31	$0	$417	$0	$0	$0	471
	Salton	$14	$45	n/a	$0	$0	$0	$21	$0	$0	$0	$0	0
Lower Colorado	Little Colorado	$15	$51	n/a	$0	$13	$27	$0	$0	$0	$0	$64	61
	Virgin	$15	$51	n/a	$0	$14	$62	$0	$0	$0	$0	$21	2,794
	Middle Colorado	$108	$359	Lake Mead/Hoover Dam	$3,278	$0	$0	$58	$0	$0	$0	$0	0
	Pahranagat	$31	$103	n/a	$0	$0	$14	$0	$0	$0	$0	$21	35
	Bill Williams	$46	$154	Alamo Dam	$222	$11	$99	$0	$0	$0	Sec. 9	$0	37
	Hoover to Parker	$23	$77	Lake Havasu/Parker Dam	$6,100	$0	$13	$71	$0	$0	Sec. 9	$0	624
	Parker to Southerly	$38	$128	Headgate Rock Dam, Imperial, Laguna, and Senator Wash Dams	$6,100	$0	$18	$34	$0	$0	$0	$0	747
Gila	Verde	$169	$564	Horseshoe Dam	$314	$29	$63	$0	$0	$0	Sec. 9	$2	3,256
	Roosevelt	$108	$359	Theodore Roosevelt Dam	$2,100	$10	$32	$36	$0	$142	Sec. 9	$0	2,603
	Middle Gila/San Pedro	$108	$359	Ashurst-Hayden Diversion Dam	$0	$4	$129	$0	$0	$0	Sec. 9	$0	3,399
	Upper Gila	$108	$359	Coolidge Dam	$1,178	$26	$102	$68	$0	$0	Sec. 9	$0	1,431
Rio Grande	San Luis Valley	$15	$51	n/a	$502	$0	$396	$70	$0	$0	Sec. 9	$0	1,309
	Upper Rio Grande	$15	$51	n/a	$0	$13	$33	$0	$0	$0	$0	$1	2,680
	Middle Rio Grande	$77	$256	n/a	$6,512	$13	$215	$146	$0	$0	Sec. 9	$0	1,089
Multiple MUs		$162	$531		$0	$0	$0	$0	$0	$0		$8	0
Subtotal		**$1,640**	**$5,384**		**$29,039**	**$159**	**$1,685**	**$1,124**	**$505**	**$159**		**$140**	**26,128**
Grand Total (low)*		**32,766**											
Grand Total (high)*		**38,036**											

Notes:
Discounted at a 7 percent discount rate. In addition to the impacts presented here, military activities at Camp Pendleton occur in the San Diego Unit. This exhibit does not include costs to Tribes, which are presented separately below.
* Assessed in Scenario 2.
**See Section 9 for a detailed discussion of potential impacts on mining activities.

Exhibit ES-4

SUMMARY OF EFFICIENCY EFFECTS FOR TRIBES
(Annual, 2004 dollars, discounted at 7 percent) Thousands of Dollars ($1000's)

Recovery Unit	Management Unit	Tribe(s)
Coastal California	San Diego	Pala: $23.12, La Jolla, Rincon, Santa Ysabel: Unknown
Lower Colorado	Middle Colorado	Hualapai: $60.5
	Hoover to Parker	CRIT: $6.7; Fort Yuma, Fort Mohave: Unknown
Gila	Verde	Camp Verde: Unknown
	Upper Gila	San Carlos Apache:$158.1
Rio Grande	Upper Rio Grande	San Ildefonso, San Juan, Santa Clara, Isleta: Unknown
Total		$249

Notes:
Only Tribal lands for which information is available on past impacts related to flycatcher conservation are included in this exhibit. Overall, the absence of cost information related to the potential impacts of flycatcher conservation on Tribal lands results in a probable underestimate of future costs to Tribal entities in this section. Administrative costs are not summarized in this table but are included total administrative cost estimates. Note that some additional administrative costs of compliance with ESA are unknown and therefore not included in estimates. To the extent that these unknown administrative costs relate to Southwestern willow flycatcher, administrative costs estimates for the Tribes may be underestimated.

Details of economic impacts disaggregated by Tribe are presented in Exhibit 7-2 of this report.

11. As stated above, Scenario 2 represents a scenario in which the Service or operators do not cooperate on an ITP, or where a third party intervenes to force an operator to avoid habitat destruction prior to receipt of an ITP. Costs under this scenario are driven by the assumed inability of impacted reservoirs to maintain water levels above current levels in order to avoid inundation of flycatcher habitat, leading to a loss of storage capacity at these facilities.[9] As stated above, it is possible that management agencies lack legal authority to release water for flycatcher management purposes. Also note that the Recovery Plan states that flycatcher management must fit into existing operating rules at reservoirs.[10] However, third parties have occasionally made separate assessments that have resulted in injunctions against allowing facilities to inundate flycatcher habitat.[11] As a result, the likelihood of such occurrences in the future is unknown. Exhibit ES-5 presents the preliminary estimates associated with Scenario 2.

[9] Note that the Recovery Plan states that both extended inundation and extended desiccation of flycatcher habitat should be avoided. This scenario would likely result in extended desiccation of habitat.
[10] Recovery Plan for the Southwestern willow flycatcher, Service, 2003.
[11] For example, at Lake Isabella in California. See the discussion of Lake Isabella in the Kern River MU in this Section.

Exhibit ES-5

SUMMARY OF FUTURE IMPACTS ASSOCIATED WITH WATER MANAGEMENT ACTIVITIES UNDER SCENARIO 2 (Annual, 2004$)

Management Unit	Water Project	Water operations/ supply		Hydropower	Flood control
		Low	High		
Santa Ana	Seven Oaks Dam	Data not available		n/a	Possible
San Diego	Lake Hodges	$539,000	$2,500,000	n/a	n/a
	Cuyamaca Reservoir	$197,000	$810,000	n/a	n/a
	Vail Dam	$539,000	$2,500,000	n/a	n/a
Mojave	Mojave Dam	n/a	n/a	n/a	Possible
Owens	Pleasant Valley Dam	$344,000	$1,400,000	Data not available	n/a
Kern	Isabella Dam	$8,000,000	$33,000,000	n/a	Possible
Middle Colorado	Lake Mead/Hoover Dam	Not expected	Not expected	Not expected	Possible
Hoover-Parker	Lake Havasu/Parker Dam	$35,300,000	$39,100,000	$157,958	n/a
Parker-Southerly	Lake Moovalya/ Headgate Rock Dam	Not expected	Not expected	Not expected	n/a
	Imperial, Laguna, and Senator Wash Dams	Not expected	Not expected	Not expected	n/a
Bill Williams	Alamo Dam	n/a	n/a	n/a	Possible
Roosevelt	Theodore Roosevelt Dam	$33,680,900	$66,134,200	$2,600,000	Likely to be small
Verde	Horseshoe Dam	$13,710,000	$15,180,000	n/a	Likely to be small
Upper Gila	Coolidge Dam	Not expected	Not expected	n/a	Not applicable
Middle Rio Grande	MRG Operations	Not expected	Not expected	n/a	Not applicable

Source: IEc analysis.

Results in Perspective

12. Scenario 2 assumes that water operators are forced to change the management regime of their facilities to avoid adverse effects on flycatcher habitat, resulting in a loss of storage capacity at these facilities. Exhibit ES-6 summarizes the estimated water losses in acre-feet and provides perspective on the number of water users for each facility that could be affected if water is spilled and not captured for beneficial use.

Exhibit ES-6

WATER USERS POTENTIALLY AFFECTED BY FLYCATCHER UNDER SCENARIO 2

Recovery Unit	Management Unit	State	Facility Name	Estimated Water Losses Under Scenario 2 (acre-feet)	Water Users	Distribution of Annual Use		Average Annual Water Use		Affected Water Users	
						Agriculture	Residential/ Commercial/ Municipal	Agriculture per Acre[3] (acre-feet)	Res/Comm (per household)	Acres of Cropland	Res/Comm Households
Coastal California	San Diego	CA	Lake Hodges	4,686	San Dieguito Water District	16%	84%	3.2	0.4	117	4,921
					Santa Fe Irrigation District	0%	100%	3.2	0.4	0	5,858
			Cuyamaca Reservoir	1,712	Helix Water District	0%	100%	3.2	0.4	0	4,280
			Vail Dam	4,461	Rancho California Water District[4]	43%	57%	3.2	0.4	599	6,357
Basin and Mojave	Owens	CA	Pleasant Valley Reservoir	2,989	Los Angeles Dept. of Water and Power[5]	0%	100%	3.2	0.4	0	7,473
	Kern	CA	Isabella Dam	69,779	North Kern Water Storage District	100%	0%	3.2	0.4	7,414	0
					Buena Vista Storage District	100%	0%	3.2	0.4	6,978	0
					City of Bakersfield	0%	100%	3.2	0.4	0	59,312
Gila	Verde	AZ	Horseshoe Dam	30,000	Salt River Project[7]	10%	90%	2	0.4	1,107	49,829
					City of Phoenix[6]	0%	100%	2	0.4	0	19,634
	Roosevelt	AZ	Theodore Roosevelt (low)	24,700	Salt River Project	10%	90%	2	0.4	1,235	55,575
			Theodore Roosevelt (high)	81,700	Salt River Project	10%	90%	2	0.4	4,085	183,825
Lower Colorado	Middle Colorado Hoover-Parker Parker-Southerly	AZ, CA, NV	Parker Dam/Lake Havasu[8]	77,338	36 Lower Colorado River Water Users	53%	47%	3.9	0.4	10,510	90,872

Exhibit A-6 (continued)

WATER USERS POTENTIALLY AFFECTED BY FLYCATCHER UNDER SCENARIO 2

Notes:

1 Annual water use represents the total quantity of water consumed by the listed user over a twelve month period from all sources, not solely the facilities listed in this chart. For the Lower Colorado Recovery Unit, annual water use figures are 2004 calendar year figures accessed from the U.S. Bureau of Reclamation at http://www.usbr.gov/lc/region/g4000/hourly/use04.html on September 1, 2005.
2 Calculation of estimated loss per user assumes that the loss to the dam facility is distributed across users in proportion to the user's annual consumption of total annual water delivery.
3 Agricultural water use per acre is calculated from the average acre-feet per acre of water use by farms from off-farm surface water suppliers in affected states (2003 Farms and Ranch Irrigation Survey, NASS)
4 Annual use of Rancho California Water District obtained from Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2004. Accessed at: http://www.ranchowater.com/pdfs/Adopted%20CAFR.pdf on August 24, 2004.
5 Annual use of Los Angeles Department of Water and Power obtained from Quick Facts 2003-2004. Accessed at: http://www.ladwp.com/ladwp/cms/ladwp000509.jsp on August 24, 2004.
6 The City of Phoenix has rights to the water behind gates erected in the spillway of Horseshoe Dam. Although water spilled from the dam would be captured behind those gates, this analysis assumes under Scenario 2 that Phoenix would lose all water stored behind the gates.
7 The Salt River project anticipates that municipal use will become 90% of its water delivery in the next 10 to 20 years. The users of water administered by the Salt River Project include: the Cities of Chandler, Glendale, Mesa, Phoenix, Scottsdale, and Tempe; the Salt River Pima-Maricopa Indian Community; Fort McDowell Indian Community; Roosevelt Water Conservation District; RID Exchange; Buckeye Irrigation District as well as smaller miscellaneous users.
8 The Lower Colorado system includes the following dams within proposed CHD: Lake Mead/Hoover Dam, Lake Havasu/Parker Dam, Imperial Diversion Dam, Laguna Dam, Senator Wash, and Lake Moovalya/Headgate Rock Dam.

Distributional Impacts

13. This analysis also investigates how potential economic impacts are likely to be distributed across the affected communities in order to assess whether a particular group or economic sector bears an undue proportion of the impacts. This section includes an assessment of local or regional impacts of flycatcher conservation and the potential effects of conservation activities on small entities and the energy industry.

- ***Distributional impacts related to restrictions on grazing activity in the area.*** As noted above, this analysis considers a scenario in which livestock grazing activity is limited on private and public lands within the proposed CHD. Flycatcher-related reductions in livestock production may result in a regional economic impact of up to five million dollars annually. Reductions in livestock production may also impact as many as 64 jobs. Detailed data on the location of projected impacts by County are presented in Appendix A.

- ***Distributional impacts related to reduced recreational activity in Tonto NF area.*** This analysis considers the potential impact of flycatcher conservation on recreational activity, and the resulting regional impacts of changes in these activities. Flycatcher-related regional economic impacts of $0.4 million in revenue and six jobs are expected.

- ***Distributional impacts on Tribal activities resulting from flycatcher conservation efforts***. Many of the affected Tribes have expended resources on flycatcher monitoring and flycatcher management plans. In addition, flycatcher-related impacts to development activities on Tribal lands have the potential to greatly affect the economies of some Tribes. While details are not available on expected impacts for some tribes, this analysis provides descriptions of known potentially affected projects (Section 7 of this analysis).

- ***Impacts on small businesses associated with flycatcher conservation efforts.*** This analysis considers the potential for impacts on small businesses associated with (1) changes in water management; (2) changes in grazing practices; (3) changes in residential development; and (4) changes in recreational behavior. Estimates of the number of affected entities and the expected annual impact are provided in Appendix A.

- ***Water management activities.*** Section 4 presents a regulatory scenario in which reservoir pools are limited to current levels to avoid take of flycatcher habitat, thus resulting in a loss of water for human beneficial use. Small business entities at greatest risk of impacts under this scenario are agricultural water users dependent on the drought reserves provided by these systems. That is, given limits on the storage capacities of these reservoirs, lower priority agricultural water users could experience a loss in irrigation water during some years. Approximately twelve major dams and reservoirs are included in the proposed CHD. Of these, nine dams on four river systems provide water to agricultural users. These dams are the Isabella Dam (Kern River); Roosevelt Dam and Horseshoe Dam (Salt River Project system); Coolidge Dam (Gila and San Pedro Rivers); and Hoover, Parker, Headgate Rock, Imperial, Laguna, and Senator Wash Dams (Lower Colorado River).

While limits on the storage capacity of affected dams could ultimately affect small businesses in other economic sectors (e.g., residential construction), data and models to identify these potentially affected businesses are not available.

- ***Livestock grazing activities.*** Limitations on livestock grazing are expected to impact ranchers in the region. As discussed in Section 5, under the high estimate, flycatcher conservation activities could result in a reduction in the level of grazing effort within the proposed CHD of 89,300 AUMs, of which 1,300 are on federal lands and 88,000 are on private lands. On non-Federal lands, impacts are uncertain because maps describing the overlap of privately grazed lands and the designation are not available (i.e., the portion of each ranch that could be impacted by the designation). In addition, no consultations or HCPs currently exist that affect private grazing in flycatcher habitat areas. The Service also questions the assumption that critical habitat designation will affect private grazing efforts in the future.[12] However, if ranchers reduce grazing effort to avoid incidental take of flycatchers, then impacts on ranches would occur. Converting AUM reductions to cattle reductions reveals that the 37 affected counties may lose a total of 3,385 head of beef cattle, or 0.6 percent of the total number of beef cattle in the affected region. (See Section A.2 for details).

- ***Land Development Activities.*** As discussed in Section 6, impacts to development activities within the proposed CHD, include land value loss, project modifications, CEQA costs, and delay costs, which total $5.3 million, or $505,000 annually. These impacts are concentrated in the Mohave and Santa Ana MUs in California. Small land development businesses in the affected counties, which include San Bernardino, San Diego and Santa Barbara Counties, will experience some impacts. Assuming the proposed CHD affects only small businesses, less than one percent of land developers in these counties will be affected, resulting in a loss of 0.02 percent of annual revenues of small land developers in the affected counties.

- ***Recreation activities.*** As detailed in Section 9, due to limitations on vehicle use, fires and smoking in two areas near Roosevelt Lake on the Tonto NF (Gila County, AZ), fewer trips to the area for hunting and fishing are expected in the future. A reduction in the number of recreation trips will result in an annual sales loss of approximately $386,000. Approximately 72 percent to 100 percent of businesses serving the recreation industry in Gila County are small businesses. Collectively, these businesses generate $157.1 million in sales each year. Thus, the total annual impact of $386,000 represents approximately 0.25 percent of annual small business revenues in Gila County.

[12] Comments of Regional Director, Service Region 2, Albuquerque, NM, January 5, 2005; Comments of Southwest Regional Office of the Solicitor, January 3, 2005; Comments of Service, Grand Junction, Colorado, Ecological Services Office, January 3, 2005.

- ***Impacts on energy production and distribution associated with flycatcher conservation efforts.*** Under Scenario 2, total financial impacts related to hydropower activities could be nine million dollars annually, which represents 0.02 percent of the estimated annual cost of regional energy production. This cost is well below the one percent threshold suggested by OMB and is likely to be borne at two AZ facilities: Lake Havasu/Parker Dam and Roosevelt Dam.

14. It is important to note that measures of regional economic impact are entirely distinct from the reported efficiency effects. As such, these two measures of impact cannot be directly compared and should not be summed.

15. Future economic impacts expected to result from flycatcher conservation efforts are summarized in Exhibits ES-7, ES-8, and discussed below. To illustrate where impacts are expected to occur, the results of the analysis are presented by MU.

Exhibit ES-7
ANNUALIZED COSTS OF FLYCATCHER CONSERVATION BY ACTIVITY AND MANAGEMENT UNIT
(7 PERCENT DISCOUNT RATE)

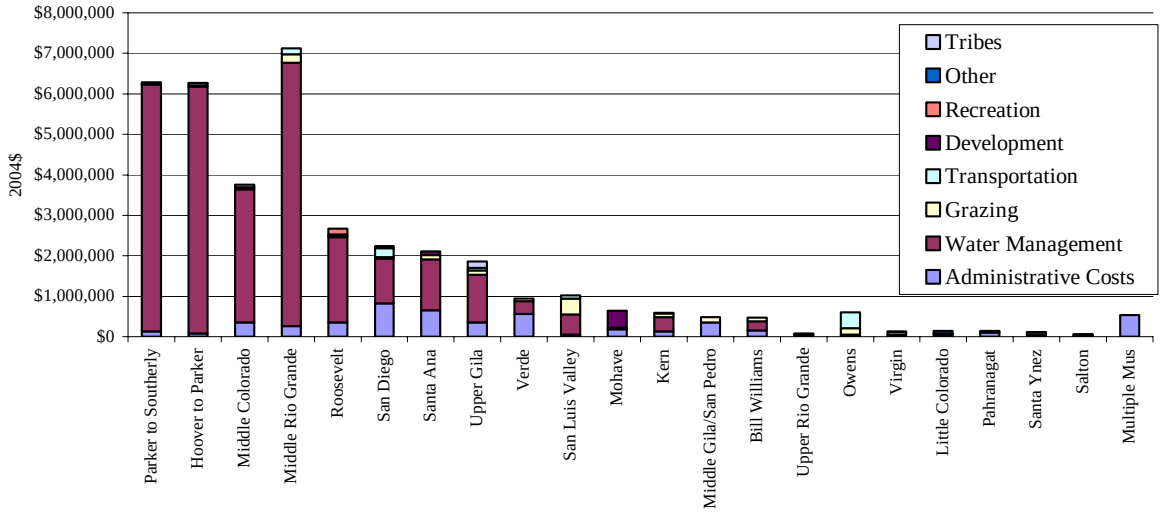
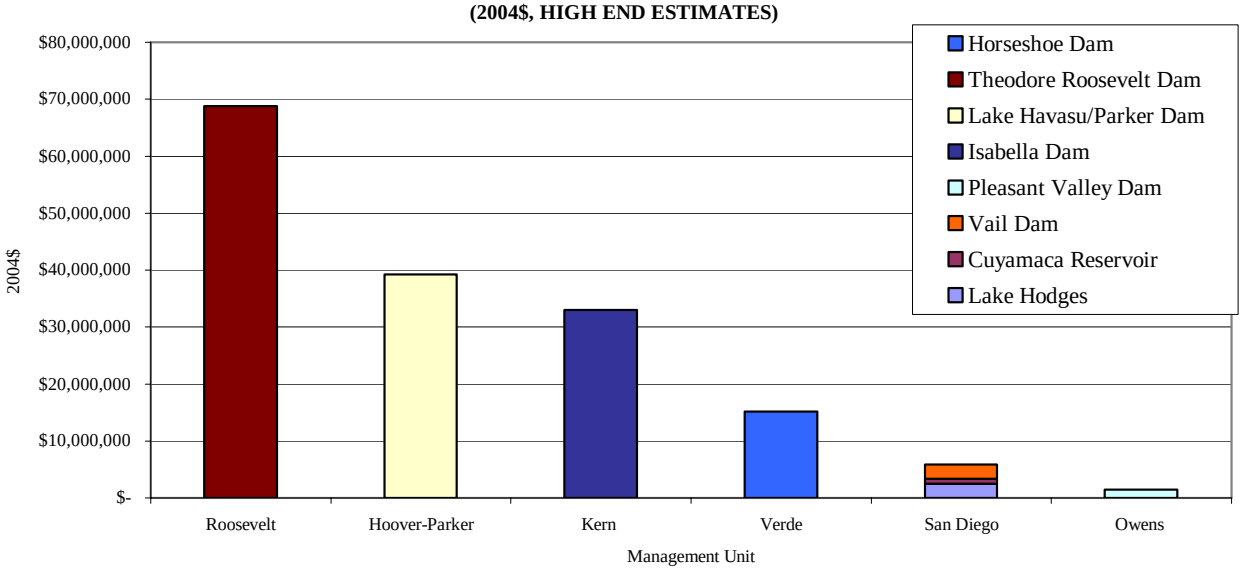


Exhibit ES-8
ANNUALIZED COSTS ASSOCIATED WITH SCENARIO 2 FOR WATER MANAGEMENT ACTIVITIES
(2004$, HIGH END ESTIMATES)



Summary of Areas Most Likely to Experience Impacts

16. Exhibit ES-7 presents annualized costs of flycatcher conservation by activity and MU, using Scenario 1 for water management activities. Exhibit ES-8 presents annualized costs associated with Scenario 2 for water management activities. The areas most likely to experience impacts include:

- For water management activities, future costs under Scenario 1 are largely driven by co-extensive costs associated with the Lower Colorado Multi-Species Conservation Program (MSCP), which covers 26 species. Implementation of the Lower Colorado MSCP will affect the entire Lower Colorado River, including the proposed sections of the Middle Colorado, Hoover to Parker, and Parker to Southerly MUs. Costs associated with implementation of this MSCP contribute 64 percent of total projected future costs.

- Future costs under Scenario 2 are highly uncertain. Costs estimated under this scenario are largest for Lake Roosevelt (Roosevelt MU), Lake Havasu (Hoover to Parker MU), and Lake Isabella (Kern MU). Costs of modifying current operations on hydropower are projected at Lake Havasu (Hoover to Parker MU) and Lake Roosevelt. Although impacts on water supply are reported as annual costs, it is highly unlikely that these costs would be incurred in every year. As a result, this analysis does not sum these costs.

- The MUs likely to experience the greatest impacts from livestock grazing restrictions include the San Luis Valley and Middle Rio Grande MUs, where the majority of the private lands are located.

- The areas most likely to experience any potential impacts on development activities are in California. Due to conservation measures associated with the flycatcher, of the 38 developable acres within the CHD, eight acres will likely be developed and 29 acres are expected to be set aside. The value of the land set aside is $3.7 million. Approximately 0.5 projects are anticipated to occur in these MUs. Project modifications are anticipated to be $1,648,000, not including CEQA costs of $12,000, and delay costs of $1,000. In the Mohave MU, total costs of approximately $4.4 million may occur over the next 20 years. In addition, $0.9 million in development impacts are expected in the Santa Ana MU. Given the fact that the expected acreage set-aside represents less than 0.04 percent of county-level real estate supply for each affected county, impacts associated with flycatcher protection are not expected to affect the dynamics of regional real estate markets.

- The Roosevelt Lake area of Tonto NF is the area most likely to experience impacts related to restrictions on recreational activity resulting from areas closures for flycatcher protection. Closures on the Tonto NF will reduce the number of fishing and hunting opportunities, resulting in welfare losses of approximately $1.7 million over the next 20 years (2004$). In terms of regional economic impacts, the Roosevelt Lake area may experience annual impacts of approximately $386,000 in lost sales, six jobs, $62,000 in salaries and wages, and $15,000 in state taxes (2004$).

- The Bagdad Mine draws 80% of its industrial water from a wellfield that lies along the Big Sandy River in the Bill Williams Unit, likely constituting the highest risk facility involved in mining activities within proposed CHD. The Middle Gila/San Pedro and the Upper Gila MUs are located in active mining areas, though only the Tyrone Mine is known to divert water to its facilities in the Upper Gila MU. Because the hydrologic connection between mining activities and proposed CHD is not clear, impacts on mining activities are not quantified.

- Public comments highlighted the Middle Rio Grande and Upper Gila MUs for concern about impacts of flycatcher conservation activities on fire management activities. Particularly, the Rio Grande Valley State Park was highlighted as a concern. The San Diego, Verde, and Middle Gila/San Pedro MUs have the largest overlap of WUI areas with proposed CHD.

17. The purpose of this report is to estimate the economic impact of actions taken to protect the Federally listed Southwestern willow flycatcher (flycatcher) (*Empidonax traillii extimus*) and its habitat. It attempts to quantify the economic effects of the critical habitat designation (CHD), as well as economic effects of protective measures taken as a result of the listing or other Federal, State, and local laws that aid habitat conservation in the areas proposed for designation. The analysis looks retrospectively at costs incurred since the flycatcher was listed, and it attempts to predict future costs likely to occur after the 2004 proposed CHD is finalized.

18. This information is intended to assist the Secretary in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.[13] In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).[14] This report also complies with direction from the U.S. 10th Circuit Court of Appeals that "co-extensive" effects should be included in the economic analysis to inform decision-makers regarding which areas to designate as critical habitat.[15]

19. This section describes the framework for this analysis. First, it describes the general analytic approach to estimating economic effects, including a discussion of both efficiency and distributional effects. Next, this section discusses the scope of the analysis, including the link between existing and critical habitat-related protection efforts and economic impacts. Finally, it presents the analytic time frame used in the report.

[13] 16 U.S.C. '1533(b)(2).

[14] Executive Order 12866, "Regulatory Planning and Review," September 30, 1993; Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001; 5. U.S.C. "601 *et seq*; and Pub Law No. 104-121.

[15] In 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of proposed CHD, regardless of whether those impacts are attributable co-extensively to other causes (*New Mexico Cattle Growers Ass=n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001)).

1.1 Approach to Estimating Economic Effects

20. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the flycatcher and its habitat (hereinafter referred to collectively as "flycatcher conservation activities"). Economic efficiency effects generally reflect "opportunity costs" associated with the commitment of resources required to accomplish species and habitat conservation. For example, if activities that can take place on a parcel of land are limited as a result of the designation or the presence of the species, and thus the market value of the land is reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal action agency to consult with the Service under section 7 represent opportunity costs of flycatcher conservation activities.

21. This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation activities on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of flycatcher conservation activities unduly burden a particular group or economic sector. For example, while conservation activities may have a relatively small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

1.1.1 Efficiency Effects

22. At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 "Regulatory Planning and Review," Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action. In the context of regulations that protect flycatcher habitat, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.[16]

23. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal landowner or manager may enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation is an economic opportunity cost because the landowner or manager's time and effort would have been spent in an alternative activity had the parcel not been included in the designation. When compliance activity is not expected to significantly affect markets -- that is, not result

[16] For additional information on the definition of "surplus" and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., *A Guide to Benefit-Cost Analysis (2nd Ed.)*, Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, September 2000, available at http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html.

in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

24. Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that impacts the timing of water delivery or storage may shift the price and quantity of water supplied in a region. In this case, changes in economic efficiency (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the market.

25. This analysis begins by measuring costs associated with measures taken to protect flycatcher and its habitat. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the cost of conservation measures is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets.

26. Where data are available, this analysis attempts to capture the *net* economic impact imposed on regulated entities and the regional economy of flycatcher conservation actions. That is, the analysis considers the economic impact of flycatcher conservation net of any direct off-setting benefit to impacted entities. For example, a developer may be forced to reduce the number of homes they can develop per acre, effectively reducing the price they are willing to pay for a parcel of land. However, the developer may be able to market the homes that are built at a higher price, reflecting the lower density of the development. By using undeveloped land values as a measure of the impact of flycatcher conservation and by considering the extent to which substitute sites in the region will be developed, this analysis attempts to recognize these offsetting effects.

1.1.2 Distributional and Regional Economic Effects

27. Measurements of changes in economic efficiency focus on the net impact of conservation activities, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.[17] This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

[17] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

Impacts on Small Entities and Energy Supply, Distribution, and Use

28. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the Regulatory Flexibility Act, might be affected by future flycatcher conservation activities.[18] In addition, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation activities on the energy industry and its customers.[19]

Regional Economic Effects

29. Regional economic impact analysis can provide an assessment of the potential localized effects of conservation activities. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that represent the relationship between a change in one sector of the economy (e.g., expenditures by recreationists) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreationists). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.

30. The use of regional input/output models in an analysis of the impacts of species and habitat conservation efforts can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.

31. Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.

[18] 5 U.S.C. § 601 *et seq.*

[19] Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001.

1.2 Scope of the Analysis

32. This analysis attempts to quantify economic effects of the CHD, *as well as the economic effects of any protective measures taken as a result of the listing or other Federal, State, and local laws that aid habitat conservation in the areas proposed for designation.* Because habitat protection efforts affording protection to the flycatcher likely contribute to the efficacy of the proposed CHD efforts, the impacts of these actions may be considered relevant for understanding the full impact of the proposed designation.

1.2.1 Sections of the Act Relevant to the Analysis

33. This analysis focuses on activities that are influenced by the Service through sections 4, 7, 9, and 10 of the Act. Section 4 of the Act focuses on the listing and recovery of endangered and threatened species, as well as the CHD. In this section, the Secretary is required to list species as endangered or threatened "solely on the basis of the best available scientific and commercial data."[20]

34. The protections afforded to threatened and endangered species and their habitat are described in sections 7, 9, and 10 of the Act, and economic impacts resulting from these protections are the focus of this analysis:

- Section 7 of the Act requires Federal agencies to consult with the Service to ensure that any action they authorize, fund, or carry out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of the species' designated critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent compliance costs associated with the listing of the species and CHD.[21]

- Section 9 defines the actions that are prohibited by the Act. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, or collect, or to attempt to engage in any such conduct." The economic impacts associated with this section manifest themselves in sections 7 and 10.

- Under section 10(a)(1)(B) of the Act, an entity (i.e., a landowner or local government) may develop a Habitat Conservation Plan (HCP) for a species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.[22] The requirements posed by the

[20] 16 U.S.C. 1533.

[21] The Service notes, however, that a recent Ninth Circuit judicial opinion, *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, has invalidated the Service's regulation defining destruction or adverse modification of critical habitat. The Service is currently reviewing the decision to determine what effect it (and to a limited extent *Center for Biological Diversity v. Bureau of Land Management* (Case No. C-03-2509-SI, N.D. Cal.)) may have on the outcome of consultations pursuant to section 7 of the Act.

[22] U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning. "From: http://endangered.fws.gov/hcp/, as viewed on August 6, 2002. Sections 9 and 10 of the Act do not apply to plants.

HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately minimized and mitigated. The designation of critical habitat does not require completion of an HCP; however, the designation may influence conservation measures provided under HCPs. In the case of the flycatcher, there are several HCPs covering areas included in the proposed CHD; the economic costs associated with these HCPs that are due to flycatcher conservation activities are considered in this analysis.

1.2.2 Other Relevant Protection Efforts

35. The protection of listed species and habitat is not limited to the Act. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction.[23] For the purpose of this analysis, such protective efforts are considered to be co-extensive with the protection offered by critical habitat, and costs associated with these efforts are included in this report. In addition, under certain circumstances, the CHD may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these costs would not have been triggered absent the designation of critical habitat, they are included in this economic analysis. For example, this analysis considers the extent to which the CHD for the flycatcher might trigger completion of an environmental impact report (EIR) under the California Environmental Quality Act (CEQA).

1.2.3 Additional Analytic Considerations

36. This analysis also considers the potential for other types of economic impacts that can be related to section 7 consultations in general and CHD in particular, including time delay, regulatory uncertainty, and stigma impacts.

Time Delay and Regulatory Uncertainty Impacts

37. Time delays are costs due to project delays associated with the consultation process or compliance with other regulations. Regulatory uncertainty costs occur in anticipation of having to modify project parameters (e.g., retaining outside experts or legal counsel to better understand their responsibilities with regard to CHD).

[23] For example, the Sikes Act Improvement Act (Sikes Act) of 1997 requires Department of Defense (DoD) military installations to develop Integrated Natural Resources Management Plans (INRMPs) that provide for the conservation, protection, and management of wildlife resources (16 U.S.C. §§ 670a - 670o). These plans must integrate natural resource management with the other activities, such as training exercises, taking place at the facility.

Stigma Impacts

38. Stigma refers to the change in economic value of a particular project or activity due to negative (or positive) perceptions of the role critical habitat will play in developing, implementing, or conducting that policy. For example, changes to private property values associated with public attitudes about the limits and costs of implementing a project in CHD are known as "stigma" impacts.

1.2.4 Benefits

39. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.[24] OMB's Circular A-4 distinguishes two types of economic benefits: *direct benefits and ancillary benefits*. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking. [25]

40. In the context of critical habitat designation, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.[26] *Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

41. Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in changes to, or maintenance of, particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as improved water quality or increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat.

42. It is often difficult to evaluate the ancillary benefits of critical habitat designation. For example, where a species conservation effort is expected to result in improved water quality within a region, reliable data may not be available to quantify and monetize the specific increment by which water quality is improved. To the extent that the ancillary

[24] Executive Order 12866, September 30,1993, "Regulatory Planning and Review."
[25] U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.
[26] Ibid.

benefits of the rulemaking may be captured by the market though an identifiable shift in resource allocation, they are factored into the overall economic impact assessment in this report. For example, if decreased off-road vehicle use to improve species habitat leads to an increase in opportunities for wildlife viewing or hiking within the region, the local economy may experience an associated measurable, positive impact. Where data are available, this analysis attempts to capture the *net* economic impact (i.e., the increased regulatory burden less any discernable offsetting market gains), of species conservation efforts imposed on regulated entities and the regional economy.

1.3 Analytic Time Frame

43. The analysis estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. This analysis estimates economic impacts to activities from 1995 (year of the species' final listing) to 2024 (twenty years from the year of final designation). Forecasts of economic conditions and other factors beyond the next 20 years would be speculative.[27]

1.4 Information Sources

44. The primary sources of information for this report were communications with and data provided by personnel from the Service, Federal action agencies, affected Tribes, affected private parties, and local and State governments within Arizona, California, Colorado, Nevada, New Mexico, and Utah. Specifically, the analysis relies on data collected in communication with personnel from the following entities:

- U.S. Bureau of Reclamation (USBR);
- U.S. Army Corps of Engineers (USACE);
- U.S. Department of Agriculture, including U.S. Forest Service (USFS);
- U.S. Bureau of Land Management (BLM);
- Bureau of Indian Affairs (BIA);
- U.S. Fish and Wildlife Service (Service);
- National Park Service (NPS);
- Camp Pendleton and Vandenberg Air Force Base;

[27] Note that the 20-year time horizon is used where better information is lacking. Where information exists for estimating costs to 50 years, those estimates are included.

- State agencies, including departments of water resources, agriculture, energy, game and fish, natural resources, recreation, transportation, and Salt River Project;

- Various County and City governments;

- Private stakeholder groups, including water facility owners and water distributors, farming and ranching interest groups, development companies, and others;

- 23 Tribes in Arizona, California, and New Mexico, including: Camp Verde Yavapai Apache, Chemehuevi, Cocopah, Cochiti, Colorado River Indian Tribes, Fort McDowell, Fort Mojave, Fort Yuma (Quechan), Hualapai, Isleta, La Jolla, Pala, Rincon, Salt River, San Carlos, San Felipe, San Illdefonso, San Juan, Sandia, Santa Ana, Santa Clara, Santa Ysabel, and Santa Domingo.

45. Publicly available data from the Census Bureau and other Department of Commerce data were relied on to characterize the regional economy. In addition, this analysis relies upon the Service's section 7 consultation records, public comments, and published journal sources. The reference section at the end of this document provides a full list of information sources.

1.5 Structure of Report

46. This remainder of this report is organized as follows:

- Section 2: Background and Socioeconomic Profiles

- Section 3: Administrative Costs

- Section 4: Water Management Activities

- Section 5: Livestock Grazing Activities

- Section 6: Development Activities

- Section 7: Tribal Activities

- Section 8: Transportation Activities

- Section 9: Mining Activities

- Section 10: Other Activities (Recreation, Fire Management, Other Federal Lands Management, and Military Operations)

- Appendix A: Small Business Impacts

- Appendix B: Energy Impacts

- Appendix C: Costs Associated with Areas Proposed for Exclusion

- Appendix D: Background And Historical Water Storage For Reservoir Facilities Assessed Under Scenario 2

- References

47. Sections 3 through 10 are organized by affected activity. For each of these activities, the analysis discusses impacts by proposed management unit.

48. This section provides information on the history of the flycatcher listing and CHD and describes the socioeconomic characteristics of proposed CHD areas.[28] The proposed CHD for the flycatcher traces the path of 1,556 stream miles winding through six states. The riparian areas along these streams cross through a variety of landscapes, including rural, urban, forest, and Tribal lands, that are subject to variegated economic activities. The proposed CHD, however, primarily bisects rural areas that experience lower per capita incomes and higher poverty rates than their respective states (see Exhibit 2-4). Exceptions are the few urban areas through which flycatcher habitat runs, Albuquerque and San Diego.

49. Because of the riparian nature of flycatcher habitat, water management issues (e.g., flood control and water supply) are expected to experience the greatest economic impact due to implementation of flycatcher conservation activities.

2.1 Background of Flycatcher Critical Habitat Designation

50. In 1993 the Service published a proposal to list the flycatcher as endangered with critical habitat.[29] This listing was finalized on February 27, 1995; however, the Service deferred the final designation of critical habitat citing issues identified in public comments, new information, and a lack of economic information necessary to conduct an economic analysis.[30] On March 20,1997, the U.S. District Court of Arizona, in response to a suit by the Southwest Center for Biological Diversity, ordered the Service to designate critical habitat for the flycatcher within 120 days. The first critical habitat designation for flycatcher was finalized on July 22, 1997.[31] This 1997 CHD included 599 river miles in AZ, CA, and NM. The Service published a correction notice on August 20, 1997 on the lateral extent of critical habitat.[32] On May 11, 2001, the 10th Circuit Court of Appeals, as a result of a suit from the New Mexico Cattlegrower's Association initiated in March 1998, withdrew critical habitat, citing a faulty economic analysis. On September 30, 2003, in a complaint brought by the

[28] A detailed discussion of potentially affected Tribal economies is presented in Section 8.
[29] 58 FR 39495
[30] 60 FR 10694
[31] 62 FR 39129
[32] 62 FR 44228

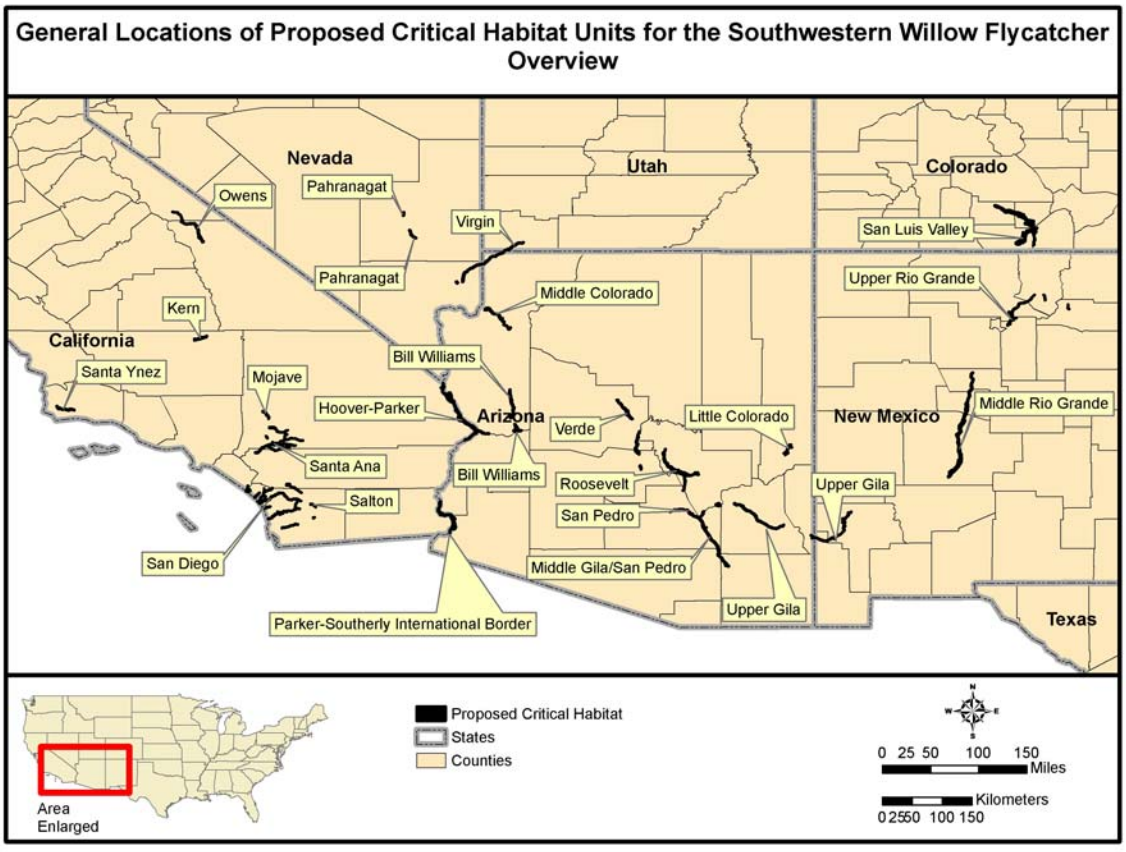
Center for Biological Diversity, the U.S. District Court of New Mexico instructed the Service to propose critical habitat by September 30, 2004, and publish a final rule by September 30, 2005.

51. The Recovery Plan for the flycatcher was completed in 2002 and provides the strategy for recovering the bird to threatened status and to the point where delisting is warranted.

2.2 Proposed Critical Habitat Designation

52. The Service has re-proposed designation of approximately 376,000 acres encompassing 1,556 stream miles within 21 proposed critical habitat units, referred to as "Management Units." These Management Units occur within five "Recovery Units." The proposed CHD crosses six states: Arizona, California, Colorado, Nevada, New Mexico, and Utah as highlighted in Exhibit 2-2. The lateral extent of the proposed CHD approximates the 100-year floodplain. Please see the Proposed/Final Rule for details about the development of these boundaries, and the legal descriptions of critical habitat areas.

Exhibit 2-1: MAP OF PROPOSED CHD FOR THE FLYCATCHER



53. Of the 376,000 acres comprising the proposed designation, approximately 41 percent are privately owned and another 34 percent are Federal lands. Of the remaining, six percent are State lands, six percent are Tribal lands and 12 percent are under other ownership. Exhibit 2-2 presents land ownership within the proposed CHD.

Exhibit 2-2

SUMMARY OF ESTIMATED LAND OWNERSHIP IN FLYCATCHER CRITICAL HABITAT (Acres)

	Land Ownership				
State	**Federal**	**State**	**Private**	**Tribal**	**Other**
Arizona	82,080	10,640	50,410	14,535	0
California	15,643	11,759	0	2,233	41,637
Colorado	7,969	1,425	59,036	0	0
New Mexico	17,676	246	39,439	6,443	0
Nevada	5,680	160	4,090	0	2,018
Utah	482	25	2,469	0	0
TOTAL	**129,530**	**24,255**	**155,444**	**23,211**	**43,655**

Source: *Proposed Determination of Critical Habitat for the Southwestern Willow Flycatcher*, October 12, 2004 (50 CFR Part 17).

54. Certain types of activities occurring within the proposed CHD are likely to be impacted by efforts to protect the flycatcher. Exhibit 2-3 identifies potentially affected activities by Federal land management agency. These activities are discussed in detail in the following sections.

Exhibit 2-3

ACTIVITIES OCCURING WITHIN PROPOSED CRITICAL HABITAT FOR THE FLYCATCHER

Federal Agency/ Affected Party	**Potentially Affected Activities**
Army Corps of Engineers/Bureau of Reclamation	Water management, dam operations, species conservation, vegetation management, and habitat restoration activities
Bureau of Indian Affairs/Tribes	Agriculture, development, fire management, recreation, cultural activities, species conservation, vegetation management, and habitat restoration activities
Bureau of Land Management	Livestock grazing, recreation activities, road construction, land sales, fire management, species conservation, vegetation management, and habitat restoration activities
Department of Defense	Troop training, fire management, munitions exercises, restoration projects, vegetation management
Federal Highway Administration	Transportation projects, bridge construction and maintenance
National Park Service	Fire management, recreation activities, trail and site maintenance, construction activities, species conservation, vegetation management, and habitat restoration activities
U.S. Fish and Wildlife Service	Refuge operations, recreation, restoration projects, vegetation management
U.S. Forest Service	Livestock grazing, fire management, recreation activities, construction and maintenance, restoration projects, vegetation management
Private	Agriculture, livestock grazing, development, habitat restoration projects, recreation

Sources: Review of consultation history and personal communication with stakeholder groups and agencies.

2.3 Description of Species and Habitat[33]

55. The southwestern willow flycatcher *(Empidonax traillii extimus)* (flycatcher) is a small neotropical migratory bird, and is one of four subspecies of the willow flycatcher currently recognized. The flycatcher is approximately 5.75 inches in length and weighs less than ½ ounce. It has a grayish-green back and wings, whitish throat, light grey–olive breast, and pale yellowish belly.

56. The historical breeding range of the flycatcher includes southern CA, southern NV, southern UT, AZ, NM, western Texas, southwestern CO, and extreme northwestern Mexico. At the end of 2002, 1,153 flycatcher territories were detected throughout southern CA, southern NV, southern UT, southern CO, AZ, and NM.

57. The flycatcher currently breeds in relatively dense riparian habitats in all or parts of six southwestern states (Arizona, California, Colorado, Nevada, New Mexico, Utah), from near sea level to over 6,000 feet above. It breeds in riparian habitats along rivers, streams, or other wetlands, where relatively dense growths of trees and shrubs are established, near or adjacent to surface water or underlain by saturated soil. The specific biological and physical features, referred to as the primary constituent elements are described in the Proposed Rule.

58. The primary cause of the flycatcher's decline is loss and modification of habitat resulting from water management and land use practices. The Recovery Plan identifies seven mechanisms resulting in loss and modification of habitat, including: dam operations, water diversion and groundwater pumping, river channelization and bank stabilization, control of phreatophytes (plants whose roots are associated with the water table), livestock grazing, recreation, fire, agricultural development, urbanization, changes in the riparian plant communities, cowbird brood parasitism, and demographic effects from small population size.

2.4 Socioeconomic Profile of the Critical Habitat Area

59. This section summarizes key economic and demographic information for the counties containing proposed CHD for the flycatcher, including population characteristics and general economic activity. County level data are presented to provide context for the discussion of potential economic impacts, and to illuminate trends that may influence these impacts. Although County level data may not precisely reflect the socioeconomic characteristics of the areas immediately surrounding the proposed CHD for the flycatcher, these data provide context for the broader analysis.

[33] The information on the flycatcher and its habitat included in this section was obtained from the *Proposed Determination of Critical Habitat for the Southwestern Willow Flycatcher*, October 12, 2004 (50 CFR Part 17), and the *Recovery Plan for the Southwestern Willow Flycatcher,* U.S. Fish and Wildlife Service, August 2002.

2.4.1 Population Characteristics

60. The proposed CHD spans an array of urban and rural areas within Arizona, California, Colorado, Nevada, New Mexico, and Utah. Exhibit 2-4 presents the population size, change in population from 1990 to 2000, per capita income, and poverty rates for the 37 counties that have CHD within their boundaries, and for each of the six states as a whole.

61. In Arizona, all counties containing CHD, with the exception of Maricopa, have a lower per capita income than Arizona's average of approximately $20,000. Eight out of the twelve counties have higher poverty rates than the State average of 14 percent. Within Apache County, almost 38 percent of all residents live below the poverty threshold. The counties containing CHD in Arizona account for over 95 percent of the State population.

62. California has nine counties containing CHD. These counties jointly comprise approximately 30 percent of the State population. Imperial County's per capita income, approximately $13,000, is 58 percent of California's State average and the lowest of the nine counties in the proposed CHD in California.

63. Counties containing CHD in Colorado each represent less than one percent of total State population. All four of the counties are characterized by higher poverty rates than the State average of approximately nine percent. Costilla County's poverty rate of 27 percent is almost triple the State average. The per capita income for each of the four counties is below Colorado's average of approximately $24,000.

64. In Nevada, the two counties containing CHD collectively account for 70 percent of Nevada's entire population. Of the two, Clark County alone comprises approximately 68.8 percent of this total; the City of Las Vegas is in this County. Both Clark and Lincoln County experience higher poverty rates than the State average of 10.5 percent.

65. Within New Mexico, the nine counties containing CHD collectively represent approximately 49 percent of the State's population. Bernalillo County, which includes the City of Albuquerque, accounts for nearly 31 percent of the total State population. Seven of the nine counties have a per capita income lower than the State average.

66. In Utah, the sole County containing CHD is Washington County. This County has a per capita income of approximately $16,000, which is less than Utah's average of $18,000. Washington County represents four percent of Utah's total population.

67. Of the 37 counties, 30 have a lower per capita income and 27 have fewer persons per square mile than their respective statewide averages. Although these measures vary considerably across states, the data suggest that overall the counties are less densely populated, and have a lower than average income per capita, than their respective states.

Exhibit 2-4

SOCIOECONOMIC PROFILE OF COUNTIES CONTAINING CRITICAL HABITAT FOR THE SOUTHWESTERN WILLOW FLYCATCHER

State	County	Population Density (persons/ sq mi)	Population (2000)	% of Statewide Population	% Change (1990-2000)	Per Capita Income (1999)	Poverty Rate (1999)
Arizona	**State Total**	**45.2**	**5,130,632**	**100%**	**40%**	**$20,275**	**13.9%**
	Apache	6.2	69,423	1.4%	12.7%	$8,986	37.8%
	Cochise	18.9	117,755	2.3%	20.6%	$15,988	17.7%
	Gila	10.7	51,335	1.0%	27.6%	$16,315	17.4%
	Graham	7.2	33,489	0.7%	26.1%	$12,139	23.0%
	Greenlee	4.6	8,547	0.2%	6.7%	$15,814	9.9%
	La Paz	4.4	19,715	0.4%	42.4%	$14,916	19.6%
	Maricopa	333.0	3,072,149	59.9%	44.8%	$22,251	11.7%
	Mohave	11.5	155,032	3.0%	65.8%	$16,788	13.9%
	Pima	91.9	843,746	16.4%	26.5%	$19,785	14.7%
	Pinal	33.4	179,727	3.5%	54.5%	$16,025	16.9%
	Yavapai	20.6	167,517	3.3%	55.5%	$19,727	11.9%
	Yuma	29.0	160,026	3.1%	49.7%	$14,802	19.2%
California	**State Total**	**217.2**	**33,871,648**	**100%**	**13.60%**	**$22,711**	**14.2%**
	Imperial	31.8	142,361	0.4%	30.20%	$13,239	22.6%
	Inyo	1.8	17,945	0.1%	-1.80%	$19,639	12.6%
	Kern	81.1	661,645	2.0%	21.40%	$15,760	20.8%
	Mono	4.1	12,853	0.0%	29.10%	$23,422	11.5%
	Orange	3,561.6	2,846,289	8.4%	18.10%	$25,826	10.3%
	Riverside	211.6	1,545,387	4.6%	32%	$18,689	14.2%
	San Bernardino	85.0	1,709,434	5.0%	20.50%	$16,856	15.8%
	San Diego	663.9	2,813,833	8.3%	12.60%	$22,926	12.4%
	Santa Barbara	145.3	399,347	1.2%	8%	$23,059	14.3%
Colorado	**State Total**	**41.5**	**4,301,261**	**100%**	**30.6%**	**$24,049**	**9.3%**
	Alamosa	20.7	14,966	0.3%	9.9%	$15,037	21.3%
	Conejos	6.5	8,400	0.2%	12.7%	$12,050	23.0%
	Costilla	3.0	3,663	0.1%	14.8%	$10,748	26.8%
	Rio Grande	13.6	12,413	0.3%	15.3%	$15,650	14.5%
Nevada	**State Total**	**18.2**	**1,998,257**	**100%**	**66.3%**	**$21,989**	**10.5%**
	Clark	170.0	1,375,765	68.8%	85.6%	$21,785	10.8%
	Lincoln	0.4	4,165	0.2%	10.3%	$17,326	16.5%
New Mexico	**State Total**	**15.0**	**1,819,046**	**100%**	**20.1%**	**$17,261**	**18.4%**
	Bernalillo	476.4	556,678	30.6%	15.8%	$20,790	13.7%
	Grant	7.8	31,002	1.7%	12%	$14,597	18.7%
	Hidalgo	1.7	5,932	0.3%	-0.4%	$12,431	27.3%
	Mora	2.7	5,180	0.3%	21.5%	$12,340	25.4%
	Rio Arriba	7.0	41,190	2.3%	19.9%	$14,263	20.3%
	Santa Fe	67.7	129,292	7.1%	30.7%	$23,594	12.0%
	Socorro	2.7	18,078	1.0%	22.4%	$12,826	31.7%
	Taos	13.6	29,979	1.6%	29.7%	$16,103	20.9%
	Valencia	61.9	66,152	3.6%	46.2%	$14,747	16.8%
Utah	**State Total**	**27.2**	**2,233,169**	**100%**	**29.6%**	**$18,185**	**9.4%**
	Washington	37.2	90,354	4.0%	86.1%	$15,873	11.2%

Source: U.S. Census Bureau, Census 2000 and State County QuickFacts, accessed at http://quickfacts.census.gov/qfd.

2.4.2 Economic Activity

68. The respective contributions of the various economic activities in counties within the proposed CHD provide insight into the activities most likely to experience potential impacts. Exhibit 2-5 highlights the annual payroll for various industries in the 37 counties containing proposed CHD for the flycatcher. The principal industries, in terms of annual payroll, include services, retail trade, manufacturing and construction.[34]

Exhibit 2-5

ECONOMIC ACTIVITY WITHIN COUNTIES CONTAINING WILLOW CRITICAL HABITAT
ANNUAL PAYROLL BY INDUSTRY (2001)

Industry	Annual Payroll (Thousands)					
	Arizona	California[b]	Colorado	Nevada	New Mexico[b]	Utah
Agriculture, Forestry, Hunting, and Fishing	$ 33,244	$ 215,138	$ 4,036	$ 2,695	$ 260	$ -
Mining	$ 212,428	$ 763,011	$ 4,539	$ 15,528	$ 14,663	$ -
Utilities	$ 602,612	$ 1,465,194	$ -	$ 234,067	$ 36,800	$ 1,832
Construction	$ 5,391,201	$ 16,219,720	$ 16,347	$ 2,250,490	$ 1,039,547	$ 79,650
Manufacturing	$ 7,725,634	$ 42,605,422	$ 6,831	$ 673,415	$ 1,040,758	$ 64,640
Wholesale Trade	$ 3,718,145	$ 23,675,813	$ 18,037	$ 794,399	$ 583,785	$ 16,864
Retail Trade	$ 5,823,809	$ 21,521,277	$ 38,740	$ 1,836,405	$ 1,266,302	$115,564
Transportation and Warehousing	$ 2,344,522	$ 9,000,320	$ 3,008	$ 563,833	$ 226,188	$ 42,066
Information[a]	$ 2,450,126	$ 18,429,681	$ 4,414	$ 637,753	$ 403,519	$ 16,212
Finance and Insurance	$ 4,804,284	$ 22,780,666	$ 11,488	$ 949,385	$ 660,391	$ 22,340
Real Estate	$ 1,216,551	$ 6,500,708	$ 2,717	$ 479,722	$ 166,404	$ 6,336
Auxiliaries	$ 635,262	$ 2,477,297	$ -	$ 113,952	$ 15,776	$ -
Unclassified[c]	$ 26,137	$ 185,270	$ 63	$ 16,629	$ 1,724	$ 445
Services and Other Industries	$ 23,325,127	$ 115,082,213	$ 81,853	$ 10,963,666	$ 4,444,270	$249,451

Source: U.S. Census Bureau, *2001 County Business Patterns*, accessed at http://censtats.census.gov/cbpnaic/cbpnaic.shtml.
[a] Information sector includes media services, such as newspaper and book publishers, cable networks, and telecommunication services.
[b] This exhibit incorporates industry information on two counties in California (Los Angeles County and Ventura County) and two counties in New Mexico (Catron and Sandoval) that have since been removed from the proposed CHD for the flycatcher. As a result the total industry payrolls for these two states may be overestimated.
[c] Establishments unclassified by NAICs code.

[34] Services sectors include professional, scientific & technical services; management of companies & enterprises; admin, support, waste management, remediation services; educational services; health care and social assistance; arts, entertainment & recreation; accommodation & food services; and other services (excluding public administration).

69. Exhibit 2-6 provides industry and employment data for all counties that contain proposed CHD for the flycatcher. The "Number of Establishments" column displays the total number of physical locations at which business activities were conducted with one or more paid employee in the year 2001. Over 640,000 business establishments operate and employ over 10 million individuals in the counties containing proposed CHD for the flycatcher. These figures provide a measure of the average density of commercial and industrial establishments in the region.

70. The largest employment sectors within the counties containing CHD are services, retail trade, and manufacturing. Employment within the services sector represented approximately 52 percent of the job base while employment within the retail trade constituted 10.4 percent of all jobs in the counties. Manufacturing employment accounted for nearly 11.5 percent of all jobs. While riparian habitat constitutes a small portion of the land area in these counties, the overall demographic information allows for a better understanding of the economies potentially affected by CHD.

71. Exhibit 2-7 presents agricultural data for counties that contain proposed flycatcher CHD. Crop agriculture as measured by total acreage under cultivation is most extensive in Maricopa, Pinal, and Yuma Counties in Arizona and Kern, Imperial, and Riverside Counties in California. Cropland in all six counties exceeds 200,000 acres, reaching nearly one million acres in Kern County. Accordingly, these counties also generate the highest revenues through crop production with Kern County, California unquestionably the highest earning county. Kern County receives more than twice the revenue from crop production as the second highest earning county, San Diego County. Although their total acreage under cultivation does not exceed 200,000 acres, San Diego and Santa Barbara Counties in California are the second and third highest earners respectively after Kern County.

72. The number of livestock production operations throughout nearly all of the affected counties ranges between 100 and 200 ranches. Cochise and Yavapai Counties in Arizona and Kern County in California have the highest numbers of beef cattle. Each of the three counties has over 35,000 head of beef cattle. However, Maricopa County, Arizona and San Bernardino, Imperial, and Riverside Counties in California generate the highest revenues from livestock production due to their much larger poultry and sheep operations.

Exhibit 2-6

ECONOMIC ACTIVITY IN COUNTIES CONTAINING PROPOSED FLYCATCHER CRITICAL HABITAT
NUMBER OF ESTABLISHMENTS AND EMPLOYEES BY INDUSTRY (2001)

Industry	Arizona		California*		Colorado		Nevada		New Mexico*		Utah	
	Employees	Establish-ments	Employees	Establish-ments	Employees	Establish-ments	Employees	Establish-ments	Employees	Establish-ments	Employees	Establish-ments
Agriculture, Forestry, Hunting, and Fishing	2,093	213	8,393	612	333	17	118	18	118	31	19	1
Mining	10,548	177	14,126	544	224	10	423	43	1734	57	19	1
Utilities	9,607	226	17,118	537	198	9	3,592	51	2823	72	38	8
Construction	164,003	11,801	358,680	28,773	720	107	60,448	2,696	23,802	2,904	3,210	512
Manufacturing	191,309	4,744	998,469	28,956	318	37	19,004	904	19,775	1,059	2,398	106
Wholesale Trade	84,629	6,247	463,560	34,817	854	63	19,088	1,510	12,932	1,317	582	100
Retail Trade	252,250	16,039	741,079	53,954	2,071	206	77,003	4,614	38413	4,027	5,870	457
Transportation & Warehousing	70,982	2,339	237,006	9,006	160	34	23,149	581	6310	495	1,288	66
Information	57,294	2,088	274,413	11,785	191	24	15,203	572	8818	529	597	47
Finance and Insurance	111,341	7,441	328,875	20,849	541	58	24,147	2,507	14876	1,546	776	151
Real Estate	40,562	5,946	152,950	19,652	186	50	15,998	1,850	4798	1,215	335	129
Auxiliaries	17,059	244	41,027	866	19	1	3,519	51	1453	128	999	5
Unclassified	2,146	1,248	7,052	4,628	64	8	611	397	354	223	54	30
Other Industries and Services	852,858	51,193	4,196,652	259,550	3,235	473	388,521	14,660	214,768	11,751	11,853	1,020

Source: U.S. Census Bureau, 2001County Business Patterns, accessed at http://censtats.census.gov/cbpnaic/cbpnaic.shtml

*This exhibit incorporates industry information on two Counties in California (Los Angeles County and Ventura County) and two counties in New Mexico (Catron and Sandoval) that have since been removed from the proposed CHD for the flycatcher. As a result the total industry payrolls for these two states may be overestimated.

Exhibit 2-7

AGRICULTURAL DATA IN COUNTIES CONTAINING PROPOSED FLYCATCHER CRITICAL HABITAT

State	County	Number of Crop Farms	Total Cropland (acres)	Market Value of Crops Sold ($1000)	Number of Ranches[3]	Number of Head[3]	Avg. Number of Head per Ranch	Market Value of Livestock Sold ($1,000)
Arizona	Apache	192	23,714	237	198	19,418	98	8,011
	Cochise	557	131,382	55,737	457	39,563	87	22,570
	Gila	86	6,434	268	86	4,364	51	2,392
	Graham	215	37,994	77,911	*104*	*15,071*	145	3,989
	Greenlee	86	6,044	907	*194*	21,921	113	3,207
	La Paz	70	98,245	85,995	29	1,158	40	628
	Maricopa	1,258	288,387	390,449	275	5,607	20	349,734
	Mohave	114	34,946	10,767	*137*	*18,119*	132	5,570
	Pima	206	47,147	56,333	182	12,908	71	12,547
	Pinal	512	252,291	177,735	146	8,515	58	247,023
	Yavapai	331	28,534	*2,252*	(254)	(37,172)	146	*24,396*
	Yuma	484	212,995	256,493*	*17*	*1,442*	85	99,657*
California	Imperial	475	487,840	649,063	(18)	(8,921)	496	394,215
	Inyo	33	12,093	8,307	55*	12,665*	230	5,563
	Kern	1,543	998,297	1,783,418	358	36,779	103	275,288
	Mono	40	17,063	5,785	23	2,989	130	3,148
	Orange	240	15,159	277,387	18	392	22	1,219
	Riverside	2,111	281,988	667,375	184	3,670	20	340,898
	San Bernardino	828	48,148	120,388	94	2,918	31	497,457
	San Diego	4,615	107,966	881,930	168	6,363	38	68,831
	Santa Barbara	1,159	154,937	687,587	203	19,482	96	29,670
Colorado	Alamosa	247	111,194	88,474	*138*	*9,189*	67	5,978
	Conejos	443	138,281	11,991	*258*	*25,118*	97	10,861
	Costilla	187	69,789	22,598	*107*	*7,099*	66	3,647
	Rio Grande	288	110,868	68,833	126*	9,942*	79	5,650
Nevada	Clark	133	10,219	6,626	(55)	(1,475)	27	10,378
	Lincoln	86	25,719	7,096	81	7,702	95	4,355
New Mexico	Bernalillo	456	19,382	5,524	104	3,487	34	14,501
	Grant	123	12,921	140	164	21,048	128	7,403
	Hidalgo	92	35,101	11,364	*102*	*19,246*	189	5,284
	Mora	323	69,093	966	240	10,698	45	13,664
	Rio Arriba	866	87,018	1,751	384	15,175	40	8,800
	Santa Fe	273	38,349	8,727	117	7,729	66	3,056
	Socorro	259	26,072	4,403	177	20,610	116	31,373
	Taos	405	37,330	607	*249*	*4,140*	17	2,817
	Valencia	567	17,864	3,700	181	6,690	37	14,015

Exhibit 2-7

AGRICULTURAL DATA IN COUNTIES CONTAINING PROPOSED FLYCATCHER CRITICAL HABITAT

State	County	Number of Crop Farms	Total Cropland (acres)	Market Value of Crops Sold ($1000)	Number of Ranches[3]	Number of Head[3]	Avg. Number of Head per Ranch	Market Value of Livestock Sold ($1,000)
Utah	Washington	336	41,427	3,020	181	7,484	41	4,236

Source: Data accessed from the USDA's 2002 Census of Agriculture at: http://www.nass.usda.gov/census/ on August 26, 2005. Because some county data are not reported in the 2002 census to avoid disclosure of information about individual ranches, the italicized figures are drawn from the USDA's 1997 Agricultural Census. Figures in parentheses are drawn from the 1992 Agricultural Census. Figures with an asterisk are drawn from the 1987 Agricultural Census. The number of beef cows in Pima and Greenlee Counties are not reported in the 2002, 1997, 1992, or 1987 censuses for the reason mentioned above. Therefore, these figures are estimated by averaging the beef cow numbers for the six counties bordering Pima and Greenlee Counties. For Pima: Pinal, Maricopa, Yuma, Santa Cruz, Cochise, and Graham Counties. For Greenlee: Apache, Graham, Cochise, Hidalgo, Grant, and Catron Counties.

73. This section presents expected total administrative costs of actions taken under section 7 of the Act associated with the geographic area proposed as critical habitat for the flycatcher. First, this section defines the types of administrative costs likely to be associated with the proposed habitat. Next, the analysis presents estimates of the number of technical assistance efforts and consultations likely to result from the designation of critical habitat for the flycatcher and/or the listing, as well as the per-unit costs of each of these activities. Based on this analysis, estimates of past and future administrative costs are derived.

3.1 Categories of Administrative Costs

74. The following section provides an overview of the categories of administrative costs impacts that arise due to the implementation of section 7 in the geographic area proposed as critical habitat for the flycatcher.

3.1.1 Technical Assistance

75. Frequently, the Service responds to requests for technical assistance from State agencies, local municipalities, and private landowners and developers who may have questions regarding whether specific activities may affect critical habitat. Technical assistance costs represent the estimated economic costs of informational conversations between these entities and the Service regarding the designation of critical habitat for the flycatcher. Most likely, such conversations will occur between municipal or private property owners and the Service regarding lands designated as critical habitat or lands adjacent to critical habitat. The Service's technical assistance activities are voluntary and generally occur in instances where a Federal nexus does not exist.

3.1.2 Section 7 Consultations

76. Section 7(a)(2) of the Act requires Federal agencies (Action agencies) to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. There are two scenarios under which

the designation of critical habitat can result in section 7 consultations with the Service beyond those required by the listing. These include:

- New consultations, which can occur when activities involving a Federal nexus are proposed in critical habitat not thought to be currently occupied by the species; and

- Re-initiations of consultations, which result when consultations that previously occurred under the listing are re-initiated due to new information or circumstances generated by the designation.

77. In some cases, consultations will involve the Service and another Federal agency only, such as the U.S. Forest Service. More often, they will also include a third party involved in projects on non-Federal lands with a Federal nexus, such as state agencies and private landowners.

78. During a consultation, the Service, the Action agency, and the landowner manager applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, and the potential effects to the species and designated critical habitat associated with the activity that has been proposed, the Federal agency, and whether there is a private applicant involved.

79. Section 7 consultations with the Service may be either informal or formal. *Informal consultation*s consist of discussions between the Service, the Action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat, is designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a *formal consultation* is required if the Action agency determines that its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in the Service's determination in its Biological Opinion of whether the action is likely to jeopardize a species or adversely modify critical habitat, and recommendations to minimize those impacts. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

3.2 Estimated Costs of Consultations and Technical Assistance

80. Estimates of the cost of an individual consultation and technical assistance request were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country conducted in 2002. These files addressed consultations conducted for both listings and critical habitat designations. Cost figures

were based on an average level of effort of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.

81. The administrative cost estimates presented in this section take into consideration the level of effort of the Service, the Action agency, and the applicant, as well as the varying complexity of the consultation or the technical assistance request. Costs associated with these consultations include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings, preparing letters, and the development of a biological opinion. Exhibit 3-1 provides a summary of the estimated administrative costs of consultations and technical assistance requests.

Exhibit 3-1

ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS (PER EFFORT)[a]

Consultation Type	Service	Action Agency	Third Party	Biological Assessment
Technical Assistance	$260 - $680	N/A	$600 - $1,500	N/A
Informal Consultation	$1,000 - $3,100	$1,300 - $3,900	$1,200 - $2,900	$0 - $4,000
Formal Consultation	$3,100 - $6,100	$3,900 - $6,500	$2,900 - $4,100	$4,000 - $5,600

[a] Low and high estimates primarily reflect variations in staff wages and time involvement by staff.

Sources: IEc analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, a review of consultation records from several Service field offices across the country. Confirmed by local Action agencies.

3.3 Summary of Past Administrative Costs

82. Since the listing of the flycatcher in 1995, there have been 106 formal section 7 consultations in the geographic area proposed as critical habitat for the flycatcher. Data provided by the Ventura office in California and Region 2 of the Fish and Wildlife Service indicate:

- The ratio of technical assistance requests to formal consultations for the flycatcher ranges from 0.3 (Region 2) to three (Ventura Office). The analysis adopts a ratio of three technical assistance requests to one formal consultation for California Management Units and 0.3 technical assistance requests to one formal consultation for Management Units in all other states.

- The ratio of informal to formal consultations for the flycatcher ranges from nine (Ventura Office) to eleven (Region 2). The analysis adopts a ratio of nine informal consultations to one formal consultation for California Management Units and eleven technical assistance requests to one formal consultation for Management Units in all other states.

83. In addition, for Management Units with no past history of formal consultations for the flycatcher, this analysis makes the conservative assumption that those Management Units will still have completed five technical assistance requests and one informal consultation for every one formal consultation, or approximately half of the regular rate observed in Region 2 and the Ventura Office. As shown in Exhibit 3-2, past administrative costs are estimated at $5.6 million to $18.5 million (2004 dollars), or $863,000 to $2.8 million annually (assuming a seven percent discount rate).

3.4 Summary of Future Administrative Costs

84. Based on a review of formal consultations during years where flycatcher critical habitat was designated (1997-2001) compared to years where flycatcher critical habitat was not designated (1995-1996; 2002+), this analysis assumes a ratio of future consultations to past consultations of 1.5 to 1. The same assumptions regarding the ratio of technical assistance requests and informal consultations to formal consultations used to estimate past administrative costs is used to estimate future administrative costs. As shown in Exhibit 3-3, future administrative costs are estimated at $17 to $57 million (2004 dollars), or $1.6 million to $5.4 million annually (assuming a seven percent discount rate over 20 years).

3.5 Caveats

85. The number of consultations and technical assistance efforts to be undertaken in the future for activities within a given unit is highly uncertain. The frequency of such efforts will be related to the level of economic activity, the presence of HCPs or other regional plans that obviate the need for consultation, and the extent to which economic activity overlaps with critical habitat. To the extent that this analysis over or underestimates the number of these efforts in the future, estimated costs will be over or understated.

Exhibit 3-2

PAST ADMINISTRATIVE COSTS FOR TECHNICAL ASSISTANCE REQUESTS AND CONSULTATIONS FOR THE SOUTHWESTERN WILLOW FLYCATCHER, 1995-2003

Recovery Unit	Management Unit	Estimated Number of:			Total Admin Costs ($2004)		Annual Costs ($2004, 7%)		Annual Costs ($2004, 3%)	
		Technical Assistance Requests[1]	Informal Consultations[2]	Formal Consultations	Low	High	Low	High	Low	High
Coastal California	Santa Ynez	3	5	0	$18,874	$71,142	$2,897	$10,919	$2,424	$9,137
	Santa Ana	44	131	15	$716,373	$2,298,424	$109,953	$352,777	$92,006	$295,195
	San Diego	56	167	19	$913,993	$2,932,472	$140,285	$450,095	$117,388	$376,629
Basin and Mohave	Owens	3	5	0	$18,874	$71,142	$2,897	$10,919	$2,424	$9,137
	Kern	9	27	3	$148,215	$475,536	$22,749	$72,988	$19,036	$61,075
	Mohave	12	36	4	$197,620	$634,048	$30,332	$97,318	$25,381	$81,433
	Salton	3	5	0	$18,874	$71,142	$2,897	$10,919	$2,424	$9,137
Lower Colorado	Little Colorado	0	11	1	$54,215	$181,060	$8,321	$27,790	$6,963	$23,254
	Virgin	0	6	0	$20,081	$79,377	$3,082	$12,183	$2,579	$10,195
	Middle Colorado	2	77	7	$379,506	$1,267,417	$58,249	$194,531	$48,741	$162,779
	Pahranagat	1	22	2	$108,430	$362,119	$16,643	$55,580	$13,926	$46,508
	Bill Williams	1	33	3	$162,645	$543,179	$24,964	$83,371	$20,889	$69,763
	Hoover-Parker	0	17	2	$81,323	$271,589	$12,482	$41,685	$10,445	$34,881
	Parker-Southerly International	1	28	3	$135,538	$452,649	$20,803	$69,475	$17,408	$58,135
Gila	Verde	3	121	11	$596,366	$1,991,656	$91,534	$305,692	$76,594	$255,796
	Roosevelt	2	77	7	$379,506	$1,267,417	$58,249	$194,531	$48,741	$162,779
	Middle Gila/San Pedro	2	77	7	$379,506	$1,267,417	$58,249	$194,531	$48,741	$162,779
	Upper Gila	2	77	7	$379,506	$1,267,417	$58,249	$194,531	$48,741	$162,779
Rio Grande	San Luis Valley	0	6	0	$20,081	$79,377	$3,082	$12,183	$2,579	$10,195
	Upper Rio Grande	0	11	1	$54,215	$181,060	$8,321	$27,790	$6,963	$23,254
	Middle Rio Grande	1	55	5	$271,076	$905,298	$41,606	$138,951	$34,815	$116,271
Multiple MUs		22	110	11	$573,358	$1,876,381	$88,003	$287,999	$73,639	$240,991
Total		**168**	**1,100**	**106**	**5,628,174**	**18,547,319**	**863,849**	**2,846,763**	**722,848**	**2,382,104**

Notes:

[1] Assumes a ratio of technical assistance requests to formal consultations of 3 to 1 for California Management Units and 0.3 to 1 for all other Management Units based on data provided by FWS field offices.

[2] Assumes a ratio of informal consultations to formal consultations of 9 to 1 for California Management Units based on data provided by the Ventura, California FWS office; and a ratio of 11 to 1 for all other Management Units based on data provided by Region 2 FWS field offices.

Exhibit 3-3

FUTURE ADMINISTRATIVE COSTS FOR TECHNICAL ASSISTANCE REQUESTS AND CONSULTATIONS FOR THE SOUTHWESTERN WILLOW FLYCATCHER, 2004-2023

Recovery Unit	Management Unit	Estimated Number of: Technical Assistance Requests[1]	Informal Consultations[2]	Formal Consultations[3]	Total Admin Costs ($2004) Low	Total Admin Costs ($2004) High	Annual Costs ($2004, 7%) Low	Annual Costs ($2004, 7%) High	Annual Costs ($2004, 3%) Low	Annual Costs ($2004, 3%) High
Coastal California	Santa Ynez	9	27	3.0	$148,000	$476,000	$14,000	$45,000	$10,000	$32,000
	Santa Ana	131	392	43.5	$2,149,000	$6,895,000	$203,000	$651,000	$144,000	$463,000
	San Diego	167	500	55.5	$2,742,000	$8,797,000	$259,000	$830,000	$184,000	$591,000
Basin and Mohave	Owens	9	27	3.0	$148,000	$476,000	$14,000	$45,000	$10,000	$32,000
	Kern	27	81	9.0	$445,000	$1,427,000	$42,000	$135,000	$30,000	$96,000
	Mohave	36	108	12.0	$593,000	$1,902,000	$56,000	$180,000	$40,000	$128,000
	Salton	9	27	3.0	$148,000	$476,000	$14,000	$45,000	$10,000	$32,000
Lower Colorado	Little Colorado	1	33	3.0	$163,000	$543,000	$15,000	$51,000	$11,000	$36,000
	Virgin	1	33	3.0	$163,000	$543,000	$15,000	$51,000	$11,000	$36,000
	Middle Colorado	6	231	21.0	$1,139,000	$3,802,000	$108,000	$359,000	$77,000	$256,000
	Pahranagat	2	66	6.0	$325,000	$1,086,000	$31,000	$103,000	$22,000	$73,000
	Bill Williams	3	99	9.0	$488,000	$1,630,000	$46,000	$154,000	$33,000	$110,000
	Hoover-Parker	1	50	4.5	$244,000	$815,000	$23,000	$77,000	$16,000	$55,000
	Parker-Southerly International	2	83	7.5	$407,000	$1,358,000	$38,000	$128,000	$27,000	$91,000
Gila	Verde	10	363	33.0	$1,789,000	$5,975,000	$169,000	$564,000	$120,000	$402,000
	Roosevelt	6	231	21.0	$1,139,000	$3,802,000	$108,000	$359,000	$77,000	$256,000
	Middle Gila/San Pedro	6	231	21.0	$1,139,000	$3,802,000	$108,000	$359,000	$77,000	$256,000
	Upper Gila	6	231	21.0	$1,139,000	$3,802,000	$108,000	$359,000	$77,000	$256,000
Rio Grande	San Luis Valley	1	33	3.0	$163,000	$543,000	$15,000	$51,000	$11,000	$36,000
	Upper Rio Grande	1	33	3.0	$163,000	$543,000	$15,000	$51,000	$11,000	$36,000
	Middle Rio Grande	4	165	15.0	$813,000	$2,716,000	$77,000	$256,000	$55,000	$183,000
Multiple MUs		66	330	33.0	$1,720,000	$5,629,000	$162,000	$531,000	$116,000	$378,000
	TOTAL:	**503**	**3,372**	**333**	**$17,367,000**	**$57,038,000**	**$1,640,000**	**$5,384,000**	**$1,169,000**	**$3,834,000**

Notes:

[1] Assumes a ratio of technical assistance requests to formal consultations of 3 to 1 for California Management Units and 0.3 to 1 for all other Management Units based on data provided by FWS field offices.

[2] Assumes a ratio of informal consultations to formal consultations of 9 to 1 for California Management Units based on data provided by the Ventura, California FWS office; and a ratio of 11 to 1 for all other Management Units based on data provided by Region 2 FWS field offices.

[3] Assumes a ratio of future consultations to past consultations of 1.5 to 1.

86. This section provides an analysis of economic impacts associated with flycatcher conservation activities related to water management activities, including dam operations, hydropower production, water diversion, groundwater pumping, river channelization, and bank stabilization. The administrative costs associated with section 7 consultation for water management activities are discussed in Section 3 of the report; all other impacts are discussed in this section.

87. This section begins with a summary of results, including an overview of the methodology. The main body of the chapter presents details of the analysis, organized by Recovery Unit, Management Unit, and Facility.

4.1 Summary of Water Management Analysis and Results

88. This analysis identifies the significant water management structures and projects in each MU and identifies past, ongoing, and future costs related to flycatcher management at those facilities. Exhibit 4-1 summarizes the results of the analysis. Key findings from this section are summarized here:

- This analysis estimates that past economic impacts associated with water management were $58.6 million. Approximately 72 percent of past costs derive from mitigation activities at Roosevelt Dam in Arizona (35 percent), Isabella Dam in California (19 percent), and along the Middle Rio Grande in New Mexico (18 percent).

- Because uncertainty exists regarding potential future costs that may be associated with flycatcher conservation, this analysis considers two scenarios:

  Scenario 1: This scenario assumes that each impacted water facility pursues and attains an incidental take permit (ITP), either through a section 7 consultation or Habitat Conservation Plan (HCP). Development and approval of an ITP for current water operations with associated mitigation measures is the historical pattern for water operations that affect flycatchers and their habitat. Costs under this scenario are estimated to be approximately $366 million, or $29.0 million annually (2004

dollars), and are principally associated with implementation of HCPs, including the Lower Colorado Multi-Species Conservation Program and the Roosevelt HCP.[35]

Scenario 2: This scenario assumes that water operators are forced to change the management regime of their facilities to avoid adverse effects on flycatchers and their habitat. This represents a scenario in which the Service or operators do not cooperate on an ITP, or where a third party intervenes to force an operator to avoid habitat destruction prior to receipt of an ITP. Costs under this scenario are driven by the assumed inability of impacted reservoirs to maintain water levels above current levels in order to avoid inundation of flycatcher habitat, leading to a loss of storage capacity at these facilities.[36]

Considerable uncertainty surrounds the quantification of estimates under Scenario 2. Foremost, it is possible that management agencies may lack legal discretion to release water for flycatcher management purposes.[37] Second, the extent to which such releases could be compensated for through adaptive management is unknown and likely to vary by facility. Finally, absent a detailed and integrated hydrologic and economic model describing the full extent of water resources, facilities and end users in the study area, it is difficult to predict the specific implications of any flycatcher-related releases.

This analysis conservatively assumes that any spilled water is lost from beneficial use and develops an approximate estimate of related economic losses using information on water rights prices and other replacement costs. Costs associated with changes to water supply under this scenario are estimated to range from six times to 233 times higher than Scenario 1, depending on the facility. This scenario also considers impacts on hydroelectric production, flood control capability and groundwater pumping.

[35] Note that the 20-year time horizon is used where better information is lacking. Where information exists for estimating costs to 50 years, those estimates are included.

[36] Note that the Recovery Plan states that both extended inundation and extended desiccation of flycatcher habitat should be avoided. This scenario would likely result in extended desiccation of habitat.

[37] For example, currently there is no legal requirement for USBR to maintain water levels below flycatcher habitat at the lake created by Hoover Dam, Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation, 143 F.3d 515 (9th Cir. 1998). Service and USBR Solicitors further state that the Department of Interior has interpreted the U.S. Supreme Court's injunction in Arizona v. California, 376 U.S. 340 (1964) as precluding the release of water from Lake Mead for the sole purpose of protecting flycatcher habitat. Congress has also enacted legislation to prohibit USBR from releasing San Juan/Chama water for flycatcher management purposes at Heron Reservoir. Comments of the Southwest Regional Solicitor's Office, December 15, 2004.

Exhibit 4-1

SUMMARY OF IMPACTS ASSOCIATED WITH WATER MANAGEMENT ACTIVITIES UNDER SCENARIO 1 (2004$)

Management Unit	Water Project	Past 1995-2003	Future[1] 2004-2023
Santa Ana	Seven Oaks Dam	$0	$3,179,000
	San Bernardino County Flood Control District	$131,000	$265,000
	Flood control projects	$849,000	$6,615,000
	Water diversion projects	$119,000	$3,336,000
San Diego	Lake Hodges	$6,787,000	$687,000
	Cuyamaca Reservoir	$364,000	$267,000
	Vail Dam	$0	$1,121,000
	Flood control projects[2]	$6,334,000	$9,565,000
Mojave	Mojave Dam	$0	$148,000
Owens	Pleasant Valley Dam	$0	$68,000
Kern	Isabella Dam	$11,316,000	$3,708,000
Middle Colorado	Lake Mead/Hoover Dam*[3]	$1,600,000	$45,233,000
Hoover-Parker	Lake Havasu/Parker Dam*[3]	$2,974,000	$84,183,000
Parker-Southerly	Lake Moovalya/ Headgate Rock Dam*[3]	$2,974,000	$84,183,000
	Imperial, Laguna, and Senator Wash Dams*[3]		
Bill Williams	Alamo Dam	$558,000	$2,356,000
Roosevelt	Theodore Roosevelt Dam[4]	$20,475,000	$28,976,000
Verde	Horseshoe Dam	$460,000	$4,331,000
	Groundwater Use	$0	21,000 af pumped
	Water Transfer	$22,000	$0
Upper Gila	Coolidge Dam	$0	$10,792,000
	Water Transfer	$0	$1,680,000
	Groundwater Use	$0	3,400 wells
Middle Rio Grande	MRG Operations	$10,353,000	$68,992,000
San Luis Valley	Water supply, flood control	$112,000	$6,434,000
	Total	**$65,428,000**	**$366,119,000**

n/a = Not applicable to this facility

[1] Costs estimates under Scenario 1. Note that the 20-year time horizon is used where better information is lacking. Where information exists for estimating costs to 50 years, those estimates are included. 50 year estimates are calculated for facilities marked by a "*".

[2] Flood control costs include costs related to the San Luis Rey Flood Control Project.

[3] Cost information for the Lower Colorado River was reported for the entire river length. Thus, costs are estimated by assuming impacts are proportional to the river segment included in proposed CHD for Middle Colorado, Hoover to Parker, and Parker to Southerly Units.

[4] Costs are equal to the sum of USBR and SRP costs. Note: Past costs are inflated to 2004$. Future costs are discounted at a 7 percent discount rate.

Exhibit 4-2

SUMMARY OF FUTURE IMPACTS ASSOCIATED WITH WATER MANAGEMENT ACTIVITIES UNDER SCENARIO 2 (Annual, 2004$)

Management Unit	Water Project	Water operations/ supply		Hydropower	Flood control
		Low	High		
Santa Ana	Seven Oaks Dam	Data not available		n/a	Possible
San Diego	Lake Hodges	$539,000	$2,500,000	n/a	n/a
	Cuyamaca Reservoir	$197,000	$810,000	n/a	n/a
	Vail Dam	$539,000	$2,500,000	n/a	n/a
Mojave	Mojave Dam	n/a	n/a	n/a	Possible
Owens	Pleasant Valley Dam	$344,000	$1,400,000	Data not available	n/a
Kern	Isabella Dam	$8,000,000	$33,000,000	n/a	Possible
Middle Colorado	Lake Mead/Hoover Dam	Not expected	Not expected	Not expected	Possible
Hoover-Parker	Lake Havasu/Parker Dam	$35,300,000	$39,100,000	$157,958	n/a
Parker-Southerly	Lake Moovalya/ Headgate Rock Dam	Not expected	Not expected	Not expected	n/a
	Imperial, Laguna, and Senator Wash Dams	Not expected	Not expected	Not expected	n/a
Bill Williams	Alamo Dam	n/a	n/a	n/a	Possible
Roosevelt	Theodore Roosevelt Dam	$33,680,900	$66,134,200	$2,600,000	Likely to be small
Verde	Horseshoe Dam	$13,710,000	$15,180,000	n/a	Likely to be small
Upper Gila	Coolidge Dam	Not expected	Not expected	n/a	Not applicable
Middle Rio Grande	MRG Operations	Not expected	Not expected	n/a	Not applicable

Source: IEc analysis.

Results in Perspective

89. Scenario 2 assumes that water operators are forced to change the management regime of their facilities to avoid adverse effects on flycatcher habitat, resulting in a loss of storage capacity at these facilities. Exhibit 4-3 summarizes the estimated water losses in acre-feet and provides perspective on the number of water users for each facility that could be affected if water is spilled and is not captured for beneficial use.[38]

90. It is important to note that flycatcher conservation measures may accelerate and compound ongoing trends in natural resource use in the Southwest. For example, many potentially affected areas are currently experiencing population growth, and a long-term, severe drought is ongoing in much of the Southwest. As a result, numerous plans for acquiring additional or alternate water supplies are under development, additional power supply facilities have been proposed, and reductions in permitted grazing use have occurred. Flycatcher conservation measures impose costs and changes on top of these significant ongoing trends.

[38] Estimated losses are for an average water year. Sensitivity analyses conducted for individual facilities also consider median and 95th percentile driest years.

Exhibit 4-3

WATER USERS POTENTIALLY AFFECTED BY FLYCATCHER UNDER SCENARIO 2

Recovery Unit	Management Unit	State	Facility Name	Estimated Water Losses Under Scenario 2 (acre-feet)	Water Users	Distribution of Annual Use		Average Annual Water Use		Affected Water Users	
						Agriculture	Residential/ Commercial/ Municipal	Agriculture per Acre[3] (acre-feet)	Res/Comm (per household)	Acres of Cropland	Res/Comm Households
Coastal California	San Diego	CA	Lake Hodges	4,686	San Dieguito Water District	16%	84%	3.2	0.4	117	4,921
					Santa Fe Irrigation District	0%	100%	3.2	0.4	0	5,858
			Cuyamaca Reservoir	1,712	Helix Water District	0%	100%	3.2	0.4	0	4,280
			Vail Dam	4,461	Rancho California Water District[4]	43%	57%	3.2	0.4	599	6,357
Basin and Mojave	Owens	CA	Pleasant Valley Reservoir	2,989	Los Angeles Dept. of Water and Power[5]	0%	100%	3.2	0.4	0	7,473
	Kern	CA	Isabella Dam	69,779	North Kern Water Storage District	100%	0%	3.2	0.4	7,414	0
					Buena Vista Storage District	100%	0%	3.2	0.4	6,978	0
					City of Bakersfield	0%	100%	3.2	0.4	0	59,312
Gila	Verde	AZ	Horseshoe Dam	30,000	Salt River Project[7]	10%	90%	2	0.4	1,107	49,829
					City of Phoenix[6]	0%	100%	2	0.4	0	19,634
	Roosevelt	AZ	Theodore Roosevelt (low)	24,700	Salt River Project	10%	90%	2	0.4	1,235	55,575
			Theodore Roosevelt (high)	81,700	Salt River Project	10%	90%	2	0.4	4,085	183,825
Lower Colorado	Middle Colorado Hoover-Parker Parker-Southerly	AZ, CA, NV	Parker Dam/Lake Havasu[8]	77,338	36 Lower Colorado River Water Users	53%	47%	3.9	0.4	10,510	90,872

Exhibit 4-3 (continued)

WATER USERS POTENTIALLY AFFECTED BY FLYCATCHER UNDER SCENARIO 2

Notes:

1 Annual water use represents the total quantity of water consumed by the listed user over a twelve month period from all sources, not solely the facilities listed in this chart. For the Lower Colorado Recovery Unit, annual water use figures are 2004 calendar year figures accessed from the U.S. Bureau of Reclamation at http://www.usbr.gov/lc/region/g4000/hourly/use04.html on September 1, 2005.
2 Calculation of estimated loss per user assumes that the loss to the dam facility is distributed across users in proportion to the user's annual consumption of total annual water delivery.
3 Agricultural water use per acre is calculated from the average acre-feet per acre of water use by farms from off-farm surface water suppliers in affected states (2003 Farms and Ranch Irrigation Survey, NASS)
4 Annual use of Rancho California Water District obtained from Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2004. Accessed at: http://www.ranchowater.com/pdfs/Adopted%20CAFR.pdf on August 24, 2004.
5 Annual use of Los Angeles Department of Water and Power obtained from Quick Facts 2003-2004. Accessed at: http://www.ladwp.com/ladwp/cms/ladwp000509.jsp on August 24, 2004.
6 The City of Phoenix has rights to the water behind gates erected in the spillway of Horseshoe Dam. Although water spilled from the dam would be captured behind those gates, this analysis assumes under Scenario 2 that Phoenix would lose all water stored behind the gates.
7 The Salt River project anticipates that municipal use will become 90% of its water delivery in the next 10 to 20 years. The users of water administered by the Salt River Project include: the Cities of Chandler, Glendale, Mesa, Phoenix, Scottsdale, and Tempe; the Salt River Pima-Maricopa Indian Community; Fort McDowell Indian Community; Roosevelt Water Conservation District; RID Exchange; Buckeye Irrigation District as well as smaller miscellaneous users.
8 The Lower Colorado system includes the following dams within proposed CHD: Lake Mead/Hoover Dam, Lake Havasu/Parker Dam, Imperial Diversion Dam, Laguna Dam, Senator Wash, and Lake Moovalya/Headgate Rock Dam.

4.2 Overview of Methodology

91. The approach followed for projecting future costs associated with water operations, hydropower production, flood control, river channelization, and groundwater pumping projects is presented in this section.

4.2.1 Dams Operations and Water Supply

92. Past economic impacts associated with flycatcher conservation measures are included in this analysis in order to provide context for understanding future impacts. In most cases, estimates of past costs are drawn from information provided by the regulated entities. Most areas affected by past conservation efforts were subject to biological opinions that resulted in extensive mitigation efforts. In addition, a complex HCP was developed at Roosevelt Dam.

93. Future economic impacts associated with dam operations are presented under two scenarios: 1) affected water operators pursue an ITP (through section 7 consultation or HCP) that allows for continued, unimpeded water operations; 2) water operators are forced to change the management regime of these facilities to avoid adverse effects on flycatcher habitat.

Scenario 1: Incidental Take Permit (ITP) Scenario

94. The first scenario for estimating future impacts on dam and hydropower operations assumes that water managers will pursue an ITP for current operations as part of an HCP or biological opinion. Costs under this scenario include the administrative costs of developing the ITP, including development of an HCP or biological opinion and assessment, as well as the potentially significant costs of actions required to comply with the ITP (e.g., costs to acquire and restore habitat).

95. In order to project the costs of ITP development and implementation, this analysis relies on an analysis of historical HCP/biological opinion development and implementation costs, as well as projections by affected entities of future costs. Specifically, the analysis considers the total cost of ITP development and implementation at reservoirs (both past and future). Some facilities have not yet contemplated costs or efforts that may be associated with a future ITP for flycatcher. For these facilities, this analysis calculates potential costs by assuming a constant relationship between mitigation costs and the storage capacity of the reservoir involved. Exhibit 4-4 presents a summary of existing cost estimates for ITPs and associated storage capacities for involved facilities on a cost of mitigation per acre-foot of storage capacity basis. Thus, this analysis assumes that a larger storage capacity facility will affect more flycatcher habitat, and therefore will be responsible for more extensive mitigation efforts as part of an HCP or biological opinion. Because few data points exist for this analysis, this analysis uses the average estimate from existing examples, which range from $7 to $36 per acre-foot (2004$, discounted at 7 percent).

96. Facilities Assessed Under Scenario 1 include: Seven Oaks Dam, Hodges Reservoir, Cuyamaca Reservoir, Vail Dam, Mohave Dam, Pleasant Valley Reservoir, Isabella Dam, Hoover Dam, Parker Dam, Headgate Rock Dam, Imperial Diversion Dam, Laguna Dam, Senator Wash Dam, Alamo Dam, Roosevelt Dam, Horseshoe Dam, Ashurst-Hayden Diversion Dam, Coolidge Dam, Middle Rio Grande Operations, and the San Luis Valley water supply.

Exhibit 4-4

COSTS OF RECENT INCIDENTAL TAKE PERMITS THAT INCLUDE SOUTHWESTERN WILLOW FLYCATCHER (per acre-foot storage capacity)

Project Name	State	Storage Capacity	Past Costs ($2004)	Future Costs ($2004)		Total Costs per Acre-foot	
				7% Discount Rate	3% Discount Rate	7% Discount Rate	3% Discount Rate
Lake Isabella	CA	562,362	$11,316,000	$3,708,000	$5,207,000	$27.34	$30.00
Lake Roosevelt	AZ	1,653,043	$4,684,000	$28,976,000	$45,223,000	$20.36	$30.19
Horseshoe Reservoir	AZ	131,427	$482,000	$4,331,000	$8,165,000	$36.62	$65.79
Lower Colorado*	AZ, NV, CA	31,003,300	$7,548,000	$213,599,000	$332,903,000	$7.13	$10.98
					Average:	**$22.71**	**$34.09**

This is the combined storage capacity for Lake Mead, Lake Mohave, and Lake Havasu.
Note: This $/per-acre-foot storage capacity estimate is used only for facilities that have not yet contemplated potential costs associated with an ITP for flycatcher.

Scenario 2: Modification of Facility Operations

97. The second scenario for estimating potential future costs associated with dam operations assumes that facility managers will be forced to change operations to avoid adverse effects on flycatcher habitat. The Recovery Plan outlines the goals for flycatcher habitat in reservoir areas as follows:

> "Sequences of flood flows, sediment deposition, and subsequent exposure of sediments often create extensive riparian habitat at reservoir inflows and margins. To the greatest extent feasible, reservoir levels should be managed to preserve this serendipitous "delta" habitat. Avoid desiccating drawdowns or extended, extreme inundation of these habitats. Because laws and regulations also control reservoir levels, this objective must be fit into existing operating rules and priorities, because it may conflict with water delivery or flood control responsibilities. The objective should be included in formal operating rules, however, and recognized as a benefit that dam operations provide."[39]

98. Thus, the Service states that flycatcher management must fit into existing operating rules at reservoirs. However, third parties have occasionally made separate assessments that have resulted in injunctions on allowing facilities to inundate flycatcher

[39] Recovery Plan for the Southwestern willow flycatcher, Service, 2003.

habitat.[40] In other cases, management agencies assert that they lack legal discretion to release water for flycatcher management purposes.[41] As a result, the likelihood of most facilities changing operations to accommodate flycatcher in the future is unknown.

99. Scenario 2 provides context for understanding the magnitude of impacts that could occur if operators are forced to alter water management in order to avoid adverse modification of habitat. As mentioned, detailed assessment of the economic impacts that on facilities and end users would require detailed system-wide hydrologic and economic models. That is, the analysis would require models that predict changes in water allocation under alternative water management regimes and the behavioral responses of various water users when faced with potential shortfalls and/or higher water prices. Such models do not exist for most areas potentially affected by flycatcher conservation activities. As a result, this analysis utilizes available data and simplifying assumptions to provide estimates that bound the magnitude of potential impacts that could result from alterations to water operations. The major assumptions of this scenario are as follows:

- For a reservoir that contains proposed CHD in its active conservation pool,[42] operators will alter water management to avoid impacts to flycatcher habitat. **Specifically, water levels are assumed to be maintained at an elevation that is at or below habitat areas,[43] where such actions are legally or physically feasible.**[44]

- Maintaining current pool levels will result in a loss of water storage capacity at reservoirs. This assumption does not take into consideration any management adaptations that a facility might make to avoid increased spills. Responses to a need

[40] For example, at Lake Isabella in California. See the discussion of Lake Isabella in the Kern River MU in this Section.

[41] For example, currently there is no legal requirement for USBR to maintain water levels below flycatcher habitat at the lake created by Hoover Dam, Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation, 143 F.3d 515 (9th Cir. 1998). In this case, the court upheld a Reasonable and Prudent Alternative that allowed USBR to mitigate off-site rather than release water to maintain flycatcher habitat. Service and USBR Solicitors further state that the Department of Interior has interpreted the U.S. Supreme Court's injunction in Arizona v. California, 376 U.S. 340 (1964) as precluding the release of water from Lake Mead for the sole purpose of protecting flycatcher habitat. Congress has also enacted legislation to prohibit USBR from releasing San Juan/Chama water for flycatcher management purposes at Heron Reservoir. Comments of the Southwest Regional Solicitor's Office, December 15, 2004.

[42] "Active storage," or "active conservation pool," refer to the reservoir space that can actually be used to store water for beneficial purposes.

[43] For cases where the critical habitat includes the entirety of a reservoir and the precise elevation of flycatcher habitat is not certain, this analysis uses the average storage level over the past five years as a proxy for the location of habitat.

[44] This analysis assumes that because of USBR's current position that it lacks discretion to release water from Lake Mead to benefit flycatcher habitat, operational changes under Scenario 2 at Lake Mead are not reasonably foreseeable. This analysis assumes that USBR will also argue that it lacks discretion at other facilities on the Lower Colorado River. This is supported by their statement: "With the implementation of the Multi-Species Conservation Program, and due to legal requirements for delivery of water, there will be no changes in the operations of the Lower Colorado River. Minimum flows and water diversions are non-discretionary actions associated with the delivery of water based on laws and treaties. Currently all conservation programs are completed through a willing sellers program, and it is not foreseen that any forbearance agreements are to be enacted specifically for the Southwestern Willow Flycatcher along the Lower Colorado River." "Economic Analysis: Southwestern Willow Flycatcher: 2006-2004", Lower Colorado Regional Office, USBR, written memorandum, July 2004.

to keep water levels low are likely to be most dramatic in the short term, before water users and managers adapt to the new management context.[45]

- A reduction in storage capacity will limit the ability of water rights holders to obtain water in some years, and may result in impacts on hydropower production and flood control. Importantly, this analysis does not account for any downstream use of water following spillage (i.e., it is assumed to be lost from beneficial use).

- A per-unit value for water, estimated via market prices or replacement costs, in a given region is a reasonable proxy for the value of water in conservation storage, and the value lost when storage is limited.[46]

100. In the Southwest, users of water must hold a water right. Such rights are treated as real property, and are traded markets. Because they are traded in competitive markets, it is assumed that the price of these rights represents the expected economic benefit of water made available by these rights, in its highest and best use.[47] Prices for short-term water leases are determined in a similar manner. Where available, this analysis uses lease prices for water transactions that occurred within proposed CHD.[48]

101. For some facilities, water lease purchases may not represent a feasible or least-cost option to replace any lost supply. In these cases, the analysis assumes that estimated replacement costs (e.g., costs associated with upgrading treatment systems for purposes of wastewater recycling) represent a more appropriate measure of any lost economic value. Exhibit 4-5 provides a summary of recent estimated water values in flycatcher CHD areas.

102. Using these various data, this scenario provides a measure of the *value* of water that could be lost from human beneficial use, or the amount that will need to be replaced, if operators are forced to limit reservoir levels to avoid adverse impacts on flycatcher habitat. Effectively, by assuming that pool levels will be limited to current levels, and that water use will be lost, this analysis assumes that current water use patterns will

[45] The adaptability of the system will depend on the hydrology of the affected system. The City of Phoenix points out that, in the case of Horseshoe reservoir, the storage capacity of the reservoir is small relative to the flow of the Verde River. In that case, the City states that any loss of storage capacity will result in a loss of water to the users. City of Phoenix, "Re: Comments on Proposed Rule, Draft Economic Analysis, and Environmental Assessment for Designating Critical Habitat for the Southwestern Willow Flycatcher." Comments of Tom Buschatzke, May 31, 2005.

[46] Note that the market value of consumptive water rights is dependent on a variety of considerations, including priority and point of diversion, among other factors.

[47] One commenter on the analysis noted that market prices may understate value for non-marginal changes in water supply. Any potential changes in availability are expected to represent about three-percent of annual water use for any one end user on average, or roughly six-percent by facility. Thus, any understatement of value is expected to be modest.

[48] Estimating the cost of water across large regions is difficult because water values are closely tied to local uses and values. In addition, because most water users hold contracts and agreements for water, legal and contractual limitations on transfers can influence market valuation. Technical peer review comments of Robert C. Wilkinson, UCSB, December 31, 2004. This issue was also raised by one commenter on the analysis. In general, the range of estimates utilized in the analysis is likely to be representative of market values on average.

continue, but with added limitations on potential future storage that may be used to meet users needs and buffer drought conditions.

103. As noted previously, this analysis does not acknowledge downstream beneficial use of any spillage. For example, one of the largest groundwater storage facilities in the United States is found downstream of Lake Isabella. Additional releases from there are likely to provide some benefit to groundwater storage.[49] However, a detailed assessment of the potential benefits to downstream users would be difficult, due to the large geographic extent and complex hydrology of the site, and thus is outside the scope of this analysis.

Exhibit 4-5

ESTIMATED PER-UNIT WATER VALUES IN FLYCATCHER PROPOSED CHD AREAS

Water Source	End Use	Price/af (2004$)
California		
Lower Colorado River*	Residential	$473
Metropolitan Water District	Municipal and Agricultural	$326 to $524
California State Water Project	Mixed	$115 to $135
Arizona		
City of Phoenix	Municipal	$457 to $506

* Water from the Lower Colorado River serves residential and agricultural users in California, Arizona and Nevada.

Sources: Personal communication with Larry Campbell, Helix Water District, November 2004; Weston, Mark. "Economic Analysis of Critical Habitat Designation at Helix Water District's Lake Cuyamaca for the Southwestern Willow Flycatcher." Public comment from Helix Water District, October 28, 2004. Personal communication with Craig Elitharp, Rancho California Water District, November 2004; California Energy Commission, Water Energy Use In California, Accessed at http://www.energy.ca.gov/pier/iaw/industry/water.html, on November 8, 2004; City of Phoenix, Economic Impact of the Designation of Critical Habitat for the Southwestern Willow Flycatcher on the City of Phoenix Water Supply, September 14, 2004; San Diego County Water Authority public comment on Draft Economic Analysis, July 15, 2005.

104. Facilities assessed under Scenario 2 that function as water supply dams include: Hodges Reservoir, Cuyamaca Reservoir, Vail Dam, Pleasant Valley Reservoir, Isabella Dam, Hoover Dam, Parker Dam, Alamo Dam, Roosevelt Dam, Horseshoe Dam.

4.2.2 Hydropower Production

105. Five facilities that fall within proposed CHD produce hydroelectric power. If these facilities are required to maintain lower reservoir elevations to avoid inundation of flycatcher habitat, impacts on hydropower facilities could result.[50] To understand the potential economic impact associated with limits on future water levels at hydropower facilities, this analysis provides information on the amount of hydropower produced by

[49] Technical peer review comments of Robert C. Wilkinson, UCSB, December 31, 2005. See "Kern River" section for details.

[50] Note that the Recovery Plan states that both extended inundation and extended desiccation of flycatcher habitat should be avoided. This scenario would result in extended desiccation of habitat.

affected facilities, and an assessment of the effects of potential changes on hydropower production due to changes in reservoir operations.

106. Energy-related impacts related to flycatcher conservation activities are likely to be displacements of peak hydroelectric energy production during the year to less productive times of the year. This practice does not reduce average energy production, but rather changes the temporal distribution of that power production. Shifting water releases from the summer, when electric power prices are generally higher, to other times of the year in order to maintain lower reservoir levels may reduce revenues. Operators at Roosevelt Dam would expect a $2.6 million per year impact under this scenario, primarily associated with producing power at periods when prices are lower.[51] The total financial impacts related to hydropower activities is estimated to be $2.7 million annually, which represents 0.02 percent of the estimated annual baseline cost of regional energy production.

107. Facilities in proposed CHD that produce hydropower are: Hoover Dam, Parker Dam, Headgate Rock Dam, Senator Wash Dam, and Roosevelt Dam.

4.2.3 Groundwater Pumping

108. De-watering from groundwater pumping is one of the stresses that may limit regeneration of suitable habitat for the flycatcher.[52] In the past, the Service has not required limits on groundwater pumping to protect the flycatcher or its habitat. However, if limits on groundwater pumping are considered as a means to protect the flycatcher and its habitat in the future, this could have a significant economic impact on groundwater users. This analysis evaluates two areas where groundwater use may affect water flow in flycatcher habitat areas: Prescott Active Management Area (AMA), Arizona, and Safford Valley, Arizona. In the Prescott AMA, 21,000 acre-feet are pumped annually, which could be valued at approximately $7.9 million. In the Safford Valley, approximately 3,400 wells are utilized.[53]

109. The principal challenge in addressing this potential category of impact is an absence of hydrologic data (e.g., conjunctive characteristics of groundwater/surface water; total quantity of water currently pumped; level of pumping that would allow for recovery of historic groundwater levels; the geographic area over which changes in pumping would be required). However, in order to better understand this category of potential impact, this analysis provides information on areas where groundwater pumping may have the potential to affect the quality of flycatcher habitat. Specifically, where available, this analysis provides information on the amount of groundwater withdrawn in an area and the breakdown of these withdrawals by type of use, and the value of this water (following the same water value approach as discussed above).

[51] Lake Roosevelt operators expect that power production would increase under this scenario; however, the price received for this power would be lower.
[52] Recovery Plan, p. I-16.
[53] No information was available on the total volume of water pumped from these wells annually.

110. Areas assessed include: Prescott, AZ Active Management Area; Safford Valley, AZ.

4.2.4 Flood Control and Water Diversion Projects

111. Flood control impacts could occur if flycatcher conservation activities affect the ability of a flood control device to protect areas from flood impacts. This analysis discusses the potential for changes in dam operations or maintenance activities to result from flycatcher conservation activities. For projects not associated directly with a dam, this analysis estimates costs using average costs for past projects in this category.

112. In the past, flood control and water diversion projects in flycatcher habitat areas have generally resulted in habitat mitigation off-site, rather than in changing operations and maintenance of facilities (e.g., vegetative clearing schedules). One exception is the San Luis Rey Flood Control Project, where changes to vegetative clearing activities were altered to accommodate flycatcher concerns, which has resulted in a reduction in flood control capacity of the project from 270 years to approximately 100 years. However, no flood damages have resulted from this change to date and the Service is currently in ongoing discussions with ACOE in an attempt to reach an agreement that the project to reach the 270 year flood control protection as originally proposed.[54] Potential impacts of future changes in operations and maintenance schedules are considered in this report. Costs associated with past flycatcher conservation activities related to flood control projects are presented in Exhibit 4-6.

113. Facilities assessed include: San Bernardino Flood Control District, San Luis Rey Flood Control Project, Mill Creek Diversion Project, Santa Ana River Flood Control Operations, San Timoteo Creek Project, Roosevelt Dam, Mohave Dam, Hoover Dam, Alamo Dam, Horseshoe Dam, small flood control and diversion projects in various units.

4.3 Background Data

114. Exhibit 4-7 presents general characteristics of dams included in the proposed CHD for flycatcher.

[54] Email communication with Jane Hendron, FWS Carlsbad Office, April 8, 2005.

Exhibit 4-6

FLOOD CONTROL PROJECT COSTS

Project Name	State	Project Type	Total Costs ($2004)	
			Seven Percent	Three Percent
Santa Ana River Flood Control Operations and Maintenance	AZ	Flood Control	$396,280	$503,367
San Timoteo Creek Flood Control Project	CA	Flood Control	$848,799	$848,799[1]
San Luis Rey Flood Control Project	CA	Flood Control	$3,716,544	$3,718,251[2]
		Average:	$1,653,874	$1,690,139

Notes:

[1] All costs for this project were incurred in the past, therefore, there is no difference in the seven percent and three percent cost estimates since there are no anticipated costs in the future.

[2] There is little difference between the seven percent and three percent cost estimates because the majority of costs were incurred in the past. Only one additional year of costs is anticipated in 2005.

Exhibit 4-7

CHARACTERISTICS OF MAJOR DAMS AND RESERVOIRS WITHIN FLYCATCHER PROPOSED CHD

Management Unit	Facility Name	County, State	Owner/Operator	Year Completed	Primary Purpose(s)	Storage Capacity (af)	Hydropower-Installed Capacity
Coastal California Recovery Unit							
Santa Ana	Seven Oaks Dam	San Bernardino, CA	USACE	2001	Flood Control	140,000	0
San Diego	Hodges Reservoir	San Diego, CA	City of San Diego	1918	Water Storage, Recreation	30,251	0
	Cuyamaca Reservoir	San Diego, CA	Helix Water District	1887	Water Storage, Recreation	11,740	0
	Vail Dam	Riverside, CA	Rancho California Water District	1949	Water Storage, Groundwater Recharge	49,370	0
Basin and Mojave Recovery Unit							
Owens	Pleasant Valley Reservoir	San Bernardino, CA	City of Los Angeles	Unknown	Water Supply	2,989	0
Mojave	Mojave Dam	San Bernardino, CA	USACE	1971	Flood Control	6,515	0
Kern	Isabella Dam	Kern, CA	USACE	1953	Water Storage, Flood Control	562,362	0
Gila Recovery Unit							
Roosevelt	Theodore Roosevelt	Gila, AZ	SRP	1909	Recreation, Hydropower, Irrigation	1,653,043	36 MW
Verde	Horseshoe	Yavapai, AZ	SRP	1938	Water Supply, Irrigation	131,427	0
Upper Gila	Coolidge Dam	Graham, AZ	SCIP	1928	Irrigation, water supply	869,000	0
Lower Colorado Recovery Unit							
Middle Colorado	Lake Mead/Hoover Dam	Clark, NV, Mohave, AZ	USBR	1936	Water Storage, Hydropower	28,537,000	2,080 MW
Hoover-Parker	Lake Havasu/Parker Dam	San Bernardino, CA, La Paz, AZ	USBR	1938	Water Storage, Hydropower	648,000	120 MW
Parker-Southerly	Lake Moovalya/ Headgate Rock Dam	San Bernardino, CA, La Paz, AZ	BIA	1942	Irrigation, Hydropower	200,000	19.5 MW
	Imperial Diversion Dam	Imperial, CA; Yuma, AZ	USBR/Imperial Irr. District	1938	Water Diversion	160,000	0
	Laguna Dam	Yuma, AZ	USBR	1909	River Regulation; debris control	1,500	0
	Senator Wash	Imperial, CA	USBR/Imperial Irr. District	1966	Water Diversion	0	7.2 MW (pumped storage)
Bill Williams	Alamo Dam	Mohave, AZ	USACE	1968	Flood Control	1,409,000	0

4.4 COASTAL CALIFORNIA RECOVERY UNIT

4.4.1 Santa Ana Management Unit

115. The Santa Ana River is one of the largest river systems in southern California, with its headwaters and tributaries in the San Bernardino Mountains of San Bernardino County, California. The Santa Ana MU includes 52 miles of the Santa Ana River in San Bernardino and Riverside Counties. In addition, in San Bernardino County, the designation includes nine miles of Bear Creek, 19 miles of Mill Creek, three miles of Waterman Creek, three miles of Wilson Creek, and eight miles of Oak Glen Creek. Streams that cross both San Bernardino and Riverside County include eight miles of San Timoteo Wash and four miles of Yucaipa Creek.

116. Within the Santa Ana MU is Seven Oaks Dam, a dam facility that is owned and operated by USACE primarily for flood control. The flycatcher consultation history for this MU includes three biological opinions on two flood control projects and one water diversion project.

4.4.1.1 Dam Operations

Seven Oaks Dam

117. Seven Oaks Dam was initially constructed and operated as a single purpose flood control facility in 1999 by the USACE. The dam is located on the Santa Ana River in the upper Santa Ana Canyon about eight miles northeast of the City of Redlands, in San Bernardino County, California. Authorization for the project construction is contained in the Water Resources Development Act of 1986.

118. With a holding capacity of 140,000 acre-feet, Seven Oaks Dam operates in tandem with Prado Dam to provide flood protection to Orange County, California.[55] During the early part of each flood season, runoff is stored behind the dam in order to build a debris pool to protect the outlet works. Small volume releases are made on a continual basis in order to maintain the downstream water supply. During a flood, Seven Oaks Dam stores water destined for Prado Dam for as long as the reservoir pool at Prado Dam is rising. When the flood threat at Prado Dam has passed, Seven Oaks begins to release its stored flood water at a rate that does not exceed the downstream channel capacity. At the end of each flood season, the reservoir at Seven Oaks is gradually drained and the Santa Ana River flows through the project unhindered.[56]

119. Recently, according to the San Bernardino Valley Municipal Water District (the "District"), the District entered into negotiations with the ACOE to re-design the dam for

[55] According to San Bernardino Valley Municipal Water District, Seven Oaks dam has the capacity to store 140,000 acre-feet of water (Husing, Dr. John W. "Comment on the "Final Draft Economic Analysis of Critical Habitat Designation for the Southwestern Willow Flycatcher." Public comment submitted on behalf of San Bernardino County Flood Control District, May 25, 2005).

[56] US Army Corp of Engineers Los Angeles District Reservoir Regulation Section. Project Information for Seven Oaks Dam. Online at: http://www.spl.usace.army.mil/resreg/htdocs/7oaks.html. Accessed on: November 10, 2004.

both flood control and water storage. The result was a $6.5 million dollar re-design project and the District submitted applications to be awarded the rights to the "new water" held behind Seven Oaks Dam. The District anticipates the application process to be completed shortly, at which time the dam will be operated for both flood control and water storage.[57]

Past Impacts

120. No past consultations or other conservation efforts have occurred for the flycatcher on the Seven Oaks dam project.

Future Impacts

121. *Scenario 1*. For water storage projects where no past consultation history is available, this analysis estimates the economic impacts of future flycatcher-related conservation efforts by assuming that the facility will be able to continue normal operations through an incidental take permit and the mitigation of flycatcher habitat. Applying an average cost per acre-foot of $23 to $34 to develop an incidental take permit and acquire habitat mitigation lands (as presented in Exhibit 4-4), this analysis estimates future costs for Seven Oaks Dam of $3.1 million (2004 dollars, assuming a seven percent discount rate).

122. *Scenario 2*. Seven Oaks Dam is currently operated for flood control only. The San Bernardino Valley Municipal District is currently in the process of securing rights to the "new water" being held behind Seven Oaks dam. As a result, historical reservoir level data are not available to estimate the potential loss storage capacity under Scenario 2.

123. Were flood control operations at this facility to be affected by flycatcher conservation efforts, impacts could be significant. The Water Control Manual for Seven Oaks Dam suggests that the Counties of San Bernardino, Riverside, and Orange benefit from flood control from the combination of Prado and Seven Oaks Dams. These counties are densely developed with residential, commercial, and industrial development.[58]

4.4.1.2 Flood Control Projects

Past Impacts

124. Two past biological opinions on the flycatcher were issued in the Santa Ana MU: one resulting from consultation with USACE for operations and maintenance of an existing flood control structure on the Santa Ana River by the San Bernardino County

[57] Husing, Dr. John W. "Comment on the "Final Draft Economic Analysis of Critical Habitat Designation for the Southwestern Willow Flycatcher." Public comment submitted on behalf of San Bernardino County Flood Control District, May 25, 2005.

[58] "Water Control Manual, Seven Oaks Dam & Reservoir Santa Ana River, San Bernardino County, California", U.S. Army Corps of Engineers, Los Angeles District, September, 2003.

Flood Control District, and a second involving USACE construction of an extension to an existing flood control structure on San Timoteo Creek. Flycatcher-related project modifications included administrative costs, survey and monitoring, and habitat mitigation. The total past cost of these two projects was $980,000 (2004 dollars, assuming a seven percent discount rate).[59]

Future Impacts

125. Public comments from the Flood Control Engineer for the County of San Bernardino Flood Control District express concerns that conservation efforts for the flycatcher may result in project delays, particularly with regard to major construction projects in the future. In addition to increasing costs, delays also increase risks of failure of infrastructure in the case of storm events.[60] Future costs in the Santa Ana MU include costs related to implementation of past biological opinions and costs from future projects. USACE estimates future costs associated with flood control projects that have already been consulted on to be $260,000 (2004 dollars, assuming a seven percent discount rate).[61]

126. Discussions with the Army Corp of Engineers and California water districts identified at least two additional projects that are likely to involve flycatcher conservation efforts in the future: operations and maintenance of an existing flood control structure on the Santa Ana River by the Riverside County Water Conservation and Flood Control District, and a new USACE flood control structure on the Wilson Creek/Oak Glen Creek system, sponsored by the San Bernardino County Flood Control District. To be conservative, this analysis assumes that a total of four future projects will require flycatcher conservation efforts over the next 20 years, an assumption that reflects the likely increase in consultations that may result after critical habitat is designated for the flycatcher. To forecast the cost of these projects, this analysis applies the average cost of flycatcher conservation efforts from similar past projects, or $1.6 million per project (2004 dollars, assuming a seven percent discount rate). As a result, the total forecast cost of flycatcher-related conservation measures for these new projects is $6.6 million (2004 dollars, assuming a seven percent discount rate).

[59] Personal communication, Maresh Varma, San Bernardino County Flood Control District, August 4, 2004; Personal communication, Joy Jaiswal, USACE Los Angeles District, October 20, 2004.

[60] For example, the Flood Control Engineer reports that a recent project affected by the San Bernardino Kangaroo Rat was delayed for nearly four years, and the costs of construction increased from $17 million to $26 million over that time period. Recent winter storms have caused localized damage and temporary shutdown of a rail corridor. Public comments of Patrick J. Mead, Flood Control Engineer, "Comments on the Southwestern willow flycatcher draft environmental assessment," May 23, 2005.

[61] Personal communication, Maresh Varma, San Bernardino County Flood Control District, August 4, 2004; Personal communication, Joy Jaiswal, USACE Los Angeles District, October 20, 2004.

4.4.1.3 Water Diversion Projects

Past Impacts

127. One river channelization project occurred in the Santa Ana MU on Mill Creek, constructed by the Orange County Water District. The total past cost of flycatcher-related conservation measures, including survey, monitoring and habitat mitigation is $120,000 (2004 dollars, assuming a seven percent discount rate).[62]

Future Impacts

128. Future costs in the Santa Ana MU consist of ongoing costs for projects already consulted on as well as new costs associated with future projects. OCWD estimates that future costs of the Mill Creek Diversion Project will be $28,000 (2004 dollars, assuming a seven percent discount rate).[63]

129. The number of future water diversion projects that may require flycatcher conservation efforts is uncertain. Lacking more specific information, this analysis assumes that two diversion projects will incur costs related to flycatcher conservation within the Santa Ana unit. This assumption reflects the likely additional actions in this unit that may require consultation after critical habitat is designated for the flycatcher. Using the average cost of past projects as a surrogate measure of expected impacts, future costs for new projects are forecast to be $3.3 million (2004 dollars, assuming a seven percent discount rate).

4.4.2 San Diego Management Unit

130. There are three dams and one flood control project operating in the San Diego MU. The flycatcher consultation history for this MU includes one biological opinion on the San Luis Rey Flood Control project.

4.4.2.1 Dam Operations

Hodges Dam

131. The 130-foot-high Hodges Dam was built in 1917 and stores up to 30,251 acre-feet of water. Hodges Reservoir stores water collected from local runoff, primarily from the San Dieguito River system. The City of San Diego purchased Hodges Reservoir in 1925 and continues to own the dam and associated water rights. However, at present, the City's water supply system is not connected to Hodges Reservoir. The San Diego County Water Authority is currently building a connection between Hodges Reservoir and Olivenhain Reservoir, expected to be completed in 2008. This pipeline will provide various benefits, including the ability to store 20,000 acre-feet of water at Hodges Reservoir for use during a water emergency, the ability to keep the reservoir at a more

[62] Personal communication, Rick Mendoza, Orange County Water District, September 15, 2004.
[63] Personal communication, Rick Mendoza, Orange County Water District, September 15, 2004.

consistent level, and the ability to capture some water before it periodically spills over Hodges Reservoir Dam and into the ocean during rainy seasons.[64] Specifically, this new connection will allow water to be pumped from Hodges Reservoir to Olivenhain Reservoir and also control the flow of water from Olivenhain Reservoir to Hodges Reservoir. In rainy winter years when Hodges Reservoir would overflow, water would be captured and moved to Olivenhain Dam while in the summer months water from Olivenhain Dam would be moved back to Hodges Reservoir to benefit recreation activities.[65] (Exhibit D-1 in Appendix D provides a map of this connection.) Olivenhain Reservoir has a storage capacity of 24,000 acre-feet. After the connection, water from Hodges will be used to supplement service to the City of San Diego's 1.3 million residents.

132. Water stored at Hodges Reservoir is currently delivered and sold to the San Dieguito Water District and the Santa Fe Irrigation District. When water is available, these districts withdraw approximately 9,000 acre-feet per year at a rate of six to ten million gallons per day. However, due to the current low reservoir level, these Districts are only withdrawing approximately 2.5 million gallons per day (equivalent to approximately 3,000 acre-feet per year).

133. San Dieguito Water District serves approximately 37,000 customers in the communities of Leucadia, Old Encinitas, Cardiff, and portions of New Encinitas. Santa Fe Irrigation District serves approximately 20,000 customers, mainly residential. In the future, water stored at Hodges Reservoir will be used to supplement service to the City of San Diego's 1.3 million residents.

Past Impacts

134. Hodges Dam resides within the boundaries of the San Diego Multiple Species Conservation Program (MSCP), an effort that encompasses more than 528,000 acres and involves the participation of the County of San Diego and 11 cities, including the City of San Diego. The City of San Diego also has an MSCP Subarea Plan.[66] This regional HCP is also a regional subarea plan under the Natural Communities Conservation Planning program (NCCP) and is being developed in cooperation with California Department of Fish and Game. The MSCP provides for the establishment of approximately 171,000 acres of preserve areas to provide conservation benefits for 85 federally-listed and sensitive species over the life of the permit (50 years), including the flycatcher. Costs associated with the development of this HCP are included in Section 6.

135. In addition, in 1997, the U.S. Army Corp of Engineers consulted with the Service under Section 7 regarding the San Diego County Water Authority Emergency Storage Project (ESP), which includes Hodges Reservoir. The consultation resulted in an incidental take for up to 9 pairs of willow flycatchers. As part of the consultation,

[64] Email communication with Jesus Meda, Jeffery Pasek, and Bob Collins, City of San Diego, September 20, 2004.
[65] San Diego County Authority. October 2002. Olivenhain Dam/Lake Hodges Community Update Summary. Online: http://www.sdcwa.org/infra/pdf/Olivenhain/DelDios10-09-02.pdf. Accessed on: February 7, 2005.
[66] Public comments of Cathy Cibit, Watershed project officer, City of San Diego Water Department, May 31, 2005.

SDCWA was required to implement a number of conservation measures to protect endangered species and habitat, including the flycatcher, Least Bell's vireo, California gnatcatcher, coastal sage scrub, and wetlands habitat. Of the wetland habitat, approximately 30 acres of wetlands habitat was affected, requiring the mitigation of approximately 50 acres. According to SDCWA, their FY2005 budget includes a total of $6.787 million for wetlands mitigation.[67]

Future Impacts

136. Hodges Reservoir is not currently connected to the City of San Diego's water supply system. This will change in 2008 when a connection between Hodges Reservoir and the Olivenhain Reservoir is constructed, thereby linking Hodges with the Water Authority's imported water delivery system and allowing water to move between the two reservoirs as well as throughout the Authority's greater aqueduct system.

137. As previously discussed, this analysis considers two scenarios to estimate the economic impact of future flycatcher-related conservation efforts:

Scenario 1. This scenario assumes that the facility will be able to continue operations, including expected future operations under the existing MSCP. This analysis assumes that, to comply, operators will be forced to conduct equivalent mitigation of flycatcher habitat as if an individual HCP for Hodges Reservoir were developed. While, if summed with all other areas, this may result in an overestimate of costs associated with the MSCP, it acts as a proxy for quantification of mitigation measures specifically associated with flycatcher critical habitat at Hodges Reservoir. Applying an average cost per acre-foot storage capacity of $23 to $34 for implementing an HCP related to flycatcher at a reservoir (as presented in Exhibit 4-4), this analysis estimates future costs associated with the MSCP at Hodges Reservoir of $690,000 (2004 dollars, assuming a seven percent discount rate).

Scenario 2. Over the past five years, Hodges Reservoir has averaged 11,906 acre-feet of active storage, or 288 feet in elevation. The City states that the goals for future management of Hodges Reservoir after connection to Olivenhain Reservoir are to maintain it between 50 and 85 percent of capacity, or between elevations 298 and 310 feet.[68] If conservation efforts for the flycatcher result in the City of San Diego attempting to maintain an elevation of 288 feet in the future to avoid inundating flycatcher habitat, this would result in a loss of storage capacity in some years.[69] By examining historical reservoir level data since 1970 of months

[67] Personal communication with Larry Purcell, San Diego County Water Authority, September 2, 2005.
[68] Email communication with Jesus Meda, Jeffery Pasek, and Bob Collins, City of San Diego, September 20, 2004.
[69] The San Diego County Water Authority states that, while the average storage in the reservoir may be reported correctly as 11,906 acre-feet, "Because Hodges is not connected to the regional water distribution system, its water levels fluctuate dramatically depending on current weather conditions….There are no plans to maintain water level at 288 and it is unlikely that the reservoir will naturally fall to this level before completion of the Water Authority Emergency Storage Project…" Laurence Purcell, San Diego County Water Authority. Letter to Steve Spangle, FWS. July 15, 2005. To be conservative, this analysis calculates Scenario 2 costs for Hodges Reservoir assuming

in which water would have to be released to maintain a level of 11,906 acre-feet, this analysis estimates that, in an average year, maintaining current water levels would represent a loss of approximately 4,686 acre-feet of storage capacity (Appendix D, Exhibit D-2 presents historic water storage of Hodges Reservoir).[70] Using a value of $115 to $524 per acre-foot,[71] this lost water is valued at $540,000 to $2.5 million (unadjusted 2004 dollars).

138. It is unclear whether maintaining low levels at Hodges Reservoir would result in reduced water use by end users. Given the future flexibility provided by the connection to Olivenhain Reservoir, it is likely that not all water would need to be spilled from the system in order to maintain low reservoir levels. However, maintaining lower levels at Hodges will result in an overall reduction in water storage capacity, and place greater pressure to import water supplies during times of water shortage.

Vail Dam and Lake

139. Constructed in 1948, Vail Dam is owned and operated by the Rancho California Water District ("the District"). Vail Lake is the only surface water capture-release facility in the hydrogeologic area of the District. Vail Dam was initially constructed to impound winter flows from the Wilson, Kolb, and Temecula Creeks, an upstream area of 319 square miles, to serve irrigation purposes in Temecula Valley. Through the Vail Lake Agreement between Kaiser Development Company and the District in 1978, the District acquired Vail Lake and Dam, as well as to the right to operate the facilities for the benefit of the District's water users.

140. The full reservoir area of Vail Dam is 1,000 surface acres and total capacity of 49,370 acre-feet. Average annual surface flows into the reservoir are approximately 11,000 acre-feet. Under an Appropriations Permit obtained from the State of California in 1947, the District may store up to 40,000 acre-feet in Vail Lake each year between November 1 and April 30. This water is used for irrigation and domestic uses incidental to farming operations on 3,797 acres of land between May 1 and October 31 in Riverside County. The leading agricultural commodities in Riverside County in 2000, include milk, nursery, and grapes.[72]

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that Hodges Reservoir would need to be maintained at a lower elevation (i.e., 288 feet) than the 298 to 310 feet stabilization level expected by Hodges Reservoir operators.

[70] Scenario 2 is calculated using data for an average water year. To test the sensitivity of this assumption, this analysis also examined the amount of water lost in the 50th and 95th percentile driest water years. For Lake Hodges, the50th percentile results in a water lost estimate of 2,503 acre-feet. The 95th percentile results in a water lost estimate of 15,376 acre-feet.

[71] This analysis uses a value of $524 per acre-foot to calculate the high-end of Scenario 2 for Hodges Reservoir. According to the San Diego County Water Authority, this is the amount charged by the Metropolitan Water District for Tier 2 treated water (Laurence Purcell, San Diego County Water Authority. Letter to Steve Spangle, FWS. July 15, 2005).

[72] Public Interest Energy Research. California Agriculture Industry Profile. Online at: http://www.energy. ca.gov/pier/iaw/industry/agri.html. Accessed on: November 5, 2004.

141. In addition to providing irrigation water for farming operations, since 1975, a total of 162,000 acre-feet of capture surface water run-off has been periodically released from Vail Lake to artificially recharge groundwater aquifers serving the District.

Past Impacts

142. Like Hodges Reservoir, Vail Lake also lies within the boundaries of the San Diego Multiple Species Conservation Program (MSCP). The MSCP provides for the establishment of approximately 171,000 acres of preserve areas to provide conservation benefits for 85 federally-listed and sensitive species over the life of the permit (50 years), including the flycatcher. No past consultations or other conservation efforts have occurred for the flycatcher on the Vail Lake.

Future Impacts

143. *Scenario 1*. This scenario assumes that the facility will be able to continue normal operations through the existing MSCP. To estimate compliance costs, this analysis assumes that operators will be forced to conduct equivalent mitigation of flycatcher habitat as if an HCP was developed just for Vail Lake. While, if summed with all other MSCP areas, this may result in an overestimate of costs associated with the MSCP, it acts as a proxy for quantification of mitigation measures associated specifically with flycatcher critical habitat at Vail Lake. Applying an average cost per acre-foot storage capacity of $23 to $34 for implementing an HCP related to flycatcher at a reservoir (as presented in Exhibit 4-4), this analysis estimates future costs associated with the MSCP at Vail Lake of $1.1 million (2004 dollars, assuming a seven percent discount rate).

144. *Scenario 2*. Over the past five years, Vail Lake has averaged 20,116 acre-feet of active storage. If conservation efforts for the flycatcher resulted in the City of San Diego attempting to maintain that storage level in the future to avoid inundating flycatcher habitat, this would result in a loss of storage capacity in some years. Using data from 1970 to present, this analysis finds that, in the average year storage was 20,116 acre-feet or less. By examining months in which water would have to be released to maintain a level of 20,116, this analysis estimates that, in an average year, maintaining current water levels would represent a loss of approximately 4,461 acre-feet of storage capacity (Appendix D, Exhibit D-5 presents historic water storage of Vail Reservoir).[73] Using a value of $115 to 473 per acre-foot, this lost water is valued at $513,000 to $2.1 million (unadjusted 2004 dollars).

145. It is worth noting that three miles downstream of Vail Dam on Temecula Creek lie two aquifers: the shallow, unconfined Pauba Aquifer and the deeper, confined Temecula Aquifer. These two aquifers supplement the District's annual water

[73] Scenario 2 is calculated using data for an average water year. To test the sensitivity of this assumption, this analysis also examined the amount of water lost in the 50th and 95th percentile driest water years. For Vail Lake, the 50th percentile results in a water lost estimate of 1,200 acre-feet. The 95th percentile results in a water lost estimate of 16,709 acre-feet.

production, accounting for approximately a third of total water production.[74] If additional releases from Vail Lake occur as a result of flycatcher conservation efforts, the released water is not likely to be lost from use. More likely, it would be captured downstream and stored as groundwater for later use by the District.

Cuyamaca Reservoir

146. Cuyamaca Reservoir is a small, 110-acre lake located in the mountains east of San Diego. Formed in 1887, the Reservoir was built to bring water to lower San Diego River areas that had been relying solely on groundwater.

147. Today, the Helix Water District ("Helix") owns and operates Cuyamaca Reservoir. Lake Cuyamaca is divided into the west and east basins. The west basin has a surface area of approximately 100 acres and is approximately 11 feet deep. The west basin is leased to the Lake Cuyamaca Recreation and Park District, a state agency, and maintained year-round as a recreation lake. The east basin is a shallow mountain meadow of 875 acres and normally stores water throughout winter and early spring. The water is then released into Boulder Creek and stored in El Capitan Reservoir through an agreement with the City of San Diego. Total storage capacity at Cuyamaca Reservoir is 11,740 acre-feet.

148. Between 1939 and 1994, Helix's average net transfer from Lake Cuyamaca to El Capitan Reservoir was 2,703 acre-feet.[75] Helix Water District serves 55,000 connections, or approximately 250,000 residential and commercial customers in the cities of La Mesa, El Cajon, Lemon Grove, the community of Spring Valley, and various unincorporated areas near El Cajon.[76]

Past Impacts

149. Helix is currently working with the Padre Dam Municipal Water District and Sweetwater Authority, FWS, and the California Department of Fish and Game to prepare a Joint Water Agencies Natural Communities Conservation Planning Program (JWA) with Subregional and Subarea Plans. Development of the Plan started seven years ago, and when completed, the Plan will be consistent with other regional NCPP plans in San Diego such as the Multiple Species Conservation Program (MSCP) in Southern Coastal San Diego County; the Multiple Habitat Conservation Program (MHCP) in North Coastal San Diego County; and the County of San Diego Multiple Habitat Conservation and Open Space Program (MHCOSP) in Eastern San Diego County. The Plan will include management measures designed to protect, restore, monitor, manage, and enhance habitat to benefit the conservation of the Arroyo Toad, the southwestern willow flycatcher, and many other federally listed and sensitive species. To date, Helix has spent $364,000

[74] Personal communication, Craig Elitharp, Rancho California Water District, February 9, 2005.
[75] Weston, Mark. "Economic Analysis of Critical Habitat Designation at Helix Water District's Lake Cuyamaca for the Southwestern Willow Flycatcher." Public comment from Helix Water District, October 28, 2004.
[76] Helix Water District. About Helix. Online at: http://www.hwd.com/about/index.htm. Accessed on November 13, 2004.

(2004 dollars, assuming a seven percent discount rate) to develop the JWA Plan.[77] No past consultations have occurred for the flycatcher on the Cuyamaca Reservoir.

Future Impacts

150. *Scenario 1*. This scenario assumes that the facility will be able to continue normal operations through an incidental take permit and the mitigation of flycatcher habitat. Applying an average cost per acre-foot of $23 to $34 to develop an incidental take permit and acquire habitat mitigation lands (as presented in Exhibit 4-4), this analysis estimates future costs for Cuyamaca Reservoir of $270,000 (2004 dollars, assuming a seven percent discount rate).

151. *Scenario 2*. Over the past five years, Cuyamaca Reservoir has averaged 664 acre-feet of active storage. If conservation efforts for the flycatcher resulted in the City of San Diego attempting to maintain that storage level in the future to avoid inundating flycatcher habitat, a loss of storage capacity in some years would result. Since 1983, storage was 664 acre-feet or lower on average. By examining months in which water would have to be released to maintain an elevation of 664 feet, this analysis estimates that, in an average year, maintaining current water levels would represent a loss of approximately 1,712 acre-feet of storage capacity (Appendix D, Exhibit D-3 presents historic water storage of Cuyamaca Reservoir).[78] Using a value of $115 to 473 per acre-foot,[79] this water would be valued at $200,000 to $810,000 (unadjusted 2004 dollars) annually.

152. If additional water releases from Lake Cuyamaca occur as a result of flycatcher conservation efforts, the spilled water is not likely to be lost from use. More likely, it would be stored downstream in El Capitan Reservoir for later use. This is because Cuyamaca Reservoir drains into Boulder Creek, a tributary of the San Diego River, which flows into El Capitan Reservoir.[80] The Helix Water District, which manages the Cuyamaca Reservoir, has an agreement with the City of San Diego for 10,000 acre-feet of storage in El Capitan Reservoir. According to conversations with the Helix Water

[77] Does not include the cost of district staff time. Personal communication, Larry Campbell, Helix Water District, November 22, 2004.

[78] Scenario 2 is calculated using data for an average water year. To test the sensitivity of this assumption, this analysis also examined the amount of water lost in the 50th and 95th percentile driest water years. For Cuyamaca Reservoir, the 50th percentile results in a water lost estimate of 479 acre-feet. The 95th percentile results in a water lost estimate of 6,725 acre-feet.

[79] Due to the drought, the District is currently purchasing water imported from the Colorado River at $473 per acre-foot. Weston, Mark. "Economic Analysis of Critical Habitat Designation at Helix Water District's Lake Cuyamaca for the Southwestern Willow Flycatcher." Public Comment from Helix Water District, October 28, 2004; Personal communication with Larry Campbell, Helix Water District, November 2004.

[80] The mouth of Boulder Creek supports habitat for the Federally endangered arroyo toad (*Bufo californicus*) and the California coastal newt (*Taricha torosa torosa*), a California Department of Fish and Game species of special concern. Conservation efforts for the flycatcher will need to consider effects on these species, who could be adversely affected by large water releases from Cuyamaca. (Mark Weston, General Manager, Helix Water District, Public Comment on "Economic Analysis of Critical Habitat Designation at Helix Water District's Lake Cuyamaca, for the Southwestern Willow Flycatcher (*Empidonax trallii extimus*)," Submitted to Steve Spangle, Service, October 28, 2004).

District, in the event that extra storage space at El Capitan is needed for released water, the District can work with the City of San Diego to negotiate a one-time waiver to accommodate extra water.[81] El Capitan Reservoir is a drinking water source for and is owned by the City of San Diego.

4.4.2.2 Flood Control Projects

Past Impacts

153. One consultation with USACE and the Service has occurred in the San Diego MU for the San Luis Rey Flood Control project. The San Luis Rey Flood Control project was initiated by USACE in 1984, construction began in 1988 and was completed in 2000. The project initially consulted with the Service on the Least Bell's vireo. Consultation with the Service was reinitiated with the designation of critical habitat for the vireo and the listing of the flycatcher in 1995. The USACE reports that past costs due to the flycatcher total $1.3 million.[82]

154. According to the project plan for the San Luis Rey River flood control project, once construction is complete and the operations and maintenance (O&M) plan is finalized, USACE will turn over responsibility of the project and all O&M activities to the project proponent, the City of Oceanside (the "City"). The City will then ask the Federal Emergency Management Agency to adjust the floodplain boundaries so flood insurance requirements can be relaxed. Although the construction of the project was completed in 2000, approval of the final operations and maintenance plan has been delayed due to ongoing consultation between USACE and the Service on the vireo and flycatcher. In this project, O&M was altered to accommodate flycatcher concerns, which has reduced the flood control capacity of the system. The focus of negotiations between USACE and the Service is on determining the appropriate level of habitat to remain in the flood channel. The City of San Diego estimates 4,600 residential and 100 commercial units will benefit from relaxed flood insurance requirements once the final O&M is approved and the project is turned over to the City of San Diego.[83] Currently, residential customers pay $604 per year for flood insurance and commercial customers pay $1,304 per year.[84] As a result of the three-year (2001-2003) delay in the approval of the final O&M plan, citizens of the City of Oceanside have incurred total increased flood insurance costs of approximately $5 million (2004 dollars).[85]

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[81] Personal communication, Larry Campbell, Helix Water District, February 9, 2005.

[82] To separate the contribution due to the flycatcher versus the vireo, a 2002 vegetation survey conducted by USACE is used, which showed that flycatcher habitat accounts for 55.7 percent of the total habitat in the project area. Personal communication, Tiffany Kayama, USACE Los Angeles District, September 3, 2004.

[83] Personal communication, Jerry Hittleman, Senior Environmental Planner, City of Oceanside, October 6, 2004.

[84] Flood insurance costs reflect the A-99 flood insurance rate, which is a less expensive premium than usually applied to flood zone risk areas of this nature as negotiated by California in the 1980s. Personal communication, Edie Lohmann, National Flood Insurance Program, October 9, 2004.

[85] To separate the contribution due to the flycatcher versus the vireo, a 2002 vegetation survey conducted by USACE is used, which showed that flycatcher habitat accounts for 55.7 percent of the total habitat in the project area.

Future Impacts

155. Future costs in the San Diego MU consist of costs related to implementation of the past biological opinions and costs from forecast future projects. The future cost of project modifications for flycatcher-related conservation measures on the San Luis Rey Flood Control project is $2.3 million (2004 dollars, assuming a seven percent discount rate). This includes the costs for habitat restoration, habitat management, survey and monitoring, and cowbird trapping. USACE anticipates that a final O&M plan will be approved by the Service in the next year. Assuming that the final O&M plan is approved in 2005, an additional two years of increased insurance costs for residents and businesses in the City of Oceanside will result in additional costs of $3.8 million for this project (2004 dollars, assuming a seven percent discount rate).

156. The San Luis Rey Flood Control Unit is the largest flood control project in the Santa Ana MU. While the planned costs related to the ongoing consultation are predictable, other maintenance activities could occur on the San Luis Rey or other river segments that result in flycatcher conservation efforts in the next 20 years. Thus, this analysis assumes two new projects of average cost will occur in this unit. While the specific number of projects is unknown, this assumption reflects the expectation that flood control actions requiring consultation will continue or increase in number in this unit over the next 20 years. Using the average cost per project as observed in the past, costs for new projects is forecast to be $3.3 million (2004 dollars, assuming a seven percent discount rate).

4.5 BASIN AND MOJAVE RECOVERY UNIT

4.5.1 Owens Management Unit

157. The Owens MU consists of 69 miles along the Owens River in Inyo and Mono Counties and includes one dam project owned by the City of Los Angeles Department of Water and Power: the Pleasant Valley Dam. There is no past flycatcher consultation history for this MU.

4.5.1.1 Dam Operations

Pleasant Valley Dam

158. The Pleasant Valley Dam ("PVD") is owned and operated by the City of Los Angeles Department of Water and Power ("LADWP"). With a maximum capacity of 2,989 acre-feet, PVD is one of eight reservoirs that make up the Owens Valley water system, providing approximately 39 percent of the total water supply to Los Angeles.[86]

[86] The LADWP water supply comes from several sources. In addition to water from the Owens Valley, in 2001 an additional 13 percent came from local groundwater wells in San Fernando and Sylmar Basins, and the remaining 48 percent was from the California State Water Project and the Colorado River, purchased from the Metropolitan Water District. LADWP. Annual Report 2000-2001. Los Angeles, CA. Accessed at http://www.ladwp.com/ladwp/cms/ladwp001599.pdf on November 11, 2004.

LADWP serves over 400 square miles in the City of Los Angeles, including 707,000 water connections and 3.8 million residents. In 2004, Los Angeles customers purchased approximately 201 billion gallons of water, an average of 103 gallons per day per home. Residential water use accounts for 64 percent of total use; commercial and government use 22 percent, industrial use three percent; and 11 percent other uses.[87] (Exhibit D-4 in Appendix D presents a map of the Los Angeles Aqueduct Water System.)

Past Impacts

159. No past consultations or other conservation efforts have occurred for the flycatcher on the Pleasant Valley Dam project.

Future Impacts

160. *Scenario 1*. This scenario assumes that the facility will be able to continue normal operations through an incidental take permit and the mitigation of flycatcher habitat. Applying an average cost per acre-foot storage capacity of $23 to $34 to develop an incidental take permit and acquire habitat mitigation lands (as presented in Exhibit 4-4), this analysis estimates future costs for Pleasant Valley Dam of $68,000 (2004 dollars, assuming a seven percent discount rate).

161. *Scenario 2*. Maximum storage capacity at Pleasant Valley Dam is 2,989 acre-feet. During drought years, the City of Los Angeles purchases water from the Metropolitan Water District, the same source used by the Helix Water District. Helix Water District purchases raw water from the Metropolitan Water District at $473 per acre-foot. Thus, the value of water currently stored at PVD is the order of $1.4 million (unadjusted 2004 dollars).[88]

162. Pleasant Valley Dam is one of eight storage reservoirs maintained by the City of Los Angeles Department of Water and Power along the Owens River. Exhibit 4-8 provides an illustration of the Los Angeles Aqueduct water system along the Owens River. Upstream of Pleasant Valley Reservoir is Long Valley Reservoir with a storage capacity of approximately 180,000 acre-feet. Directly downstream of Pleasant Valley Reservoir is Tinemaha Reservoir with a storage capacity of 6,000 acre-feet. If Pleasant Valley Reservoir needs to be maintained at a lower level to accommodate flycatcher needs, LADWP should have some flexibility in providing alternative storage for that water. However, legal or contractual constraints could limit this flexibility in the short-term. As a result, it is not certain whether additional releases, or lost water, would result from flycatcher conservation efforts.

163. If releases do occur, a change in the timing of hydropower generation could result at downstream facilities, though the total amount of power produced should be about the same. This could result in some amount of change to hydropower revenues by displacing

[87] LADWP. Quick Facts 2003-2004. Accessed at: http:/www.ladwp.com/ladwp/cms/ ladwp000509.jsp on November 15, 2004.
[88] Historical water storage data was not available for Pleasant Valley Dam.

some production from peak to off-peak times.[89] While hydropower facilities in this system are not included in proposed CHD, LADWP is concerned that CHD could have impacts on hydropower operations. LADWP plans to submit public comments on this draft that discuss potential impacts related to flycatcher conservation efforts on the Pleasant Valley Dam.[90]

4.5.2 Kern Management Unit

164. The Kern MU consists of 13 miles of the South Fork of the Kern River in Kern County, California, including the upper portion of Lake Isabella at the confluence of the lake and the South Fork Kern River. Lake Isabella is operated by the USACE and has had a long history of consultations on the flycatcher since the mid-1990s. (A map of the Kern River Valley is presented in Exhibit D-6 in Appendix D.)

4.5.2.1 Dam Operations

Lake Isabella

165. In 1953, the USACE built earthen dams across the two forks of the Kern River to create the Isabella reservoir, Kern County's largest body of water, with a surface area of approximately 11,200 acres and a total storage capacity of 568,000 acre-feet of water. Located at the tail-end of the Sequoia National Forest, construction on Lake Isabella reservoir began in March of 1948 and was completed in 1953. The construction of Lake Isabella was authorized by the Flood Control Act of 1944 to protect the city of Bakersfield, a city built on the floodplain of the Kern River. The 1978 Isabella Lake Reservoir Regulation Manual outlines the project's objectives:

- Restrict flows in downstream channels of Kern River and its tributaries to non-damaging rates;
- Eliminate or minimize flood flows from Kern River into Tulare lakebed; and
- Provide the maximum practicable amount of storage space for conservation of irrigation and power water without impairment of the flood-control functions.

166. Rights to water stored at Lake Isabella are stipulated under the 1964 Contract. Exhibit 4-8 shows the primary water rights holders of storage space at Lake Isabella Reservoir.

[89] Technical advisor review comments of Robert Wilkinson, UCSB, December 31, 2004.
[90] Personal communication with Brian Tillemans, LAPWD, November 18, 2004.

Exhibit 4-8 PRIMARY HOLDERS OF STORAGE SPACE AT LAKE ISABELLA	
North Kern Water Storage District	34 %
Buena Vista Storage District	32 %
City of Bakersfield, Water Resources Department	34 %
Source: Personal Communication, C.H. Williams, Kern River Watermaster, November 11, 2004.	

167. Secondary water rights holders of storage space at Lake Isabella, include:

- During wet years, the Kern Delta Water District can store a maximum of 44,000 acre-feet (this depends on timing/season/reservoir levels) under contract to the City of Bakersfield.

- During wet years (or years following wet years), the Hacienda Water District has the right to rent a maximum of 10% of the City of Bakersfield's storage space.

- The Kern County Water Agency does not have rights but often can exchange California aqueduct water (suitable for agriculture) for Kern River water (for municipal use).

168. This list is not comprehensive, as dozens of other contracts and agreements exist with other agencies during wet years.

169. Water stored at Lake Isabella is primarily used for agriculture and irrigation uses (approximately 90 percent). The total area dependent upon the water stored at Lake Isabella is approximately 333,333 acres within the southern San Joaquin Valley portion of Kern County, California. Kern County irrigated crop acreage totaled 787,560 acres in 1992 with 31 percent in permanent crops (tree nuts, tree fruits, and grapes) and the remaining 69 percent in annual crops. Nearly 282,000 acres is located in water districts with Kern River contracts and entitlements, comprising nearly 36 percent of the county's irrigated acreage base.

Past Impacts

170. The creation of Lake Isabella resulted in the loss of approximately 3,211 acres of riparian forest on the South Fork Kern River. The South Fork Kern River supports one of the largest contiguous riparian forests in the State of California, encompassing over 2,400 acres and providing some of the state's best remaining examples of a native deciduous riparian system.

171. An additional 309 acres of riparian habitat, at the confluence of Lake Isabella and the South Fork Kern River, lies within gross pool elevation and is periodically inundated by the reservoir during years of high runoff. Included in this riparian corridor are the South Fork Wildlife Area and the Kern River Preserve. The South Fork Wildlife Area

was established by USACE within the gross pool of Lake Isabella and transferred to the Forest Service in the early 1990s. The Kern River Preserve is located immediately east of the South Fork Wildlife Area and has been managed by the Nature Conservancy since 1981.

172. Without intervention, rising water levels at Lake Isabella Reservoir would inundate flycatcher nests in the South Fork Wildlife Area in wet years. USACE projections of peak inflows and reservoir levels coincide with the flycatcher breeding season from April through July. Formal consultation on the operations and maintenance of the Lake Isabella Reservoir began on January 8, 1995. Applicants to the consultation included the USACE, USFS, and the Kern River Watermaster. In January 1995, the Service and USACE agreed to complete the consultation in two phases. Operations and management of the Lake Isabella Dam and Reservoir for water year 1996 was addressed in the first consultation, while a subsequent consultation addressed the future, long-term operations of the dam and reservoir.

173. On April 18, 1997, the Service issued a biological opinion addressing the impacts of the long-term operations and maintenance of Lake Isabella Dam and Reservoir. As part of the Interagency Agreement for long-term operations, USACE and Service agreed to protect, in 1997, 360 acres of flycatcher habitat upstream of Lake Isabella.

174. In addition to this protection measure, the Service appointed a subcommittee of the flycatcher recovery team to frame critical questions relating to flycatchers and their habitat in the project vicinity. Their report was finalized on June 22, 1998. After review of the best available information, the Service determined it was necessary to protect a total of 1,100 acres of habitat to minimize the effects of future reservoir operations. USACE in cooperation with the National Wildlife Fish and Wildlife Foundation and the National Audubon Society allocated $3.8 million for the acquisition and/or easement and management of 1,100 acres.

175. On October 24, 1997, the Southwest Center for Biodiversity filed a lawsuit against the U.S. alleging USACE and the Service violated the Endangered Species Act with respect to the biological opinion on the long-term operations of Isabella Reservoir. On April 1, 1999, an injunction was granted against USACE filling of the reservoir above 2,584 feet, or 347,580 acre-feet of storage.

176. Due to the time required to complete the appraisals, evaluations, and escrow, the land acquisition negotiations was delayed. As a result, USACE was required to implement a set of interim measures for a period of 12 months if the purchase of 1,100 acres was not completed by March 1, 2000. These measures state that USACE should not allow the reservoir to rise above 2,584 feet in elevation for the period of March 1 through September 30 each year until the land is purchased or a permanent conservation easement is in place.

177. Land acquisition has continued to be slow and by 2004, USACE had still not completed acquisition of the total 1,100 acres. As a result, the Service is currently

proposing a five-year interim amendment to the biological opinion. This amendment would allow for the return of "routine" operations of the Lake Isabella Reservoir upon completion of the pending protection of 2,489 acres (Phase 1) with an additional 1,905 acres (Phase 2) in the South Fork Kern River Valley (expected in 2005).

178. The past costs of conservation measures implemented for the protection of flycatcher associated with the operations and maintenance of Lake Isabella Dam and Reservoir were approximately $11.3 million (2004 dollars, assuming a seven percent discount rate) through FY 2003. Approximately $7.5 million dollars of the past costs is associated with the one-time cost (i.e., $3.8 million in 1998 and $3.7 million in 2000) of acquiring offsite mitigation lands and the establishment of an endowed trust account to support operations and management of the 1,150 acres of acquired habitat in perpetuity. The remainder, or $3.8 million, includes costs for habitat restoration, flycatcher surveys, cowbird control, invasive species management, and cattle exclusion fencing. To date, the USACE has not been forced to spill water as a result of the injunction due to low water levels existing in the lake.

Future Impacts

179. Future costs of conservation measures for the flycatcher at Lake Isabella are estimated to be $350,000 per year, or $3.7 million over 20 years (2004 dollars, assuming a seven percent discount rate).[91] This estimate includes the costs of restoration work, surveys, cowbird control, invasive species management, and cattle exclusion fencing. It does not, however, include the operations and management costs on the acquired habitat. In addition, this estimate assumes that the 5-year interim amendment is implemented and reinitiation of formal consultation is not required.[92]

180. *Scenario 2*. According to the April 1999 injunction, USACE is prohibited from allowing the reservoir to fill above 2,584 feet, or 347,580 acre-feet. If the 5-year interim amendment is not implemented as requested by the Service and as a result the injunction is not lifted on Lake Isabella, then a loss of storage capacity in some years is likely at Lake Isabella. By examining months since 1970 in which water would have to be released to maintain a level of 347,580, this analysis estimates that, in an average year, maintaining current water levels would represent a loss of approximately 69,779 acre-feet of storage capacity (Appendix D, Exhibit D-7 presents historical water storage for Lake Isabella).[93] Using a value of $115 to $473 per acre-foot, this water would be valued at $8 million to $33 million (unadjusted 2004 dollars) annually.

[91] The annual cost of $350,000 is derived from the interest generated off the endowment fund, capitalized at $7.5 million (Email communication, Mitch Stewart, Army Corp of Engineers Sacramento District, August 26, 2004).

[92] Reinitiation of formal consultation is required by 50 CFR 402.16 if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may impact listed species or proposed critical habitat in a manner or to an extent not considered in the biological opinion, (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or proposed critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

[93] Scenario 2 is calculated using data for an average water year. To test the sensitivity of this assumption, this analysis also examined the amount of water lost in the 50th and 95th percentile driest water years. For Lake Isabella,

181. It is worth noting that the downstream flow of the Kern River is heavily utilized, providing up to 700,000 acre-feet of water to agricultural diversions and municipal use.[94] In addition, one of the largest aquifer storage and recovery efforts in the United States is taking place in the downstream alluvial fan of the Kern River.[95,96] This effort, known as the Kern River Water Bank, can capture up to a million acre-feet of groundwater that can be stored for water supply use. Thus, if additional releases from Lake Isabella occur as a result of flycatcher conservation efforts, the released water not likely to be lost from use. More likely, it would be drawn by downstream agricultural users or stored by the Water Bank as groundwater for later use. However, a detailed assessment of the potential benefits to downstream users would be difficult, due to the large geographic extent and complex hydrology of the site, and thus is outside the scope of this analysis.

4.5.3 Mohave Management Unit

182. The Mohave MU consists of 10 miles on the Mojave River including the Mojave River Forks Reservoir. Mojave River Forks Dam is owned and operated by the Army Corp of Engineers. There is no past flycatcher consultation history for this MU.

4.5.3.1 Dam Operations

Mojave River Dam

183. Mojave River Dam is an un-gated flood control structure located on the northern side of the San Bernardino Mountains. The drainage area above the dam consists of about 215 square miles of mountainous terrain. This area is drained by two main tributaries, Deep Creek and West Fork Mojave River, which converge just above the dam to form the Mojave River. In its entirety, the Mojave River basin comprises about 4,700 square miles, of which 95 percent is desert. The eastern extent of the river is a dry lake bed near Baker, California. Nearly all of the surface water that reaches the Mojave River is contributed by the relatively small area above the dam. The Mojave River Dam is the only flood control reservoir in the basin, but the area above the dam does include Lake Arrowhead and Lake Gregory, both man-made recreation lakes. Also located in the Mohave River basin is Cedar Springs Dam and its associated Silverwood Lake, which is part of the California Aqueduct operated by the State of California Department of Water Resources and is used for both water supply and recreation.[97]

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the 50th percentile results in a water lost estimate of 0 acre-feet. The 95th percentile results in a water lost estimate of 228,784 acre-feet.

[94] San Joaquin Geological Society, Hydrogeology of the Kern River Alluvial Fan. Accessed at http://www.sjgs.com/groundwater/groundwater.html on February 7, 2005.

[95] Meiller, Laurent M. Et al. "Hydrogeological study and modeling of the Kern Water Bank," University of California Water Resources Center: Technical Completion Reports, University of California, Santa Barbara, 2001.

[96] The current storage at Lake Isabella (2,545 feet, or 95,498 acre-feet, as of October 21, 2004) is well below the April 1999 injunction level of 2,584 feet, or 347,580 acre-feet. In addition, as previously noted, to date USACE has not been forced by the April 1999 injunction to spill water due to existing low water levels from current drought conditions.

[97] "Mohave River Dam", accessed at http://www.spl.usace.army.mil/resreg/htdocs/mojv.html on October 26, 2004.

184. Inflows of magnitudes up to and including the reservoir design flood would be controlled by the dam. During the reservoir design flood, inflow peaks at 94,000 cfs while the maximum outflow is kept to a maximum of about 23,500 cfs. All inflows are released from the reservoir through the outlet tunnel. The outlet works do not include any mechanical equipment that would permit adjustment to outflows.[98]

185. Operations and maintenance of flood control infrastructure on the Mojave River is the responsibility of the San Bernardino Flood Control District. San Bernardino County Flood Control District conducts annual maintenance activities in four critical reaches of the Mojave River: Spring Valley Lakes, Victorville, Silver Lakes and Barstow. Vegetation clearing in these areas and occasional maintenance of other areas in the river is conducted in accordance with an existing biological opinion. This biological opinion addressed the least Bell's vireo, southwestern willow flycatcher, and arroyo toad. Measures are incorporated into the Maintenance Plan to remove exotic vegetation, assist in preventing off-highway vehicles from entering Mojave Narrows Regional Park, operate cowbird traps, and fund restoration efforts by the BLM at Afton Canyon.[99]

Past Impacts

186. No past consultations or other conservation efforts have occurred for the flycatcher on the Mojave Forks dam project.

Future Impacts

187. As previously discussed, for water projects where no past consultation history is available, this analysis estimates the economic impacts of future flycatcher-related conservation efforts assuming that the facility will be able to continue normal operations through an incidental take permit and the mitigation of flycatcher habitat. Applying an average cost per acre-foot of $23 to $34 to develop an incidental take permit and acquire habitat mitigation lands (as presented in Exhibit 4-4), this analysis estimates future costs for Mojave Forks Dam of $150,000 (2004 dollars, assuming a seven percent discount rate). Were flood control operations at this facility to be affected by flycatcher management, impacts could be significant. The Water Control Manual for Mohave River states that the value of property downstream of Mohave Dam was $65.8 million in 1965. Potential flood damages were estimated at $12.3 million in 1965.[100] The USACE states that flood protection for this dam is provided to agricultural, military, and railroad property, as well as highway, residential and commercial development.

[98] *Ibid*.
[99] LaPré, Larry. "Mohave River Presentation", Desert Managers Group, BLM, January 14, 2004.
[100] "Reservoir Regulation Manual for Mohave River Dam", USACE, Los Angeles District, Revised 1985.
California", U.S. Army Corps of Engineers, September, 2003.

4.6 LOWER COLORADO RECOVERY UNIT

4.6.1 Middle Colorado, Hoover to Parker, Parker to Southerly International Boundary Management Units

188. Three MUs contain portions of the mainstem Colorado River being proposed as critical habitat for the flycatcher: Middle Colorado, Hoover to Parker, and Parker to Southerly International Boundary. These three units are addressed together in this analysis because they are all part of the Colorado River System Reservoirs management scheme, they were consulted on under a large programmatic biological opinion with USBR, and because they are all encompassed as part of the Lower Colorado Multi-Species Conservation Program (MSCP).

189. The Colorado River provides one of the few perennial water supplies to the Southwestern United States. It is considered to be a vital component to the economies of the entire region in which it runs. Waters from the Colorado are diverted to seven states, and are used for every purpose, including municipal, agricultural, and hydropower uses. The Lower Colorado River runs from Lee Ferry in Arizona to the Southern International Boundary with Mexico, a length of 700 miles. Arizona, California, and Nevada have rights to 7.5 million acre-feet of Colorado River water annually. The Colorado River is managed and operated under numerous Federal laws, compacts, court decisions, and decrees, contracts and regulatory guidelines. These regulations are collectively referred to as the "Law of the River." Exhibit 4-9 presents general information on the population served by Lower Colorado River water. (Exhibit D-11 in Appendix D maps the Lower Colorado River channels.)

Exhibit 4-9

CHARACTERISTICS OF THE LOWER COLORADO RIVER

Overview	**Arizona**	**California**	**Nevada**
Watershed area in square miles	114,000	Unknown	12,400
Allotment of Colorado River Water	2.8 million af	4.4 million af	300,000 af
Population served by Colorado River water	3.1 million	over 16 million	1.4 million
Major Facilities Used to Deliver Colorado River water	Central Arizona Project, Gila Project, Wellton-Mohawk Project, Yuma Project	Colorado River Aqueduct-MWD, All-American Canal-IID, Coachella Canal, CVWD Main Canal-PVID	n/a
Contribution to State water needs	Approx. 25 percent	14 percent	12 percent

Source: Colorado River Water Users Association information, accessed at Http://www.crwua.org on November 3, 2004.

190. Clearly, agricultural uses are key uses of Lower Colorado water. Exhibit 4-10 presents background information on the agricultural inputs to the Colorado River.

Exhibit 4-10

CHARACTERISTICS OF AGRICULTURAL PRACTICES IN THE LOWER COLORADO WATERSHED

Agriculture	**Arizona**	**California**
Irrigated Acres Served by Colorado River water	560,000	900,000
Major Crops under irrigation	cotton, alfalfa, lettuce, wheat, citrus, barley, cauliflower	cantaloupes, dates, grapes, oranges, lemons, avocados, other fruits, lettuce, tomatoes, onions, carrots, other vegetables, alfalfa, wheat, grasses, other forage crops
Notes: Only eight percent of Southern Nevada water use is for non-urban uses, including irrigation of golf courses, parks, school grounds, and other turf. Source: Colorado River Water Users Association. Information accessed at http://www.crwua.org on November 3, 2004.		

191. Exhibit 4-11 presents information on hydropower production facilities included in the flycatcher proposed CHD. Hoover Dam and Parker Dam power facilities are managed jointly, and provide power to municipal, industrial, commercial, and agricultural users. Headgate Rock Dam is managed by the Bureau of Indian Affairs, and primarily provides power to the Colorado River Indian Tribes for agricultural use. Power produced at Senator Wash is primarily used to run pumps that bring water from Imperial Reservoir to Senator Wash.[101]

Exhibit 4-11

CHARACTERISTICS OF HYDROPOWER GENERATION ON THE LOWER COLORADO RIVER IN FLYCATCHER PROPOSED CHD

Total Generating Capacity on the Lower Colorado	4177 MW
Annual generation (1996)	1,197 MW
Annual revenues from power sales	$176,985,500
Generates enough power to meet all electrical needs of:	3 million people
Generating Capacity at Dams included in proposed CHD:	
Hoover Dam	2,079 MW
Parker Dam*	120 MW capacity (tailrace limits total plant throughput to 104-108 MW)
Headgate Rock Dam	19.5 MW
Senator Wash Dam	7.2 MW (pumped storage)
Sources: "Parker Dam. Dams, Projects, and Powerplants, Bureau of Reclamation." Accessed at: http://www.usbr.gov/dams/az10312.htm on September 22, 2004. Colorado River Front Work and Levee System. Dams, Projects, and Powerplants, Bureau of Reclamation." Accessed at: http://www.usbr.gov/dataweb/html/fwls.html; Colorado River Water Users Association information. Accessed at Http://www.crwua.org on November 3, 2004.	

[101] Personal communication with Bruce Williams, Daily Operations Team Lead, Boulder Canyon Operations Office, USBR, December 22, 2004.

4.6.1.1 Dam Operations

Lower Colorado River

192. In the Middle Colorado MU, a 35-mile segment above Lake Mead is proposed that includes a one-mile portion of Lake Mead. In the Hoover to Parker MU, the Service is proposing to designate a 67-mile reach of mainstem Colorado River above Parker Dam (including Lake Havasu and Topock Marsh). In the Parker to Southerly International Boundary MU, the Service is proposing two segments along the Colorado mainstem that extend 67 miles. The proposed CHD includes the following facilities:

- Lake Mead: Lake Mead is controlled by Hoover Dam, which is owned and operated by USBR. Lake Mead is the primary flood control and water storage facility on the Lower Colorado. Hoover Power Plant also produces a steady supply of power for agricultural, municipal, and industrial uses. Lake Mead is also heavily used for recreation. Habitat for the razorback sucker also exists at Lake Mead.[102]

- Lake Havasu and Parker Dam: Parker Dam and Powerplant are owned and operated by USBR. The primary purpose of Parker Dam is to provide reservoir storage for water deliveries to the Metropolitan Water District (California Aquaduct) and the Central Arizona Project (CAP). Lake Havasu is also heavily used for recreation.

- Moovalya Lake and Headgate Rock Dam: Headgate Rock Dam is a water diversion structure and low-head hydroelectric plant owned by the BIA and operated primarily for the use of the Colorado River Indian Tribes.

- Laguna Dam: One of the oldest facilities in the Lower Colorado system, this dam is now used as a regulating structure to help manage water deliveries and for sediment control.

- Imperial Dam: A major diversion dam that delivers water to the All-American Canal and the Gila Gravity Main Canal, which serves the Imperial Irrigation District (IID) and Coachella Valley Water District (CVWD), among others.

- Senator Wash Dam: Owned by the USBR and operated by the Imperial Irrigation District. This is a small pump and store reservoir that provides off-stream regulatory storage to help manage water deliveries at the lower end of the Colorado River.

Lower Colorado River Operations

193. In April 1997, the Service issued a biological opinion to the USBR for the Operations and Maintenance of the Lower Colorado River on the flycatcher, bonytail chub, razorback sucker, Yuma clapper rail, and flat-horned lizard. The action area for this

[102] Arizona Department of Water Resources, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher: Federal Register: October 12, 2004 (Volume 69, Number 196)", Comments of Herbert R. Guenther, May 27, 2005.

biological opinion generally included the mainstem Lower Colorado River from the upper end of Lake Mead to the Southerly International Boundary (approximately 700 river miles). (Exhibits D-8 and D-9 in Appendix D provide an overview of the Lake Mead System and Reservoir.) Thus, this consultation included all USBR activities in proposed critical habitat reaches in the Hoover to Parker and Parker to Southerly MUs, as well as a portion of the proposed reach in the Middle Colorado MU. This opinion found that the proposed action was likely to jeopardize the existence of the flycatcher. In addition, the action was likely to jeopardize and adversely modify critical habitat for the bonytail chub and razorback sucker. As a result of this consultation, USBR was required to:

- Protect approximately 1,400 acres of currently unprotected riparian habitat;
- Review and evaluate fish and wildlife mitigation and enhancement programs in the action area to determine how they may be modified to enhance flycatcher habitat;
- Survey and monitor habitat and breeding groups;
- Fund a 5-year survey, monitoring and research program for the flycatcher along the Lower Colorado River and confluent drainages;
- Develop a long-term plan for on and offsite compensation for lost flycatcher habitat;
- Participate in the MSCP and develop agreements with MSCP parties;
- Conduct ecological restoration;
- Evaluate progress annually in a written report.[103]

194. In January 2001, the Service issued a separate biological opinion to USBR on the potential impacts of Interim Surplus Criteria, Secretarial Implementation Agreements, and Conservation Measures on flycatcher, Yuma clapper rail, bonytail chub, and razorback suckers. Although the Service did not find jeopardy for any species, it did request that USBR conduct flycatcher surveys for up to five years between Parker and Imperial dams. In April 2002, the Service issued another biological opinion resulting from reinitiation of the 1997 consultation on USBR Lower Colorado operations. This opinion added the requirement of studying the effectiveness of brown-headed cowbird trapping on conservation of the flycatcher.

195. Resulting from these past consultations and from other flycatcher-related conservation activities, past efforts by USBR and cooperating agencies involved conducting survey/monitoring and life history studies in approximately 140 sites and four life history sites along the Virgin River, Grand Canyon, Pahranagat NWR, Bill Williams, and the Lower Colorado River. Restoration sites have included Planet Ranch along the Bill Williams River (1995-6), Pratt Agriculture Site (near Yuma, Arizona) (1999, 2001);

[103] "Biological and Conference Opinion on Lower Colorado River Operations and Maintenance: Lake Mean to Southerly International Boundary." Service, Southwestern Regional Office, April 30, 1997; "Economic Analysis: Southwestern Willow Flycatcher: 1996-2004," Lower Colorado Regional Office, USBR, written memorandum to Industrial Economics, July 2004.

Cibola Nature Trail Site, Cibola NWR (1999); Imperial Ducks Unlimited Ponds, Imperial NWR (2000); Colorado River Indian Tribe (two sites 2002, 2003); and Beal Lake (phase 1). Past costs to USBR associated with flycatchers and implementation of these biological opinions are presented in Exhibit 4-12.

Exhibit 4-12

PAST COSTS ASSOCIATED WITH USBR CONSERVATION EFFORTS FOR THE FLYCATCHER FOR LOWER COLORADO OPERATIONS, 1996-2003

Expenditure Type	Expenditures (2004$)
Administrative Costs	$1,595,000
Survey/ monitoring	$3,777,000
Winter Ecology	$63,000
Cowbird trapping	$272,000
Restoration demonstration sites	$626,000
Land acquisition *	$1,216,000
Total (Nominal)	**$7,547,000**

* Land acquisition costs were $85,050 for years 1996-2001--these are assumed to have been distributed evenly 1996-2001. Land Acquisition included approximately 1,400 acres of protected southwestern willow flycatcher habitat through either easements or in fee title. Acquisitions and easements were made through funding provided by Reclamation through a National Fish and Wildlife Foundation Fund. "Economic Analysis: Southwestern Willow Flycatcher: 1996-2004," Lower Colorado Regional Office, USBR, written memorandum to Industrial Economics, July 2004.

196. Future costs to USBR related to flycatcher conservation efforts on the Lower Colorado are included below as part of the Lower Colorado Multi-Species Conservation Program discussion.

Lower Colorado Multi-Species Conservation Program

197. The Draft Lower Colorado Multi-Species Conservation Program (MSCP) was released on June 18, 2004, and was signed (with the Incidental Take Permit) on April 4, 2005. The MSCP planning area includes the historical floodplain in the Lower Basin, from Lee Ferry (above Lake Mead) to the Southerly International Boundary with Mexico, including the full-pool elevations of Lakes Mead, Mohave, and Havasu. The program was started following the designation of portions of the Lower Colorado River as critical habitat for four endangered fish species in 1994.[104] Federally threatened and endangered species now included in the MSCP include the Yuma clapper rail, flycatcher, Desert tortoise, bonytail chub, humpback chub, and razorback sucker. The covered area includes all flycatcher proposed CHD in the Middle Colorado, Hoover to Parker, and Parker to Southerly MUs. The goals of the MSCP are:

- To conserve habitat and work toward the recovery of threatened and endangered species, as well as reduce the likelihood of additional species being listed;

[104] Lower Colorado Multi-Species Conservation Program Website. Accessed at: www.lcrmscp.org/Description /html

- To accommodate present water diversions and power production and optimize opportunities for future water and power development, to the extent consistent with the law, and;
- To provide the basis for incidental take authorizations.[105]

198. In keeping with its goals, the MSCP does not recommend that agencies modify water operations, citing legal and contractual constraints. In addition to the extremely complex Law of the River, another legal constraint is that a Federal action agency is not required to modify its activities to protect endangered species if it has no discretion to change its operations. In 1997, USBR advised the Service that it lacked discretion to reduce the level of Lake Mead except for purposes of river regulation, flood control, irrigation, domestic uses, and power generation. The Ninth Circuit Court of Appeals upheld USBR's position that protection of flycatcher habitat outside of the Lake Mead delta was acceptable (and thus changing water operations was not necessary).[106]

199. In general, the MSCP "provides long-term mitigation to offset incidental take of listed threatened and endangered species resulting from actions, projects, or activities" for many Federal and non-Federal actions related to water diversions and returns and hydropower operations. Among other initiatives, the MSCP calls for the creation or restoration of 8,132 acres of habitat along the Colorado River. Of these acres, 5,940 acres are to be cottonwood-willow habitat, and 4,050 are specifically to be created and maintained for flycatcher habitat.[107] The costs associated with developing and implementing the MSCP are included in the draft conservation plan over the 50-year estimated time horizon for the program. Total costs that can reasonably attributed to flycatcher conservation are estimated at $507 million over 50 years (nominal dollars).[108] This estimate includes costs associated with all species and habitat types in the MSCP, except where noted.[109] This is due to the difficulty in separating out implementation efforts put forth solely for flycatchers. Exhibit 4-13 presents the total planned expenditures for the MSCP, and a breakdown of those expenditures that are considered to be co-extensive with flycatcher.

[105] Draft Lower Colorado River Multi-Species Conservation Program Habitat Conservation Plan, June 18, 2004.
[106] Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation. 143 F.3d 515 (9th Cir. 1998).
[107] Chapter 7, "Implementation Costs and Funding Sources", Lower Colorado MSCP, June 18, 2004; Chapter 5, "Conservation Plan", Lower Colorado MSCP, June 18, 2004.
[108] These costs are summarized in Exhibit 4-1 by dividing these costs across the three MUs on the Lower Colorado according to the river miles of proposed CHD in each: Middle Colorado, Hoover to Parker, Parker to Southerly. Note that some efforts may be executed for projects in the Pahranagat and Virgin River Units. However, because the source of these costs is the Lower Colorado River, costs are solely attributed to the three Lower Colorado units.
[109] Costs explicitly targeted to fish augmentation are excluded. Habitat creation costs include costs of creating 5,940 acres of cottonwood willow habitat. Costs associated with creating other habitat types are excluded. Monitoring costs exclude $6 million of fish-related monitoring costs.

PLANNED EXPENDITURES ON THE LOWER COLORADO MSCP COEXTENSIVE WITH FLYCATCHER (50 years) [a]			
Category	**Planned Expenditures for All Species (nominal $)**	**Planned Expenditures for Flycatcher (nominal $)**	**Percent of Total Funds for this Activity**
Program admin	$50,910,000	$50,910,000	10.0%
Land acquisition	$60,000,000	$60,000,000	11.8%
Planning, design, and engineering	$11,060,000	$11,060,000	2.2%
Habitat creation[b]	$143,130,000	$90,000,000	17.7%
Environmental compliance	$3,060,000	$3,060,000	0.6%
Fish augmentation	$34,000,000	$0	0.0%
Conservation area mgt and maintenance	$52,670,000	$52,670,000	10.4%
Law enforcement staff	$8,000,000	$8,000,000	1.6%
Firefighting staff	$11,370,000	$11,370,000	2.2%
Existing habitat maintenance	$25,000,000	$25,000,000	4.9%
Topock marsh pumping	$2,700,000	$2,700,000	0.5%
Monitoring, research, and adaptive management[c]	$161,010,000	$129,460,000	25.5%
Remedial measures	$13,270,000	$13,270,000	2.6%
Water acquisition	$50,000,000	$50,000,000	9.9%
Total (Nominal$)	**$626,180,000**	**$507,500,000**	**100%**

Notes

[a] This estimate includes costs associated with all species and habitat types in the MSCP, except where noted. This is due to the difficulty in separating out implementation efforts put forth solely for flycatchers. Costs explicitly targeted to fish augmentation are excluded.

[b] Habitat creation costs include costs of creating 5,940 acres of cottonwood willow habitat. Costs associated with creating other habitat types are excluded.

[c] Monitoring costs exclude $6 million of fish-related monitoring costs.

Sources: Chapter 7, "Implementation Costs and Funding Sources", Draft Lower Colorado MSCP, June 18, 2004; Appendix N, "Detailed Implementation Cost Estimate Assumptions, Lower Colorado MSCP, June 18 , 2004.

Scenario 2

200. **Lake Mead.** As stated above, USBR maintains (and the Ninth Circuit Court of Appeals has upheld) that it lacks discretion to reduce the level of Lake Mead except for purposes of river regulation, flood control, irrigation, domestic uses, and power generation. Thus, Scenario 2 is not reasonably foreseeable for Lake Mead, given the legal precedent at that site.[110] The following evaluation of potential impacts was conducted for Lake Mead, but rejected due to its low likelihood of occurrence:

- If water operations to any of the larger dams on the Lower Colorado were altered to accommodate flycatcher, significant economic impacts would be expected. In particular, if Lake Mead operations were changed to accommodate flycatcher conservation by avoiding inundation of flycatcher habitat, then water use could be

[110] Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation. 143 F.3d 515 (9th Cir. 1998).

affected. In addition, hydropower production and flood control planning efforts could be affected.

- The proposed CHD in Lake Mead occurs at approximately 1,200 to 1,220 feet in elevation.[111] If conservation efforts for the flycatcher resulted in the USBR attempting to maintain that storage level in the future to avoid inundating flycatcher habitat, this would result in a loss of storage capacity in some years. Using data from 1970 to present, this analysis estimates that this management strategy could result in spilling an additional 487,000 acre-feet of water in an average year if no adaptations are made to water management to accommodate flycatcher concerns (Appendix D, Exhibit D-10 presents historical water storage for Lake Mead Reservoir).[112]

- If water levels at Lake Mead are maintained at 1,200 feet in elevation to accommodate flycatcher, impacts to revenues from hydropower could result.[113] If USBR is forced to spill water, it may not have sufficient storage to produce maximum power during peak demand. If that excess demand for peaking power is met by purchasing replacement gas turbine power, the cost of producing power at Lake Mead would be increased by approximately $6.4 million in an average year (unadjusted 2004 dollars). An acre-foot of water released from Hoover dam generates approximately 415 kWh of electricity.[114] Thus, 202,269 MWh,[115] or approximately 23.1 average MWs of hydroelectric energy-production, could be displaced from peak-power production in an average year due to changes to reservoir operations to accommodate flycatcher conservation efforts, if Scenario 2 were foreseeable.[116] This would represent about four percent of Hoover Dam's average annual net electricity production during the past ten years and one percent of its nameplate capacity.[117] However, as stated above, Scenario 2 is not considered to be feasible along the Lower Colorado River.

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[111] Email communication with Theresa Olson, Wildlife Biologist, US Bureau of Reclamation, February 1, 2005.

[112] Scenario 2 is calculated using data for an average water year. To test the sensitivity of this assumption, this analysis also examined the amount of water lost in the 50th and 95th percentile driest water years. For Lake Mead, the 50th percentile results in a water lost estimate of 0 acre-feet. The 95th percentile results in a water loss estimate of 2.0 million acre-feet.

[113] An acre-foot of water released from Hoover dam generates approximately 415 kWh of electricity. Average production at Hoover dam during the 12-month period of December 2003 through November 2004. U.S. Department of the Interior, Bureau of Reclamation, Lower Colorado Region, Archives of Daily Levels/Elevations for Lower Colorado River Reservoirs, available at http://www.usbr.gov/lc/region/g4000/archives.html.

[114] Average production at Hoover dam during the 12-month period of December 2003 through November 2004. U.S. Department of the Interior, Bureau of Reclamation, Lower Colorado Region, Archives of Daily Levels/Elevations for Lower Colorado River Reservoirs, available at http://www.usbr.gov/lc/region/g4000/archives.html.

[115] 487,080 acre-feet * 415 kWh/acre-feet * 1 MWh/1,000 kWh = 202,269 MWh.

[116] A MW is an average measure of the total electricity produced in one year. In this case, 202,269 MWh * 1 average MW/8,760 MWh = 23.1 average MW. It does not necessarily mean that this average MWh of electricity is continually produced for a year. Over the course of a year, an average MW is equal to 8,760 MWh (24 hours multiplied by 365 days multiplied by one MW).

[117] Gas turbines have an increased in production cost of $0.03 per kWh to replace hydropower. The annual net electricity production at Hoover dam during the past ten years averaged approximately 5 billion kWh. The installed nameplate capacity is 2,078 MW. Source: http://www.usbr.gov/power/data/sites/hoover/ hoovergr.pdf.

- Flood control criteria currently exist at Lake Mead that identify when and how flood control releases are conducted. If USBR is forced to avoid inundation of flycatcher habitat at Lake Mead, then the flood control criteria would need to be revised.[118] This would likely be an involved and expensive process, involving USACE, USBR, USGS, the International Boundary and Water Commission, NRCS, and the affected states.

201. USBR states that: "With the implementation of the Multi-Species Conservation Program, and due to legal requirements for delivery of water, there will be no changes in the operations of the Lower Colorado River. Minimum flows and water diversions are non-discretionary actions associated with the delivery of water based on laws and treaties. Currently all conservation programs are completed through a willing sellers program, and it is not foreseen that any forbearance agreements are to be enacted specifically for the Southwestern Willow Flycatcher along the Lower Colorado River."[119] While it is likely that USBR will also argue that it lacks discretion to release water to benefit flycatcher habitat at other facilities on the Lower Colorado River, the precedent is less clear. However, to provide context for understanding the implications of Scenario 2, should it occur, the analysis includes the following discussion.

- **Parker Dam**. Parker Dam is managed so that Lake Havasu is usually maintained within a elevation range of four feet (between 445 and 448.6 feet in elevation).[120] Should flycatcher conservation activities at Lake Havasu result in USBR attempting to maintain the average storage level during the past five years (575,000 acre-feet) into the future to avoid inundating flycatcher habitat, minimal lost storage capacity would result. Because water delivery from Parker Dam is managed as part of the Lower Colorado system, any decrease in storage at Lake Havasu would most likely be compensated by increased storage at Lake Mead, or at other storage facilities on the river.

  In an analysis identical to that used to measure Hoover dam power impacts, this analysis finds maintaining an average reservoir storage of 575,000 feet could result in spilling displacing water 77,338 acre-feet of water releases in an average year (Appendix D, Exhibit D-113 presents historical water storage for Lake Havasu/Parker Dam).[121] However, the USBR notes that "modification of Lake Havasu is very unlikely due to the 'Law of the River.'[122] Arizona Department of Water Resources,

[118] Personal communication with Bruce Williams, Daily Operations Team Lead, Boulder Canyon Operation Office, USBR, December 22, 2004.
[119] "Economic Analysis: Southwestern Willow Flycatcher: 2006-2004", Lower Colorado Regional Office, USBR, written memorandum, July 2004.
[120] Personal communication with Bruce Williams, Daily Operations Team Lead, Boulder Canyon Operation Office, USBR, December 22, 2004.
[121] Scenario 2 is calculated using data for an average water year. To test the sensitivity of this assumption, this analysis also examined the amount of water lost in the 50th and 95th percentile driest water years. For Parker Dam, the 50th percentile results in a water lost estimate of 71,459 acre-feet. The 95th percentile results in a water lost estimate of 123,761 acre-feet.
[122] USBR, "Comments on the Draft Environmental Assessment and the Draft Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Southwestern Willow Flycatcher (*Empidonax trailli extimus*), Lower Colorado Region Office, May 31, 2005.

who has general control and supervision of surface water in Arizona, states that at Lake Havasu, "changed operation to avoid inundating flycatcher habitat [is] not a probable scenario."[123]

An acre-foot of water released from Parker Dam generates approximately 65 kWh of electricity.[124] Therefore, 5,027 MWh,[125] or approximately 0.6 average MWs of hydroelectric energy-production, could be displaced during peak power production during an average year due to changes in reservoir operations to accommodate flycatcher conservation efforts.[126] This would be equal to about one percent of Parker dam's average annual net electricity production during the past ten years and 0.5 percent of its nameplate capacity.[127] Using an increase in production cost of $0.03 per kWh to replace hydropower with the next best alternative, gas, costs to replace lost hydropower generation at Parker Dam could be approximately $151,000 in an average year. Flood control operations at Parker Dam would not be affected by flycatcher management. However, USBR states that "decreasing the level of inundation at Lake Havasu would not help any flycatchers present, so this is an unlikely scenario."[128]

- **Headgate Rock Dam**. Headgate Rock Dam hydroelectric plant is owned and operated by the BIA. Power generation is dependent upon the flow of the river through Lake Moovalya, which is maintained at a constant elevation for most of the year. During 1996 and 1997, net energy production averaged 87,165 MWh annually.[129]

- **Senator Wash Dam**. Senator Wash Dam and Reservoir is owned by the USBR and operated by the Imperial Irrigation District. The reservoir covers about 470 surface acres and holds approximately 14,000 acre-feet of water when full. This is a pump and store reservoir that provides off-stream regulatory storage to manage the fluctuating flows at the lower end of the Colorado River System (i.e., to temporarily store water ordered in excess of user needs).

[123] Arizona Department of Water Resources, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher: Federal Register: October 12, 2004 (Volume 69, Number 196)", Comments of Herbert R. Guenther, May 27, 2005. On a related note, SRP states that, changes in water management would be more likely to occur at Lake Mead than at Lake Havasu. Public comments of Paul Cherrington, "Comments of Salt River Project on Proposed Rule Designating Critical Habitat for the Southwestern willow flycatcher, Draft Environmental Assessment and Draft Economic Analysis of the Proposed Rule", May 31, 2005.

[124] Average production at Parker dam during the 12-month period of December 2003 through November 2004. U.S. Department of the Interior, Bureau of Reclamation, Lower Colorado Region, Archives of Daily Levels/Elevations for Lower Colorado River Reservoirs, available at http://www.usbr.gov/lc/region/g4000/archives.html.

[125] 77,338 acre-feet * 65 kWh/acre-feet * 1 MWh/1,000 kWh = 5,027 MWh.

[126] 5,027 MWh * 1 average MW/8,760 MWh = 0.57 average MW.

[127] The annual net electricity production at Parker dam during the past ten years averaged approximately 5 million kWh. While the installed nameplate capacity is 120 MW, the plant has a 108 MW maximum operating capacity. Source: http://www.usbr.gov/power/data/sites/hoover/hoovergr.pdf.

[128] USBR, "Comments on the Draft Environmental Assessment and the Draft Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Southwestern Willow Flycatcher (*Empidonax trailli extimus*), Lower Colorado Region Office, May 31, 2005.

[129] IID Water Conservation and Transfer Project, Draft Habitat Conservation Plan, Draft EIR/EIS. Available at http://projects.ch2m.com/iidweb/current/documents/draft/20Section3.12.pdf.

- **Imperial Diversion Dam and Laguna Dam.** Imperial Diversion Dam and Laguna Dam are also owned by USBR and operated by the Imperial Irrigation District. These dams are used for river regulation and water delivery, and thus are not expected to be required to alter operations for the flycatcher. These dams do not have hydropower generating capacity. The USBR states that the associated All-American Canal de-silting basin, Laguna settling basin, and associated dredge spoil disposal areas also fall in critical habitat in this reach. USBR is concerned that maintenance dredging could need to be curtailed to accommodate CHD, which would quickly result in the system becoming silted and inoperative. The All American Canal and Gila Gravity Canal serve approximately 668,000 acres of cropland and provide water to over 250,000 people.[130]

4.6.2 Bill Williams Management Unit

202. The Service is proposing critical habitat on a portion of the Bill Williams River that includes upper Alamo Lake on the Bill Williams River in Arizona, where nesting flycatchers have been found. The Service is also proposing a 15-mile segment of the river from Planet Ranch through the Bill Williams NWR to the confluence with Lake Havasu at the Colorado River (potential impacts at Lake Havasu are discussed in the Hoover to Parker MU section). There are no significant water control facilities other than Alamo Lake within the Bill Williams River system.[131]

4.6.2.1 Dam Operations/Flood Control

Alamo Lake

203. Alamo Dam is an Army Corps of Engineers project with flood control, water supply and conservation, as well as recreation uses that was completed in 1968. In 1996, Congress amended the purposes of Alamo Dam to include management of fish and wildlife resources both upstream and downstream.[132] Water releases from Alamo Dam large enough to reach the mainstem Colorado River drain into Lake Havasu behind Parker Dam.[133] Alamo Dam operations are closely coordinated with the operations of the USBR dams on the Lower Colorado.

204. Approximately 18,000 acres of the 23,000 acres in the Alamo Lake Recreation Area are managed as the Alamo Wildlife Area by Arizona Game and Fish (AZGFD). The area has an adaptive management plan for riparian management. In addition, AZGFD, the Service, Arizona State Parks, USACE and USGS sit on the Bill Williams

[130] USBR, Lower Colorado Regional Office "Proposed Rule to Designate Critical Habitat for the Southwestern Willow Flycatcher *(Empidonax trailli extimus)*, December 10, 2005.
[131] Water Control Manual, Alamo Lake, Colorado River Basin, Bill Williams River, Arizona, U.S. Army Corps of Engineers, October, 2003.
[132] Arizona Department of Water Resources, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher: Federal Register: October 12, 2004 (Volume 69, Number 196)", Comments of Herbert R. Guenther, May 27, 2005.
[133] Accessed at http://www.spl.usace.army.mil/resreg/htdocs/almo_status.html on September 20, 2004.

River Technical Committee, whose aim is to improve bird and other species habitats in the river. A portion of the $600,000 spent on restoration by USBR in the Lower Colorado River since 1996 was used for restoration efforts at Planet Ranch.[134]

205. In 1999, the Service issued a biological opinion to USACE on its proposed Alamo Lake Re-Operation and Ecosystem Restoration project. The primary concern of the consultation was effects on riparian resources below the dam (including Bill Williams National Wildlife Refuge). The consultation concluded that USACE should conduct annual monitoring of flycatcher habitat areas above the dam, but did not attempt to alter the planned operations of the dam.[135]

206. Monitoring for flycatchers have been the extent of costs incurred at this facility by USACE to date.[136] This is mainly because USACE does not typically hold water in the reservoir at times of the year that flycatchers are present.[137] Annual costs for these monitoring efforts are estimated to be $273,000 per year, based on past monitoring efforts and planned expenses. In addition, AZGFD estimates that it spends approximately $7,200 annually to participate in the Committee.[138] Assuming a similar level of resources are expended by other participating agencies, then approximately $43,000 is spent annually on the Committee. This analysis assumes that monitoring and committee meetings began in 2002, and will continue over next 20 years, resulting in past costs of $558,000, and future costs of $2.4 million (2004 dollars, assuming a discount rate of seven percent).

Scenario 2

207. If a court were to request that USACE manage Alamo Lake to maintain recent low levels to avoid inundating flycatcher habitat, it would be difficult for operators to comply.[139] This is because river inflows frequently exceed the maximum release capabilities of the reservoir: USACE reports that maximum controlled releases from the reservoir are 7,000 cfs, while inflows regularly reach 100,000 cfs.[140] This means that in high flow situations, USACE cannot avoid inundation of habitat inside the flood control pool by increasing flood release rates.

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[134] "Economic Analysis: Southwestern Willow Flycatcher: 1996-2004", Lower Colorado Regional Office, USBR, written memorandum, July 2004. Note that past USBR costs are driven by actions on the Lower Colorado River. Therefore, these costs are included in cost estimates for the three Lower Colorado MUs: Middle Colorado, Hoover to Parker and Parker to Southerly.

[135] "Alamo Lake Reoperation and Ecosystem Restoration", Service, Phoenix Office, to USACE, LA District, March 26, 1999.

[136] Personal communication with Carvel Bass, USACE, Los Angeles District, October 1, 2004.

[137] Personal communication with Carvel Bass, USACE, Los Angeles District, October 1, 2004.

[138] Email communication with Charles Paradzick, Aquatic Habitat Specialist, AZFGD, April 12, 2004.

[139] Ironically, flycatcher habitat would likely be compromised if lake levels were kept at current levels, as habitat has recently been degrading at the lake due to lack of inundation resulting from drought conditions. Service Hydrologist, Branch of Water Resources, Service, November 10, 2004.

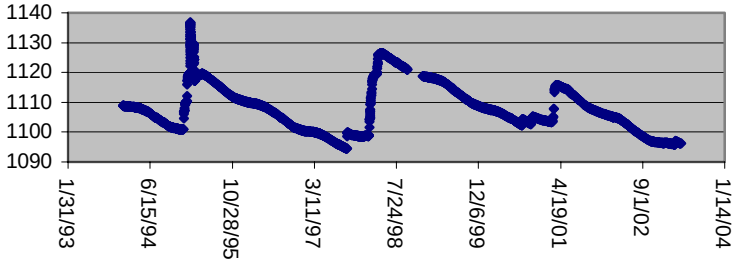
[140] Water Control Manual, Alamo Lake, Colorado River Basin, Bill Williams River, Arizona, U.S. Army Corps of Engineers, October, 2003; Personal communication with Joseph Evelyn, Hydrology and Hydraulics Branch, USACE, Los Angeles District, December 23, 2004.

208. USACE considers that Alamo Dam provides flood protection to all property downstream from Parker Dam to Mexico, which has an estimated population of 1.2 million.[141] The USACE states that "practically all economic development protected by Alamo Dam is along the Lower Colorado River; very few improvements are located on the Bill Williams River below the dam." The economy of the Lower Colorado downstream of Parker Dam is primarily agricultural, but the area also includes residential, commercial, and industrial lands, as well as public facilities. The Alamo Dam Risk Assessment estimated the value of the depreciated replacement of the property located in the floodplain to be $5.5 million.[142] The maximum release rate of 7,000 cfs at Alamo Dam was derived assuming a Colorado River channel capacity of 25,000 cfs,[143] and thus would only increase flood risk to downstream properties on the Lower Colorado if the total Colorado River flow were to exceed capacity. Operators of the Lower Colorado work together with Alamo Lake operators to avoid this flow rate whenever possible.

209. Exhibit 4-14 presents historic reservoir operations for Alamo Lake since 1994. The USACE Water Control Manual states that flood releases at the dam are to be commenced when the reservoir level reaches 1,125 feet in elevation.[144] If flycatcher habitat is located at 1,108 feet in elevation[145] (the average reservoir elevation over the past 10 years (1994-2003[146])), then flood releases are not scheduled to begin until after habitat becomes inundated. Thus, to comply, operators would have to alter their release schedule. If habitat requirements result in USACE reevaluating and revising their water control manual, this would likely be an expensive, multi-year effort.[147] (Exhibit D-12 in Appendix D presents the Alamo Dam Storage Allocations Diagram.)

[141] AZDWR states that this population estimate overstates the affected U.S. population. Arizona Department of Water Resources, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher: Federal Register: October 12, 2004 (Volume 69, Number 196)", Comments of Herbert R. Guenther, May 27, 2005.
[142] Water Control Manual, Alamo Lake, Colorado River Basin, Bill Williams River, Arizona, U.S. Army Corps of Engineers, October, 2003.
[143] Water Control Manual, Alamo Lake, Colorado River Basin, Bill Williams River, Arizona, U.S. Army Corps of Engineers, October, 2003.
[144] "Reservoir Operation Schedule", Water Control Manual, Alamo Lake, Colorado River Basin, Bill Williams River, Arizona, U.S. Army Corps of Engineers, October, 2003.
[145] This is unknown. However, AZDWR states that flycatcher habitat is located at a higher elevation estimated reported here. That being the case, estimates of ensuing effects on water management activities due to flycatcher at Alamo Dam would be overstated. Arizona Department of Water Resources, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher: Federal Register: October 12, 2004 (Volume 69, Number 196)", Comments of Herbert R. Guenther, May 27, 2005.
[146] Preliminary Water Level Record, USACE, Los Angeles, accessed at: http://www.spl.usace.army.mil/resreg/htdocs/data_hist3.html on November 11, 2004.
[147] Personal communication with Joseph Evelyn, Hydrology and Hydraulics Branch, USACE, Los Angeles District, December 23, 2004.

Exhibit 4-14
RESERVOIR ELEVATIONS
AT ALAMO DAM (1994-2003)



4.6.3 Pahranagat Management Unit

210. The Pahranagat MU contains Nesbitt Lake, which is managed by the Nevada Department of Wildlife as part of the Key Pittman Wildlife Management Area for waterfowl use and, secondarily, as for recreational fishing (See Recreation section). Proposed CHD is not anticipated to affect management of this lake, since it is already managed to accommodate wildlife. Similarly, water management at Pahranagat National Wildlife Refuge and the Overton Wildlife Area are not expected to be affected by proposed CHD. A portion of the $600,000 spent on restoration by USBR in the Lower Colorado River since 1996 was used to restore habitat in Pahranagat NWR.[148]

4.6.4 Virgin Management Unit

211. The Service is proposing a continuous segment of the Virgin River in UT, AZ, and NV. The segment extends for 92 miles from the Washington Field Diversion Impoundment in Washington County, UT, downstream through the Town of Littlefield, AZ, and into Nevada to Colorado River mile 280 at the upper end of Lake Mead in Clark County, NV. A portion of the $600,000 spent on restoration by USBR in the Lower Colorado River since 1996 was used to restore sites on the Virgin River.[149] This stretch of river does not contain any significant water management infrastructure that will be affected proposed CHD. The Town of Virgin, Utah submitted a public comment expressing concern that debris removal efforts on the Virgin River could be hindered by flycatcher conservation efforts.[150]

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[148] "Economic Analysis: Southwestern Willow Flycatcher: 1996-2004", Lower Colorado Regional Office, USBR, written memorandum, July 2004. Note that past USBR costs are driven by actions on the Lower Colorado River. Therefore, these costs are included in cost estimates for the three Lower Colorado MUs: Middle Colorado, Hoover to Parker and Parker to Southerly.

[149] "Economic Analysis: Southwestern Willow Flycatcher: 1996-2004", Lower Colorado Regional Office, USBR, written memorandum, July 2004. Note that past USBR costs are driven by actions on the Lower Colorado River. Therefore, these costs are included in cost estimates for the three Lower Colorado MUs: Middle Colorado, Hoover to Parker and Parker to Southerly.

[150] Public comments of Darwin Hall, Mayor, Virgin, Utah, May 5, 2005.

212. The Southern Nevada Water Authority (SNWA) is planning the development surface flows from the Virgin and Muddy Rivers.[151] "The SNWA currently holds annual maximum diversion rights to the Virgin River of 190,000 acre-feet per year, with an average annual diversion not to exceed 113,000 acre-feet. The SNWA's Muddy River surface water rights, which currently represent approximately 7,000 acre-feet per year, are in the form of shares in the Muddy Valley Irrigation Company. The SNWA proposes to deliver this water to Southern Nevada through one of three options:

- Diversion and Overland Conveyance
- River Conveyance
- Combination of Diversion and Overland Conveyance/River Conveyance."[152]

213. The SNWA has applied for a permanent Right of Way from BLM for the construction and operation of a surface water diversion facilities. "This application requires the preparation of an Environmental Impact Statement by the BLM. Specific facilities and alternatives associated with this project will be identified during the EIS process, and the application may be modified as project design details are developed. The Diversion and Overland Conveyance alternative proposes to divert surface water rights from the Virgin River through an off-stream reservoir and from the Muddy River via the Bowman Reservoir. The River Conveyance alternative would change the SNWA's point of diversion for Virgin and Muddy River water rights to Lake Mead, allowing for water withdrawal through existing facilities. The Combination of Diversion and Overland Conveyance and River Conveyance would reduce the volume of Virgin River surface water diversion, conveying the remaining rights through existing facilities at Lake Mead and potentially eliminating the need for an off-stream reservoir. Depending upon the alternative identified, necessary facilities may include: Diversion structure across the Virgin River and associated off-stream storage reservoir; pump stations; water transmission pipelines; water treatment facilities; brine evaporation ponds; overhead electrical distribution lines; and access roads. Pending completion of the EIS, the SNWA anticipates that construction of facilities for this project is anticipated to begin in 2009 and may extend through 2012."[153]

214. Because the outcome of the proposed project is unknown, impacts on its water delivery functions are not estimated in this analysis. It is possible that flycatcher considerations could influence the selection of the chosen alternative for this project in the future, however.

[151] Public comments of Kenneth Albright, Southern Nevada Water Authority, May 31, 2005; Public comments of Guy Martin, Western Water Users Association, May 31, 2005.
[152] Southern Nevada Water Authority, Fact Sheet on the Virgin & Muddy Rivers Surface Water Development Project, accessed at http://www.snwa.com/assets/pdf/fact_sheet_surface.pdf, on August 31, 2005.
[153] Southern Nevada Water Authority, Fact Sheet on the Virgin & Muddy Rivers Surface Water Development Project, accessed at http://www.snwa.com/assets/pdf/fact_sheet_surface.pdf, on August 31, 2005.

4.6.5 Little Colorado Management Unit

215. A public comment submitted on behalf of, the Lyman Water Company, the Round Valley Water Users Association, J. Albert Brown Ranches, and others states that "the potential loss of the ability to divert surface water and possibly groundwater is perhaps the most important economic, social, and environmental consideration in the Little Colorado Management Unit."[154] These diversions are subject to "the Norviel Decree", which enforces water rights dating back to the 1870s. Under this Decree, the court found that this river is fully appropriated. However, the Little Colorado MU does not appear to contain any significant water management infrastructure that will be affected by proposed CHD for the flycatcher. Thus, water use by entities in this unit are not anticipated to be affected under either Scenario 1 or Scenario 2 of this analysis. The commenter notes that, were ranching, farming, and irrigation operations within this unit to be prohibited from beneficially using their water, significant economic impacts on the local economies would result. In any case, the potential section 7 consultations and resulting project modification requirements will "add a level of uncertainty to financial planning and land use management practices in the Little Colorado Management Unit."[155]

4.7 GILA RECOVERY UNIT

4.7.1 Roosevelt Management Unit

216. The proposed CHD in the Roosevelt MU consists of four river segments, (Roosevelt Lake, Salt River, Tonto Creek, Pinto Creek), all of which are part of the Salt River Project water management system. (Exhibits D-14 and D-15 in Appendix D present maps of the Roosevelt Reservoir Water System and the Salt Reservoir System

4.7.1.1 Dam Operations

Roosevelt Dam and Lake

217. Roosevelt Dam and Lake is the dominant water management feature in the proposed CHD of the Roosevelt MU. While USBR owns Roosevelt dam, the Salt River Project[156] operates and manages it. Tonto National Forest is responsible for management of recreation and other public land uses (see Section 9, Recreation).

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[154] Comments of David A. Brown and Michael J. Brown, Brown & Brown Law Offices, of behalf of the Lyman Water Company, the Round Valley Water Users Association, various cities and towns, J. Albert Brown Ranches, and numerous other irrigation users within the Little Colorado River watershed, "Proposed Designation of Southwestern willow flycatcher critical habitat," July 12, 2005.

[155] *Ibid*.

[156] "Salt River Project" consists of the Salt River Valley Water Users' Association and the Salt River Project Agricultural Improvement and Power District. Cherrington, Paul. "Comments of SRP on Preparation of Designation of Critical Habitat for the Southwestern willow flycatcher, Analysis of Economic and other Relevant Impacts of the Designation, and Impact Analysis Required by the National Environmental Policy Act", Salt River Project, March 8, 2004.

218. The Salt River Project (SRP) operates six reservoirs and dams on the Salt and Verde Rivers. Together, these reservoirs provide 40 percent of the water supply to the Phoenix Active Management Area, an area of approximately 5,600 square miles.[157] SRP diverts about 900,000 af of surface water annually for use by the City of Phoenix, Salt River Pima-Maricopa Indian Community, Fort McDowell Yavapai Nation, Phelps Dodge, irrigation users, and other communities in the Phoenix area, including Chandler, Glendale, Mesa, Scottsdale, and Tempe. The system serves 240,000 acres over an area of 375 square miles. Roosevelt is the largest of four reservoirs on the Salt River, representing 71 percent of the total surface water storage capacity in the SRP system.[158]

U.S. Bureau of Reclamation

219. In 1996, the Service issued a biological opinion to the USBR on a Federal action to raise the Roosevelt dam elevation from 2,136 feet to 2,151 feet. This action would create New Conservation Space (NCS) behind the dam. USBR initiated the consultation because the new water conservation space added by raising the dam contained flycatcher habitat. The biological opinion was put forth solely for the southwestern willow flycatcher, and concluded that the action was likely to jeopardize the continued existence of the flycatcher.[159] As part of the reasonable and prudent alternative, the USBR was asked to undertake the following actions:

- Reclamation should not permit long-term storage in the new conservation space (elevation 2136 to 2151 feet) until after September 1, 1996 (one year);
- Purchase "replacement" habitat and provide funds for management;
- Provide a management fund for on-the-ground improvements;
- Hire a conservation coordinator for 10 years;
- Conduct research and monitoring for 10 years;
- Implement a cowbird management program;
- Conduct population monitoring at Roosevelt Lake and Lower San Pedro River;
- Collect demographic data for flycatchers;
- Conduct dispersal/emigration surveys within a 25-mile radius of Roosevelt Lake and lower San Pedro River sites, Gila River, Verde River;
- Conduct a genetic study; and,
- Conduct habitat monitoring.

[157] Final Environmental Impact Statement for the Roosevelt Habitat Conservation Plan, Gila And Maricopa Counties, Arizona Volume 1 of the FEIS. Service, 2002. p 15
[158] *Ibid*., p 18
[159] "Biological Opinion for the Modified Roosevelt Dam and its Effects on the Endangered Southwestern willow flycatcher." Arizona State Office, Service, July 16, 1996.

220. The 1996 opinion requirement that Reclamation not permit long-term storage in the new conservation space (elevation 2136 to 2151 feet) until after September 1, 1996 could have resulted in impacts on water storage in Roosevelt Lake. However, water levels were too low during that year for this to occur. USBR states:

> *"Prior to September 1, the new conservation space was to be operated as specified in the Corps of Engineers operations manual for Roosevelt Dam, where all flood waters above 2151 feet are released within 20 days. This potentially costly management restriction did not impact Reclamation or SRP water users, because rainfall and runoff were insufficient to fill the reservoir."* [160]

221. Costs of implementing other measures set forth in the USBR biological opinion are summarized in Exhibits 4-15 and 4-16. These estimates were provided by USBR's Phoenix Area Office. In total, these measures have resulted in approximately $12 million in costs to USBR from 1995-2003. Costs associated with non-Section 7 related activities are estimated to be approximately $1.4 million. Total past costs to USBR are estimated to be $13.4 million (nominal dollars).

222. USBR is responsible for implementing the 1996 biological opinion through 2006. Because the Salt River Project will assume management of the new conservation space after that time, future USBR costs are not expected to be as large as past costs. USBR provided estimates of future costs related to implementation of the 1996 opinion and non-Section 7 related activities through FY2007. This analysis estimates that costs to USBR for future implementation of the 1996 opinion and non-Section 7 related activities to be approximately $20.1 million (2003 dollars) over the next 20 years by assuming that projected average FY2004-2007 costs will continue.[161] Because USBR is not able to predict costs beyond 2007 related to flycatcher conservation activities, this estimate may overstate or understate actual costs.

[160] "Economic Analysis: Southwestern Willow Flycatcher", Phoenix Area Office, Lower Colorado Region, USBR, written memorandum, June 8, 2004.

[161] "Economic Analysis: Southwestern Willow Flycatcher", Phoenix Area Office, Lower Colorado Region, USBR, written memorandum, June 8, 2004.

Exhibit 4-15

PAST USBR COSTS RELATED TO FLYCATCHER CONSERVATION EFFORTS ASSOCIATED WITH ROOSEVELT RESERVOIR
(FY1995-2003, Nominal $)

Activity	Description of Activity	Section 7-related costs	Other Costs	Total
Administrative time	*Flycatcher Conservation Coordinator and other staff.*	$2,124,000	$473,000	$2,597,000
Survey/Monitoring	*Flycatcher surveying and monitoring, habitat monitoring, aerial photography, habitat and vegetation typing study.*	$4,547,000	$382,000	$4,929,000
Research	*Flycatcher movement, life history, genetics, habitat suitability model.*	$1,286,000	$498,000	$1,784,000
Cowbird trapping	*Cowbird trapping on San Pedro and Gila river.*	$1,526,000	$0	$1,526,000
Land acquisition	*San Pedro River Preserve and others.*	$1,517,000	$0	$1,517,000
Operation and maintenance of acquired habitat	*San Pedro River Preserve management.*	$1,009,000	$10,000	$1,019,000
	Total	**$12,009,000**	**$1,363,000**	**$13,372,000**

Source: "Economic Analysis: Southwestern Willow Flycatcher", Phoenix Area Office, Lower Colorado Region, USBR, written memorandum, June 8, 2004.

Exhibit 4-16

FUTURE USBR COSTS RELATED TO FLYCATCHER CONSERVATION EFFORTS ASSOCIATED WITH ROOSEVELT RESERVOIR
(FY2004-FY2023)

Activity	Description of Activity	Total Costs (2004$)
Administrative time	*Willow Flycatcher Conservation Coordinator and other staff*	$5,657,000
Survey/monitoring	*Willow flycatcher surveying and monitoring, habitat monitoring, Aerial Photography, Initial habitat and vegetation typing study*	$5,747,000
Research	*Flycatcher movement, life history, genetics, habitat suitability model*	$2,441,000
Cowbird trapping	*Trapping on San Pedro and Gila rivers*	$318,000
Land acquisition	*San Pedro River Preserve and other areas*	$3,311,000
Operation and maintenance of acquired habitat/Other Conservation	*San Pedro River Preserve management*	$3,368,000
	Total	**$20,842,000**

Note: USBR provided estimates of future costs related to implementation of the 1996 biological opinion and non-section 7 related activities through FY2007. Costs to USBR assume that projected average FY2004-2007 costs will continue. Discounted at seven percent.
Source: USBR Phoenix area estimates and IEc Analysis. "Economic Analysis: Southwestern Willow Flycatcher", Phoenix Area Office, Lower Colorado Region, USBR, written memorandum, June 8, 2004.

Salt River Project and Associated Water Users

223. Under a 1917 Agreement, the Salt River Project (SRP) operates and maintains Roosevelt Dam and Lake, although USBR owns the dam. The Cities of Chandler, Gilbert, Glendale, Mesa, Peoria, Phoenix, Scottsdale, and Tempe have rights to the original conservation space behind Roosevelt Dam, along with several irrigation districts and three Tribes. The cities of Chandler, Glendale, Mesa, Phoenix, Scottsdale, and Tempe have rights to water stored in the New Conservation Space that was created when the dam was raised.[162]

224. When flycatcher territories were found below the 2136 feet elevation (an area not covered by the USBR consultation), SRP began pursuing a Habitat Conservation Plan (HCP) for authorization of "take", under Section 10 of the ESA. It was later agreed that this HCP should be expanded to include all impacts associated with SRP water storage, both in the new and existing conservation space.[163] As a result, the HCP was approved in February 2003 with an incidental take permit for storage up to 2151. Although some permitted areas overlap with USBR consultation area, the 1996 requirements for USBR will remain in place until they expire in 2006. As part of the HCP, SRP agreed to:

- Acquire and manage riparian habitat;
- Protect and manage habitat at Roosevelt Lake;
- Acquire water rights for maintenance of riparian habitat; and,
- Acquire buffer lands to benefit riparian habitat.

225. SRP has expended costs associated with developing this HCP of approximately $4.7 million from 1996-2003 (nominal dollars), primarily associated with land acquisition. Past costs of flycatcher conservation activities are presented in Exhibit 4-17.

226. Future costs to SRP associated with the HCP at Roosevelt are estimated by SRP to be approximately $9.7 million (2004 dollars, assuming a seven percent discount rate over 50 years). Future costs are anticipated to primarily include land acquisition, habitat management and maintenance, and survey monitoring and research.[164]

[162] Arizona Municipal Water Users Association, "Comments on Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher," Comments of V.C. Danos, May 25, 2005.
[163] "Economic Analysis: Southwestern Willow Flycatcher", Phoenix Area Office, Lower Colorado Region, USBR, written memorandum, June 8, 2004.
[164] Written comments of Craig Sommers, ERO Resources, on behalf of the Salt River Project, to Industrial Economics, Inc. August 26, 2004.

Exhibit 4-17 PAST COSTS OF FLYCATCHER CONSERVATION TO SALT RIVER PROJECT AT ROOSEVELT RESERVOIR, 1996-2003 (Nominal $)	
Studies, Administrative, Legal	$1,154,000
Habitat restoration	$144,000
Land Acquisition	$3,160,000
Habitat management and monitoring	$226,000
Total	**$4,684,000**
Source: Written comments of Craig Sommers, ERO Resources, on behalf of the Salt River Project, to Industrial Economics, Inc. August 26, 2004.	

Scenario 2

227. The HCP and Incidental Take Permit for Roosevelt state that critical habitat designation should not result in additional requirements to SRP:

228. "FWS shall consider the RHCP in its preparation of any proposed designation of critical habitat concerning any Plan Species. Consistent with 50 CFR 402.12, the RHCP incorporates special management considerations necessary to conservation of the Plan Species. If critical habitat is designated for any Plan Species, as long as the RHCP is being properly implemented, FWS shall not require, through the formal consultation process of section 7 of the ESA or otherwise, the commitment by the Permittee of additional land, water, financial compensation or other measures beyond those already provided for in the RHCP."[165]

229. However, SRP states in its comments that "because the overriding purpose of Roosevelt Lake is water conservation, and, secondarily, hydropower generation, the designation of Roosevelt as critical habitat for the flycatcher has the potential to affect the vested rights of those relying upon the availability of water stored at Roosevelt for municipal, industrial, irrigation, and other beneficial purposes."[166] SRP further notes that, were the designation of critical habitat in Roosevelt Dam to affect or disrupt the existing incidental take permit that SRP has received, potentially large impacts on water operations and delivery could result.[167] SRP evaluated a "No Permit" and a "Reoperation" Alternative in detail in its Environmental Impact Statement for the HCP, and suggests that these scenarios offer an estimate of the impacts "if Roosevelt Lake

[165] Salt River Project. Roosevelt Habitat Conservation Plan, Gila and Maricopa Counties, Arizona. Submitted to U.S. Fish and Wildlife Service, December 2002. Appendix 8; and Section N.1(c)(ii) , Incidental Take Permit for Roosevelt.

[166] Cherrington, Paul. "Comments of SRP on Preparation of Designation of Critical Habitat for the Southwestern willow flycatcher, Analysis of Economic and other Relevant Impacts of the Designation, and Impact Analysis Required by the National Environmental Policy Act", Salt River Project, March 8, 2004.

[167] *Ibid*.

could not be filled because the water would adversely modify or destroy flycatcher habitat."[168] Exhibit 4-18 presents alternative water deliveries under the two scenarios.

Exhibit 4-18

COMPARISON OF ROOSEVELT CHARACTERISTICS UNDER ALTERNATIVE OPERATIONS SCENARIOS

Roosevelt Characteristics	Existing conditions	No Permit Alternative	*% Change*	Reoperation Alternative	*% Change*
Maximum Reservoir elevation* (feet)	2,151	2,095	*-2.6%*	2,125	*-1.2%*
Maximum Reservoir surface area (acres)	21,500	13,000	*-39.5%*	17,000	*-20.9%*
Conservation Storage**	1,609,134	701,547	*-56.4%*	1,149,242	*-28.6%*
Flood control storage***	1,802,300	2,709,887	*50.4%*	2,262,192	*25.5%*
Delivery to downstream users (af)					
SRP Surface Water Deliveries	948,000	867,000	*-8.5%*	924,000	*-2.5%*
*City NCS Deliveries****	49,000	0	*-100.0%*	0	*-100.0%*
Total	997,000	867,000	*-13.0%*	924,000	*-7.3%*

*Also called "operating high water level" or "active conservation level." USBR Theodore Roosevelt Dam Fact Sheet, accessed at Http://www.usbr.gov/lc/phoenix/user/publicrl/rdfact.html on July 21, 2004.

**Storage capacity for water delivery, except dead storage capacity of 17,400 af.

***Includes flood control storage and safety of dam flood surcharge pools. In Scenario 2, reduced conservation storage becomes additional flood control storage. Also called "flood surcharge storage."

****New Conservation Storage deliveries. These are deliveries made available by the new conservation storage area.

Adapted from Tables 13 & 14, Chapter 4, Final Environmental Impact Statement for the Roosevelt Habitat Conservation Plan, 2002. p.118, 119. Based in SRPSIM model run for the years 1889-1994.

230. In its analysis of the No Permit Alternative, SRP assumes that in order to avoid take, SRP would have to change the operations of Roosevelt Dam so as to avoid inundation of the riparian areas where habitat exists. By assuming that the reservoir is held to an elevation of 2095 feet, SRP estimates an annual loss of water supplies to SRP of 81,700 acre-feet per year. Assuming that costs to replace this water are $457 to $506 per acre-foot,[169] then this change in operations would result in annual costs of $37.3 million to $41.3 million to SRP. SRP also states that it is likely to be unable to replace the 81,700 acre-feet annually, which could result in additional costs to water users. SRP estimates that the user cities (primarily the City of Phoenix) would bear costs of $22 million to $24 million annually to replace 49,000 acre-feet lost of new conservation space. In a public comment, SRP notes that in 2004 (since the time that these estimates were made), flycatcher habitat has extended further down into the reservoir bottom, and

[168] Written comments of Craig Sommers, ERO Resources, on behalf of the Salt River Project, to Industrial Economics, Inc. August 26, 2004.

[169] This cost estimate is revised from the Roosevelt HCP using figures developed by the City of Phoenix. The City states: "The least-cost alternative to replace [City of Phoenix water] that appears most feasible is to re-use effluent as described in the Roosevelt HCP…In the Roosevelt HCP, the estimated cost of providing water that is equal to [City of Phoenix water] was $780 per acre-foot per year, using a 6 percent discount rate. This estimate is refined [here] using a closer examination of the City's costs, planning horizon, and interest rates. This project is now in the active planning stage, with refined data emerging regularly." Buschatzke, Tom. "Issue Paper: Economic Impact of the Designation of Critical Habitat for the Southwestern Willow Flycatcher on the City of Phoenix Water Supply," City of Phoenix, Office of the City Manager, Water Advisor, September 13, 2004.

thus additional water losses could be required to avoid inundating habitat, though the extent to which this effect would occur has not been quantified.[170]

231. Similarly, the Reoperation Alternative in the EIS for the Roosevelt HCP assumes that the reservoir would be managed to not exceed an elevation of 2,125 feet, resulting in an annual loss of 24,700 to SRP at an annual cost of $11.3 million to $12.5 million. SRP estimates that the user cities (again primarily the City of Phoenix) would also bear costs of $22 million to $24 million annually.

232. Salt River Project (SRP) personnel provided estimates of power production for the two alternatives under the 2002 Roosevelt HCP. Based on SRPSIM, a model that simulates SRP reservoir operation alternatives,[171] the annual power production of the hydroelectric facility at full operations (2,151 feet) is 77,462 MWh, while the annual power production at reservoir management to elevations of 2,125 and 2,095 feet is 78,617 MWh and 80,311 MWh, respectively.[172] Thus, forecasted impacts to hydroelectric production resulting from changes to reservoir operations to accommodate flycatcher conservation efforts are a net gain in power generation of 1,155 to 2,846 MWh. While hydroelectric power production increases, however, revenues under flycatcher conservation activities are forecast to decline by $1.3 to $2.6 million annually due to changes in the timing of hydropower.[173] In addition, SRP estimates that about $6 million annually could be lost to recreation-related businesses (as a result of lower water levels). Opportunity costs of using alternative water supplies for existing uses rather than for future growth would also occur.

233. Regarding potential impacts on flood control, the EIS for Roosevelt states that, "the additional flood storage capacity would have moderate benefits to maintaining the safety and integrity of the dam by allowing greater attenuation of flood events."[174] In recent communications, representatives for SRP state that these statements "continue to adequately characterize the potential flood impacts from any modification of reservoir operations due to proposed CHD. Although spills would increase if Roosevelt Lake can't be filled due to flycatcher habitat…downstream flooding is primarily governed by the capacity of outlet works and spillways, not available storage. The same is true for the reservoirs on the Verde. Thus, for big flood events that could create significant economic damage, the peak downstream flows would not change much regardless of available storage. Essentially, the additional spills reflect more frequent or longer lasting flood flows but the peak flows would remain about the same. Thus, although there is a potential for flood-related economic impacts from restricted storage, they are likely to be relatively

[170] Public comments of Paul Cherrington, "Comments of Salt River Project on Proposed Rule Designating Critical Habitat for the Southwestern willow flycatcher, Draft Environmental Assessment and Draft Economic Analysis of the Proposed Rule", May 31, 2005.
[171] Salt River Project, Roosevelt Lake Habitat Conservation Plan, Appendix 3: SRMSIM Model, December 2002.
[172] Personal communication, Yvonne Reinink, Salt River Project, November 30, 2004.
[173] Final Environmental Impact Statement for the Roosevelt Habitat Conservation Plan, Gila and Maricopa Counties, Arizona, Volume I of the FEIS, December 2002.
[174] Final Environmental Impact Statement for the Roosevelt Habitat Conservation Plan, Gila and Maricopa Counties, Arizona, Volume 1 December 2002. page 120, page 122.

small and have not been quantified."[175] Representatives of SRP do note some potential example impacts from more frequent or longer duration flood flows "1) damage to structures and operations (e.g., SRP has an earthen canal serving a groundwater recharge project that would have to be replaced each time and recharge would be interrupted, 2) adverse impacts on recreation (e.g., draining Tempe Town Lake and closure of Rio Salado); and 3) interference with gravel mining."[176] (Appendix D, Exhibit D-16 presents historical water storage for Roosevelt.)

Summary of Costs at Roosevelt Dam and Reservoir

234. Total costs anticipated at Roosevelt Dam and Reservoir are the sum of costs borne by SRP, USBR, and associated water users, including the cities of Chandler, Glendale, Mesa, Phoenix, Scottsdale, and Tempe. Past costs are estimated at $20.5 million (2004 dollars). Future costs are estimated at $29 million in Scenario 1. Under Scenario 2, $33.7 to $66.1 million in annual impacts on water supply could occur. In addition, $2.6 million in annual costs to hydropower could occur under Scenario 2.

4.7.2 Verde Management Unit

235. On the Verde River in Arizona, three segments are included in the proposed CHD: a 36-mile segment in the Verde Valley in Yavapai County; a 39-mile segment that includes Horseshoe Dam and Reservoir in Yavapai and Maricopa Counties; and a 4.5 mile segment below Horseshoe Dam in Maricopa County. As stated above, Horseshoe Reservoir is part of the Salt River Project system of reservoirs, and is the dominant water management structure included in this MU.

4.7.2.1 Dam Operations

Horseshoe Reservoir

Salt River Project

236. As stated above, SRP diverts about 900,000 acre-feet of surface water annually for use by municipal and agricultural users. Of the diversions, about 40 percent are supplied from Horseshoe and Bartlett Reservoirs, while 60 percent are supplied by the Salt River System (including Roosevelt).

237. Horseshoe Reservoir has a current storage capacity of 109,217 acre-feet, and downstream Bartlett Reservoir has a storage capacity of 178,186 acre-feet. Because these reservoirs can only handle two-thirds of the average runoff of the Verde, they are managed differently than Roosevelt Dam, which is also part of the SRP system. Water stored in Horseshoe is the first to be released out of all of the SRP reservoirs in order to

[175] Email communication with Craig Sommers, ERO Resources, October 27, 2004.
[176] *Ibid*.

provide space for additional runoff on the Verde. Only 287,400 acre-feet (12 percent) of SRP's storage capacity exists in the Verde River reservoirs.[177]

Past Impacts

238. SRP is currently developing a Draft HCP for Horseshoe and Bartlett Reservoirs. The HCP for Horseshoe and Bartlett may include two upstream fish, the spikedace and loach minnow, in addition to the flycatcher.[178] SRP reports that costs to develop this HCP were $460,000 through 2003 (2004 dollars).[179]

Future Impacts: Scenario 1

239. SRP estimates costs of implementation of the developing HCP based on its experience with the Roosevelt HCP. SRP estimates that flycatcher conservation efforts will involve land acquisition, habitat restoration, habitat management and maintenance, survey and monitoring, and research. Future costs associated with this HCP are anticipated to be approximately $4.5 over the life of the HCP (2004 dollars, assuming a seven percent discount rate over 50 years). [180]

Future Impacts: Scenario 2

240. SRP notes that it currently supplies 9,000 acre-feet annually to its shareholders and contractors from Horseshoe Reservoir water. If flycatcher conservation activities were to result in the loss of delivery of that volume of water, then assuming that costs to replace this water are $457 to $506 per acre-foot., SRP could incur $4.1 million to $4.6 million annually to replace it, assuming that replacement supplies are available.[181] No hydropower is produced at Horseshoe Reservoir, so none would be lost.

City of Phoenix

Future Impacts: Scenario 2

241. After the construction of Horseshoe Dam in 1946, the City of Phoenix paid to install 26-foot gates in the spillway, which added 76,000 af of storage to the Reservoir.[182] This additional storage water is known as "gatewater." The City holds a Certificate of Water Right issued by the state of Arizona for the storage and use of gatewater, which is

[177] Salt River Project, "Draft Habitat Conservation Plan: Operation of Horseshoe and Bartlett Reservoirs", August 26, 2004.
[178] Public comment from Paul Cherrington, Manager, Salt River Project, March 8, 2004.
[179] Written comments of Craig Sommers, ERO Resources, on behalf of the Salt River Project, to Industrial Economics, Inc. August 26, 2004.
[180] *Ibid*.
[181] *Ibid*.
[182] Buschatzke, Tom. "Issue Paper: Economic Impact of the Designation of Critical Habitat for the Southwestern Willow Flycatcher on the City of Phoenix Water Supply," City of Phoenix, Office of the City Manager, Water Advisor, September 13, 2004.

credited as an assured supply of 21,000 acre-feet to the City.[183] Under agreements with SRP, the City of Phoenix may accrue up to 150,000 af of storage credits. Although the City's water rights stem from the gatewater rights at Horseshoe Dam, the City's agreement allows for storage credits to be held in the Salt River System if necessary to avoid spillage of credits.

242. The City notes that the flycatchers "typically are not present during the early spring when the use of maximum reservoir storage space is most critical." However, the City is concerned that, to avoid adverse modification of critical habitat, inundation of that habitat might not be possible even without the presence of birds. After an initial assessment, the City of Phoenix estimates that all of its average annual yield of gatewater (21,000 af) could be lost to human beneficial use if Horseshoe Reservoir is managed to avoid adverse modification of flycatcher habitat there.[184] The City reports that this volume of water would support a population of 85,000 people.[185] Drawing on the methodology that was used in the Roosevelt HCP, the City states that the feasible, least-cost alternative to replace gatewater is to re-use effluent produced by the 91st Avenue Treatment Plant by constructing a tertiary treatment plant, then routing it through the Tres Rios Reconstructed Wetlands, then recovered from wells, then transported to the CAP canal to the SRP turnout. By refining costs used in the RHCP, the City estimates annual costs per acre-foot for replacing Horseshoe Reservoir water at $457 to $506 (using 5.5 and 7 percent discount rates, respectively, over 50 years). This equates to a total present value cost of $147 to $162 million, or $9.6 to $10.6 million annually (using 5.5 and 7 percent discount rates, respectively, over 50 years).

4.7.2.2 Water Transfer

243. A 1998 biological opinion with USBR addressed a water transfer in the Verde Valley. This transfer involved transferring CAP water from Cottonwood Water Works, Inc. (CWW) and Camp Verde Water Systems, Inc. (CVWS) to the City of Scottsdale.[186] The project involved the sale of water rights to the City of Scottsdale. Funds from the sale were put into a "Water Trust Fund" to be used to develop alternative, mainly groundwater, supplies. The consultation included the flycatcher, razorback sucker, bald eagle, and Arizona cliffrose. In this biological opinion the Service provided the following terms and conditions in order to protect and enhance flycatcher habitat:

- Construction, maintenance or operations of wells, pipelines and other water delivery facilities associated with developing deep aquifer resources shall occur outside of the riparian zone of suitable or occupied flycatcher habitat;
- USBR protect and enhance flycatcher habitat on the Verde River,

[183] *Ibid*.
[184] *Ibid*.
[185] City of Phoenix, "Re: Comments on Proposed Rule, Draft Economic Analysis, and Environmental Assessment for Designating Critical Habitat for the Southwestern Willow Flycatcher." Comments of Tom Buschatzke, May 31, 2005.
[186] U.S. Fish and Wildlife Arizona Ecological Services Field Office. 1998. Biological opinion on the Central Arizona (CAP) Water Assignment - Cottonwood Water Works, Inc., and Camp Verde Water Systems, Inc. to the City of Scottsdale, March 30, 2004.

- USBR should work with landowners and conservation groups along the Verde River for the management of riparian habitat in the Verde Valley with the goal of supporting flycatcher populations;
- USBR participate in the Verde Watershed Association and seek to coordinate flycatcher monitoring on the Verde River;
- USBR should explore the use of a portion of the flycatcher management funds set aside from the Roosevelt Lake biological opinion to be used specifically for Verde River flycatcher territories;
- USBR should require the CWW and CVWS to set aside one percent of the Trust Fund (approximately $20,000) for public information and education about endangered species issues; and,
- USBR should educate public about endangered species issues and promote voluntary water conservation.

244. Project modification costs borne by CWW and CVWS are estimated at $20,000, based on their requirement to provide informational materials regarding endangered species. Survey and monitoring costs for this area are included in USBR costs related to the Roosevelt HCP. Administrative costs for the consultation are included as part of Section 3.

4.7.2.3 Groundwater Use

245. The Prescott Active Management Area (AMA) has been identified as an area where groundwater pumping may have the potential to affect the quality of flycatcher habitat.[187] A part of the Prescott AMA lies within the proposed flycatcher CHD. Based on hydrologic monitoring data compiled by the Arizona Department of Water Resources (ADWR) in 1999, the ADWR determined that the Prescott AMA was no longer at safe-yield. As defined by ADWR, "safe yield is a groundwater management goal that attempts to achieve and thereafter maintain a long-term balance between the amount of groundwater withdrawn within an active management area and the annual amount of natural and artificial recharge in the active management area."[188]

246. The Prescott area has already outgrown its water supply. A conceptual water budget developed by ADWR estimates that groundwater outflows exceeded inflows resulting in a 15,450 acre-feet overdraft within the Prescott AMA for 2002. In order to meet increasing demand for water as urban growth continues, the City of Prescott has purchased property where it has proposed to sink a well and pump groundwater. This proposal has not been formalized or undergone consultation; however, some minimal administrative costs related to this proposal have been incurred by the Service and other

[187] Recovery Plan, p. 35. Also, Wolfe, E.W., and Hjalmarson, W. 2003. The Upper Verde Watershed Crisis. March 2003.
[188] Arizona Department of Water Resources. 2004. Prescott Active Management Area web page. http://adwr.state.az.us/WaterManagement/Content/AMAs/PrescottAMA/default.html. Accessed on October 18, 2004.

agencies that would be involved in reviewing potential impacts to threatened and endangered species.[189]

247. Decreasing groundwater storage trends were observed at 65 of the 85 wells (76 percent) that were measured in both 2002 and 2003 in the Prescott AMA.[190] Exempt wells (less than 35 gallons per minute) were estimated to pump approximately 3,100 acre-feet per year; these are primarily domestic wells supplying water for residents outside of local water providers' service areas. Based on data for 1990 to 2002, within the Prescott AMA, the amount of groundwater withdrawn annually through non-exempt wells (wells that can pump 35 or more gallons per minute) is approximately 16,200 acre-feet. This figure has been increasing steadily over the past five years, from 15,229 acre-feet in 1998 to 21,815 acre-feet in 2002.[191] The breakdown of 2002 non-exempt groundwater uses is shown in the table below. Based on this information, and assuming that all exempt well pumpage goes to residential users, nearly 70 percent of groundwater withdrawals in the Prescott AMA is for municipal and residential use, while 25 percent is for agricultural use. Thus, any limits on groundwater pumping for flycatcher conservation purposes would primarily affect municipal and residential users in this area. Exhibit 4-19 presents a breakdown of groundwater pumping activities by type in the Prescott AMA. By assuming a value of $115 to 473 per acre-foot this groundwater has a value of $2.5 million to $10.4 million (unadjusted 2004 dollars).

Exhibit 4-19

BREAKDOWN OF 2002 NON-EXEMPT GROUNDWATER PUMPAGE: PRESCOTT AMA

Water User	Amount of Groundwater Pumpage (Acre-feet)
Agriculture	6,200
Commercial Industrial	1,750
Small Water Provider (<250 acre-feet)	710
Large Water Provider (=> 250 acre-feet)	13,140
Unaccounted	15
Total	**21,815**

Source: Personal communication with Jack McCormick, Prescott AMA, Arizona Department of Water Resources, October 22, 2004.

[189] Personal communication with Chuck Paradzick, AZ Game and Fish Department, April 8, 2004.
[190] Arizona Department of Water Resources. 2003. Prescott Active Management Area 2002-2003 Hydrologic Monitoring Report. August 29. Available for download at: http://adwr.state.az.us/WaterManagement/Content/AMAs/PrescottAMA/default.html. Accessed on October 18, 2004.
[191] *Ibid*.

4.7.3 Middle Gila/San Pedro Management Unit

4.7.3.1 Dam Operations/Water Diversion

Ashurst-Hayden Diversion Dam

248. The proposed CHD within the Middle Gila/San Pedro MU contains a stretch of the Gila River from Dripping Springs Wash to the Ashurst-Hayden Diversion Dam and a portion of the San Pedro River from near Hot Springs Canyon to the confluence of the Gila and the San Pedro Rivers. Construction of the Ashurst-Hayden Diversion Dam was completed in 1922. The Ashurst-Hayden diversion dam is operated by the BIA, under the San Carlos Irrigation Project (SCIP) for the purposes of providing irrigation for the Gila River Indian Community (GRIC) and the San Carlos Irrigation and Drainage District (SCIDD). There is no history of consultation with the Service for the effects of Ashurst-Hayden Diversion Dam operations on the flycatcher. All of the flows between the Coolidge Dam and the Ashurst-Hayden Diversion Dam are appropriated. Diversions to these entities are regulated under the 1935 Globe Equity 59 Decree, and overseen by the Gila River Water Commissioner. The Gila Water Commissioner is appointed by the US District Court to administer the Globe Equity 59 Decree, which controls use of the waters of the Gila River in the reach from above Virden, NM to its confluence with the Salt River west of Phoenix, AZ. Further discussion of potential impacts on water users in this area is included below within the discussion of the Upper Gila MU.

4.7.4 Upper Gila Management Unit

249. The proposed CHD within the Upper Gila MU contains two stretches of the Gila River and a portion of the San Carlos Reservoir, all of which are above Coolidge Dam. This section discusses Coolidge Dam operations as well as potential water transfers in this MU, and groundwater pumping in areas along the Gila River upstream of the San Carlos Apache Reservation.

4.7.4.1 Dam Operations

Coolidge Dam

250. Construction of Coolidge Dam was completed in 1928. The Coolidge Dam is operated by SCIP for the purposes of providing irrigation to GRIC and the SCIDD. The maximum storage of Coolidge Dam is 869,000 acre-feet at an elevation of 2,511 feet (the maximum height before water goes over the spillway). As of November 1, 2004, there were approximately 17,000 acre-feet stored in the San Carlos Reservoir (2,410 feet).[192]

251. The flows between the Coolidge Dam and the Ashurst-Hayden Diversion Dam are appropriated to GRIC and SCIDD –all diversions of Gila River water are regulated under the 1935 Globe Equity 59 Decree. The Gila Water Commissioner is appointed by the U.S. District Court to administer the Decree, which controls use of the waters of the

[192] Personal communication with Carl Christesen, San Carlos Irrigation Project, November 1, 2004.

Gila River in the reach from above Virden, NM, to its confluence with the Salt River west of Phoenix, AZ. Under the Decree, approximately 60 percent of the water goes to GRIC, while the other 40 percent goes to SCIDD.[193] SCIDD provides water to a variety of private landowners and municipalities for irrigation purposes on approximately 50,000 acres, including the communities of the Casa Grande and Florence Valleys.[194] In addition, there is ongoing litigation regarding Gila River water rights.

252. *Scenario 1*. In 2004, the USBR consulted with the Service on a proposal to sell up to 20,000 acre-feet of CAP water to the San Carlos Apache Tribe to be supplied downstream of Coolidge Dam. The purchase of CAP water would allow the San Carlos Apache to maintain water in the San Carlos Reservoir for recreation and wildlife uses, while meeting its obligations to deliver water out of the reservoir to downstream users. The March 2004 biological opinion addressed this proposed water exchange; however, this project was not implemented because the Tribe was denied a permit for the transaction.[195] In addition, the Tribe has been unable to secure funds to purchase the CAP water.[196] USBR states that this project will be reevaluated before an exchange will occur and a new consultation is likely. Thus, future impacts are uncertain. As a proxy for future costs, this analysis assesses the activities recommended by the 2004 opinion.

253. The biological opinion on the transfer recommended that USBR undertake a variety of activities, including additional research and monitoring, cowbird trapping, installation of meters, and reporting.[197] The USBR estimates that costs associated with implementing conservation activities for the flycatcher and bald eagle would occur over five years and cost approximately $2.2 million (nominal dollars), to be incurred primarily by USBR.[198] In addition, to create replacement habitat for downstream flycatcher habitat that would likely be lost if successive annual water transfers were implemented under chronic low reservoir storage conditions, the Service has suggested that flycatcher habitat could be acquired on the San Pedro River as part of an HCP.[199] Using GIS, this analysis estimates that 500 acres of proposed CHD occur downstream of San Carlos Reservoir on the Gila River. An evaluation of this scenario in 2004 estimated that $21,000 to $36,000 could be spent per acre on this mitigation (incorporating costs associated with developing an HCP). Using this assumption, this HCP could cost $11 to $16 million over 20 years. If any restrictions related to flycatcher were to require additional releases from San Carlos Reservoir to provide flows to downstream flycatcher habitat, impacts to the San Carlos

[193] Personal communication with John Allred, Gila River Water Commissioner's Office, November 5, 2004.
[194] Salmon, Riney B. "Comments of San Carlos Irrigation and Drainage District on Proposed Rule Designating Critical Habitat for the Southwestern Willow Flycatcher (69 Fed. Reg. 60706 (October 12, 2004). Salmon, Lewis, and Weldon, P.L.C., May 24, 2005.
[195] Written communication Susan Sferra, Bruce Ellis, and Henry Messing, Bureau of Reclamation, Phoenix Area Office, September 24, 2004.
[196] BIA has denied the permanent release of funds for the water purchase, which the Tribe is appealing. Comments of Southwest Regional Solicitor's Office, Service, December 15, 2004.
[197] U.S. Fish and Wildlife Albuquerque Regional Office. 2004. Biological opinion on the Bureau of Reclamation's Approval of Water Exchange by the San Carlos Apache Tribe for Retention in San Carlos Reservoir, March 8.
[198] Written communication Susan Sferra, Southwestern Willow Flycatcher Coordinator, Bureau of Reclamation, Phoenix Area Office, August 13, 2004.
[199] Comments of Southwest Regional Solicitor's Office, Service, December 15, 2004.

Apache Tribe could result. Potential impacts on the Tribe related to this water exchange are discussed in Section 7 of this analysis.

254. *Scenario 2*. The Federal District Court recently held that the BIA's operation of Coolidge Dam physically could not cause a take of flycatcher above the dam because when the water level reached the vicinity of the flycatcher nests at the rim of the Lake, the water level would be high enough to reach the spillway level, and it would automatically flow out of the lake. The court found that the only way that flycatcher along the Gila River could be injured was if insufficient water is released from Coolidge Dam.[200] Therefore, Scenario 2 is assumed not to be reasonably foreseeable at Coolidge Dam.

4.7.4.2 Other Water Transfers

255. According to the USBR, if the proposed Arizona Water Rights Settlement Bill is passed, additional CAP water exchanges are likely with Phelps Dodge and ASARCO in this MU. The Bill would also provide funding for previously authorized CAP exchanges on the upper Gila River in New Mexico. If implemented, these exchanges could result in additional diversions from the Gila River. USBR states that exchanges by parties mentioned in the Bill may be affected by flycatcher conservation measures, but such limitations, if any, would be defined through the section 7 consultation process.[201] However, it is uncertain when these activities would occur or how much water would be exchanged. One possible outcome from a section 7 consultation could be for USBR to pursue forbearance agreements on the San Pedro and Gila Rivers. The USBR states that, if required, "the objective of these agreements would be to retire agriculture and mining use to offset impacts from CAP exchanges, and help ensure the future health of the riparian ecosystem, including flycatcher habitat."[202] However, given the uncertainty associated with the passing of the Bill, this analysis does not project costs associated with potentially approved water exchanges.

4.7.4.3 Groundwater Use and Diversions Above Coolidge Dam

256. Although there is not a large-scale water management structure that controls the flow of the Gila River above Coolidge Dam in proposed CHD, a significant number of water withdrawals and diversions exist along designated river stretches. The Gila Valley Irrigation District (GVID) diverts water for irrigation using ten diversion dams along the river between San Jose and Fort Thomas, Arizona. The District is concerned that any restrictions on their ability to access the diversion dams, access roads, and canal heads for maintenance and repair could have implications for water delivery and crop production. Under the Globe Equity No. 59 Decree, the SCIP has rights that are senior to those of the GVIP. Thus, in a low water situation, GVIP water uses would be more vulnerable to

[200] San Carlos Apache Tribe v USA, 272 F. Supp.2d 860 (D.Az. 2003). The case brought by the San Carlos Apache against the Department of Interior is still pending on appeal in the Ninth Circuit Court of Appeals as of December 2004. Comments of Southwest Regional Solicitor's Office, Service, December 15, 2004.
[201] Written communication Susan Sferra, Bruce Ellis, and Henry Messing, Bureau of Reclamation, Phoenix Area Office, September 24, 2004.
[202] *Ibid.*

water shortages than SCIP users.[203] The Franklin Irrigation District has similar concerns.[204]

257. The Safford Valley in Arizona has been identified as an area where groundwater pumping may have the potential to affect the quality of flycatcher habitat along the Gila River within the proposed flycatcher CHD. GVID notes that most of the farmers that are served by GVID also rely on groundwater wells to supplement irrigation needs. Groundwater pumping in this area for irrigation purposes may impact the level of the Gila River.[205] There is limited data available regarding groundwater pumpage in areas of Arizona such as the Safford Valley, which falls outside of active management areas. However, ADWR's groundwater wells registry database provides the number wells drilled for various purposes in the area.

258. Based on ADWR well registration data, there are approximately 1,800 exempt wells and 1,600 non-exempt wells in the area. As stated above, exempt wells produced less than 35 gallons per minute, while non-exempt wells are wells that can pump 35 or more gallons per minute. The breakdown of water use for each of these types of well is shown in Exhibit 4-20. The primary use for exempt wells is domestic use, and for non-exempt wells irrigation. Non-exempt wells likely make up a much greater proportion of the water withdrawals. Thus, any limits on groundwater pumping for flycatcher conservation purposes would primarily impact irrigation users in this area.

[203] Public comments of Neal Montierth, Gila Valley Irrigation District, on the Proposed Rule to Designate Critical Habitat for the Southwestern Willow Flycatcher, May 25, 2005; Public comments of L. Anthony Fines, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher," Law Offices of L. Anthony Fines, May 31, 2005 and July 18, 2005.

[204] Comments of David A. Brown and Michael J. Brown, Brown & Brown Law Offices, of behalf of the Franklin Irrigation District, "Proposed Designation of Southwestern willow flycatcher critical habitat," July 18, 2005.

[205] Arizona Department of Water Resources. Upper Gila Watershed web page. Accessed at http://www.water.az.gov/adwr/Content/WaterInfo/OutsideAMAs/SoutheasternArizona/Watersheds .

Exhibit 4-20

SAFFORD VALLEY GROUNDWATER WELLS

	Type of Well		
Water Use	**Exempt**	**Non-Exempt**	**Total**
Unknown	1	2	3
Commercial	1	3	4
Domestic	1,278	157	1,435
Industrial	14	20	34
Irrigation	204	1,330	1,534
Mining	18	21	39
Monitoring		1	1
Municipal		13	13
None	4		4
Other - Production	1	4	5
Recreation	3	8	11
Stock	273	43	316
Test		6	6
Utility (Water Company)	1	5	6
Total	**1,798**	**1,613**	**3,411**

Source: Arizona Department of Water Resources, Groundwater wells registry database. Based on data for Graham County, Upper Gila Watershed wells, where the Well Use was identified as Water Production.

4.8 RIO GRANDE RECOVERY UNIT

4.8.1 Middle Rio Grande Management Unit

259. The Service is proposing a 129-mile segment of the Middle Rio Grande in New Mexico as flycatcher critical habitat. This segment starts 4.2 miles north of the intersection of I-25 and I-40 downstream to the overhead powerline near Milligan Gulch at the northern end of Elephant Butte State Park. This reach does not include any area within the active conservation pool of Elephant Butte.[206] This reach is also critical habitat for the Rio Grande silvery minnow.

260. In 1995, 340,000 acre-feet of surface water in the Middle Rio Grande region was consumed. Of that water, 28 percent was withdrawn for agricultural use, 28 percent was assumed to be consumed by riparian vegetation, 25 percent was used for public water supply, and 16 percent was lost of open water evaporation.[207] Exhibit 4-21 presents the surface water withdrawals for 2000 for Bernallillo, Cibola, Sandoval, Santa Fe, Soccorro, Torrance, and Valencia Counties, the six counties in the Middle Rio Grande. The City of Albuquerque, a city of 450,000 people, surrounds a portion of the Middle Rio Grande.

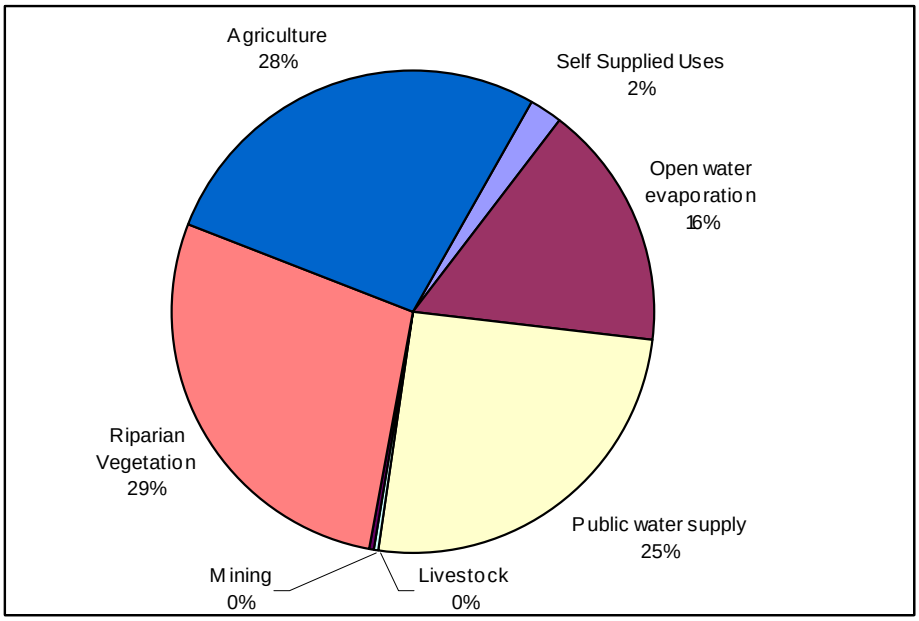
[206] Email communication with the Service, Southwestern Regional Office and Phoenix Field Office, October 20, 2004.

[207] Middle Rio Grande Regional Water Plan: 2000 to 2050, Volume 1, August 2004. http://www.ose.state.nm.us/water-info/NMWaterPlanning/regions/MiddleRioGrande/CH07-CurrentWaterDemand-No-ActionFutureWaterDemand.pdf, accessed September 2005.

Though the City primarily relies on groundwater for its drinking water, it holds rights to San-Juan Chama project water that it intends to utilize in the future. The Middle Rio Grande Conservancy District extends for much of the proposed CHD area along the Rio Grande, and covers about 278,000 acres, of which 128,787 acres are irrigable lands, and currently serves approximately 70,000 irrigated acres of private land, including six Indian Pueblos and part of the City of Albuquerque.

Exhibit 4-21

DISTRIBUTION OF CONSUMPTIVE USE IN MIDDLE RIO GRANDE REGION



Source: Water Use by Categories in New Mexico Counties and River Basins, and Irrigated Acreage in 2000 by Brian C. Wilson, P.E., New Mexico State Engineer Office, Technical Report 51, 2003. Accessed at http://www.seo.state.nm.us/water-info/water-use/county00/mcounty.html on November 3, 2004.

USACE and USBR

261. A large programmatic opinion on USBR's Water and River Maintenance Operations, USACE Flood Control Operations, and related Federal Actions on the Middle Rio Grande was issued March 17, 2003. This opinion found jeopardy for both Rio Grande silvery minnow and flycatcher. The opinion included concurrences (informal) on the bald eagle and interior least tern. This consultation was a reinitiation of an earlier consultation that was completed in 2001.

262. USACE is responsible for operation and maintenance of five flood control dams on the Rio Grande: Abiquiu (Rio Chama), Cochiti, Galisteo (Galisteo Creek), Jemez Canyon (Jemez River), and Platoro (Conejos River) dams. Of these, only Cochiti is on the mainstem Rio Grande, and it is located above the flycatcher proposed CHD on the

Middle Rio Grande. USBR is responsible for the operation, maintenance, and/or oversight of Federal projects on the mainstem Rio Grande and its upper basin tributaries. Projects that affect the Middle Rio Grande are the San-Juan Chama project and the Middle Rio Grande Project. The San Juan-Chama project allows the diversion of Colorado River Basin water into the Rio Grande Basin of New Mexico. The Middle Rio Grande Conservancy District (MRGCD) operates the Middle Rio Grande Project works under a 1951 contract with USBR, who maintains title to the works. These works include the Cochiti Heading (which takes water directly out of the upper stilling basin of Cochiti Dam outlet works), Isleta, San Acacia, and Angostura diversion dams.

263. The Reasonable and Prudent Alternative for the March 17, 2003 biological opinion is summarized in Exhibit 4-22.

Middle Rio Grande Endangered Species Collaborative Program

264. The Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program) was established in 2000 (also known as the ESA Work Group). In 2002, a Memorandum of Understanding (MOU) was signed by a wide array of stakeholder groups, including the New Mexico Interstate Stream Commission, City of Albuquerque, the Middle Rio Grande Conservancy District, USACE, USBR, as well as several other Tribal, local, state, and Federal representatives. The MOU formalizes the Collaborative Program and assists with securing funding.

265. The Collaborative Program has a dual goal of survival and recovery of endangered species while simultaneously protecting existing and future water uses in compliance with state and Federal law. USBR reports that the Collaborative Program "was established in 2001 to help implement the biological opinions related to water operations on the middle Rio Grande. The Collaborative Program, which is currently funded through write-in monies, was developed specifically to benefit both the southwestern willow flycatcher and the Rio Grande silvery minnow (*Hybognathus amarus*)."[208] These "write-in monies" are Federal congressional appropriations, funded annually, which are combined with funds from the New Mexico state legislature. The program received $24.8 million in Federal funds through 2003, and $1.5 million from New Mexico.[209] Congress appropriated nearly $7 million in 2004 for program activities.[210] Funding through to 2005 has been used for efforts to acquire and manage water, enhance habitat, and increase species populations of the silvery minnow and flycatcher.[211]

[208] Written memorandum from Robert Doster, USBR, Albuquerque Area Office, August 18, 2004.
[209] "Middle Rio Grande: ESA Collaborative Program Overview." Accessed at http://www.usbr.gov/uc/albuq/envprog/mrg/fact/collabprog.pdf on February 10, 2005.
[210] Middle Rio Grande Endangered Species Collaborative Program. "2004 Annual Report: Middle Rio Grande Endangered Species Collaborative Program." 2004.
[211] Public comments of Mark S. Sanchez, Albuquerque Bernalillo County Water Utility Authority, " Albuquerque Bernalillo County Water Utility Authority comments on FWS designation of critical habitat for the SWWF", May 26, 2005.

City of Albuquerque

266. The Service issued a biological opinion on the City of Albuquerque's Drinking Water Project in February 2004 that included the silvery minnow and the flycatcher. The Albuquerque Bernalillo County Water Utility Authority has now assumed responsibility for the Project and implementation of the biological opinion. Conservation measures agreed to as part of the opinion included:

- Maintenance of an accounting system that identifies the locations and quantities of water diverted from the river, and the amount returned to the river
- Assisting with short and long term voluntary conservation measures, including a project to remove non-naïve species from the riparian area within Albuquerque (to which the City has invested $650,000
- Efforts to minimize impacts on listed species during construction
- Reporting and coordination of efforts to the Service
- Numerous habitat restoration efforts.

267. Reasonable and prudent measures included spill prevention and containment methods during construction, and several measures to benefit silvery minnows (egg collection, fish screens, fish salvage).

Exhibit 4-22

REQUIREMENTS OF THE MARCH 17, 2003 BIOLOGICAL OPINION ON THE MIDDLE RIO GRANDE FOR THE RIO GRANDE SILVERY MINNOW AND THE FLYCATCHER

ID	Conservation Effort	Flycatcher	Minnow
Water Operations Elements			
A	A one-time increase in flows annually to cue minnow spawning	No	Yes
B	Release any supplemental water (manage available water efficiently)	Yes	Yes
C	Routine monitoring when flows are 300 cfs or less	Yes	Yes
D	Provide active flycatcher territories with pumped water from the LFCC June 15-September 1	Yes	No
E/H/L	Provide continuous flow from Nov 16 to June 15 to the southern boundary of minnow critical habitat (average and dry years); with target flow at San Marcial Floodway gage of 100cfs (wet years)	Benefit to habitat	Yes
F/J/N	Agencies shall provide year round flow from Cochiti to Isleta Diversion Dam with a minimum flow of 100cfs at the Central Bridge gage (dry years); with a target flow of 100 cfs over Isleta Diversion Dam (average years); with a target flow of 150 cfs over Isleta Diversion Dam (wet years)	Yes	Yes
G/K/O	Reclamation shall pump from LFCC to prevent river recession (dry and average years); as needed (wet years)	Yes	Benefit
I/M	Ramp down flow from June 16 to July 1 to achieve a target flow of 50 cfs over San Acacia dam through November 15 (average years);to achieve a target flow of 100 cfs over San Acacia dam through November 15 (wet years)	Benefit	Yes
Habitat Improvement Elements			
P	Prevent or minimize flycatcher habitat destruction when installing pumps or wells	Yes	No
Q	Improve gauging and monitoring	Yes	Yes
R	Add fish passage at San Acacia	No	Yes
S	Conduct habitat restoration of 1600 acres by 2013	Yes	Yes
T	When bioengineering is not possible, conduct habitat restoration	Yes	Yes
U	By Sept 30, 2008, collaborate on San Marcial RR Bridge river realignment and proposed relocation	Yes	Yes
V	In above average years, Corps shall provide overbank flooding to create habitat for minnow and flycatcher	Yes	Yes
W	Corps and Pueblos shall investigate sediment transport through Jemez Canyon and Galisteo Dam and Cochiti	No	Yes
X	Agencies shall prevent saltcedar encroachment and destabilize islands, but should not degrade flycatcher habitat	Yes	Yes
Salvage and Captive Propagation Elements			
Y	Agencies shall provide $300,000 annually to NMESFO for propagation activities	No	Yes
Z	Agencies shall provide $200,000 annually for the first 3 years for site expansion of propagation facilities for minnow	No	Yes
AA	Agencies shall construct two new naturalized refugia for minnow	No	Yes
BB	Beginning in 2008, agencies shall provide NMESFO with $100,000 annually for 5 years for monitoring of minnows	No	Yes
CC	Silvery minnow surveys	No	Yes
Water Quality Elements			
DD/EE	Water quality funding for minnow	No	Yes
Reporting Element			
FF	Agencies shall provide a consolidated report on the status of RPA elements to the Service annually.	Yes	Yes

Source: Biological and Conference Opinions on the effects of Actions Associated with the Programmatic Biological Assessment of Bureau of Reclamation's Water and River Maintenance Programs, Army Corps of Engineers' Flood Control Operation, and Related Non-Federal Actions on the Middle Rio Grande, New Mexico, March 17, 2003.

268. The USBR reports that it has expended efforts for flycatcher conservation since 1996. These efforts include administrative costs associated with coordinating the flycatcher program and section 7 consultation with the Service, survey and monitoring efforts, grazing studies, brown-headed cowbird studies, habitat restoration, and habitat management. The USBR reports that "most habitat restoration activities for southwestern willow flycatchers have been accomplished through the Middle Rio Grande Endangered Species Act Collaborative Program."[212] As shown in Exhibit 4-23, past expenditures to date incurred by USBR related to flycatcher conservation total approximately $10 million.

Exhibit 4-23

PAST USBR COSTS OF FLYCATCHER CONSERVATION ON THE MIDDLE RIO GRANDE (1996-2003)

Type	Expenditures (Nominal $)
Administrative	$950,000
Survey/ Monitoring [1]	$1,806,000
Grazing studies	$280,000
Cowbird studies [2]	$277,000
Habitat Restoration [3]	$6,220,000
Habitat Management [4]	$439,000
Total	**$9,972,000**

Notes:

[1] In 1996, $15,000 was used to survey the Pecos River, the remainder used for the Rio Grande. All subsequent years are Rio Grande survey and monitoring only.

[2] Brown-headed Cowbird studies include trapping (discontinued in 2002) and survey and monitoring of alternative songbird host species.

[3] Most habitat restoration activities for Southwestern Willow Flycatchers have been accomplished through the Middle Rio Grande Endangered Species Act Collaborative Program.

[4] Habitat management work includes various items such as acquisition of aerial photography, vegetation classification and associated ground-truthing, topographic mapping, etc.

Source: Written memorandum from Robert Doster, Albuquerque Area Office, USBR, August 18, 2004.

269. Future costs associated with the Collaborative Program, which will include funding for silvery minnow recovery efforts as well as flycatcher recovery efforts, have been projected by the Program to be $257 million (nominal dollars) between 2005 and 2014, as presented in Exhibit 4-24. Projected costs for flycatcher recovery efforts, estimated by excluding silvery minnow costs where possible, and splitting projected costs of shred activities evenly among the two species, are approximately $90 million (nominal dollars, 2005 to 2014).

[212] Written memorandum from Robert Doster, USBR, Albuquerque Area Office, August 18, 2004.

EXHIBIT 4-24

SUMMARY OF MRG ESA COLLABORATIVE PROGRAM ACTIVITIES AND COST

Description of Activity	Approximate Costs From 2001-2004 (Nominal $)	Total Estimated Costs 2005-2014 (Nominal $)
Silvery Minnow Recovery Research	$1,606,000	$10,525,000
Silvery Minnow Population Management	$2,330,000	$12,730,000
Captive Silvery Minnow Management	$5,370,000	$13,400,000
Flycatcher Research and Population Management	$433,800	$2,475,000
Habitat Restoration		
General Studies and Environmental Compliance Oversight	$277,200	$400,000
Comprehensive and Reach Specific Plan Development	$1,544,100	$850,000
Flycatcher Habitat Restoration	$2,182,450	$9,500,000
Silvery Minnow Habitat Restoration	$8,666,200	$34,800,000
Fish Passage/River Connectivity	$1,002,200	$14,100,000
Water Operations	$5,104,000	$8,313,000
Program Coordination	$4,443,800	$11,050,000
Water Acquisition	$9,053,000	$135,200,000
TOTAL COST*	**$44,281,950**	**$257,076,000**
FLYCATCHER-SPECIFIC TOTAL	**$23,038,350**	**$89,881,500**

*The figures in this exhibit do not sum precisely. These are reported here as they appear in the Collaborative Program data.

Source: Middle Rio Grande Endangered Species Collaborative Program Long-Term Plan, February 28, 2005, Draft for PMSC Review. Submitted as Appendix 2D. February 2005 MRG ESA Collaborative Program Long-Term Plan. Public comments of Mark S. Sanchez, Albuquerque Bernalillo County Water Utility Authority, " Albuquerque Bernalillo County Water Utility Authority comments on FWS designation of critical habitat for the SWWF", May 26, 2005.

4.8.2 San Luis Valley Management Unit

270. The Service is proposing an 87-mile segment of the Rio Grande River and a 29-mile segment of the Conejos River in Costilla, Conejos, Alamosa and Rio Grande Counties, Colorado, in the San Luis Valley MU. The San Luis Valley is a high mountain desert where agriculture and livestock raising has been the primary economic activity since the mid-1800's.[213] The Rio Grande Water Conservation District (RGWCD) is comprised of cities, towns, water conservancy districts, water users associations, and irrigation companies in the San Luis Valley. It was formed in 1967 to represent the San Luis Valley in litigation concerning the Rio Grande Compact.[214] Water control structures

[213] Simonds, Wm Joe. "The San Luis Valley Project." Accessed at www.usbr.gov/history/sanluisv.htm on November 17, 2004.

[214] Robbins, David and Laura Bottaro. "Comments by the Rio Grande Water Conservation District on Preparation of a Proposed Rule Designating Critical Habitat for the Southwestern willow flycatcher and Related NEPA Compliance," Public scoping comments to Service, March 8, 2004.

in the area include a number of canals for irrigation and the San Luis Valley Project. Agricultural land uses are summarized in Exhibit 4-25.

Exhibit 4-25

AGRICULTURAL LAND USE FOR RIO GRANDE, ALAMOSA, CONEJOS, AND COSTILLA COUNTIES IN COLORADO (2002)

Item	State Total	Rio Grande	Alamosa	Conejos	Costilla
Total Cropland Acres (% of state)	11,530,700 (3.7%)	110,868 (1%)	111,194 (1%)	138,281 (1.2%)	69,789 (0.6%)
Harvested Cropland Acres (% of state)	4,346,955 (5.6%)	79,993 (1.8%)	78,963 (1.8%)	51,976 (1.20%)	34,330 (0.8%)
Irrigated Land Acres (% of state)	2,590,654 (10.7%)	89,241 (3.4%)	93,968 (3.6%)	59,209 (2.3%)	34,866 (1.4%)
Major Crops		Potatoes, barley and forage	Potatoes, barley, forage and oats	Barley, potatoes, forage and oats	Potatoes, barley, oats and forage.

Source: County Summary Highlights, 2002 Census of Agriculture-County Data, USDA, National Agricultural Statistics Service, 2002.

271. The San Luis Valley Project was authorized in 1940 to provide flood control protection and regulate water supply for San Luis Valley. Platoro Dam is the only part of the project that was built to date, located 40 miles away from the Conejos River Water Conservancy District and the proposed CHD. Until the 1980's, the dam was used exclusively for flood control protection, as water was not able to be stored in the reservoir in order for Colorado to meet its obligation to deliver Rio Grande River water to New Mexico annually. Since then, the reservoir has been used to provide some water for irrigation use in the Valley. Currently, the USBR is developing the Closed Basin Division of the project north of the Rio Grande and proposed CHD, which aims to install wells, pumping plants, laterals, and a canal to salvage groundwater for delivery to the Rio Grande.[215]

Future Impacts

272. Along the Rio Grande River, through the town of Alamosa, there are a series of dikes installed in order to prevent flooding of nearby communities and businesses. Future operations and maintenance for this flood control device that overlap with proposed CHD will likely require section 7 consultation and associated flycatcher conservation measures by the RGWCD. To forecast the cost of this project, this analysis applies the average cost of flycatcher conservation efforts from similar past flood control projects, or $1.6 million (2004 dollars, assuming a seven percent discount rate).

273. In addition, RGWCD is currently developing an HCP for the region. The anticipated goals of the HCP are to "provide long-term protection and conservation for the endangered flycatcher and its habitat, to protect the land and water use practices and

[215] "San Luis Project, Colorado," US Bureau of Reclamation. Accessed at www.usbr.gov/dataweb/html/sanluis.html on November 17, 2004.

values of private landowners which are essential to the large agricultural community in the San Luis Valley, and to provide an example of implementing a regional HCP in rural areas." In addition, "the District wants to take a proactive approach to ESA compliance for flycatchers living in habitat in the San Luis Valley in south-central Colorado. FWS has encouraged the District and landowners in the Valley to develop an HCP in support of an incidental take permit for covered non-Federal activities. The upcoming designation of critical habitat also motivated the District to consider development of a San Luis Valley HCP."[216]

274. Past costs of HCP development were $112,000 through 2003 (2004 dollars). RGWCD anticipates that future costs of completing the development of the HCP at $490,000 (2004 dollars).[217]

275. RGWCD reports that compliance costs associated with the HCP are unknown at this time because the HCP is in its early development phases. To roughly estimate the potential implementation costs of this HCP, this analysis assumes that costs will be similar to those anticipated as a result of the HCP being developed for Horsehoe and Bartlett Reservoirs in Arizona, because known HCP development costs are similar. While the San Luis Valley portion of critical habitat does not contain reservoirs, it appears likely that costs associated with land acquisition, habitat management and maintenance, and survey and monitoring will occur as a result of this HCP. As a result, costs of future development and implementation of the San Luis Valley HCP are estimated at approximately $300,000 to $600,000 annually, or $5.0 million over the life of the HCP (2004 dollars, 50 years, discounted at percent).

276. The RGWCD has expressed concern about potential impacts that critical habitat may have on activities in the district, including:

- "Possible adverse effects on the District's statutory obligation to safeguard the waters of the Rio Grande and its tributaries, to which Colorado is equitably entitled by the Rio Grande Compact, and to meet Colorado's Rio Grande Compact obligations. For example, the State of Colorado and the District water users are obligated to provide Rio Grande water to downstream states under the Rio Grande Compact. The Colorado State Engineer encourages private landowners to keep stream channels open to maintain current flows to meet these Compact obligations, and to maintain current irrigation practices and the intricate system of water rights administration in the San Luis Valley.[218]

[216] Written comments of Craig Sommers, ERO Resources, on behalf of the Rio Grande Water Conservation District, Colorado, to Industrial Economics, Inc. September 21, 2004.
[217] "Table 2. Cost Share Contribution, San Luis Valley Regional HCP", Revised June 28, 2004. Provided by Ron Beane, ERO Resources, September 1, 2004. Also, Written comments of Craig Sommers, ERO Resources, on behalf of the Rio Grande Water Conservation District, Colorado, to Industrial Economics, Inc. September 21, 2004.
[218] This point was reiterated in the public comments of Steven Vandiver, "Comments on the Proposed Critical Habitat Designation for the Southwestern willow flycatcher in the San Luis Valley in Colorado," State of Colorado, Office of the State Engineer, May 26, 2005.

- Possible additional adverse effects on land and water uses, including water delivery and irrigation systems, bridge construction and maintenance, and flood control activities (or flood damages if riparian vegetation cannot be removed).
- Possible adverse effects on the District's proposed HCP by making it more difficult and expensive to obtain an incidental take permit.[219]
- Possible adverse effects on irrigation and other agricultural activities including grazing, which may affect the economic viability of some small operations.
- Possible damage to the existing good working relationship between private landowners and federal and state agencies, including FWS, to protect and benefit wildlife.
- Possible loss of future opportunities to manage habitat for the benefit of other wildlife species because of adverse reactions of landowners to imposition of critical habitat, which will be seen as another Federal land use restriction."[220]

277. In addition, a public comment submitted by the State of Colorado, Office of the State Engineer, expresses concerns about the possibility that proposed CHD may inhibit flexibility in water management needed for the river system, which is overallocated, as well as inhibiting river access to gauging stations and maintenance areas.[221]

4.8.3 Upper Rio Grande Management Unit

278. The Service is proposing a 46-mile segment of the Upper Rio Grande, a 7-mile stretch of Rio Grande del Rancho, and a 6-mile stretch of Coyote Creek in Taos, Rio Arriba, and Santa Fe Counties, New Mexico. The Upper Rio Grande MU does not appear to contain any significant water management infrastructure that will be affected by proposed CHD for the flycatcher.

[219] This point was reiterated in a public comments from John T. Salazar, U.S. House of Representatives, May 27, 2005, and Public comments of the Bill Owens, State of Colorado, Office of the Executive Director, July 18, 2005.
[220] Robbins, David and Laura Bottaro. "Comments by the Rio Grande Water Conservation District on Preparation of a Proposed Rule Designating Critical Habitat for the Southwestern willow flycatcher and Related NEPA Compliance," Public scoping comments to Service, March 8, 2004; Public comments of Hill & Robbins, P.C., "Comments by the Rio Grande Water Conservation District on the Proposed Rule Designating Critical Habitat for the Southwestern willow flycatcher, and Related NEPA Compliance (Environmental Assessment and Economic Analysis), May 31, 2005; Public comments by the Conejos Water Conservancy District on the Proposed Rule Designating Critical Habitat for the Southwestern willow flycatcher, and Related NEPA Compliance (Environmental Assessment and Economic Analysis", Moses W. Wittenmyer, Harrison, and Woodruff, P.C., May 31, 2005.
[221] Public comments of Steven Vandiver, "Comments on the Proposed Critical Habitat Designation for the Southwestern willow flycatcher in the San Luis Valley in Colorado," State of Colorado, Office of the State Engineer, May 26, 2005.

4.8.5 Caveats to Economic Analysis of Impacts on the Water Management Activities

279. Exhibit 4-27 summarizes the key assumptions of the analysis of economic impacts on the water management activities, as well as the potential direction and relative scale of bias introduced by these assumptions.

Exhibit 4-27

CAVEATS TO THE ECONOMIC ANALYSIS ON WATER MANAGEMENT ACTIVITIES

Key Assumption	Effect on Impact Estimate
It is unknown whether water operators will be forced to change operations to accommodate flycatcher (i.e., whether Scenario 1 or Scenario 2 will apply to given facilities)	+/-
Detailed hydrologic and behavioral models were not used in this analysis to model impacts of potential changes to water operations. As a result: • Scenario 2 assumes that water that cannot be stored is lost from use (i.e., spilled water is not captured in downstream impoundments or otherwise used by downstream users). • Scenario 2 assumes that there is no adaptive response on the part of water managers and users in response to water use restrictions, including limited substitution to other sources of water and power supplies.	+
Potential benefits to groundwater recharge of additional water releases are not included in the alternative analysis.	+
The average value of replacement water supplies is based on current market prices.	-
There is an absence of hydrologic data (e.g., conjunctive characteristics of groundwater/surface water; total quantity of water currently pumped; level of pumping that would allow for recovery of historic groundwater levels; the geographic area over which changes in pumping would be required).	+/-
Under Scenario 2, this analysis uses the average reservoir level over the past 5 years as a proxy for the required level to protect flycatcher habitat, where current habitat elevation is lacking. For Alamo Lake, AZDWR estimates that the average elevation proxy yields an estimate that is lower in elevation than current habitat elevation. [222] This would means that current estimates overstate the need for changes to water management needed to accommodate the flycatcher.	+/-
Under Scenarios 1 and 2, this analysis assumes that water level restrictions will be in effect year-round. In fact, the consultation history suggests that water level restrictions may only be disallowed for part of a year (e.g., during the flycatcher breeding season).	
- : This assumption may result in an underestimate of real costs. + : This assumption may result in an overestimate of real costs. +/- : This assumption has an unknown effect on the magnitude of cost estimates.	

[222] Arizona Department of Water Resources, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher: Federal Register: October 12, 2004 (Volume 69, Number 196)", Comments of Herbert R. Guenther, May 27, 2005.

POTENTIAL ECONOMIC IMPACTS TO LIVESTOCK GRAZING ACTIVITIES

SECTION 5

280. This section describes the past and expected future economic impacts to livestock grazing activities in areas proposed as critical habitat for the flycatcher. Specifically, this analysis estimates direct and indirect impacts on grazing due to flycatcher conservation activities. This section is divided into three parts. The first provides an overview of grazing in areas proposed for critical habitat and a general description of recommended conservation activities. Next is a description of the methods used to estimate the economic impacts of grazing restrictions implemented to protect the flycatcher and its habitat. The final section provides a summary of the past and expected future impacts to grazing, by management unit. Appendix A, Small Business Impacts, presents impacts on grazing activities organized by county and on a per ranch basis.

5.1 Background

281. The proposed critical habitat area for the flycatcher includes areas of USFS, BLM, and private lands that are used for seasonal or year round livestock grazing. Exhibit 5-1 presents the number of acres of USFS, BLM, and non-federal grazing lands included in this proposed designation.

Exhibit 5-1

ACRES OF USFS, BLM, AND NON-FEDERAL GRAZING LANDS IN PROPOSED FLYCATCHER CRITICAL HABITAT

Recovery Unit	USFS	BLM	Non-federal
Coastal California	700	-	9,000
Basin and Mohave	500	-	13,100
Lower Colorado	500	20,400	10,800
Gila	24,400	4,800	20,600
Rio Grande	100	4,000	41,200
TOTAL:	**26,200**	**29,200**	**94,700**

Note: Numbers may not sum due to rounding.
Sources: For NM, AZ, CO, NV, UT: National Land Cover Data, USGS, 2004, "grasslands/herbaceous" and "shrubland" land classes; For CA: Agricultural land use data, California Division of Land Resource Protection, Department of Conservation, 2004,"Grazing lands" classification.

282. While livestock grazing does not directly impact the flycatcher, it has the potential to indirectly affect it. The RP states that grazing may affect the flycatcher by:

- Impairing the ability of riparian communities to develop into flycatcher habitat;
- Destroying nests with eggs or young; and
- Facilitating brood parasitism by brown-headed cowbirds.[223]

283. The Recovery Plan notes that "...the effects of livestock grazing vary over the range of the flycatcher, due to variations in grazing practices, climate, hydrology, ecological setting, habitat quality, and other factors. … Addressing the issue of livestock management in the context of recovery of the southwestern willow flycatcher is therefore complicated." On Federal lands, specific management of grazing allotments is left to the discretion of the Federal agencies responsible for permitting grazing on their lands. Grazing activities on non-federal lands are discussed in section 5.3.

5.2 Overview of Impacts on Federal Grazing Activities

284. This section discusses the typical project modifications implemented to provide protection for the flycatcher from livestock grazing activities on Federal lands. For allotments where formal consultation was conducted in the past, the USFS and BLM proposed adaptations to accommodate the flycatcher, and in turn the Service presented Reasonable and Prudent Measures and Terms and Conditions for USFS and BLM to follow. This analysis refers to these actions as project modifications. Exhibits 5-2 and 5-3 present a

[223] Recovery Plan for the Southwestern willow flycatcher (*Empidonax traillii extimus*), Service, August 2002 (Appendix G).

list of example project modifications from past consultations on USFS and BLM grazing allotments. Examples of conservation activities implemented on grazing allotments for flycatcher protection include:

- Conducting surveys at occupied and/or potential flycatcher locations;
- Exclusion or removal of livestock grazing from riparian areas year-round, or during the flycatcher breeding season;
- Monitoring of the entire river corridor to ensure that permitted and trespass cattle remain outside flycatcher nesting areas and riparian corridors; and
- Initiation of cowbird trapping programs during the flycatcher breeding season to reduce the incidence of cowbird parasitism.

285. These actions can be grouped into three categories: grazing restrictions, other project modifications, and administrative costs. The following sections provide a discussion of the methodology used to estimate the cost of each of these categories on livestock grazing activities.

Exhibit 5-2

EXAMPLE PROJECT MODIFICATIONS FROM PAST FORMAL CONSULTATIONS BY USFS ON SOUTHWESTERN WILLOW FLYCATCHER

Grazing restrictions:

- If standardized monitoring indicates that use of apical stems of woody riparian vegetation exceeds 40% (frequency of occurrence), then the Service must remove livestock from riparian area in the affected pasture immediately and shall defer use of the riparian area in the affected pasture in the following year. (a)

Monitoring and reducing cattle trespassing:

- Any trespass livestock found shall be removed from riparian areas immediately and a reasonable effort shall be made to determine and eliminate the source or point of trespass. (a)
- Immediately remove all cattle entering the breeding area through breaks in fencing on neighboring allotments. (c)

Livestock monitoring:

- Monitor livestock use of riparian areas to which livestock have access. (a)
- Monitor the entire river corridor through the allotment for livestock. (a)
- Monitor to ensure that cattle remain outside of the WIFL breeding area and riparian area after March 15 of each year. (c)
- Ensure that cattle do not access habitat occupied by flycatcher or its proposed critical habitat, including inspecting and repairing fencing that excludes cattle. (d)

Cowbird trapping:

- Initiate cowbird trapping program by April 1 and continue through July 31, or until the WIFL breeding season has ended. (b, c, d)
- If breeding status of any flycatcher observed is confirmed or suspected, begin a brown-headed cowbird trapping program in the following year by April 1. (e)
- Maintain data on the brown-headed cowbird trapping program. (e)

WIFL monitoring:

- Monitor WIFL as part of the statewide Partners in Flight survey and monitoring effort. (b, c)
- Conduct annual surveys at the project site. (d, e)
- Conduct surveys at potential flycatcher locations at least once in each of the last two ten-day periods of May. (d, e)
- Determine breeding status of any flycatcher observed. If breeding status is confirmed or suspected, continue monitoring efforts by visiting breeding locations at least once during each of the three 10-day periods of June and July. (e)
- Monitor for signs of nest parasitism. (e)

Surveys:

- Map the distribution, size, and areal extent of riparian habitats along the river corridor through the allotment. (a)

Administrative:

- Report to the Service each year on the WIFL survey and cowbird trapping program. (e)

Sources: (a) 2-21-94-I-559, Tonto National Forest, Yavapai County, AZ, June 25, 1997; (b) 2-21-92-F-693, Eastern Roosevelt Lake Watershed, Gila County, AZ, December 1, 1995; (c) 2-21-92-I-360, Tonto Basin, AZ, November 30, 1995; (d) 2-21-95-F-399, Coconino National Forest, Coconino and Yavapai Counties, AZ, September 27, 1995; (e) 2-21-92-F-500, Coconino National Forest, Yavapai and Coconino Counties, AZ, February 3, 1995.

Exhibit 5-3

EXAMPLE PROJECT MODIFICATIONS FROM PAST FORMAL CONSULTATIONS BY BLM ON SOUTHWESTERN WILLOW FLYCATCHER

Grazing restrictions:

- Livestock grazing shall be restricted to winter grazing of riparian pastures from November 1 to April 1. (a)
- Monitoring of the utilization levels shall be done to ensure <30 percent utilization limits are not exceeded. Once the 30 percent utilization level is met , all livestock will be removed from the pasture. (a)
- Riparian exclosures will be excluded from grazing. The fences of all riparian exclosures shall be inspected and maintained at least twice annually. (c)

Cowbird trapping:

- Implement cowbird trapping in the action area if cowbird parasitism results in excess of 5 percent nest failure per year. (a)
- New livestock management facilities that are likely to attract and support cowbirds must be located beyond five miles of occupied, suitable, or potential flycatcher habitat. (b)
- If flycatcher breeding is confirmed or suspected, begin a brown-headed cowbird trapping program in the following year by April 1. (c)
- Monitor for signs of nest parasitism such as cowbirds fledgling from flycatcher nest(s). (c)

Monitoring and reducing cattle trespassing:

- Work with private landowners to exclude livestock from Bureau-administered lands. (a)
- Take immediate action to remove trespass cattle from or within 5 miles of occupied flycatcher habitats, and measures, including fences, shall be developed and implemented. (a, b)
- Work diligently with adjacent landowners to ensure that trespass does not continue. (a, b)
- Grazing in riparian pastures with occupied habitat will not be authorized until riparian fencing is completed. (a)

Maintenance and management activities:

- Construction, maintenance, and management activities in occupied or suitable flycatcher habitat shall occur outside the SWWF breeding season (April 15 – August 31). (a, b)
- Construction, maintenance, and management activities in occupied SWWF habitat shall be planned to avoid removing trees and shrubs. (a)
- Construction, maintenance, and management activities in occupied SWWF habitat shall be planned to avoid removing willows and cottonwoods. (b)
- Restriction of range improvement activities in the riparian corridor, except for fences, cattle guards, and gates to exclude and better manage cattle. (a, b)
- Fence maintenance of exclosures, riparian pastures, or boundary fences, and sweeps of occupied and unsurveyed suitable habitat will be conducted before each flycatcher breeding season. (b)

Management plans:

- If Allotment Management Plans are not yet developed, they shall be completed within three years and implemented no later than two years after completion. (a, b)
- A mitigation plan shall be developed by the Bureau in coordination with the Service for each range improvement project and vegetation management project that may adversely affect the SWWF, and for each prescribed fire in the allotments. (b)

Monitoring:

- Monitor incidental take resulting from the proposed action and report the findings of that monitoring. (a, b)
- Conduct annual surveys for flycatcher along the river and its tributaries that may provide suitable habitat. If flycatchers are detected, determine their breeding status. (c)

General:

- Conduct all proposed actions in a manner that will minimize take of southwestern willow flycatchers and minimize the suitability of the area for cowbird habitation. (c)
- Work with the Natural Resource Conservation Service and landowners in the allotments to develop and implement watershed improvement projects and will increase infiltration. (b)

Sources: (a) 2-21-00-F-0029, Middle Gila River Ecosystem, Gila and Pinal Counties, AZ, October 23, 2003; (b) 2-21-96-F-160, Safford and Tucson Field Office's Livestock Grazing Program, Southeastern, AZ, September 26, 1997; (c) 2-21-95-F-177, Empire-Cienega Ranch, Pima County, AZ, January 8, 1996.

5.2.1 AUMs and permit value on Federal lands

286. The greatest economic impact of flycatcher conservation on grazing activity occurs when restrictions on the use of riparian areas for livestock grazing are implemented.[224] Exclusion of riparian areas from grazing can result in a reduction in the number of permitted AUMs (animal unit months: forage for one cow and calf for one month) on the allotment. This section provides a discussion of the methodology used to estimate the economic value of reductions in permitted AUMs.

287. The system of Federal grazing permits in the American West was established on USFS lands in the early 1990s and on BLM lands by the Taylor Grazing Act of 1934.[225] In most areas, qualifying ranches ("base properties") were assigned an exclusive amount of AUMs based on the carrying capacity of the grazing allotment.[226] These allotments were connected to private holdings through the establishment of renewable leases that were both inheritable and transferable with the sale of the land or, in the case of USFS permits, the transfer of the livestock (pending the approval of the USFS or the BLM). As a result of this attachment of the grazing permit to the base properties, real estate markets adjusted the value of those properties to reflect the Federal AUMs associated with the grazing permits, or permit value.[227]

288. This concept of permit value, however, has been an issue of debate. A 1970 court decision, Pankey Land and Cattle Co. v. Hardin, 427 F.2d 43 (10th Cir. 1970), formed the basis for the government's position that ranchers "are not given title to the grazing resource and as such do not own a property right or have a corresponding economic right to permit value."[228] Nonetheless, numerous published studies have found that a rancher obtains a value for holding a Federal grazing permit whether or not he has title to the permit, and whether or

[224] Public comments of the New Mexico Cattlegrower's Association (NMCA) point out that ranchers often have debts to repay that rely on the current number of AUMs grazed. NMCA states that even small cuts in the number of AUMs grazed by these ranchers can affect the financial stability of those operations. Public comments of Caren Cowan on behalf of the New Mexico Cattlegrowers' Association, and Mike Corn, New Mexico Wool Growers, Inc, "Re: Reopening of the comment period on proposed critical habitat for the Southwestern willow flycatcher/July 7, 2005 Federal Register (Volume 70, Number 129), July 18, 2005.

[225] Grazing fees on USFS lands was first introduced in 1906. (Cody, B.A. 1996. Grazing Fees: An Overview. Congressional Research Service. Washington, D.C.)

[226] Kerr, Andy. 1998. "The Voluntary Retirement Option for Federal Public Land Grazing Permittees. Rangelands." Vol. 20, No. 5. October. 26-30.

[227] Stern, B.S. 1998. "Permit Value: A Hidden Key to the Public Land Grazing Dispute." M.S. Thesis. University of Montana. March 1998.

[228] Torell et al. "The Market Value of Public Land Forage Implied from Grazing permits." Current issues in Rangeland Economics: 1994. Western Research Coordinating Committee 55: Range Economics, 1994.

not he sells his property.[229] Furthermore, if the grazing fee is below the value of grazing, and if the permit is renewable from year to year in a dependable fashion, then the economic rents (the difference between the fee and the value of grazing) will be incorporated and reflected into the value of the grazing permit.[230]

289. Thus, permit value can be used as a measure of rancher wealth tied up in grazing permits and forced reductions in permitted AUMs can be represented by a loss in permit value, or rancher wealth (regional livestock production loss and regional economic impacts are discussed later in this section).

290. Numerous publications support this concept of permit value. For example, Torell et al., states that "permit value represents the only available direct valuation of public land forage, except for a few scattered instances where public land is competitively leased. Using an appropriate capitalization rate, annualized estimates of forage value can be determined from the observed permit value."[231] In a summary of recommended forage valuation methods, the author states that "permit values provide a direct and site-specific estimate of forage value. Theoretically, this estimate should provide a site-specific estimate of value while considering the inherent production characteristics, regulations, and economic potential of specific allotments."[232] As defined in a public comment from the New Mexico Department of Agriculture, "permit value is essentially a measure of rancher wealth based on the number of federally permitted AUMs he is allowed to graze, the value of the Federal grazing fee, and the private property rights owned by the permittee."[233] Exhibit 5-4 presents the results of nine recent studies that attempt to measure the permit value, in perpetuity, of Federal grazing (per AUM), by permitting agency (USFS and BLM).

291. The range of values found in these studies likely results from variations in factors, such as study method, region, quality of forage, substitute availability, and capitalization rates. This analysis adopts an estimated permit value, in perpetuity, per AUM as the average of the permit value studies above, or $88 per BLM AUM and $80 per USFS AUM.

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[229] "The general observation is that public land grazing permits do have market value," Torell et al. "The Lack of Profit motive for ranching: Implications for policy analysis." Current issues in Rangeland Economics, Western Coordinating Committee 55 (WCC-55), 2001. Torell, L. Allen and S.A. Bailey. "Public land policy and the value of grazing permits." Western Journal of Agricultural Economics, Volume 16 (174-184), 1991. Also see Rowan, R.C., and J.P. Workman. "Factors affecting Utah ranch prices." Journal of Range Management. Volume 45 (263-266), 1992. Sunderman, M. A., and R. Spahr. "Valuation of government grazing leases." Journal of Real Estate Research, Volume 9 (179-196), 1992. Spahr, R. and M.A. Sunderman. "Additional evidence on the homogeneity of the value of government grazing leases and changing attributes for ranch value." Journal of Real Estate Research, Volume 10 (601-616), 1995. Torell, L. Allen and M.E. Kincaid. "Public land policy and the market value of New Mexico ranches, 1979-1994." Journal of Range Management, Volume 49 (270-276), 1996.

[230] Technical advisor review comments of B. Delworth Gardner, Brigham Young University, December 18, 2005.

[231] Torell et al. "The Lack of Profit motive for ranching: Implications for policy analysis." Current issues in Rangeland Economics, Western Coordinating Committee 55 (WCC-55), 2001.

[232] Torell, L. Allen et al. "Theoretical Justification and Limitations of Alternative Methods used to value public land forage." 1994. Western Research Coordinating Committee 55: Range Economics, 1994.

[233] Private property referred to here reflect private land values. Public comment on Draft Economic Analysis of Critical Habitat for the MSO from Julie Maitland, Division Director, New Mexico Department of Agriculture, April 26, 2004.

Exhibit 5-4

SUMMARY OF RELEVANT PERMIT VALUE ESTIMATES FOR BLM AND USFS PERMITS

Study	Method	Years	Location	$/BLMAUM (2004$)*	$/FSAUM (2004$)*
Rowen & Workman	Regression	1975-1987	Utah	$32	$32
Torell & Doll	Regression	1979-1988	New Mexico	$97	$97
Rowen & Workman	Regression	1980-1988	Utah	$60	$60
Torell & Kincaid	Various	1988	New Mexico	$107	$100
Torell et al.	Regression	1992	New Mexico	$110	$89
Kincaid	Regression	1987-1994	New Mexico	$101	$98
Torell & Kincaid	Various	1994	New Mexico	$103	$71
Torell et al.	Case studies	2002	Idaho, Nevada, Oregon	$95	$95
			Average:	**$88**	**$80**

* Numbers represent the permit value per AUM in perpetuity. Values adjusted to 2004$ using the GDP Deflator, Budget of the United States Government, Fiscal Year 2005, Historical Tables. Sources: Department of Commerce, Bureau of Economic Analysis, 2004. Sources: Stern, Bill S. "Permit Value: A Hidden Key to the Public Lands Grazing Dispute," University of Montana, Master of Science thesis, 1998; Torell et al., "Ranch level impacts of changing grazing policies on BLM land to protect the Greater Sage-Grouse: Evidence from Idaho, Nevada, and Oregon." Policy Analysis Center for Western Public Lands, Policy Paper SGB01B02, 2002.

5.2.2 Reductions in AUMs on Federal lands related to flycatcher conservation activities

292. On some allotments that contain flycatcher habitat, riparian areas have been excluded from grazing either year-round or seasonally thus reducing the carrying capacity, or permitted AUMs. These reductions in AUMs have impacted the ranchers that graze those lands. However, a complete history of the changes to authorized and permitted head, utilization, and AUMs by allotment over time due to flycatcher is not available. In addition, two complications arise when estimating the number of AUM reductions associated with restrictions on riparian grazing:

(1) Numerous factors affect the number of permitted and authorized AUMs approved by USFS and BLM for any given grazing allotment, and often AUM reductions due to the flycatcher cannot be separated from other causes: and

(2) In some cases, restrictions on grazing allotments have been limited to the exclusion of only the riparian corridor from grazing during the flycatcher breeding season from May 1 through September 1. According to conversations with USFS and BLM staff, AUM reductions have been avoided in the past for this type of restriction through offsetting increases in the number of head during non-flycatcher breeding months, or by changing grazing management schemes to avoid excluded riparian corridors.

These two complications are explored further in the following sections.

Factors affecting permitted and authorized AUMs

293. On a particular allotment containing flycatcher habitat, reductions to authorized or permitted AUMs made by USFS or BLM may be: (1) directly related to flycatcher conservation; (2) not related to flycatcher conservation at all; or (3) a combination of factors. These scenarios are described below:

(1) *Causes directly related to flycatcher.* Even though livestock grazing does not directly harm flycatchers, Action agencies have had to consider potential impacts of livestock grazing actions on flycatcher in habitat areas since its listing. In a 2001 hearing with the New Mexico Public Land Grazing Task Force (New Mexico Task Force), Federal agencies in New Mexico cited compliance with Federal laws as a key factor that affects their management of livestock grazing.[234] As part of a survey, the New Mexico Task Force asked USFS and BLM permittees whether decreases in the permitted number of livestock on their allotments were due to the presence of federally listed endangered or threatened species (Exhibit 5-5). Their answers indicate that endangered species considerations have influenced the number of permitted AUMs, particularly on National Forest lands.[235] Although not definitive, this survey supports the assertion that flycatcher considerations may affect the number of permitted AUMs on allotments.

Exhibit 5-5

RESPONDENTS CLAIMING REDUCTIONS IN PERMITTED AUMS DUE TO PRESENCE OF THREATENED AND ENDANGERED SPECIES

Grazing Area	Percent
Carson NF	23
Cibola NF	2
Gila NF	42
Lincoln	7
Santa Fe NF	2
New Mexico BLM*	5

Notes: (1) The survey question was not specific to flycatcher, thus drawing conclusions from this study about reductions in AUMs that may have resulted from flycatcher conservation activities is not possible. (2) BLM percentage presented is an average of the four offices. The Task Force sent surveys to 1,128 USFS permittees and 2,045 BLM permittees. They received responses from 322 USFS and 482 BLM permittees, or 29 and 24 percent, respectively.
Source: "Report to the Governor of New Mexico from the Public Land Grazing Task Force," prepared by George A. Douds, New Mexico Department of Agriculture, 2002, Appendices D, E and F.

[234] "Report to the Governor of New Mexico from the Public Land Grazing Task Force," prepared by George A. Douds, New Mexico Department of Agriculture, 2002.
[235] While this survey does not present a definitive answer to the question posed, it suggests that AUM reductions may be, in part, associated with endangered species considerations. However, the survey question was not specific to flycatcher, thus drawing conclusions from this study about reductions in AUMs that may have resulted from flycatcher conservation activities is not possible.

(2) *Causes unrelated to flycatcher.* When Federal agencies assess an allotment for permit renewal, they must also consider weather conditions (drought), forage availability, presence of other ungulates, such as elk, as well as presence of other sensitive, threatened and endangered species. For example, past reductions in AUMs were prompted in the Tonto National Forest because of drought and on Arizona BLM allotments along the Virgin River due to the presence of the endangered desert tortoise.

(3) *Combination of Causes.* In most cases, however, decisions by Federal agencies to change the permitted or authorized AUMs in flycatcher habitat areas is a combination of considerations that include the flycatcher, other endangered species, other regulatory considerations (such as Grazing Guidance Criteria, Forest Plans, and Resource Management Plans), current forage availability, general health of the riparian corridor, and weather conditions. In addition, subjective factors such as political pressures from interest groups or other land user groups may also influence agency decisions. These subjective impacts are the most difficult to predict, but may play an important role in the decisionmaking process.

294. For allotments that have gone through formal section 7 consultations, or the NEPA permit issuance processes, specific changes directly caused by the flycatcher can be described and documented. However, not all changes to the permitted AUMs may be directly attributable to flycatcher conservation activities, and as described above, the spatial and temporal overlap with flycatcher consultation activities makes separating these impacts difficult.

295. In the past, the most frequent cause of riparian grazing exclusion were "general riparian health" and/or "protection of endangered riparian species." For example, in 1998, USFS Region 3 conducted a region-wide consultation on all of their grazing actions, resulting in the allotment-by-allotment review of 963 allotments. This review was the result of two lawsuits filed against the USFS by environmental groups in 1997, the Forest Guardians and the Center for Biological Diversity. The Forest Guardians' initial lawsuit focused upon four endangered and threatened species: the flycatcher, the loach minnow, the spikedace, and the Mexican spotted owl (MSO). Their lawsuit challenged the issuance of grazing permits on allotments located in the Apache-Sitgreaves, Carson, Cibola, Gila, Prescott and Santa Fe National Forests. The Center for Biological Diversity's initial lawsuit did not focus on any specific endangered or threatened species, but challenged the issuance of grazing permits on allotments in six national forests: Apache-Sitgreaves, Coconino, Coronado, Gila, Prescott, and Tonto. Because the complaints shared common issues and challenged many of the same allotments, the cases were consolidated.

296. In response to the lawsuit, USFS initiated informal consultation with the Service in February 1998 on the 158 allotments named in the complaints as well as hundreds of other allotments (962 in total) in the National Forests of Arizona and New Mexico (USFS Region 3). The purpose of the consultation was to determine the potential effects of livestock grazing on endangered and threatened species on the allotments and therefore whether formal consultation between the Forest Service and the Service was necessary. As part of

the informal consultation process, the Forest Service also developed "Grazing Guidance Criteria for Preliminary Effects Determinations for Species Listed as Threatened, Endangered, or Proposed for Listing," ("Guidance Criteria") dated February 13, 1998.

297. Of the 962 allotments under consultation, 619 "No Effect," 321 "NLAA" (not likely to adversely affect) findings, and 22 "LAA" (likely to adversely affect) determinations were made. "No Effect" findings concluded the Forest Service's obligations under the Act and do not require Service concurrence. The Forest Service received concurrence from the Service for the 321 "NLAA" determinations thus no further action was necessary on those allotments.

298. This left 22 allotments where the Forest Service made LAA determinations with regards to the loach minnow. In February 1999, the Service released a biological opinion in which it concluded that the impacts of grazing on 21 of the 22 allotments would not jeopardize the continued existence of the loach minnow.

299. The 962-allotment review prompted both Plaintiffs to amend their complaints in September 1999. The Forest Guardians narrowed their complaint to the loach minnow, the spikedace, and the Mexican spotted owl (the MSO) on allotments in the Apache-Sitgreaves, Gila and Cibola National Forests while the Center for Biological Diversity re-focused their complaint to the loach minnow and spikedace on allotments in the Apache-Sitgreaves and Gila National Forests.[236]

300. The result of this process was the exclusion of the majority of the riparian corridors on grazing allotments in USFS Region 3.[237] In these cases, it is clear that the riparian exclusions were a result of a combination of causes, to which the flycatcher may have contributed but was not the primary driving factor. However, because of the temporal and spatial overlap, it is difficult to separate flycatcher-related impacts from the other causes.

Avoiding AUM Reductions

301. According to USFS and BLM staff, range managers can sometimes avoid AUM reductions when grazing restrictions are put in place for flycatcher through changes in grazing management practices. For example, in the Apache-Sitgreaves forest, three flycatcher nesting sites were identified on allotments along the Little Colorado River. Grazing was restricted within a two mile radius around these sites during the flycatcher breeding season. Due to the small number of acres excluded relative to the entire allotment, USFS range managers were able to alter grazing patterns to avoid these areas during the summer without reducing AUMs. Another example of this type occurred with the exclusion of grazing during the flycatcher breeding season on the Bruton River allotment, administered by New Mexico BLM. Initially this allotment was authorized for 1800 AUMs for 150 head

[236] United States District Court of Arizona. Southwest Center for Biological Diversity, et al., Plaintiffs v. United States Forest Service et al., Defendants, and Arizona Cattle Growers' Association, Applicant-in-Intervention. Forest Guardians, Plaintiff vs. United States Forest Service, et al., Defendants. No. CV 97-666 TUC JMR consolidated with No. CIV 97-2562 PHX-SMM.

[237] Personal communication, Wally Murphy, USFS Region 3, September 3, 2004.

year-round. To avoid reducing AUMs, after the exclusion of grazing during the flycatcher breeding season, BLM increased the number of head authorized during rest of the year from 150 to 198 cows, thereby maintaining an authorization of 1800 AUMs. However, these approaches to management may result in other costs, such as losses in flexibility and increases in the time permittee must commit to livestock management to ensure that cows do not wander into flycatcher-protected areas.[238]

Estimating Flycatcher-related AUM Reductions on Federal Grazing Lands

302. As a result of these complications, this analysis includes a low and high estimate of AUMs reduced due to the flycatcher.

Low Estimate

303. The low estimate uses the following criteria:

1) For allotments identified by wildlife biologists, range managers, and permittees as impacted by actions directly related to flycatcher protection, this analysis utilized the AUM reductions estimated by these entities;

2) For allotments where proposed critical habitat is equal to less than five percent of total allotment area, this analysis assumes that changes in grazing management practices are available to avoid AUM reductions; and

3) For allotments where proposed critical habitat is equal to more than five percent of total allotment area, this analysis assumes the reduction in AUMs due to flycatcher is proportional to the percentage of the allotment designated as proposed flycatcher critical habitat.

High Estimate

304. The high estimate uses the following criteria:

1) For allotments identified by wildlife biologists, range managers, and permittees as impacted by actions directly related to flycatcher protection, this analysis utilizes the AUM reductions estimated by these entities;

2) For allotments where the number of AUM reductions directly related to flycatcher protection is not known, this analysis assumes the

[238] Personal communication, Vicente Ordonez, Apache-Sitgreaves National Forest, August 13, 2004; Personal communication, Ralph Pope, Gila National Forest, August 27, 2004.

reduction in AUMs due to flycatcher is proportional to the percentage of the allotment designated as proposed flycatcher critical habitat.

3) For allotments where the number of AUMs in an allotment is unavailable, this analysis calculates the reduction in AUMs due to flycatcher by multiplying the average number of AUMs reduced per acre (derived from allotments where AUM data are available, or 0.23 AUMs per acre), by the number of acres of grazing land in critical habitat. Exhibit 5-6 presents the derivation of the average AUMs reduced.

305. As a result of the second and third criteria above, the high estimate effectively allocates grazing impacts to all allotments included in the proposed flycatcher critical habitat area.[239]

Exhibit 5-6

AVERAGE AUMS REDUCED DUE TO FLYCATCHER PER ACRE OF PROPOSED FLYCATCHER CRITICAL HABITAT

Management Unit	Average AUMs Reduced per Acre of Proposed Flycatcher Critical Habitat
San Diego	0.73
Kern	1.04
Little Colorado	0.34
Virgin	0.03
Bill Williams	0.03
Parker to Southerly International	0.02
Verde	0.15
Roosevelt	0.13
Middle Gila/San Pedro	0.13
Upper Gila	1.05
Upper Rio Grande	1.42
Middle Rio Grande	0.31
Average:	**0.23**

Source: IEc analysis**.** Note that some of the impacts described here may be caused jointly by several causes, including other endangered species and other riparian habitat protection initiatives.

5.2.3 Administrative and Other Project Modifications

306. In addition to AUM reductions, the Service has also included stipulations for other modifications to grazing permits and administrative requirements. Administrative requirements include the costs associated with biological opinions and writing annual reports

[239] Exceptions include allotments identified by range managers as (1) allotments closed prior to listing of the flycatcher, (2) ephemeral allotments where no AUMs are currently authorized; and (3) allotments identified as not touching the river or where livestock access to the river is prevented (e.g., highway crossings or canyons).

to the Service. These costs are included in Section 3. In addition, the Service also requires flycatcher survey and monitoring. These costs are included in Section 8.

307. Other project modifications consist of constructing and maintaining riparian exclusion fencing and initiating cowbird trapping programs. Estimates for the past costs of these project modifications are based on conversations with wildlife biologists, range management specialists, and permittees. As shown in Exhibit 5-7, future costs are estimated by calculating the average of all past costs for USFS and BLM, divided by the total number of administrative units, or $13,000 per year (2004 dollars).

Exhibit 5-7

ESTIMATION OF FUTURE COSTS OF OTHER PROJECT MODIFICATIONS, PER PROJECT (2004$)

Other Project Modifications	Total Past Costs*	Number of Years	Cost per Year	Number of Administrative Units	Past Cost per Administrative Unit
Cowbird trapping	$342,157	13	$26,320	6	$4,400
Exclosure construction	$452,135	9	$50,237	7	$7,200
Exclosure maintenance	$65,193	10	$6,519	5	$1,300
				TOTAL:	**$13,000**

***** Based on conversations with wildlife biologists, range management specialists, and permittees.

5.3 Impacts on Non-federal Grazing Activities

308. Flycatcher conservation activities may also impact non-federal grazing activities to the extent that private landowners modify grazing practices in order to avoid incidental take under section 9.[240] Determining the economic impact to non-federal grazing activities requires an estimate of the number of acres of non-federal grazing lands and a measure of the number of cattle that could be supported by these lands (e.g., AUMs), and the value per AUM of private grazing lands. This section describes the methodology used to estimate the economic impact of the flycatcher on non-federal grazing activities.

Identifying Non-federal Grazing Lands

309. With the exception of California, accurate geographic data on the number of acres of non-federal lands used for livestock grazing activities are not readily available in geographic data format.[241] In California, the Division of Land Resource Protection under the Department of Conservation maintains geographic data of agricultural land uses by county.

[240] It is worth noting that no consultations or HCPs currently exist that affect private grazing in flycatcher habitat areas. The Service questions the assumption that critical habitat designation will affect private grazing efforts in the future. Comments of Regional Director, Service Region 2, Albuquerque, NM, January 5, 2005; Comments of Southwest Regional Office of the Solicitor, January 3, 2005; Comments of Service, Grand Junction, Colorado, Ecological Services Office, January 3, 2005.

[241] The 2002 Census of Agriculture reports the number of acres of farmland by county and state and the National Agricultural Statistics Service reports the number of livestock operations by state. However, neither sources provide accurate data in GIS form on the acreage of non-federal lands used for livestock grazing.

This data includes grazing lands, defined as land on which the existing vegetation is suited to the grazing of livestock, co-developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities.[242]

310. For New Mexico, Utah, Arizona, Colorado, and Nevada, this analysis relies on geographic land cover data identifying rangeland vegetation to estimate the acres of non-Federal lands grazed in proposed CHD. The National Land Cover Data (NLCD), maintained by the USGS, was developed using satellite imagery for the purpose of generating a generalized and nationally consistent land cover data set. The NLCD classification consists of 21 different land cover categories. Rangelands are identified through a combination of two land classes, "grasslands /Herbaceous" and "shrubland".[243] Because this classification system indicates whether grazing lands are suitable for grazing rather than whether they are currently utilized for grazing, estimates of current grazing are likely to be overstated for these states. For example, the AZDWR states that little non-Federal grazing activity occurs in the Bill Williams MU, while using NLCD data, this analysis estimates that 7,000 AUMs are grazed there.[244]

Estimating Flycatcher-related AUM Reductions on Non-federal Grazing Lands

311. This analysis did not identify any past flycatcher consultations or HCPs for livestock grazing activities on non-federal lands. Therefore, this analysis only includes an estimate of lost AUMs on non-federal lands in the high estimate of grazing impacts.[245]

312. To estimate the number of private grazing AUMs that may be reduced in to avoid incidental take under section 9 of the Act, this analysis relies on a 1989 study prepared for the California Department of Forestry and Fire Protection profiling the California Livestock Industry. As part of this study, the productivity of grazing lands for privately owned or

[242] Land use maps were not available for the Owens River area in Inyo and Mono Counties. However, conservations with the major landowner along the Owens River, the City of Los Angeles Department of Water and Power, indicated that the City administers grazing allotments in this area. As a result, land owned by the City along the Owens River in the Owens MU is included in this analysis (Personal communication, Brian Tillemans, City of Los Angeles Department of Water and Power, September 8, 2004). Public comments suggest that the Los Angeles Department of Water and Power has completed a draft comprehensive watershed management plan and habitat conservation strategy for this area of the Owens River. The plan "promulgates long-term strategies to ensure watershed health and promote continued recreational use. Some of these strategies endorse existing grazing practices employed by the ranchers leasing the land for grazing purposes." Public comments of Ted Williams, County of Inyo, Board of Supervisors, May 27, 2005.

[243] Grasslands/Herbaceous are areas dominated by upland grasses and forbs. Shrublands are areas characterized by natural or semi-natural woody vegetation with aerial stems, generally less than 6 meters tall, with individuals or clumps not touching to interlocking.

[244] Arizona Department of Water Resources, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher: Federal Register: October 12, 2004 (Volume 69, Number 196)", Comments of Herbert R. Guenther, May 27, 2005.

[245] As stated above, the Service questions the assumption that critical habitat designation will affect private grazing efforts in the future. Comments of Regional Director, Service Region 2, Albuquerque, NM, January 5, 2005; Comments of Southwest Regional Office of the Solicitor, January 3, 2005; Comments of Service, Grand Junction, Colorado, Ecological Services Office, January 3, 2005;

leased land was compared to the productivity of land leased from USFS and BLM. On average, depending on vegetation type, this study found that private lands range from being as productive to up to 17 times as productive as USFS and BLM grazing lands. To estimate the number of AUMs reduced on non-federal grazing lands in the proposed CHD, this analysis utilizes the weighted average of these data, or 0.93 AUMs per acre, which suggests that private lands, on average, are four times as productive as Federal lands.

Value per AUM on Non-Federal Grazing Lands

313. This section provides a discussion of the methodology used to estimate the economic value of reductions in AUMs on non-federal lands. Since 1979, fees for grazing on Federal public lands have been determined by a formula established initially by the Public Rangeland Improvement Act of 1978 and then in 1986, by Executive Order 12548. This formula relies on a number of components, including grazing rates on private lands across 17 states based on survey of monthly lease rates and reported by the USDA's National Agricultural Statistics Services. Exhibit 5-8 summarizes the grazing fee rates for cattle (per AUM) on private non-irrigated lands for those states included in the proposed designation. This analysis utilizes these private grazing fee rates per AUM, in perpetuity, to estimate the economic losses associated with potential AUM reductions on non-federal lands to avoid incidental take.

Exhibit 5-8

PRIVATE NON-IRRIGATED GRAZING FEE RATES FOR CATTLE BY STATE

	$/AUM	
State	**2003**	**Perpetuity ($2004)***
Arizona	$7.50	$109
California	$13.50	$195
Colorado	$13.00	$188
Nevada	$10.50	$152
New Mexico	$8.60	$124
Utah	$11.60	$168

* Calculated into perpetuity assuming a seven percent discount rate. Values adjusted to $2003 using "Table 1.1.9. Implicit Price Deflators for Gross Domestic Product", Department of Commerce, Bureau of Economic Analysis, 2004.
Source: NASS. 2004. Agricultural Prices 2003 Summary. USDA.

5.4 Past and Future Impacts of Flycatcher Conservation on Federal and Non-federal Grazing Activities

314. This section discusses the past and future impacts of flycatcher conservation activities on USFS, BLM, and non-federal lands by looking at reductions in grazing effort (lost permit value), costs of other project modifications, and regional economic impacts. Exhibits 5-9 and 5-10 present the total past and future economic impacts on livestock grazing due to the flycatcher conservation activities.

315. The following sections provide summaries of past and future flycatcher conservation activities and the status of grazing within the riparian corridor on Federal grazing lands by management unit. Estimated future impacts to livestock grazing activities on private lands are detailed in Exhibit 5-10.

5.4.1 COASTAL CALIFORNIA RECOVERY UNIT

316. The Coastal California Recovery Unit is made up of three MUs. The Santa Ynez MU falls primarily on private lands. In the Santa Ana and San Diego MUs, USFS owns and administers grazing allotments within the San Bernardino and Cleveland National Forests.

5.4.1.1 Santa Ana Management Unit

Forest Service

317. One allotment, Santa Ana, overlaps proposed flycatcher critical habitat in the San Bernardino National Forest. This allotment has not been in use since 1991 when the permittee quit ranching and abandoned the permit. There are no present plans to reauthorize grazing on this allotment, and due to the poor condition of foraging material and overgrown chaparral vegetation, it is not expected that grazing will be reinitiated in the future.[246]

5.4.1.2 San Diego Management Unit

Forest Service

318. Three allotments overlap with proposed flycatcher critical habitat areas in the Cleveland National Forest. Two of these allotments, Pamo and Lusardi, were retired in 1998 in order to protect for the flycatcher.[247] However, fencing was installed on the third allotment, Mesa Grande, along with various other allotments, to protect the riparian corridor for the flycatcher and other riparian species.

[246] Email communications with Steve Loe, Forest Biologist, USFS San Bernardino National Forest, August 19, 2004; August 20, 2004; September 23, 2004.

[247] These two allotments were closed as a result of cost prohibitive conservation activities required to protect for the flycatcher from ongoing grazing activities, primarily a required program of cowbird trapping. (Email communications with Kirsten Winter, Forest Biologist, USFS Cleveland National Forest, August 16, 2004.)

5.4.2 BASIN AND MOHAVE RECOVERY UNIT

319. The Basin and Mohave recovery unit is made up of four management units. The Salton MU falls primarily on private lands. The Owens MU includes non-federal grazing lands administered by the City of Los Angeles. In the Kern and Mohave MUs, USFS owns and administers grazing allotments within the Sequoia and San Bernardino National Forests.

5.4.2.1 Kern Management Unit

Forest Service and Bureau of Land Management

320. One allotment, Lake Isabella, overlaps proposed flycatcher critical habitat areas in the Sequoia National Forest. When the flycatcher was listed in 1995, livestock use of the riparian areas of this 1,900-acre allotment was discontinued during the flycatcher breeding season (June 1 to September 15). According to the permittee, this seasonal closure resulted in the reduction of 250 AUMs.[248] Public comments of the Bureau of Land Management Unit, California State Office, report that some BLM-administered areas have been included in this unit. BLM states that these areas are unlikely to contain the constituent elements of flycatcher habitat.[249]

5.4.2.2 Mohave Management Unit

Forest Service

321. One allotment, Deep Creek, overlaps proposed flycatcher critical habitat areas in the San Bernardino National Forest. Multiple permit violations by the permittee and a general decline in the overall health of the riparian habitat resulted in the formal exclusion of livestock grazing in 1999. According to the Forest Biologist, efforts to exclude livestock on the allotment were ongoing for many years prior to any knowledge of the presence of flycatchers in the drainage area.[250]

5.4.3 LOWER COLORADO RECOVERY UNIT

322. The Lower Colorado recovery unit is made up of six MUs. The Hoover to Parker MU falls on lands owned by a variety of entities, including state, private, and tribal lands; and the Paranaghat MU falls primarily on National Wildlife Refuge lands and private lands. Large areas of the remaining five MUs fall within lands owned by USFS and BLM, and used for grazing activities. The Little Colorado MU falls exclusively on USFS lands in the Apache-Sitgreaves National Forest while the remaining four MUs fall on land held by a variety of landowners, the largest of which is BLM.

[248] Personal communication with Bruce Hafenfeld, Lake Isabella Allotment Permittee, August 26, 2004.
[249] Public comments of State Director, Bureau of Land Management, May 24, 2005.
[250] Email communications with Steve Loe, Forest Biologist, San Bernardino National Forest, August 20, 2004; September 23, 2004.

5.4.3.1 Little Colorado Management Unit

Forest Service

323. Three allotments overlap with proposed flycatcher critical habitat in the Apache-Sitgreaves National Forest. Approximately 50 to 60 percent of the riparian areas in these allotments were excluded from grazing in the early 1990s as a result of continuing conflict between grazing and recreation use in the riparian corridor.[251] Past flycatcher conservation activities include the exclusion of livestock grazing within a two-mile radius around confirmed flycatcher nesting sites within each of these allotments. In the future, it is possible that the remaining 40 to 50 percent of the riparian area could be excluded from grazing.

5.4.3.2 Virgin Management Unit

324. The Virgin MU includes grazing allotments on BLM lands in Arizona and Utah. Grazing allotments on BLM lands along the Virgin River in Nevada do not have access to the river, which is owned by private landholders.[252]

Arizona Bureau of Land Management

325. Seven allotments on lands owned by BLM in Arizona overlap with the proposed Virgin River unit . BLM consulted with the Service on three of these allotments in 1998, resulting in seasonal restrictions on grazing from March 16 to October 15 for the desert tortoise.[253] Flycatcher surveys to date have not indicated the presence of the species.

326. The remaining four allotments are currently the subject of a consultation with the Service expected to be completed by June 2005. Grazing on one allotment is currently year-round while the other two allotments are seasonally restricted to grazing during the winter months for the desert tortoise. Flycatcher surveys for these allotments have also been negative. Flycatcher-related costs are limited to the co-extensive future impacts of seasonal restrictions imposed on grazing activities.

Utah Bureau of Land Management

327. Five BLM allotments on lands owned by the federal government in Utah overlap with the proposed Virgin River MU. Grazing is authorized only during the winter months, outside of the flycatcher breeding season, for four of these allotments.[254] Year-round grazing is authorized on the fifth allotment, and no conservation activities for the flycatcher have

[251] Personal communication with Vicente Ordonez, Wildlife Biologist, USFS Apache-Sitgreaves National Forest, September 13, 2004.
[252] Personal communication, David Waller, NV BLM, September 13, 2004.
[253] Consultation No. 2-21-96-F-132.
[254] Summer grazing is not typically authorized due to the low elevation of these allotments, and thus weather that is too hot during the summer to sustain grazing (Personal communication, Bob Douglas, Wildlife Biologist, UT BLM, October 1, 2004).

been implemented. Livestock grazing in the riparian area is authorized on this fifth allotment. If livestock grazing on the riparian portion of this unit were completely removed in the future, there would be a loss of 20-acres to grazing and five AUMs per year.[255]

5.4.3.3 Bill Williams Management Unit

328. The Bill Williams MU includes livestock grazing administered by BLM along the Big Sandy River, Bill Williams River, and the Santa Maria River (including upper Alamo Lake). No past conservation activities for the flycatcher have been implemented on any of these allotments. A discussion of the potential for future restrictions on grazing in the riparian areas of each river segment during the flycatcher breeding season follows.

Arizona Bureau of Land Management

329. On the Big Sandy River, 13 allotments overlap proposed flycatcher critical habitat areas. Year-round livestock grazing is authorized on ten of these allotments.[256] Future impacts could result from the flycatcher, as riparian grazing is currently allowed on these allotments.

330. Only one allotment, Planet, overlaps with proposed flycatcher critical habitat areas on the Bill Williams River. According to the Lake Havasu Field Office, this allotment has not been in use since 1983. In addition, if grazing is reauthorized on this allotment, the allotment is currently classified for "ephemeral grazing operations only"; as a result, livestock are removed each year by the end of April.[257]

331. Four allotments overlap with proposed flycatcher critical habitat areas on Alamo Lake. Three of these allotments are currently closed to grazing and the fourth, Palmertia, is authorized for year-round grazing.[258]

[255] The current configuration of the Riverview allotment encompasses 960-acres, 20 of which are in riparian habitat. Twenty three AUMs are authorized for this allotment, five of which are authorized in the 20-acre riparian habitat (Email communication with Bob Douglas, Wildlife Biologist, UT BLM, October 1, 2004).
[256] Of the remaining three allotments, one allotment is only authorized for ephemeral grazing, the second is authorized during the fall/winter season only (outside of the flycatcher breeding season), and the third is already on a deferred rotational grazing pattern outside of the flycatcher breeding season (Email communication, Rebecca Peck and Jack Spears, AZ BLM, Kingman Field Office, September 22, 2004). Ephemeral grazing is a category of BLM rangeland that generally lies within the southwest desert region. This region is characterized by desert type vegetation, which does not consistently produce forage, but periodically provides annual vegetation suitable for livestock grazing. In years of abundant moisture and other favorable climate conditions, forage may be produced. Because of the unique characteristics of ephemeral range, BLM developed special rules to manage this range type, specifically, AUMs are authorized on a year-to-year basis only when sufficient forage exists.
[257] Email communication, AZ BLM, Lake Havasu Field Office, September 22, 2004.
[258] Email communication, AZ BLM, Kingman Field Office, September 24, 2004 and October 13, 2004.

5.4.3.4 Parker to Southerly Management Unit

Arizona Bureau of Land Management

332. Three allotments overlap with proposed flycatcher critical habitat areas along the Colorado River. Livestock do not have access to the riparian corridor on the Ganado allotment due to a highway crossing; the Ehrenberg allotment has not been in use since 1971 with no future plans to reauthorize; and the Bishop allotment is currently authorized for grazing from October to March, outside the flycatcher breeding season.[259]

5.4.4 GILA RECOVERY UNIT

333. This unit includes the Gila River watershed, from its headwaters in southwestern New Mexico downstream to its confluence with the Colorado River. This Recovery Unit includes USFS and BLM grazing lands in the Verde, Roosevelt, Upper Gila, and Middle Gila/San Pedro MUs.

5.4.4.1 Verde Management Unit

334. The Verde MU encompasses land on three USFS national forests, the Coconino, Prescott, and Tonto National Forests.

Forest Service, Coconino National Forest

335. Three allotments overlap with proposed flycatcher critical habitat in the Coconino National Forest on the Verde River. In 1996, approximately 400 acres, or 0.16 percent of the total available acres, on the Windmill allotment was excluded directly for flycatcher-protection.

Forest Service, Prescott National Forest

336. Six allotments overlap with proposed flycatcher critical habitat area on the Prescott National Forest side of the Verde River. In 1998, grazing was restricted during the flycatcher breeding season (April 1 to July 31) in the riparian pastures of three of these allotments, Verde, Copper Canyon, and Young. For the remaining three allotments, grazing within the riparian corridor was fenced off in order to provide protection for listed fish species, general riparian health, and to reduce conflict between grazing activities and recreational use of the Verde River.[260]

Forest Service, Tonto National Forest

337. Five allotments overlap with proposed flycatcher critical habitat on the Verde River in the Tonto National Forest. Two of these allotments, St. Clair and Bartlett, are currently

[259] Email communication, AZ BLM, Lake Havasu Field Office, September 22, 2004.
[260] Personal communication with Albert Sillas, Fisheries Biologist, Prescott National Forest, September 17, 2004.

vacant. The Skeleton Ridge/Ike's Backbone and Red Creek allotments completed a consultation in 1997 and 2000, respectively. Restrictions to livestock grazing, however, did not result from either consultation, whose terms and conditions were limited to continued monitoring of flycatcher presence, livestock use of riparian areas, and surveys to determine the condition of riparian habitat.[261] Currently no livestock grazing occurs on the Sears Club/Chalk Mountain allotment, as this area is undergoing NEPA review.

338. As presented in Exhibit 5-10, the Verde River has some private lands that could lose AUMs (1,754). Several public comments stated concerns of private ranching operations in this unit.[262]

5.4.4.2 Roosevelt Management Unit

Forest Service

339. Nineteen allotments overlap proposed flycatcher critical habitat in the Tonto National Forest. The Tonto National Forest has the greatest number of past consultations (5) that have considered the impact of grazing activities on the flycatcher of any national forest. Conservation activities implemented under these consultations have included survey and monitoring of flycatcher and flycatcher habitat, implementing an annual cowbird management program, monitoring of livestock use of riparian areas, conducting annual reviews of issued grazing permits to determine the feasibility of grazing the suggested number of cattle, and removing trespass livestock from riparian areas.

5.4.4.3 Middle Gila/San Pedro Management Unit

Arizona Bureau of Land Management

340. The Middle Gila/San Pedro MU includes BLM grazing lands along the Gila River and the San Pedro River. Along the Gila River, 20 allotments overlap proposed flycatcher critical habitat. In October 2003, BLM consulted on the ongoing grazing activities of the majority of these allotments, six of which were classified as riparian habitat and of concern to the flycatcher. As a result of the 2000 consultation, BLM excluded livestock grazing in the riparian corridors of the majority of these allotments. On the Rafter Six allotment, livestock was restricted to winter grazing of riparian pastures from November 1 to April 1 and utilization levels were limited to 30 percent. For this allotment, this analysis assumes that the number of AUMs reduced is equal to the 30 percent utilization level required by the biological consultation. Currently, 1,055 AUMs are authorized for this allotment. A 30 percent reduction in AUMs translates to an approximate reduction of 317 AUMs. Future impacts to grazing on the Gila River are possible on the seven BLM allotments where riparian grazing still takes place, or for allotments that are currently in non-use, but could be reauthorized.

[261] Biological Consultation on Grazing on Skeleton Ridge/Ike's Backbone, 2-21-94-I-559, June 25, 1997; Biological Consultation on Grazing on Red Creek, 2-21-99-F-022, March 18, 2000.

[262] For example, see public comments of February 23, 2005; Bert Kellis, Yavapai Cattle Growers Association, Groseta Ranches, received by the Service on June 30, 2005; David Cook, DC Cattle Co., Inc., November 15, 2004.

341. Along the San Pedro River, four allotments overlap proposed flycatcher critical habitat on BLM lands. No past conservation activities for the flycatcher have been implemented in this area. Future impacts to grazing on the San Pedro River are possible on all of these allotments, which currently allow grazing of the riparian areas.

342. As presented in Exhibit 5-10, the Middle Gila/San Pedro Unit has the third largest amount of land suitable for grazing among the proposed CHD units. As such, a relatively large number of potential AUMs could be lost in this unit (10,789). Several public comments stated concerns of private ranching operations in this unit.[263] For example, the C-Spear Ranch states that it "is very concerned about the impact the Proposed Rule will have on the productivity of its ranching operations and the current and future value of its property and water rights."[264]

5.4.4.4 Upper Gila Management Unit

343. The Upper Gila Grande MU encompasses land on the Gila National Forest and on land owned and administered by the New Mexico Bureau of Land Management.

Forest Service

344. Along the Lower Gila River, three allotments overlap with proposed flycatcher critical habitat in the Gila National Forest. Livestock grazing on the Watson Mountain and Brock Canyon allotments was discontinued in April 1999 due both to riparian health and the protection of endangered species, primarily the flycatcher, loach minnow, and spike dace. Removing livestock grazing from these allotments resulted in a total reduction of 3,336 AUMs. To be conservative, i.e., to be more likely to overstate than understate impacts, this analysis attributes the total number of AUMs reduced due to this closure to the flycatcher, although some impacts of the closure resulted from the presence of other species.[265]

345. The entire river corridor on the third allotment, Gila River, was fenced off and excluded in 1997 and 1998. The initial exclusion was driven primarily by the loach minnow; however the exclusion is maintained in part due to the flycatcher.[266]

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[263] For example, see public comments of Lamar Smith, Banderilla Ranch, May 28, 3005; Andrew Smallhouse, Redington Livestock Inc, July 16, 2005; Dennis Parker, on behalf of Gila County Cattle Growers of Gila County, Arizona, received by the Service on May 29, 2005; Public comments of Fennemore Craig, P.C., on behalf of C-Spear Ranch, "Proposed Designation of Critical Habitat for the Southwestern willow flycatcher," July 18, 2005; David W. Ogilvie, U Bar Ranch, May 30, 2005.

[264] Public comments of Fennemore Craig, P.C., on behalf of C-Spear Ranch, "Proposed Designation of Critical Habitat for the Southwestern willow flycatcher," July 18, 2005.

[265] Forest Guardians states in its public comment that this assumption overstates impacts due to flycatcher. Public comments of Billy Stern, Grazing Program Coordinator, Forest Guardians, "Proposed Designation of Critical Habitat for the Southwestern willow flycatcher (*Empidonax traillii extimus*)", May 26, 2005. While this is true, these past impacts had joint causes, making separating costs based on species difficult and speculative.

[266] Personal communication with Ralph Pope, Ranger, Silver City Ranger District, Gila National Forest, August 25, 2004.

New Mexico Bureau of Land Management

346. Livestock were excluded from the riparian areas of grazing allotments administered by BLM along the Gila River in 2000. In the 1990s, BLM initiated an EIS for Riparian and Aquatic Habitat Management driven in part by the declining health of riparian areas along the river and as part of a settlement agreement involving litigation on NEPA and ESA Section 7 compliance. This action resulted in the exclusion of livestock from the riparian corridors in order to provide for the restoration and protection of riparian habitat on BLM lands under the Las Cruces Field Office.[267]

5.4.5 RIO GRANDE RECOVERY UNIT

5.4.5.1 San Luis Valley Management Unit

Colorado Bureau of Land Management

347. Only one allotment, McIntyre-Simpson, overlaps with proposed flycatcher critical habitat on BLM lands in this unit. This allotment was recently acquired by the BLM (2003), and to date, does not have a grazing management plan. A management plan for this approximately 1,050-acre allotment is not expected for another five years.[268] Past grazing on the allotment has been fairly intensive and it is unknown at this time what level of AUMs will be authorized.

348. A public comment from the Mayor of the City of Alamosa states that "cattle grazing does not adversely affect the flycatcher, but it would be drastically limited if the designation were implemented.[269] As presented in Exhibit 5-10, the San Luis Valley Unit has the largest amount of land suitable for grazing among the proposed CHD units. As such, a relatively large number of potential AUMs could be lost in this unit (21,578).

5.4.5.2 Upper and Middle Rio Grande Management Unit

349. The Upper and Middle Rio Grande MU encompasses land on one USFS national forest, the Carson National Forest, and on grazing land owned and administered by the New Mexico Bureau of Land Management.

Forest Service

350. Two allotments overlap with proposed flycatcher critical habitat in the Carson National Forest, Miranda and Rio Pueblo. Both allotments experienced some restriction in the use of riparian areas for grazing due to the flycatcher in 1998. For the Rio Pueblo

[267] Bureau of Land Management. 2000. Final Environmental Impact Statement for Riparian and Aquatic Habitat Management in the Las Cruces Field Office-New Mexico. Volumes 1 and 2.
[268] Personal communication with Melissa Scott, CO Bureau of Land Management, August 31, 2004.
[269] Public comments of Mayor Farris Bervig, City of Alamosa, Colorado, May 25, 2005.

Allotment, this resulted in a reduction of 58 AUMs. No reduction in AUMs was realized on the Miranda allotment.[270]

NM Bureau of Land Management

351. One allotment, Bruton River, overlaps proposed flycatcher critical habitat along the Rio Grande. This allotment falls on land owned by USBR but grazing is administered by BLM. The Bruton River allotment has had a long history of consultation with the Service beginning April 1997 when all livestock grazing was prohibited during the flycatcher breeding season, from April 15, 1997 to July 31, 1997.

352. This process was repeated in 1998 and 1999 with similar result. In 1999, USBR took steps to avoid "take" and potential violations of the ESA, directing BLM to immediately modify the year-long grazing authorization for the Bruton River allotment to exclude grazing from August 1, 1999 through October 15, 1999. On behalf of USBR, BLM issued a Full Force and Effect Decision dated October 1, 1999 for the removal of livestock from the Bruton River allotment beginning October 6, 1999 to prevent a "take" under the ESA. On January 26, 2001, a final decision was issued modifying the livestock grazing permit for the Bruton River allotment. Prior to 1997, the Bruton River allotment was authorized for 150 cows year-round, or 1800 AUMs. To prevent the reduction of AUMs, the 2001 decision increased the number of authorized cows from 150 to 198 during the nine months that cattle were authorized on the allotment.

353. In addition to impacts on authorized AUMs, conversations with the BLM Rangeland Management Specialist identified another significant set of costs borne by the permittee since 1997. Specifically, the 1997 decision to remove livestock beginning April 15, 1997 was imposed on the permittee without much advance notice; as a result, the permittee incurred substantial costs to quickly move livestock to another location. The permittee also decided to appeal the 1997 and 1998 decisions to remove livestock during the flycatcher breeding season, resulting in significant legal and attorney fees. Estimates of these costs, however, are not available.

5.4.6 Summary of Past Impacts on Grazing Activities

354. This analysis estimates that a total of 4,000 to 9,000 AUMs have been reduced as a result of past flycatcher conservation actions, resulting in past permit value losses to ranchers between $350,000 to $750,000 (2004 dollars). As shown in Exhibit 5-9, total costs related to past impacts on grazing on USFS and BLM lands are estimated at $1.5 million to $2.3 million (2004 dollars).

[270] Personal communication with Melvin Herrera, Range Conservationist, Carson National Forest, August 26, 2004.

5.4.7 Summary of Future Impacts on Grazing Activities

355. This analysis forecasts total future grazing reductions of 300 to 89,000 AUMs as a result of flycatcher conservation, resulting in future permit value losses to ranchers between $27,000 and $13.5 million (2004 dollars). This wide range is driven by permit values losses attributed to non-federal lands, estimated at $13.5 million (2004 dollars), or 99 percent of total losses due to reductions in grazing effort (permit value). The San Luis Valley MU accounts for the greatest proportion of these costs at $4.0 million, or 30 percent of total losses; followed by the Middle Rio Grande and the Bill Williams MUs, each contributing 15 and 11 percent respectively.

356. As shown in Exhibit 5-10, total costs, including other project modifications, related to forecast future impacts on grazing on USFS, BLM, and non-federal lands are estimated at $1.7 million to $17.9 million (2004 dollars, assuming a rate of seven percent over the next 20 years). The large variation between the low bound and high bound estimate is driven by the assumption in the high bound estimate that private landowners will modify grazing practices in order to avoid incidental take under section 9.[271]

[271] As stated above, the Service questions the assumption that critical habitat designation will affect private grazing efforts in the future. Comments of Regional Director, Service Region 2, Albuquerque, NM, January 5, 2005; Comments of Southwest Regional Office of the Solicitor, January 3, 2005; Comments of Service, Grand Junction, Colorado, Ecological Services Office, January 3, 2005.

Exhibit 5-9

PAST IMPACTS ON LIVESTOCK GRAZING DUE TO FLYCATCHER CONSERVATION ACTIVITIES, 1995-2003[1,2,3]

Management Unit	Affected Party	CHD Acres[4]	Total Acres[5]	Estimated AUM Reduction		Estimated Permit Value Losses ($2004)		Other Project Modifications	Total Past Impacts ($2003)	
				Low	High	Low	High	($2004)	Low	High
San Diego	USFS	593	15,624	212	220	$17,000	$17,700	$243,400	$260,400	$278,100
Kern	USFS	240	3,332	250	250	$20,100	$20,100	$17,100	$37,200	$57,300
Little Colorado	USFS	538	49,714	-	111	$0	$8,900	$20,800	$20,800	$29,700
Verde	USFS	6,452	830,101	-	367	$0	$29,500	$159,700	$159,700	$189,200
Roosevelt	USFS	16,343	781,644	73	1,514	$5,900	$121,500	$293,600	$299,500	$421,000
Middle Gila/San Pedro	BLM	4,535	338,338	323	361	$28,400	$31,800	$127,400	$155,800	$187,600
Upper Gila	USFS	1,574	54,591	3,336	3,423	$267,700	$274,700	$86,500	$354,200	$628,900
Upper Gila	BLM	7,664	102,496	-	1,760	$0	$155,100	$241,300	$241,300	$396,400
Upper Rio Grande	USFS	123	84,887	58	61	$4,700	$4,900	$7,400	$12,100	$17,000
Middle Rio Grande	BLM	4,012	5,775	2	1,250	$200	$110,200	$0	$200	$110,400
USFS Subtotal:		**25,864**	**1,819,893**	**3,929**	**5,948**	**$315,400**	**$477,300**	**$828,500**	**$1,143,900**	**$1,621,200**
BLM Subtotal:		**16,210**	**446,608**	**325**	**3,372**	**$28,600**	**$297,100**	**$368,700**	**$397,300**	**$694,400**
TOTAL:		**42,074**	**2,266,501**	**4,254**	**9,319**	**$344,000**	**$774,400**	**$1,197,200**	**$1,541,200**	**$2,315,600**
								Annual Costs ($2003, 7%):	**$194,000**	**$291,500**
								Annual Costs ($2003, 3%):	**$154,800**	**$232,600**

Notes: Some of the impacts cited here may be caused jointly by several causes, including other endangered species and other riparian habitat protection initiatives.

[1] This analysis did not identify any past flycatcher consultations for livestock grazing activities on non-federal lands.

[2] Estimated permit values calculated assuming a permit value of $80 per USFS AUM and $88 per BLM/private AUM.

[3] Numbers may not add due to rounding.

[4] Equals the number of acres designated as proposed flycatcher critical habitat within the grazing allotment.

[5] Equals the total number of acres within the grazing allotment.

Exhibit 5-10

FUTURE IMPACTS ON LIVESTOCK GRAZING DUE TO FLYCATCHER CONSERVATION ACTIVITIES, 2004-2023

Management Unit	Affected Party	Estimated AUM Reduction		$/AUM	Estimated Permit Value Losses ($2004)		Other Project Modifications (Nominal $)*	Total Future Impacts ($2004, 7%)		Total Future Impacts ($2004, 3%)	
		Low	High		Low	High		Low	High	Low	High
Santa Ynez	Private	-	2,565	$195	-	$500,100	$260,000	$0	$638,000	$0	$694,000
Santa Ana	Private	-	5,069	$195	-	$988,400	$260,000	$0	$1,126,000	$0	$1,182,000
San Diego	USFS	-	-	$80	-	0	$260,000	$138,000	$138,000	$193,000	$193,000
San Diego	Private	-	705	$195	-	$137,500	$260,000	$0	$275,000	$0	$331,000
Owens	Private	-	7,867	$195	-	$1,534,000	$260,000	$0	$1,672,000	$0	$1,727,000
Kern	USFS	-	-	$80	-	0	$260,000	$138,000	$138,000	$193,000	$193,000
Kern	Private	-	3,355	$195	-	$654,300	$260,000	$0	$792,000	$0	$848,000
Mojave	Private	-	986	$195	-	$192,200	$260,000	$0	$330,000	$0	$386,000
Little Colorado	USFS	-	111	$80	-	$8,900	$260,000	$138,000	$147,000	$193,000	$202,000
Little Colorado	Private	-	51	$109	-	$5,500	$260,000	$0	$143,000	$0	$199,000
Virgin	BLM	-	54	$88	-	$4,700	$275,919	$146,000	$142,000	$205,000	$198,000
Virgin	Private	-	2,396	$109-$168	-	$371,300	$260,000	$0	$517,000	$0	$577,000
Pahranagat	Private	-	47	$152	-	$7,200	$260,000	$0	$145,000	$0	$201,000
Bill Williams	BLM	96	529	$88	$8,500	$46,600	$194,487	$112,000	$150,000	$153,000	$191,000
Bill Williams	Private	-	6,975	$109	-	$760,300	$260,000	$0	$898,000	$0	$954,000
Hoover to Parker	Private	-	24	$109	-	$2,600	$260,000	$0	$140,000	$0	$196,000
Parker to Southerly International	Private	-	522	$109	-	$56,900	$260,000	$0	$195,000	$0	$250,000
Verde	USFS	-	305	$80	-	$24,400	$586,988	$311,000	$335,000	$437,000	$461,000
Verde	Private	-	1,754	$109	-	$191,200	$260,000	$0	$329,000	$0	$385,000
Roosevelt	USFS	-	-	$80	-	0	$193,012	$102,000	$102,000	$144,000	$144,000
Roosevelt	Private	-	930	$109	-	$101,400	$260,000	$0	$239,000	$0	$295,000
Middle Gila/San Pedro	BLM	214	271	$88	$18,900	$23,900	$47,015	$44,000	$49,000	$54,000	$59,000
Middle Gila/San Pedro	Private	-	10,789	$109	-	$1,176,000	$260,000	$0	$1,314,000	$0	$1,369,000
Upper Gila	USFS	-	-	$80	-	0	$260,000	$138,000	$138,000	$193,000	$193,000
Upper Gila	BLM	-	-	$88	-	0	$262,579	$139,000	$139,000	$195,000	$195,000
Upper Gila	Private	-	5,716	$109-$124	-	$663,900	$260,000	$0	$802,000	$0	$857,000
San Luis Valley	Private	-	21,578	$188	-	$4,056,700	$260,000	$0	$4,194,000	$0	$4,250,000

Exhibit 5-10

FUTURE IMPACTS ON LIVESTOCK GRAZING DUE TO FLYCATCHER CONSERVATION ACTIVITIES, 2004-2023

Management Unit	Affected Party	Estimated AUM Reduction			Estimated Permit Value Losses ($2004)		Other Project Modifications	Total Future Impacts ($2004, 7%)		Total Future Impacts ($2004, 3%)	
		Low	High	$/AUM	Low	High	(Nominal $)*	Low	High	Low	High
Upper Rio Grande	USFS	-	-	$80	-	0	$260,000	$138,000	$138,000	$193,000	$193,000
Upper Rio Grande	Private	-	583	$124	-	$72,200	$260,000	$0	$210,000	$0	$266,000
Middle Rio Grande	BLM	-	-	$88	-	0	$260,000	$138,000	$138,000	$193,000	$193,000
Middle Rio Grande	Private	-	16,176	$124	-	$2,005,800	$260,000	$0	$2,144,000	$0	$2,199,000
USFS Subtotal:		**-**	**416**		**$0**	**$33,300**	**$2,080,000**	**$1,103,000**	**$1,136,000**	**$1,546,000**	**$1,579,000**
BLM Subtotal:		**311**	**854**		**$27,400**	**$75,200**	**$1,024,081**	**$579,000**	**$618,000**	**$800,000**	**$836,000**
Non-Federal Subtotal:		**-**	**88,087**		**$0**	**$13,477,500**	**$4,955,919**	**$0**	**$16,103,000**	**$0**	**$17,166,000**
Total:		**311**	**89,357**		**$27,400**	**$13,586,000**	**$8,060,000**	**$1,682,000**	**$17,857,000**	**$2,346,000**	**$19,581,000**
							Annual Costs ($2004):	**$159,000**	**$1,686,000**	**$158,000**	**$1,316,151**

* Other project modifications are calculated assuming $13,000 per year (see Exhibit 5-7, section 5.2.3) for 20 years, and include costs associated with fence construction, fence maintenance, and cowbird trapping programs. For private parties, this analysis assumes that no costs for other project modifications are incurred if no AUM reductions occur. Note that some of the potential impacts cited here may be caused jointly by several causes, including other endangered species and other riparian habitat protection initiatives.

5.4.8 Regional Economic Impacts

357. This section presents the regional economic impacts expected to result from reductions in grazed AUMs generated by flycatcher conservation activities. The above analysis estimates:

- Approximately 4,300 to 9,200 AUMs reduced each year on Federal grazing lands due to flycatcher conservation activities since 1992.[272]

- Approximately 300 to 90,000 AUMs reduced each year on Federal and non-federal grazing lands over the next 20 years due to flycatcher conservation activities.

358. Decreases in livestock production due to reductions in AUMs in proposed flycatcher critical habitat areas will occur only if no substitute forage is available. In general, it has been documented that ranchers work to maintain the size of existing herds following changes in public land forage availability. For example, Rimbey et al. states that when faced with changes to public forage availability, ranchers "would do everything they could do to maintain their existing herd. Depending upon when the reductions occurred during the year, the ranchers identified alternatives for maintaining herd size and remaining in business: purchase (or not sell) additional hay (to replace forage in winter, early spring, or late fall), and look for private pasture and rangeland leases (summer forage). The last alternative mentioned by ranchers was the reduction in the number of cattle they would run on their ranches."[273] Torell et al. state that "given the stated and observed desire to remain in ranching, perhaps, the most reasonable assumption for policy analysis is that western ranchers will continue in business until forced to leave."[274] In another example, Rowe et al. states that "in general, ranchers favor finding alternatives to Federal forage rather than selling their ranch if faced with reductions in Federal forage."[275] Given observed rancher behavior, it is unclear that a reduction in permitted or authorized AUMs in proposed flycatcher critical habitat areas would necessarily lead to a reduction in herd size, as long as replacement forage is available.

359. However, given the localized nature of ranching and the increasing number of restrictions on ranching behavior overall, it is possible that reductions in forage availability on public land associated with flycatcher conservation could occur in areas where substitute forage is not available, or where supplemental forage is prohibitively expensive. This

[272] Note that this estimate includes the co-extensive impacts of the flycatcher with other causes unrelated to ESA.
[273] Rimbey, N., T. Darden, A. Torrell, J. Tanaka, L. Van Tassel, and J.D. Wulfhorst. "Ranch Level Economic Impacts of Public Land Grazing Policy Alternatives in the Bureau Resource Area of Owyhee County, Idaho." Agricultural Economics Extension Series No. 03-05, University of Idaho, College of Agricultural and Life Sciences, June 2003.
[274] Torell, L. Allen et al., "The Lack of Profit Motive for Ranching: Implications for Policy Analysis," *Current Issues in Rangeland Economics, Proceedings of a Symposium Sponsored by Western Coordinating Committee* 55 (WCC-55), February 2001.
[275] Rowe, Helen I., M. Shinderman, and E.T. Bartlett, "Change on the range." Rangelands 23 (2), April 2001.

analysis assumes that AUMs will be reduced as a result of flycatcher conservation (i.e., effectively assuming that no replacement forage is available). This analysis captures the value of these losses to rancher wealth by assuming that ranchers lose the value of these AUMs.

360. To estimate the regional economic impact of grazing restrictions, this analysis first estimates the number of AUMs likely to be lost annually as a result of flycatcher conservation activities. Direct effects are calculated by converting this AUM reduction to an estimated loss in livestock production. Next, the analysis utilizes IMPLAN to estimate indirect and induced impacts on the region in terms of output and jobs.

Running the IMPLAN Model

361. For purposes of this regional economic impact analysis, the study area includes 29 counties in Arizona, New Mexico, Colorado, Utah, Nevada, and California. The study area includes only the counties in which flycatcher critical habitat is proposed, with the exception of four counties containing large urban areas: Maricopa County Arizona (Phoenix), Pima County Arizona (Tucson), Bernalillo County New Mexico (Albuquerque), and Clark County Nevada (Las Vegas). These four counties are excluded from the analysis because including their large economies would likely mask the impacts within the region's rural areas likely to be significantly affected by restrictions to grazing activity. This scale at which regional economic impacts are modeled was determined by considering that the overall impact of this activity relative to the size of the sector is small. While it would be possible to run the IMPLAN model at the individual county level, at that fine scale, some regional impacts may "leak out" of the analysis and cause the impacts to appear smaller yet.

362. Restrictions in grazing activity will primarily affect the livestock-related sectors of the economy. Decreased operations in these industries would also result in secondary effects on related sectors in the study area. Some of these related sectors may be closely associated with the livestock, such as feed grains and hay and pasture; while others may be less closely associated with the industry, such as the insurance sector.

363. This analysis relies on regional economic modeling to estimate the economic impacts of these initial and secondary effects. In particular, it utilizes a software package called IMPLAN to estimate the total economic effects of the reduction in economic activity in the livestock-related industries in the study area. IMPLAN is commonly used by State and Federal agencies for policy planning and evaluation purposes. The model draws upon data from several Federal and State agencies, including the Bureau of Economic Analysis and the Bureau of Labor Statistics.

364. IMPLAN translates initial changes in expenditures into changes from demand for inputs to affected industries. These effects can be described as direct, indirect, or induced, depending on the nature of the change:

- *Direct effects* represent changes in output attributable to a change in demand or a supply shock. These are specified initially by the modeler (e.g., the change in recreation expenditures on goods and services, by sector);

- *Indirect effects* are changes in output industries that supply goods and services to those that directly affected by the initial change in expenditures; and

- *Induced effects* reflect changes in household consumption, arising from changes in employment (which in turn are the result of direct and indirect effects). For example, changes in employment in a region may affect the consumption of certain goods and services.

365. These categories are calculated for all industries to determine the regional economic impact of grazing restrictions resulting from flycatcher conservation activities.

Caveats to the IMPLAN Model

366. There are two important caveats relevant to the interpretation of IMPLAN model estimates, generally, and within the context of this analysis. The first is that the model is static in nature and measures only those effects resulting from a specific policy change (or the functional equivalent specified by the modeler) at a single point in time. Thus, IMPLAN does not account for posterior adjustments that may occur, such as the subsequent re-employment of workers displaced by the original policy change. In the present analysis, this caveat suggests that the long-run net output and employment effects resulting from grazing restrictions are likely to be smaller than those estimated in the model, which implies an upward bias in the estimates. A second caveat to the IMPLAN analysis is related to the model data. The IMPLAN analysis relies upon input/output relationships derived from 1998 data. Thus, this analysis assumes that this historical characterization of the affected counties' economies are a reasonable approximation of current conditions. If significant changes have occurred since 1998 in the structure of the economies of the counties in the study area, the results may be sensitive to this assumption. The magnitude and direction of any such bias are unknown.

5.4.8.1 Past Regional Economic Impact Estimates

367. Past direct effect of reduced AUMs on annual livestock production are estimated using the high estimate of lost AUMs (Exhibit 5-11). At the high end, this analysis estimates 9,200 AUMs have been lost each year due to flycatcher conservation activities since 1995. The calculation of the direct effect of reduced AUMs on annual livestock production rely on the following assumptions:

- The five-year average of livestock production per head in New Mexico and Arizona ($758); and[276]

[276] Value of all cattle and calves per head (dollar), 1992-2003. NASS, 2002.

- Value per head is converted to annual forage value (per AUM) by dividing by 18 ($42).[277]

Exhibit 5-11

CALCULATION OF PAST DIRECT EFFECT OF GRAZING REDUCTIONS ON LIVESTOCK PRODUCTION, 1995-2003 (ANNUAL)

Management Unit	Affected Party	Estimated AUM reduction (annually)[1]	Value of Livestock Production (per AUM)[2]	Total Livestock Production Loss (annual)[3]
San Diego	USFS	220	$42	$9,000
Kern	USFS	250	$42	$11,000
Little Colorado	USFS	111	$42	$5,000
Verde	USFS	367	$42	$15,000
Roosevelt	USFS	1,514	$42	$64,000
Middle Gila/San Pedro	BLM	361	$42	$15,000
Upper Gila	USFS	3,423	$42	$144,000
Upper Gila	BLM	1,760	$42	$74,000
Upper Rio Grande	USFS	61	$42	$3,000
Middle Rio Grande	BLM	1,250	$42	$53,000
TOTAL:		**9,319**		**$391,000**

Notes:
[1] Based on the high estimate of AUM reduction.
[2] Value of production represents the five year average for NM and AZ.
[3] Totals may not sum due to rounding.

368. Exhibit 5-12 presents the results of the IMPLAN analysis. The reduction in livestock production as a result of AUM reductions is shown to have resulted in an annual economic loss of approximately $650,000 (2004 dollars) in regional output and approximately seven jobs across all sectors of the economy. This impact represents approximately 0.36 percent of total output from the livestock industry in this region.[278]

[277] Assuming one calf per cow and a monthly requirement of 0.5 AUMs per calf. Lewandrowski, Jan and K. Ingram, Restricting Grazing on Federal Lands in the West to Protect Threatened and Endangered Species: Ranch and Livestock Sector Impacts. Review of Agricultural Economics, Volume 24, Number 1 (78-107).
[278] This data is from IMPLAN for the Range-Fed, Ranch-Fed and Cattle Feedlots livestock sectors.

Exhibit 5-12

PAST REGIONAL ECONOMIC IMPACT OF REDUCTIONS IN LIVESTOCK PRODUCTION, 1995-2003 (ANNUAL)*

Management Unit	Affected Party	Direct Effect (Output)	Indirect Effect (Output)	Induced Effect (Output)	Total Impact (Output)
San Diego	USFS	$10,000	$3,000	$2,000	$15,000
Kern	USFS	$11,000	$4,000	$3,000	$17,000
Little Colorado	USFS	$5,000	$2,000	$1,000	$8,000
Verde	USFS	$16,000	$6,000	$4,000	$26,000
Roosevelt	USFS	$66,000	$24,000	$17,000	$106,000
Middle Gila/San Pedro	BLM	$16,000	$6,000	$4,000	$25,000
Upper Gila	USFS	$148,000	$53,000	$38,000	$239,000
Upper Gila	BLM	$76,000	$27,000	$19,000	$123,000
Upper Rio Grande	USFS	$3,000	$1,000	$1,000	$4,000
Middle Rio Grande	BLM	$54,000	$19,000	$14,000	$87,000
TOTAL OUTPUT:		**$405,000**	**$145,000**	**$103,000**	**$650,000**
TOTAL EMPLOYMENT:		**3.30**	**1.80**	**1.50**	**6.50**

* Regional economic impact measures represent one-time changes in economic activity (i.e., not present values); thus, these estimates represent annual losses. Note that some of the impacts cited here may be caused jointly by several causes, including other endangered species and other riparian habitat protection initiatives.

5.4.8.2 Future Regional Economic Impact Estimates

369. Future regional economic impacts are estimated using the high estimate of lost AUMs (Exhibit 5-13). At the high end, this analysis estimates future AUMs reductions of 89,300 AUMs due to flycatcher conservation activities. The calculation of the direct effect of future reductions in AUMs on annual livestock production relies on the same assumptions as the analysis of past impacts:

- The five-year average of livestock production per head in New Mexico and Arizona ($758); and[279]
- Value per head is converted to annual forage value (per AUM) by dividing by 18 ($42).[280]

370. Exhibit 5-14 presents the results of the IMPLAN analysis. The future reduction in livestock production as a result of AUM reductions is shown to result in an annual economic loss of approximately $5.4 million (2004 dollars) in regional output and approximately 65 jobs across all sectors of the economy. This impact represents approximately three percent of total output from the livestock industry in this region.[281]

[279] Value of all cattle and calves per head (dollar), 1992-2003. NASS, 2002.
[280] Assuming one calf per cow and a monthly requirement of 0.5 AUMs per calf. Lewandrowski, Jan and K. Ingram, Restricting Grazing on Federal Lands in the West to Protect Threatened and Endangered Species: Ranch and Livestock Sector Impacts. Review of Agricultural Economics, Volume 24, Number 1 (78-107).
[281] This data is from IMPLAN for the Range-Fed, Ranch-Fed and Cattle Feedlots livestock sectors.

Exhibit 5-13

CALCULATION OF FUTURE DIRECT EFFECT OF GRAZING REDUCTIONS ON LIVESTOCK PRODUCTION, 2004-2023 (ANNUAL)

Management Unit	Affected Party	Estimated AUM reduction[1]	Value of Livestock Production (per AUM)[2]	Total Livestock Production Loss (annual)[3]
Santa Ynez	Non-federal	2,565	$42	$108,000
Santa Ana	Non-federal	5,069	$42	$213,000
San Diego	Non-federal	705	$42	$30,000
Owens	Non-federal	7,867	$42	$330,000
Kern	Non-federal	3,355	$42	$141,000
Mohave	Non-federal	986	$42	$41,000
Little Colorado	USFS	111	$42	$5,000
Little Colorado	Non-federal	51	$42	$2,000
Virgin	BLM	54	$42	$2,000
Virgin	Non-federal	2,396	$42	$101,000
Pahranagat	Non-federal	47	$42	$2,000
Bill Williams	BLM	529	$42	$22,000
Bill Williams	Non-federal	6,975	$42	$293,000
Hoover to Parker	Non-federal	24	$42	$1,000
Parker to Southerly International	Non-federal	522	$42	$22,000
Verde	USFS	305	$42	$13,000
Verde	Non-federal	1,754	$42	$74,000
Roosevelt	Non-federal	930	$42	$39,000
Middle Gila/San Pedro	BLM	271	$42	$11,000
Middle Gila/San Pedro	Non-federal	10,789	$42	$453,000
Upper Gila	Non-federal	5,716	$42	$240,000
San Luis Valley	Non-federal	21,578	$42	$906,000
Upper Rio Grande	Non-federal	583	$42	$24,000
Middle Rio Grande	Non-federal	16,176	$42	$679,000
TOTAL:		**89,357**		$3,403,000

Notes:

[1] Based on the high estimate of AUM reduction. Note that some of the potential impacts cited here may be caused jointly by several causes, including other endangered species and other riparian habitat protection initiatives.

[2] Value of production represents the five year average for NM and AZ.

[3] Totals may not sum due to rounding.

Exhibit 5-14

FUTURE REGIONAL ECONOMIC IMPACT OF REDUCTIONS IN LIVESTOCK PRODUCTION, 2004-2023 (ANNUAL)*

Management Unit	Affected Party	Direct Effect (Output)	Indirect Effect (Output)	Induced Effect (Output)	Total Impact (Output)
Santa Ynez	Non-federal	$96,000	$35,000	$25,000	$156,000
Santa Ana	Non-federal	$190,000	$69,000	$49,000	$308,000
San Diego	Non-federal	$26,000	$10,000	$7,000	$43,000
Owens	Non-federal	$295,000	$107,000	$76,000	$478,000
Kern	Non-federal	$126,000	$46,000	$33,000	$204,000
Mohave	Non-federal	$37,000	$13,000	$10,000	$60,000
Little Colorado	USFS	$4,000	$2,000	$1,000	$7,000
Little Colorado	Non-federal	$2,000	$1,000	$0	$3,000
Virgin	BLM	$2,000	$1,000	$1,000	$3,000
Virgin	Non-federal	$90,000	$33,000	$23,000	$146,000
Pahranagat	Non-federal	$2,000	$1,000	$0	$3,000
Bill Williams	BLM	$20,000	$7,000	$5,000	$32,000
Bill Williams	Non-federal	$261,000	$95,000	$68,000	$424,000
Hoover to Parker	Non-federal	$1,000	$0	$0	$1,000
Parker to Southerly International	Non-federal	$20,000	$7,000	$5,000	$32,000
Verde	USFS	$11,000	$4,000	$3,000	$19,000
Verde	Non-federal	$66,000	$24,000	$17,000	$107,000
Roosevelt	Non-federal	$35,000	$13,000	$9,000	$57,000
Middle Gila/San Pedro	BLM	$10,000	$4,000	$3,000	$16,000
Middle Gila/San Pedro	Non-federal	$404,000	$147,000	$105,000	$656,000
Upper Gila	Non-federal	$214,000	$78,000	$55,000	$348,000
San Luis Valley	Non-federal	$808,000	$294,000	$209,000	$1,312,000
Upper Rio Grande	Non-federal	$22,000	$8,000	$6,000	$35,000
Middle Rio Grande	Non-federal	$606,000	$221,000	$157,000	$983,000
TOTAL OUTPUT:		**$3,348,000**	**$1,220,000**	**$867,000**	**$5,433,000**
TOTAL EMPLOYMENT:		**32.30**	**17.40**	**14.20**	**63.90**

* Regional economic impact measures represent one-time changes in economic activity (i.e., not present values); thus, these estimates represent annual losses. Note that some of the potential impacts cited here may be caused jointly by several causes, including other endangered species and other riparian habitat protection initiatives.

5.5 Caveats to Economic Analysis of Impacts on the Livestock Grazing Activities

371. Exhibit 5-15 summarizes the key assumptions of the analysis of economic impacts on the grazing activities, as well as the potential direction and relative scale of bias introduced by these assumptions.

Exhibit 5-15

CAVEATS TO THE ECONOMIC ANALYSIS ON LIVESTOCK GRAZING ACTIVITIES

Key Assumption	Effect on Impact Estimate
Although there are many factors that may result in AUM reductions, historical reductions to grazing (permitted AUMs) in flycatcher habitat are assumed to result from flycatcher conservation activities.[282]	+
All private lands supporting rangeland vegetation in Arizona, New Mexico, Colorado, Utah, and Nevada are assumed to be used for livestock grazing.	+
While there is no history of grazing restrictions on private lands for flycatcher, this analysis incorporates a scenario into the high bound estimate that assumes restrictions are likely in the future to reflect the possibility that private landowners may modify their grazing practices to avoid incidental take under section 9.	+/-
For the high-end estimate, this analysis assumes that the entire proposed CHD will be excluded from grazing use due to flycatcher. In fact, many areas have already excluded grazing due to other concerns.	+
For the high-end estimate, this analysis assumes that affected allotments will be retired completely. In fact, the consultation history suggests that grazing may only be disallowed for part of a year.	+
The percent of AUMs reduced on allotments where direct AUM reductions were not known is assumed to be equal to the percentage of the allotment designated as proposed flycatcher critical habitat. This analysis could underestimate (e.g., range managers are able to avoid AUM reductions through changes in grazing management and patterns) or overestimate (e.g., fencing off the riparian corridor results in a greater number of AUMs reduced) the economic impacts.	+/-
The livestock grazing permit value is $80/AUM on USFS lands, and $88/AUM on BLM lands.	+/-
For Federal allotments where the actual number of AUMs grazed is unknown, this analysis estimates the AUMs reduced due to flycatcher using the average AUM reduction on Federal grazing lands with known AUMs.	+/-
To estimate the number of AUMs reduced on non-federal grazing lands in the proposed CHD, this analysis utilizes 0.93 AUMs per acre, which suggests that private lands, on average, are four times as productive as Federal lands.	+/-

[282] Forest Guardians agrees in its public comment that this assumption overstates impacts due to flycatcher. Public comments of Billy Stern, Grazing Program Coordinator, Forest Guardians, "Proposed Designation of Critical Habitat for the Southwestern willow flycatcher (*Empidonax traillii extimus*)", May 26, 2005.

Exhibit 5-15

CAVEATS TO THE ECONOMIC ANALYSIS ON LIVESTOCK GRAZING ACTIVITIES

Key Assumption	Effect on Impact Estimate
The IMPLAN model used to estimate regional economic impacts is a static model and does not account for the fact that the economy will adjust. IMPLAN measures the effects of a specific policy change at one point in time. Over the long-run, the economic losses predicted by the model may be overstated as adjustments such as re-employment of displaced employees occurs.	+
The IMPLAN model used to estimate regional economic impacts relies on 1998 data. If significant changes have occurred in the structure of the affected counties economies, the results may be sensitive to this assumption. The direction of any bias is unknown.	+/-
The annual production value of livestock is $42/AUM.	+/-

- : This assumption may result in an underestimate of real costs.
+ : This assumption may result in an overestimate of real costs.
+/- : This assumption has an unknown effect on the magnitude of cost estimates.

372. This section evaluates how conservation activities to protect the flycatcher and its habitat affect real estate development. Specifically, the analysis focuses on the past and future economic effects resulting from flycatcher conservation activities and "co-extensive" land use regulations affecting residential and commercial real estate development within proposed flycatcher CHD. Related impacts are addressed in other chapters. For example, real estate development increases demand for domestic, commercial, and industrial water use, transportation infrastructure, and recreational opportunities, each of these activities is addressed elsewhere in this report. This section presents a summary of economic impacts on real estate development, relevant background information, an overview of the methodology used to evaluate economic impacts and a detailed presentation of the analysis. A discussion of the number of residential customers that could be affected if changes to water management within proposed CHD is included in Section 4.

6.1 Summary of Economic Impacts

373. This analysis examines past and future economic impacts on residential and commercial real estate development resulting from flycatcher conservation activities. The section below summarizes the past economic impacts and the estimated future economic impacts. This section considers the costs of modifications to projects and other indirect impacts of flycatcher conservation activities. Administrative costs associated with consultations regarding the flycatcher and habitat are quantified in Section 3 of this report.

6.1.1 Summary of Past Economic Impacts

374. Past section 7 consultations addressing development projects impacting the flycatcher have occurred in the Verde Management Unit in Yavapai County, Arizona. The Service has consulted on two non-Tribal residential development projects with potential to affect the flycatcher in this management unit. While the Service prepared biological opinions for both of the projects, only one of the projects (the Homestead project) is expected to proceed. The other project has been delayed due to factors

unrelated to the flycatcher. This analysis estimates the economic impact resulting from flycatcher conservation activities associated with the active project range from $4,445,000 to $4,775,000.[283]

6.1.2 Summary of Future Economic Impacts

375. Future economic impacts are anticipated in the Coastal California Recovery Unit and Basin and Mojave Recovery Unit in California. Development impacts are not expected in other CHD units because demand is projected to be insufficient to support new development in these areas. In particular, development in these units is expected to be cost prohibitive due to the riparian-nature of flycatcher habitat. A summary of the total future economic impact of flycatcher conservation activities on real estate development is shown in Exhibit 6-1. The total costs of future project modifications, flycatcher-related California Environmental Quality Act (CEQA) costs, and project delay costs are estimated to be approximately $5.3 million. The derivation of these costs is detailed in Sections 6.5 though 6.8.

Exhibit 6-1

SUMMARY OF ESTIMATED FUTURE ECONOMIC IMPACTS BY MANAGEMENT UNIT

Management Unit	Acres of Development	Land Value Loss	Other Project Modifications	CEQA Costs	Delay Costs	Total Cost
Mojave	8	$3,037,017	$1,365,503	$9,670	$868	$4,413,058
Santa Ana	2	$643,815	$282,741	$2,002	$184	$928,742
Total	**10**	**$3,680,833**	**$1,648,243**	**$11,672**	**$1,052**	**$5,341,800**

Note: Impacts are discounted at 7 percent and presented in present value terms using 2004 dollars.

6.2 Background on Residential Development in the Proposed CHD

376. The proposed flycatcher CHD is located within the FEMA 100-year floodplain. Generally, Federal guidelines govern real estate development in floodplains. Many jurisdictions in flood-prone areas participate in the National Flood Insurance Program (NFIP), managed by the Mitigation Division of the Federal Emergency Management Agency (FEMA). Communities voluntarily adopt FEMA's floodplain management ordinances in exchange for Federally-backed flood insurance.

377. The 100-year floodplain is defined as all land subject to inundation by the 100-year flood (i.e., the flood elevation with a one percent chance of being equaled or exceeded each year). FEMA defines these lands as Special Flood Hazard Areas and places special requirements on development within them. The lowest floor of all new residential buildings in the floodplain must be at or above the level of the 100-year flood, in order to qualify for FEMA-backed insurance. Non-residential buildings must be at or

[283] While the biological opinion regarding the Homestead project defines specific project modifications for which costs are estimated, these costs have not been borne to date. Although the cost of the project modifications is an accurate estimate of the loss in land value, these costs have not been discounted to account for the timing of the project modifications.

above the level of the 100-year flood, or be flood-proofed to that level. Using these guidelines, construction in a floodplain is possible in lower-risk locations such as areas where the floodplain is wide. While FEMA regulates development in these areas, individual jurisdictions may place additional restrictions on construction above and beyond FEMA regulations.

378. Within the floodplain, the "floodway" is defined as all land required to convey the 100-year flood without structural improvements and/or all land required to convey the 100-year flood without increasing water surface elevation by more than one foot at any single point. It is the part of a waterway where water is likely to be fastest and highest, and it is therefore important that the floodway be kept free of obstructions in order to avoid increasing the water level. FEMA does not prohibit all construction in floodways, but does require developers to obtain a "No Rise Certificate" by demonstrating that there will be no increase in water level as a result of construction. This FEMA development regulation may require flood control facilities or other special engineering, often making development in floodways impractical and prohibitively expensive.[284] Furthermore, individual jurisdictions may establish additional, more stringent restrictions on construction in the floodway.

6.3 Analytical Approach

379. Potential modifications to land use projects stemming from flycatcher conservation activities can affect landowners, consumers, and real estate markets in general. The total economic impact depends on the scope of flycatcher conservation activities, pre-existing land use and regulatory controls in the region, and the nature of regional land and real estate markets. In order to accurately account for all of these factors, and to estimate the corresponding economic impacts, this analysis employs the following series of methodological tasks.[285]

6.3.1 Estimate Future Development within Proposed CHD

380. The first step in evaluating the effect of flycatcher conservation activities on private land development is to identify the amount, type and location of land included within CHD. Economic effects on private development stem from projects on land within proposed CHD that can be feasibly developed during the timeframe being considered. Because flycatcher habitat is contained within the 100-year floodplain, the analysis limits flycatcher impacts on development to areas within CHD where real estate demand is great enough to justify the costs associated with developing the floodplain. In addition, to isolate potentially impacted areas, the analysis removes non-developable areas such as bodies of water, public parks, and other permanent open space.

[284] Personal communication with Mekbib Degaga, Riverside County Flood Control and Water Conservation District, August 18, 2004. Personal communication with Clark Pharr, Kern County Engineering and Survey Services Department, August 18, 2004.

[285] The steps described below outline the methodological approach used to estimate the economic impacts associated with future land development in proposed CHD; past development projects in California have not required project modification due to flycatcher concerns.

Geographically based development projections are then used to estimate the amount of future development (residential and commercial) expected to occur on developable acreage within proposed CHD for the flycatcher.

6.3.2 Identify Flycatcher Conservation Activities

381. The effects of flycatcher conservation activities on land value ultimately depend on the type and level of project modifications recommended. Thus, the second step is to estimate the expected modifications to land use projects associated with flycatcher conservation activities. Due to the scarcity of past flycatcher consultations addressing development projects, this analysis relies on an assumed offsetting compensation ratio and additional project modifications derived from various past section 7 consultations addressing the flycatcher to forecast future impacts. Requirements associated with pre-existing regulations or land use restrictions, including Federal, State, local, or regional laws and agreements, that are co-extensive with flycatcher protection under section 7 are included in this analysis.

6.3.3 Evaluate Effects on Regional Real Estate Market and Associated Cost Incidence

382. The third step is to determine the significance of flycatcher-related land use project modifications relative to regional real estate market dynamics, and the resulting regulatory cost incidence. The incidence or burden of the project modifications and other compliance costs will ultimately depend on their scope and the nature of the regional real estate markets.

383. The economic impacts are likely to extend beyond the regulated landowners and affect the real estate market, real estate consumers, and the regional economy if: (1) the amount of land set-aside (i.e., land not developed as a result of flycatcher conservation activities) is high relative to the total developable land in the region, and/or (2) other compliance costs are high relative to real estate development value and cover a significant proportion of developable land. In these cases, landowners and developers may pass on the costs to real estate consumers in the form of higher prices.

384. Conversely, if project modification costs are low and/or flycatcher conservation activities only affect a small fraction of the total developable land supply in a region, then the economic effects are likely to be limited to that sub-set of individual landowners and/or projects. In this case, the regulated landowners will not be able to pass on their increased costs to consumers and their development projects will either relocate to other available sites or proceed with a reduced land value.

6.3.4 Estimate Economic Impacts

385. The fourth step involves applying the data and conclusions from steps one through three to estimate the potential economic costs associated with flycatcher conservation activities. The approach to economic cost estimation is different depending

on the cost incidence. If the project modification requirements do not affect the overall regional real estate market dynamics, cost impacts as estimated are borne by the regulated landowners. The economic costs are determined based on the loss in land value associated with required on-site set-asides and other project modifications that may be incurred by individual landowners/developers.

386. If, however, the scale and intensity of the proposed designation is sufficient to affect regional real estate dynamics, regulatory requirements may affect consumers through some mix of increased real estate prices and reduced real estate production. Developers or landowners will also be affected, although those with land outside of the designation area could gain from the reduced supply and corresponding price increase. The total economic effect is measured through the change in producer and consumer surplus, a measure of social welfare.

6.4 Estimated Future Development within Proposed CHD

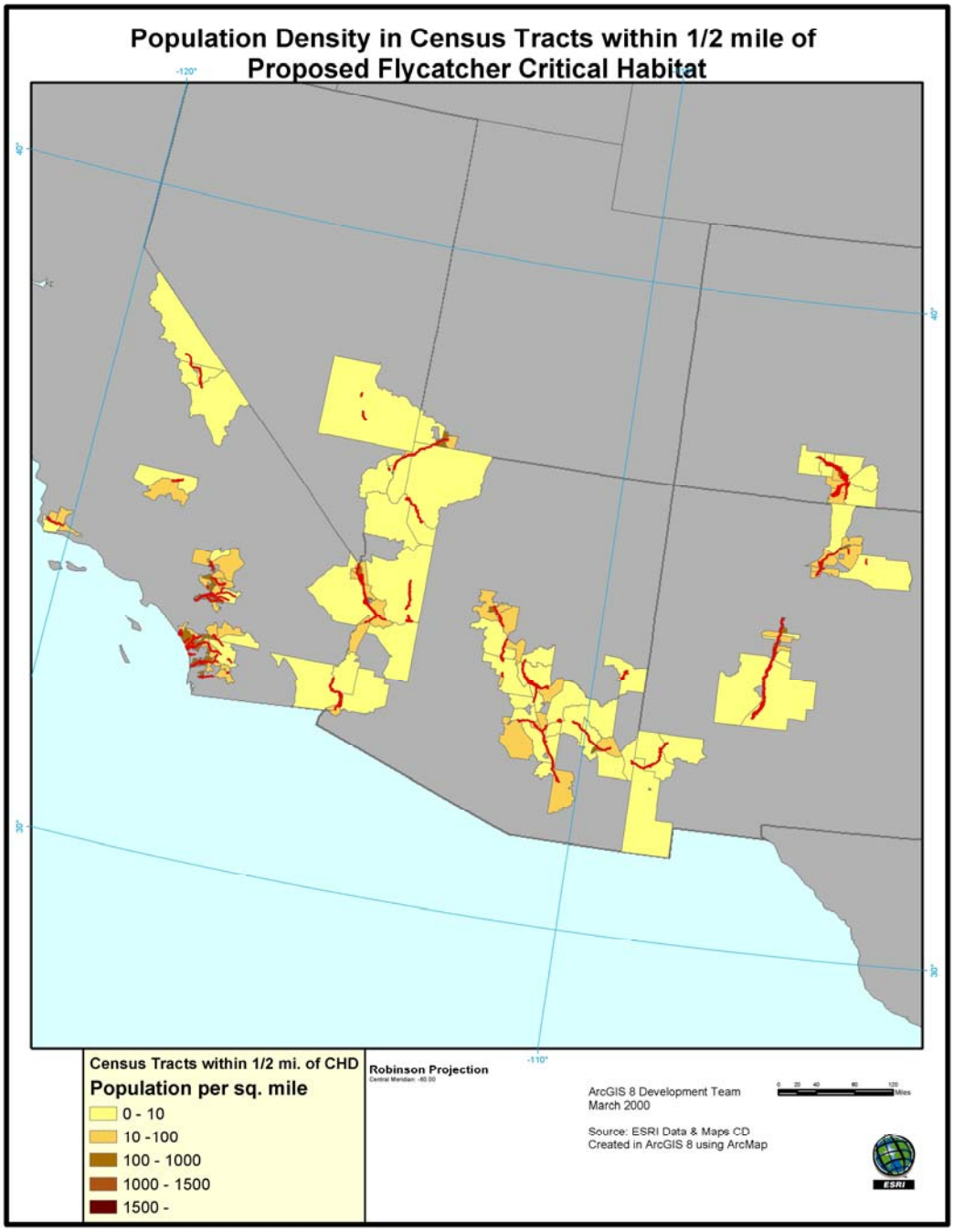
387. The analysis limits flycatcher impacts on real estate development to areas within proposed CHD where real estate demand is great enough to support floodplain development in the future. While the additional construction and insurance costs specific to floodplain development make it unlikely in most areas, real estate markets in some high-demand locations may support new development in the floodplain. This analysis identifies the areas within CHD where floodplain development is most likely.

6.4.1 Identifying Areas Where Floodplain Development is Most Probable

388. The analysis relies on population density and land scarcity measures (where available) to identify areas where floodplain development is most probable. First, Geographic Information System (GIS) analysis is used to identify census tracts intersecting proposed flycatcher habitat. Next, population density is calculated from Census 2000 data for each census tract intersecting proposed flycatcher habitat. Exhibit 6-2 presents the population density for census tracts that cross flycatcher CHD. Then, for each census tract intersecting proposed habitat in California, developable acreage is calculated and divided by land area to determine the proportion of each census tract that is developable.[286] This calculation is not performed elsewhere, as the data necessary to identify developable lands within the proposed CHD are not available for Arizona, Colorado, New Mexico, Nevada, or Utah.

[286] Developable acreage is calculated as total private acreage proposed less (private) water acreage and (private) urbanized acreage based on GIS land ownership data provided by the Service and California's Farmland Mapping and Monitoring Program (FMMP) data regarding urbanization. FMMP data is not available for Inyo or Mono Counties but these areas are known to be very rural.

Exhibit 6-2


Population Density in Census Tracts within 1/2 mile of Proposed Flycatcher Critical Habitat
-120°
40°
30°
-110°
Census Tracts within 1/2 mi. of CHD
Population per sq. mile
0 - 10
10 - 100
100 - 1000
1000 - 1500
1500 -
Robinson Projection
Central Meridian: -60.00
ArcGIS 8 Development Team
March 2000
Source: ESRI Data & Maps CD
Created in ArcGIS 8 using ArcMap
0 20 40 80 120
Miles
ESRI

389. Floodplain development is assumed to be most probable in those census tracts that are densely populated and largely devoid of opportunities for new development (thereby necessitating development within the floodplain). Specifically, in California, those census tracts intersecting flycatcher habitat that are both the most densely populated (i.e., the densest 25 percent of tracts intersecting habitat) and least developable (i.e., the least developable 25 percent of tracts intersecting habitat) are isolated for further analysis. Where developable acreage is unknown (i.e., Arizona, Colorado, New Mexico, and Utah), population density alone is used to identify tracts where floodplain development is most likely occur in the future. In these states, census tracts with at least 1,000 persons per square mile were considered most likely to support floodplain development. In sum, 117 census tracts located in 12 Counties are identified as likely to support floodplain development. Exhibit 6-3 presents the Counties identified as most likely to support floodplain development.

Exhibit 6-3

COUNTIES IDENTIFIED AS MOST LIKELY TO SUPPORT DEVLOPMENT WITHIN PROPOSED FLYCATCHER CHD

State	County(s)
Arizona	La Paz, Yuma
California	San Bernardino, San Diego, Santa Barbara
Colorado	None
New Mexico	Bernalillo, Rio Arriba, Sandoval, Santa Fe, Valencia
Utah	Washington
Nevada	Clark

Source: Based on GIS analysis of Census 2000 population density, land ownership data provided by the U.S. Fish and Wildlife Service, and Farmland Mapping and Monitoring Program (FMMP) data.

390. While the GIS analysis utilizes the best available data, some areas identified as most likely to support floodplain development may be constrained by existing flood control infrastructure, local floodplain and floodway ordinances, or other factors not reflected in the GIS data available for this analysis. To account for factors not captured in the GIS analysis, County and City planners were contacted to verify development potential in floodplain areas identified as the most likely to support development. Maps of the census tracts where development in the floodplain is most likely were emailed to the appropriate agencies. Based on information provided, development projects in California are anticipated to be affected by conservation measures associated with the flycatcher. However, development projects in Arizona, Colorado, New Mexico, Nevada, and Utah are not anticipated to be affected. Specific findings for each management unit are discussed in Section 6.9.

6.4.2 Development Projections

391. In addition to identification of areas most likely to support development, estimation of future flycatcher-related impacts on private development within CHD requires consideration of projected level of development in those areas. To analyze

development projections, GIS maps of the proposed CHD boundaries were correlated with census tract level data provided by the Southern California Association of Governments (SCAG), the San Diego Association of Governments (SANDAG), and the U.S. Census Bureau.

392. SCAG and SANDAG are quasi-governmental agencies responsible for providing official demographic projections for (a) the Counties of Los Angeles, Ventura, Riverside, San Bernardino, and Orange Counties, and (b) San Diego County, respectively. The regional agency responsible for demographic projections in Santa Barbara County (the Santa Barbara County Association of Governments [SBCAG]) does not develop land use projections on a census tract basis. The rate of past growth in the number of households based on 1990 and 2000 census data is therefore used to evaluate future development by census tract in this County.

393. The SCAG and SANDAG land use projections are used to identify undeveloped acres slated for residential, retail, office, or industrial development. SANDAG provides acreage estimates for these land use categories while SCAG data were converted to an acreage format based on assumptions regarding employees and households per acre. In Santa Barbara County, census data indicate a reduction in the number of households between 1990 and 2000 in the one tract where floodplain development is most probable. Thus, no future development is forecasted for this Santa Barbara tract. Further according to the Public Works Department for San Diego, development within the floodplain areas identified is not expected to occur. These areas have not been subject to development in the past, despite population growth patterns, and no plans for future development exist.[287]

394. For census tracts that are partially covered by proposed CHD, projected growth is assumed to be evenly distributed throughout all land available for development in that census tract.[288] The amount of growth projected within proposed CHD is then estimated according to the proportion of developable land within the entire census tract that is also within proposed CHD. In some census tracts, projected development is limited by developable acreage. Also, development is not projected to occur in infeasible areas, as determined through interviews with local and regional planners (See Section 6.9 for additional detail).

395. Of the 117 proposed CHD acres in California, GIS analysis indicates that 66 acres of CHD are developable. Based on development projections and information collected from County and City planners, future demand is estimated support approximately 38 acres of new development in proposed CHD through 2023. Exhibit 6-4 presents projected development within CHD.

[287] Personal communication with Greg Mayer, Deputy City Engineer, Public Works Department, City of Oceanside, CA, September 9, 2004.

[288] This is a simplifying assumption. In reality, costs associated with development in the floodplain make such development less likely than non-floodplain areas. This assumption will lead the analysis to overstate rather than understate the economic cost of flycatcher protection on real estate development.

Exhibit 6-4

DEVELOPMENT PROJECTIONS IN CENSUS TRACTS WHERE FLOODPLAIN DEVELOPMENT IS MOST PROBABLE

Management Unit	County (Census Tract)	Projected Development (Acres)
Mojave	SAN BERNARDINO (009800)	31.7
San Diego[1]	SAN DIEGO (18300)	0.0
San Diego[1]	SAN DIEGO (18400)	0.0
Santa Ana	SAN BERNARDINO (008301)	6.6
Santa Ana	SAN BERNARDINO (008702)	0.0
Santa Inez	SANTA BARBARA (002703)	0.0
Total		**38.3**

[1] See Section 6.9.1 for discussion of public comments regarding potential development in San Diego County.

6.5 Flycatcher Conservation Activities

396. The economic impact of proposed CHD on private sector land development requires information on the type and level of offsetting compensation and other conservation activities likely to be associated with future impacts to the flycatcher.

6.5.1 Offsetting Compensation

397. The Service may request a range of offsetting compensation for impacts to flycatcher habitat. For example, it is possible that the Service may request that developers avoid permanent impacts to flycatcher habitat in the future. That is, due to the scarcity of flycatcher habitat, the Service may ask that developers not undertake projects in flycatcher habitat. A more common result is that the Service may request an offsetting compensation ratio to replace affected habitat. For example, the Service requested an average offsetting compensation ratio of 1.25-to-1 for impacts to arroyo toad habitat (See the *Economic Analysis of Critical Habitat Designation for the Arroyo Toad*).

398. There are only two past biological opinions addressing the effect of development projects on the flycatcher. Both past development projects required offsetting compensation. Although the ratio of impacted habitat to set-aside is difficult to ascertain from the biological opinions, it appears that the ratio is greater than 1.25:1. Thus, this analysis relies on an offsetting compensation ratio of 3-to-1 for permanent impacts to flycatcher habitat. This corresponds to the mitigation ratio described by the Service for the California tiger salamander. That is, for every project acre developed, three on-site acres must be preserved.[289] The acreage of offsetting compensation projected within flycatcher CHD is presented in Exhibit 6-5.

[289] The Service states that a more realistic ratio would be 1.25 to 1. Written comments of California/Nevada Operations Office, Service, January 18, 2005.

Exhibit 6-5

DEVELOPMENT SET-ASIDES IN CENSUS TRACTS WHERE FLOODPLAIN DEVELOPMENT IS MOST PROBABLE

Management Unit	County (Census Tract)	Projected On-Site Set-Aside (Acres)[a]
Mojave	SAN BERNARDINO (009800)	23.8
San Diego	SAN DIEGO (18300)	0.0
San Diego	SAN DIEGO (18400)	0.0
Santa Ana	SAN BERNARDINO (008301)	4.9
Santa Ana	SAN BERNARDINO (008702)	0.0
Santa Inez	SANTA BARBARA (002703)	0.0
Total		**28.7**

[a] Based on an offsetting compensation ratio of 3:1. The Service states that a more likely ratio would be 1.25 to 1. Written comments of California/Nevada Operations Office, Service, January 18, 2005. See Section 6.9.1 for discussion of public comments regarding potential development in San Diego County.

6.5.2 Regional Real Estate Effects

399. The cost incidence or economic burden of real estate development project modifications stemming from flycatcher protection will be determined by their impact on the regional real estate market (i.e., on overall real estate production and prices). To determine the regional significance of flycatcher conservation activities, this analysis compares the reduction in acres slated for development to market-wide demand and supply conditions.

400. Ideally, land set-aside requirements should be compared with the total supply of developable acreage in the region. However, accurate estimates of total regional development potential are not readily available. Consequently, for the purposes of this analysis, projected acres of growth through 2023 in the three Counties where floodplain development is most probable are used as proxies for regional market supply. Total land development potential is based on SCAG and SANDAG forecasts.

401. A comparison of the total acres of on-site habitat set-aside in proposed CHD resulting from flycatcher conservation activities and the total projected acres of growth through 2023 for each County is provided in Exhibit 6-6. As shown, the estimated on-site habitat set-aside in proposed CHD represents between approximately zero and 0.04 percent of future growth at the County level.

Exhibit 6-6

REGIONAL SIGNIFICANCE OF PROJECTED LAND SET-ASIDE

County	Total County Growth through 2023 (Acres)	Regional Significance of CH	
		On-site Acres Set-Aside	Percent of Projected County Growth
San Diego, California (1)	235,641	0	0.00%
San Bernardino, California (2)	80,213	29	0.04%
Santa Barbara, California (3)	4,989	0	0.00%
Total	**320,842**	**29**	**0.01%**

Notes:
1. Land development projections provided by SANDAG. See Section 6.9.1 for discussion of public comments regarding potential development in San Diego County.
2. Land development estimated based on SCAG demographic and employment projections.
3. Based on countywide projections of new residential units and commercial land from 2005 to 2023, from *SBCAG Regional Growth Forecast 2000-2030.*

402. It is important to note that the set-aside estimates presented in Tables 6-5 and 6-6 are an overestimate of the flycatcher conservation activities on regional development opportunities. The following factors suggest that the flycatcher-related on-site habitat set-aside will actually represent a much smaller proportion of the regional real estate market.

- **Regional land supply is greater than projected demand through 2023.** The above estimates rely on projected land consumption through 2023 as a proxy for long-term supply. In reality, the long-term land supply is greater than demand through 2023 because many of the communities within the three-County area are not expected to reach build-out until significantly beyond that date.

- **Developers will adjust to reduced land supply by increasing density.** The above estimates assume that development in areas both inside and outside of CHD cannot occur at higher densities. In practice, increased densification as well as revitalization of under-utilized "in-fill" sites can continue to provide significant development opportunities in land constrained markets.

403. Given the factors described above, and the fact that 0.04 percent is a very small proportion of real estate supply, the set-aside land associated with flycatcher protection is not expected to affect the dynamics of the regional real estate market. Hence, housing prices in each County are not likely to be affected. However, regulated landowners will bear the cost associated with flycatcher protection, in the form of lower property values. As this analysis assumes that the total supply of housing will be met, some projects may be distributed to other locations while others may proceed with higher flycatcher protection costs and lower land values. No broader effects on regional real estate prices are anticipated.

6.6 Economic Impact of Lost Land Development Opportunities

404. This section calculates the loss in land value for on-site set-aside due to flycatcher conservation activities projected for private development projects.

6.6.1 Real Estate Land Value Data and Assumptions

405. Residential, commercial, and industrial market data for each of the three Counties were used to estimate the cost, or lost value, resulting from on-site habitat set-aside. A summary of relevant market data and calculation of the "residual land value" by real estate product type are presented in Exhibit 6-7.

406. The residual land value is an estimate of the value of a raw, unimproved parcel (with no infrastructure) that is zoned for the development type in question (e.g., single family residential, office, etc.). The use of unimproved land value is appropriate because a developer seeking project entitlement will not invest money in infrastructure or other improvements on land designated as a habitat set-aside – using improved land prices would overstate the land value lost due to flycatcher protection.

407. Land was assumed to be appropriately zoned because this analysis is based on demographic projections provided by official regional agencies; the fact that growth is projected to occur assumes that the underlying land is (or will be) zoned appropriately by the time that growth is expected to occur. This assumption is more likely to overestimate than underestimate the actual cost of the designation than a calculation that assumed no entitlements (i.e., zoning) are in place.

408. This analysis assumes that the value of raw, unimproved land will range from 10 to 15 percent of finished product value, depending on the type of land use in question. In reality, raw land values can vary substantially depending on unique physical and geographical factors as well as the market conditions that exist at the time of sale. However, given that reliable raw land sales data are not available, this analysis relies on a residual land value estimate calculated using observed market values for finished products (e.g., home sales or industrial and commercial lease rates).

Exhibit 6-7

RESIDENTIAL AND COMMERCIAL RESIDUAL LAND VALUE CALCULATIONS

Land Use / Item		Land Value Calculations by County		
		San Diego	**San Bernardino**	**Santa Barbara**
Residential	Median home price (1)	$408,336	$247,587	$303,435
	Gross property value (2)	$2,041,678	$1,237,936	$1,517,174
	Residual Value / Acre @ 11% (3)	**$224,802**	**$136,305**	**$167,051**
Office	Annual Lease Rate (NNN) [4]	$21.60	$20	N/A
	Gross Revenue / Gross Ac. (5)	$265,921	$242,283	N/A
	Net Operating Income (6)	$257,943	$235,015	N/A
	Capitalized Value / Ac. (7)	$2,866,035	$2,611,276	N/A
	Residual Value / Acre @ 10% (3)	**$286,603**	**$261,128**	N/A
Retail	Annual Lease Rate (NNN) [8]	$23.28	$17	N/A
	Gross Revenue / Gross Ac. (5)	$268,781	$195,351	N/A
	Net Operating Income (6)	$260,718	$189,491	N/A
	Capitalized Value / Ac. (7)	$2,896,862	$2,105,452	N/A
	Residual Value / Acre @ 15% (3)	**$434,529**	**$315,818**	N/A
Industrial (3)	Annual Lease Rate (gross) [9]	$11.04	$4	N/A
	Gross Revenue / Gross Ac. (5)	$97,082	$39,044	N/A
	Net Operating Income (6)	$77,666	$31,235	N/A
	Capitalized Value / Ac. (7)	$862,953	$347,057	N/A
	Residual Value / Acre @ 10% (3)	**$86,295**	**$34,706**	N/A

Notes:

1. Based on the average median new home price in six Counties from 2000 to 2004, inflated to 2004 dollars, based on data from DataQuick. Note, public comments received from Dr. John Husing on behalf of the San Bernardino County Flood Control District, dated May 26, 2005, notes that in San Bernardino County, the 2004 median home price was $400,686 and $530,074 in the first quarter of 2005. To the extent that the median home price is higher than the estimate used in this analysis, the impacts to residential development in San Bernardino County could be higher.
2. Assumes 5 units per gross acre.
3. Residual land value is the value of raw, unimproved land that is zoned for development. It is calculated as a percentage of finished product value, as shown (see Table 9 for calculation for residential residual land value).
NNN lease rates do not reflect property insurance, tax, or maintenance/improvements. Office lease rate data from CB Richard Ellis Q4, 2003.
4. Lease rate (/SqFt) converted to a per-acre basis and multiplied by (a) 'floor-to-area' ratio, (b) occupancy rate, and (c) a 'net-to-gross' factor to account for parking, landscaping, and other vacant site uses.
5. Operating expenses assumed to be 3.0% of gross revenue for office and retail, and 20% of gross revenue for industrial.
6. Assumes nine percent capitalization rate.
7. Retail lease rate data from Marcus & Millichap Retail Research Report, February 2004 and CB Richard Ellis Q4, 2003; Ventura County lease rate data from NAI Capital Commercial 2004 Global Market Report.
Industrial lease rate data from CB Richard Ellis 4Q, 2003 and 1Q, 2004.

Sources: Data Quick; CB Richard Ellis; Marcus & Millichap; Economic & Planning Systems, Inc.

409. A residual land value calculation for a typical single-family residential product is provided in Exhibit 6-8. The home price of $374,000 represents an average for residential units in the Counties where flycatcher impacts are most probable. As shown, the residual land value for a typical residential product represents approximately 11 percent of the finished product price. The residual land value for office, retail, and industrial land generally exhibit a similar relationship to finished product value.

410. It is important to note that the data presented in Exhibits 6-6 and 6-7 are not specific to floodplain development. This is important because meeting NFIP requirements can add significant costs to development projects. Building residential structures with the first floor above the 100-year flood level requires fill to raise the base elevation of the structure or stilt construction. Commercial buildings require flood-proofing, also an additional cost not experienced outside the floodplain. Furthermore, the consumer bears increased insurance costs in the floodplain. Additional development and insurance costs create downward pressure on home and land prices in the floodplain. Development in the floodway is generally even more costly than development within the floodplain. The lower land values in the floodplain and floodway are not captured by this analysis. Thus, the residual land values used in this analysis are likely to overstate rather than understate land value losses from habitat set-aside.

411. Finally, this analysis assumes that raw land values will experience real appreciation through time, reflecting the relatively strong performance of California's real estate markets over the last ten to 20 years. Specifically, raw land values are assumed to appreciate at a rate of 4.25 percent per year in real terms (i.e., adjusted for inflation) over the next 20 years, or through 2024.[290] This rate reflects an average of a 10-year and a 20-year trend in repeat sales or refinancing of the same residential properties in California, a method that controls for changes in housing quality, location, and size.[291]

412. Based on this indexing method, the real value of housing grew at 2.0 percent per year between 1980 and 2003 and at 6.5 percent between 1994 and 2003. The average of these rates, or 4.25 percent, is judged appropriate for this analysis given the 20-year timeframe and the fact the bulk of the potential development within flycatcher essential habitat is residential.

[290] Note, public comments received from Dr. John Husing on behalf of the San Bernardino County Flood Control District, dated May 25, 2005, recommends an appreciation rate of six percent in San Bernardino County.
[291] Based on data from Office of Federal Housing Enterprise Oversight (OFHEO), "House Price Index for the First Quarter of 2004," June 1, 2004, available at http://www.ofheo.gov/HPI.asp. U.S. Department of Labor, Bureau of Labor Statistics, Bureau of Labor Statistics Data, as viewed on June 1, 2004 at www.bls.gov.

Exhibit 6-8

RESIDUAL LAND VALUE CALCULATIONS FOR RESIDENTIAL PRODUCT

Cash-Flow Item	Assumptions	Amount
Project Summary		
Avg. Price Per Unit (1)		$374,000
Avg. sq. ft. / Unit (1)		2,132
Avg. FAR (2)		23%
Net to Gross Ratio (3)		80%
Avg. # of Units / Gross Acre		3.8
Avg. Lot Size		16,154
Revenues		
Avg. Price Per Unit (1)		$374,000
Avg. Median Price per SF (1)		$175
Total Revenues / Gross Acre		$1,406,924
Direct Costs (excluding land)		
Building costs / Sq. ft. (3)		91
Total		$732,701
In Tract Costs / lot		$15,000
Total		$56,427
Subtotal		$789,128
Indirect Costs (excluding land)		
Planning & Entitlement	0.35% of direct costs	$2,762
Fees & Permits	3.00% of direct costs	$23,674
Architecture & Engineering	1.65% of direct costs	$13,021
Construction Management	2.00% of direct costs	$15,783
General & Administrative	3.00% of direct costs	$23,674
Financing & Charges	5.00% of direct costs	$39,456
Sales & Marketing	5.00% of unit value	$39,456
Contingency	3.00% of direct costs	$23,674
Subtotal		$181,500
Total Development Costs		$970,628
Per Unit		$258,020
Per Sq. ft.		$121
Developer Profit @	25.00% of development and land cost (4)	$281,385
Per Unit		$74,800
Residual Land Value		
Project Wide		$154,911
Per Unit		$41,180
Land Value/Unit Sales Price		11%

Notes:

1. Represents the average median new home price and square footage in years 2000 through 2004 in six Counties based on data from DataQuick, inflated to 2004 based on the CPI. This price adjustment does not consider real appreciation in home prices in order to control for housing market cycles.
2. Floor-to-Area Ratio. Based on new home living area and lot size data from years 2000 through 2004 in six Counties from DataQuick.
3. Based on data from RSMeans Square Foot Costs 2004. Per square foot construction costs are based on an average quality 1.5 story single family residence with heating and air conditioning.
4. Based on standard real estate industry pre-tax return on investment criteria.

Source: Economic & Planning Systems, Inc.

6.6.2 Estimated Future Land Value Losses

413. Future land value losses for private development projects through 2023 are estimated by calculating the lost residual land value of on-site acres expected to be set aside due to flycatcher protection. Projected development (and on-site set aside) is assumed to be evenly distributed through 2023. The economic impact associated with on-site set-aside is therefore calculated as the present value of future annual land value losses, assuming a seven percent discount rate. The results of these calculations are summarized by management unit in Exhibit 6-1. The present value of future land value losses associated with flycatcher conservation activities is estimated to be approximately $3.7 million.

414. As described above, the total amount of land projected to be set aside due to flycatcher conservation activities does not represent a significant proportion of the total land supply. No regional price increases are therefore expected, and the cost burden of the proposed rulemaking is expected to fall entirely on landowners in the form of reduced raw land prices for parcels affected by CHD.

6.6.3 Estimated Past Land Value Losses

415. Past section 7 consultations addressing development projects impacting the flycatcher have been located in the Verde Management Unit in Yavapai County, Arizona. The Service has consulted on two non-tribal residential development projects affecting the flycatcher in this management unit. While the Service prepared biological opinions for both of the projects, only one of the projects has been constructed. The other past development project has been delayed (i.e., not constructed to date) due to factors unrelated to the flycatcher. This analysis estimates that the historical land value loss resulting from offsetting compensation (i.e., habitat set-aside) associated with the active project ranges from $1,320,000 to $1,650,000.[292]

416. No past development projects requiring flycatcher protection measures have been identified within CHD in California. However, it is possible that development projects covered by a habitat conservation plan (HCP) occurred without project-specific consultation with the Service. Because flycatcher habitat is adjacent to stream reaches, it is likely that development projects would have required Clean Water Act permitting and, therefore, consultation with the Service. The consultation history does not reflect any such consultation in California. Nevertheless, the flycatcher is a listed species in the regional HCPs that currently exist in a number of southern California Counties.

[292] Personal communication with Doug Zuber, Harvard Investments, September 21, 2004.

6.7 Other Project Modification Costs

417. In addition to offsetting compensation, flycatcher conservation measures may also include biological monitoring, fencing and additional project modifications – referred to hereafter as "other" project modifications. This section examines past project modification costs and presents the "other" project modification costs that are applied future projects.

418. The two past real estate development project consultations addressing the flycatcher provide information on a range of project modifications associated with flycatcher conservation, as shown in Exhibit 6-9.

Exhibit 6-9

EXAMPLE PROJECT MODIFICATIONS FROM PAST FORMAL CONSULTATIONS ON FLYCATCHER

Development restrictions:

- Conservation of floodplain riparian habitat/open space that shall not be developed for residential, commercial, or recreational purposes. (c)
- Construction of a six-foot masonry wall adjacent to the riparian corridor and designation of a development setback between the wall and residential development.

Offsetting compensation for habitat impacts:

- Conservation (through donation) of floodplain and flood-prone habitat. (a)

Cowbird trapping:

- Implementation of a cowbird trapping program for the life of the project. (a)

Resident education:

- Development and implementation of a flycatcher, threatened and endangered fish, and critical habitat education program for residents and other interested in parties annually for 10 years and then every other year for 20 years. (a, c)
- Delivery of educational materials to the residents annually (for at least 30 years) describing the closing and opening of the breeding area closure, fire restrictions, trespass, and other pertinent data on flycatcher success, riparian restoration, etc. (a)

Resident covenants, conditions, and restrictions:

- Implementation of a 25-mile per hour speed limit on designated streets. (a, c)
- Ban on swimming or in-stream recreation in the vicinity of the Conservation Area. (a)
- Distribution of a list of approved plants and prohibited plants to homeowners. (a)
- Limit on grass lawns in front of housing (20 percent of the front yard). (a)
- Confinement of pets to the homeowner's property or be leashed at all times. (a)
- Ban on birdfeeders. (a)
- Limited vehicle access to the preserve for fire or other emergency purposes. (a)
- Retirement of water wells from use. (a)

Maintenance and construction restrictions:

- Repair work on the bridge should be completed in 30 days during the months of November and December.

Studies:

- Fund and carry out a research and monitoring program to examine the effects of vehicular traffic type and volume on the behavior of flycatchers at the Tuzigoot Bridge site. (c)

Management plans:

- Development of a response and action plan to minimize the risk and effect of fire on riparian habitat. (a)

Monitoring:

- Conduct storm water monitoring, including all monitoring and maintenance requirements. Evaluate receiving water monitoring data that are higher than AZ Water Quality standards. Measure the actual contaminants of organics and metals to soil particles. Conduct visual inspections to indicate evidence of a violation of the AZ Surface Water Quality narrative standards. Report the results of the monitoring to the Service annually. (b)

Flycatcher surveys and monitoring:

- Development of a Recreation and Habitat Monitoring Plan and establishment of an environmental baseline of the Conservation Area. (a)
- Implementation of annual flycatcher surveys and nest monitoring for the life of the project, including documentation of cowbird parasitism in suitable habitat. (a)

Sources: (a) 2-21-01-F-148, Homestead at Camp Verde, Yavapai County, AZ, December 26, 2001; (b) 2-21-94-F-309, Issuance of a NPDES Storm Water Permit for the Verde Valley Ranch Development, Yavapai County, AZ, October 7, 1997; (c) 2-21-94-F-020, Section 404 permit for the Valley Verde Ranch, Yavapai County, AZ, February, 1996.

419. The "other" project modifications described in Exhibit 6-9 are based on conversations with the private developers undertaking such measures. While the Service prepared biological opinions for two past projects, only one of the projects has been carried out. The other past development project has been delayed due to factors unrelated to the flycatcher. This analysis estimates the cost of "other" project modifications associated with the past project that did occur (i.e., the Harvard Investments Project) to be roughly $3,125,000.[293] Exhibit 6-10 presents the estimated cost of each past project modification implemented.

Exhibit 6-10

PAST "OTHER" PROJECT MODIFICATION COSTS

"Other" Project Modification	Cost
Fencing	$100,000
Educational materials for homeowners	$200,000
Scientific studies over 20 years	$2,000,000
Surveying and monitoring over 20 years	$800,000
Cowbird trapping program	$25,000
Total	**$3,125,000**

Source: Personal communication with Doug Zuber, Harvard Investments, September 21, 2004.

420. This analysis assumes that all future real estate development projects will be required to implement the same suite of "other" project modifications (i.e., fencing, educational materials for homeowners, studies, surveying and monitoring, and cowbird trapping). The total cost of "other" project modifications is estimated to be approximately $3,125,000 for each future project. This figure is based on data from the Harvard Investments project in Arizona as detailed in Exhibit 6-10.

6.8 Other Future Impacts on Real Estate Development

421. This section discusses whether the designation of critical habitat provides new information that triggers additional administrative costs under the California Environmental Quality Act (CEQA). It explains how CEQA functions to protect species and habitat and to what degree any CEQA-imposed costs may be linked to these activities.[294] CEQA costs only affect projects in California; similar statutes are not in place in Arizona, Colorado, New Mexico, Nevada, or Utah. In addition, this section addresses delay costs associated with future development projects located within CHD.

[293] Personal communication with Doug Zuber, Harvard Investments, September 21, 2004. Note that while the biological opinion regarding the Homestead project defines specific project modifications for which costs estimated, these costs have not been borne to date. Although the cost of the project modifications is an accurate estimate of the loss in land value, these costs have not been discounted to account for the timing of the project modifications.

[294] Please note that this section focuses exclusively on whether critical habitat triggers an additional administrative burden under CEQA for landowners or project proponents that would not exist without the designation of critical habitat. CEQA may also require project modifications which were addressed in previously in this Section.

6.8.1 CEQA Background

422. CEQA is a California State statute that requires state and local agencies (known here as "lead agencies") to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible. Projects carried out by Federal agencies are not subject to CEQA provisions. CEQA regulations require a lead agency to initially presume that a project will result in a potentially significant adverse environmental impact and to prepare an Environmental Impact Report (EIR) if the project may produce certain types of impacts,[295] including when:

> *[t]he project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of an endangered, rare, or threatened species, or eliminate important examples of the major periods of California history or prehistory*.[296]

423. State law instructs the lead agency (typically a County or City community development or planning department in the case of land development projects) to examine impacts from a very broad perspective, taking into account the value of animal and plant habitats to be modified by the project. The lead agency must determine which, if any, project impacts are potentially significant and, for any such impacts identified, whether feasible mitigation measures or feasible alternatives will reduce the impacts to a level that is less than significant. It is within the power of a lead agency to decide that negative impacts are acceptable in light of economic, social, or other benefits generated by the project.

424. Projects without a mandatory finding of significance and in which the applicant finds no significant impact according to CEQA regulations may be approved by a lead agency in what is known as a "negative declaration." Alternative project scenarios are not examined in a negative declaration, and the administrative expenditures are typically much lower than what would be required to complete an EIR.

425. Alternatively, an applicant may request that a lead agency issue a permit or some other discretionary approval for a project that is redesigned to either avoid or mitigate all impacts to the environment. Typically, the project is accompanied by mitigation measures in the form of a "mitigated negative declaration." Similar to a negative declaration, the expenditures required for the approval of a project with a mitigated negative declaration are on average much lower than costs associated with an EIR.

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[295] Categories of "environmental impact" evaluated in the context of CEQA review and/or EIR preparation typically include geological, air quality, water quality, noise, light/glare, land use planning, population, housing, transportation/circulation, public service, utility system, energy, human health, aesthetic, recreational, and cultural resource impacts.

[296] California Natural Resources Code §15065(a).

426. Finally, minor projects that fit one of eleven classifications as defined by the CEQA statutes may be found to have no significant effect on the environment. Some of these classifications are listed here:

- Certain alterations of existing facilities;
- Replacement or reconstruction of existing structures;
- Smaller development projects such as restaurants smaller than 2500 square feet;
- Certain projects involving landscaping or temporary trenching;
- Lot line adjustments;
- Experimental management or research;
- Habitat restoration;
- Certain safety inspections and mortgage lending; and
- Signs and small parking lots.

427. Many of these types of minor projects are eligible for a categorical exemption from the provisions of CEQA altogether, and compliance costs are usually limited to completion of the paperwork required by the lead agency.

6.8.2 Indirect Effects through CEQA

428. The question of whether habitat designation can change the public review process for a project that requires a discretionary action by lead agencies in California does not appear to have been answered either by the implementation of CEQA or by litigation over the allowable extent of CEQA's exemption language. It is likely that the next 10 to 20 years will establish a regulatory record or the judicial review required for an adequate assessment of the actual effects of critical habitat designation.

429. In the absence of empirical evidence, this analysis assumes that State law will disqualify project proponents from claiming a categorical exemption if the project is located in CH, and that these projects will be required to prepare an EIR. Second, this analysis assumes that all projects that would have submitted either a mitigated negative declaration or a negative declaration under CEQA prior to the designation of critical habitat will also need to complete an EIR due to the potential impact to flycatcher proposed CHD.

430. This analysis estimates the number of future projects that would have sought either a categorical exemption or a negative declaration in the absence of proposed CHD by consulting the historical rate of CEQA document submittal in each County, as shown in Exhibit 6-11. The number of CEQA documents submitted in each County between 1995 and 2004 are converted to an historical annual rate, which is used to project future document submittals in proposed CHD based on population growth and development forecasts. The resulting projections are shown in Exhibit 6-11.

Exhibit 6-11

CEQA DOCUMENT SUBMITTALS BY COUNTY

County	CEQA Document Type (1995 – 2003)			
	Notice of Exemption	**Negative Declaration**	**EIR**	**Total**
San Diego	1,238	1,842	379	**2,221**
San Bernardino	716	792	146	**1,654**
Santa Barbara	505	393	114	**1,012**
Total	**2,459**	**3,027**	**639**	**6,125**

Source: CEQAnet database (accessed online at http://www.ceqanet.ca.gov/queryform.asp?)

431. The economic impact of the proposed rulemaking is estimated as the difference between the cost to perform an EIR and the cost either to (a) perform a negative declaration or (b) apply for and receive a categorical exemption. Based on interviews conducted with biological consultants who frequently develop CEQA documents, this analysis assumes the costs to apply for and receive a categorical exemption, prepare a negative declaration, and prepare an EIR are approximately $500, $7,500, and $50,000, respectively, for small projects.[297]

432. As shown in Exhibit 6-12, the present value of indirect CEQA costs following designation of critical habitat is estimated to be approximately $12,000. Because information on projected development projects requiring CEQA documentation is available at the County level, this estimate is adjusted to account for the probability that the development project occurs within the proposed flycatcher CHD (probability is based on the percent of total acres in county that are within the proposed CHD). As there is a low number of potential development projects to begin with, the adjusted numbers are small, as highlighted in Exhibit 6-12.

[297] Personal communication with senior staff from RBF Consulting (San Jose, California), EDAW (Sacramento, California) and HT Harvey & Associates (Watsonville, California), February 24–28, 2003.

Exhibit 6-12

CEQA COSTS FOR ESTIMATED PROJECTS

Management Unit	County (Census Tract)	Annual CEQA Documents in CH (1)				Present Value of CEQA Cost (2)		
		Notice of Exemption	Negative Declaration	EIR	Total	Notice of Exemption	Negative Declaration	Total
Mojave	SAN BERNARDINO (009800)	0.009	0.010	0.002	0.022	$4,960	$4,710	$9,670
San Diego	SAN DIEGO (18300)	0.000	0.000	0.000	0.000	$0	$0	$0
	SAN DIEGO (18400)	0.000	0.000	0.000	0.000	$0	$0	$0
Santa Ana	SAN BERNARDINO (008301)	0.002	0.002	0.000	0.005	$1,027	$975	$2,002
	SAN BERNARDINO (008702)	0.000	0.000	0.000	0.000	$0	$0	$0
Santa Ynez	SANTA BARBARA (002703)	0.000	0.000	0.000	0.000	$0	$0	$0
Total		**0.011**	**0.013**	**0.002**	**0.026**	**$5,987**	**$5,686**	**$11,672**

1. Based on historical rate of CEQA document submittal (by County). Projections were estimated based on historical and projected population growth, and allocated among habitat units based on projected growth acres in CH vs. the County as a whole.

2. Assumes CHD causes projects that might otherwise have received a Categorical Exemption or produced a Negative Declaration will be required to prepare an EIR. For "small projects," the assumed cost to produce these document types are $500, $7,500, and $50,000, respectively.

6.8.3 Regulatory Delay Impacts

433. Land use projects are generally required to undertake a variety of planning- and entitlement-related activities prior to actual approval. While flycatcher conservation-related regulatory requirements are likely to increase the administrative costs of most land use projects, they will not necessarily delay the implementation of the project. Given sufficient knowledge of the regulatory environment, the various administrative activities associated with the Act can generally be coordinated with other regulatory processes (such as tentative map approvals or action on project EIRs) and do not necessarily increase the time to obtain approvals.

434. Flycatcher conservation activities can, however, cause time delays to some private land development projects due to requirements not to conduct certain construction activities during specific periods of the year (e.g., during the flycatcher-breeding season). In addition, projects pursued by applicants unfamiliar with the requirements of the Act may be delayed until compliance requirements become well understood. Consequently, this analysis estimates the potential impact of project delays that may occur in the short-term.

435. The following assumptions were made to estimate the economic cost of time delay associated with breeding season requirements and other factors:

- Projects expected to begin more than 12 months after critical habitat designation are not expected to face any additional delay, as land development activities can be planned around the breeding season.

- The average delay to projects slated to occur in the next 12 months is 6 months (the approximate breeding season duration).

- Private land development will occur at a constant rate through 2024.

- The land value loss associated with this delay can be estimated by applying the appropriate discount rate – a measure of the time value of money. As discussed above, the private land developer annual discount rate is about seven percent. This discount rate is halved to calculate the time loss associated with a six-month delay.

436. As mentioned above, about 38 acres of private land development is expected to occur in proposed CHD through 2023. Assuming this development occurs evenly throughout the 20-year timeframe of this analysis, roughly 3 acres are expected to be developed in the first year after designation and are expected to be delayed by an average of six months. Assuming 4.25 percent real appreciation in land value and a 7 percent discount rate, time delay results in a total land value loss of approximately $1,100.

6.9 Total Economic Impacts to Development Projects by Proposed CHD Unit

6.9.1 Coastal California Recovery Unit

437. There are three management units within the Coastal California Recovery Unit that may be impacted by future flycatcher conservation activities to real estate development projects. These include the Santa Ynez, Santa Ana, and San Diego management units. This analysis estimates that flycatcher conservation activities related to real estate development in the Coastal California Recovery Unit will cost roughly $928,700 over the next 20 years, in present value terms.

Santa Ynez Management Unit

438. While approximately 4,989 acres of growth are projected for Santa Barbara County through the year 2023, none of this development is projected to occur within proposed CHD. Therefore, no development impacts are estimated to be borne within the Santa Ynez Management Unit.

Santa Ana Management Unit

439. Approximately 6.6 acres of CHD are projected to be developed in the Santa Ana Management Unit through 2023. This analysis estimates that roughly 1.7 acres will be developed and 4.9 acres will be set aside as offsetting compensation for habitat impacts. The value of the land set aside is $643,800 (see Exhibit 6-1). Project modification costs, CEQA costs, and delay costs are estimated to be approximately $282,700, $2,000 and $200, respectively. Total costs associated with the Santa Ana Management Unit are estimated to be $928,700 over the next 20 years, in present value terms.

440. While approximately 235,641 acres of growth are projected for San Diego County through the year 2023, none of this development is anticipated to occur within proposed CHD. Therefore, SANDAG does not currently project development impacts in the San Diego Management Unit. One public commenter, commenting on behalf of the San Luis Rey Municipal Water District describes two potential developments that may be proposed within unincorporated County lands that may overlap CHD areas: a potential development on the Gregory Canyon Landfill, and a potential development by Pardee Homes. It should be noted that this analysis uses the approved development projection data for the regional public entity that is responsible for growth projections for San Diego County. At this time, potential growth is not projected in proposed CHD areas. The comment reports that the District is currently assembling financing to pay for a study that will analyze the scope of development over the next 20 years.[298]

[298] Public comments of Francis D. Logan, Law Offices of Susan Trager, "Draft Economic Analysis for the Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher", on behalf of San Luis Rey Municipal Water District, May 31, 2005; Public comments of Francis D. Logan, Law Offices of Susan Trager, "Proposed Designation of Critical Habitat for the Southwestern willow flycatcher (69 Federal Register 60706 (October 12, 2004)", on behalf of San Luis Rey Municipal Water District, December 10, 2005.

6.9.2 Basin and Mojave Recovery Unit in California

441. Development projects in the Mojave Management Unit in California may be impacted by future flycatcher conservation activities. Total costs associated with the Basin and Mojave Recovery Unit are estimated to $4.4 million over the next 20 years, in present value terms.

Mojave Management Unit

442. Approximately 32 acres of CHD are projected to be developed in the within the Mojave Management Unit through 2023. This analysis estimates that roughly 7.9 acres will be developed and 23.8 acres will be set aside as offsetting compensation for habitat impacts. Project modification costs, CEQA costs and delay costs are anticipated to be approximately $1,366,000, $10,000, and $1,000, respectively. Total costs associated with the Mojave Management Unit are estimated to be $4.4 million over the next 20 years, in present value terms.

6.9.3 Gila River Recovery Unit in Arizona and New Mexico

443. Development projects in the Verde Management Unit, a subunit of the Gila River Recovery Unit, has been impacted by flycatcher conservation activities in the past. The total past cost of flycatcher conservation measures in the Gila River Recovery Unit is approximately $4,445,000 to $4,775,000. Future impacts related to real estate development are not expected.

Verde Management Unit

444. The Service has consulted on two residential development projects with potential to affect the flycatcher: the Homestead master planned community and the Verde Valley Ranch developments. While the Service prepared biological opinions for both of the projects, only Homestead project is expected to proceed. The Verde Valley development project has been delayed (i.e., not constructed to date) due to factors unrelated to the flycatcher. This analysis estimates the economic impact resulting from conservation activities associated with the Homestead project range from $4,445,000 to $4,775,000.

445. While the Homestead project investor is currently interested selling the project, it is expected that the project will be constructed in the future. Project modification costs of $4,445,000 to $4,775,000 are expected to influence the sale price for the property. This analysis assumes that the value of the property has been reduced by the full $4,445,000 to $4,775,000 due to flycatcher conservation requests.[299]

446. While the Service completed the consultation regarding the Verde Valley Ranch Development in 1997, the project has not progressed. The proposed 977 acre project includes construction of 1,200 residential homes, a golf course, and a small commercial

[299] Note that the land value loss associated with land set aside and other project modifications has not been discounted to reflect the time value of money.

area.[300] The golf course is planned for an area containing a capped copper tailings pond. Conservation activities requested for the flycatcher are a small component of the overarching environmental constraints faced by the developer. Further, the project has been subject to legal battles unrelated to the flycatcher.[301] Due to uncertainty regarding the feasibility of the Verde Valley Ranch Development, economic costs related to this project are not estimated.

6.9.4 Lower Colorado Recovery Unit

447. Data concerning Parker to Southerly International Border and Virgin, two subunits of the Lower Colorado Recovery Unit, suggest that real estate development may be impacted by flycatcher conservation activities. However, personal communication with local and regional planners and other data suggests otherwise. The potential impacts in each of these management units are discussed below. Nonetheless, development impacts are not forecasted to occur within the Lower Colorado Recovery Unit.

Parker to Southerly International Border Management Unit

448. Census tract data from La Paz and Yuma Counties indicate that population density is high in these areas (i.e., population density exceeds the 1,000 persons per square mile threshold established within this analysis for consideration of impacts on development). In particular, the population density in Parker City (La Paz County/Colorado River Indian Tribes Reservation) suggests potential for floodplain development and related habitat impacts. However, as discussed in Section 8, future economic development along the Colorado River within the Reservation is uncertain; therefore no costs related to real estate development have been estimated as in this area.

449. The City and County of Yuma also support high population density. Currently, the area within proposed CHD is largely agricultural, and is expected to remain in this agriculture for the foreseeable future.[302] As such, flycatcher-related impacts to development are not projected in this area.

Virgin Management Unit

450. The Virgin Management Unit includes a portion of the City of Mesquite in Clark County, Nevada. Zoned land uses within proposed CHD include land reserves/park land, agriculture and public facilities land.[303] Due to the existing zoning, flycatcher CHD is unlikely to impact development in Mesquite.

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[300] U.S. Fish and Wildlife Service. Biological Opinion on the Issuance of a NPDES Storm Water Permit for the Verde Valley Ranch Development, Yavapai County, AZ, October 7, 1997.
[301] Greene, Terry. "From Dust to…Golf." Phoenix New Times. March 21, 1996. NPDES Appeal No. 01-07. In RE Phelps Dodge Corporation Verde Valley Ranch Development. 10 E.A.D. 460. May 21, 2002.
[302] Personal communication with Matthew Spriggs, Senior Planner, City of Yuma, September 16, 2004. Personal communication with Kevin Eatherly, City of Yuma Project Manager, September 24, 2004.
[303] City of Mesquite, Nevada. Zoning Map and Land Use Plan. July 25, 2004. Map produced by the City of Mesquite Planning and Redevelopment Department.

451. The Virgin Management Unit also includes segments of Washington County, Utah. Over the past 20 years, two development projects have been constructed in floodplain areas. These development projects were located outside of flycatcher habitat and project modifications for the flycatcher were not requested. Future real estate development is not expected within flycatcher CHD.

6.9.5 Rio Grande Recovery Unit

452. Data concerning the Middle Rio Grande Management Unit, a subunit of the Rio Grande Recovery Unit, suggest that real estate development may be impacted by flycatcher conservation activities. However, personal communication with local and regional planners and other data suggests otherwise. The potential impact in this management unit is discussed below. Nonetheless, development impacts are not forecasted to occur within the Rio Grande Recovery Unit.

Middle Rio Grande Management Unit

453. Census data from the City of Albuquerque, New Mexico indicates high population density. As such, demand for new development may be strong enough to support floodplain development. However, personal communication with the Albuquerque Planning Department indicates that development is not anticipated in the floodplain in Albuquerque.[304] Further downstream, in Valencia County, development within proposed flycatcher CHD is not feasible due to an existing levee system.[305] Therefore, real estate development impacts are not anticipated within the Middle Rio Grande Management Unit.

6.10 Land Development Assumptions and Caveats

454. The economic cost impacts estimated above are based on a series of assumptions. The following factors should be taken under consideration when evaluating the costs described above:

- **Off-setting Compensation Standards.** While the assumption of a 3-to-1 offsetting compensation ratio is reasonable given conversations with the Service and observed offsetting compensation for impacts to similar habitat for other species, a flycatcher-specific offsetting compensation ratio has not been identified from the consultation history. It is possible that offsetting compensation for impacts to flycatcher habitat might be greater or less than the 3-to-1 ratio relied upon in this analysis.

- **Net or Effective Land Development Set-Aside**. Development rarely occurs on 100 percent of the project area assembled by a developer, regardless of the degree

[304] Personal communication with Richard Sertich, Albuquerque Planning Department, September 2004.
[305] Personal communication with Richard Padilla, Planning and Zoning Department, Valencia County, September 8, 2004.

of species protection in place. A development site will naturally include acreage set aside for a variety of factors, including slope, avoidance of hydrologic features (e.g., floodway), parcel configuration, and creation of "amenity features" such as landscaping, parks, and open space. The streambeds and riparian areas that constitute the flycatcher's primary habitat are highly correlated with the areas a developer would be most likely to set aside, irrespective of flycatcher conservation activities. This analysis does not attempt to quantify set-aside that would occur in the absence of the flycatcher.

- **Land set-aside in the floodplain and floodway is valued using residual land values that do not incorporate floodplain characteristics.** Developing floodplain to meet NFIP requirements can be costly. Construction of residential structures with the first floor above the 100-year flood level requires fill to raise the base elevation of the structure or stilt construction. Commercial buildings require flood-proofing. Furthermore, consumers bear increased insurance costs in the floodplain. Additional development and insurance costs create downward pressure on home and land prices in the floodplain. Development in the floodway is generally even more costly than development within the floodplain. Lower land values for floodplain and floodway land are not estimated. Thus, the residual land values used in this analysis are likely to overstate rather than understate land value losses from habitat set-aside.

- **Economic losses not off-set by economic gains**. This analysis endeavors to capture the net economic impact imposed on regulated entities and the regional economy resulting from flycatcher conservation activities. To the extent possible, the estimated net economic impact should account for any offsetting benefits that might accrue to the regulated community from flycatcher habitat conservation activities. For example, in certain cases real estate development that effectively incorporates flycatcher habitat set-aside on-site might realize a value premium typically associated with additional open space. Any such premium will offset conservation costs borne by landowners/developers. Reliable data revealing the premium that the market places on nearby open space in Southern California is not readily available. However, it is likely that any such value is minimal given the nature of the flycatcher habitat.

455. As described in Section 2 of this analysis, lands belonging to 15 Indian Tribes are included within the boundaries of the proposed flycatcher CHD as highlighted in Exhibit 7-1.[306] This section provides an analysis of economic impacts associated with flycatcher conservation activities on these Tribal lands. The administrative costs associated with section 7 consultation for activities occurring on Tribal lands are discussed in Section 3 of the report, while impacts related to surveying and monitoring efforts funded by the Tribes, and project modifications associated with Tribal activities are discussed in this section.

Exhibit 7-1

TRIBAL LANDS OVERLAPPING PROPOSED CHD FOR THE FLYCATCHER

Recovery Unit	Management Unit	Tribal Lands
Coastal California Recovery Unit	San Diego Management Unit	La Jolla
		Pala
		Rincon
		Santa Ysabel
Lower Colorado Recovery Unit	Middle Colorado Management Unit	Hualapai
	Hoover to Parker Management Unit	Fort Mohave
		Chemehuevi
		Colorado River Indian Tribes
	Parker to Southerly International Border Management Unit	Fort Yuma (Quechan)

[306] Taos Pueblo and Santo Domingo in New Mexico submitted comments concerning potential economic impacts to their activities pursuant to critical habitat designation for flycatcher. These tribes are not considered in this section because they do not fall within proposed flycatcher CHD. However, the analysis makes note of specific comments provided by the Pueblo and Santo Domingo. Taos Pueblo notes that although the proposed CHD does not fall within their lands, the CHD may adversely impact their water rights if it limits their ability to use water upstream of the Upper Rio Grande Management Unit. In this case, economic activities that utilize this water would be impacted, as would income the Pueblo receives from leasing its water to other users. The Pueblo also points to potential future restrictions on water development activities and the cultural significance of this water to the Pueblo. Santo Domingo notes that while their lands are not within proposed flycatcher CHD, they are located upstream of the Middle Rio Grande Management Unit. Therefore, if maintaining flow in this management unit becomes a future requirement, water use activities of the Tribe may be limited. The Tribe also notes that the DEA fails to consider the impacts of flycatcher CHD on ongoing efforts of the Tribe to restore and protect river, bosque, and wetland habitat for the species.

Exhibit 7-1

TRIBAL LANDS OVERLAPPING PROPOSED CHD FOR THE FLYCATCHER

Recovery Unit	Management Unit	Tribal Lands
Gila Recovery Unit	Verde Management Unit	Camp Verde Yavapai Apache
	Upper Gila Management Unit	San Carlos Apache
Rio Grande Recovery Unit	Upper Rio Grande Management Unit	San Ildefonso
		San Juan
		Santa Clara
	Middle Rio Grande Management Unit	Isleta

456. This section first provides an outline of past and future economic impacts on Tribal lands associated with the flycatcher; it then provides information on the background and socioeconomic status of the potentially affected Tribes. Finally, this section discusses in detail the individual Tribes and projects that are potentially affected. In general, these Tribal economies are poorer than their respective regional economies. The poverty rates on Tribal lands, for example, range from 12.5 percent to 48.2 percent, which at the high end is four times the National average. In each case, per capita income on the Tribal lands (which ranges from $5,200 to $14,848) is less than the respective State average per capita income (which ranges from $17,261 to $22,711 in the three States containing Tribal lands). As is evidenced in the remainder of this section, the Tribal lands are primarily poor, rural areas that may be particularly vulnerable to economic impact associated with increased regulatory burden.

7.1 Summary of Impacts on Tribal Activities

7.1.1 Past Impacts

457. Past impacts resulting from flycatcher conservation activities on Tribal lands primarily include administrative costs and costs of surveying and monitoring efforts. To date, project modifications required for the flycatcher have not greatly impacted Tribal activities.

458. Where information was available on past impacts, costs related to flycatcher conservation are estimated. A summary of these past impacts is provided in Exhibit 7-2. Data on impacts to past Tribal activities are included for three Tribal land areas: Hualapai, Colorado River Indian Tribes, and San Carlos Apache. Of these three, past economic impacts as estimated were greatest for the Colorado River Indian Tribes. This is primarily due to annual funding of $150,000 for the past nine years for riparian habitat restoration activities designed to benefit all riparian species, including the flycatcher. For the remaining Tribes in Exhibit 7-2, costs of flycatcher conservation activities were either entirely administrative costs of consultation (and therefore included in Section 3 of this report) or not available for inclusion in this analysis.

Exhibit 7-2

SUMMARY OF PAST IMPACTS ON TRIBAL ACTIVITIES

CHD Unit	Tribal Lands	Description of Impact (year(s) incurred)	Cost Impact (2004$)
Lower Colorado Recovery Unit			
Middle Colorado MU	Hualapai	Surveying for species (1997 – 2003)	$420,000[a]
Hoover to Parker MU	Fort Mojave*	Project modifications were recommended related to a casino construction project, but the project was not undertaken. Recommended project modifications included: - Species surveys, - Project timing restrictions, - Conservation of replacement habitat, and - Development and implementation of a wetlands enhancement plan.	Unknown
	Chemehuevi	Project timing restrictions on exotic plant removal activities	Unknown
	Colorado River Indian Tribes	Surveying for species (1998, 1999, 2000, and 2002)	$16,000
		Riparian habitat conservation and restoration activities (1995 – 2003)	$1,469,000
Parker to Southerly Border MU	Fort Yuma	Surveying for species Project timing restrictions resulting in delays to restoration projects	Unknown
Gila Recovery Unit			
Verde MU	Camp Verde Yavapai Apache*	Impacts limited to administrative costs	None
Upper Gila MU	San Carlos Apache*	Surveying and monitoring for species (1998 – 2003)	$75,000
Rio Grande Recovery Unit			
Upper Rio Grande MU	San Ildefonso*	Surveying for species	Unknown
	San Juan*	Surveying for species	Unknown
Middle Rio Grande MU	Isleta*	Surveying and monitoring for species	Unknown

Notes: Only Tribal lands for which information is available on past impacts related to flycatcher conservation are included in this exhibit. Overall, the absence of cost information related to the potential impacts of flycatcher conservation on Tribal lands results in a probable underestimate of future costs to Tribal entities in this section. *Administrative costs are not summarized in this table but are included Section 3 of this analysis. Note that some additional administrative costs of compliance with ESA are unknown and therefore not included in estimates. To the extent that these unknown administrative costs relate to Southwestern willow flycatcher, administrative costs estimates for the Tribes may be underestimated.

[a] This cost estimate includes USBR funding of species surveys. The Tribe also commits an unknown amount of its own funding to species surveys.

7.1.2 Future Impacts

459. The following Tribes have not experienced a measurable economic impact associated with flycatcher conservation activities:

- La Jolla
- Pala
- Rincon
- Santa Ysabel
- Santa Clara

460. Future impacts resulting from flycatcher conservation activities on Tribal lands include administrative costs of consultations, surveys and monitoring, development of management plans, modifications to development activities, and potential project modifications to restoration activities and water projects. While many of the Tribes do not expect to experience significant economic impact from flycatcher conservation, certain Tribes are more likely to experience economic impacts to activities on their lands. A summary of these forecast future impacts is presented in Exhibit 7-3.

461. Tribal activities in all 15 Tribal land areas are anticipated to result in some economic impact associated with flycatcher conservation. In many cases, these impacts are administrative costs related to consultation, as described in Section 3 of this report. The primary issue concerning the estimation of future economic impacts on Tribal lands is that little information is available regarding potential development projects. Where development of the Tribal lands in the proposed flycatcher CHD is likely, particular project plans are generally not available to determine the potential need for flycatcher conservation activities. Exhibit 7-3 highlights Tribal lands where some type of development within the flycatcher proposed CHD is likely; however, specific costs are not determinable at this time.

462. Data on future impacts to Tribal activities are included for four Tribal land areas, Pala, Hualapai, Colorado River Indian Tribes, and San Carlos Apache. Of these, future economic impacts as estimated are greatest for the San Carlos Apache activities. This is primarily due to Tribal spending of $1.6 million ($1.5 million applying a seven percent discount rate) on water deliveries. The Tribe has expressed concern that after committing funds to these Central Arizona Project water deliveries, restrictions on water withdrawals may be imposed for the flycatcher. While there is uncertainty surrounding the likelihood of these restrictions, this cost is included as an estimate of potential impact. Impacts to grazing activities on the San Carlos Apache Tribal lands are also uncertain. The exact number of acres available for grazing that overlap proposed flycatcher habitat is unknown. It is further unknown what modifications or mitigation measures may be recommended to grazing activities that are related to flycatcher concerns.

463. For the remaining Tribes in Exhibit 7-3, costs of flycatcher conservation activities were either entirely administrative costs of consultation or were not available for inclusion in this analysis. Details on the cost estimates provided in Exhibit 7-3 are included in Sections 7.4 through 7.7 of this analysis.

Exhibit 7-3

SUMMARY OF FUTURE IMPACTS ON TRIBAL ACTIVITIES

CHD Unit	Tribal Lands	Description of Impact (year(s) to be incurred)	Cost Impact (2004$)
Coastal California Recovery Unit			
San Diego MU	La Jolla	Development and implementation of habitat conservation plan (unknown)	Unknown
		Development along the San Luis Rey River (unknown)	Unknown
	Pala	Environmental Assessments associated with development of residential allotments (assumed in 2004)	$245,000
		Project modifications associated with development of residential allotments (unknown)	Unknown
	Rincon	Development and implementation of habitat conservation plan (unknown)	Unknown
		Development along the San Luis Rey River (unknown)	Unknown
	Santa Ysabel	Species survey associated with road maintenance project (unknown)	Unknown
Lower Colorado Recovery Unit			
Middle Colorado MU	Hualapai	Development of flycatcher management plan (2004)	$5,000
		Species surveying and monitoring (2004 – 2024)	$636,000[1,2]
		Development along river corridor (unknown)	Unknown
Hoover to Parker MU	Fort Mohave	Project modifications related to casino development project may include: - Species surveys, - Project timing restrictions, - Conservation of replacement habitat, and - Development and implementation of a wetlands enhancement plan	Unknown
		Other economic development along the Colorado River (unknown)	Unknown
	Chemehuevi	Project modifications associated with development of tourist facilities along Lake Havasu including, marina, hotel, and casino construction (unknown)	Unknown
	Colorado River Indian Tribes	Species surveys and monitoring (2004 – 2024)	$64,000[2]
		Development of flycatcher management plan (2004)	$6,000
		Implementation of flycatcher management plan (2004 – 2024)	Unknown

Exhibit 7-3

SUMMARY OF FUTURE IMPACTS ON TRIBAL ACTIVITIES

CHD Unit	Tribal Lands	Description of Impact (year(s) to be incurred)	Cost Impact (2004$)
Parker to Southerly Border MU	Fort Yuma (Quechan)	Delays to restoration and clean-up projects, including increased costs for operating equipment in wet season and reduced employment for Tribal members (unknown)	Unknown
		Project modifications associated with development projects (unknown)	Unknown
Gila Recovery Unit			
Verde MU	Camp Verde Yavapai Apache	Potential administrative costs associated with consultations on development; project modifications are not anticipated	None
Upper Gila MU	San Carlos Apache	Species surveys (2004 – 2024)	$159,000[2]
		Cowbird trapping (2004 - 2024)	$11,000[2]
		Development of flycatcher management plan (2004)	$5,000
		Cost of Central Arizona Project (CAP) water to be delivered to Tribal lands (2005)	$1.5 million[2]
		Impacts to recreation and agriculture associated with potential restrictions on future water delivery projects (unknown)	Unknown
		Modifications to Tribal lands grazing activities (unknown)	Unknown
Rio Grande Recovery Unit			
Upper Rio Grande MU	San Ildefonso	Species surveys (unknown)	Unknown
		Bosque restoration projects (unknown)	Unknown
	San Juan	Species surveys (unknown)	Unknown
		Bosque restoration projects (unknown)	Unknown
	Santa Clara	Unknown	Unknown
Middle Rio Grande MU	Isleta	Species surveys (2004 – 2024)	Unknown
		Implementation of Bosque management plan (2004 – 2024)	Unknown

Notes: All Tribes may incur future administrative costs related to consultation efforts. These costs are not summarized in this table but are included in Section 3 of this analysis.

[1]This cost estimate includes the USBR funding of species surveys. The Tribe also commits an unknown amount of its own funding.

[2]Cost estimate is translated to present value using a seven percent discount rate.

7.2 Limitations and Caveats

464. The following uncertainties and caveats pertain to the analysis of economic impacts to Tribal activities:

- Development projects on these Tribal lands are either being considered or are only in the early planning stages. As such, information was not available detailing the likely future effect on development projects and potential of flycatcher conservation activities.

- The estimate of future economic impacts includes $1.6 million ($1.5 million applying a seven percent discount rate) of Tribal spending on the part of the San Carlos Apache Tribe for Central Arizona Project (CAP) water deliveries. The Tribe has expressed concern that they will spend this amount for the water deliveries and subsequent consultation with the Service will result in restrictions to the actual deliveries. While the potential for this to happen is uncertain, the cost is included as an upper bound estimate of potential economic impact.

- Costs to grazing activities on San Carlos Apache lands are not included. This is because the acres available for grazing are unknown and potential project modifications or mitigation measures that may be recommended are uncertain.

- Where information is not available on the time frame of future projects, those projects are assumed to occur in year 2004. This lack of discounting results in a conservative (i.e., high) estimation of project costs.

- In many cases, information was not available for costs of flycatcher conservation activities, such as species surveys. In addition, administrative costs of compliance with the Act are often not known. These instances are noted in Exhibits 7-2 and 7-3. Overall, the absence of cost information related to the potential impacts of flycatcher conservation on Tribal lands results in a probable underestimate of future costs to Tribal entities in this section.

7.3 Background and Socioeconomic Status of Potentially Affected Tribes

465. Each of the potentially impacted Tribes is a sovereign nation. Secretarial Order 3206 recognizes that Tribes have governmental authority and the desire to protect and manage their resources in the manner that is most beneficial to them. Flycatcher conservation and riparian restoration activities have been ongoing on various Tribal lands included in the proposed CHD. Many of the affected Tribes have their own natural resource programs and staff, and several are developing flycatcher management plans. In addition, as trustee for land held in trust by the United States for Indian Tribes, the BIA oversees a variety of

programs on Tribal lands. The Recovery Plan provides an overview of how flycatcher conservation fits into Tribal goals for restoring riparian systems:

> "*Given the tentative nature with which Tribal leaders and land managers have approached endangered species issues, there were several reasons why the southwestern willow flycatcher recovery [sic] gives us cause for optimism. The goal for the recovery process, of course, is not only higher populations of this particular bird, but improved riparian areas in general. For many Tribes in the Southwest, the rivers and streams that cross their land provide critical areas for plant and animal collection, recreation, and cultural and religious use. Tribes see riparian protection as an excellent long-term goal. In only a few generations Tribes have seen these areas severely degraded, mainly from human induced changes, some of these changes have unquestionable provided benefits to Tribes, but many of which Tribes had no say in implementing. To restore riparian and wetland habitat and to improve these critical ecosystems is a goal that all Tribes in the region can support.*"[307]

466. Given the unique characteristics of Tribal economies, the approach used to analyze potentially affected activities on Tribal lands is different than that for other types of activities. This section first provides a discussion of the current economic status of the affected Tribal communities, and second, highlights potential impacts to Tribal activities occurring in proposed flycatcher critical habitat. In order to gather information, meetings were held with several Tribes that had high potential for impacts, either because of the size of the proposed designation on their lands or because of projects planned within the proposed CHD. In addition, each Tribe was contacted individually as part of the research conducted for this analysis.

467. For each of the Tribes, this analysis provides current socioeconomic data underscoring the conditions on each of the Tribal land areas. Available data demonstrate the economic conditions on each of the Tribal land areas analyzed; often these Tribal economies exhibit higher unemployment, lower income levels, and higher poverty rates than State averages. In addition, re-employment opportunities on some Tribal lands may be limited. For example, Tribal members who lose jobs may be less likely to move off the Tribal lands to find work elsewhere. Thus, if flycatcher conservation activities impact job availability on the Tribal lands, those impacts may be compounded by poor baseline economic conditions. Table 7-1 presents an overview of socioeconomic statistics for the affected Tribes, as well as national and State averages for comparative purposes. Population, unemployment, and income statistics are from the U.S. Census. In general, these data illustrate the vulnerability of the Tribes to economic impact or regulatory burden.

[307] U.S. Fish and Wildlife Service. 2002. Recovery Plan for the Southwestern willow flycatcher. August 2002. Appendix N, page N-8.

Exhibit 7-4

2000 SOCIOECONOMIC INFORMATION – AFFECTED TRIBES

Area/Tribal Lands	Population	Unemployment Rate	Per Capita Income	Poverty Rate[(1)]
National Level Information				
USA	281,421,906	4.2%	$21,587	12.4%
State Level Information				
Arizona	5,130,632	5.6%	$20,275	13.9%
California	33,871,648	7.0%	$22,711	14.2%
New Mexico	1,819,046	7.3%	$17,261	18.4%
Tribal Level Information				
La Jolla	390	13.9%	$11,960	16.3%
Pala	1,573	9.9%	$10,955	40.6%
Rincon	1,495	8.8%	$9,848	29.5%
Santa Ysabel	250	14.6%	$14,332	23.3%
Hualapai	1,353	18.2%	$8,147	35.8%
Fort Mohave	1,043	7.2%	$12,766	22.6%
Chemehuevi	345	8.5%	$13,130	30.7%
Colorado River Indian Tribes	9,201	9.6%	$12,621	21.8%
Fort Yuma (Quechan)	2,376	19.8%	$8,402	34.1%
Camp Verde Yavapai Apache	743	12.7%	$8,347	33.4%
San Carlos Apache	9,385	35.4% [(2)]	$5,200	48.2%
San Ildefonso	1,524	6.4%	$14,848	12.5%
San Juan	6,748	7.6%	$12,083	22.7%
Santa Clara	10,658	7.8%	$15,336	20.0%
Isleta	3,166	9.6%	$11,438	18.3%

Notes:

(1) Poverty rate represents the percent of individuals below the applicable poverty threshold level. Poverty thresholds are the same for all parts of the country, but vary depending on the applicable family size, age of householder, and number of related children under 18. Poverty thresholds are shown at http://www.Census.gov/hhes/poverty/threshld/thresh99.html.

(2) A recent study by the San Carlos Apache Tribe found that the unemployment rate is 76 percent. Letter from Joe Sparks, Sparks, Tehan & Ryley, P.C. re: Request for Information Regarding Possible Designation of Critical Habitat for the Southwestern Willow Flycatcher, dated September 7, 2004.

Source: U.S. Census Bureau, Census 2000, http://censtats.census.gov/pub/Profiles.shtml.

468. The remainder of this section is organized by Recovery Unit and discusses each potentially affected Tribe individually. Data on geographic size of each Tribal land area are from Tiller's Guide to Indian Country, unless otherwise noted.[308] Further, where information is available, this section contemplates the overall contribution of potentially affected activities to provide an upper bound estimate of potential economic impacts that may result from implementing flycatcher conservation activities. For example, various Tribes have

[308] Tiller, V., 1993. Tillers Guide to Indian Country, Economic Profiles of American Indian Reservations.

plans for development along riverfront property that may overlap with the proposed CHD. To the extent that the Tribes had specific information on these development plans, the information is presented in this section.

7.4 Coastal California Recovery Unit

7.4.1 San Diego Management Unit

La Jolla

469. The La Jolla Reservation encompasses 8,541 acres in Southern California. Approximately 221 acres on the La Jolla Reservation along the San Luis Rey River are included in the proposed flycatcher critical habitat designation.

La Jolla Socioeconomic Status

470. The 2000 population on the La Jolla Reservation was 390. The unemployment rate was 13.9 percent in 2000, approximately double the average of that for the State of California. Per capita income was $11,960 in 2000, approximately half the average for California. In addition, approximately 16.3 percent of the Tribe's population lives below the poverty line.

La Jolla Potentially Affected Activities

471. The La Jolla Tribe has not experienced past economic impacts related to flycatcher conservation activities. The Tribe has not been involved in any survey efforts or consultations specifically for the flycatcher. Currently, the Tribe is considering preparing a habitat conservation plan. Because this effort is still in initial planning stages, costs associated with development and implementation of the plan are unknown.[309]

472. Future impacts on the La Jolla Tribe, however, may result from the proposed CHD. The Tribe has indicated that future development along the San Luis Rey River could potentially be affected by flycatcher conservation activities.[310] Economic impacts associated with the new development may stem from, for example, additional administrative effort in the planning stages and modifications to projects to incorporate flycatcher and habitat conservation measures. Information regarding potential future development was not available for inclusion in this analysis. It is anticipated that the final economic analysis will incorporate comments and additional information regarding impacts on the La Jolla Reservation, if available.

[309] Personal communication with Rob Roy, Environmental Department, La Jolla Tribe, September 20, 2004.
[310] *Ibid.*

Pala

473. The Pala Reservation encompasses 11,893 acres in Southern California. Approximately 286 acres on the Pala Reservation along the San Luis Rey River are included in the proposed flycatcher critical habitat designation.

Pala Socioeconomic Status

474. The 2000 population on the Pala Reservation was 1,573. The unemployment rate was 9.9 percent in 2000. Per capita income was $10,955 in 2000, approximately half the average for the State of California. In addition, approximately 40.6 percent of the Tribe's population lives below the poverty line, more than three times the State average.

Pala Potentially Affected Activities

475. Past economic impacts related to flycatcher conservation activities have been limited on the Pala Reservation. The Tribe has not had to consult for the flycatcher in the past, and has not undertaken any surveying or monitoring efforts to date.

476. Based on discussion with the Pala Environmental Department, development of residential allotments (granted to individual Tribe members) along the San Luis Rey River could potentially be affected by flycatcher conservation activities in the future. These impacts would include administrative efforts related to completing an Environmental Assessment (EA) as part of consultation efforts for each home lease granted by BIA. While some of these costs may relate to other species, such as the Arroyo Toad, the proposed flycatcher CHD will be a factor necessitating these consultations efforts. To date, because the flycatcher has not established any nesting sites on the Reservation, an EA is not required for the flycatcher when an allotment is developed along the river. However, an EA may be required if the allotment falls in proposed Arroyo toad CHD, which overlaps with much of the proposed flycatcher CHD on the Pala Reservation.

477. Preparing an EA could result in costs of approximately $5,000 per allotment, paid for by individual Tribal members.[311] There are 49 undeveloped allotments along the river that overlap with the proposed flycatcher CHD.[312] Thus, while the timing of development of each of these allotments is unknown, the total impact on Pala Tribal members could be $245,000 if all 49 allotments were developed. *These costs relate only to administrative efforts associated with consultation, and do not include implementing any potential mitigation measures.* Costs related to any project modifications resulting from flycatcher conservation activities are unknown at this time.[313]

[311] Personal communication with Lenore Volturno, Environmental Director, Pala Tribe, September 9, 2004.
[312] Email communication from Chris Nieto, GIS Technician, Pala Tribe, September 15, 2004.
[313] Personal communication with Lenore Volturno, Environmental Director, Pala Tribe, September 9, 2004.

Rincon

478. The Rincon Reservation encompasses 4,276 acres in Southern California. Approximately 80 acres on the Rincon Reservation located on the San Luis Rey River are included in the proposed flycatcher critical habitat designation.

Rincon Socioeconomic Status

479. The 2000 population on the Rincon Reservation was 1,495. The unemployment rate was 8.8 percent in 2000. Per capita income was $9,848 in 2000, less than half the average for California. In addition, approximately 29.5 percent of the Tribe's population lives below the poverty line, more than double the State average for California.

Rincon Potentially Affected Activities

480. The Rincon Tribe has not experienced past economic impacts related to flycatcher conservation activities. The Rincon Tribe is currently working on an HCP that would cover the area included in the proposed flycatcher CHD, primarily driven by Arroyo toad habitat on the Reservation. Nearly all proposed flycatcher CHD on the Rincon Reservation overlaps with proposed Arroyo toad CHD. Because the HCP is still in initial planning stages, administrative costs associated with development of this plan and future implementation costs related to the plan are unknown.[314]

481. Future impacts, however, could result from the proposed CHD. A Tribal representative indicated that future development along the San Luis Rey River could potentially be affected by flycatcher conservation activities.[315] Economic impacts associated with the new development may stem from, for example, additional administrative effort in the planning stages and modifications to projects to incorporate flycatcher and habitat conservation measures. Information regarding potential future development and development-related impacts resulting from flycatcher conservation was not available for inclusion in this draft economic analysis; it is anticipated that the final economic analysis will incorporate comments and additional information regarding impacts on the Rincon Reservation, if available.

Santa Ysabel

482. The Santa Ysabel Reservation encompasses 15,527 acres in Southern California. Approximately 27 acres on the Santa Ysabel Reservation along the San Felipe Creek are included in the proposed flycatcher critical habitat designation.

[314] Personal communication with Sean Skaggs, Attorney representing Rincon Tribe, August 18, 2004.
[315] *Ibid.*

Santa Ysabel Socioeconomic Status

483. The 2000 population on the Santa Ysabel Reservation was 250. The unemployment rate was 14.6 percent in 2000, approximately double the average for California. Per capita income was $14,332 in 2000, approximately two-thirds the average for California. In addition, approximately 23.3 percent of the population on the Santa Ysabel Reservation lives below the poverty line.

Santa Ysabel Potentially Affected Activities

484. Based on conversations with the Tribal representatives, activities on Santa Ysabel Reservation lands included in the proposed CHD are likely to be limited. Currently, there are two residences in that area; one residence was damaged in a recent wildfire and the other was recently condemned. Both of these residences will be rebuilt outside of the floodplain, using Federal funds. Any other future residential development in the area would also likely occur outside of the floodplain. The Tribe plans to designate the riparian/floodplain area as a protected area for cultural reasons and for habitat management purposes. The San Felipe Creek area is used for cultural activities including gathering grasses and willows for basketmaking. Because development is not expected to fall within the proposed CHD, and because the floodplain/riparian area is likely to be set aside from development, development activity on the Santa Ysabel Reservation is not expected to be affected by flycatcher conservation.[316]

485. The only activity occurring in the proposed CHD on the Santa Ysabel Reservation that is likely to be affected by flycatcher conservation in the future is maintenance to an existing road in the area. If the proposed CHD is in place, the Tribe may incur some costs related to consultation and surveying efforts related to road maintenance.[317] While the specific amount of these costs is unknown, these costs will likely have a small impact on the Tribe.

7.5 Lower Colorado Recovery Unit

7.5.1 Middle Colorado Management Unit

Hualapai

486. The Hualapai Reservation encompasses nearly one million acres in northern Arizona; flycatcher habitat on this reservation is located on the southern shore of the Colorado River, across from Grand Canyon NP. Approximately 30 river miles and 1,721 acres on the Hualapai Reservation are included in the proposed flycatcher critical habitat designation.

[316] Personal communication with Rodney Kephart, Councilman, Santa Ysabel, September 21, 2004.
[317] *Ibid.*

Hualapai Socioeconomic Status

487. The 2000 population on the Hualapai Reservation was 1,353. The unemployment rate reached 27 percent in 2003 (versus 18.2 percent shown in the 2000 Census), more than four times the average for Arizona.[318] The 2000 Census identifies a per capita income was $8,147 in 2000, less than half the average for Arizona. In addition, approximately 35.8 percent of the Tribe's population lives below the poverty line.

Hualapai Potentially Affected Activities

488. Based on discussion at a meeting with representatives of the Hualapai Tribe, activities on Hualapai Reservation lands have not been greatly impacted by flycatcher conservation activities to date, and expected future impacts are limited to administrative costs. These administrative costs are related to surveying and monitoring efforts, section 7 consultations, and preparation of the Final Southwestern Willow Flycatcher Management Plan that has been submitted by the Tribe to the Service. Flycatcher surveys on Hualapai lands in the Grand Canyon have been funded by USBR since 1997. USBR funds approximately $60,000 annually to cover six flycatcher surveys per year (6 trips/year, 3-4 days/trip, 5-6 people/day). In addition, the Tribe expends its own resources for flycatcher surveys, which are estimated to be less than the $60,000/annually spent by USBR. USBR funding is renewed annually, and the Tribe expects that this funding will likely continue into the future.[319] In addition, the Hualapai have prepared a management plan, which the Tribe estimates will result in administrative efforts totaling approximately $5,000 in 2004.[320]

489. The Hualapai operate a rafting enterprise and lease lands to a helicopter tour operation along the Colorado River. Neither of these activities is expected to be impacted by designation of critical habitat or flycatcher conservation activities. Additional consultation efforts are not expected as a result of critical habitat; however, consultations for flycatcher will continue to occur for projects with a Federal nexus. The types of projects affected in the past have included: prescribed burns (timing restrictions), construction of restroom facilities, and habitat conservation projects. The impacts related to these projects have been primarily limited to the administrative costs resulting from consultation efforts. While future economic development along the Colorado River is a possibility, the Tribe is still in the very early planning stages and it is unclear what development might occur along the river corridor, and whether this future development would be impacted by flycatcher conservation activities.

[318] Arizona Department of Commerce, Hualapai Indian Reservation Community Profile, prepared on 6/2004. Available at http://www.azcommerce.com/Communities/indian%20profile.asp.
[319] Personal communication with Hualapai Tribe, July 6, 2004.
[320] Personal communication with Don Bay, Hualapai Department of Natural Resources, September 2, 2004. Public comment on Proposed Rule Designating Critical Habitat for the Southwestern willow flycatcher, Hualapai Nation, Office of the Chairman, October 14, 2004.

7.5.2 Hoover to Parker Management Unit

Fort Mohave

490. The Fort Mohave Reservation encompasses 41,884 acres in Arizona, California, and Nevada. Approximately 4,204 acres on the Fort Mohave Reservation along the Colorado River are included in the proposed flycatcher critical habitat designation.

Fort Mohave Socioeconomic Status

491. The 2000 population on the Fort Mohave Reservation was 1,043. The unemployment rate was 7.2 percent in 2000. Per capita income was $12,766 in 2000, approximately two-thirds of the averages for the surrounding States. In addition, approximately 22.6 percent of the Tribe's population lives below the poverty line, while Arizona, California and Nevada State average poverty rates range from 10.5 to 14.2 percent.

Fort Mohave Potentially Affected Activities

492. Past consultations for the flycatcher included one formal consultation for a development project (Gold Properties) on the Fort Mohave Reservation. BIA indicated that this project was never undertaken. Based on conversations with BIA and Tribal staff, activities on Fort Mohave Reservation lands likely to be impacted by flycatcher conservation activities include development and building new irrigation ditches. The Fort Mohave Tribe is considering development of a new casino under a 25-year lease to a private company. The Tribe states that, if it proceeds in this manner, this project will likely not have to be approved by BIA. Future development projects with a Federal nexus, however, may result in costs to the Tribe related to the following potential project modifications (assuming similar requirements to those associated with the Gold Properties development consultation):[321]

- Surveys to determine the presence/absence of flycatchers on or adjacent to the project site;
- Limitations on surface disturbing activity within 250 feet of occupied habitat, until after flycatchers have migrated out of the area;
- Conservation of replacement habitat if flycatchers are nesting on or adjacent to the project site; and
- Development and implementation of a wetland enhancement plan.

[321] U.S. Fish and Wildlife Service. Biological Opinion on the Potential Effects of the Proposed Gold Properties Limited, Inc., Development on the Endangered Southwestern Willow Flycatcher. June 5, 1995. File #1-5-95-F-197.

493. While further future development along the Colorado River is likely, the Fort Mohave Tribe's specific development plans are still uncertain. Information regarding specific future development and development-related impacts resulting from flycatcher conservation was therefore not available for inclusion in this analysis. It is anticipated that the final economic analysis will incorporate comments and additional information regarding impacts on the Fort Mohave Reservation, if available.

494. In addition, future farming activities on the Fort Mohave Reservation that could be impacted include expansion of irrigation ditches. While consultation efforts may occur related to expanding irrigation ditches, no project modifications are expected.

Chemehuevi

495. The Chemehuevi Reservation encompasses 30,653 acres in California; flycatcher habitat on this reservation is located on the Colorado River and Lake Havasu. Approximately 55 acres on the Chemehuevi Reservation are included in the proposed flycatcher critical habitat designation.

Chemehuevi Socioeconomic Status

496. The 2000 population on the Chemehuevi Reservation was 345. The unemployment rate was 8.5 percent in 2000. Per capita income was $13,130 in 2000, less than two-thirds the average for California. In addition, approximately 30.7 percent of the Tribe's population lives below the poverty line, more than double the California State average.

Chemehuevi Potentially Affected Activities

497. In the past, Chemehuevi have not been greatly impacted by flycatcher conservation activities. While they have timed exotic plant removal activities to avoid migratory bird breeding season, the Tribe has not consulted on any projects specifically for the flycatcher. The Chemehuevi Tribe is currently planning to develop additional tourist facilities along Lake Havasu. The planned large upscale development includes a marina, several hotels, housing/condos, and a new casino. The Chemehuevi economy is largely based on tourism, and this project will bring significant job opportunities and revenue. The Tribe will consult on this project for a variety of endangered species. The outcome of this consultation is unclear, but any limitations on the project scope or size could reduce the number of jobs and amount of revenues to the Tribe.[322]

[322] Personal communication with David Todd, Environmental Director, Chemehuevi Tribe, August 24, 2004.

Colorado River Indian Tribes

498. The Colorado River Indian Tribes (CRIT) Reservation encompasses approximately 270,000 acres in Arizona and California. Approximately 481 acres on the CRIT Reservation along the Colorado River are included in the proposed flycatcher critical habitat designation.

Colorado River Indian Tribes Socioeconomic Status

499. The 2000 population on the CRIT Reservation was 9,201. The unemployment rate was 9.6 percent in 2000. Per capita income was $12,621 in 2000, less than two-thirds the average for Arizona or California. In addition, 21.8 percent of CRIT's population lives below the poverty line.

Colorado River Indian Tribes Potentially Affected Activities

500. In the past, CRIT has undertaken various conservation activities for the flycatcher, including surveys, monitoring and restoration of a large riparian area. These efforts have resulted in the following costs to the Tribe:[323]

- Southwestern willow flycatcher surveys have been performed periodically by the CRIT Department of Fish and Game. In particular, surveys were performed on CRIT lands during 1998, 1999, 2000, and 2002. Each year's survey had an estimated cost of about $4,000. These costs include field surveys, data entry, and report preparation and represent CRIT's in kind contribution to these projects. The projected cost of future annual flycatcher monitoring under the proposed draft CRIT Southwestern Willow Flycatcher Management Plan is expected to average about $6,000 annually.

- The CRIT Department of Fish and Game is currently preparing a flycatcher management plan. Estimated costs in developing the CRIT Southwestern Willow Flycatcher Management Plan are currently about $6,000; however, because the Plan is still in draft form additional costs may be incurred. The costs associated with implementing this plan cannot be forecast at this time and will depend on the conservation measures included in the plan.

- Riparian habitat conservation/restoration activities are primarily undertaken on the Colorado River Indian Reservation by the Ahakhav Tribal Preserve. These activities are directed toward benefiting all riparian wildlife species including the southwestern willow flycatcher. The Preserve's annual operating budget is directed toward these activities and the budget averages approximately $150,000/year since 1995.

501. A variety of activities occur on CRIT lands either on or adjacent to the proposed CHD. This includes agriculture, Casino and resort operations (including a marina and movie

[323] Email communication from Charley Land, CRIT Wildlife Manager, September 13, 2004 and September 20, 2004.

theater), and other tourism related enterprises. Based on available information, these ongoing operations are unlikely to be affected by flycatcher conservation activities. However, any future expansion of these enterprises would likely require consultation for the flycatcher under the proposed CHD. Economic impacts associated with the potential expansion of these activities could result in administrative efforts for consultation, and potential mitigation measures. At this time, because expansion plans are uncertain, no impacts have been estimated related to these Tribal enterprises.

7.5.3 Parker to Southerly International Border Management Unit

Fort Yuma (Quechan)

502. The Fort Yuma Reservation encompasses 43,942 acres in southern Arizona and California. Approximately 641 acres on the Fort Yuma Reservation along the Colorado River are included in the proposed flycatcher critical habitat designation.

Fort Yuma Socioeconomic Status

503. The 2000 population on the Fort Yuma Reservation was 2,376. The unemployment rate was 19.8 percent in 2000, more than three times the average for Arizona. Per capita income was $8,402 in 2000, less than half the averages for Arizona and California. In addition, approximately 34.1 percent of the Tribe's population lives below the poverty line.

Fort Yuma Potentially Affected Activities

504. The Tribe has conducted some surveys for threatened and endangered species including the flycatcher. These survey efforts are part of a three-year clean-up project funded by BIA. The BIA is also funding salt cedar removal projects on the reservation; approximately 100 acres are cleared each year. These projects are funded under BIA's fire management and noxious weeds programs. The timing of these vegetation removal projects has been limited to outside of the breeding season for the flycatcher.[324] Limiting treatments to outside of flycatcher breeding season results in having to clear vegetation from marshy areas in the wet season, rather than during the summer when the water table drops and there is less precipitation. This results in making projects more difficult and costly. For example, in the past, the presence of the mud has caused equipment to become stuck, resulting in costs of $26,000 to the Tribe. In addition, various crewmembers that would have been employed during the five-month flycatcher breeding season may be unable to find other work to fill in this time period. For example, of 20 crewmembers, approximately 10 did not have other work during the 2004 breeding season.[325]

505. In addition, the Quechan Tribe is involved in a restoration project along the Colorado River. The restoration project is a part of a larger development, the East Wetlands project, undertaken by the City of Yuma, Arizona along with various partners. As part of this

[324] Personal communication with Arlene Kingery, Environmental Department, Quechan Tribe, August 18, 2004.
[325] Personal communication with Arlene Kingery, Environmental Department, Quechan Tribe, November 3, 2004.

development project, the Tribe is developing a small area for recreational use.[326] In addition, the Tribe is considering another site for recreational development along the river; however, this project is in the early discussion stages.[327] Potential recreational development could include RV/Trailer parks, a marina, restaurants, and stores, similar to an RV park on BLM lands upriver.[328] Information regarding potential future development and development-related impacts resulting from flycatcher conservation was not available for inclusion in this draft economic analysis. It is anticipated that the final economic analysis will incorporate comments and additional information regarding impacts on the Fort Yuma Reservation, if available.

7.6 Gila Recovery Unit

7.6.1 Verde Management Unit

Camp Verde Yavapai Apache

506. The Camp Verde Reservation encompasses 652 acres in Arizona. Approximately 147 acres on the Camp Verde Reservation along the Verde River are included in the proposed flycatcher critical habitat designation.

Camp Verde Socioeconomic Status

507. The 2000 population on the Camp Verde Reservation was 743. The unemployment rate was 12.7 percent in 2000, approximately double the average for Arizona. Per capita income was $8,347 in 2000, less than half the average for Arizona. In addition, approximately 33.4 percent of the Tribe's population lives below the poverty line.

Camp Verde Potentially Affected Activities

508. Based on available information, past impacts of flycatcher conservation on the Camp Verde Reservation have been limited to administrative efforts. Based on conversations with the Service, BIA and Tribal staff, activities on Camp Verde Reservation lands likely to be impacted by flycatcher conservation activities in the future are related to future development projects associated with the transfer of title of 1,211 acres of fee lands to trust lands. The Supplemental EA for this land transfer States, "If future development activities involve a Federal nexus, then additional consultation on impacts to critical habitat and threatened or endangered species will be conducted with USFWS."[329]

[326] Personal communication with Bill Pyott, Bureau of Indian Affairs Fort Yuma, July 15, 2004.
[327] Personal communication with Brian Golding, Economic Development Dept., Quechan Tribe, September 27, 2004.
[328] Personal communication with Arlene Kingerly, Environmental Department, Quechan Tribe, August 18, 2004.
[329] SAGE Landscape Architecture & Environmental, Inc. 2004. Supplemental Environmental Assessment for the Transfer of title of 1,211 Acres of fee lands owned by the Yavapai Apache Nation to the United States of America in trust for the beneficial use of the Yavapai Apache Nation. Submitted to Bureau of Indian Affairs and Yavapai-Apache Nation, Revised by SAGE Lands Landscape Architecture & Environmental, Inc. May 2004.

509. The Supplemental EA for the land transfer identifies intended uses of the land along the Verde River including residential development and reclamation of lands for agriculture use. The area identified by the Tribe as an economic development area for commercial development is not within the proposed CHD. As trust lands, commercial and residential development of these lands will likely be subject to lease approval by BIA; thus, if a project falls within the proposed CHD it will require individual consultation. Discussion with the Tribe's Environmental Department, however, indicates that planned development will not be impacted by the flycatcher and the proposed CHD because the Tribe is working on a zoning ordinance that would set aside all of the floodplain area as conservation districts (e.g., open space). The zoning ordinance is currently in draft form but it should be final within a year. Thus, development is unlikely to occur in the proposed CHD. In addition, areas in the floodplain are not seen as conducive to development because of other Verde Valley local and State ordinances and the proposed CHD.[330] Given the proposed zoning ordinance, future impacts to activities on the Camp Verde Reservation related to flycatcher conservation are expected to be minimal.

7.6.2 Upper Gila Management Unit

San Carlos Apache

510. The San Carlos Apache Reservation encompasses over 1.8 million acres in southeast Arizona. Approximately 8,888 acres along the Gila River and a portion of the San Carlos Reservoir on the San Carlos Apache Reservation are included in the proposed flycatcher CHD. The following discussion provides background information on the San Carlos Apache and estimates impacts on the San Carlos Apache due to flycatcher conservation activities.

San Carlos Apache Socioeconomic Status

511. Based on U.S. Census data, the San Carlos Apache population was 9,385 in 2000; current population is estimated at more than 12,000.[331] Based on the 2000 Census, the unemployment rate was 35.4 percent. However, a recent study by the Tribe found that the unemployment rate is much higher, at 76 percent, indicating that at least seven out of ten people in the Tribe's labor force was unemployed.[332] San Carlos Apache per capita income was $5,200 in 2000, or about one-fifth of the Arizona average. In addition, the poverty rate on the San Carlos Apache Reservation is 48 percent.

[330] Personal communication with Bob Lau, Environment Department, Camp Verde Yavapai Apache, September 1, 2004.
[331] Letter from Susan B. Montgomery, Sparks, Tehan & Ryley, P.C. re: Comments to Draft Economic Analysis Regarding Possible Designation of Critical Habitat for the Southwestern Willow Flycatcher on the San Carlos Apache Reservation, dated October 6, 2004.
[332] Letter from Joe Sparks, Sparks, Tehan & Ryley, P.C. re: Request for Information Regarding Possible Designation of Critical Habitat for the Southwestern Willow Flycatcher, dated September 7, 2004.

San Carlos Apache Potentially Affected Activities

512. Several activities on San Carlos Apache Reservation lands have been or may be impacted by flycatcher conservation. Past economic impacts related to flycatcher conservation include administrative efforts, surveying and monitoring, and cowbird trapping. Future potential impacts may include costs of continued administrative and conservation activities as well as potential economic impacts from modifications to water delivery projects.

513. Based on conversations with the Service, BIA, USBR, and Tribal representatives, impacts stemming from potential restrictions on water delivery projects, such as impacts on agriculture and recreation, are difficult to forecast. Additional activities occurring in the proposed CHD area include gathering of willows for staves used in shade structures, and grazing. Because cultural gathering activities lack a Federal nexus, these activities are not expected to be impacted by flycatcher conservation activities. Tribal representatives have indicated, however, that the Tribe's ability to graze cattle could be affected by the proposed CHD; these impacts are discussed below.

Administrative and Conservation-Related Activities

514. Consulting with the Service, surveying for flycatchers, and preparing a flycatcher management plan utilizes the Tribe's limited resources. The San Carlos Apache have consulted on twenty projects in the past for which the Service considered effects to the flycatcher.[333] Costs associated with consultation efforts are discussed in Section 3. The San Carlos Apache Tribe has conducted flycatcher surveys since 1998. The Tribe spends approximately $15,000 annually on flycatcher surveys. In addition the San Carlos Apache spent approximately $1,000 for cowbird trapping in 2004, the first year in which the Tribe set cowbird traps. These flycatcher surveying and cowbird trapping costs of approximately $16,000/year are expected to continue into the future. In addition, the San Carlos Apache are currently preparing a flycatcher management plan. The cost of developing the management plan is estimated to be $5,000, though the exact cost is unclear at this time. The costs associated with the actual implementation of the plan are also not known at this time.[334]

[333] Faxed information from Mary Jo Stegman dated August 5, 2004. "U.S. Fish and Wildlife Service Section 7 Consultations with the San Carlos Apache Tribe (1995 – 2004) that Involve the Southwestern Willow Flycatcher."
[334] Personal communication with Stefanie White, San Carlos Apache Recreation and Wildlife Department, August 24, August 26 and September 8, 2004.

Water Exchange Project

515. In addition to continued administrative and conservation activities, this analysis considers potential future impacts related to two proposed projects that would provide additional water to the San Carlos Apache Tribe. The first project involves a water exchange. Under this proposed project, as discussed in Section 4, the USBR oversee the sake of up to 20,000 acre feet of Central Arizona Project (CAP) water to the San Carlos Apache Tribe to be supplied downstream of San Carlos Reservoir and Coolidge Dam. The purchase of CAP water would allow the San Carlos Apache to maintain a minimum pool in the San Carlos Reservoir in lieu of releasing water out of the San Carlos Reservoir; the Tribe will likely seek to implement this water exchange water annually in perpetuity. A March 2004 Biological Opinion (BO) addressed this proposed water exchange; however, the project did not take place in 2004. This BO recommended that USBR undertake a variety of activities, including additional research and monitoring, cowbird trapping, installation of meters, and reporting.[335] The costs associated with these activities are reported in the water management section of this report (Section 4). While these or similar measures would be expected if a similar project is proposed in the future, this project would be reevaluated before an exchange could occur in 2005 or any future year; thus, future impacts are uncertain.

516. The March 2004 BO requires the USBR to investigate flow regimes appropriate to support southwestern willow flycatcher habitat from Coolidge Dam to Kelvin. The Service did not, however, establish any minimum flow requirements in this BO. Rather, the BO states, "at this time, we cannot articulate a minimum flow (cfs) that is needed to maintain flycatcher sites and to provide for adequate forage base for reproduction."[336] Because the science needed to determine minimum flows is not currently available, it is unlikely that the Service would require minimum flows to protect the flycatcher over the 20-year period of this analysis.[337]

517. However, as the reasonable and prudent measures that the Service will require if this project proceeds in the future are not currently known, this section provides information on Tribal activities that could be affected were reservoir levels to be restricted. In particular, restrictions on reservoir levels could affect recreation activities on the San Carlos Apache Reservation. The San Carlos Apache derive income from a variety of recreational activities at San Carlos Reservoir, including: fishing license fees, camping fees, marina and store revenues. In the past, revenues from these sources has exceeded $2 million a year. This recreational activity also supports a number of jobs on the Reservation, as well as supporting the management and law enforcement at the Reservoir and in the Tribal Recreation and Wildlife Department.[338] If any restrictions related to flycatcher were to affect reservoir levels at the San Carlos Reservoir, these revenues and jobs could be at risk.

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[335] U.S. Fish and Wildlife Albuquerque Regional Office. 2004. Biological opinion on the Bureau of Reclamation's Approval of Water Exchange by the San Carlos Apache Tribe for Retention in San Carlos Reservoir, March 8.
[336] *Ibid.*
[337] Personal communication with Service personnel, Region 2, August 9, 2004.
[338] Letter from Joe Sparks, Sparks, Tehan & Ryley, P.C. re: Request for Information Regarding Possible Designation of Critical Habitat for the Southwestern Willow Flycatcher, dated September 7, 2004.

518. Another potential impact related to the water exchange project stems from the fact that the San Carlos Apache may have to order and pay for the delivery of CAP water well in advance, even before section 7 consultation is complete. If flycatcher conservation were to affect the Tribe's ability to complete an exchange after the Tribe has already paid, the Tribe could lose the money it has paid for CAP water and never receive the benefit of stored water in the Reservoir. In 2005, the Tribe's cost for CAP water will be $79 per acre-foot; this equates to $1.6 million for 20,000 acre-feet.[339] While it is not clear at this time whether this cost will be lost (that is, that the Tribe will pay for the delivery and, due to flycatcher concerns, not receive the benefit of the water delivery), the Tribe anticipates that this is a potential high-end cost of flycatcher conservation.

519. In addition, Tribal representatives believe that conditions set forth in future BOs could have an adverse economic impact on the Tribe "through curtailing of development, unexpected administrative or compliance costs, or by requiring costly mitigation measures."[340] Based on the reasonable and prudent measures in the March 2004 BO, these types of impacts are not expected. However, the reasonable and prudent measures that the Service will require if this project proceeds in the future are not currently known; thus, impacts related to this project are uncertain. It is anticipated that the final economic analysis will incorporate additional information regarding impacts on the San Carlos Apache Reservation, if available.

Water Delivery System Project

520. The second water project being discussed involves buildout of a system to deliver CAP water to the San Carlos Apache Tribe. This water would primarily be used for agricultural irrigation, although other uses may include municipal, commercial, and industrial purposes, and to provide recreational, cultural, and biological amenities. At this point, the scope of the project and delivery method have not been decided. Given the uncertainty associated with this project, it is not possible to anticipate future impacts related to flycatcher conservation measures that could be required for this project.[341] As with the water exchange project, USBR would likely bear the costs associated with flycatcher conservation for this project.[342]

521. Because the reasonable and prudent measures that the Service may require when this project proceeds in the future are not currently known, this section provides information on activity that could be affected if the amount of water available to the San Carlos Apache Tribe from this project were to be limited for the flycatcher. Specifically, limits on water available for irrigation would affect the Tribe's agriculture activities. The San Carlos

[339] *Ibid.*
[340] Letter from Susan B. Montgomery, Sparks, Tehan & Ryley, P.C. re: Comments to Draft Economic Analysis Regarding Possible Designation of Critical Habitat for the Southwestern Willow Flycatcher on the San Carlos Apache Reservation, dated October 6, 2004.
[341] Personal communication with John McGlothlen, USBR, August 24, 2004. Also, Letter from Joe Sparks, Sparks, Tehan & Ryley, P.C. re: Request for Information Regarding Possible Designation of Critical Habitat for the Southwestern Willow Flycatcher, dated September 7, 2004.
[342] Personal communication with Service personnel, August 9, 2004.

Apache Tribe has been farming for hundreds of years in the Gila Valley, with over 9,000 acres of land under cultivation in the late 1800s. According to Tribal representatives, "the Tribe now struggles to farm a fraction of these lands due to the lack of a reliable water supply."[343] The San Carlos Apache Tribe currently farms 500 acres, generating $135,000 in revenues (for the period from October 2003 through July 2004) and supporting six jobs with $165,000 in payroll. The Tribe has recently invested heavily in equipment for its agricultural operations. This was the first year of operation for the farm, a Tribal enterprise that has not reached profitability yet. The Tribe is looking into expanding farming, possibly beginning with adding approximately 1,000 acres.[344] While expansion plans are still uncertain, there are thousands of acres of irrigable lands on the Reservation.[345] If restrictions related to flycatcher conservation measures impact the Tribe's ability to continue or expand farming on the Reservation, these jobs and revenues may be affected.

Livestock Grazing

522. Livestock grazing is an important source of income for the San Carlos Apache Tribe. Tribal representatives have expressed concerns that grazing could be impacted.[346] While there is no history of section 7 consultation efforts in relation to grazing activity on the Reservation, the Tribe believes that if the proposed CHD were in place requiring section 7 consultation, the Service could recommend modifications to grazing activities which could result in economic impacts for the Tribe. As the grazing areas overlap with the riparian area included in the 8,888 acres of CHD on the Reservation, impacts to this activity are possible.[347] Information regarding potential grazing-related impacts resulting from flycatcher conservation was not available for inclusion in this draft economic analysis. It is anticipated that the final economic analysis will incorporate comments and additional information regarding impacts on the San Carlos Apache Reservation, if available.

[343] Letter from Susan B. Montgomery, Sparks, Tehan & Ryley, P.C. re: Comments to Draft Economic Analysis Regarding Possible Designation of Critical Habitat for the Southwestern Willow Flycatcher on the San Carlos Apache Reservation, dated October 6, 2004.
[344] Personal communication with Victoria Wesley, Forest Resource Program, San Carlos Apache Tribe, August 30, 2004.
[345] Letter from Joe Sparks, Sparks, Tehan & Ryley, P.C. re: Request for Information Regarding Possible Designation of Critical Habitat for the Southwestern Willow Flycatcher, dated September 7, 2004.
[346] Personal communication with Service personnel, August 9, 2004; and Letter from Susan B. Montgomery, Sparks, Tehan & Ryley, P.C. re: Comments to Draft Economic Analysis Regarding Possible Designation of Critical Habitat for the Southwestern Willow Flycatcher on the San Carlos Apache Reservation, dated October 6, 2004.
[347] Personal communication with Clark Richens, BIA San Carlos Agency, October 27, 2004. Acreage estimated based on GIS analysis. This acreage overstates area available for grazing because it includes areas in the Reservoir and Gila River bed.

7.7 Rio Grande Recovery Unit

7.7.1 Upper Rio Grande Management Unit

San Ildefonso

523. The San Ildefonso Pueblo encompasses 26,198 acres in New Mexico north of Santa Fe. Approximately 1,073 acres on the San Ildefonso Pueblo along the Rio Grande River are included in the proposed flycatcher critical habitat designation.

San Ildefonso Socioeconomic Status

524. The 2000 population on the San Ildefonso Pueblo was 1,524. The unemployment rate was 6.4 percent in 2000, less than the average for New Mexico. Per capita income was $14,848 in 2000. In addition, approximately 12.5 percent of the Pueblo's population lives below the poverty line, similar to average for New Mexico. These statistics indicate that economic situation on the San Ildefonso Pueblo is similar to that of the region; however, economic conditions in the region significantly lag national conditions.

San Ildefonso Potentially Affected Activities

525. Activities on San Ildefonso Pueblo lands likely impacted by flycatcher conservation activities are primarily limited to administrative costs related to consultation and surveying efforts. In 2003, the San Ildefonso Pueblo did a flycatcher survey of an area along the Rio Grande as part of the Environmental Assessment for their Bosque Restoration project. While the surveys and the restoration work were funded through BIA forestry and USFS grants, the Tribe likely expended some efforts in the form of staff time to participate in this project and develop an EA. To date there have not been any other projects on this Pueblo that have dealt with flycatcher issues. The San Ildefonso are planning another Bosque restoration project in the future; this will cover approximately 350 acres and will be a collaboration with funding from the Corps. The Tribe expects to undertake additional flycatcher survey efforts as part of this project.[348] Because impacts will likely be limited to administrative and surveying efforts, future economic impacts to the San Ildefonso are expected to be minimal.

San Juan

526. The San Juan Pueblo encompasses 26,198 acres in New Mexico north of Santa Fe. Approximately 1,744 acres on the San Juan Pueblo along the Rio Grande River are included in the proposed flycatcher critical habitat designation.

[348] Personal communication with James Pena, Natural Resources Department, San Ildefonso Pueblo, September 3, 2004.

San Juan Socioeconomic Status

527. The 2000 population on the San Juan Pueblo was 1,524. The unemployment rate was 6.4 percent in 2000, less than the average for New Mexico. Per capita income was $14,848 in 2000. In addition, approximately 12.5 percent of the Pueblo's population lives below the poverty line, similar to average for New Mexico. These statistics indicate that economic situation on the San Juan Pueblo is similar to that of the region; however, economic conditions in the region significantly lag national conditions.

San Juan Potentially Affected Activities

528. Activities on the San Juan Pueblo likely to be impacted by flycatcher conservation activities are limited to administrative and surveying efforts conducted as part of riparian and wetlands restoration projects. There is no economic development currently planned in the riparian area along the Rio Grande other than Bosque restoration activities. The restoration projects began as early as 1994 and have been funded by various agencies under various collaborative programs. Currently, the San Juan Pueblo Environmental Affairs department employs nine Tribal members who all work on habitat restoration in a holistic manner. Habitat restoration activities include removal of non-native species, flycatcher surveys, and restoration of wetlands.[349] In addition, the Pueblo of San Juan recently received a grant for $237,146 from the Service for habitat restoration for the flycatcher and other riparian species. This project will restore 40 acres of riparian and wetland habitat to benefit the flycatcher on Tribal lands. Invasive non-native vegetation will be removed in favor of re-establishment of native species.[350] Because impacts will likely be limited to administrative and surveying efforts included in habitat restoration projects funded by outside sources, future economic impacts to the San Juan Pueblo from flycatcher conservation are expected to be minimal.

Santa Clara

529. The Santa Clara Pueblo encompasses 45,969 acres in New Mexico north of Santa Fe. Approximately 1,609 acres on the Santa Clara Pueblo along the Rio Grande River are included in the proposed flycatcher critical habitat designation.

Santa Clara Socioeconomic Status

530. The 2000 population on the Santa Clara Pueblo was 10,658. The unemployment rate was 7.8 percent; per capita income was $15,336, and 20 percent of the Pueblo's population lives below the poverty line. These statistics are similar to the averages for the State of New Mexico; however, economic conditions in the region significantly lag national conditions.

[349] Email communication from Charles Lujan, Environmental Affairs, San Juan Pueblo, September 7, 2004.
[350] U.S. Fish and Wildlife Service. 2004. News Release titled "Secretary Norton Announces $9 Million in Grants to Tribes to Help Fund Fish and Wildlife Conservation Projects", August 26, 2004. Available at http://news.fws.gov/NewsReleases/R9/9C040661-65B7-D693-7E629E4D8335644C.html.

Santa Clara Potentially Affected Activities

531. The Santa Clara Pueblo has not experienced past economic impacts related to flycatcher conservation activities.

532. Information submitted by the Santa Clara Pueblo regarding potential future impacts resulting from flycatcher conservation indicates that limits to groundwater pumping could have significant economic impacts to the Pueblo. However, the form and magnitude of these impacts are currently unknown.[351]

7.7.2 Middle Rio Grande Management Unit

Isleta

533. The Isleta Pueblo encompasses 211,045 acres in New Mexico south of Albuquerque. Approximately 2,018 acres on the Isleta Pueblo along the Rio Grande River are included in the proposed flycatcher critical habitat designation.

Isleta Pueblo Socioeconomic Status

534. The 2000 population on the Isleta Pueblo was 3,166. The unemployment rate was 9.6 percent, slightly higher than the State average. While per capita income was significantly lower than the State average at $11,438, the poverty rate of 18.3 percent was approximately equal to the State average.

Isleta Pueblo Potentially Affected Activities

535. Based on discussion with Pueblo staff, past impacts of flycatcher conservation have been limited to providing assistance with surveying and monitoring. Surveying and monitoring has occurred on the Isleta Pueblo for the past five years, with funding provided by BIA. Surveys have been performed by the Natural Heritage Department of University of New Mexico, in coordination with Pueblo. The Isleta Pueblo expends its own resources for flycatcher conservation activities including costs for labor to escort survey crews and to coordinate and review results of the studies. In addition, the Pueblo has a Bosque management plan in place that covers the area proposed for CHD; this plan was created primarily for the silvery minnow. Future impacts related to flycatcher conservation are expected to be limited because the CHD area is already set aside from development and left in natural state.[352]

[351] "Santa Clara Pueblo's Concerns with the Proposed Rule, Draft Economic Analysis, and Draft Environmental Assessment Regarding the Proposed Re-Designation of Critical Habitat for the Southwestern Willow Flycatcher, Santa Clara Indian Pueblo," Office of the Governor, Undated, received by USFWS 2005.
[352] Personal communication with John Sorrell, Water Resources Department, Isleta Pueblo, August 16, 2004.

536. This section evaluates the effect of flycatcher conservation activities on transportation activities, such as bridge construction, repair, replacement, or retrofitting, and road construction, repair, widening, or improvements. These activities have the potential to affect flycatcher habitat, for example, through soil erosion, water quality or flow changes, or impacts to vegetation assemblages. This analysis first quantifies the economic impact on past transportation projects of implementing flycatcher conservation activities, and then examines the likelihood of similar economic impacts to future road and bridge construction and maintenance activities.

537. Transportation projects are affected by flycatcher conservation activities only when they cross riparian zones. Past economic impacts to transportation activities are estimated to have been approximately $8.2 million. Future projects (2004-2024) are estimated to experience impacts of $11.9 million to $56.9 million (discounted at seven percent over 20 years).

8.1 Estimated Past Impacts

538. The flycatcher consultation history includes 18 biological opinions on transportation projects: eight in California, three in Colorado, six in Arizona, and one in Nevada. These consultations involved the Federal Highway Administration (FHWA), USACE, California Department of Transportation (Caltrans), Arizona Department of Transportation (ADOT), and BLM and addressed the construction, expansion and repair of highways, bridges and rail projects.

539. In general, the Service has sought flycatcher habitat avoidance during the construction process, or habitat restoration and/or compensation for lost habitat if this was not possible. The following flycatcher conservation activities were recommended on past transportation projects:

- Timing restrictions (avoidance of flycatcher breeding season);
- Erosion control;
- Creation and management of substitute habitat;
- Re-vegetation of disturbed areas;

- Signing habitat areas;
- Limiting construction of temporary access roads;
- Funding flycatcher recovery efforts;
- Ensuring no disturbance to stream flow;
- Elimination of fill or dredge materials;
- Limiting in-stream vehicles and equipment; and
- Flycatcher surveys and monitoring.[352]

540. Where these past project modifications resulted in measurable economic impacts on transportation activities, Exhibit 8-1 describes these costs by Management Unit. Past consultations regarding the flycatcher have not, however, resulted in significant constraints on the size or location of transportation projects. This analysis accordingly assumes that future flycatcher conservation activities may engender additional costs to projects, but will not impair regional mobility.

[352] List of past conservation activities derives from study of the consultation history of past transportation-related activities (Colorado State Highway 151 Los Pinos River Bridge Replacement, Light Plant Road and Mill Creek, Eight Corners Intersection and Improvement Project, U.S. Highway 93 Widening Project, Scour Protection of Bridges over Peck Canyon, Mingus Avenue Extension, Highway 75 Bridge Replacement over Gila River, State Route 260: Cottonwood to Camp Verde, U.S. Highway 93 Wickenburg-Kingman Highway: Santa Maria River to Wikieup, New Solomon Bridge and Interim Repairs to Existing Crossing over the Gila River, Construction of the Pabco Road Erosion Control Structure).

Exhibit 8-1

PAST IMPACT ON TRANSPORTATION PROJECTS (2004$)

Management Unit	Project Type	On-Site Biologist [1]	Worker Training[1]	Fencing[1]	Habitat Restoration[2]	Habitat Creation[3]	Timing Restrictions[4]	Monitoring and Evaluation[5]	Other	Total Cost
San Diego	Road/Bridge[6]	$0	$1,000	$185,000	$93,000	$918,000	N/A	N/A	$1,590,000	**$2,787,000**
San Diego	Light Rail/ Bridge	$15,000	$1,000	$0	$112,000	$246,000	N/A	N/A	$28,000	**$402,000**
San Luis Valley	Bridge Replacement	$0	$0	$185,000	$102,000	$0	$172,000	$91,000	$0	**$551,000**
San Luis Valley	Road	$0	$0	$0	$102,000	$0	$172,000	$91,000	$0	**$366,000**
San Luis Valley	Road/Bridge	$0	$0	$0	$102,000	$0	$172,000	$91,000	$0	**$366,000**
Bill Williams	Road/Bridge	$0	$0	$0	$102,000	$33,000	$172,000	$91,000	$0	**$399,000**
Middle Gila/San Pedro	Bridge	$0	$0	$0	$102,000	$210,000	$172,000	$0	$0	**$484,000**
Verde	Road	$0	$0	$185,000	$102,000	$105,000	$172,000	$91,000	$0	**$656,000**
Verde	Bridge	$0	$0	$0	$102,000	$0	$172,000	$91,000	$0	**$366,000**
Verde	Road	$15,000	$1,000	$0	$102,000	$210,000	$172,000	$213,000	$0	**$713,000**
Verde	Road	$15,000	$1,000	$0	$102,000	$210,000	$172,000	$91,000	$0	**$591,000**
Upper Gila	Bridge	$15,000	$1,000	$0	$0	$0	$0	$0	$0	**$16,000**
Virgin	Road	$15,000	$1,000	$0	$102,000	$210,000	$172,000	$0	$0	**$500,000**
Total		**$73,000**	**$8,000**	**$555,000**	**$1,228,000**	**$2,141,000**	**$1,722,000**	**$852,000**	**$1,618,000**	**$8,196,000**

Exhibit 8-1

PAST IMPACT ON TRANSPORTATION PROJECTS (2004$)

Notes:

Estimates may not sum due to rounding. Values are adjusted to 2004 dollars using the GDP Deflator, Budget of the United States Government, Fiscal Year 2005, Historical Tables.

[1] Cost figures derived from two past consultations in California: Mission Valley East Light Rail Transit Project and Cannon Road (cost information provided by James Hecht, SANDAG, on July 20, 2004 and Shari Howard, City of Carlsbad Planning Department, on August 4, 2004).

[2] For projects where habitat restoration costs were unknown, this analysis uses averages the cost of two California projects (Mission Valley East Light Rail Transit Project and Cannon Road) to calculate a per-project modification cost figure for Habitat Restoration ($91,790)

[3] Cost figures derived from three separate biological opinions:

$818,000 from Cannon Road consultation, Carlsbad, CA

$222,200 from Mission Valley East Light Rail Transit Project

$33,000 from Reinitiation of US 93 Highway (Wickenburg to Kingman) Widening Project

$100,000 from Mingus Avenue Extension

$200,000 from Scour Protection, Bridges over Peck Canyon

[4] Annual cost figure derived from Arizona Department of Transportation (ADOT) study regarding the approximate cost of avoiding WIFL breeding season . The number is based upon demobilizing equipment at a site and remobilizing approximately 4 months later.

[5] Cost figures derived from the following sources**:**

$195,000 from State Route 260, Cottonwood to Camp Verde

$90,000 from ADOT study regarding past costs of monitoring and evaluation for WIFL.

[6] The Highway 71 widening Project (Riverside) required construction of two wildlife undercrossings (i.e., bridges). The total associated with the undercrossings was and flycatcher was estimated at $1.6 million by CalTrans. These costs are included in the “Other” category.

8.2 Potential Future Impacts

541. This section describes the projected transportation activities that are foreseeable within or affecting flycatcher proposed CHD.[353]

8.2.1 California

542. Transportation-related activities in California are expected to experience an economic impact of approximately $6.8 million to 51.7 million (discounted at seven percent to 2004 dollars) associated with flycatcher conservation activities in the foreseeable future. This estimate includes anticipated impacts of $2.7 million to California Transportation Planning Program (CTTP) projects and impacts of $4.1 million to $49 million to the Transportation Corridor Agency's (TCA) Foothill-South extension project.

California Transportation Planning Program (CTPP) Projects

543. The California Transportation Planning Program's (CTPP) California Transportation Investment System (CTIS) was used to inform this analysis regarding plans for future road projects occurring in the State.[354] The CTIS includes data on projects such as highway widenings and new road and bridge construction projects. This analysis employed GIS to determine the number of miles of highway construction and improvement expected to occur within proposed CHD in the future. Costs of flycatcher related conservation activities were then assigned on a per mile basis. The following describes the analytical methodology:

- **Estimate future road project miles intersecting proposed CHD.** CTIS GIS data analysis permits calculation of the number of planned and programmed transportation project miles in proposed CHD. Future transportation projects are likely to intersect the San Diego, Santa Ana and Santa Ynez Management Units. In sum, three road projects totaling

[353] Flycatcher consultation and conservation measures may cause time delays in project implementation and/or construction. Due to insufficient data, this analysis does not calculate the economic impact associated with project delays. These costs can, however, be significant. The San Bernardino County Flood Control District (SBCFCD) reports significant delays in past projects due to prolonged consultations on endangered species. For example, listing of the San Bernardino Kangaroo Rat resulted in a three and one-half year delay in construction on the San Sevaine Creek Water project. The project, initially estimated to cost $17 million, escalated to $26 million due to the delay and increased in construction costs over time (Mead, P.J. "Comments on the Southwestern Willow Flycatcher Draft Environmental Assessment." Flood Control Engineer, San Bernardino County Flood Control District, dated May 23, 2005).

[354] California Office of State Planning, "California Transportation Investment System, Transportation Planning Program," accessed at http://www.dot.ca.gov/hq/tpp/offices/osp/ userguide/intro.htm.

roughly 5.2 project miles are expected to intersect flycatcher proposed CHD in California.[355]

- **Estimate flycatcher restoration cost per mile.** The average cost of flycatcher conservation measures is calculated on a per project mile basis. This estimate is reached by averaging the per project mile cost of flycatcher conservation activities from all past projects. The average cost of flycatcher conservation measures is estimated to be approximately $684,000 per project-mile.

- **Calculate the cost of future projects.** Multiplying future project miles intersecting proposed CHD and per project mile flycatcher-related costs, and using CTIS data regarding the timing of the projects, a present value cost of roughly $2.7 million is calculated using a discount rate of seven percent.

Exhibit 8-2

COSTS OF FUTURE TRANSPORTATION CTPP PROJECTS IN CALIFORNIA

Management Unit	Road Name	Funding Year	Project Mileage	Cost Estimate (2004$)
Mohave	15	2010	0.48	$219,000
San Diego	76	2008	4.57	$2,384,000
Santa Ynez	246	2005	0.14	$89,000
California Total			5.19	$2,690,000

Notes: Values are adjusted to 2004 dollars using the GDP Deflator, Budget of the United States Government, Fiscal Year 2005, Historical Tables.

Transportation Corridor Agency's (TCA) Foothill-South Extension Project

544. In addition to CTPP projects, economic impacts associated with flycatcher conservation activities may also occur on projects owned and operated by the Transportation Corridor Agency (TCA). The TCA is a multi-jurisdictional agency with joint powers authority that currently owns and operates several toll roads in Southern California. In 1999, the TCA proposed the extension of the 241 Toll Road south to the I-5 near San Clemente. This extension, known as the Foothill-South project, is the final segment of the TCA's 67-mile public toll road network.

[355] One public comment cites the Sierra Way Bridge on the south fork of the Kern River in Kern County as one that requires ongoing repair and maintenance. This bridge did not show up as a planned project in the California Transportation Investment System database. This may be because the project is county-funded. That being the case, it is unclear whether flycatcher conservation measures will affect maintenance of this bridge. Public comments of Ted James, Kern County Planning Department, May 10, 2005.

545. In May 2004, TCA completed and released a 3,200-page Environmental Impact Report/ Environmental Impact Statement (EIR/EIS), which analyzed the environmental, socioeconomics, and traffic impacts of two no action alternatives and eight "build" alternatives, consisting of six toll-road alignments, the widening of I-5, and the widening of major arterial streets. Three of the eight "build" alternatives overlap flycatcher critical habitat along San Mateo Creek in the San Diego Management Unit:

- Alignment 7 (A-7) – Far East Crossover;
- Far East Corridor – West; and
- Far East Corridor – Modified.[356]

These three alternatives follow the same route through flycatcher critical habitat within San Onofre State Beach.

546. The public comment period for the EIR/EIS closed on August 6, 2004. TCA received over 6,000 public comments. According to TCA's website, by the end of 2005, the Foothill/Eastern TCA Board of Directors will choose a locally preferred alternative from among the eight project alternatives. Once a locally preferred alternative is selected, a number of state and federal approvals must be secured and a financing plan must be developed before construction can begin. Project construction is expected to begin in 2007 and the road could open to traffic by 2009.

547. Given the uncertainty surrounding final project selection, to be conservative, this analysis assumes that one of the three alternatives above will be selected. This analysis assumes that the TCA Foothill-South project will impact all 240 acres of flycatcher critical habitat in the San Mateo River, beginning at the I-5 through San Onofre State Beach. Assuming a mitigation ratio of approximately 3:1, this analysis estimates the total area required for mitigation at 720 acres. To estimate the costs associated with flycatcher mitigation, this analysis uses a low of $6,522 per acre and a high of $78,000 per acre. The low estimate is equal to the cost per acre for flycatcher habitat mitigation at Lake Isabella. The high estimate is based on a review of mitigation banks in San Diego County conducted for mitigation of coastal sage scrub. This analysis estimates future costs for the TCA Foothill-South project of $4.1 million to $49 million (2004 dollars, assuming a seven percent discount rate). To the extent that TCA's analysis of the various alternatives results in selection of a project alternative outside of flycatcher critical habitat, the impacts could be zero.

8.2.2 Utah

548. Transportation-related activities in Utah are not expected to experience an economic impact associated with flycatcher conservation activities in the foreseeable future.

[356] For more detail on the various project alternatives, go to: http://www.thetollroads.com/home/current_foothill.htm

549. The Utah Department of Transportation (UDOT) has indicated that no planned transportation projects are likely to affect proposed CHD.[357] The Service agrees that no known projects will affect the Virgin River or its habitats in Utah.[358]

550. Communities surrounding I-15 along the Virgin River are expected to experience development pressure in the future. UDOT anticipates a corresponding demand for more and improved infrastructure, including the expansion of existing roads and highways to meet the county's growing needs.[359] The extent and the specific locations of future road and bridge development, however, are speculative at this time.

8.2.3 Colorado

551. Transportation-related activities in Colorado are not expected to experience an economic impact associated with flycatcher conservation activities in the foreseeable future.

552. The Colorado Department of Transportation (CDOT) has indicated that no existing transportation projects bisect the proposed CHD for the flycatcher.[360] The Transportation Commission of Colorado's 2020 plan indicates that one project is planned to occur within the critical habitat designation in the next 16 years.[361] This project, the "US 160 - Bypass Through Alamosa Project Phase 1," is a three-mile bypass project slated to occur at the intersection of Highway 160 and Highway 285 in East Alamosa. CDOT has indicated that no conservation efforts specific to the flycatcher are anticipated for this project, and that further project development along the proposed CHD is unlikely in the foreseeable future.[362] This analysis accordingly determines that no flycatcher efforts will be undertaken for this project.

8.2.4 Nevada

553. Transportation-related activities in Nevada are expected to experience an economic impact of $617,000 (discounted at seven percent to 2004 dollars) associated with flycatcher conservation activities in the foreseeable future.

554. The Nevada Department of Transportation (NDOT) has identified one transportation project that will pass through the Virgin Management Unit of the proposed critical habitat designation in the next 10 years.[363] This project is the rebuilding of the Virgin River bridge at SR170 in Clark County, Nevada. Construction is projected to

[357] Personal communication with Paul West, Utah Department of Transportation, September 30, 2004 and February 15, 2005.
[358] Service, Region 6, January 4, 2005.
[359] Personal communication with Paul West, Utah Department of Transportation, September 30, 2004.
[360] Personal communication with Jeff Peterson and Gary Spinuzz, California Department of Transportation, August 26, 2004; personal communication with Jon Holst, California Department of Transportation, September 16, 2004.
[361] Colorado Department of Transportation, "2020 Plan: Investing in Colorado's Future," accessed at http://www.dot. state.co.us/StateWidePlanning/PlansStudies/2020Plan.htm on December 2, 2004.
[362] Personal communication with Jon Holst, California Department of Transportation, September 30, 2004.
[363] Personal communication with Eric Warmath, Nevada Department of Transportation, August 31, 2004.

begin in early 2005, and may take several months to complete.[364] Although the flycatcher has not been seen in the immediate construction area, potential habitat exists.[365] Thus, NDOT will conduct further surveys in the area.[366] Project modification cost information for this project is based on costs of modifications to similar projects in Arizona and is presented in Exhibit 8-3.

8.2.5 New Mexico

555. Transportation-related activities in New Mexico are expected to experience an economic impact of $1.6 million (discounted at seven percent to 2004 dollars) associated with flycatcher conservation activities in the foreseeable future.

556. The State Transportation Improvement Plan (STIP) for New Mexico identifies three transportation projects planned to pass through the proposed CHD for the flycatcher in New Mexico by 2009:[367]

- Tri-Centennial West Gateway Zone, Old Route 66 Interchange Project;
- Espanola Main Street (Paseo de Onate) road project; and
- Scenic Overlook Project at the Rio Arriba/Taos County Line.

557. At the present time, the New Mexico Department of Transportation (NMDOT) has not conducted an environmental assessment for any of these projects, and any impacts specific to flycatcher are uncertain.[368] This analysis assumes that each of these projects may be subject to flycatcher conservation measures, and that the costs of these measures will be comparable to the costs of compliance for similar past projects in Arizona (see Section 8.2.6). Project modification costs for these projects may stem from date restrictions (the cost of demobilizing equipment to avoid breeding season), monitoring and evaluation, and surveying. Exhibit 8-3 presents more detailed information regarding the potential future costs of project modification for these projects.

8.2.6 Arizona

558. Transportation-related activities in Arizona are expected to experience an economic impact of approximately $3.0 million (discounted at seven percent to 2004 dollars) associated with flycatcher conservation activities in the foreseeable future.

[364] Nevada Department of Transportation, "Statewide Improvement Plan (STIP)," accessed at http://www.nevadadot.com/traveler/construction_projects/stip/ on December 2, 2004.
[365] Personal communication with Ted Bendure, Nevada Department of Transportation, October 6, 2004.
[366] Personal communication with Lori Bells, Nevada Department of Transportation, October 6, 2004.
[367] Nevada Department of Transportation, "Statewide Improvement Plan (STIP)," accessed at http://www.nevadadot.com/traveler/construction_projects/stip/ on December 2, 2004.
[368] Personal communication with Rand Morgan, New Mexico Department of Transportation, September 30, 2004.

559. The Arizona Department of Transportation (ADOT) has identified seven transportation projects that are planned to pass through the proposed CHD in the next ten years: the Big Sandy Project on US 93, and road rehabilitation projects along State Routes 179, 95, 80, 70, 75 and I-19. The exact start dates and scope for these projects are still uncertain at this time.[369] ADOT anticipates potential project modifications to these projects. Costs may result from date restrictions, surveying, and monitoring and evaluation as highlighted in Exhibit 8-3.[370]

[369] Personal communication with Justin White, Arizona Department of Transportation, August 31, 2004.
[370] Personal communication with Thomas C. Ashbeck, Senior Project Scientist , EcoPlan Associates, Inc., October 4, 2004.

Exhibit 8-3

FUTURE IMPACT ON TRANSPORTATION PROJECTS
2004-2023 (2004$) [1]

Management Unit (State)	Project Name (Project Type)	Funding Year	Timing Restrictions [4]	Monitoring and Evaluation [4]	Other [4]	Present Value Total Cost
Mohave (CA)	15 (Road)	2010	N/A [2]	N/A [2]	N/A [2]	$219,000
San Diego (CA)	76 (Road)	2008	N/A [2]	N/A [2]	N/A [2]	$2,384,000
San Diego (CA)	241 (Toll Road)	2006	N/A [5]	N/A [5]	$4,100,000 to $49,000,000 [5]	$4,100,000 to $49,000,000 [5]
Santa Ynez (CA)	246 (Road)	2005	N/A [2]	N/A [2]	N/A [2]	$89,000
Bill Williams (AZ)	Big Sandy, US 93 (Road/Bridge)	2005-2007	$510,000	$270,000	$22,500	$750,000
Verde (AZ)	SR 179, MP 312.6 (Road)	Unknown [3]	$340,000	$0	$45,000	$385,000
Upper Gila (AZ)	SR 70, MP 379 (Road)	Unknown [3]	$340,000	$0	$15,000	$355,000
Upper Gila (AZ)	SR75, MP 384 (Road)	Unknown [3]	$340,000	$0	$45,000	$385,000
Middle Gila/San Pedro (AZ)	SR 80, MP 298 (Road)	Unknown [3]	$340,000	$0	$15,000	$355,000
Middle Gila/San Pedro (AZ)	I-19, MP 17 (Road)	Unknown [3]	$340,000	$0	$25,000	$365,000
Hoover-Parker (AZ)	SR95, MP 158.8 (Road)	Unknown [3]	$340,000	$0	$15,000	$355,000
Upper Rio Grande (NM)	Tri-Centennial West Gateway Zone, Old Route 66 Interchange – East (Road)	2009	$364,000	$270,000	$26,000	$471,000
Upper Rio Grande (NM)	Espanola Main Street (Paseo de Onate) (Road)	2008	$364,000	$270,000	$26,000	$504,000
Upper Rio Grande (NM)	Scenic Overlook at Rio Arriba/Taos County Line (Road)	2006	$364,000	$270,000	$26,000	$577,000
Virgin (NV)	Virgin River Bridge Project (Bridge)	2005	$364,000	$270,000	$26,000	$617,000
Total						**$11,900,000 to $56,900,000**

Notes: Estimates may not sum due to rounding.
[1] Future costs are discounted at a rate of seven percent and presented in 2004 dollars.
[2] Future costs of California projects are determine applying an average cost per project mile as detailed in Exhibit 8-2.
[3] Projects with an unknown time frame are assumed to occur this year; that is, costs associated with these projects are not discounted.
[4] Cost estimates from personal communication with Justin White, Arizona Department of Transportation, September 14, 2004.
[5] Future cost to the TCA Foothill-South Extension Project (Toll Road 241) are determined by applying an average cost per acre for habitat mitigations as detailed in Section 8.2.1.

POTENTIAL IMPACTS ON MINING ACTIVITIES SECTION 9

560. Although the Draft Economic Analysis addressed a number of activities potentially affected by changes in water use, it did not capture how such changes could affect mining activities. In response to public comments on the draft analysis, this section has been added.

561. While few active mineral mining activities occur within the proposed CHD, comments received on the Draft Economic Analysis expressed concerns that water use by existing or potential mining operations could be affected by flycatcher conservation. Critical to an understanding of the potential for impacts on water diversions or conveyance is an understanding of the probability and magnitude of any such changes. As discussed below, there is currently no information that indicates whether and in what geographic areas existing or expected future diversions of water related to mining activities (including groundwater use) reduce stream flow or modify hydrologic conditions to a degree that adversely impacts the flycatcher or its habitat. In addition, existing hydrologic models are unavailable to assess the role of any specific mining facility's groundwater pumping or surface water diversions in determining stream flow or other hydrologic conditions within critical habitat. As such, there are no existing models available to assess the extent to which water use would need to be curtailed or modified to remedy any such impacts, should they occur.

562. Given these data and model limitations, this analysis does not answer the question of whether impacts to mining operations are likely (i.e., the probability of such impacts), or define the expected magnitude of these impacts. It does, however, provide information on the potential scale of the economic impact that could occur if requirements associated with flycatcher conservation result in changes in water diversions or conveyance. Specifically, to allow for an understanding of the economic activities that could be at risk if modifications to water use or conveyance are required, this analysis provides data on the location of mining activities potentially associated with CHD areas, as well as data on the regional economic importance of these operations.

9.1 Potential Impacts to Mining Operations

563. The Recovery Plan and Proposed Rule do not specifically identify mining activities as a threat to the flycatcher and its habitat. However, the Recovery Plan broadly states: "surface water diversions and groundwater pumping for agricultural, industrial, and municipal uses are major factors in the deterioration of southwestern willow flycatcher habitats."[371] Because certain types of mines use considerable volumes of water, flycatcher protection measures that require significant modifications in management regimes at dams or in surface or groundwater diversions could impact mining activities.

564. Mining is a large industry in the counties containing flycatcher CHD, particularly in the state of Arizona. Several mines, primarily located outside of proposed CHD, draw surface water and/or utilize groundwater wells located in the vicinity of critical habitat for industrial purposes. In some areas, mining infrastructure crosses Federal lands in the vicinity of proposed CHD, and thus has a potential Federal nexus for consultation. In addition, mining facilities can require a variety of Federal permits, potentially generating a Federal nexus for consultation. This combination of factors lead several mining companies to express concern in public comments about potential impacts of flycatcher conservation activities on their operations. The concerns include potential costs associated with section 7 consultations and mitigation, but focus on potential delays that could render operations uneconomical, and/or potential restrictions in mineral output that would lead to mine shut-down and subsequent closure.[372] One commenter expressed concern that flycatcher conservation activities could restrict or eliminate access to water resources used by the mines.[373] In addition to impacts to these entities, changes in mining operations could also impact local economies.

9.2 Background on Mining Activities

565. As stated above, mining is an important industry in the counties containing flycatcher CHD, particularly in the state of Arizona. According to the Arizona Department of Mines and Mineral Resources, the estimated value of Arizona's non-fuel mineral production in 2003 was $2.1 billion, an eight percent increase over the 2002 value. Moreover, in 2003 the value of Arizona's nonfuel mineral production ranked third in the U.S.[374]

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[371] Final Recovery Plan Southwestern Willow Flycatcher (*Empidonax traillii extimus*), August 2002, p. II-38.
[372] Honey Creek Resources Inc., "Economic Impacts of Critical Habitat Designation to Copper Mining, Pinto Creek Basin, Arizona." Prepared for BHP Copper Inc., Honey Creek, Iowa. July 2005.
[373] David L. Sunding, Richard W. Dunford, and Jamie Glenn. "Proposed Critical Habitat Designation for the Southwestern willow flycatcher: Potential Economic Impacts on Phelps Dodge Corporation Operations." Prepared for Phelps Dodge Corporation, July 13, 2005.
[374] Arizona Department of Mines and Minerals/U.S. Geological Survey, "The Mineral Industry of Arizona," U.S. Geological Survey Minerals Yearbook, 2003, accessed at minerals.usgs.gov/minerals/pubs/state/az.html.

566. Copper production makes up the majority of nonfuel mineral production in Arizona. The Arizona Mining Association (AMA) states that Arizona "leads the nation in copper production, accounting for 65 percent of the total U.S. mine production."[375] Phelps Dodge is the state's largest copper producer, accounting for more than 75 percent of Arizona's total copper production in 2003.[376] The AMA notes that Arizona is also a leader in the production of gemstones, molybdenum, silver, perlite, sand, and gravel. In sum, 72 mining companies operated 126 mines in Arizona and employed more than 15,000 people in 2003.[377] Consequently, the mining industry's contribution to Arizona's economy is important, particularly to some rural communities who rely on mining activities to provide employment and tax revenue. In 2004, the combined direct and indirect impacts of solely the copper industry on Arizona's economy was approximately $3.3 billion,[378] or 1.8 percent of Arizona's 2004 total gross state product.[379]

9.3 Past Economic Impacts on Mining Activities

567. Since the listing of the species, the Service has conducted two formal consultations with the mining industry that involved the flycatcher. A 2002 consultation with BLM concerned the proposed Phelps Dodge Dos Pobres/San Juan Project near Safford in Graham County, Arizona.[380] The consultation and environmental impact statement (EIS) examined two land development options. Phelps Dodge could use 3,300 acres of BLM land to develop the Dos Pobres and San Juan copper ore bodies in the Gila Mountains. Alternatively, Phelps Dodge could relinquish 3,858 acres of land to the BLM in various locations in Arizona in exchange for 17,000 acres of BLM land near the project site. The EIS identified the land exchange as the preferred alternative from the standpoint of species conservation. In addition to the flycatcher, the consultation considered potential impacts to the Gila topminnow, razorback sucker, spikedace, loach minnow, and their critical habitats. Phelps Dodge agreed to protect sensitive habitat areas and monitor the populations occurring on their land. Phelps Dodge surveyed the flycatcher populations on their land in 2002 and 2004, while three additional annual surveys were conducted by the Service. The Service ultimately concluded that disturbances resulting from the proposed Dos Pobres/San Juan Projects were unlikely to jeopardize the existence of the flycatcher.

568. Another biological opinion was issued in 1997 for five species including the flycatcher. The proposed action for the consultation was the issuance of a National Pollution Discharge Elimination Program (NPDES) permit for the Phelps Dodge

[375] Arizona Mining Association, Public Comment on Draft EA for Southwestern Willow Flycatcher, submitted on July 18, 2005.
[376] Arizona Department of Mines and Minerals/U.S. Geological Survey, "The Mineral Industry of Arizona," U.S. Geological Survey Minerals Yearbook, 2003, accessed at minerals.usgs.gov/minerals/pubs/state/az.html.
[377] *Ibid*.
[378] George F. Learning, Western Economic Analysis Center, "The Economic Impact of the Arizona Copper Industry 2004", May 2005.
[379] U.S. Department of Commerce, Bureau of Economic Analysis. Gross State Produce News Release accessed at http://www.bea.gov/bea/newsrel/GSPNewsRelease.htm on September 9, 2005.
[380] U.S. Fish and Wildlife Service, Phoenix, Arizona Ecological Services Office, Biological Opinion for the Dos Pobres/San Juan Project, June 11, 2002.

Development, Verde Valley Ranch. This consultation involved reclamation of tailings associated with historic United Verde mining operations. Reasonable and prudent measures for this consultation stated that implementation of the storm water management plan should not result in declining water quality to nearby receiving waters.[381]

9.4 Future Economic Impacts on Mining Activities

569. The locations of mine and mineral deposits relative to CHD areas were determined using geographic data from the USGS Mineral Resource Data System [382] As shown in Exhibit 9-1, thirty-six sites fall within CHD areas. Approximately 70 percent of those sites in CHD areas are located in Arizona (14) and New Mexico (11). The remaining eleven are split between Colorado (6) and California (5).

570. Half of the mines in critical habitat (18) are sand and gravel operations. The Arizona Department of Mines reports that these sand and gravel mines are typically small operations that extract streambed material in or near river channels with perennially low water levels. This type of mining activity does not utilize large volumes of surface water.[383] The Service maintains that although sand and gravel operations may disturb habitat over relatively small areas, they are unlikely to pose a major threat to the species.[384] As a result, it is unlikely that sand and gravel mines will face significant constraints on their operations, despite their location within critical habitat.

571. Eleven of the 18 non-gravel sites in proposed CHD are mineral "occurrences" that are presently undeveloped. "Occurrence" status indicates the presence of an unexplored mineral deposit with no mining infrastructure. Such status does not imply that any individual or corporation owns rights to the deposit or that any individual or corporation intends to mine the deposit. Four non-gravel sites were identified as "prospect" areas. "Prospect" status indicates that exploratory analysis of a mineral deposit has occurred, yet that no production is planned in the near term. The status of one non-gravel site is unknown.

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[381] U.S. Fish and Wildlife Service, Phoenix, Arizona Ecological Services Office, Biological Opinion for the National Pollution Discharge Elimination Program Storm Water permit to Phelps Dodge for the Proposed Verde Valley Ranch Development in Yavapai County, June 11, 1997.

[382] U.S. Geological Survey, 2005, Mineral Resources Data System: U.S. Geological Survey, Reston, Virginia. The geographic data used for this analysis was extracted in December 2004. This database contains the records previously provided in the Mineral Resource Data System of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS. USGS states that the positional information of the data is variable, and that data may not be updated to current conditions. This data was cross-checked with the Arizona Department of Mines for accuracy where possible. Changes to the dataset were made as appropriate and are noted in Exhibit 9-1. This exhibit does not include past producers.

[383] Personal communication with Nyal Niemuth, Mining Engineer, Arizona Department of Mines and Mineral Resources on September 2, 2005 and September 9, 2005.

[384] Personal communication with Biologist, U.S. Fish and Wildlife Service, Arizona Ecological Services Office, September 7, 2005.

Exhibit 9-1

MINERAL RESOURCES LOCATED WITHIN FLYCATCHER MANAGEMENT UNITS

Mgmt. Unit	State	County	Site Name	Type	Status
Bill Williams	Arizona	Mohave	Adams	Gypsum-Anhydrite	Occurrence
	Arizona	Mohave	Krook	Silver, Gold	Occurrence
Hoover-Parker	California	San Bernardino	Needles Sand & Gravel Deposit	Sand and Gravel	Producer
Middle Gila/San Pedro	Arizona	Pinal	Winkelman	Gypsum-Anhydrite	Occurrence
	Arizona	Pinal	Arizona Gold Mine	Copper	Producer
	Arizona	Pima	Unknown	Geothermal	Occurrence
	Arizona	Pinal	F.L. Clark Trucking Co. Plant	Silica	Producer
	Arizona	Pinal	Chalcocite Group	Copper	Prospect
Middle Rio Grande	New Mexico	Socorro	Vignali Pit	Sand and Gravel	Producer
	New Mexico	Valencia	Tome Pit	Sand and Gravel	Producer
	New Mexico	Socorro	Joyita Prospects	Unknown	Occurrence
	New Mexico	Socorro	Materials Pits	Sand and Gravel	Unknown
Parker-Southerly International Border	Arizona	La Paz	Clip Wash	Kyanite	Occurrence
	Arizona	Yuma	Unknown	Geothermal	Unknown
Roosevelt	Arizona	Gila	Wagner	Unknown	Occurrence
	Arizona	Gila	Clay Deposit	Clay	Prospect
San Diego	California	San Diego	Pala Pit	Sand and Gravel	Producer
	California	San Diego	Prospects	Gemstone	Prospect
San Luis Valley	Colorado	Costilla	Unknown	Sand and Gravel	Occurrence
	Colorado	Alamosa	Unknown	Sand and Gravel	Occurrence
	Colorado	Alamosa	Unknown	Sand and Gravel	Occurrence
	Colorado	Alamosa	Unknown	Sand and Gravel	Occurrence
	Colorado	Conejos	Unknown	Sand and Gravel	Producer
	Colorado	Rio Grande	Unknown	Sand and Gravel	Unknown
Santa Ana	California	San Bernardino	Colton Cement Plant	Limestone - General	Producer
	California	San Bernardino	Alabama Street Pit	Sand and Gravel	Producer
Upper Gila	Arizona	Graham	Myres Property	Gold, Copper	Occurrence
	New Mexico	Grant	Big Trail Nut Deposit	Fluorine-Fluorite	Occurrence
	New Mexico	Grant	Big Trail Deposit	Unknown	Occurrence
Upper Rio Grande	New Mexico	Rio Arriba	Materials Pit No. 64-17-S	Sand and Gravel	Prospect
	New Mexico	Santa Fe	Materials Pits	Sand and Gravel	Unknown
	New Mexico	Santa Fe	Materials Pits	Sand and Gravel	Unknown
	New Mexico	Taos	Glenwoody Camp	Gold	Prospect
	New Mexico	Santa Fe	Materials Pit	Sand and Gravel	Unknown
Verde	Arizona	Yavapai	Bedrock Aggregate	Sand and Gravel	Producer
	Arizona	Yavapai	El Jay Sand & Gravel	Sand and Gravel	Producer

Exhibit 9-1 (continued)

MINERAL RESOURCES LOCATED WITHIN FLYCATCHER MANAGEMENT UNITS

Notes: The geographic data used for this analysis was extracted in December 2004. This database contains the records previously provided in the Mineral Resource Data System of USGS and the Mineral Availability System/Mineral Industry Locator System (MAS/MILS) originated in the U.S. Bureau of Mines, which is now part of USGS.
[1]"Occurrence" status indicates that a mineral deposit exists, yet that no developed mining infrastructure exists on the site. Such status does not imply that any individual or corporation owns rights to the deposit or that any individual or corporation intends to mine the deposit. "Prospect" status indicates that although exploration at a mineral deposit is underway, no production is planned in the near term. "Producer" status indicates that the resource is in active use.
Sources: U.S. Geological Survey, 2005, Mineral Resources Data System: U.S. Geological Survey, Reston, Virginia. Written and personal communication with Nyal Niemuth, Mining Engineer, Arizona Department of Mines and Mineral Resources on September 2, 2005 and September 9, 2005.

572. The two remaining mines within proposed CHD are active producer sites. One of these sites is a copper site owned by Arizona Gold Mine in Pinal County. The Arizona Department of Mines and Mineral Resources (ADMMR) reports that the Arizona Gold Mine has not been at full production since the 1960s. According to ADMMR, the mine is likely to be inactive, although very small-scale extractive operations may still be underway.[385] The second site is the F.L. Clark Trucking Company Plant, a silica mine also located in Pinal County. A silica mine is a quarry-style operation, and thus is not water intensive. Expansion of production at the F.L. Clark silica site could involve deepening or widening of the quarry, but not significant horizontal expansion across the landscape that could destroy flycatcher habitat. Consequently, it is highly unlikely that either of these two sites located within CHD would pose a threat to the flycatcher or its habitat. Accordingly, neither of the sites are likely to encounter constraints on their operations due to the designation of critical habitat.

573. Aside from the two sites located within critical habitat, mining companies are concerned that mines outside of CHD may encounter limitations on their surface and groundwater withdrawals, which are critical to production. It is conceivable that mines outside of CHD could negatively affect streamflow or other hydrologic within CHD through surface and/or groundwater withdrawals. If impacts on flycatcher habitat were found to exist, these mines could potentially face constraints on their water use. Because the affected region is arid, and the volumes of water used by these facilities large, substitute water sources are generally not readily available. Thus, these mining companies worry that reductions in water availability could delay or curtail production at mine facilities. While less water intensive mining processes are being developed, such technology is not available in the short-term.[386] Because of the volatile nature of copper pricing, timing of mining production can is critical to maximizing the value of the extracted resource. One commenter notes that for copper mines, "mine owners primarily

[385] Personal communication with Nyal Niemuth, Mining Engineer, Arizona Department of Mines and Mineral Resources on September 2, 2005 and September 9, 2005.
[386] David L. Sunding, Richard W. Dunford, and Jamie Glenn. "Proposed Critical Habitat Designation for the Southwestern willow flycatcher: Potential Economic Impacts on Phelps Dodge Corporation Operations." Prepared for Phelps Dodge Corporation, July 13, 2005.

bear the burden of the damages to the extent that mitigation reduced profitability. However, if the mitigation ultimately results in a reduction in mine investment, including production being reduced or stopped, then the local communities share the burden through lost employment opportunities and reduced local government revenues."[387]

574. Constraints on water use that would be needed to accommodate flycatcher concerns cannot be accurately quantified because hydrological models that explain the relationship between groundwater pumping and surface water diversions and flycatcher habitat health are not available. Such a model would need to be highly site-specific in order to be accurate, and thus would require information that includes:

- Precise locations of water withdrawals;
- Streamflow in affected river reaches;
- Volume of surface and/or groundwater withdrawals by mines and nearby water users;
- Streamflow reduction resulting from a given volume of surface and groundwater withdrawn;
- Flow level necessary to maintain flycatcher habitat and populations;
- The availability of substitute water for mining activities.

575. While the above information is not available, Exhibit 9-2 provides information on the economic resources at risk given potential constraints on surface water and groundwater use.

576. The remainder of this section presents a general overview of the sources of water used by mines located outside CHD as well as other information provided by public commenters.

9.4.1 Potential Impacts to Phelps Dodge Corporation

577. According to Fennemore Craig, P.C., which submitted a public comment on behalf of Phelps Dodge Corporation (PDC), "the utility of Phelps Dodge's operations depends on the certainty of available water supplies. It is well known that mining requires the use and availability of dependable water supplies and that such supplies are in limited quantity in the arid southwest. If the availability of water is curtailed or precluded, PDC operations would be severely impacted and their viability placed at risk."[388] PDC is also concerned that potential ore reserves in several locations may not be exploitable, if critical habitat for flycatcher leads to unavailability of water supplies, large mitigation

[387] Honey Creek Resources Inc., "Economic Impacts of Critical Habitat Designation to Copper Mining, Pinto Creek Basin, Arizona." Prepared for BHP Copper Inc., Honey Creek, Iowa. July 2005.
[388] Fennemore Craig, P.C., Public Comment on Draft EA for Southwestern Willow Flycatcher, submitted on behalf of the Phelps Dodge Corporation, July 18, 2005.

costs and/or project delays. PDC provided detailed information on the economic attributes of its mines near proposed CHD, and some information about water demands at the at-risk operations/resources.

578. The comment identifies two operating mines, Bagdad and Tyrone, and three non-operating mines, Dos Pobres/San Juan, Clarkdale/Jerome, and the Christmas Mine district, for which flycatcher could be a concern.

Bagdad Mine

579. The Bagdad Mine is an open-pit copper mine and sulfide ore concentrator. PDC reports that it is the largest U.S. producer of concentrate leach material, and currently provides 22 percent of PDC's net operating income.[389] The potential impact of flycatcher conservation on the Bagdad mine is of concern to PDC both due to its economic importance to PDC and its reliance on water withdrawals in the vicinity of proposed CHD.[390] In addition, mine operations contribute regional economic benefits, including employment and taxes, to Yavapai County.

580. While the Bagdad mine is located 20 miles from the proposed CHD, PDC owns most of the land within and directly adjacent to the proposed 38-mile stretch of the Big Sandy River in the Bill Williams River watershed that runs from Cane Springs Wash (called "Cove Sor Wash" in the Proposed Rule) to an area downstream of the Town of Wikieup, Arizona. While the lands are currently used for private grazing activities, PDC's primary purpose for these lands is as a groundwater well field that follows the length of the Big Sandy, with most wells sited north of the Route 93 bridge crossing. According to Phelps Dodge, this water provides 80 percent of the industrial water used by the Bagdad mine.[391] En route to the mine, the pipeline for these wells cross federal lands, thus, providing a potential Federal nexus for consultation on flycatcher.[392]

581. The Bagdad mine has consistently produced the second or third largest volume of copper sold by PDC from its U.S. mines (123.3 thousand tons in 2000). PDC employed 570 people at Bagdad mine in 2004, representing 0.6 percent of the 81,700 person labor force in Yavapai County.[393] PDC also paid $1.9 million in sales tax to Yavapai County, as well as $2.2 million in severance taxes to the State of Arizona.[394]

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[389] David L. Sunding, Richard W. Dunford, and Jamie Glenn. "Proposed Critical Habitat Designation for the Southwestern willow flycatcher: Potential Economic Impacts on Phelps Dodge Corporation Operations." Prepared for Phelps Dodge Corporation, July 13, 2005.
[390] *Ibid*.
[391] *Ibid*.
[392] *Ibid*.
[393] Arizona Department of Commerce, "Profile of Yavapai County, Arizona," http://www.azcommerce.com/doclib/COMMUNE/Yavapai%20County.pdf.
[394] David L. Sunding, Richard W. Dunford, and Jamie Glenn. "Proposed Critical Habitat Designation for the Southwestern willow flycatcher: Potential Economic Impacts on Phelps Dodge Corporation Operations." Prepared for Phelps Dodge Corporation, July 13, 2005.

Tyrone Mine

582. The Tyrone mine is an active open-pit copper mine located in Grant County, New Mexico. The Tyrone mine is located 20 miles from the Upper Gila proposed CHD and relies on surface and groundwater supplies for its mining operations. PDC maintains a water diversion from within proposed CHD that leads to an off-river river water storage area called Bill Evans Lake which feeds an underground pipeline to the mine. Unlike the Bagdad mine, the pipeline does not cross Federal lands. However, PDC is concerned that the maintenance of the diversion could act as a Federal nexus for consultation on flycatcher. While the surface water diversion constitutes only a portion of the water used by this mine , the volumes used are significant in that it may be difficult for this operation to access substitute water sources.[395]

Safford Site (San Juan/Dos Pobres)

583. The Safford Mine (which includes the San Juan/Dos Pobres ore bodies development) is not currently operational. However, PDC intends to bring it on-line in the near future.[396] The mine site is located seven to eight miles from the proposed CHD. For the current phase of planned operations, localized groundwater resources will be utilized.[397] While there is no near-term threat to Safford operations from proposed CHD, future mine expansion could lead PDC to utilize water rights it holds to proposed CHD areas on the Gila River.[398] At that time, limitations on water use or mitigation could be required to accommodate flycatcher. In addition, PDC did consult on the land exchange plan with regard to flycatcher, and has conducted some habitat restoration for flycatcher as a result.[399]

584. The Safford Mine plans to employ 350 people in Graham County, Arizona, when it comes on-line. This will represent nearly three percent of the civilian labor force in Graham County.

Christmas Mine

585. The Christmas mine district is adjacent to proposed CHD for the flycatcher in the Middle Gila/San Pedro Management Unit between Dripping Springs Wash and the confluence of the San Pedro and Gila Rivers. This mine was taken off-line in 1983 and is currently in a "care and maintenance" phase. There are no plans to reopen the mine at this time.[400] Thus, no immediate threat to PDC operations are apparent at this site. However, should PDC seek to secure water for future mining efforts at this mine in the future, flycatcher considerations could delay or hinder those efforts.

[395] *Ibid.*
[396] *Ibid.*
[397] *Ibid.*
[398] *Ibid.*
[399] *Ibid.*
[400] *Ibid.*

United Verde Mine

586. The United Verde Mine is located near Jerome, Arizona, in Yavapai County. The mine closed in 1953 and is in a "long-term care-and-maintenance" mode. There are no plans to reopen this mine in the foreseeable future. However, should it reopen, future mining operations would necessitate utilization of water rights from the Verde River. PDC notes that because land values are increasing in this area, the lands and water rights themselves are valuable assets to PDC. [401]

587. As described above, a 1997 consultation occurred at this site related to reclamation of tailings associated with historic United Verde mining operations.[402]

9.4.2 Potential Impacts to BHP Copper, Inc.

588. BHP Copper, Inc. produces copper in the Pinto Creek basin through leaching operations and is considering alternatives for increasing the future utilization of the Pinto Valley facility. The mine is adjacent to lands along the Pinto Creek that form part of the Roosevelt Management Unit; however, since the listing of the species in 1993 the flycatcher has not impacted the company's operations at Pinto Creek.[403]

589. The Pinto Valley division of BHP Copper, Inc. includes the closed Pinto Valley sulfide mine, the Miami in-situ leach, and the Miami No. 2 tailings leach operations. Both sites are between two to four miles from the Roosevelt management unit in Miami, Arizona in Gila County. The Arizona Department of Mines and Mineral Resources estimates that the Miami in-situ deposit contains 172 million tons of copper with an average grade of 0.40 percent copper. The Department estimates that the No. 2 tailings operation contains 9 million tons also with an average grade of 0.40 percent.[404] Information was not provided on water use by these facilities.

590. Honey Creek Resources (HCR), which submitted an analysis on behalf of BHP Copper, analyzed potential impacts to the Pinto Creek mine under three scenarios for future mine operations, and assigned a probability to each. Scenario 1 is continued operation of the present leaching facility at Pinto Creek, which is assumed to be a certainty. Under scenario 2, BHP Copper would lease its processing assets at Pinto Creek to other mining operations that would transport material to Pinto Creek. The assumed probability of Scenario 2 occurring is 60 percent. Under Scenario 3 BHP Copper would recommence open pit mining at Pinto Creek. The assumed probability of Scenario 3 occurring is 20 percent.

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[401] *Ibid*.

[402] U.S. Fish and Wildlife Service, Phoenix, Arizona Ecological Services Office, Biological Opinion for the National Pollution Discharge Elimination Program Storm Water permit to Phelps Dodge for the Proposed Verde Valley Ranch Development in Yavapai County, June 11, 1997.

[403] Honey Creek Resources Inc., "Economic Impacts of Critical Habitat Designation to Copper Mining, Pinto Creek Basin, Arizona." Prepared for BHP Copper Inc., Honey Creek, Iowa. July 2005.

[404] Data on Pinto Valley deposits accessed from the website of the Arizona Department of Mines and Mineral Resources at http://www.admmr.state.az.us/minupdat99.htm on August 31, 2005.

591. HCR uses high range, low range, and most likely estimates for a series of variables used to calculate the economic costs incurred under each scenario. These variables include, but are not limited to, Section 7 consultation costs, length of consultation, percentage reduction in output, cost of production, and mitigation costs. The "high range," "low range," and "most likely" estimates for each of these variables vary across scenarios. HCR ran a statistical simulation with 10,000 combinations of values from the ranges identified for each variable. When the "most likely" annual costs for each scenario are weighted by their probability of occurrence, the total "most likely" cost to the Pinto Creek mine due to flycatcher CHD is $185,059 per year. HCR estimates that there is a 50 percent probability that annual impacts to Pinto Creek will be greater than $325,300 and a 20 percent probability (80th percentile) that the annual economic impact will be $2.3 million or greater. The comment notes that for copper mines, "mine owners primarily bear the burden of the damages to the extent that mitigation reduced profitability. However, if the mitigation ultimately results in a reduction in mine investment, including production being reduced or stopped, then the local communities share the burden through lost employment opportunities and reduced local government revenues."[405]

9.4.3 Potential Impacts to ASARCO, Inc.

592. ASARCO Inc., is a subsidiary of Grupo Mexico, S.A. de C.V. and the third largest producer of copper in the world.[406] According to public comments from ASARCO, flycatcher CHD could impact the company's Ray Complex, which includes the Hayden and Ray Operations on the Middle Gila River in Arizona.[407] The Ray Operation is located roughly four to five miles north of the Middle Gila/San Pedro Management Unit. The Hayden Operation is located at the convergence of two branches of the Gila River, and therefore lies a half mile to two miles both to the northeast and the northwest of the Middle Gila/San Pedro Management Unit.[408] [can we say anything about their water withdrawal or regional economic importance?]+

9.5 Summary of Impacts

593. Exhibit 9-2 presents available data on mines for which water concerns have been raised related to flycatcher proposed CHD. The active mining operations that are known to utilize water within proposed CHD areas are Bagdad mine (Bill Williams MU) and Tyrone Mine (Upper Gila MU).

[405] Honey Creek Resources Inc., "Economic Impacts of Critical Habitat Designation to Copper Mining, Pinto Creek Basin, Arizona." Prepared for BHP Copper Inc., Honey Creek, Iowa. July 2005.
[406] On August 10, 2005, ASARCO LLC filed for Chapter 11 bankruptcy protection in U.S. Bankruptcy Court in Corpus Christi, Texas.
[407] Public comments of Krishna Parameswaran, ASARCO LLC, "Comments on the U.S. Fish and Wildlife Service Proposal to Designate Critical Habitat for the Southwestern willow flycatcher (Empidonax traillii extimus), 69 Fed. Reg. 60706 (October 12, 2004), July 18, 2005 and May 27, 2004.
[408] Data on mine locations from the U. S. Geological Survey's Mineral Resources Data System accessible at http://tin.er.usgs.gov/mrds/.

Exhibit 9-2

MINE OPERATIONS FOR WHICH WATER CONCERNS HAVE BEEN RAISED RELATED TO FLYCATCHER PROPOSED CHD

Owner	Mine	State	Site in CHD?	Mine is Operational?	Hydrologic Connection to Proposed CHD	Dependence on Proposed CHD Stream Reach	Current or Potential Source of Water for Mining Activities	Quantity & Value of Production (where mine is operational)
Phelps Dodge	Bagdad Mine	AZ	No. Site is 20 miles east of the Big Sandy River in **Bill Williams MU**	Yes.	Water withdrawals from well field in proposed CHD	Replacement of current rights likely to be difficult	Mine obtains up to 80% of production water from groundwater wells along the Big Sandy River, which falls within the Bill Williams MU.	676.3 million tons of proven and probable ore reserves. 111,900 short tons of copper produced in 2004 generating $174.9 million in net operating income Expected life: 22 years
Phelps Dodge	Tyrone Mine	NM	No. Site is 18 miles southeast of **Upper Gila MU**.	Yes.	Water diversion from proposed CHD	Surface water provides partial supply to mining operations.	Mine diverts water from Gila River to stores in Bill Evans Lake for operations.	1.1 billion pounds of recoverable copper (net of copper extracted). 43,100 short tons of copper produced generating $28.7 million in net operating income in 2004
BHP Copper Inc.	Pinto Valley Division	AZ	No. Sites are between two to four miles from the **Roosevelt MU.**	Partially. Leaching operations continue, though open pit mining cessated in 1998.	Unknown	Unknown	Mine pumps local groundwater to feed its operations.	The Miami in-situ project contains an estimated 172 million tons at an average grade of 0.40 percent copper; at the No. 2 tailings operation, only 9 million tons at 0.40 percent remain to be processed.
Asarco Inc.	Ray Complex	AZ	No. Sites are 4 to 5 miles north of the **Middle Gila/San Pedro MU**.	Yes.	Unknown	Unknown	Mine pumps local groundwater to feed its operations. Surface river water is temporarily diverted from river and then returned to river to avoid potential water contamination by mine. No water is consumed in process.	In 2001 the Ray Complex extracted 249,600,000 lbs. of copper in concentrate, 684,374 oz. of silver in concentrate, 102,959,000 lbs. of copper in cathodes, and 438,308,000 lbs. of copper in anodes.
Phelps Dodge	Safford Mine (Dos Pobres/San Juan)	AZ	No. The mine is 7 to 8 miles north of **Upper Gila MU**.	No. PDC states that opening is planned between 2007 and 2009.	None in near term.	None.	Current phase will use groundwater wells outside of CHD. Future mine expansion could lead PDC to utilize Gila River water rights.	Not operational, but planned for operation. The copper ore bodies contain an estimated 538 million tons of leachable reserves with an ore grade of 0.37% copper and a potential (present value) future income stream of $1.2 to $1.8 billion.

Exhibit 9-2

MINE OPERATIONS FOR WHICH WATER CONCERNS HAVE BEEN RAISED RELATED TO FLYCATCHER PROPOSED CHD

Owner	Mine	State	Site in CHD?	Mine is Operational?	Hydrologic Connection to Proposed CHD	Dependence on Proposed CHD Stream Reach	Current or Potential Source of Water for Mining Activities	Quantity & Value of Production (where mine is operational)
Phelps Dodge	Christmas Mine District	AZ	Yes. Located adjacent to **Middle Gila/San Pedro MU**.	No. Production ceased in 1983, and now is in a care and maintenance phase.	Water diversion to support re-opening could come from proposed CHD area.	None.	None. Access to surface and/or groundwater would be required to re-open Christmas Mine. At present no water drawn from Gila River; but mine holds Gila River water rights.	PDC estimates the mine contains 1.8 billion pounds of recoverable copper.
Phelps Dodge	United Verde Mine	AZ	No. 6 miles northwest of **Verde MU**.	No. Mine stopped producing in 1953 and is currently in a long-term care and maintenance phase.	Should it reopen, diversions upstream of proposed segment could be required to support future mining operations.	None	Existing surface water rights in Verde River upstream of proposed CHD and localized groundwater resources.	25 million short tons of geologic material containing 6% zinc, 0.9% copper, and silver and gold estimated to be present at the mine.

Sources:

[1] David L. Sunding, and Robert Dunford, Triangle Economic Research, "Proposed Critical Habitat Designation for the Southwestern Willow Flycatcher: Potential Economic Impacts on Phelps Dodge Corporation Operations," Prepared for Phelps Dodge Corporation, July 13, 2005.

[2] Ray Complex production figures drawn from the ASARCO company website accessed at http://www.asarco.com/ray.html on September 1, 2005.

[3] Public comments of Jeff Parker, BHP Copper Inc. on the Proposed Critical Habitat Designation for the Southwestern willow flycatcher," July 15, 2005.

[4] Public comments of Krishna Parameswaran, ASARCO LLC, "Comments on the U.S. Fish and Wildlife Service Proposal to Designate Critical Habitat for the Southwestern willow flycatcher (*Empidonax traillii extimus*), 69 Fed.Reg. 60706 (October 12, 2004), July 18, 2005 and May 27, 2004.

[5] Conversations with Nyal Niemuth, Mining Engineer, Arizona Department of Mines and Mineral Resources on September 2, 2005 and September 9, 2005.

594. In addition to the activities discussed in previous sections of this report, other economic activities may be affected by flycatcher conservation activities. These activities include recreation, fire management, other Federal land management actions, and military activities. Specific Federal lands management actions that have incorporated flycatcher conservation activities in the past have included fire management, exotic plant removal, management plans, restoration projects, pesticide use, and land exchanges.

595. This section describes impacts of flycatcher conservation on these activities and provides information on potential future impacts. For the most part, the impacts to these activities resulting from flycatcher protection efforts include section 7 consultation efforts and related project modifications such as surveying and monitoring. In addition, there have been some impacts related to closures of recreation areas. Impacts to military activities have been primarily related to the administrative efforts of section 7 consultations. This analysis does not attempt to quantify impacts to military readiness that may result from flycatcher conservation activities. Future impacts to military activities may increase slightly due to additional consultations and surveying requirements related to CHD. However, the types of project modifications recommended by the Service are not expected to change.

10.1 Impacts to Recreation Activities

596. A variety of recreational activities occur in the proposed CHD including hiking, camping, picnicking, fishing, hunting, boating, river rafting and off highway vehicle (OHV) use. In some cases, flycatcher conservation activities have resulted in limits on areas available for certain recreational activities. The following section details impacts to recreation activities in the proposed CHD, organized by recovery unit.

10.1.1 Coastal California Recovery Unit

Santa Ana Management Unit

597. Portions of the San Bernardino NF fall within this Management Unit. During the flycatcher breeding season, the forest restricts use on a portion of the Thurman Flats picnic area. There is a flycatcher nesting location adjacent to the Thurman Flats picnic area along

Mill Creek. Conservation measures have included fencing and barriers around the nest site and weekend patrols to guard the nest site, ongoing since 2000 at a cost of approximately $3,000 per year. Discussions with San Bernardino NF indicate that this closure has not affected the amount of recreation use in the area, as the closure includes only a portion of the picnic area.[409]

San Diego Management Unit

598. Portions of the Cleveland NF fall within this Management Unit. There is a flycatcher nesting location adjacent to a picnic area along the San Luis Rey River. However, the forest has not closed off any of the area to accommodate flycatchers. Thus, use of the area has not been affected.[410] The forest has implemented a variety of conservation activities at this picnic area, including:

- Posting additional signs inform the public and to limit activity outside of the developed picnic area;
- Installing animal proof garbage bins to limit predators in the area; and
- Removing some picnic tables closer to the occupied flycatcher areas.

Flycatcher was only one reason for undertaking these measures; in addition, there are issues with Least Bell's vireo. Therefore, some of these measures may have been implemented regardless of the flycatcher. The cost of these measures has been minimal. Lake Cuyamaca is also used for activities such as hiking, fishing, bird watching, and picnicking.[411] These activities are not anticipated to be affected by conservation efforts for the flycatcher.

10.1.2 Basin And Mojave Recovery Unit

Kern Management Unit

599. Lake Isabella, a popular recreation area with more than two million visitors a year, is located in this Management Unit. There has been substantial public concern regarding potential limitations on water levels in the lake that were agreed to as part of a biological opinion resulting from the USACE consultation on Lake Isabella dam operations. In particular, the biological opinion states "[i]f the interim measures or the purchase of 1,100 acres are not completed by March 1, 2000, the USACE will not allow the reservoir to rise above 2,584 feet in elevation (inundate the South Fork Wildlife Area (SWFA)) for the period of March 1 through September 30 each year until the land is purchased or a permanent conservation easement is in place."[412] However, due to recent drought conditions, these

[409] Personal communication with Steve Loe, San Bernardino NF, August 24, 2004.
[410] Personal communication with Kirsten Winter, Cleveland NF, August 27, 2004.
[411] Public comments of Theodore Griswold, Procopio, Cory, Hargreaves, and Savitch, on behalf of Lake Cuyamaca Recreation and Park District, December 10, 2005.
[412] U.S. Fish and Wildlife Service, Sacramento Office. 2000. Letter from Cay G. Goude, Acting Field Supervisor, Sacramento Fish and Wildlife Office, to Colonel Michael J. Walsh, District Engineer, U.S. Army Corps of Engineers, re: Reinitiation of Formal Consultation on the Army Corps of Engineers Long-term Operation of Isabella Dam and Reservoir, dated June 14, 2000.

limitations have not resulted in changes to water operations because water levels were already below required elevations. Therefore, there have been no past impacts on lake levels from flycatcher conservation activities. In addition, because the purchase of the land is nearly completed, the lake level is not expected to be limited for flycatcher conservation in the future.[413]

600. A Decision Memo by the USFS describes the habitat protection measures affecting recreation activity in the SFWA. To date, there have been various impacts on recreational activity at Lake Isabella due to flycatcher conservation activities, including: [414]

- ***Efforts to control watercraft, including a five miles per hour speed limit within 100 feet of riparian areas in the SFWA***. This speed limit is in effect year round; but in practicality, the areas affected are inundated for only five weeks each year. In addition, since the listing of the flycatcher, there was only enough water to inundate this area during the years from 1995 to 1999. From 2000 to 2004, there has not been enough water for the speed restriction to have an impact on recreationists; however, USFS still incurred costs related to maintenance. USFS has spent approximately $97,000 (2004 dollars) to enforce this speed limit in the past. This includes an initial investment to purchase buoys to mark the speed enforcement area, a patrol boat, personal watercrafts and to pay salaries for maintenance and enforcement personnel. Over the next 20 years, enforcement efforts by USFS will total approximately $153,000 (2004 dollars assuming a seven percent discount rate), including annual maintenance and enforcement, as well as future boat replacement. These future costs equate to $7,600 annually.

- ***Prohibition on overnight camping and motorized vehicle travel in the SWFA in order to protect the unique habitat in the area***. This has resulted in loss of some recreation activity, specifically boaters who would launch small boats from a nearby ravine and access the shoreline to camp on an unimproved area along a small stretch of shoreline in Sequoia NF. However, this area had already been closed to camping since 1994 and was not a designated camping area. USFS indicates that the amount of overnight camping that was occurring in that area was very limited because it was such a small area and only accessible by boat; approximately 10 to 15 individuals would camp there on holiday weekends.[415] Boats may still access this area; however, the closure to motorized vehicles restricts where boats can be launched. Thus, small boats that would have used a nearby launch would now have to be launched further away and the return trip to the launch site would be very difficult because of wind conditions on the lake. USFS recreation staff indicated that there are other overnight camping areas in the

[413] Meeting with USACE and Kern River Water Master, Lake Isabella, CA on June 29, 2004.
[414] Fax communication from Sue Porter, USFS, September 15, 2004.
[415] Email communication from Sue Porter, USFS, October 1, 2004.

forest; however, other nearby areas are not as easily accessible by boat or conducive to fishing, so the quality of the experience may be affected. This analysis does not attempt to quantify this loss in quality of the experience, and no regional economic impacts are expected as a result of this overnight camping restriction. Fishing has not been prohibited, and larger boats that can return upwind to launch sites can still be used to access the area.

10.1.3 Lower Colorado Recovery Unit

Little Colorado Management Unit

601. Apache-Sitgreaves and Gila NFs both have lands within this Management Unit. To date, recreation activities have not been impacted by flycatcher conservation activities in this area. The Greer Recreation Area in Apache-Sitgreaves NF is a popular recreational fishing location. Because it is a designated recreation area, this area is closed to motorized vehicle use. Fishing and hiking is popular along both the East and West Forks of the Little Colorado River, as well as by boat and along the shoreline of Greer Lakes. The proposed CHD is not expected to affect recreational activity in this area; however, if the forest were to implement any closures to recreational use for the flycatcher, economic impacts would be likely. Apache-Sitgreaves NF staff estimate that approximately 70,000 to 75,000 people use the recreation area annually.[416]

Virgin Management Unit

602. A portion of Lake Mead National Recreation Area falls in this Management Unit. As discussed in the previous section, recreational activity at Lake Mead has not been impacted by flycatcher conservation. In addition, dispersed recreation occurs along the Virgin River in Utah on City of St. George, BLM and private lands. Review of a 1998 biological opinion indicates that "recreation that degrades riparian habitat will be prohibited in riparian areas on Bureau land along the Virgin River."[417] However, discussion with BLM outdoor recreation staff indicates that recreation along the Virgin River has not been affected by flycatcher conservation activities to date. In the future there is some potential for expansion of existing walking trails to be affected by flycatcher conservation. The City of St. George may be developing additional trails.[418] If this development is funded with Federal money, there could be some administrative costs associated with consulting on development of additional trails in the proposed CHD. However, project modifications and associated impacts are not expected.

[416] Personal communication with Barbara Romero, Recreation Specialist, Apache-Sitgreaves NF, September 9, 2004.
[417] U.S. Fish and Wildlife Service, Phoenix Office. Formal Consultation #2-21-96-F-132. Programmatic Biological Opinion for Proposed Amendment to the Arizona Strip Resource Management Plan. January 28, 1998.
[418] Personal communication with R.J. Hughes, Outdoor Recreation Planner, BLM St. George, Utah office, September 30, 2004.

Middle Colorado Management Unit

603. Grand Canyon National Park (NP) and Lake Mead National Recreation Area both fall within this Management Unit. There have been various closures affecting recreation activity at the Grand Canyon. Past closures, which were implemented at various times between 1993 and 1997, have meant that rafting groups and backcountry campers could not use an overnight camping area at mile 50-51, and had to continue approximately two to three miles further downstream to an alternative campsite. However, with available substitutes nearby, these closures have not affected the number of visitors to the NP.[419] The Grand Canyon is an extremely popular rafting destination; people wait for years to receive a permit for a private rafting trip. Approximately 22,500 recreational users participating in private rafting trips and commercially guided trips in 2003; approximately 80 percent of this occurred between May and September.[420] While the beach closures for the flycatcher may have caused some inconvenience for guides who were accustomed to stopping in that area; economic impacts related to this inconvenience has been minimal.

604. In a programmatic biological opinion done for recreational activities in Lake Mead NRA, conservation measures for the flycatcher included additional surveys of potential flycatcher habitats and closures to restrict land and lake access by recreationists to any sites where breeding pairs of flycatchers are found.[421] However, discussions with Lake Mead NRA indicate that to date, recreation at Lake Mead has not been affected by flycatcher conservation activities. While access to Lake Mead has been limited by low water levels forcing closure of ramps near flycatcher habitat (e.g., Pearce Ferry), these closures have not been related to flycatcher conservation.[422]

Pahranagat Management Unit

605. This Management Unit contains several State-run Wildlife Management Areas, as well as a portion of Lake Mead NRA. Discussions with the Nevada Department of Wildlife indicate that there have not been any flycatcher-related impacts to recreational activities at Overton and Key Pittman Wildlife Management Areas. As discussed previously, recreational activity at Lake Mead has not been impacted by flycatcher conservation.

Bill Williams Management Unit

606. This Management Unit contains Alamo Lake, a popular recreation area and the Bill Williams National Wildlife Refuge (NWR). To date, flycatcher conservation has not impacted recreation activities in this area. The Bill Williams NWR is managed for recreation and wildlife conservation purposes. No specific measures have been necessary to protect the flycatcher. Hunting and off-highway vehicle activities on the Bill Williams

[419] Personal communication with Elaine Leslie, Biologist, Grand Canyon NP, August 30, 2004.
[420] Personal communication with Linda Jalbert, Outdoor Recreation Planner, Grand Canyon NP, September 28, 2004.
[421] U.S. Fish and Wildlife Service, Phoenix Office. Formal Consultation #02-21-01-F-0263. Memorandum re: Lake Mead National Recreation Area Lake Management Plan, dated October 7, 2002.
[422] Personal communication with Ross Haley, Wildlife Biologist, Lake Mead National Recreation Area, July 15, 2004.

NWR do not overlap with the proposed CHD. Ninety percent of the visitation to the Bill Williams NWR is by boat, and the refuge is a no wake zone. Flycatcher surveys in the area may be performed by several entities, depending on responsibility and availability of funds, including the Arizona Game and Fish Department (costs of these efforts are included in Section 4). AZGFD states that a late spring-early summer drawdown under Scenario 2 could affect recreation at Alamo Lake.[423] Mohave County is an important destination for anglers, comprising 15 percent of all fishing days in the region in 2001.[424]

Parker to Southerly International Border Management Unit

607. This Management Unit contains portions of Cibola and Imperial National Wildlife Refuges. No impacts to recreation activities are expected at either of these refuges. Discussion with Imperial NWR indicates that flycatcher habitat contains very dense vegetation that is not conducive to recreational use.[425] AZGFD states that a late spring-early summer drawdown under Scenario 2 could affect recreation at Lake Havasu.[426] As stated above, Mohave County is an important destination for anglers, comprising 15 percent of all fishing days to the region in 2001.[427]

10.1.4 Gila Recovery Unit

Verde Management Unit

608. This unit includes portions of the Tonto NF, Coconino NF and Prescott NF. There is only limited recreational activity in these forests along the Verde River, none of which is expected to be affected by flycatcher conservation activities. In particular, in the Tonto NF there have not been any restrictions on recreation in this Management Unit related to flycatchers.[428] AZGFD states that a late spring-early summer drawdown under Scenario 2 could affect recreation at Roosevelt and Horseshoe Reservoirs.[429] Gila and Yavapai County comprised 13 percent of angler days in Arizona in 2001.[430]

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[423] Public comments of Duane L. Shroufe, "Southwestern willow flycatcher critical habitat designation proposed rule", State of Arizona Game and Fish Department, May 31, 2005. Several studies have investigated how recreational impacts could change with varying reservoir levels. However, this type of study is beyond the scope of this analysis. Cordell, Ken H. and John C. Bergstrom. 1993. Comparison of Recreation Use Values Among Alternative Reservoir Water Level Management Scenarios. *Water Resources Research.* 29 (2): 247-258.Huszar et al. 1999. Recreational damages from reservoir storage level changes. *Water Resources Research.*

[424] Silberman, John. "The Economic Importance of Fishing and Hunting." for Arizona Game and Fish Department, 2001.

[425] Personal communication with Sky Wagner, Biologist, Imperial National Wildlife Refuge, September 28, 2004.

[426] Public comments of Duane L. Shroufe, "Southwestern willow flycatcher critical habitat designation proposed rule", State of Arizona Game and Fish Department, May 31, 2005.

[427] Silberman, John. "The Economic Importance of Fishing and Hunting." for Arizona Game and Fish Department, 2001.

[428] Personal communication with Todd Willard, Cave Creek Ranger District, Tonto NF, August 27, 2004.

[429] Public comments of Duane L. Shroufe, "Southwestern willow flycatcher critical habitat designation proposed rule", State of Arizona Game and Fish Department, May 31, 2005.

[430] Silberman, John. "The Economic Importance of Fishing and Hunting." for Arizona Game and Fish Department, 2001.

Roosevelt Management Unit

609. The Roosevelt Management Unit is the area with the largest impacts on recreation related to flycatcher conservation. Within the proposed CHD, the Tonto has had closures in place since 1998 on both the Salt River and in Lake Roosevelt on the Tonto Creek end.[431] The closures limit vehicle use and fires; fishing and hunting are not prohibited in these areas. However, because of the nature of the catfishing and hunting activities that have historically occurred in these areas, these closures have likely affected the level of recreational use on the Tonto NF. Catfishermen and dove and quail hunters may prefer to be able to drive in to a site, rather than haul coolers and equipment down to the river. Thus, a number of these fishermen and hunters have likely chosen to go elsewhere, outside of the local area, to participate in these activities. As Roosevelt Lake is not a destination for out-of state tourists, the fishermen and hunters most likely affected by these closures are Arizona residents who will continue to fish or hunt at substitute recreational sites available within the state.

610. USFS estimates that the Tonto NF gets approximately 6.2 million visitors per year.[432] While visitor use at dispersed recreation sites on Roosevelt Lake area is not available, the EIS for the HCP at Roosevelt Lake estimates that in 2001 there were approximately 600,000 visitor days in 2001.[433] A study funded by Arizona Game and Fish Department provides 2001 data on the economic impacts of hunting and fishing in Arizona at the county level. This study indicates a total of 413,374 angler days and 75,510 hunter days in 2001 in Gila County, Arizona (where Roosevelt Lake is located). As presented in Exhibit 10-1, displaced recreation due to closures for flycatcher are estimated to 4,050 fishing and hunting days, which equates to less than one percent of this activity in Gila County in 2001.[434]

611. While the Tonto NF does not track usage of the undeveloped areas that were included in the two 1998 closures, recreation staff at the Tonto Basin Ranger District provided estimates of the number of recreationists affected annually on average. The flycatcher related closure on the Salt River arm may have displaced up to 3,000 catfishermen annually. Of these, approximately 75 percent continue to fish at alternative sites in the Roosevelt Lake area, while 25 percent or 750 fishermen likely go elsewhere in Arizona. Similarly, the flycatcher related closure on the Tonto Creek arm may have displaced up to 3,000 fishermen and 2,000 hunters. Of these fishermen, approximately 50 percent continue to fish at alternative sites in the Roosevelt Lake area, while the other half or 1,500 fishermen likely go elsewhere in Arizona. Of these hunters, approximately 10 percent continue to hunt at alternative sites in the Roosevelt Lake area, while 90 percent or 1,800 hunters likely go elsewhere in Arizona. Thus, in total, 2,250 angler days and 1,800 hunting days are lost to the region (Exhibit 10-1). These lost visitor days result in two types of economic impacts:

[431] It is worth noting that Tonto NF is developing a bald eagle closure unrelated to flycatcher along the Tonto Creek arm of Roosevelt Lake that surrounds much of the flycatcher habitat. Comments of Regional Director, Service, Region 2, January 5, 2005.
[432] USFS 2003. Biological Opinion on the Draft Biological Assessment of 11 Land & Resource Management Plans, USDA Forest Service Southwestern Region. Submitted to the U.S. Fish and Wildlife Service in November 2003. p. 228.
[433] Final Environmental Impact Statement for the Roosevelt Habitat Conservation Plan.
[434] Arizona Game and Fish Department. 2001 Estimated Angler Use Days extrapolated from license sales.

efficiency effects resulting from the loss of use of the area, and distributional impacts related to loss of local spending by fishermen and hunters in the Roosevelt Lake region.

Exhibit 10-1

NUMBER OF RECREATION DAYS LOST DUE TO FLYCATCHER CLOSURES AT TONTO NF (ANNUAL SINCE 1998)

	Angler Days	Hunting Days	Total Days
Salt River arm	750	--	750
Tonto Creek arm	1,500	1,800	3,300
Total Lost Trips	**2,250**	**1,800**	**4,050**

612. This analysis does not attempt to value the impacts related to displaced fishermen and hunters who continue to participate in fishing or hunting within Tonto NF. While there may be some loss of consumer surplus associated with the inconvenience of having to use a different location, especially if this area is already congested, data on the value associated with lower trip quality are not available. For example, the loss would depend on a variety of factors including the distance to an alternative site (which could be closer depending on the point of embarkation) and the amount of congestion at the alternative site. Rather, this analysis focuses on valuing impacts related to the trips that will no longer occur in the Roosevelt Lake area.

Defining Consumer Surplus and Welfare Effects. Welfare economics is based upon the idea that social welfare can be maximized by using resources in ways that yield the greatest benefits to society. Economists generally rely on consumer surplus as a measure of net social welfare. Consumer surplus is based on the principle that some consumers benefit because they are able to purchase goods or services at a price that is less than their total willingness to pay (i.e., the maximum amount they would pay for the good). In the context of this analysis, consumer surplus is realized by fishermen and hunters when the value of their fishing or hunting experience exceeds the "price" they pay for the experience in terms of travel costs, equipment costs, and other fees.

Efficiency Effects

613. This section estimates the consumer surplus, or welfare, impacts associated with lost fishing and hunting opportunities in Tonto NF (see Text Box). Because areas along the Salt River and Tonto Creek are closed to motorized vehicle use, some fisherman and hunters choose to go elsewhere to participate in this activity. For the purposes of this analysis, for fishing and hunting trips no longer taken in the Roosevelt Lake area, the total welfare value of these trips is estimated to represent the efficiency loss. This may overstate impacts if the fisherman or hunter continues to fish in another location; however, as alternatives are not likely to provide a similar quality of experience, this high-end estimate was considered reasonable for this analysis.

614. Estimates of the consumer surplus generated by fishing and hunting in Tonto NF requires information on the number of trips lost to this area and the value of each trip. The number of lost trips has been estimated by Tonto NF recreation staff and is presented above in Exhibit 10-1. The welfare value of fishing and hunting trips is based on relevant studies from the economic valuation literature, illustrated in Exhibits 10-2 and 10-3, respectively. Based on these studies, the analysis utilizes a value of $26 per day for fishing, and $41 per day for hunting (2004 dollars).

Exhibit 10-2

SUMMARY OF FISHING WELFARE VALUES

Author (date)	Study Location	Species Valued	Value (2004$)*
Roach (1996)	California	Catfish, Black Bass	$25.29 per trip
Hay (1988)	Arizona	Bass	$26.10 per day
Vaughan and Russell (1982)	National	Catfish	$26.96 per day
* Welfare values are adjusted to current dollars using the GDP Deflator, Budget of the United States Government, Fiscal Year 2005, Historical Tables			

Exhibit 10-3

SUMMARY OF WATERFOWL HUNTING WELFARE VALUES

Author (date)	Study Location	Value (2004$)*
Cooper and Loomis (1993)	California	$34.37 per trip
Hay (1988)	Pacific Flyway (South, includes AZ, CA, NV, UT)	$47.60 per trip
* Welfare values are adjusted to current dollars using the GDP Deflator, Budget of the United States Government, Fiscal Year 2005, Historical Tables.		

615. Based on the welfare values and the number of days of fishing and hunting lost due to the closures for the flycatcher, welfare losses are estimated to total $132,300 (2004 dollars) annually since 1998 as shown in Exhibit 10-4. This equates to a total past economic efficiency effect of $793,800 since 1998 and a potential future impact of $1.4 million (2004 assuming a seven percent discount rate over 20 years).

Exhibit 10-4

ECONOMIC EFFICIENCY LOST DUE TO FLYCATCHER CLOSURES AT TONTO NF

	Total Lost Days	Value per Day (Nominal)	Annual Welfare Loss (Nominal)
Fishing	2,250	$26	$58,500
Hunting	1,800	$41	$73,800
Annual Welfare Loss			**$132,300**
Total Welfare Loss over 20 Years @ 7% (2004$)			**$1,500,000**
Total Welfare Loss over 20 Years @3% (2004$)			**$1,895,000**

Distributional Effects

616. Distributional effects, also referred to as regional economic impacts, may result from the loss of fishing and hunting at Roosevelt Lake associated with the closure of two areas to motorized vehicle use.[435] These regional economic impacts are expressed in terms of changes in revenues, local employment, and tax receipts. Direct impacts are felt primarily in the tourism-related sectors of the local economy, while secondary impacts, resulting from the loss of circulation of spending through the local economy, is felt in a broader range of sectors.

617. A study funded by Arizona Game and Fish Department provides 2001 data on the economic impacts of hunting and fishing in Arizona at the county level. This study indicates that there are 488,884 angler and hunter days in Gila County in 2001. For Gila County, average expenditures (adjusted to 2004 dollars) for an angler day are approximately $87, while average expenditures for a hunting day are $72. Given the estimate of 2,250 angler days and 1,800 hunting days lost to the region, this results in a direct economic loss to the area of approximately $325,000 (2004 dollars). This loss in direct spending flowing through the economy results in total impacts of approximately $386,000 in lost sales, six jobs, $62,000 in salaries and wages, and $15,000 in state taxes (Exhibit 10-5).[436]

Exhibit 10-5

SUMMARY OF REGIONAL ECONOMIC IMPACTS DUE TO FLYCATCHER CLOSURES AT TONTO NF (2004$)

Total Sales	Jobs	Salaries & Wages	State Tax Revenues
$386,270	6.3	$61,902	$14,857

Source: IEc analysis and Silberman, J. The Economic Importance of Fishing and Hunting, Economic data on fishing and hunting for the State of Arizona and for each Arizona County, accessed at http://www.gf.state.az.us/w_c/survey_results.shtml.

10.2 Impacts to Fire Management Activities

618. Various agencies and private parties may conduct fire management activities within the proposed CHD. This section is divided into two parts. First, a background discussion on the potential for flycatcher conservation activities to result in a decrease in the effectiveness of actions taken to reduce the risk of catastrophic fire to surrounding communities is presented. Second, Wildland-Urban Interface (WUI) data and information from public comments are utilized to identify areas within the proposed CHD where fire management activities are most likely to occur.

[435] It is important to note that distributional effects are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.
[436] Silberman, J. The Economic Importance of Fishing and Hunting, Economic data on fishing and hunting for the State of Arizona and for each Arizona County, accessed at http://www.gf.state.az.us/w_c/survey_results.shtml.

10.2.1 Flycatcher Conservation Activities and Fire Management

619. The Recovery Plan discusses that historically, fire was probably uncommon in flycatcher habitat. However, fire in some riparian zones (primarily low and mid-elevation areas) has increased as a result of flood suppression, dewatering of rivers, and other manmade effects. These changes to the environment have led to the proliferation of more flammable exotic vegetation such as tamarisk, giant reed, and red brome. Ignition sources have also increased due to greater use of riparian areas from recreation and urbanization.

620. The Recovery Plan includes suggested actions for reducing and eliminating the risk and impacts of fire in flycatcher potential breeding habitat. The Plan recommends developing fire risk and management plans and suppression of fires if they occur. It also recommends pro-active management to limit the occurrence and/or extent of fires by developing dry and wet fire breaks, limiting ignition sources, increasing education or fire hazards, and improving riparian habitat conditions (moisture, water flow, habitat restoration, etc.). However, due to the highly flammable nature of tamarisk, controlled burns in this habitat are not recommended, though further research is requested. One public commenter points out that there is some inherent conflict between tamarisk removal efforts and the flycatcher's use of this species as habitat.[437]

621. Although fire management efforts are widespread, past impacts on fire management activities due to flycatcher conservation efforts have been limited in proposed CHD areas. The only past consultations related to fire management activities were related to emergency suppression efforts on Federal lands managed by BLM. As emergency consultations are conducted after the fact, no project modifications were associated with these past consultations. A review of programmatic biological opinions addressing USFS forest management, and discussions with various agencies indicates that flycatcher conservation activities required for fire management activities, include:

- Timing restrictions to avoid doing fuel treatments (i.e., prescribed burns, fuel breaks) during the flycatcher breeding season.

- Avoidance of occupied habitat as dip spot for fire suppression activities unless risk to life or property exists.[438]

- Avoidance of activities within a certain buffer zone (1/4 mile, ½ mile or more if needed to protect nesting birds from disturbance) around known nest sites or unsurveyed suitable habitat.

- Restricting treatment of riparian areas with potential or suitable flycatcher habitat.

[437] Public comments of Kenneth Albright, Southern Nevada Water Authority, May 31, 2005.
[438] Personal communication with Deanna Williams, Carson NF, August 24, 2004.

10.2.2 Future Economics Impacts on Fire Management

622. In areas that are in relatively close proximity to large urban populations, fire management, including exotic species removal and fuels management, is a critical component of urban planning efforts. Thus, proposed flycatcher CHD in areas proximate to urban areas has raised concerns with local officials in several locations about ongoing and future plans for these activities, particularly exotic species removal (particularly, tamarisk control).

Middle Rio Grande MU

623. Several public comments express concerns that conservation efforts for the flycatcher could affect ongoing exotic species removal and fuel reduction efforts along the designated stretch of the Middle Rio Grande, and particularly with regard to the Rio Grande Valley State Park that is located close to Albuquerque, New Mexico.[439] The comments note that several of the primary constituent elements include the word "dense" when describing vegetation, and raise concerns that such vegetation may increase fire risk. The comments highlight two recent bosque fires in 2003 that forced extensive evacuation of adjacent residential areas, as well as other recent fires that have occurred outside of the park along the Rio Grande. The comments report that 13,535 structures have been identified as being at risk within a portion of the Rio Grande corridor.[440]

624. Several informal consultations have occurred with USACE regarding fuel treatments on the Middle Rio Grande, and the Service has conducted several technical assistance efforts with the City of Albuquerque regarding fuel treatments. In most cases, the Service has determined that activities would not affect flycatcher habitat. In one case, the USACE delayed implementation of the project until the end of the nesting season.[441] Public comments on fire management issues in these areas raise concerns that future time delays and regulatory uncertainty will result from conservation efforts for the flycatcher.[442]

Upper Gila MU

625. Public comments submitted on behalf of the City of Safford, Arizona, express concern that activities including salt cedar control, pest and insect control, and fire suppression could be restricted or delayed to accommodate flycatcher concerns in proposed

[439] Public comments of Mark S. Sanchez, Albuquerque Bernalillo County Water Utility Authority, " Albuquerque Bernalillo County Water Utility Authority comments on FWS designation of critical habitat for the SWWF", May 23, 2005; Public Comments of Mayor Martin Chavez, City of Albuquerque, on Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher, May 31, 2005.

[440] F. Lee Brown, "Economic Review : 1) Final Draft Economic Analysis of Critical Habitat Designation for the Southwestern willow flycatcher; 2) Designation of Critical Habitat for the Southwestern Willow Flycatcher: Draft Environmental Assessment as prepared for the U.S. Fish and Wildlife Service," May 23, 2005, submitted as Appendix A.1 to Public comments of Mark S. Sanchez, Albuquerque Bernalillo County Water Utility Authority, " Albuquerque Bernalillo County Water Utility Authority comments on FWS designation of critical habitat for the SWWF", May 26, 2005.

[441] Personal communication, Service, Albuquerque Ecological Services Office, February 14, 2005.

[442] F. Lee Brown, May 23, 2005, as referenced above.

CHD areas.[443] Another public comment cited community safety concerns for non-Tribal areas of Graham County where several areas of moderate and high fire risk are located.[444]

Other Areas

626. For Southern California NFs (including San Bernardino and Cleveland NFs), USFS Region 5 indicates that USFS has proposed "to not conduct prescribed burns within a ¼ mile of listed riparian bird nests sites, when occupied."[445]

627. USBR reports that frequent fire activity does occur in the riparian zone along the Lower Colorado River. Over the past five years, approximately 10 to 15 flycatcher survey sites have burned.[446] Fire management activities are among the activities discussed in the Lower Colorado Multi-Species Conservation Plan.

Wildlife-Urban-Interface Areas within Proposed CHD

628. In flycatcher habitat areas, and in many areas across the U.S., the Department of Agriculture and the Department of the Interior are jointly implementing what is known as the "National Fire Plan," which grew out of a report to the President called *Managing the Impacts of Wildfire on Communities and the Environment: A report to the President in Response to the Wildfires of 2000.* The National Fire Plan calls for a substantial increase in the number of forested acres treated annually to reduce hazardous fuels. Under the plan, Wildland-Urban Interface (WUI) areas are defined by each agency "where human life, property, and natural resources are in imminent danger from catastrophic wildfire."[447] WUI are areas where houses meet or intermingle with undeveloped wildland vegetation. This makes the WUI a focal area for human-environment conflicts such as wildland fires.[448]

[443] Public comments of Jeffrey C. Zimmerman on behalf of the City of Safford, Arizona, "City of Safford, Arizona/Comments on Proposed Designation of Critical Habitat for the Southwest[sic] willow flycatcher published in the Federal Register on October 12, 2004", Moyes Story Law Offices, May 31, 2005.
[444] Public comments of Mark Herrington, Eastern Arizona Counties Organization, "Comments: Proposed SW Willow Flycatcher Critical Habitat Documents," July 18, 2005.
[445] USFWS 2001. Biological and Conference Opinions on the Continued Implementation of Land and Resource Management Plans for the Four Southern California National Forests, as Modified by New Interim Management Direction and Conservation Measures (1-6-00-F-773.2). February 27, 2001.
[446] USBR, "Comments on the Draft Environmental Assessment and the Draft Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Southwestern Willow Flycatcher (*Empidonax trailli extimus*), Lower Colorado Region Office, May 31, 2005.
[447] USFS 2001. Biological Opinion on the AUSFS Proposed Wildland/Urban Interface (WUI) Fuel treatments in New Mexico and Arizona and their effects on listed and proposed species in accordance with section 7 of the Endangered Species Act, Service, April 2001.
[448] "The Wildland-Urban Interface," University of Wisconsin, Department of Forest Ecology & Management, Spatial analysis for conservation and sustainability (SILVIS) Lab, Online at: http://silvis.forest.wisc.edu/projects/WUI_Main.asp, Accessed on: November 30, 2004.

629. This analysis relies on data developed by the University of Wisconsin that integrates U.S. Census and USGS National Land Cover Data to map WUI areas according to the Federal Register definition of WUI (Federal Register 66:751, 2001).[449] WUI areas are composed of both "interface" and "intermix" communities. In both communities, housing must meet or exceed a minimum density of one structure per 40 acres. Intermix communities are places where housing and vegetation intermingle. Intermix areas are characterized by continuous wildland vegetation and more than 50 percent vegetation. Interface communities are areas with housing in the "vicinity" of contiguous vegetation, that is, areas with less than 50 percent vegetation but within 1.5 miles of an area over 1,325 acres (500 ha) that is more than 75 percent vegetated. The California Fire Alliance defines "vicinity" as all areas within 1.5 miles of wildland vegetation, roughly the distance that firebrands can be carried from a wildland fire to the roof of a house. Including interface communities captures the those homes that are at risk of being burned in a wildland fire, regardless of whether or not the homes sit within the forest area.

630. Based on an analysis of the WUI data, overlap of the proposed CHD with WUI areas is limited. Approximately 26,000 acres of WUI areas fall within the proposed CHD across 36 counties. Of this, seven counties account for the majority, 74 percent, of the total acres. As shown in Exhibit 10-6, approximately 107,000 acres have been proposed as flycatcher CHD in those seven counties. In total, seven percent of the total number of proposed CHD acres overlaps with WUI areas. The number of acres that overlap WUI areas is presented by Management Unit in Exhibit 10-7.

[449] "The Wildland-Urban Interface," University of Wisconsin, Department of Forest Ecology & Management, Spatial analysis for conservation and sustainability (SILVIS) Lab, Online at: http://silvis.forest.wisc.edu/projects/WUI_Main.asp, Accessed on: November 30, 2004.

Exhibit 10-6

WILDLAND URBAN INTERFACE AREAS IN PROPOSED CHD (HIGHLIGHTING COUNTIES WITH LARGEST WUI OVERLAP)

State	County	CHD (Acres)	Overlap with WUI (Acres)	Overlap as a Percent Of CHD Acres In County
CA	San Diego	14,631	3,731	25%
AZ	Pinal	20,206	3,385	17%
AZ	Yavapai	7,317	3,256	44%
AZ	Gila	32,169	2,964	9%
NM	Rio Arriba	4,383	2,179	50%
UT	Washington	2,977	1,995	67%
CA	San Bernardino	25,012	1,827	7%
Various	Various	269,308	6,664	2%
	TOTAL:	**376,000**	**26,000**	**7%**

Note: Counties not included in this table contain 6,792 acres of WUI area that overlaps with proposed CHD.
Source: University of Wisconsin, Department of Forest Ecology & Management, Spatial analysis for conservation and sustainability (SILVIS) Lab, Online at: http://silvis.forest.wisc.edu/projects/WUI_Main.asp

631. In several locations within the proposed CHD areas, fire management activities are limited due to the relative remoteness of flycatcher habitat and the location of flycatcher habitat within the riparian zone. This is further illustrated in several documents used by Action agencies in managing Federal lands:

- The Grand Canyon NP Fire Management Plan indicates that no wildland fire use activities are planned in or near flycatcher habitat.[450]

- The Draft Biological Assessment of the USFS Region 3 Resource Management Plans indicates that "Prescribed fires in the Region average vary [sic] from NF to NF (Table 7); it is not known how many of these, if any are conducted in riparian areas but most, if not all, are probably in upland areas….Direct reduction of fuel loads in wild land-urban interface areas have occurred (Figure 8) but treatments in riparian areas are limited."[451]

[450] U.S. Fish and Wildlife Service, Phoenix Office. Formal Consultation #02-21-01-F-0118. Memorandum re: Biological Opinion for the Grand Canyon National Park Fire Use Program, dated June 11, 2003.
[451] USFS 2003. Biological Opinion on the Draft Biological Assessment of 11 Land & Resource Management Plans, USDA Forest Service Southwestern Region. Submitted to the U.S. Fish and Wildlife Service in November 2003.

- The USFS Region 3 WUI Biological Assessment states that, for USFS lands, "treatments are unlikely to occur in flycatcher habitat, as these areas area generally fairly wet and are not considered a fire risk."[452]

632. As part of the National Fire Plan effort, Action Agencies published new regulations for implementing section 7 consultation requirements in December 2003. These regulations provide an alternative process that "eliminates the need to conduct informal consultation and eliminates the need to provide written concurrence from the Service for those National Fire Plan actions that the Action Agency determines are "not likely to adversely affect (NLAA) any listed species or its designated critical habitat." Thus, future informal consultation efforts on fire management activities are expected to be streamlined.[453]

633. In areas where fire management activity is planned within proposed CHD areas, impacts to fire management activities are unknown. Expected impacts include administrative costs related to consultation on fire management plans, suppression activities and any future treatment activity, and some future surveying and monitoring efforts. Costs related to these impacts are estimated in other sections. The number of acres of WUI by management unit highlight areas within proposed CHD where impacts on fire management are most likely to occur.

10.3 Impacts to Exotic Species Management and Removal

634. The Recovery Plan for the flycatcher identifies three plant groups that may negatively affect the habitat for flycatcher: tamarisk/saltcedar (*Tamarix ramosissima* and closely related species), Russian olive (*Elaeagnus angustifolia*), and giant reed (*Arundo donax*). One complexity is that flycatchers sometimes nest in invasive tree species. For example, the Recovery Plan notes that "Southwestern willow flycatcher have been reported to nest in tamarisk at sites along the Colorado, Verde, Gila, San Pedro, Salt, Santa Maria, and Big Sandy Rivers in Arizona, Tonto Creek in Arizona, the Rio Grande in New Mexico, and the San Dieguito River in California. Along the Lower Colorado River and immediate tributaries, about 40% of the flycatcher nests were in tamarisk in 1998. In Arizona in 1998, three-quarters (194 of 250) of the flycatcher nests were in tamarisk" (citations omitted).[454]

635. Numerous salt cedar removal projects have been undertaken in the proposed CHD by Tribes and Action agencies, including the Service, BLM, BIA, USBR, and USACE. In practice, impacts on exotic/invasive species removal projects due to flycatcher conservation have included both administrative costs related to consulting or otherwise meeting with the Service about a planned activity, in addition to project modifications that result. The Recovery Plan recommends "… clear small parcels of habitat. Do not attempt to clear large areas at a time. We propose a guideline of clearing/restoring no more than 5% of the exotic-

[452] USFS 2001. Biological Opinion on the USFS Proposed Wildland/Urban Interface (WUI) Fuel treatments in New Mexico and Arizona and their effects on listed and proposed species in accordance with section 7 of the Endangered Species Act, Service, April 2001.
[453] "Joint Counterpart Endangered Species Act Section 7 Consultation Regulations," 68 FR No 235, p. 68254, December 8, 2003.
[454] Recovery Plan, Service, 2002. Appendix H.

dominated area per year, followed by a waiting period of 5 years to determine the success of the restoration project….If the site is occupied, make sure that the areas targeted for clearing do not have any endangered species nest sites, and are at least 100 m away from the closest nest site. Clearing and earthmoving should be timed to avoid the breeding season of the flycatcher and other sensitive species (e.g., late March-September)."[455]

636. In the past, agencies undertaking vegetation removal efforts have been able to identify alternative areas to clear where flycatchers are not an issue; thus, the net impact has been limited to surveying costs and delays as alternative sites were identified and planning efforts completed. Costs related to additional surveying efforts have been included in estimates presented in Section 10.4.1. Impacts on these types of projects generally involve minimal costs associated with planning efforts to reschedule the activity. In particular:

- Section 4 describes the ongoing cooperative effort in the Middle Rio Grande known as the Middle Rio Grande Endangered Species Act Collaborative Program. In addition to this effort, the Middle Rio Grande Bosque Initiative is an ongoing, congressionally supported effort related to the restoration and management of the Middle Rio Grande. In addition, the USACE has an ongoing revitalization project that will create a 20-mile park along the Middle Rio Grande. There has been some concern that critical habitat designation for the flycatcher may hinder the efforts of these programs.[456] Effects to actions planned by these programs to date has been similar to those experienced by other saltcedar removal and vegetation management projects, primarily including avoiding removal of vegetation during flycatcher breeding season.[457]

- At Imperial NWR, minimal administrative costs of consulting for fire management projects have been incurred, such as the burning of salt cedar habitat.[458]

- Delays in efforts to remove salt cedar and Russian olive at Pahranagat NWR because of the need to conduct flycatcher surveys have occurred.[459]

- Wetland enhancement projects have avoided occupied flycatcher areas in Overton Wildlife Management Area, which is run by the Nevada Department of Wildlife (NDOW). NDOW states that this has only a minor impact to their management actions, as they just choose an alternative location.[460]

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[455] *Ibid.*
[456] "Domenici: Delay protection of bird: He says habitat drains bosque." Albuquerque Tribune, March 2, 2005. Accessed at http://www.abqtrib.com/albq/news/article/0,2564,ALBQ_19855_3588411,00.html on March 3, 2005.
[457] Personal communication with Service, Middle Rio Grande Bosque Initiative, Albuquerque Ecological Services Office, on April 1, 2005.
[458] Personal communication with Sky Wagner, Biologist, Imperial National Wildlife Refuge, September 28, 2004.
[459] Personal communication with Jim Doctor, Pahranagat National Wildlife Refuge, September 14, 2004.
[460] Personal communication with Chris Tomlinson, Nevada State Department of Wildlife, September 14, 2004.

10.4 Impacts to Other Federal Land Management Activities

10.4.1 Surveying and Monitoring

637. Various agencies conduct flycatcher surveying and monitoring. Surveying and monitoring may be conducted under existing biological opinions or as part of ongoing conservation activities by an agency. Surveying efforts funded by USBR under its various biological opinions are included in Section 4. Likewise, costs incurred by Tribes related to surveying efforts are included in Section 7. This section summarizes the remaining costs of surveying and monitoring by Recovery Unit.

Exhibit 10-7

FUTURE COSTS OF FLYCATCHER SURVEYING AND MONITORING EFFORTS (EXCLUDING WATER MGT AND TRIBES), 2004-2023[1]

Recovery Unit	Management Unit	Funding Agency/Organization	Total Past Costs (2004$)	Total Future Costs (2004$, 7% discount rate)
Coastal California	Santa Ana	San Bernadino NF	$8,000	$23,000
	San Diego	Cleveland NF	$145,000	$227,000
Lower Colorado	Little Colorado	USFS, Rocky Mountain Research Station, Phelps Dodge, Air Force	$507,000	$680,000
	Virgin	BLM Utah	$16,000	$228,000
	Middle Colorado	Grand Canyon NP	Minimal	Minimal
	Pahranagat	FWS (Conducted by NV Department of Wildlife)	$62,000	$227,000
	Bill Williams	AZGFD	$49,000	Funding unknown
Gila	Verde	Coconino NF	$22,000	$23,000
Rio Grande	Upper Rio Grande	Carson NF	$4,000	$8,000
Multiple Units		AZGFD	$71,000	$82,000
Total Costs[2]			**$883,000**	**$1,496,000**
Total Future Costs discounted at 3%				**$1,954,000**

Notes:
[1] This does not represent a complete account of all costs related to surveying and monitoring. A large portion of surveying efforts are funded by USBR or USACE under various biological opinions and these costs are included in Section 4. Likewise, costs incurred by Tribes related to surveying efforts are included in Section 7.
[2] Totals may not sum due to rounding.

10.4.2 Resource Management Plans and Other Federal Lands Management Activities

638. Thirteen formal section 7 consultations by the USFS and BLM have been related to land use and resource management plans. Each of these consultations has considered impacts to the flycatcher. Various agencies have also consulted individually for the flycatcher on various Federal land management activities, including: exotic species management, habitat restoration, pesticide use, road repairs, mining and land exchange activities. There have been less than ten formal consultations related to these activities in the past. Conservation recommendations for the flycatcher have included a variety of measures.

- Avoid land-altering projects during the flycatcher breeding season;
- Preparation of flycatcher management plan until Recovery Plan is published;
- Mapping, surveying and monitoring flycatcher habitat;
- Grazing restrictions and cowbird control efforts;
- Create Fire management plan (AZ Strip);
- Monitoring grazing impacts on habitat;
- Salt cedar removal, replanting willow and cottonwood habitat; and
- Recreation limits in occupied territory

639. Project modifications have primarily been related to timing restrictions to avoid flycatcher breeding season. Timing restrictions can be related to the time required to carry out surveys, or to requirements to avoid activities during flycatcher migration and nesting season (April through September). As an example, when surveys identify nesting birds, vegetation removal or pesticide application may be prohibited in that area during the flycatcher breeding season. The costs associated with project modifications included as reasonable and prudent measures in the Resource Management Plan biological opinions have all been addressed in other sections of this report. For example, surveying costs are included in Section 10.4.1, impacts to recreation are discussed in Section 10.1, and grazing impacts are detailed in Section 5.

10.5 Impacts to Military Activities

640. Two military installations in California fall within the proposed CHD: both are located on Camp Pendleton in the San Diego Management Unit. Impacts to past activities occurring on these military lands resulting from flycatcher conservation activities are discussed below. *Note that this analysis does not attempt to quantify the impact to military readiness that may result from flycatcher conservation activities.* Information regarding potential impacts to future military activities resulting from flycatcher conservation was not available for inclusion in this draft economic analysis; it is anticipated that the final economic analysis will incorporate comments and additional information regarding impacts on affected military installations, as available.

10.5.1 Coastal California Recovery Unit

San Diego Management Unit

641. Camp Pendleton falls within this Management Unit and includes a Marine Corps Base and the Fallbrook Naval Weapons Station.

Marine Corps Base at Camp Pendleton

642. In 1995, the Service completed a biological opinion on Programmatic Activities and Conservation Plans in Riparian and Estuarine/Beach Ecosystems on Marine Corps Base, Camp Pendleton (MCBCP). This biological opinion requires additional consultation for any project that may affect the flycatcher. Since 1995 an additional 13 Biological Opinions have been completed as amendments to the 1995 biological opinion addressing a variety of activities; however, none of these 13 opinions have addressed the flycatcher. In addition, MCBCP has developed an Integrated Natural Resource Management Plan (INRMP). The Service determined that activities covered in the INRMP did not require additional consultation because of the 1995 biological opinion, which covers all activities likely to adversely affect the flycatcher.[461]

643. MSBCP has undertaken surveying and monitoring for the flycatcher since the late 1990s. For activities occurring in flycatcher habitat, MSBCP attempts to conduct projects outside of flycatcher breeding season in order to avoid impacting the flycatcher. In addition, MSBCP has undertaken habitat restoration projects for benefit of all riparian species.[462]

Fallbrook Naval Weapons Station

644. Fallbrook NWS is working cooperatively with the Service to develop an INRMP that will address conservation needs for the flycatcher. Fallbrook NWS does not currently have any breeding flycatcher on its lands. Currently, Fallbrook does not conduct specific surveys for the flycatcher; however, surveys conducted by MSBCP cover the Santa Margarita River that borders both MSBCP and Fallbrook.[463]

645. Fallbrook recently underwent consultation for its fire management plan. This included informal consultation for the flycatcher, which the Service agreed was not likely to adversely affect. The Service believes measures to offset, avoid or minimize affects to the Least Bell's vireo, as described in the Service's Biological Opinion on the Fallbrook Fire Management Plan, are also adequate to avoid effects on transient flycatchers. If the proposed CHD were in place, this Fallbrook would likely need to reinitiate this consultation.

[461] Personal communication with Service personnel, Carlsbad Field Office, September 14, 2004.
[462] *Ibid.*
[463] *Ibid.*

10.6 Summary of Impacts to Other Activities

646. This section is divided into three parts and provides a summary of all activities addressed in this chapter. The first two parts provide a summary of the past and future monetized impacts to recreation activities (Section 10.1) and the costs of survey and monitoring (Section 10.3.1), discussed in previous sections. The final part provides a summary of impacts on activities that could not be monetized, including fire management activities and military activities.

10.6.1 Past Impacts

647. Past efficiency impacts related to other activities result from project modifications to recreation activities (Section 10.1) and costs of surveying and monitoring (Section 10.3.1). As shown in Exhibit 10-8, the total costs to other activities of flycatcher conservation activities is approximately $1.8 million (2004 dollars).

648. In addition, as described in Section 10.1, lost recreational activity has also resulted in regional economic impacts. Given the estimate of 2,250 angler days and 1,800 hunting days lost to the region annually since 1998, this results in a direct economic loss to the area of approximately $325,000 (2004 dollars). This loss in direct spending flowing through the economy results in total impacts of approximately $386,000 in lost sales, six jobs, $62,000 in salaries and wages, and $15,000 in state taxes.

Exhibit 10-8

PAST IMPACTS OF FLYCATCHER CONSERVATION ACTIVITIES ON FEDERAL LANDS ACTIVITIES, INCLUDING RECREATION AND SURVEY AND MONITORING EFFORTS

Recovery Unit	Management Unit	Total Past Costs (2004$)
Coastal California	Santa Ana	$20,000
	San Diego	$146,000
Basin and Mojave	Kern	$97,000
Lower Colorado	Little Colorado	$507,000
	Virgin	$16,000
	Pahranagat	$62,000
	Bill Williams	$49,000
Gila	Verde	$22,000
	Roosevelt	$794,000
Rio Grande	Upper Rio Grande	$4,000
Multiple Management Units		$71,000
	TOTAL*	**$1,788,000**

* Totals may not sum due to rounding.

10.6.2 Future Impacts

649. In the future, efficiency impacts are expected to result from project modifications to recreation activities and costs of surveying and monitoring. As shown in Exhibit 10-9, the total future costs to other activities of flycatcher conservation activities is approximately $3.2 million (2004 dollars assuming a seven percent discount rate).

Exhibit 10-9

SUMMARY OF FUTURE IMPACTS OF FLYCATCHER CONSERVATION ACTIVITIES ON FEDERAL LANDS ACTIVITIES, INCLUDING RECREATION AND SURVEY AND MONITORING EFFORTS, 2004-2023

		Present Value of Total Costs (2004$)		Annual Costs (2004$)	
Recovery Unit	**Management Unit**	**Using 7% Discount Rate**	**Using 3% Discount Rate**	**Using 7% Discount Rate**	**Using 3% Discount Rate**
Coastal California	Santa Ana	$57,000	$77,000	$5,000	$5,000
	San Diego	$227,000	$306,000	$21,000	$15,000
Basin and Mojave	Kern	$153,000	$202,000	$14,000	$14,000
Lower Colorado	Little Colorado	$680,000	$919,000	$64,000	$46,000
	Virgin	$228,000	$240,000	$21,000	$12,000
	Pahranagat	$227,000	$306,000	$21,000	$15,000
Gila	Verde	$23,000	$31,000	$2,000	$2,000
	Roosevelt	$1,500,000	$2,027,000	$142,000	$136,000
Rio Grande	Upper Rio Grande	$8,000	$11,000	$1,000	$1,000
Multiple Management Units		$82,000	$110,000	$8,000	$6,000
	TOTAL*	**$3,184,000**	**$4,229,000**	**$299,000**	**$252,000**

* Totals may not sum due to rounding.

650. In addition, as described in Section 10.1, lost recreational activity is also expected to continue to result in regional economic impacts due to closures in the Tonto NF. Given the estimate of 2,250 angler days and 1,800 hunting days lost to the region annually, direct economic loss to the local area of approximately $325,000 (2004 dollars) is expected. This loss in turn results in total annual impacts of approximately $386,000 in lost sales, six jobs, $62,000 in salaries and wages, and $15,000 in state taxes.

10.6.3 Non-Monetized Impacts

651. Exhibit 10-10 summarizes the impacts on activities that could not be monetized. Specifically, 26,127 WUI acres are included in the proposed CHD, the majority of which lies in the San Diego, Virgin, Verde, Roosevelt, Middle Gila/San Pedro, and Upper Rio Grande Management Units. In addition, two military installations located on Camp Pendleton in the San Diego Management Unit are included in the proposed CHD. As noted previously, this analysis does not attempt to quantify the impact to military readiness that may result from flycatcher conservation activities.

Exhibit 10-10

NON-MONETIZED FUTURE IMPACTS OF FLYCATCHER CONSERVATION ACTIVITIES, 2004-2023

Recovery Unit	Management Unit	Activity	
		Fire Management (WUI acres)*	**Military**
Coastal California	Santa Ynez	418	
	Santa Ana	1,437	• Marine Corps Base at Camp Pendleton • Fallbrook Naval Weapons Station
	San Diego	3,735	
Basin and Mojave	Owens	2	
	Mohave	471	
Lower Colorado	Little Colorado	61	
	Virgin	2,794	
	Pahranagat	35	
	Bill Williams	37	
	Hoover to Parker	624	
	Parker to Southerly International	747	
Gila	Verde	3,256	
	Roosevelt	2,603	
	Middle Gila/San Pedro	3,399	
	Upper Gila	1,431	
Rio Grande	San Luis Valley	1,309	
	Upper Rio Grande	2,680	
	Middle Rio Grande	1,089	
	TOTAL:	**26,127**	

* Based on an analysis of GIS data for WUI areas provided by the University of Wisconsin, Department of Forest Ecology & Management, Spatial analysis for conservation and sustainability (SILVIS) Lab, Online at: http://silvis.forest.wisc.edu/projects/WUI_Main.asp

10.7 Caveats to Economic Analysis of Impacts on the Other Activities

652. Exhibit 10-11 summarizes the key assumptions of the analysis of economic impacts on the other activities, as well as the potential direction and relative scale of bias introduced by these assumptions.

Exhibit 10-11

CAVEATS TO THE ECONOMIC ANALYSIS OF OTHER ACTIVITIES

Key Assumption	Effect on Impact Estimate
In the Tonto NF, only a portion of the total number of fisherman and hunters are assumed to continue to fishing and hunting activities at alternative sites within the Roosevelt Lake area.	+/-
The IMPLAN model used to estimate regional economic impacts is a static model and does not account for the fact that the economy will adjust. IMPLAN measures the effects of a specific policy change at one point in time. Over the long-run, the economic losses predicted by the model may be overstated as adjustments such as re-employment of displaced employees occurs.	+
The IMPLAN model used to estimate regional economic impacts relies on 1998 data. If significant changes have occurred in the structure of the affected counties economies, the results may be sensitive to this assumption. The direction of any bias is unknown.	+/-
Potential impacts to future actions on military lands resulting from flycatcher conservation activities are not included in this analysis.	-

- : This assumption may result in an underestimate of real costs.
+ : This assumption may result in an overestimate of real costs.
+/- : This assumption has an unknown effect on the magnitude of cost estimates.

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5 U.S.C. 601 et seq.

16 U.S.C. §1533(b)(2)

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APPENDIX A: SMALL BUSINESS

653. This Appendix considers the extent to which the analytic results presented in the previous sections reflect potential future impacts to small businesses. The small business analysis presented in this Appendix is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) in 1996. Information was gathered from the Small Business Administration, U.S. Census Bureau, and U.S. Department of Agriculture.

654. This Appendix presents data on the number of affected small entities in each industry and the magnitude of the impact of flycatcher conservation efforts. For each industry, the number of small entities affected and potential economic impact on those small entities is estimated. Additional detail has been provided in this draft in response to public comments. Affected industries include dam operations and water supply activities, and by extension, crop agriculture, ranching activities, residential development, and businesses affected by changes to recreational use.

655. Exhibit A-1 provides the Small Business Administration size standards for affected industries and the affected geographic region examined in this Appendix. The remainder of this section addresses the potential impacts to each of the affected activities that may involve small entities.

Exhibit A-1

SMALL BUSINESS SIZE STANDARDS FOR ACTIVITIES WITH SMALL BUSINESS IMPACTS AND AFFECTED REGIONS

NAICS Code/Industry	Size Standard	Affected Region
Water Management		
22131: Water Supply and Irrigation Systems	$6 million average annual receipts or 50,000 customers	Most counties containing proposed CHD
22111: Hydroelectric Power Generation	4 million megawatt hours for the preceding fiscal year	Phoenix area, Lower Colorado region
NAICS 1111: Oil Seed and Grain Farming	$750,000	Many counties containing proposed CHD
NAICS 1112: Vegetable and Melon Farming	$750,000	Many counties containing proposed CHD
NAICS 1113: Fruit and Tree Nut Farming	$750,000	Several counties containing proposed CHD
Livestock Grazing		
112111: Beef Cattle Ranching and Farming	$750,000	All counties containing proposed CHD

Exhibit A-1

SMALL BUSINESS SIZE STANDARDS FOR ACTIVITIES WITH SMALL BUSINESS IMPACTS AND AFFECTED REGIONS

NAICS Code/Industry	Size Standard	Affected Region
Land Development		
237210: Land Subdivision	500 employees	Santa Barbara, San Diego, San Bernardino Counties, California
Recreation		
Food and Beverage Stores		Gila County, Arizona
44511: Supermarkets and Other Grocery (Except Convenience) Stores	$23,000,000	
44512: Convenience Stores	$23,000,000	
44529: Other Specialty Food Stores	$6,000,000	
44531: Beer, Wine and Liquor Stores	$6,000,000	
Food Service and Drinking Places		
72211: Full-Service Restaurants	$6,000,000	
72221: Limited Service Eating Places	$6,000,000	
72241: Drinking Places	$6,000,000	
Accommodations		
7211: Traveler Accommodation	$6,000,000	
7212: Recreational Vehicle Parks and Recreational Camps	$6,000,000	
Transportation		
44131: Automotive Parts and Accessories Stores	$6,000,000	
44132: Tire Dealers	$6,000,000	
447190: Service Stations, Gasoline	$7,500,000	
Source: SBA's Table of Small Business Size Standards based on NAICS 2002 (http://www.sba.gov/size/indextableofsize.html), IEc analysis.		

A.1 Small Business Impacts on Dam Operations and Water Supply Activities

656. Due to uncertainty regarding the potential future costs of flycatcher conservation efforts on dam operations and water supply activities, Section 4 presents two scenarios. Under the first scenario, water management would not be anticipated to change as a result of actions to protect the flycatcher. Most impacts under this scenario would be borne by large-scale water control facilities and operators and state and Federal agencies. Thus, impacts on small entities are not anticipated under this scenario. The second scenario assumes that flycatcher conservation activities require water operators to change baseline management regimes to avoid adverse effects on flycatcher habitat. Specifically, this analysis assumes that reservoir pool elevations will be limited to current levels in order to avoid take of flycatcher habitat. The result is a loss of water from beneficial use. Under this scenario, both the large-scale water operations and the water users that hold rights to water at these

facilities could be affected. In addition, impacts to end users, including municipalities and crop farmers, could occur.

657. In addition to impacts that result from changes to water operations at large-scale water facilities, several public commenters expressed concern that small-scale crop agriculture could be affected in areas for which large-scale water control facilities have not been included in the proposed CHD, e.g. water users in the Safford Valley on the Gila River, Arizona. In these areas, water users expressed concerns that groundwater and/or surface water withdrawals could need to be curtailed to accommodate flycatcher concerns. This Appendix addresses potential impacts on these users, where appropriate.

Summary of Impacts

658. Of the 17 large-scale facilities with proposed CHD in reservoir areas, eight serve a purpose as municipal and agricultural water suppliers and do not have legal restrictions specific to the flycatcher that prevent the alteration of flows to accommodate flycatcher.[464] None of the affected facilities are small entities. Approximately 54 primary water users receive deliveries from the eight facilities affected under Scenario 2, and therefore may face delivery reductions, as summarized in Exhibit A-2 and detailed in Exhibit A-3. These users are primarily water and irrigation districts as well as tribal reservations. Approximately 43 percent of these users (23 of 54) are classified as "small entities."[465] The affected small water and irrigation districts constitute two percent of the total number of water and irrigation districts in the affected counties.[466] Over eighty percent of the users affected under Scenario 2 draw water from the Lower Colorado River.[467]

659. Exhibit A-3 summarizes the estimated Scenario 2 water reductions by facility, and allocates these reductions across water users according to the proportion of annual water delivery their annual use represents. As shown, reductions of less than five percent are

[464] For example, currently there is no legal requirement for USBR to maintain water levels below flycatcher habitat at the lake created by Hoover Dam, Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation, 143 F.3d 515 (9th Cir. 1998). Service and USBR Solicitors further state that the Department of the Interior has interpreted the U.S. Supreme Court's injunction in Arizona v. California, 376 U.S. 340 (1964) as precluding the release of water from Lake Mead for the sole purpose of protecting flycatcher habitat. Congress has also enacted legislation to prohibit USBR from releasing San Juan/Chama water for flycatcher management purposes at Heron Reservoir. Comments of the Southwest Regional Solicitor's Office, December 15, 2004.

[465] Seven users for which data was not available are assumed to be small. Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers" for NAICS code 22131: Water Supply and Irrigation Systems. Small businesses were determined based on the SBA size standard reported in Exhibit A-1.

[466] *Ibid.*

[467] Any impacts on their water supply is assumed to stem from changes in management at Lake Havasu. The USBR notes that "modification of Lake Havasu is very unlikely due to the 'Law of the River.' The Arizona Department of Water Resources, which has general control and supervision over surface water in Arizona, also states: "changed operation to avoid inundating flycatcher habitat [is] not a probable scenario [at Lake Havasu]."USBR, "Comments on the Draft Environmental Assessment and the Draft Economic Analysis for the Proposed Rule to Designate Critical Habitat for the Southwestern Willow Flycatcher (*Empidonax trailli extimus*), Lower Colorado Region Office, May 31, 2005; Arizona Department of Water Resources, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher: Federal Register: October 12 ,2004 (Volume 69, Number 196)", Comments of Herbert R. Guenther, May 27, 2005.

estimated for most users. Small entities for which impacts could be greater are the San Dieguito Water District and the Santa Fe Irrigation District, where water reductions could represent 26 percent of their annual consumption of Lake Hodges water. In addition, the Rancho California Water District could face a reduction of approximately six percent of its annual use.

660. Because several affected water districts provide water for agricultural purposes, water reductions could result in corresponding reductions in irrigated crop acres, if farmers are unable to switch to less water-intensive crops or find substitute water sources. Vail Dam, Isabella Dam, Horseshoe Dam, Roosevelt Dam, and the Lower Colorado systems dams all serve a significant number of agricultural users and are projected to lose water under Scenario 2. As detailed in Exhibit A-4, estimated water losses to districts supplying agricultural end users may reduce irrigated agricultural acreage in the affected counties by up to 30,938 acres, assuming all reservoir facilities are affected simultaneously.[468] A cropland reduction of that magnitude would represent approximately 1.05 percent of total irrigated and non-irrigated cropland in the affected areas.

Exhibit A-2

SUMMARY OF IMPACTS ON WATER MANAGEMENT AND OPERATION

Metric	**Number**	**Number Small**
Water Facilities that could be affected under Scenario 2 (large-scale)	17	0
Water Facilities that could experience water delivery losses	8	0
Irrigation districts/water districts with rights to water behind affected facilities [1]	54	23
Percent of irrigation/water districts affected in region	6%	2%
Percent of water use affected at each facility under Scenario 2	<1% to 26%	<1% to 26%
Total cropland lost[2]	30,938	26,298
Percent of total area cropland	1.05%	1. 05%
Percent of Crop revenues affected [3]	0.82%	0.82%

[1] For the Lower Colorado Recovery Unit, annual water use figures are 2004 calendar year figures accessed from the U.S. Bureau of Reclamation at http://www.usbr.gov/lc/region/g4000/hourly/use04.html on September 1, 2005. Some users that are not irrigation districts or water districts are counted as affected users.
[2]Assumes that all facilities are affected simultaneously and no substitutes exist.
[3] Assumes that 85% of farms are small in the affected region. Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers."

[468] This loss of cropland was estimated by multiplying the water reduction at each dam by the proportion of dam water devoted to agriculture. The lost agricultural water was divided by the average acre-feet used annually to irrigate an acre of cropland, yielding the number of irrigated crop acres lost.

Exhibit A-3

WATER USERS POTENTIALLY AFFECTED BY FLYCATCHER UNDER SCENARIO 2*

MU	Facility Name	Estimated Water Losses -Scenario 2 (acre-feet)	Water User	Annual Water Use[1] (acre-feet)	Estimated Water Loss per User[2] (acre-feet)	Percent of Annual Water Use Affected	Small Entity?
San Diego	Lake Hodges	4,686	San Dieguito Water District	9,000	2,343	26%	Yes
			Santa Fe Irrigation District	9,000	2,343	26%	Yes
	Cuyamaca Reservoir	1,712	Helix Water District	39,956	1,712	4%	No
	Vail Dam	4,461	Rancho California Water District[4]	79,934	4,461	6%	Yes
Owens	Pleasant Valley Reservoir	2,989	Los Angeles Dept. of Water and Power[5]	616,846	2,989	0%	No
Kern	Isabella Dam	69,779	North Kern Water Storage District	109,041	16,138	15%	Yes
			Buena Vista Storage District	64,791	9,589	15%	Yes
			City of Bakersfield	118,658	17,561	15%	No
			Kern Delta Water District	179,001	26,491	15%	Yes
Verde	Horseshoe Dam	30,000	Salt River Project	900,000	22,146	2%	No
			City of Phoenix[6]	319,164	7,854	2%	No
Roosevelt	Theodore Roosevelt Dam	24,700 to 81,700	Salt River Project[7]	900,000	24,700 to 81,700	3% to 9%	No
Middle Colorado	Parker Dam/Lake Havasu[8]	77,338	Lake Mead National Recreation	69	1	1%	No
Hoover-Parker			Lake Mead National Recreation	207	2	1%	No
			Bullhead City	6,360	65	1%	Yes
Parker-Southerly			Mohave Valley I.D.D.	19,857	203	1%	Yes
			Fort Mojave Indian Reservation	26,909	275	1%	No
			Havasu National Wildlife Refuge	5,634	58	1%	No
			Lake Havasu I.D.D.	11,050	113	1%	*Yes*
			Central Arizona Project	1,668,332	17,061	1%	No
			Town of Parker	399	4	1%	Yes
			Colorado River Indian Reservation	314,979	3,221	1%	No
			Yuma Proving Ground	616	6	1%	No
			Gila Monster Ranch	5,903	60	1%	*Yes*
			Wellton Mohawk I.D.D.	255,788	2,616	1%	No
			City of Yuma	19,172	196	1%	No
			Marine Corps Air Station	1,994	20	1%	No
			Southern Pacific Company	24	0	1%	Yes
			Yuma Mesa Fruit Growers Assn.	12	0	1%	No
			University of Arizona	735	8	1%	No
			Yuma Union High School	143	1	1%	No
			Camille, Albec. Jr.	27	0	1%	*Yes*

Exhibit A-3

WATER USERS POTENTIALLY AFFECTED BY FLYCATCHER UNDER SCENARIO 2*

MU	Facility Name	Estimated Water Losses -Scenario 2 (acre-feet)	Water User	Annual Water Use[1] (acre-feet)	Estimated Water Loss per User[2] (acre-feet)	Percent of Annual Water Use Affected	Small Entity?
			Desert Lawn Memorial	55	1	1%	Yes
			North Gila Valley Irrigation District	10,645	109	1%	*Yes*
			Yuma Irrigation District	34,854	356	1%	Yes
			Yuma Mesa I.D.D.	111,476	1,140	1%	Yes
			Unit "B" I.D.D.	15,995	164	1%	Yes
			Yuma County Water Users Assn.	222,668	2,277	1%	No
			Cocopah Indian Reservation	3,871	40	1%	No
			Fort Mojave Indian Reservation	6,309	65	1%	No
			Chemehuevi Indian Reservation	1,002	10	1%	No
			Metropolitan Water District	750,031	7,670	1%	No
			Palo Verde Irrigation District	412,700	4,220	1%	Yes
			Yuma Project, Res. Div. Indian Unit	32,841	336	1%	No
			Yuma Project, Res. Div. Bard Unit	35,788	366	1%	No
			Returns from Yuma Project	39,417	403	1%	No
			Imperial Irrigation District	2,757,120	28,195	1%	No
			Coachella Valley Water District	319,385	3,266	1%	No
			Robert B. Griffith Water Project	433,575	4,434	1%	*Yes*
			Lake Mead Nat'l Recreation	648	7	1%	No
			Lake Mead Nat'l Recreation	237	2	1%	No
			Basic Management Inc.	5,861	60	1%	Yes
			City of Henderson	13,163	135	1%	No
			Nevada Dept. of Fish and Game	11	0	1%	No
			Pacific Coast Building Products Inc.	892	9	1%	*Yes*
			Southern Nevada Water Authority	12,038	123	1%	No
			Big Bend Water District	2,092	21	1%	Yes
			Fort Mojave Indian Reservation (2 wells)	1,891	19	1%	No

Exhibit A-3

WATER USERS POTENTIALLY AFFECTED BY FLYCATCHER UNDER SCENARIO 2

MU	Facility Name	Estimated Water Losses -Scenario 2 (acre-feet)	Water User	Annual Water Use[1] (acre-feet)	Estimated Water Loss per User[2] (acre-feet)	Percent of Annual Water Use Affected	Small Entity?

*This exhibit includes data for water users that are not considered small entities. This is because these entities frequently serve small entities as end users, and thus presents additional information for those users.

Notes:

Italics indicated that data was unavailable, and thus entity is assumed to be small. Gray shading indicates water users that are not small entities.

[1]Annual water use represents the total quantity of water consumed by the listed user over a twelve month period from all sources, not solely the facilities listed in this chart. For the Lower Colorado Recovery Unit, annual water use figures are 2004 calendar year figures accessed from the U.S. Bureau of Reclamation at http://www.usbr.gov/lc/region/g4000/hourly/use04.html on September 1, 2005; Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers," June 2005 version.

[2] Calculation of estimated loss per user assumes that the loss to the dam facility is distributed across users in proportion to the user's annual consumption of total annual water delivery.

[3] Agricultural water use per acre is calculated from the average acre-feet per acre of water use by farms from off-farm surface water suppliers in affected states (2003 Farms and Ranch Irrigation Survey, NASS)

[4] Annual use of Rancho California Water District obtained from Comprehensive Annual Financial Report for the Fiscal Year Ended June 30, 2004. Accessed at: http://www.ranchowater.com/pdfs/Adopted%20CAFR.pdf on August 24, 2004.

Exhibit A-4

ESTIMATED IMPACTS ON AGRICULTURE UNDER SCENARIO 2*

Recovery Unit	Management Unit	State	Facility Name	Counties Served by Affected Facilities	Total Crop Acres (2002)	Total Crop Revenues (2002)	Revenues per Crop Acre	Crop Acres Loss due to Flycatcher	Percent of Crop Acres	Revenue Loss due to flycatcher	Percent of Total Crop Revenues Lost due to Flycatcher
Coastal California	San Diego	California	Hodges Dam	San Diego	107,966	$881,930,000	$8,169	117	0.11%	$955,725	0.11%
		California	Vail Lake	Riverside	281,988	$667,375,000	$2,367	599	0.21%	$1,418,750	0.21%
MU Total					**389,954**	**1,549,305,000**		**716**	**0.18%**	**$2,374,476**	**0.15%**
Basin and Mojave	Kern	California	Isabella Dam	Kern	998,297	$1,783,418,000	$1,786	13,586	1.36%	$24,264,596	1.36%
MU Total					**998,297**	**$1,783,418,000**		**13,586**	**1.36%**	**$24,264,596**	**1.36%**
Gila	Roosevelt	Arizona	Roosevelt	Maricopa	288,387	$390,449,000	$1,354	1,235 to 4085	0.43% to 1.42%	$1,672,074 to $5,530,708	0.43% to 1.42%
MU Total					**288,387**	**$390,449,000**		**5,320**	**0.92%**	**$1,672,074 to $5,530,708**	**0.43% to 1.42%**
Lower Colorado	Hoover-Parker	Arizona	Lake Mead/ Hoover Dam[2]	Maricopa	288,387	$390,449,000	$1,354	1,957	0.68%	$2,650,105	0.68%
				Pinal	252,291	$177,735,000	$704	1,712	0.68%	$1,206,346	0.68%
				Gila	6,434	$268,000	$42	44	0.68%	$1,819	0.68%
				Graham	37,994	$77,911,000	$2,051	258	0.68%	$528,807	0.68%
				Pima	47,147	$56,333,000	$1,195	320	0.68%	$382,351	0.68%
				La Paz	98,245	$85,995,000	$875	667	0.68%	$583,676	0.68%
		California		Imperial	487,840	$649,063,000	$1,330	3,311	0.68%	$4,405,403	0.68%
				Riverside	281,988	$667,375,000	$2,367	1,914	0.68%	$4,529,693	0.68%
				San Bernardino	48,148	$120,388,000	$2,500	327	0.68%	$817,113	0.68%
MU Total					**1,548,474**	**$2,225,517,000**		**10,510**	**0.68%**	**$15,105,313**	**0.68%**

*This exhibit includes data for all potential crop acres that could be lost under Scenario 2. Approximately 85 percent of this impact is anticipated to be borne by small entities.

Source: Data on crop acres and crop revenue per county accessed from the USDA's 2002 Census of Agriculture at: http://www.nass.usda.gov/census/ on September 5, 2005.

Exhibit 4-4 (continued)

ESTIMATED IMPACTS ON AGRICULTURE UNDER SCENARIO 2

Notes:

Assumes no replacement water available and crop acreage is lost.

1 Water from the Parker Dam supplies the Colorado River Aqueduct and the Central Arizona Project. The Colorado River Aqueduct carries water to the Cities of Los Angeles and San Diego. The Central Arizona Project primarily supplies the Greater Phoenix Metro Area with the exception of the following agricultural users: Maricopa-Stanfield Irrigation District, Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, San Carlos-Apache Tribe, Tohono O'Odham Nation, and Harquala Valley Irrigation District.

2 The Lower Colorado system includes the following dams within proposed CHD: Lake Mead/Hoover Dam, Lake Havasu/Parker Dam, Imperial Diversion Dam, Laguna Dam, Senator Wash, and Lake Moovalya/Headgate Rock Dam.

661. Of the eight water supply dams and reservoirs for which impacts are quantified under Scenario 2, four of these systems provide water to agricultural users. The following sections profile the agricultural users that are at risk of changes in water supply under Scenario 2 of the water management analysis.

Isabella Dam

662. The primary holders of water storage at Lake Isabella, include the North Kern Water Storage District, the Buena Vista Storage District, and the City of Bakersfield Water Resources Department. Water stored at Lake Isabella is primarily used for agriculture and irrigation uses (approximately 90 percent). The total area dependent upon the water stored at Lake Isabella is approximately 333,333 acres within the southern San Joaquin Valley portion of Kern County, California. Kern County irrigated crop acreage totaled 787,560 acres in 1992 with 31 percent in permanent crops (tree nuts, tree fruits, and grapes) and the remaining 69 percent in annual crops. Nearly 282,000 acres is located in water districts with Kern River contracts and entitlements, comprising nearly 36 percent of the county's irrigated acreage base.

Roosevelt Dam

663. The Salt River Project (SRP) operates six reservoirs and dams on the Salt and Verde Rivers. Together, these reservoirs provide 40 percent of the water supply to the Phoenix Active Management Area, an area of approximately 5,600 square miles.[469] SRP diverts about 900,000 af of surface water annually for use by the City of Phoenix, Salt River Pima-Maricopa Indian Community, Fort McDowell Yavapai Nation, Phelps Dodge, irrigation users, and other communities in the Phoenix area, including Chandler, Glendale, Mesa, Scottsdale, and Tempe. The system serves 240,000 acres over an area of 375 square miles.

664. Roosevelt Reservoir is the largest of four reservoirs on the Salt River, representing 71 percent of the total surface water storage capacity in the SRP system.[470] The SRP service area is in Gila and Maricopa Counties, Arizona. Gila County reported 63 farms on 1,228 irrigated acres in 2002; Maricopa County reported 1,344 farms on 237,532 acres in 2002. The market value of agricultural products in these counties was 743 million in $2002, 99 percent of which came from Maricopa County.

Coolidge Dam

665. As described in Section 4, the Federal District Court recently held that the BIA's operation of Coolidge Dam physically could not cause a take of flycatcher above the dam because when the water level reached the vicinity of the flycatcher nests at the rim of the Lake, the water level would be high enough to reach the spillway level, and it would

[469] Final Environmental Impact Statement for the Roosevelt Habitat Conservation Plan, Gila And Maricopa Counties, Arizona Volume 1 of the FEIS. Service, 2002. p 15.
[470] *Ibid.*, p 18.

automatically flow out of the lake. The court found that the only way that flycatcher along the Gila River could be injured was if insufficient water is released from Coolidge Dam. Therefore, Scenario 2 is assumed not to be reasonably foreseeable at Coolidge Dam.

666. Although Scenario 2 for water management is not reasonably foreseeable at Coolidge Dam, a significant number of water withdrawals and diversions exist along designated river stretches. The Coolidge Dam is operated by the San Carlos Irrigation Project (SCIP) for purposes of providing irrigation to Gila River Indian Community (GRIC) and the San Carlos Irrigation and Drainage District (SCIDD). SCIDD members own approximately 50,000 acres within the boundaries of the San Carlos Irrigation Project downstream of San Carlos Reservoir.[471]

667. The Gila Valley Irrigation District (GVID) diverts water for irrigation using ten diversion dams along the river between San Jose and Fort Thomas, Arizona. The District is concerned that any restrictions on their ability to access the diversion dams, access roads, and canal heads for maintenance and repair could have implications for water delivery and crop production. Under the Globe Equity No. 59 Decree, the SCIP has rights that are senior to those of the GVIP. Thus, in a low water situation, GVIP water uses would be more vulnerable to water shortages than SCIP users.[472] In addition, the Safford Valley in Arizona has been identified as an area where groundwater pumping may have the potential to affect the quality of flycatcher habitat along the Gila River within the proposed flycatcher CHD. GVID notes that most of the farmers that are served by GVID also rely on groundwater wells to supplement irrigation needs. NASS reports that Graham County, Arizona, where much of this district is located, contains 215 farms and 104 beef cattle ranches.[473]

Lower Colorado

668. Water from the Colorado River is diverted to six states, and is used for every purpose, including municipal, agricultural, and hydropower uses. Exhibit A-5 presents background information on the agricultural inputs to the Colorado River. As shown, the lower Colorado currently serves 1.4 million acres of irrigated farmlands in Arizona and California, and at least 35 major water users.

[471] Public comments of Riney B. Salmon, San Carlos Irrigation and Drainage District on Proposed Rule Designating Critical Habitat for the Southwestern willow flycatcher (69 Fed.Reg 60706 (October 12, 2004), May 24, 2005.
[472] Public comments of Neal Montierth, Gila Valley Irrigation District, on the Proposed Rule to Designate Critical Habitat for the Southwestern Willow Flycatcher, May 25, 2005; Public comments of L. Anthony Fines, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher," Law Offices of L. Anthony Fines, May 31, 2005 and July 18, 2005.
[473] Data accessed from the USDA's 2002 Census of Agriculture at: http://www.nass.usda.gov/census/ on August 26, 2005.

Exhibit A-5

CHARACTERISTICS OF AGRICULTURAL PRACTICES IN THE LOWER COLORADO WATERSHED*

Agriculture	Arizona	California
Irrigated Acres Served by Colorado River water	560,000	900,000
Major Crops under irrigation	cotton, alfalfa, lettuce, wheat, citrus, barley, cauliflower	cantaloupes, dates, grapes, oranges, lemons, avocados, other fruits, lettuce, tomatoes, onions, carrots, other vegetables, alfalfa, wheat, grasses, other forage crops
Number of Water Users/Irrigation Districts/Water Districts Served	26	9

* Only eight percent of Southern Nevada water use is for non-urban uses, including irrigation for golf courses, parks, school grounds, and other turf; Water users utilizing LCR water are 2004 calendar year figures accessed from the U.S. Bureau of Reclamation at http://www.usbr.gov/lc/region/g4000/hourly/use04.html on September 1, 2005.

A.2 Small Business Impacts on Livestock Grazing Activities

669. The proposed CHD includes areas of USFS, BLM, and private lands that are used for seasonal or year-round livestock grazing. On some Federal allotments that contain flycatcher habitat, riparian areas have been excluded from grazing either year-round or seasonally, thus reducing the carrying capacity, or permitted AUMs, on those allotments. Historically, returns to cattle operations have been low throughout the Southwest. In recent years, these returns have been lower yet due to the recent drought. As a result, any reductions in grazing effort for flycatcher may affect the sustainability of ranching operations in these areas.

670. This analysis assumes that, in the future, grazing efforts on proposed CHD areas will be reduced, or, in the high-end estimate, eliminated due to flycatcher concerns. Private ranches could be affected either by reductions in federally permitted AUMs that they hold permits to, or by reductions on grazing effort on private property to avoid adverse impacts on flycatcher habitat. As discussed in Section 5, the expected reduction in AUMs is based on an examination of historic grazing levels, section 7 consultations, and discussions with range managers, wildlife biologists, and permittees. Based on this analysis, the high impact scenario for allotments in the proposed CHD is a reduction of 89,400 AUMs over 20 years. Of the total AUMs lost, 1,200 are Federally permitted and 88,000 are private. Converting AUM reductions to cattle reductions reveals that the 37 affected counties may lose a total of 3,385 head of beef cattle, or 0.6 percent of the total number of beef cattle in the affected region. To be conservative, i.e., to be more likely to overstate than understate impacts, this analysis attributes the total number of AUMs reduced in proposed CHD areas in riparian areas to the flycatcher, although some impacts of conservation measures may result from the presence of other species.[474]

[474] Forest Guardians states in its public comment that this assumption overstates impacts due to flycatcher. Public comments of Billy Stern, Grazing Program Coordinator, Forest Guardians, "Proposed Designation of Critical Habitat for the Southwestern willow flycatcher (*Empidonax traillii extimus*)", May 26, 2005.

671. In Exhibit A-6, county level data on beef cow operations are used to estimate the magnitude of CHD impacts at the scale of the individual ranch. The projected 20-year AUM reductions in each management unit are allocated to counties based on the proportion of management unit land located in each county. County AUM losses were converted to county cattle losses in order to understand the magnitude of impacts on ranches in each county. An AUM represents the quantity of forage required to support a 1,000 pound cow with or without a nursing calf for one month. By dividing the estimated AUM reductions by 12, animal unit year reductions can be estimated. Dividing animal unit years by 2.2[475] years per animal gives an estimate of the number of cows that could be raised and brought to slaughter in each county.

672. Note that the distribution of these impacts is unknown, and could affect some ranchers more than others. However, because this distribution is not well understood, this analysis assumes that lost county grazing lands are distributed evenly across county ranches, enabling an estimate of impacts on a per ranch basis. For 30 of the 37 counties, the estimated cattle reduction represents less than two percent of average ranch size. San Bernardino County, California, faces a six percent reduction in average ranch size. This is likely to be the case because this county has a relatively large amount of land in proposed CHD combined with a relatively low average ranch size (31head). Even for counties for which percentage losses appear relatively large, absolute losses per average size ranch are one to three cows over a twenty year period. Not that this assumes an even distribution of impact across ranches, where impacts may not be distributed evenly. Approximately 93 percent of ranches across the 37 affected counties are small ranches (meaning their annual revenues are less than $750,000).

[475] The average age at slaughter for beef cows in the United States is 2.2 years. Comerford, John W., et al. "Beef Cow-calf Production." Agricultural Alternatives: 2001, Penn State University College of Agricultural Sciences, Agricultural Research and Cooperative Extension. Accessed at http://agalternatives.aers.psu.edu/livestock/beef_cow-calf/beef_cow-calf.pdf on Friday, September 2, 2005.

Exhibit A-6

COUNTY AND RANCH-LEVEL IMPACTS OF PROPOSED FLYCATCHER CHD (2004-2023)

				Estimated Loss Per County				Estimated Loss Per Ranch				
RU	**MU**	**State**	**County**	**County Land in CHD (acres)**	**Percent CHD Area in County**	**AUMs Lost in County[1]**	**Head Lost in County[2]**	**Total Ranches[3] (2002)**	**Number of Head[3] (Total per County, 2002)**	**Number of Head per Ranch (Average, 2002)**	**Avg. Number of Head Lost per Ranch[4]**	**Head Lost per Ranch (% of herd)**
Coastal California	Santa Ynez	CA	Santa Barbara	3,855	100%	2,565	97	203	19,482	96	0	0%
	Santa Ana	CA	Riverside	1,281	12%	612	23	184	3,670	20	0	1%
			San Bernardino	9,327	88%	4,457	169	94	2,918	31	2	6%
	San Diego	CA	Orange	90	1%	4	0	18	392	22	0	0%
			Riverside	1,364	9%	61	2	184	3,670	20	0	0%
			San Diego	14,436	91%	640	24	168	6,363	38	0	0%
Basin and Mojave	Owens	CA	Inyo	9,199	98%	7,727	293	*55*	*12,665*	230	5	2%
			Mono	167	2%	140	5	23	2,989	130	0	0%
	Kern	CA	Kern	5,309	100%	3,355	127	358	36,779	103	0	0%
	Mojave	CA	San Bernardino	2,553	100%	986	37	94	2,918	31	0	1%
	Salton	CA	San Bernardino	4	2%	0	0	94	2,918	31	0	0%
			San Diego	202	98%	0	0	168	6,363	38	0	0%
Lower Colorado	Little Colorado	AZ	Apache	609	100%	162	6	198	19,418	98	0	0%
	Virgin	AZ	Mohave	2,681	20%	479	18	*137*	*18,119*	132	0	0%
		NV	Clark	8,057	59%	1,439	55	*(55)*	*(1,475)*	27	1	4%
		UT	Washington	2,977	22%	532	20	181	7,484	41	0	0%
	Middle Colorado	AZ	Mohave	6,762	100%	0	0	*137*	*18,119*	132	0	0%
	Pahranagat	NV	Clark	496	13%	6	0	*(55)*	*(1,475)*	27	0	0%
			Lincoln	3,401	87%	41	2	81	7,702	95	0	0%
	Bill Williams	AZ	La Paz	3,754	18%	1,368	52	29	1,158	40	2	4%
			Mohave	16,842	82%	6,136	232	*137*	*18,119*	132	2	1%

Exhibit A-6

COUNTY AND RANCH-LEVEL IMPACTS OF PROPOSED FLYCATCHER CHD (2004-2023)

				Estimated Loss Per County				Estimated Loss Per Ranch				
RU	**MU**	**State**	**County**	**County Land in CHD (acres)**	**Percent CHD Area in County**	**AUMs Lost in County[1]**	**Head Lost in County[2]**	**Total Ranches[3] (2002)**	**Number of Head[3] (Total per County, 2002)**	**Number of Head per Ranch (Average, 2002)**	**Avg. Number of Head Lost per Ranch[4]**	**Head Lost per Ranch (% of herd)**
	Hoover to Parker	AZ	La Paz	192	0%	0	0	29	1,158	40	0	0%
			Mohave	28,972	70%	17	1	*137*	*18,119*	132	0	0%
		CA	San Bernardino	12,498	30%	7	0	94	2,918	31	0	0%
		NV	Clark	0	0%	0	0	(55)	(1,475)	27	0	0%
	Parker to Southerly	AZ	La Paz	5,338	21%	110	4	29	1,158	40	0	0%
			Yuma	9,045	36%	186	7	*17*	*1,442*	85	0	0%
		CA	Imperial	10,424	41%	214	8	(18)	(8,921)	496	0	0%
			San Bernardino	630	2%	13	0	94	2,918	31	0	0%
Gila	Verde	AZ	Gila	125	1%	25	1	86	4,364	51	0	0%
			Maricopa	2,765	27%	558	21	275	5,607	20	0	0%
			Yavapai	7,317	72%	1,476	56	(254)	(37,172)	146	0	0%
	Roosevelt	AZ	Gila	29,463	100%	928	35	86	4,364	51	0	1%
			Maricopa	2	0%	0	0	275	5,607	20	0	0%
			Pinal	55	0%	2	0	146	8,515	58	0	0%
	Middle Gila/San Pedro	AZ	Cochise	2,808	12%	1,279	48	457	39,563	87	0	0%
			Gila	504	2%	229	9	86	4,364	51	0	0%
			Pima	2,398	10%	1,092	41	182	12,908	71	0	0%
			Pinal	18,603	76%	8,460	320	146	8,515	58	2	4%
	Upper Gila	AZ	Gila	2,077	8%	434	16	86	4,364	51	0	0%
			Graham	15,234	56%	3,181	121	*104*	*15,071*	145	1	1%
			Greenlee	612	2%	128	5	*194*	21,921	113	0	0%
			Pinal	1,548	6%	323	12	146	8,515	58	0	0%
		NM	Grant	6,686	24%	1,396	53	164	21,048	128	0	0%
			Hidalgo	1,214	4%	254	10	*102*	*19,246*	189	0	0%

Exhibit A-6

COUNTY AND RANCH-LEVEL IMPACTS OF PROPOSED FLYCATCHER CHD (2004-2023)

				Estimated Loss Per County				Estimated Loss Per Ranch				
RU	**MU**	**State**	**County**	**County Land in CHD (acres)**	**Percent CHD Area in County**	**AUMs Lost in County[1]**	**Head Lost in County[2]**	**Total Ranches[3] (2002)**	**Number of Head[3] (Total per County, 2002)**	**Number of Head per Ranch (Average, 2002)**	**Avg. Number of Head Lost per Ranch[4]**	**Head Lost per Ranch (% of herd)**
Rio Grande	San Luis Valley	CO	Alamosa	29,151	43%	9,191	348	*138*	*9,189*	67	3	4%
			Conejos	25,723	38%	8,110	307	*258*	*25,118*	97	1	1%
			Costilla	2,247	3%	709	27	*107*	*7,099*	66	0	0%
			Rio Grande	11,316	17%	3,568	135	126	9,942	79	1	1%
	San Pedro	AZ	Pinal	26	100%	0	0	146	8,515	58	0	0%
	Middle Rio Grande	NM	Bernalillo	4,618	9%	1,506	57	104	3,487	34	1	2%
			Socorro	39,171	79%	12,777	484	177	20,610	116	3	2%
			Valencia	5,804	12%	1,893	72	181	6,690	37	0	1%
	Upper Rio Grande	NM	Mora	118	2%	11	0	240	10,698	45	0	0%
			Rio Arriba	4,383	69%	404	15	384	15,175	40	0	0%
			Santa Fe	1,267	20%	117	4	117	7,729	66	0	0%
			Taos	549	9%	51	2	*249*	*4,140*	17	0	0%

[1] Calculation of AUMs lost per county assumes that loss is proportional to the amount of county land in the CHD.

[2] AUMs lost were converted into head of cattle lost using the following calculation: (AUMS/12)/2.2. An AUM represents the quantity of forage required to support a 1,000 pound cow with or without a nursing calf for one month. AUM reductions are divided by 12, yielding animal unit year reductions, or the number of 1,000 pound cows supported for one year on the lost county grazing lands. According to the Agricultural Research and Cooperative Extension of Penn State's College of Agricultural Sciences, the average age at slaughter for beef cows in the United States is 2.2 years. Dividing animal unit years by 2.2 gives an estimate of the number of cows that could be raised and brought to slaughter on each county's lost grazing lands.

[3] Data on numbers of beef ranches and beef cows per county accessed from the USDA's 2002 Census of Agriculture at: http://www.nass.usda.gov/census/ on August 26, 2005. Because some county data are not reported in the 2002 census to avoid disclosure of information about individual ranches the italicized figures are drawn from the USDA's 1997 Agricultural Census. Figures in parentheses are drawn from the 1992 Agricultural Census. The number of beef cows in Pima and Greenlee Counties were not reported in the 2002, 1997, 1992, or 1987 censuses for the reason mentioned above. Therefore, these figures were estimated by averaging the beef cow numbers for the six counties bordering Pima and Greenlee Counties. For Pima: Pinal, Maricopa, Yuma, Santa Cruz, Cochise, and Graham Counties. For Greenlee: Apache, Graham, Cochise, Hidalgo, Grant, and Catron Counties.

[4] Calculation of head lost per ranch assumes that county-wide cattle loss is distributed evenly across all ranches in the county.

A.3 Small Business Impacts on Land Development Activities

673. Because flycatcher habitat is contained within the 100-year floodplain, the analysis limits flycatcher impacts on development to areas within proposed CHD where real estate demand is expected to support the additional cost burden associated with developing in the floodplain. No regional price increases are expected, and the cost burden resulting from flycatcher conservation efforts is expected to fall entirely on owners of land within the proposed designation, in the form of reduced raw land prices for parcels affected by proposed CHD. In many instances, the existing landowners may not be a business. Rather, they may be individuals holding the land as an investment. However, to be conservative, this analysis assumes that all of the landowners impacted by future flycatcher conservation activities are developers. This assumption is likely to overstate the actual impacts to small land development firms. Impacts to landowners include land value loss, other project modifications, CEQA costs and delay costs. These future impacts are expected to occur in the San Diego, San Bernardino and Santa Barbara Counties in California within the Mojave and Santa Ana Management Units. This analysis uses the approved development projection data from SANDAG and SCAG, the regional public entities that are responsible for growth projections for San Diego County.[476]

674. To estimate the number of future projects affected, this analysis uses the historic rate of CEQA document submittal by County. The number of CEQA documents submitted in each county between 1995 and 2004 are converted to a historical annual rate, which is used to project future document submittals in proposed CHD based on population growth and development forecasts for the CHD area in each county. The total number of affected projects estimated in Section 7 of this report was 0.52 projects. As a result, the number of small land developers affected annually is less than 0.01 percent of the 1,300 small land development firms in the region.

[476] One public commenter, commenting on behalf of the San Luis Rey Municipal Water District, describes two potential developments that may be proposed within unincorporated County lands that may overlap CHD areas: a potential development on the Gregory Canyon Landfill, and a potential development by Pardee Homes. The comment reports that the District is currently assembling financing to pay for a study that will analyze the scope of development over the next 20 years. However, at this time, SANDAG has not included this potential growth in proposed CHD areas in its projections. Public comments of Francis D. Logan, Law Offices of Susan Trager, "Draft Economic Analysis for the Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher", on behalf of San Luis Rey Municipal Water District, May 31, 2005; Public comments of Francis D. Logan, Law Offices of Susan Trager, "Proposed Designation of Critical Habitat for the Southwestern willow flycatcher (69 Federal Register 60706 (October 12, 2004))", on behalf of San Luis Rey Municipal Water District, December 10, 2004.

Exhibit A-7

IMPACT TO SMALL BUSINESSES IN THE LAND DEVELOPMENT SECTOR IN THE PROPOSED CHD

	Costs in 2004$
Total Development Impacts	
Land Value Loss	$3,681,000
Other Project Modifications	$1,648,000
CEQA Costs	$12,000
Delay Costs	$1,000
Total Impact	$5,342,000
Annual Impact[1]	$504,000
Annual Revenues of Small Land Development Businesses in San Diego, Santa Barbara, and San Bernardino Counties[2]	$2,038,400,000
Percent Impact Assuming All Impacts are Borne by Small Businesses	**0.02 %**

Notes:
[1] Costs are annualized over 20 years using a 7 percent discount rate.
[2] Businesses in the NAICS code #237210 "Land Subdivision." Defined as "small" businesses using the Small Business Administration definition as businesses with a gross annual income of $6 million or less. Revenue data is based on Robert Morris Associates (RMA) data for 2003. Note that public comments received from Dr. John Husing on behalf of the San Bernardino County Flood Control District, dated May 26, 2005, notes that in San Bernardino County, the 2004 median home price was $400,686 and $530,074 in the first quarter of 2005. To the extent that the median home price is higher than the estimate used in this analysis, the impacts to residential development in San Bernardino County could be higher.

A.4 Small Business Impacts on Recreation Activities

675. Impacts to small businesses in this industry result from a reduction in fishing and hunting trips to the Roosevelt Lake area of Tonto NF, due to restrictions on activities related to flycatcher conservation efforts. These impacts are discussed in Section 9 of this report. This reduction in the number of fishing and hunting trips in each region is estimated to result in an annual sales loss of $386,000 (2004 dollars). As illustrated in Exhibit A-1, these impacts are spread across a variety of industries including food and beverage stores, food service and drinking places, accommodations, transportation, and sporting goods.

676. Exhibit A-8 illustrates the total number of businesses in Gila County, Arizona, that could be affected by this loss in sales. This exhibit also indicates the number of these businesses that are classified as small businesses (based on SBA size standards).

Exhibit A-8

SMALL BUSINESSES IMPACTS ASSOCIATED WITH RECREATION-RELATED EXPENDITURES GILA COUNTY, ARIZONA

Economic Sector	# Businesses[1]	# of Small Businesses[1]	Total Revenues[2]	Small Business Revenues[3]
Food and Beverage Stores				
44511: Supermarkets and Other Grocery (Except Convenience) Stores	27	25		
44512: Convenience Stores	21	21		
44529: Other Specialty Food Stores	2	2		
44531: Beer, Wine and Liquor Stores	3	3		
Subtotal Food and Beverage Stores	53	51	$83,041,000	$79,907,000
Food Service and Drinking Places				
72211: Full-Service Restaurants	68	43		
72221: Limited Service Eating Places	43	32		
72241: Drinking Places	18	18		
Subtotal Food Service and Drinking Places	129	93	$40,551,000	$29,234,000
Accommodations				
7211: Traveler Accommodation	41	33		
7212: RV Parks and Recreational Camps	16	16		
Subtotal Accommodations	57	49	$15,633,000	$13,439,000
Transportation				
44131: Automotive Parts and Accessories Stores	10	10	$14,669,000	$14,669,000
44132: Tire Dealers	4	4		
447190: Service Stations, Gasoline	15	14	$21,060,000	$19,656,000
Subtotal Transportation	29	28	$35,729,000	$34,497,000
Total, All Recreation-Related Sectors	268	221	$174,954,000	$157,078,000
Total Impact from Reduced Recreation (Section 9.1.4)				$386,000
Recreation Impacts as a Percentage of Affected Small Business Revenues				0.25%

Notes:

[1] Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers." Additional NAICs codes were considered; however, because no businesses were reported in our search, these codes(NAICS 44522, 44523, 72233, and 44121 are not included here. Small businesses were determined based on the SBA size standard reported in Exhibit 10-1.

[2] U.S. Census Bureau, 1997 Economic Census for Gila County Arizona. Accessed on November 24, 2004, at http://www.census.gov/epcd/ec97/az/AZ000.html. Where sales were not available for specific subsectors, we used the entire sector. Specifically, we used sector 445 Food and Beverage Stores, sector 721 for Accommodation, and sector 722 for Foodservices and drinking places, and sector 4413 for Automotive Parts and Accessories and tire stores.

[3] Small business revenues are estimated by applying the percentage of businesses in each sector that are small to the total revenues for that sector.

677. Specifically, there are 221 small businesses in these industries in Gila County.[477] Depending on the sector, between 72 percent and 100 percent of the businesses serving hunting and fishing recreators in Gila County are small businesses. Sales generated by these small businesses are estimated at $157.1 million.[478] Thus, the total annual impact of $386,000 is equivalent to 0.25 percent of small business revenues in affected industries in Gila County.

[477] Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers."
[478] U.S. Census Bureau, 1997 Economic Census for Gila County Arizona. Accessed on November 24, 2004, at http:// www.census.gov/epcd/ec97/az/AZ000.html.

APPENDIX B: POTENTIAL IMPACTS ON THE ENERGY INDUSTRY

678. Pursuant to Executive Order No. 13211, "Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use," issued May 18, 2001, Federal agencies must prepare and submit a "Statement of Energy Effects" for all "significant energy actions." The purpose of this requirement is to ensure that all Federal agencies "appropriately weigh and consider the effects of the Federal Government's regulations on the supply, distribution, and use of energy."[479] The Office of Management and Budget has provided guidance for implementing this Executive Order that outlines nine outcomes that may constitute "a significant adverse effect" of a regulatory action under consideration:

- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
- Reductions in fuel production in excess of 4,000 barrels per day;
- Reductions in coal production in excess of 5 million tons per year;
- Reductions in natural gas production in excess of 25 million Mcf per year;
- Reductions in electricity production in excess of 1 billion kilowatts-hours per year or in excess of 500 megawatts of installed capacity;
- Increases in energy use required by the regulatory action that exceed the thresholds above;
- Increases in the cost of energy production in excess of one percent;
- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.[480]

679. Two of these criteria are relevant to this analysis: (1) reductions in electricity production in excess of one billion kilowatt-hours per year or in excess of 500 MWs of installed capacity and (2) increases in the cost of energy production in excess of one

[479] U.S. Office of Management and Budget, The Executive Office of the President, "Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27," July 13, 2001.
[480] *Ibid.*

percent. Below, the analysis determines whether the electricity industry is likely to experience "a significant adverse effect" as a result of flycatcher conservation activities.

B.1.1 Evaluation of Whether the Designation will Result in a Reduction in Electricity Production in Excess of One Billion Kilowatt-Hours Per Year or in Excess of 500 Megawatts of Installed Capacity

680. Installed capacity is "the total manufacturer-rated capacity for equipment such as turbines, generators, condensers, transformers, and other system components" and represents the maximum rate of flow of energy from the plant, or the maximum output of the plant. As noted in Section 4 of this report, restricting reservoir elevations to current levels to avoid inundating flycatcher habitat would result in a loss of water storage capacity and thus the release of water from reservoirs in some years that otherwise would have been stored. In some instances, water spilled would be lost to use for power generation. In other instances, the water would be used to generate electricity during non-summer months when the value of electricity is lower. This, however, affects the cost of power production, and installed capacity remains unchanged.

681. Five dams that control reservoirs that fall within the proposed critical habitat designation have installed hydropower generating capacity: Roosevelt (36 MW), Hoover (2,079 MW), Parker (120 MW), Headgate Rock (19.5 MW), and Senator Wash (7.2 MW). If Scenario 2 for water management activities were reasonably foreseeable, then flycatcher conservation activities could impact the reservoir operations, including power generation, of the three larger facilities, Roosevelt, Hoover, and Parker. At the two remaining facilities, Senator Wash and Headgate Rock, flycatcher conservation activities would not be expected to impact reservoir and hydropower operations.

- Senator Wash Dam and reservoir, owned by the USBR and operated by the Imperial Irrigation District, cover about 470 surface acres and holds approximately 14,000 acre-feet of water. This is a pump and store reservoir that provides off-stream regulatory storage to manage the fluctuating flows at the lower end of the Colorado River System (i.e., to temporarily store water ordered in excess of user needs). While there is 7.2 MW of installed hydroelectric generating capacity at the dam, power produced at Senator Wash is primarily used to run pumps that bring water from Imperial Reservoir to Senator Wash.[481]

- Headgate Rock Dam is a run-of-the-river hydroelectric plant owned and operated by the BIA for the primary use of the Colorado River Indian Tribes and other Indian Tribes. Power generation is dependent upon the flow of the river. The structure does create a small impoundment (Lake Moovalya), but the impoundment has very little storage capacity. The river flow through the dam is not anticipated to be affected by flycatcher

[481] Personal communication with Bruce Williams, Daily Operations Team Lead, Boulder Canyon Operation Office, USBR, December 22, 2004.

conservation activities. During 1996 and 1997, net energy production averaged 87,165 MWh annually.[482]

682. Energy-related impacts related to flycatcher conservation activities are likely to be displacements of peak hydroelectric energy production during the year to less productive times of the year. This practice does not reduce average energy production, but rather changes the temporal distribution of that power production. Shifting water releases from the summer, when electric power prices are generally higher, to other times of the year in order to maintain lower reservoir levels may reduce revenues. This is the situation at Roosevelt Dam, where model simulations of reservoir operations show that accommodating flycatcher conservation efforts may result in a net increase in power production. While hydroelectric power production increases, however, revenues under flycatcher conservation activities are forecast to decline by $1.3 to $2.6 million annually.[483]

683. This analysis assumes that because of USBR's current position that it lacks discretion to release water from Lake Mead to benefit flycatcher habitat, operational changes under Scenario 2 at Lake Mead are not reasonably foreseeable.[484] While it is likely that USBR will also argue that it lacks discretion at other facilities on the Lower Colorado River, the precedent is less clear. The USBR nonetheless states: "With the implementation of the Multi-Species Conservation Program, and due to legal requirements for delivery of water, there will be no changes in the operation of the Lower Colorado River. Minimum flows and water diversions are non-discretionary actions associated with the delivery of water based on laws and treaties. Currently all conservation programs are completed through a willing sellers program, and it is not foreseen that any forbearance agreements are to be enacted specifically for the Southwestern Willow Flycatcher along the Lower Colorado River."[485] Arizona Department of Water Resources, who has general control and supervision of surface water in Arizona, also states that at Lake Havasu, "changed operation to avoid inundating flycatcher habitat [is] not a probable scenario."[486] Parker Dam is discussed in this analysis as if Scenario 2 for water management activities is reasonably foreseeable. This analysis recognizes that Scenario 2 is mostly likely not to occur at Parker Dam.

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[482] IID Water Conservation and Transfer Project, Draft Habitat Conservation Plan, Draft EIR/EIS. Available at http://projects.ch2m.com/iidweb/current/documents/draft/20Section3.12.pdf.

[483] Final Environmental Impact Statement for the Roosevelt Habitat Conservation Plan, Gila and Maricopa Counties, Arizona, Volume I of the FEIS, December 2002.

[484] There is no current legal requirement for USBR to maintain water levels below flycatcher habitat at the lake created by Hoover Dam, Southwest Center for Biological Diversity v. U.S. Bureau of Reclamation, 143 F.3d 515 (9th Cir. 1998). Service and USBR Solicitors further state that the Department of Interior has interpreted the U.S. Supreme Court's injunction in Arizona v. California, 376 U.S. 340 (1964) as precluding the release of water from Lake Mead for the sole purpose of protecting flycatcher habitat. Comments of the Southwest Regional Solicitor's Office, December 15, 2004.

[485] "Economic Analysis: Southwestern Willow Flycatcher: 2006-2004", Lower Colorado Regional Office, USBR, written memorandum, July 2004.

[486] Arizona Department of Water Resources, "Proposed Designation of Critical Habitat for the Southwestern Willow Flycatcher: Federal Register: October 12 ,2004 (Volume 69, Number 196)", Comments of Herbert R. Guenther, May 27, 2005.

Roosevelt Dam

684. Salt River Project (SRP) personnel provided estimates of power production for two operation alternatives under the 2002 Roosevelt Habitat Conservation Plan (HCP). The first alternative restricts reservoir operations to an elevation of 2,095 feet; the second alternative restricts operations to an elevation of 2,125 feet. The level of Roosevelt during full operations is 2,151 feet. Based on Salt River Project Simulation Model (SRPSIM), a model that simulates SRP reservoir operation alternatives, the annual power production of the hydroelectric facility at full operations (2,151 feet) is 77,462 MWh.[487] In contrast, the annual power production with reservoir elevations of 2,125 and 2,095 feet is 78,617 MWh and 80,311 MWh, respectively.[488] Thus, the impact to hydroelectric production resulting from changes to reservoir operations to accommodate flycatcher conservation efforts is a net gain in power generation of 1,155 to 2,849 MWh.

Hoover Dam

685. If conservation efforts for the flycatcher resulted in USBR attempting to maintain a storage level of 1,200 feet in elevation for Lake Mead (Hoover Dam), to avoid inundating flycatcher habitat, the result would be a loss of storage capacity in some years. However, as stated above, this analysis assumes that because of USBR's current position that it lacks discretion to release water from Lake Mead to benefit flycatcher habitat, operational changes under Scenario 2 at Lake Mead are not reasonably foreseeable.

Parker Dam

686. If Scenario 2 is reasonably foreseeable at Parker Dam, then attempting to maintain a reservoirs levels to avoid inundating flycatcher habitat would result in a loss of storage capacity in some years. This analysis finds that this management strategy would result in displacing 77,338 acre-feet of water in an average year. An acre-foot of water released from Parker dam generates approximately 65 kWh of electricity.[489] Therefore, 5,011 MWh,[490] or approximately 0.6 average MWs of hydroelectric energy-production, is expected to be displaced in an average year due to changes to reservoir operations to accommodate flycatcher conservation efforts.[491] This is equal to about one percent of Parker dam's average annual net electricity production during the past ten years and 0.5 percent of its nameplate capacity.[492] As with Lake Mead, no net loss of electricity production is expected. Further, displaced peak production is expected to be replaced with an alternative, more expensive power supply (see B.1.2).

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[487] Salt River Project, Roosevelt Lake Habitat Conservation Plan, Appendix 3: SRMSIM Model, December 2002.
[488] Personal communication, Yvonne Reinink, Salt River Project, November 30, 2004.
[489] Average production at Parker dam during the 12-month period of December 2003 through November 2004. U.S. Department of the Interior, Bureau of Reclamation, Lower Colorado Region, Archives of Daily Levels/Elevations for Lower Colorado River Reservoirs, available at http://www.usbr.gov/lc/region/g4000/archives.html.
[490] 77,338 acre-feet * 65 kWh/acre-feet * 1 MWh/1,000 kWh = 5,011 MWh (note: estimates rounded).
[491] 5,011 MWh * 1 average MW/8,760 MWh = 0.57 average MW (note: estimates rounded).
[492] The annual net electricity production at Parker dam during the past ten years averaged approximately 5 million kWh. While the installed nameplate capacity is 120 MW, the plant has a 108 MW maximum operating capacity. Source: http://www.usbr.gov/power/data/sites/hoover/hoovergr.pdf.

687. Because no net reduction in electricity production is anticipated, the suggested OMB threshold of one billion kWh is not anticipated to be exceeded.

B.1.2 Evaluation of Whether the Designation will Result in an Increase in the Cost of Energy Production in Excess of One Percent

688. The following analysis considers the probability that displacing hydroelectric production from peak to off-peak production times will lead to a regional increase in the cost of energy production of one percent or more. Because 4 million kWh (5.011 million KWh displaced at Parker less 1.155 million kWh gained at Roosevelt) represents a small portion of the power generated within the six states encompassing the proposed critical habitat designation, this screening level analysis assumes the electricity will be purchased from an alternative source.[493] This analysis assumes the most likely source of replace energy is electricity from a gas turbine peaking facility.

689. First, total annual net electricity generation is estimated,[494] by fuel type, for the six state region. As shown in Exhibit B-1, the region produced 446 billion kWh of electricity in 2000.

Exhibit B-1

REGIONAL NET GENERATION BY FUEL TYPE, 2000 (million kWh)

Fuel Type	CA	AZ	NV	UT	CO	NM	Total
Hydroelectric	39,211	8,643	2,436	751	1,494	221	52,756
Gas	106,313	8,872	12,822	1,146	6,668	4,669	140,490
Petroleum	2,359	194	65	57	113	37	2,825
Coal	2,471	41,012	18,932	34,477	35,386	29,067	161,345
Nuclear	35,176	30,381	-	-	-	-	65,557
Other	21,518	-	1,384	160	-	-	23,062
Total	207,048	89,102	35,639	36,591	43,661	33,994	446,035

Source: Energy Information Administration, Electric Power Annual 2000, Tables A8 through A13, Net Generation from Coal, Petroleum, Gas, Nuclear, Hydroelectric, and Other by Census Division and State, 2000 and 1999.

690. Next, the average operating expense is calculated for each fuel type. In this screening level analysis, the average, in mills per kWh, is determined for the years 1996 to 2000, and then converted into dollars per kWh (Exhibit B-2).

691. The total cost of energy production for the region is then calculated assuming (1) baseline scenario of no change in power operations and (2) alternative scenario including the replacement of hydroelectric power (lost generation from Parker plus increased generation at Roosevelt) with power from a gas turbine facility (Exhibit B-3). Spilling additional water is assumed not to increase costs of hydroelectric production. Therefore,

[493] In 2000, regional energy production by all fuel types in California, Arizona, Nevada, Colorado, Utah, and New Mexico totaled approximately 446 billion kWh (Exhibit B-1).

[494] Net generation is gross generation less plant use. The energy required for pumping at a pumped storage plant is regarded as "plant use" and is deducted from the gross generation.

the estimated production costs of hydroelectric energy associated with the implementation of flycatcher conservation activities (alternative scenario) are assumed to remain the same as current production costs (baseline scenario).

692. Finally, the costs of producing 4 million kWh of energy from a gas turbine facility due to the displacement power at Roosevelt and Parker Dams are compared to regional energy production costs to determine impacts. As illustrated in Exhibit B-3, total financial impacts related to flycatcher conservation activities ($2.7 million annually) represent 0.02 percent of the estimated annual baseline cost of regional energy production, well below the one percent threshold suggested by OMB.

693. It is therefore estimated that constraints placed on energy production within the region resulting from flycatcher conservation activities will not result in significant decreases in production or increases in energy costs within the region.

Exhibit B-2

AVERAGE OPERATING EXPENSES FOR MAJOR U.S. INVESTOR-OWNED ELECTRIC UTILITIES
(Mills per Kilowatt-hour)

Expense	2000	1999	1998	1997	1996	Average
Operating						
Nuclear	8.41	8.93	9.98	11.02	9.47	9.56
Fossil Steam	2.31	2.21	2.17	2.22	2.25	2.23
Hydroelectric	4.74	4.17	3.85	3.29	3.87	3.98
Gas Turbine and Small Scale	4.57	5.16	3.85	4.43	5.08	4.62
Maintenance						
Nuclear	4.93	5.13	5.79	6.90	5.68	5.69
Fossil Steam	2.45	2.38	2.41	2.43	2.49	2.43
Hydroelectric	2.99	2.60	2.00	2.49	2.08	2.43
Gas Turbine and Small Scale	3.50	4.80	3.43	3.43	4.98	4.03
Fuel						
Nuclear	4.95	5.17	5.39	5.42	5.50	5.29
Fossil Steam	17.69	15.62	15.94	16.80	16.51	16.51
Hydroelectric	0.00	0.00	0.00	0.00	0.00	0.00
Gas Turbine and Small Scale	39.19	28.72	23.02	24.94	30.58	29.29
Total, mills/kWh						
Nuclear	18.29	19.23	21.16	23.34	20.65	20.53
Fossil Steam	22.45	20.21	20.52	21.45	21.25	21.18
Hydroelectric	7.73	6.77	5.85	5.78	5.95	6.42
Gas Turbine and Small Scale	47.26	38.68	30.30	32.80	40.64	37.94
Total, $/kWh						
Nuclear	0.0183	0.0192	0.0212	0.0233	0.0207	0.0205
Fossil Steam	0.0225	0.0202	0.0205	0.0215	0.0213	0.0212
Hydroelectric	0.0077	0.0068	0.0059	0.0058	0.0060	0.0064
Gas Turbine and Small Scale	0.0473	0.0387	0.0303	0.0328	0.0406	0.0379

Note: Operating expenses do not include capital or transmission costs.
Source: Energy Information Administration, Electric Power Annual 2000, Table 13. Average Operating Expenses for Major U.S. Investor-Owned Electric Utilities 1996 Through 2000.

Exhibit B-3

INCREASE IN REGIONAL COST OF ENERGY PRODUCTION

Fuel Type	2000 Actual, million kWh	Moving million KWr From Hydro to Gas, million kWh	Change in Regional Energy Production (a) (Million kWh)	Average Operating Cost 1996 to 2000, $/kWh	Estimated Cost of Energy Production in 2000 $	Estimated Cost Moving (a) million kWr From Hydro to Gas, $	
Hydro	52,756	52,752	-4	0.00642	338,482,496	338,457,754	-24,742
Gas	140,490	140,494	4	0.03794	5,329,628,640	5,329,774,934	146,294
Petroleum	2,825	2,825	0	0.02118	59,822,200	59,822,200	0
Coal	161,345	161,345	0	0.02118	3,416,641,720	3,416,641,720	0
Nuclear	65,557	65,557	0	0.02053	1,346,147,438	1,346,147,438	0
Other	23,062	23,062	0	0.03794	874,880,032	874,880,032	0
Total	446,035	446,035	0	-	11,365,602,526	11,365,724,078	121,552
Total Impact of Changes in Energy Production at Three Dams							
Incremental cost of displacing kWh from hydroelectric to gas					$121,552		
Value of lost power production from Roosevelt dam					$2,600,000		
Total Economic Impact					$2,721,552		
Percent increase from baseline energy production costs					0.02%		

APPENDIX C: COSTS ASSOCIATED WITH AREAS PROPOSED FOR EXCLUSION

694. Section 4(b)(2) of the Act states that critical habitat shall be designated, and revised, on the basis of the best available scientific data available after taking into consideration the economic impact, impact on national security, and any other relevant impact, of specifying any particular area as critical habitat. An area may be excluded from critical habitat if it is determined that the benefits of such exclusion outweigh the benefits of specifying a particular area as critical habitat, unless the failure to designate such area as critical habitat will result in the extinction of the species.

695. Within the 376,000 acres identified as essential habitat for the flycatcher across six states, 102,000 acres are excluded from CHD, proposed for exclusion from CHD, or considered for exclusion from CHD.[495] These areas include Tribal lands, lands managed by DOD, National Wildlife Refuges, private lands with legally operative HCPs or draft HCPs, State lands with conservation plans, and other lands with management plans in place for the southwestern willow flycatcher. Specifically, this appendix considers:

- **Areas Excluded from CHD**. This includes areas covered by certain approved and pending HCPs and lands owned and managed by the Department of Defense. For these lands, the Service determined that the benefits of excluding these lands outweigh the benefits of their inclusion (69 FR 60706). Specifically, this group includes areas covered by the Western Riverside Multiple Species Conservation Plan; the San Diego Multiple Species Conservation Program; and the City of Carlsbad's Habitat Management Plan. Military lands that fall into this group, include the Marine Corps Base, Camp Pendleton; and the Seal Beach Naval Weapons Station, Fallbrook Detachment.

- **Areas Proposed for Exclusion from CHD**. This includes areas covered by the Lake Roosevelt Habitat Conservation Plan, which the Service is proposing to exclude from CHD because it is already managed to protect the PCEs.

[495] For a detailed review of various exclusions under consideration, see pages 60724-60731of the proposed rule to designate critical habitat for the flycatcher (69 FR 60706).

- **Areas Considered for Exclusion from CHD**. This group includes State Wildlife Areas (SWA), National Wildlife Refuge (NWR) lands, and Tribal and Pueblo lands. For these lands the Service "may consider for exclusion from the final designation of critical habitat based upon further analysis and public comment (69 FR 60729)." Specifically, this group, includes the Clark County Multiple Species Habitat Conservation Plan; the Lower Colorado River Multi-Species Conservation Plan; Hualapai Tribe; Lower Colorado River Indian Tribes; San Carlos Apache Tribe; Key Pittman SWA; Overton SWA; Pahranagat NWR; Bill Williams NWR; Havasu NWR; Cibola NWR; and Imperial NWR; Alamosa/Monte Vista NWRs; Bosque del Apache NWR; and Sevilleta NWR.

696. As shown in Exhibit C-1, areas excluded from CHD comprise 11,000 acres, or three percent of essential habitat; areas proposed for exclusion comprise 19,500 acres, or five percent of essential habitat; and areas considered for exclusion comprise 71,500 acres, or 19 percent of essential habitat.

697. Exhibits C-2 summarizes the annual future costs by management unit resulting from flycatcher conservation activities in each of these three groups. Additional detail for each group is provided in the following exhibits C-3 to C-5. For each group, non-monetized impacts resulting from flycatcher protection are also presented. This includes the impacts of flycatcher conservation activities on fire management activities, represented by the number of CHD acres that overlap WUI areas, and activities on military and Tribal lands.

Exhibit C-1

TOTAL NUMBER OF ACRES OF AREAS EXCLUDED, AREAS PROPOSED FOR EXCLUSION, AND AREAS CONSIDERED FOR EXCLUSION FROM FLYCATCHER CRITICAL HABITAT

Recovery Unit	Management Unit	Total Acres Proposed Rule	Areas Excluded from CHD	Areas Proposed for Exclusion from CHD	Areas Considered for Exclusion from CHD
Basin and Mojave	Kern	5,309	0	0	0
	Mojave	2,553	0	0	0
	Owens	9,366	0	0	0
	Salton	206	0	0	27
Coastal California	San Diego	15,890	9,634	0	1,050
	Santa Ana	10,608	1,285	0	0
	Santa Ynez	3,855	0	0	0
Gila	Middle Gila/San Pedro	24,287	0	232	0
	Roosevelt	29,520	0	19,171	0
	San Pedro	26	0	0	0
	Upper Gila	27,372	0	0	8,888
	Verde	10,207	0	124	165
Lower Colorado	Bill Williams	20,596	0	0	2,385
	Hoover-Parker	41,662	0	0	18,980
	Little Colorado	609	0	0	0
	Middle Colorado	6,762	0	0	1,721
	Pahranagat	3,897	0	0	3,511
	Parker-Southerly International Border	25,437	0	0	6,422
	Virgin	13,714	0	0	3,007
Rio Grande	Middle Rio Grande	49,593	0	0	13,090
	San Luis Valley	68,437	0	0	7,822
	Upper Rio Grande	6,318	0	0	4,426
	TOTAL:	**376,223**	**10,919**	**19,527**	**71,494**
	% of Total:		**3%**	**5%**	**19%**

Exhibit C-2

COSTS ASSOCIATED WITH AREAS EXCLUDED, AREAS PROPOSED FOR EXCLUSION, AND AREAS CONSIDERED FOR EXCLUSION FROM FLYCATCHER CRITICAL HABITAT

Recovery Unit	Management Unit	Areas Excluded from CHD		Areas Proposed for Exclusion from CHD		Areas Considered for Exclusion from CHD	
		Annual Future Costs	Non-Monetrized Costs	Annual Future Costs	Non-Monetized Costs	Annual Future Costs	Non-Monetized Costs
Coastal California	Santa Ynez	$0		$0		$0	
	Santa Ana	$1,909,000	• 377 WUI acres • Marine Corps Base at Camp Pendleton • Fallbrooks Naval Weapons Station	$0		$0	
	San Diego	$629,000	• 2,630 WUI acres	$0		$72,000	• 289 WUI acres
Basin and Mojave	Owens	$0		$0		$0	
	Kern	$0		$0		$0	
	Mohave	$0		$0		$0	
	Salton	$0		$0		$8,000	
Lower Colorado	Little Colorado	$0		$0		$0	
	Virgin	$0		$0		$15,000	
	Middle Colorado	$0		$0		$4,388,000	
	Pahranagat	$0		$0		$120,000	• 31 WUI acres
	Bill Williams	$0		$0		$23,000	
	Hoover to Parker	$0		$0		$7,992,000	• 78 WUI acres
	Parker to Southerly	$0		$0		$7,989,000	• 221 WUI acres
Gila	Verde	$0		$8,000	• 124 WUI acres	$12,000	• 165 WUI acres
	Roosevelt	$0		$2,968,000	• 2 WUI acres	$0	
	Middle Gila/San Pedro	$0		$5,000	• 48 WUI acres	$0	
	Upper Gila	$0		$0		$151,000	• 976 WUI acres
Rio Grande	San Luis	$0		$0		$10,000	
	Upper Rio Grande	$0		$0		$47,000	• 1,966 WUI acres
	Middle Rio Grande	$0		$0		$88,000	• 153 WUI acres
Multiple MUs		$0		$0		$0	
	TOTAL:	**$2,538,000**	• **3,007 WUI acres** • **2 military facilities**	**$2,981,000**	• **174 WUI acres**	**$20,915,000**	• **3,879 WUI acres**

Note: Grazing: Future costs from grazing activities is limited to permit value losses. Costs associated with other project modifications are not included because areas excluded, proposed for exclusion, or considered for exclusion are very small relative the acreage proposed.

Exhibit C-3

COSTS ASSOCIATED WITH EXCLUDED FLYCATCHER CRITICAL HABITAT AREAS BY MANAGEMENT UNIT

		Total Future Costs		Annual Future Costs		Non-Monetized Impacts	
Recovery Unit	**Management Unit**	**LOW**	**HIGH**	**LOW**	**HIGH**	**WUI Acres**	**Military/Tribal Lands**
Coastal	Santa Ynez	$0	$0	$0	$0	0	
California	Santa Ana	$17,338,000	$20,223,000	$1,637,000	$1,909,000	377	- Marine Corps Base at Camp Pendleton - Fallbrook Naval Weapons Station
	San Diego	$2,567,000	$6,659,000	$242,000	$629,000	2,630	
Basin and Mojave	Owens	$0	$0	$0	$0	0	
	Kern	$0	$0	$0	$0	0	
	Mohave	$0	$0	$0	$0	0	
	Salton	$0	$0	$0	$0	0	
Lower Colorado	Little Colorado	$0	$0	$0	$0	0	
	Virgin	$0	$0	$0	$0	0	
	Middle Colorado	$0	$0	$0	$0	0	
	Pahranagat	$0	$0	$0	$0	0	
	Bill Williams	$0	$0	$0	$0	0	
	Hoover to Parker	$0	$0	$0	$0	0	
	Parker to Southerly	$0	$0	$0	$0	0	
Gila	Verde	$0	$0	$0	$0	0	
	Roosevelt	$0	$0	$0	$0	0	
	Middle Gila/San Pedro	$0	$0	$0	$0	0	
	Upper Gila	$0	$0	$0	$0	0	
Rio Grande	San Luis	$0	$0	$0	$0	0	
	Upper Rio Grande	$0	$0	$0	$0	0	
	Middle Rio Grande	$0	$0	$0	$0	0	
	Multiple MUs	$0	$0	$0	$0	0	
	TOTAL:	**$19,905,000**	**$26,882,000**	**$1,879,000**	**$2,538,000**	**3,007**	**· 3,007 WUI acres** **· 2 military facilities**

Note: Grazing: Future costs from grazing activities is limited to permit value losses. Costs associated with other project modifications are not included because areas excluded, proposed for exclusion, or considered for exclusion are very small relative the acreage proposed.

Exhibit C-4

COSTS FOR FLYCATCHER CRITICAL HABITAT AREAS PROPOSED FOR EXCLUSION

		Total Future Costs		Annual Future Costs		Non-Monetized Impacts	
Recovery Unit	**Management Unit**	**LOW**	**HIGH**	**LOW**	**HIGH**	**WUI Acres**	**Military/Tribal Lands**
Coastal California	Santa Ynez	$0	$0	$0	$0	0	
	Santa Ana	$0	$0	$0	$0	0	
	San Diego	$0	$0	$0	$0	0	
Basin and Mojave	Owens	$0	$0	$0	$0	0	
	Kern	$0	$0	$0	$0	0	
	Mohave	$0	$0	$0	$0	0	
	Salton	$0	$0	$0	$0	0	
Lower Colorado	Little Colorado	$0	$0	$0	$0	0	
	Virgin	$0	$0	$0	$0	0	
	Middle Colorado	$0	$0	$0	$0	0	
	Pahranagat	$0	$0	$0	$0	0	
	Bill Williams	$0	$0	$0	$0	0	
	Hoover to Parker	$0	$0	$0	$0	0	
	Parker to Southerly	$0	$0	$0	$0	0	
Gila	Verde	$22,000	$82,000	$2,000	$8,000	124	
	Roosevelt	$29,716,000	$31,448,000	$2,805,000	$2,968,000	2	
	Middle Gila/San Pedro	$11,000	$53,000	$1,000	$5,000	48	
	Upper Gila	$0	$0	$0	$0	0	
Rio Grande	San Luis	$0	$0	$0	$0	0	
	Upper Rio Grande	$0	$0	$0	$0	0	
	Middle Rio Grande	$0	$0	$0	$0	0	
	Multiple MUs	$0	$0	$0	$0	0	
	TOTAL:	**$29,749,000**	**$31,583,000**	**$2,808,000**	**$2,981,000**	**174**	

Notes: This exhibit represents costs associated with areas proposed for exclusion as stated in the proposed rule. Grazing: Future costs from grazing activities is limited to permit value losses. Costs associated with other project modifications are not included because areas excluded, proposed for exclusion, or considered for exclusion are very small relative the acreage proposed.

Exhibit C-5

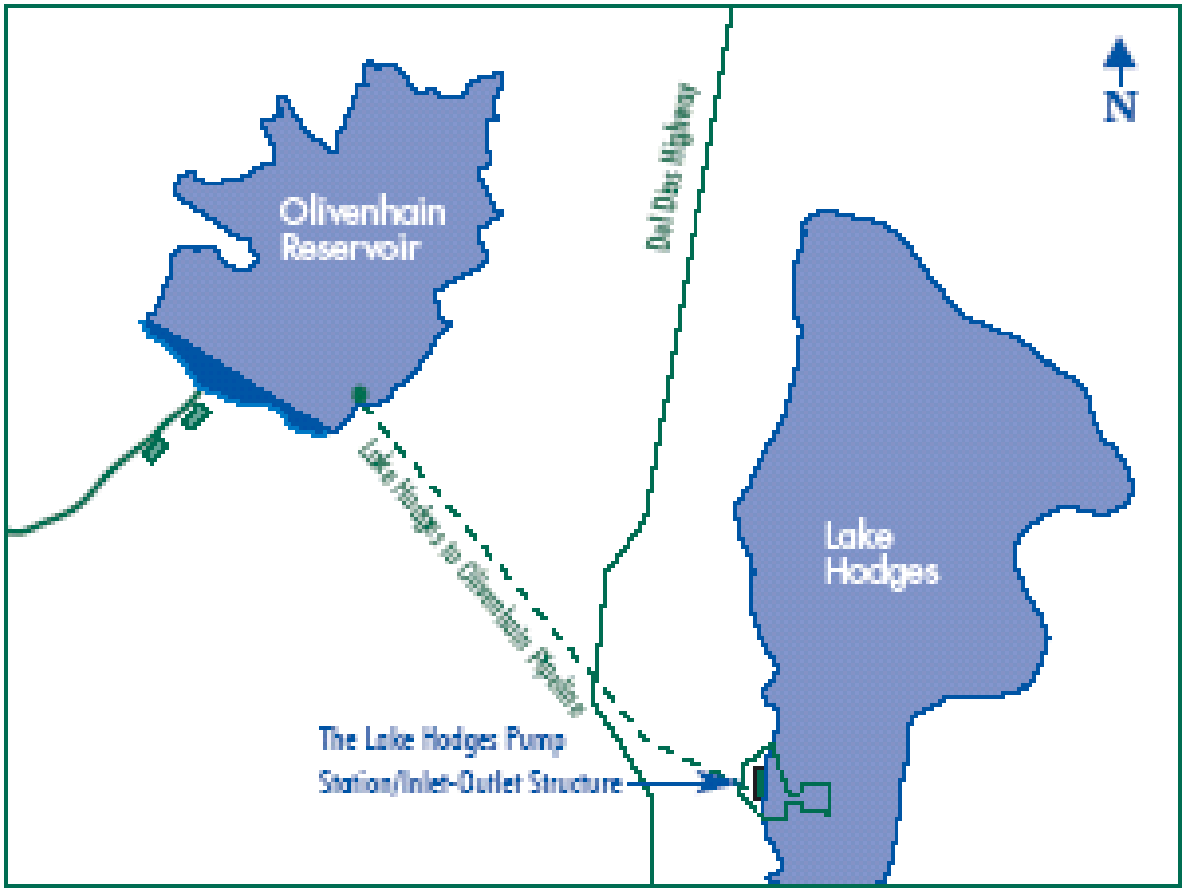
COSTS FOR FLYCATCHER CRITICAL HABITAT AREAS CONSIDERED FOR EXCLUSION

		Total Future Costs		Annual Future Costs		Non-Monetized Impacts	
Recovery Unit	**Management Unit**	**LOW**	**HIGH**	**LOW**	**HIGH**	**WUI Acres**	**Military/Tribal Lands**
Coastal California	Santa Ynez	$0	$0	$0	$0	0	
	Santa Ana	$0	$0	$0	$0	0	
	San Diego	$181,000	$581,000	$17,000	$55,000	289	
Basin and Mojave	Owens	$0	$0	$0	$0	0	
	Kern	$0	$0	$0	$0	0	
	Mohave	$0	$0	$0	$0	0	
	Salton	$20,000	$63,000	$2,000	$6,000	0	
Lower Colorado	Little Colorado	$0	$0	$0	$0	0	
	Virgin	$36,000	$123,000	$3,000	$12,000	0	
	Middle Colorado	$45,523,000	$46,201,000	$4,297,000	$4,361,000	0	
	Pahranagat	$293,000	$979,000	$28,000	$92,000	31	
	Bill Williams	$57,000	$189,000	$5,000	$18,000	0	
	Hoover to Parker	$84,294,000	$84,554,000	$7,957,000	$7,981,000	78	
	Parker to Southerly	$84,286,000	$84,531,000	$7,956,000	$7,979,000	221	
Gila	Verde	$29,000	$99,000	$3,000	$9,000	165	
	Roosevelt	$0	$0	$0	$0	0	
	Middle Gila/San Pedro	$0	$0	$0	$0	0	
	Upper Gila	$370,000	$1,235,000	$35,000	$117,000	976	
Rio Grande	San Luis	$19,000	$88,000	$2,000	$8,000	0	
	Upper Rio Grande	$114,000	$380,000	$11,000	$36,000	1,966	
	Middle Rio Grande	$215,000	$717,000	$20,000	$68,000	153	
	Multiple MUs	$0	$0	$0	$0	0	
	TOTAL:	**$215,437,000**	**$219,740,000**	**$20,336,000**	**$20,742,000**	**3,879**	

Appendix D

BACKGROUND AND HISTORICAL WATER STORAGE FOR RESERVOIR FACILITIES ASSESSED UNDER SCENARIO 2

Exhibit D-1
Proposed Connection Between Lake Hodges And Olivenhain Reservoir



Source: San Diego County Water Authority, Oliverhain-Hodges Pumped Storage Project Fact Sheet. July 2004.

Exhibit D-2

Lake Hodges Reservoir: Historical Water Storage and Water Lost Estimate under Scenario 2

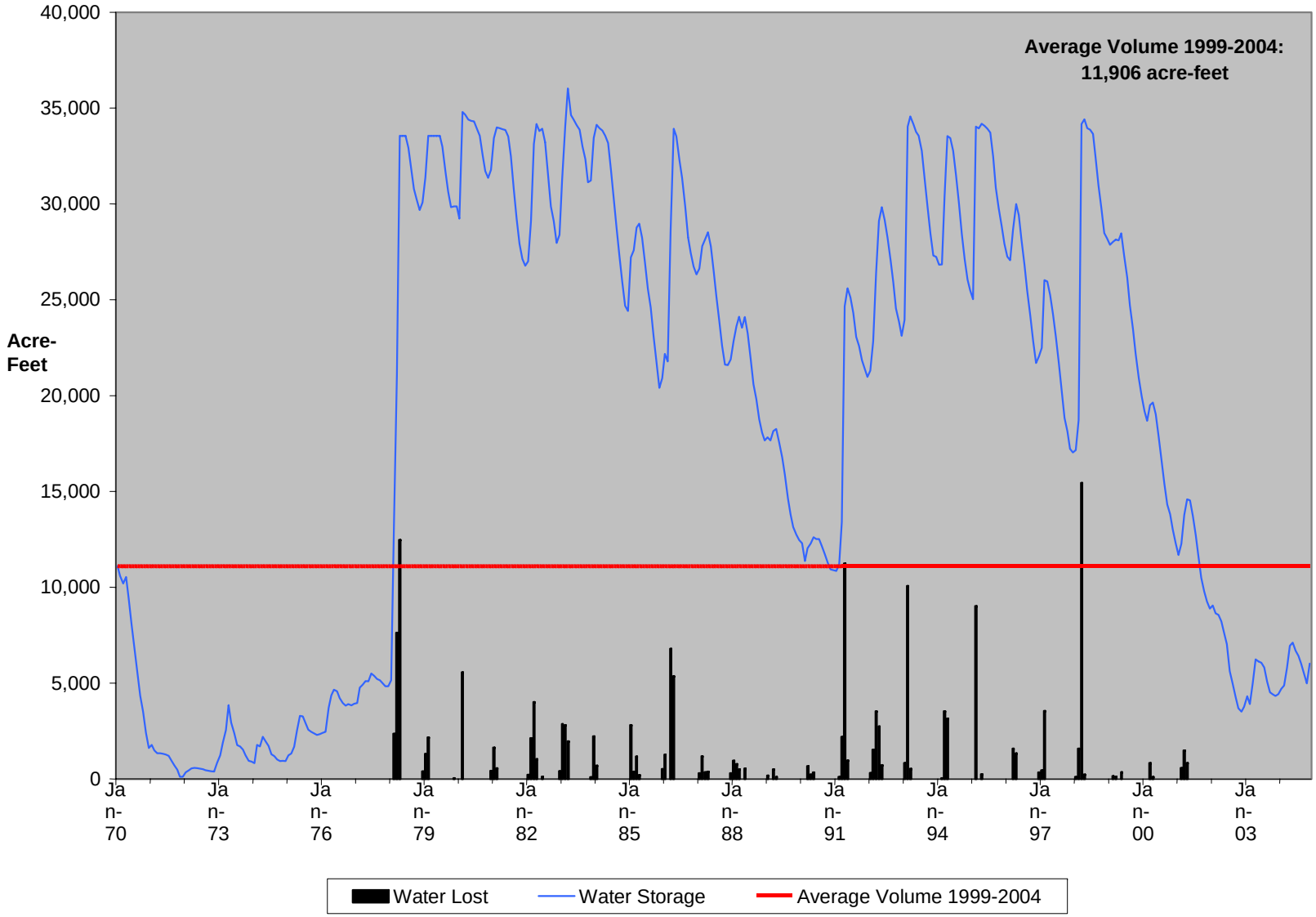


Exhibit D-3

Lake Cuyamaca Reservoir: Historical Water Storage and Water Lost Estimate under Scenario 2

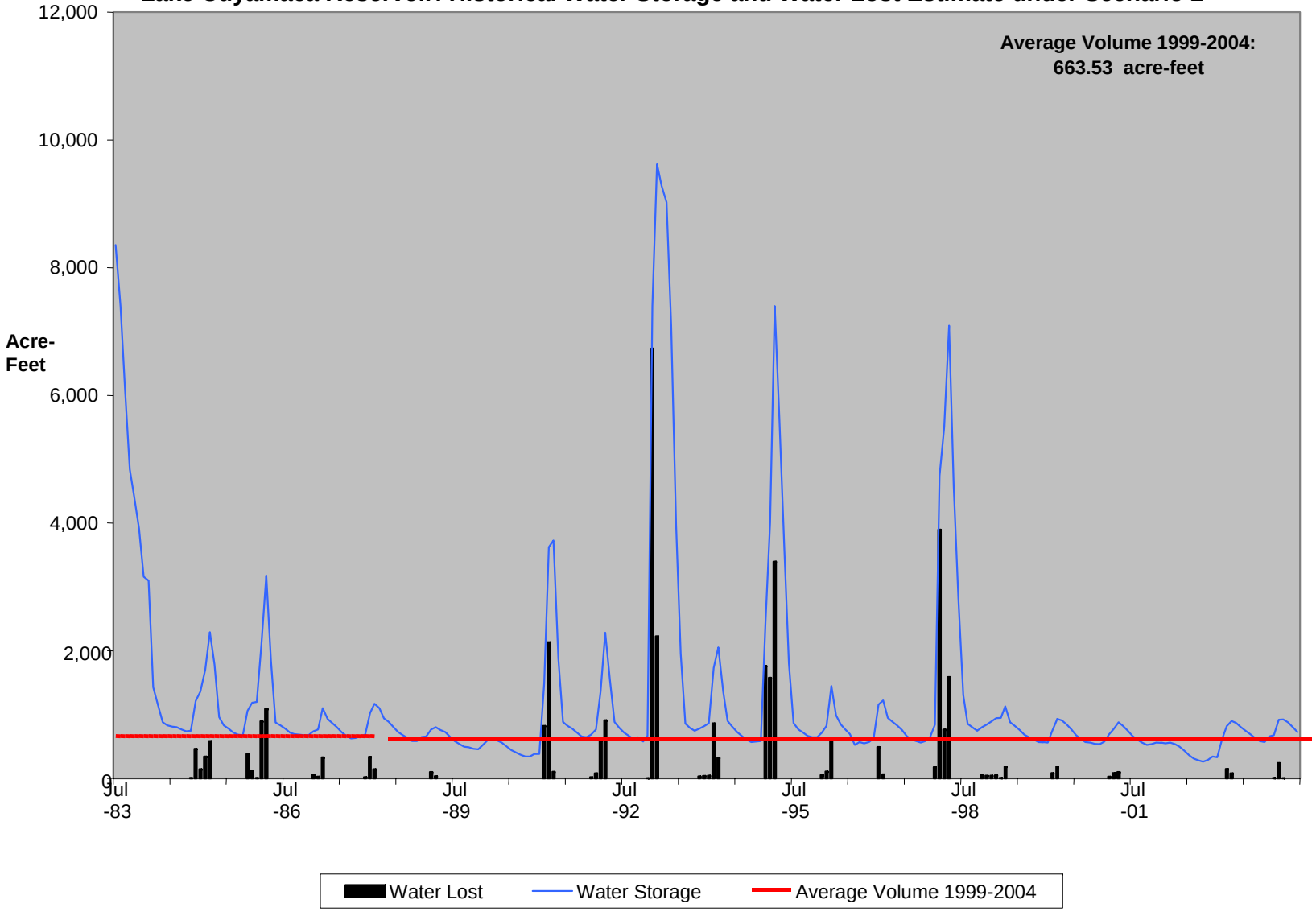
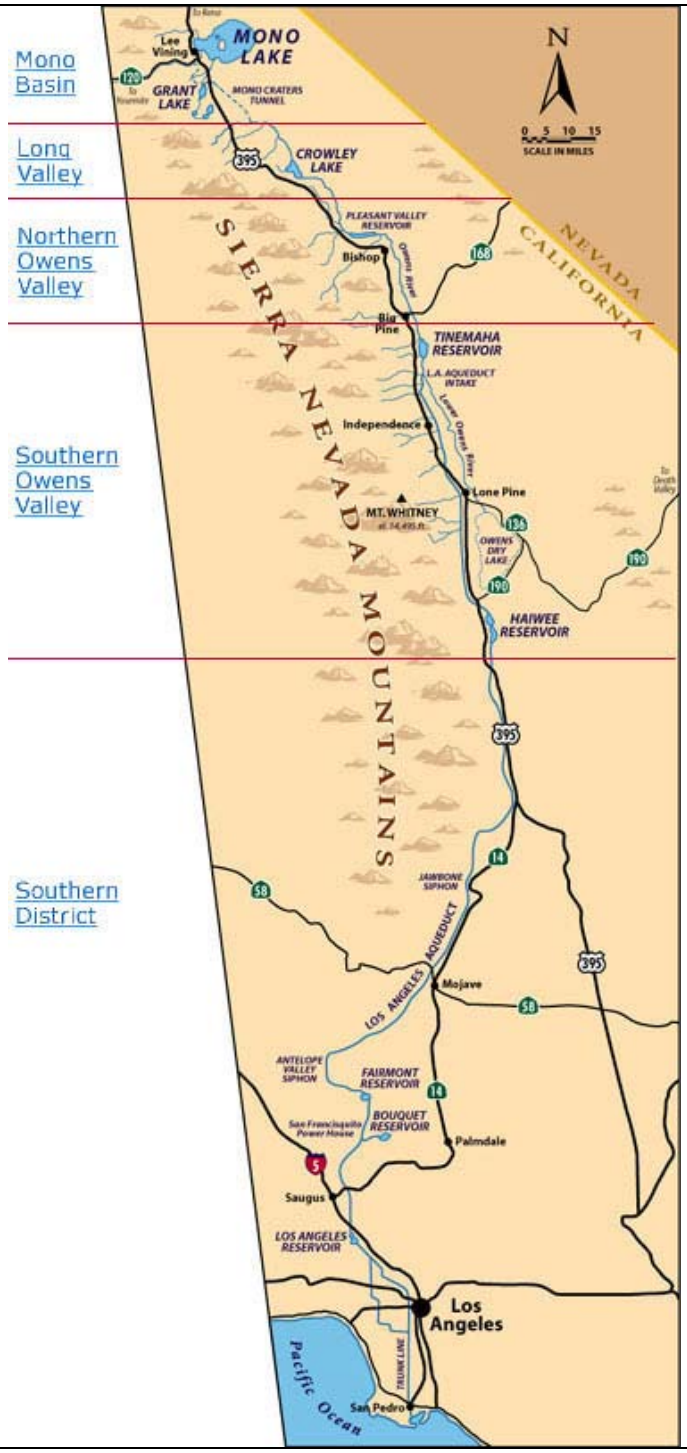


Exhibit D-4
Los Angeles Aqueduct Water System Along The Owens River, Including Pleasant Valley Dam



Source: Los Angeles Department of Water and Power. Online: http://wsoweb.ladwp.com/Aqueduct/operations/index.htm. Accessed on: February 7, 2005.

Exhibit D-5

Lake Vail Reservoir: Historical Water Storage and Water Lost Estimate under Scenario 2

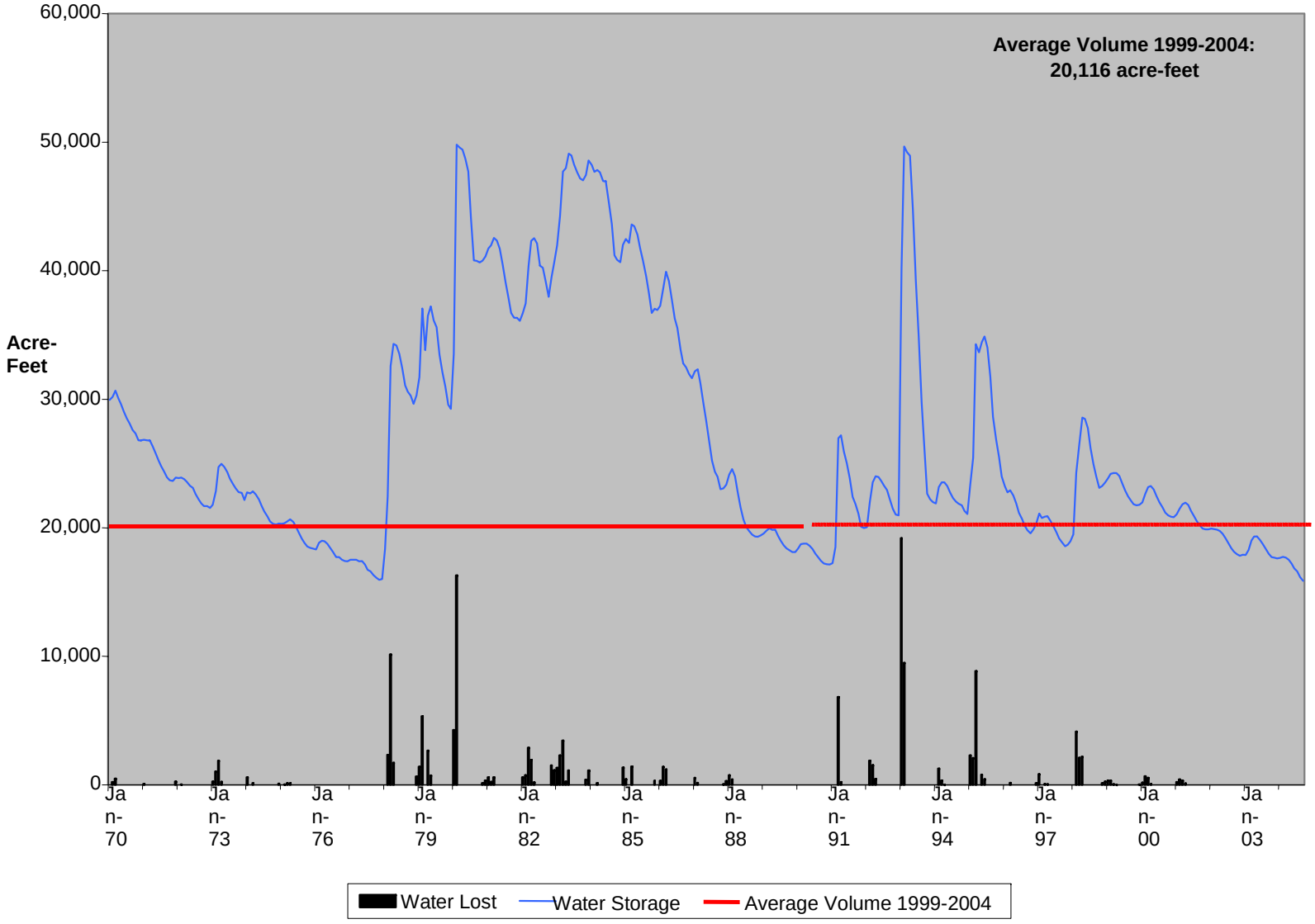
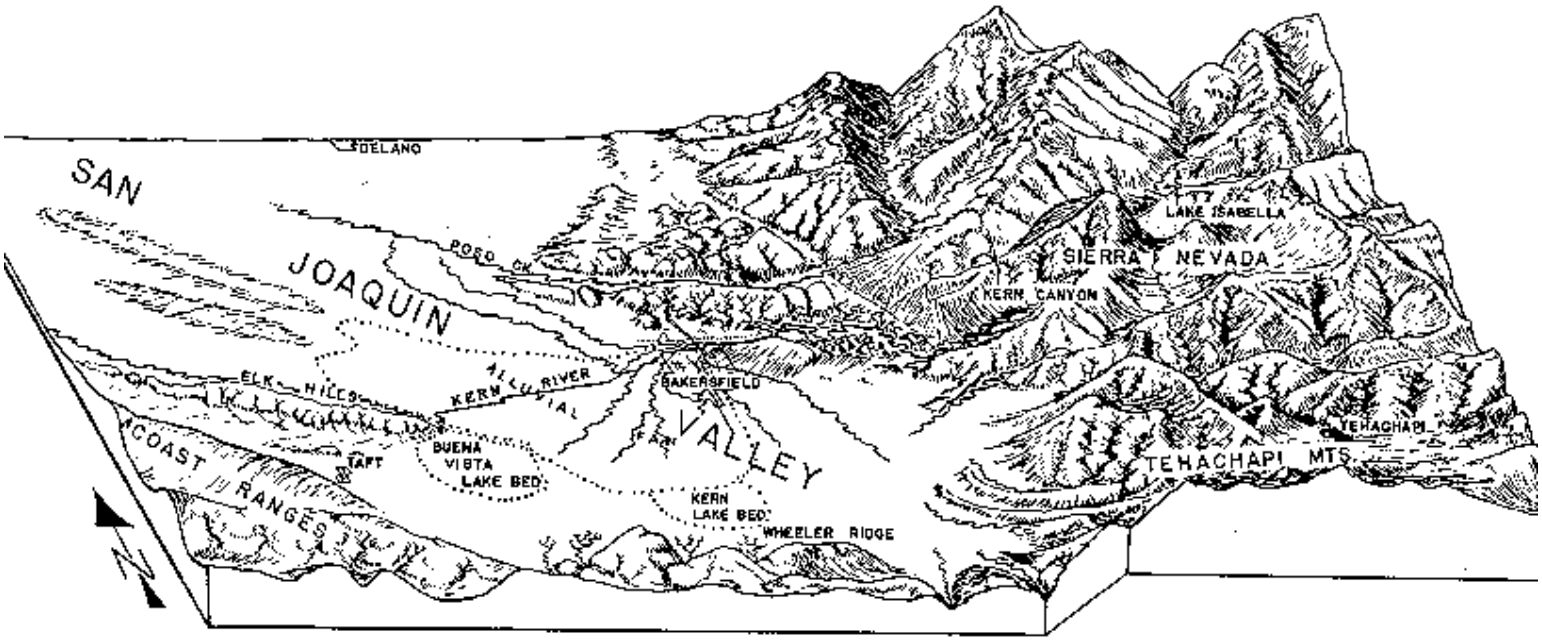


Exhibit D-6
Kern River Valley and Lake Isabella



Source: San Joaquin Valley Geological Society. Runoff from the Sierras. Accessed online on 2/14/2005 at http://www.sjgs.com/groundwater/GVblock.gif.

Exhibit D-7

Lake Isabella Reservoir: Historical Water Storage and Water Lost Estimate under Scenario 2

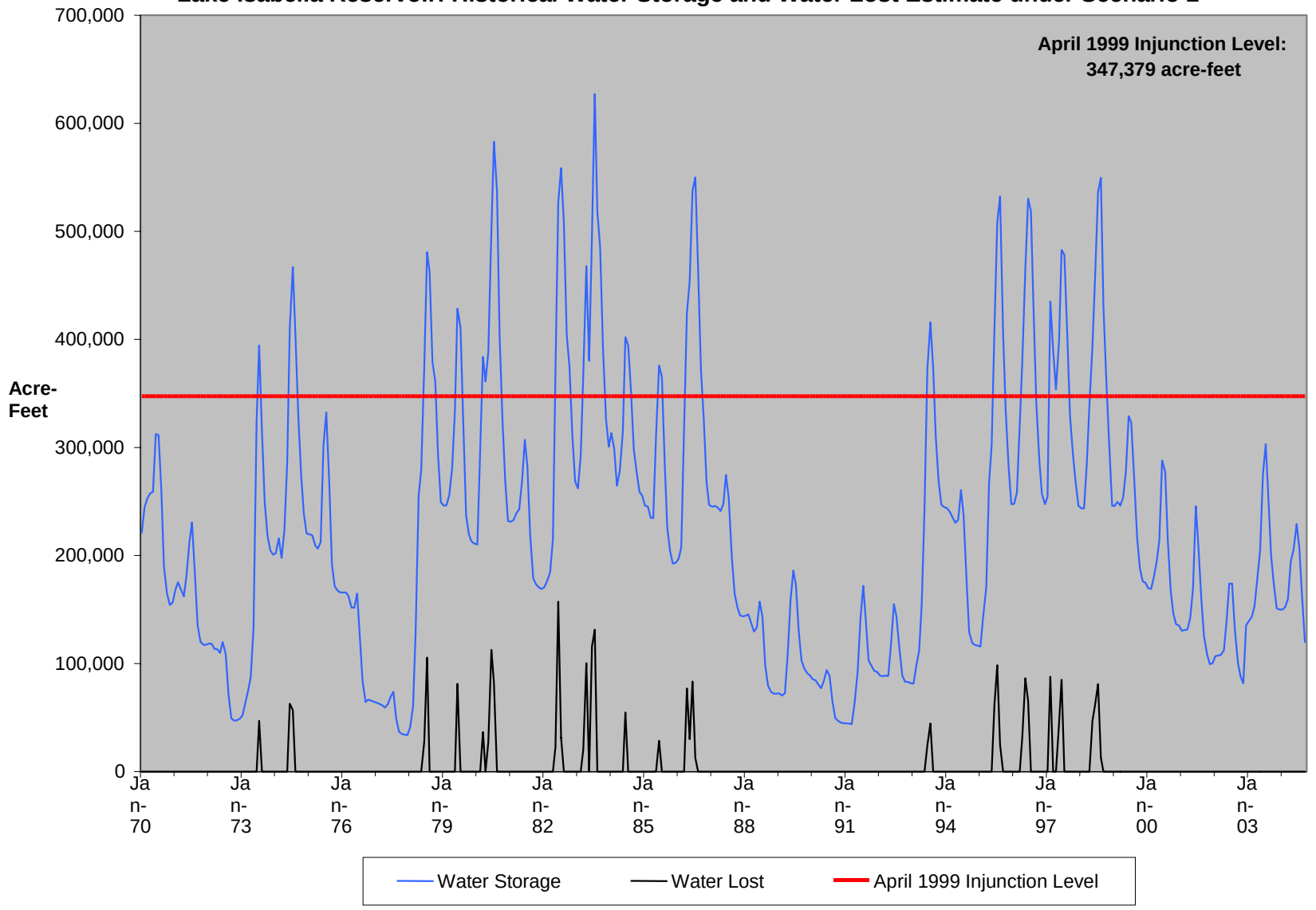
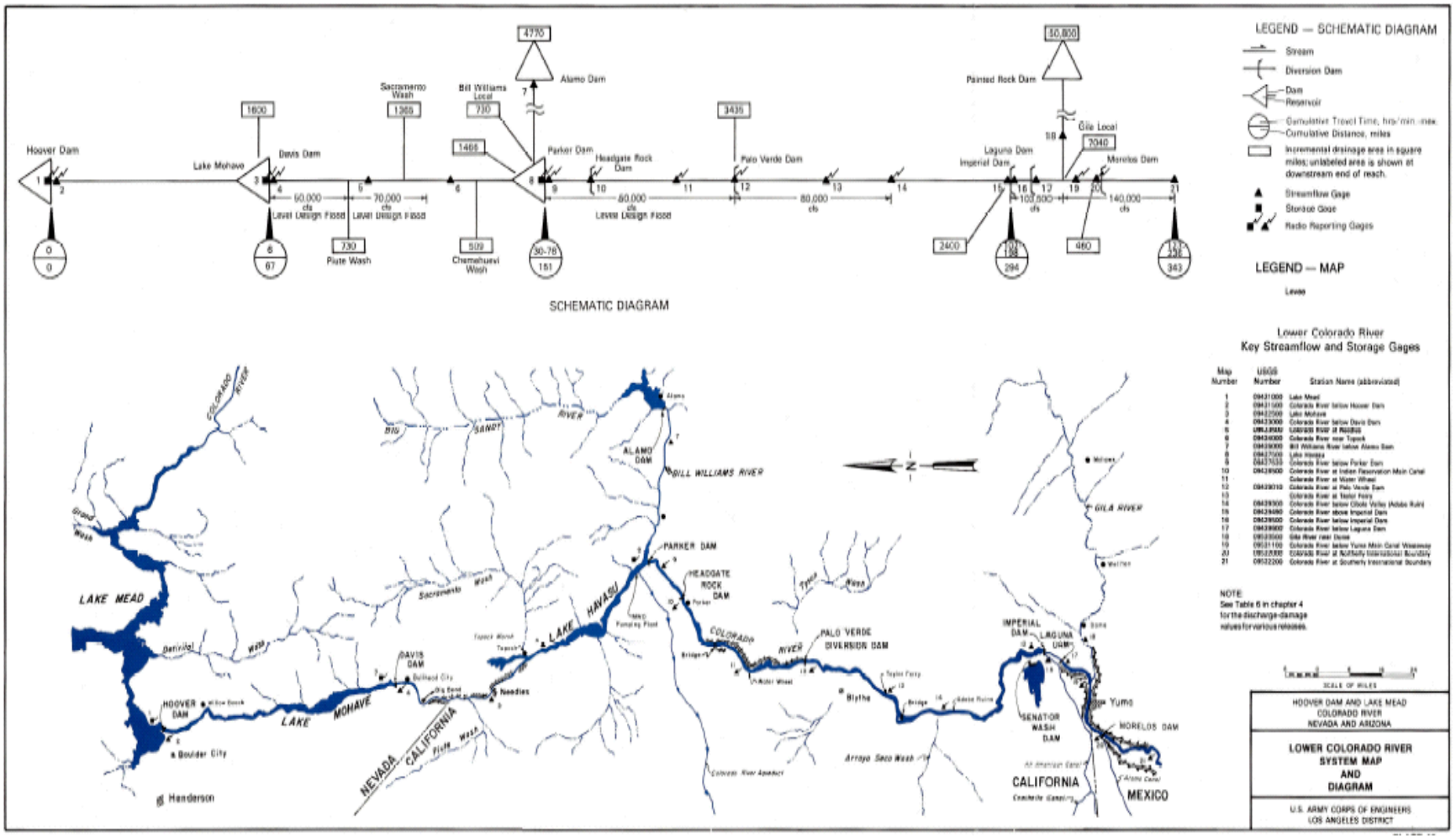
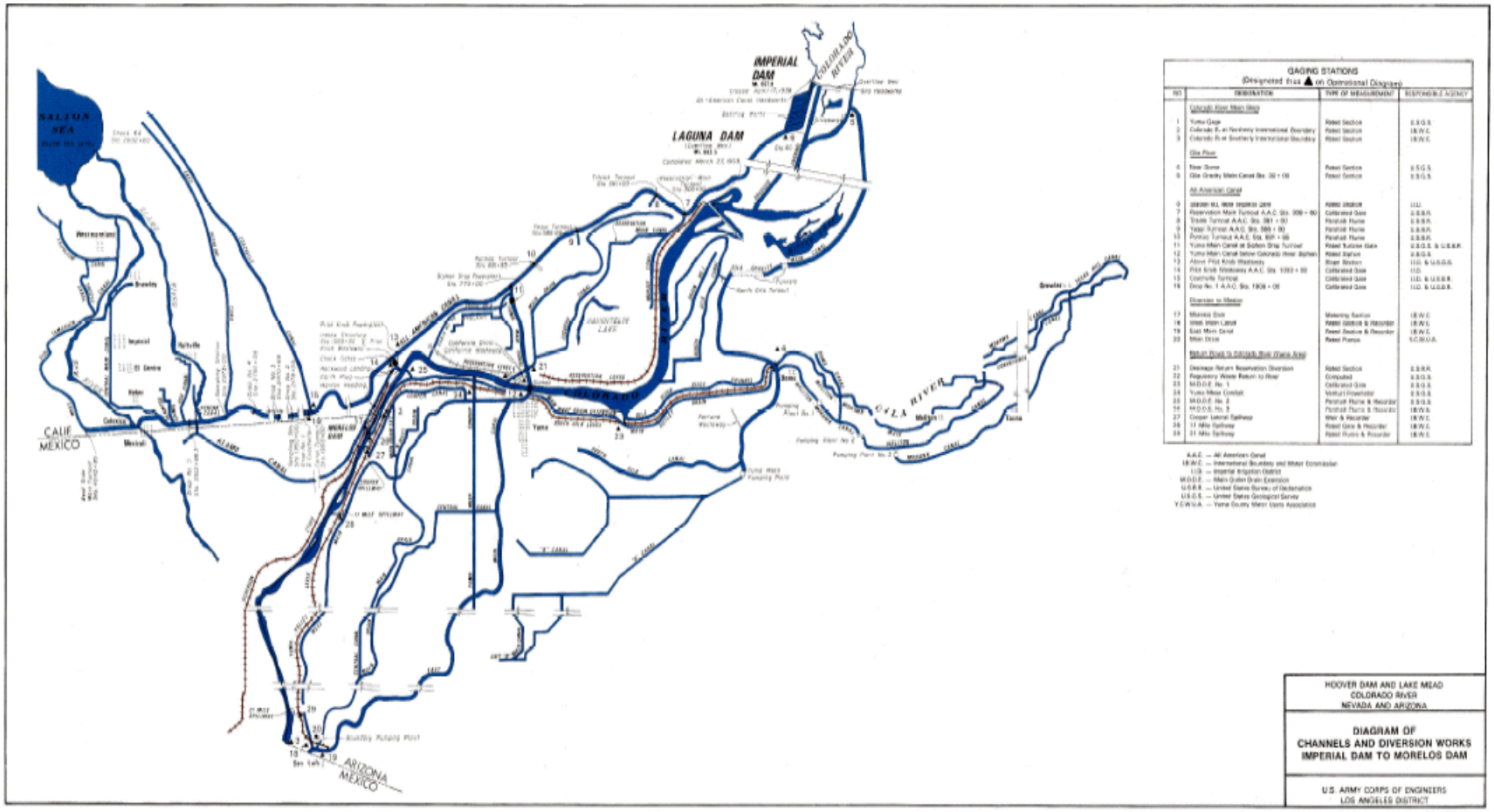


Exhibit D-8
Hoover Dam/Lake Mead System Map



Source: USACE, Water Control Manual for Flood Control, Hoover Dam and Lake Mead, Colorado River. Plate 19. December 1982.

Exhibit D-9
Laguna/Imperial Dam Area, Lower Colorado River



Source: USACE, Water Control Manual for Flood Control, Hoover Dam and Lake Mead, Colorado River. Plate 19. December 1982.

Exhibit D-10

Lake Mead Reservoir: Historical Water Storage and Water Lost Estimate Under Scenario 2

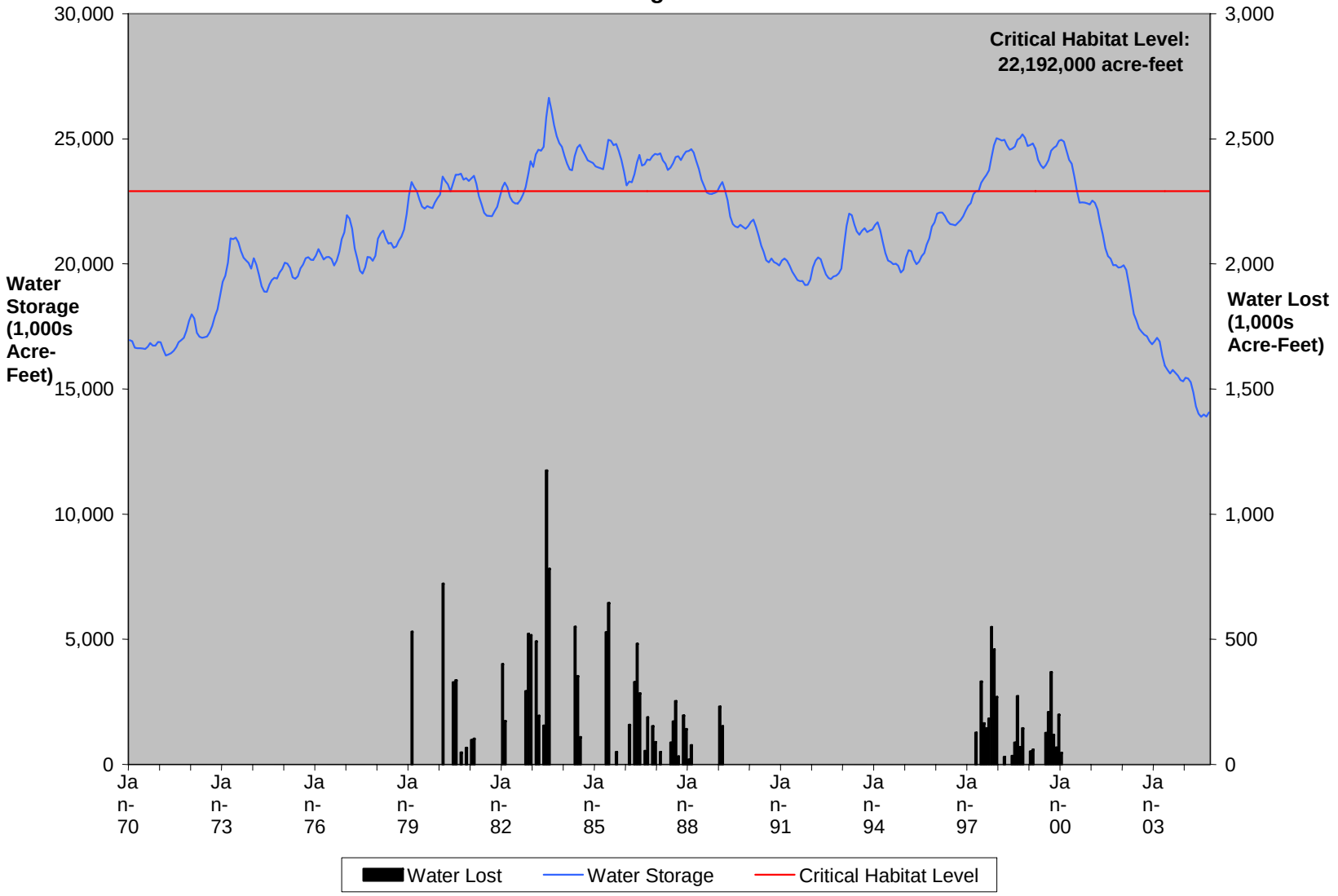
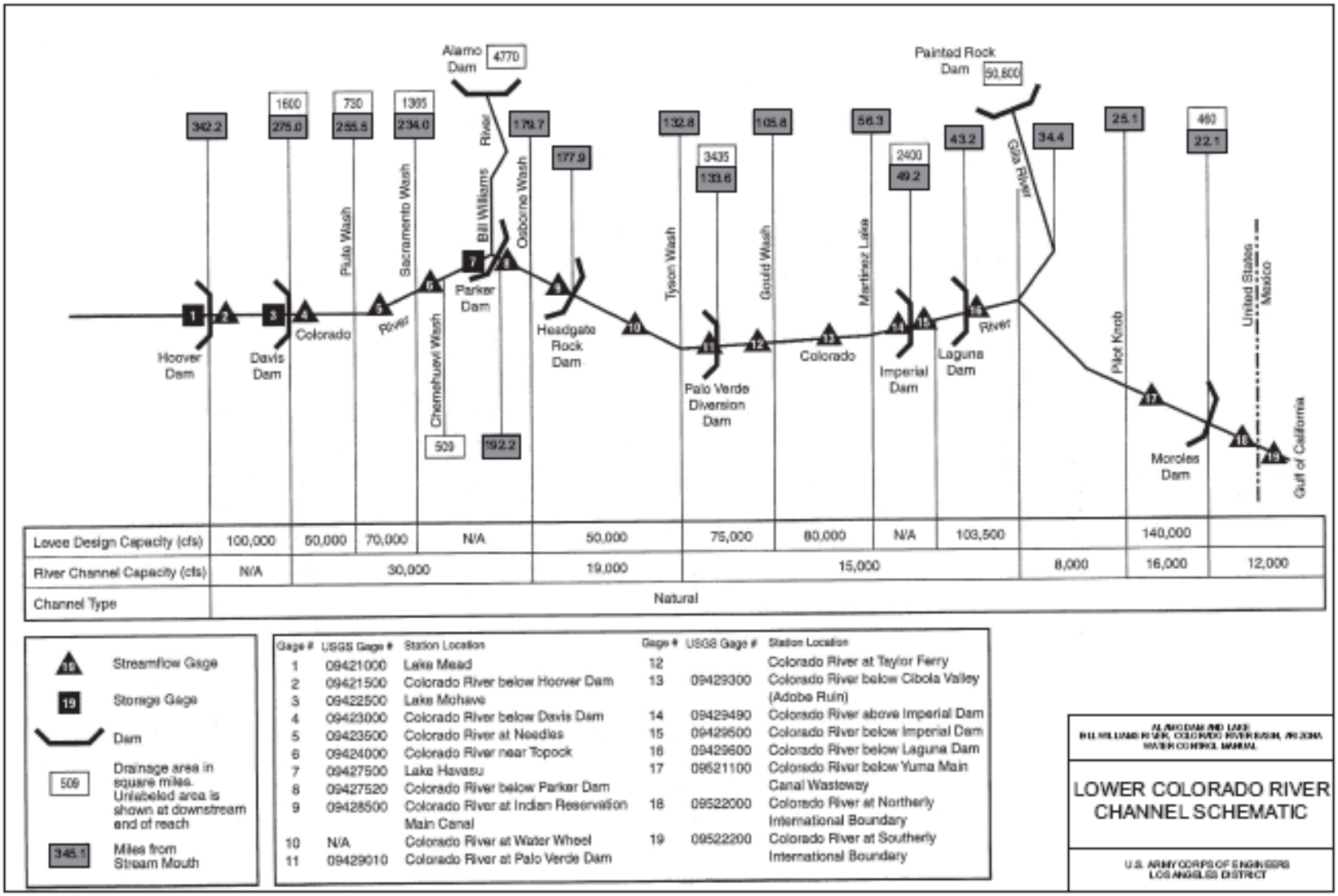
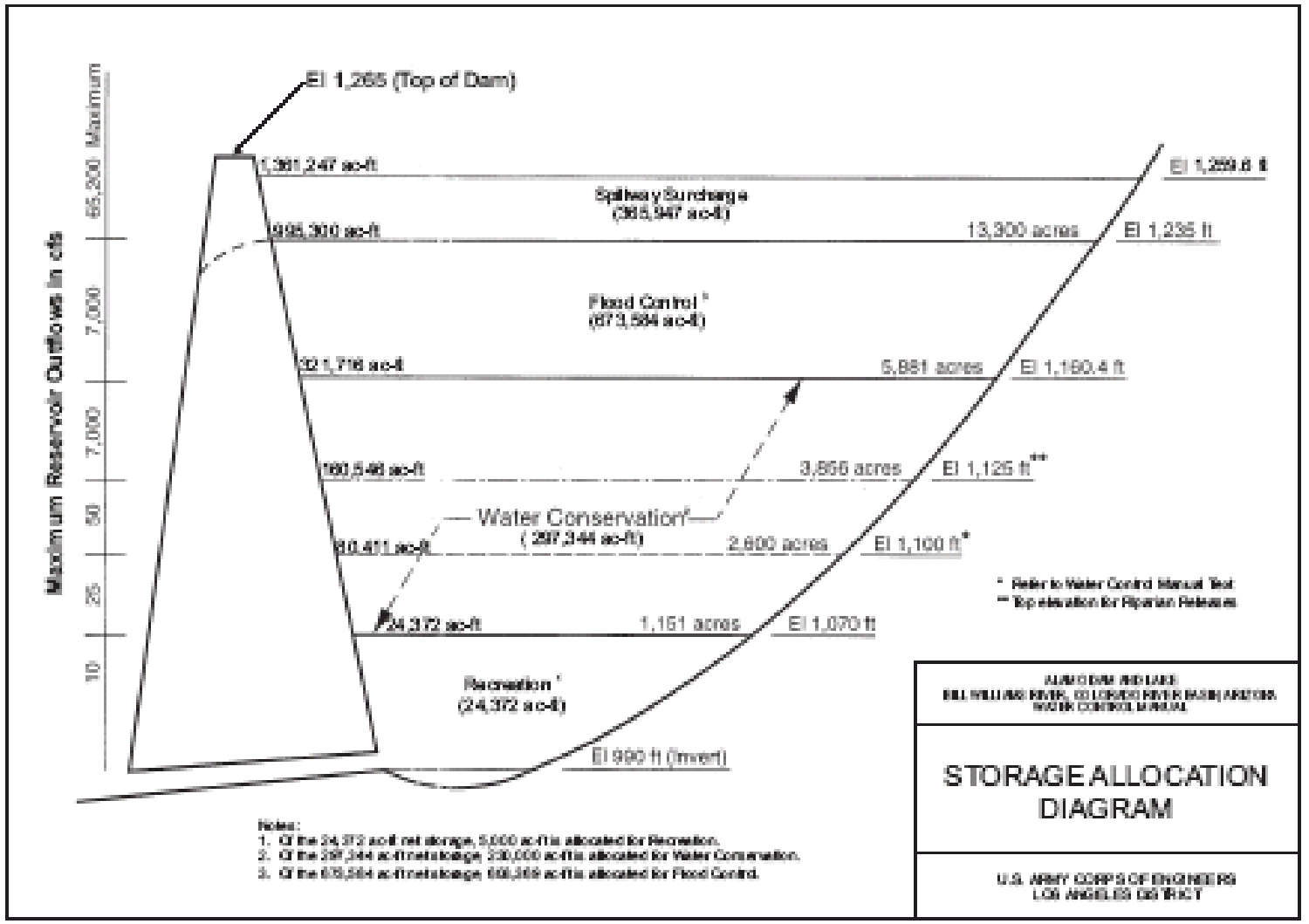


Exhibit D-11
Lower Colorado River Channel Schematic



Source: USACE, Water Control Manual, Lake Alamo, Colorado River Basin, Bill Williams River, Arizona. Plate 3-01. October 2003.

Exhibit D-12
Alamo Dam Storage Allocation Diagram



Source: USACE, Water Control Manual, Lake Alamo, Colorado River Basin, Bill Williams River, Arizona. Plate 7-01. October 2003.

Exhibit D-13
Lake Havasu Reservoir: Historical Water Storage and Water Loss Estimate Under Scenario 2

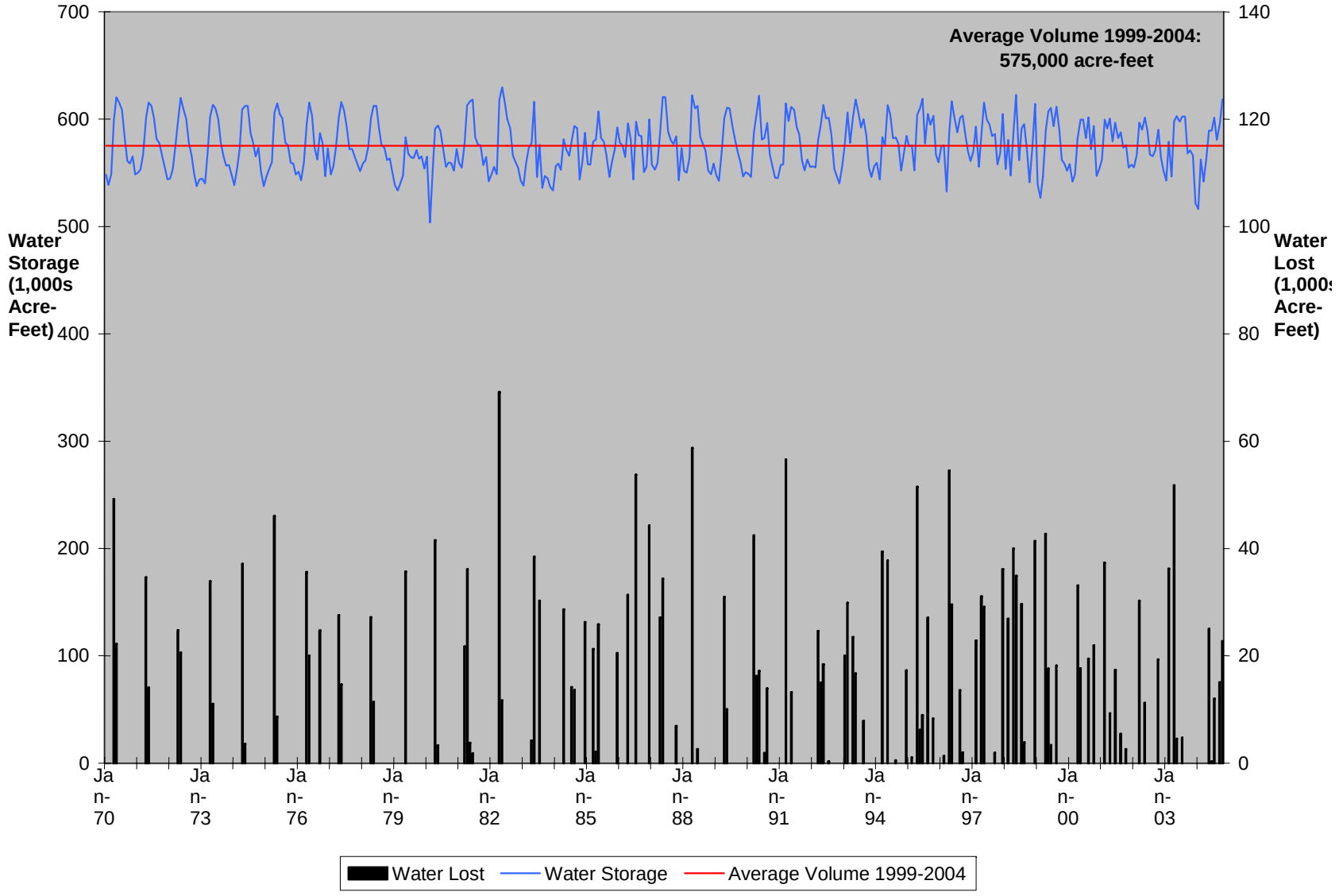
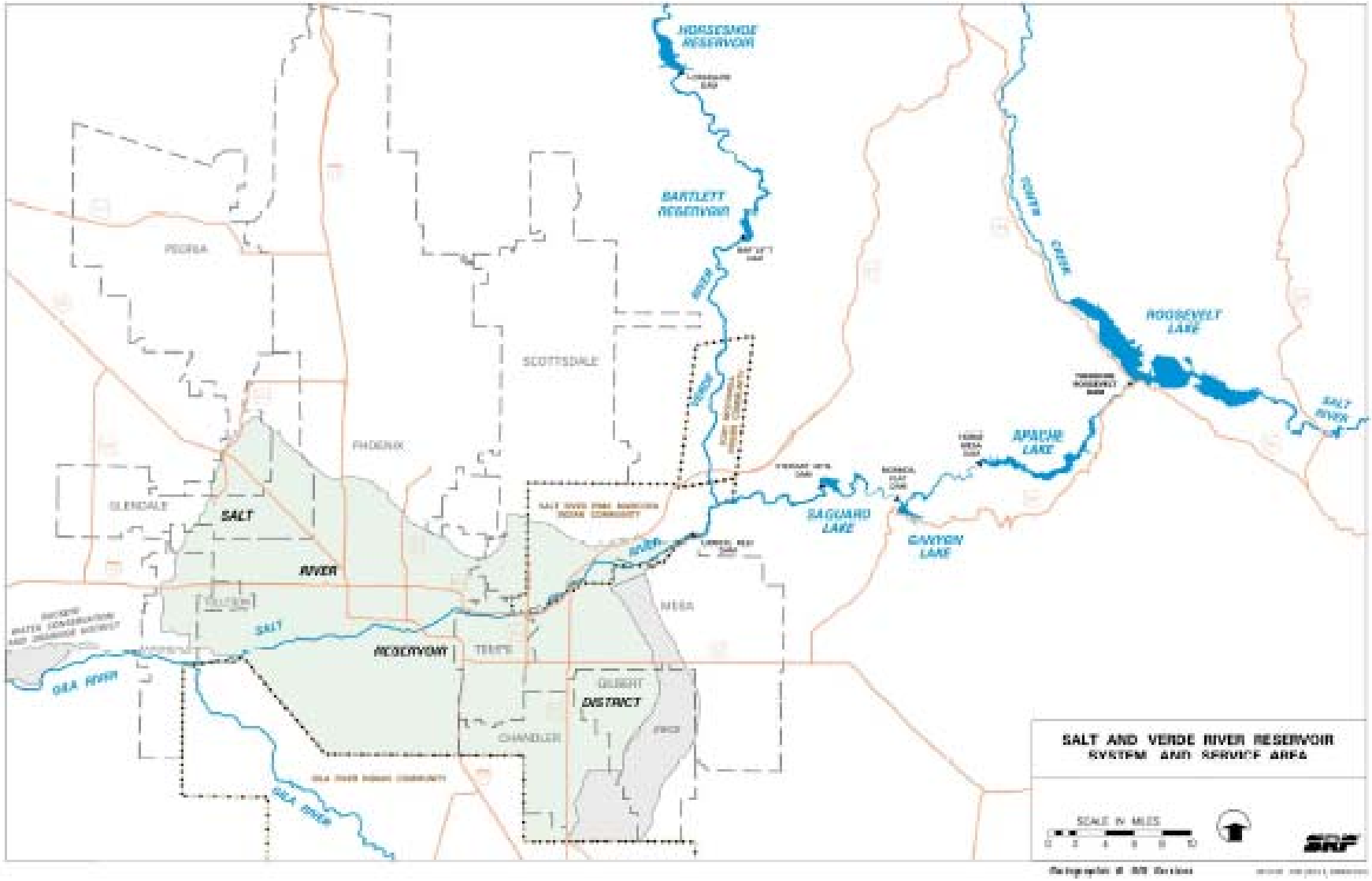
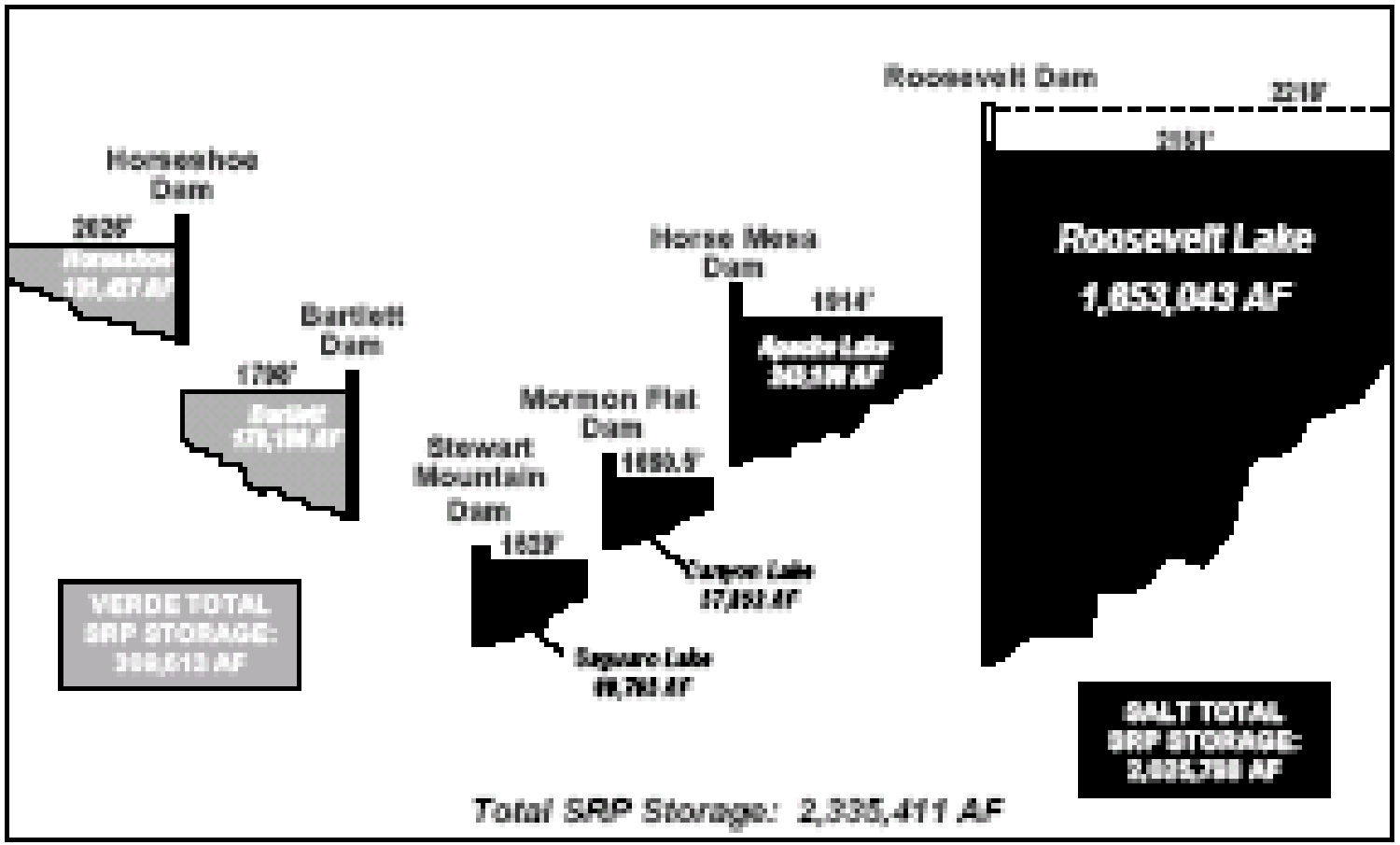


Exhibit D-14
Roosevelt Reservoir Water System



Source: Salt River Project, Roosevelt Habitat Conservation Plan, Gila and Maricopa Counties, Arizona, Volume II, page 12, December 2002

Exhibit D-15
Salt and Verde Reservoir Systems Capacity in Acre-Feet



Note: The maximum conservation storage elevation above mean sea level is shown for each dam, and the maximum flood control elevation (2,218 feet) is also shown for Roosevelt.
Source: Salt River Project, Roosevelt Habitat Conservation Plan, Gila and Maricopa Counties, Arizona, Volume II, page 15. December 2002

Exhibit D-16
Historical Roosevelt Elevations, 1951 Through April 2002