United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Carlsbad Fish and Wildlife Office
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FEB 1 0 2000

Colonel John P. Carroll
District Engineer
U. S. Army Corps of Engineers, Los Angeles District
911 Wilshire Blvd.
P.O. Box 532711
Los Angeles, California 90053-2325

Attn: Alex Watt and Lois Goodman, Environmental Planning Branch
Carvel Bass, Operations Branch

Re: Formal Section 7 Consultation on the Prado Basin Water Conservation and Water Control Operations Project, Prado Basin, Riverside and San Bernardino Counties, California (1-6-99-F-75)

Dear Colonel Carroll:

This document transmits our biological opinion based on our review of the proposed water conservation and water control operations project located in the Prado Basin in Riverside and San Bernardino Counties, California, and its effects on two federally endangered species, the least Bell's vireo (*Vireo bellii pusillus*, "vireo") and southwestern willow flycatcher (*Empidonax traillii extimus*, "flycatcher"), and their designated critical habitats in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your August 10, 1999, request for formal consultation on the revised project was received on August 11, 1999.

Because the federally threatened California red-legged frog (*Rana aurora draytonii*) and endangered arroyo toad *(Bufo microscaphus californicus*) were not located within the Prado Basin during focused surveys in 1999 (Dr. H. Lee Jones, pers. comm., 1999), we concur with the U.S. Army Corps of Engineers (Corps) that the project will not adversely affect either species. In addition, the Corps has elected not to initiate conference for potential, project-related effects to the Santa Ana sucker (*Catastomus santaanae*), a species proposed for Federal listing as threatened. As a result, these three species will not be addressed further herein.

Consultation History

In October 1992, the Los Angeles District of the Corps released the environmental impact statement entitled (EIS) *Prado Dam Operation for Water Conservation* for the conservation of water behind Prado Dam during the non-flood season up to a maximum elevation of 505 feet

above sea level. A fish and wildlife coordination act report and planning aid letter were previously prepared for this proposed project (U.S. Fish and Wildlife Service 1987, 1990). The Orange County Water District (OCWD), which owns all rights to the surface water in the Prado Basin, was and remains the project proponent.

Because the project may adversely affect the vireo, the Corps initiated formal consultation. The proposed action was permitted pursuant to our biological opinion (1-6-93-F-7) issued on February 25, 1993. This opinion addressed the impacts of OCWD's phased water retention and conservation project in the Prado Basin. On February 15, 1994, we amended the opinion, which incorporated written comments submitted by Robert Joe of the Corps in a letter dated October 5, 1993, and subsequent discussions and meetings involving our respective staffs. These meetings and discussions resolved the issues raised in that letter and resulted in the mutual agreement to to amend the original biological opinion.

The EIS, coordination act report, planning aid letter, and amended biological opinion addressed impacts associated with the controlled water storage project, which enabled the ultimate capture of the maximum possible amount of water from March 1 to September 1 of each calendar year at OCWD spreading facilities downstream of the dam. During the prescribed water conservation period, releases were restricted to 450 cubic feet per second (cfs), which was then the recharge capacity of the OCWD spreading facilities downstream. Flows into the Prado Basin in excess of the 450 cfs would thus increase the amount of stored water behind the dam up to an eventual, permitted maximum pool elevation of 505 feet above sea level. However, the combination of runoff and base flow was not sufficient in most years to increase the pool elevations to the permitted maxima.

The implementation of the project was initially phased to allow for the "appropriate replacement of habitats occupied by the vireo that are destroyed or degraded as a result of water conservation activities" (EIS). The Corps further specific in the EIS the conservation pool level to which water could be held based on the acreage of mitigation achieved during any single year. The maximum permitted water conservation pool elevation would be raised incrementally from 494 to 505 feet dependent upon the acreage of replacement habitat that had been created or conserved. Per the EIS and the Corps project description, these requirements are detailed in Table 1.

In concert with the project description for this previously-permitted, phased water conservation project, the Corps limited the rate of water releases from the dam between March 1 and September 30 once the elevation pool was at or below a prescribed elevation. By 1994, a minimum of 83 acres of vireo habitat had been created by the project proponent, which allowed the pool to be raised to an elevation of 497 feet.

By 1995, a minimum of 100 acres of vireo habitat had been created and that an elevation 498 would be the allowed level for that year. However, before the onset of the 1995 water conservation season, we recommended a change in habitat conservation and restoration strategies, which was accepted by the Corps and OCWD. This change in compensation strategy

reflected observations of continuing damage to native habitat caused by the uncontrolled spread of giant reed (*Arundo donax*) throughout the Santa Ana River watershed and the vulnerability of created habitats to the frequent, flood-induced damage.

The original restoration strategy called for the removal of giant reed at designated restoration areas and the subsequent planting of native riparian species. However, giant reed propagules were transported to the Prado Basin during years of heavy rainfall, where the alien plant invaded habitats consisting of native plants or impacted areas that had been revegetated or restored. The proposed restoration alternative required the funding of a giant reed eradication program within the Santa Ana River watershed. We hypothesized that native species would be able to revegetate, either naturally or with minimal assistance, in areas cleared of giant reed. The restoration areas that were originally identified in the EIS were still to be revegetated, but over a longer time period.

Subsequent to informal discussions on the conclusion of an informal consultation process, OCWD proposed that the Corps modify the operation of the Prado Flood Control Dam to the accelerate the implementation of the phased water conservation project and that the Department of the Interior and Corps sign a cooperative agreement that formalized this change in operations and OCWD's proposal to incorporate additional compensation measures into the project description. As a result, a cooperative agreement was signed in April 1995 that described in part the revised project and provided for the compensation of unavoidable, project-related impacts relating to the revised OCWD water conservation program. The raising of the water conservation pool to 505 feet, was authorized in light of substantial, additional impact avoidance, minimization and compensation measures.

According to and quoting from the cooperative agreement:

1. The agencies (U.S. Fish and Wildlife Service, Corps, and OCWD) agree to cooperatively manage the environmental value of OCWD lands that have been identified as critical habitat for the least Bell's vireo, specifically OCWD lands in Prado Basin below elevation 543 feet, fully recognizing the water conservation, water quality and various environmental values of these lands.

2. The agencies agree to meet on a quarterly basis to discuss water conservation, water quality and wildlife enhancement objectives.

3. Least Bell's vireo mitigation completed thus far by OCWD, per the Prado October 1992 EIS, has resulted in significant recovery of the species in Prado Basin. While the Prado October 1992 EIS and other agreements have been beneficial, a more productive use of the efforts of the agencies toward expanding an ecosystem-wide program as quickly as possible, in keeping with the spirit of the Prado October 1992 EIS, will benefit both wildlife and water conservation programs.

4. OCWD and U.S. Fish and Wildlife Service (Service) agree to meet annually to specifically review *Arundo donax* removal efforts and re-prioritize the program if necessary. In this regard, a goal of treating all of the *Arundo donax* within a 3-year time frame will be established.

5. OCWD shall contribute $1,000,000 to establish a conservation that will be used to remove *Arundo donax* in the Santa Ana River watershed. With respect to the $1 million contribution, OCWD will contribute the money in four equal payments ($250,000 each) beginning June 1, 1995, and semi-annually thereafter on January 1, 1996; June 1, 1996; and January 1, 1997. The use of this conservation fund shall be at the direction of the Service subsequent to input from, and discussions with, the OCWD and the Corps. The *Arundo donax* removal program will be reviewed annually in January of each year by OCWD and the Service to determine its effectiveness and to redirect the program if necessary.

6. This Cooperative Agreement is consistent with the implementation of an annual mitigation plan pursuant to the Memorandum of Agreement (MOA), dated January 1994, between the U.S. Army Corps of Engineers and the OCWD for the operation of Prado Dam for seasonal additional water conservation. The Cooperative Agreement fully satisfies the annual mitigation plan to achieve a permanent water conservation pool to elevation 505 feet, per the MOA. Additional mitigation must be implemented by OCWD at a future time to achieve a permanent water conservation pool above 505 feet.

7. As part of this Cooperative Agreement, OCWD will employ a full-time temporary employee to assist in the vireo management program. This full-time position will be filled in the March through September time frame each year and will then serve as a part-time temporary employee in the October through December time frame each year to assist in completing the vireo management report for The Nature Conservancy (TNC). This position will be fully funded by OCWD and will be hired by OCWD, with input from the Service. After a period of 5 years (year 2000), the agencies will determine if this position is still necessary and/or explore other options to assist in the vireo management program.

8. If, in the event that the water conservation pool to elevation 505 feet impacts existing occupied nests of least Bell's vireos, OCWD, in cooperation with the Service, will dedicate personnel to physically relocate nests to minimize impact from the higher water conservation pool.

9. From March 1 to August 30 of each year, OCWD agrees to take a flow of 500 cfs or a flow that equals OCWD's maximum recharge capacity, whichever is greater, up to a pool elevation of 505 feet. If it is in the agencies' best interests to reduce the outflow from Prado Dam below 500 cfs, OCWD and the Service must both approve the new outflow program. If weather and hydrologic forecasts and reservoir conditions indicate that the pool elevation may exceed 505 feet because of a projected disparity between inflow and outflow, the water control manager at the Reservoir Operation Center shall take any and

all steps necessary (including the immediate release of water at the maximum possible rate) to (1) prevent the pool elevation from exceeding 505 feet or (2) to reduce, to the extent possible, the amount of time the pool is above 505 feet if, in fact, the early release of water at the maximum possible rate does not succeed in keeping the pool elevation below 505 feet. These requirements shall be followed unless the agencies find that it is in the best interests of the agencies to deviate from this arrangement."

The original biological opinion, as amended, did not address (1) potential impacts of the revised project on the flycatcher, which was listed as endangered by the U.S. Fish and Wildlife Service (Service) on February 27, 1995, (2) impacts to critical habitat for the vireo, which was designated on February 3, 1994, or (3) the proposed, immediate implementation of the project at the maximum pool elevation of 505 feet. Therefore, because of the project's potential to adversely affect the flycatcher, vireo, and the latter species' designated critical habitat and the participation of the Department of the Interior in the signing and implementing the cooperative agreement, we initiated an internal formal consultation that addressed the Department's action in a biological opinion (1-6-95-F-28).

Although that internal opinion addressed effects of the project to the vireo, flycatcher, and vireo critical habitat, the document did not address subsequent, proposed alterations to the operation of the dam or impacts of the project to flycatcher critical habitat, which was designated by the Service on August 20, 1997 (62 FR 39129, 62 FR 44228). This biological opinion addresses the revised project description and associated, projected impacts to the vireo, flycatcher, and to both species' designated critical habitats.

As part of past species and habitat conservation efforts, OCWD:

- has spent approximately $50,000,000 on capital projects to improve its ability to capture and recharge Santa Ana River flow since 1988. These improvements have increased OCWD's recharge capability from 190,000 acre-feet to over 290,000 acre-feet (OCWD letter #1) and enabled an increase in Prado Dam discharges from 450 cfs to a maximum of 600 cfs during past water conservation programs. The OCWD is committed to further increase its recharge capacity, and is actively planning future projects, including the development of a "Deep Basin Clean Device," the construction of additional recharge basins, and the diversion or retention of water at Gypsum Canyon Reservoir or Aliso Canyon Reservoir, to accomplish this end (OCWD letter #1).

- funded the 1989 and 1990 California State University, Long Beach Foundation vireo management and monitoring program in the Prado Basin at a cost of $70,000.

- dedicated the 124-acre plot known as PR3 (see Table 1) for purposes of habitat creation and restoration in 1991.

- contributed another $50,000 for habitat restoration and an additional $50,000 to the vireo management fund administered by TNC and removed approximately 40 acres of *Arundo donax* on OCWD property designated as PR6 (see Table 1)in 1992.

- contributed $50,000 to each of the habitat restoration and vireo management funds in 1993.

- refurbished 10 vandalized brown-headed cowbird (*Molothrus ater*) traps in 1994, and subsequently conducted ongoing repairs of broken and vandalized traps and provided decoy cowbirds for numerous other cowbird management programs in Orange, San Diego, Riverside, and San Bernardino counties.

- contributed $1,000,000 to augment giant reed removal and habitat restoration efforts within the Santa Ana River watershed in 1995. The cooperative agreement provided for a one-time contribution in this amount to provide for the removal of giant reed and habitat restoration within the Santa Ana River watershed. The various cash contributions have led to the creation of the Santa Ana River Conservation Trust Fund (trust fund), which is used for endangered species and habitat management. This fund is managed cooperatively by the Service and OCWD. Vireo work in relation to the project has been conducted since 1989; habitat management work in relation to the project has been conducted since 1991.

- began funding a permanent full-time position to assist in the vireo/flycatcher monitoring and management program and provide for giant reed eradication and habitat restoration on OCWD-owned lands in Prado Basin in 1995. Per the cooperative agreement, two full-time seasonal OCWD positions are funded through the trust fund for vireo and flycatcher monitoring and cowbird trapping within Prado Basin. Although the salaries for these two positions are funded through the trust fund, OCWD does incur some administrative costs for maintaining these positions.

- established the Santa Ana Watershed Conservation Fund Program in 1995. The OCWD continues to manage the fund, in cooperation with the Service. The funds, which now exceed $3.8 million dollars (James Van Haun, consultant to the OCWD, *in litt.*, 1999), are dedicated to giant reed removal and habitat restoration the Santa Ana River watershed. In addition, two full-time seasonal OCWD positions are funded through the trust fund for vireo and flycatcher monitoring and cowbird trapping within Prado Basin. Although the salaries for these positions are funded through the trust fund, OCWD does incur administrative costs for maintaining these positions.

- provided a four-wheel drive vehicle to vireo/flycatcher monitors for access to off-highway locations for cowbird trapping and vireo monitoring from 1995 to 1999. The OCWD additionally provided office space and computer equipment for vireo monitors

from 1995 to 1999, a residence and vehicle to one vireo monitor in 1996, and two-way radios to all monitors to increase safety and facilitate coordination efforts.

- removed approximately 10 acres of giant reed just downstream of River Road bridge and allowed for natural revegetation in 1996.

- provided host sites on OCWD property for mule-fat plantings adjacent to lower lying areas impacted by the project in 1997. The project was in cooperation with TNC and East Valley Resource Conservation District staff providing guidance.

- created and maintained access to a 124-acre revegetation area and other inaccessible sites by clearing giant reed and other debris with OCWD equipment. In 1996 through 1998, this aided in the discovery of several vireo nesting locations that were previously unknown.

- established and maintained a native plant nursery at the Prado field office with input from TNC from 1997 through 1999.

- provided site for removal of 30 acres of giant reed upstream of River Road bridge and provided OCWD staff to coordinate efforts with other agencies in 1998.

- dedicated lands for the restoration of vireo and flycatcher habitat (Table 2). The EIS called for the restoration of 228 acres of vireo habitat and 278 acres of wildlife habitat (prior to holding water to the 505 feet elevation) and for the creation of a fund to manage vireo within the basin.

Your original request was dated February 8, 1997, and received by facsimile on that same day. Formal consultation was subsequently suspended until the project description could be reviewed and subsequently amended. Although the Corps requested the initiation of consultation again on January 22, 1999, this request was withdrawn in a subsequent letter dated March 11, 1999, which cited the need for additional minor clarifications to the project description. We provided a species list to the Corps in a letter dated April 13, 1999. In a letter dated August 10, 1999, the Corps requested the initiation of consultation on the revised project and associated final biological assessment (BA) on August 11, 1999. We acknowledged the initiation of formal consultation in a letter dated September 20, 1999.

This biological opinion was prepared in large part using the following information: 1) Prado Dam Operation for Water Conservation, U.S. Army Corps of Engineers Draft Environmental Impact Statement, October 1992; 2) Prado Basin Water Control Plan, U.S. Army Corps of Engineers, Los Angeles District; September, 1994; 3) Fish and Wildlife Coordination Act Report dated July 1990; U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement, Laguna Niguel, California; 4) Planning Aid Letter dated July 1987, regarding Water Conservation in Prado Reservoir; U.S. Fish and Wildlife Service, Fish and Wildlife Enhancement, Laguna Niguel, California; 5) Supplemental Biological Information, Evaluation of Potential Impacts to the Least

Bell's Vireo, Prado Basin Water Conservation Study; December 1987; Dames and Moore, Santa Barbara, California; 6) Prado Dam Water Conservation Study, Draft Engineering/ Hydrology Report; May 1987; U.S. Army Corps of Engineers, Los Angeles District; 7) Biological Opinion (1-6-93-F-7), issued by the U.S. Fish and Wildlife Service on February 25, 1993; 8) Amendment to Biological Opinion (1-6-93-F-7) dated February 15, 1994; 9) Internal Biological Opinion (1-6-95-F-28) dated April 19, 1995, 9) Biological Assessment for the Prado Dam Water Conservation and Supply Feasibility Study, Riverside and San Bernardino Counties, California; Corps of Engineers, Los Angeles District; August, 1999; 10) OCWD transmittal to the Service dated August 25, 1999 (OCWD letter #1); 11) OCWD transmittal to the Service dated December 8, 1999 (OCWD letter #2); 12) the biological literature (see "Literature Cited and References" below); and 13) other communications with the Corps and the OCWD (on file).

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Prado Dam, located in Riverside County near Corona, Riverside County, California (Figures 1, 2) has been operated by the Corps according to the procedures outlined in the Prado Basin Water Control Plan of September, 1994 and the our 1995 internal biological opinion. Since the issuance of the previous biological opinions addressing the proposed project, the Corps has proposed to modify the project description to reflect necessary changes in the operation of the dam. Nevertheless, the dam will continue to be operated to (1) prevent flooding of areas along the Santa Ana River downstream from the dam; (2) conserve water to the extent possible pursuant to the terms and conditions of permitted water conservation projects; and (3) minimize the environmental impacts associated with prolonged inundation of sensitive, wetland habitats in the Prado Basin.

The stated purposes of all past and present water conservation projects in the Prado Basin are to conserve water and to improve, overall, the quality of water that is stored in underground aquifers in Orange County, California. OCWD is presently the sole owner of rights to surface waters in the project area. Increased water conservation capabilities would additionally preclude or diminish the need for the OCWD to import water from the Colorado River or elsewhere in the region.

The Corps is responsible for operating the dam for flood control and water conservation purposes. The following description of the proposed procedures for operating the dam is derived largely from the BA, which contains the complete description of the proposed operations and maintenance parameters associated with the future operation of the dam and is incorporated herein by reference. Although the analysis and conclusions summarized or stated herein were generated subsequent to a consideration of this precise project description, no other potential operations and maintenance project features were envisioned and, thus, none were analyzed for their potential effect on vireo, flycatcher, or both species' designated critical habitats.

In general, water releases from Prado Dam will be dictated by the Prado Dam Water Control Plan. This plan was designed to enable the dam to capture potential flood waters and limit the exposure of the downstream channel to possible structural damage by controlling smaller flood events by making relatively small nondamaging (to the channel) releases, and reserving larger reservoir releases for larger flood events. During large flood events, releases from Prado Dam are increased up to 5,000 cfs (or greater). As is discussed in detail in the water control plan, the maximum non-damaging (to the downstream channel and other structures in the channel such as bridges) release rate is 5,000 cfs. As downstream channel improvements are completed, releases in excess of 5,000 cfs can be made from Prado Dam provided that the downstream channel can safely convey such release magnitudes.

The water control manager's decisions regarding the regulation of Prado Dam are based upon available weather and runoff forecasts. Because weather and runoff forecasts are rarely 100 percent accurate, the target water surface elevations (WSEs) likely will, at times, be exceeded. Whether the water control manager deems it necessary to implement the regulation guidelines of the next release range will depend upon the magnitude of encroachment into the next release range, and the current weather and runoff forecast. The dam is operated differently at various WSE ranges, which are discussed individually below.

WSE 460.0 - 490.0 (Debris Pool) (Release Range: 0 - 600 cfs). The debris pool is allowed to fill prior to flood control releases to prevent debris from entering and plugging the outlet works. No seasonal restrictions exist for inundation of the debris pool. Releases from the debris pool are normally coordinated with the OCWD and are set equal to the spreading capacity of the downstream groundwater recharge facility.

WSE 490.0 - 494.0/505 (Buffer Pool) (Release Range: 200 - 2,500 cfs). Due to the channel erosion problems previously experienced in the Santa Ana River channel when prolonged releases from Prado Dam have exceeded 2,500 cfs, a buffer pool has been established which allows the water control manager to control small flood events without making large and potentially channel damaging releases. Due to the increased need for water conservation and the presence of the endangered vireo and flycatcher within the Prado Flood Control Basin, buffer pool regulation differs slightly during the winter flood season and the nonflood season as described below:

- Winter Flood Season (October 1 to February 28). A release of 200 to 2,500 cfs is made as necessary so as not to exceed elevation 494 feet. The drawdown release rate is coordinated with the OCWD to maximize the conservation of water through ground water recharge (Note: a minimum release of 200 cfs is required except for temporary release cutbacks to facilitate OCWD reconstruction of in-stream diversion dikes). Releases greater than 800 cfs can damage OCWD's in-channel sand diversion dikes.

  If a significant amount of inflow to the dam is in the forecast, the reservoir can be drawn down to the debris pool elevation of 490 feet within 24 hours, while releasing nondamaging flows (i.e., releases at or below 2,500 cfs).

- Non-Flood Season (March 1 to 30 September 30). In compliance with the MOA between the Corps and OCWD to increase water conservation, the regulation of the dam is modified during the nonflood season. Beginning in March, the allowable maximum reservoir water surface elevation is increased from WSE 494 feet to WSE 505 feet by 10 March at a rate of 1.1 feet/day, or higher, as determined by the water control managers at the Reservoir Operation Center (ROC), based on current reservoir status, forecasted inflow, and capacity/condition of the downstream channel. The reservoir level may be maintained as high as WSE 505 feet until September 30, provided that hydrologic forecasts and reservoir conditions do not indicate the reservoir elevation rising above elevation 505 feet.

  Because paragraph 9 of the 1995 Cooperative Agreement was found to be inconsistent with the physical and operational capabilities for Prado Dam, the Corps has revised the minimum release rates during the nonflood season. During the period from March 1 - September 30, the release rates when the pool is between elevations 494 and 505 feet may range from 350 cfs to 650 cfs provided that the running average outflow is always greater than or equal to 500 cfs. Release rates tend to be higher at the beginning of the season and taper off toward the end of the season. Therefore, the running average for the period from March 1 - September 30 when the pool is between 494 and 505 feet would tend to start out above 500 cfs and gradually approach 500 cfs as the season progresses. In addition, when the OCWD spreading capacity exceeds 500 cfs, the outflow from the dam will be increased up to a level of the recharge capacity of the OCWD downstream recharge basins.

  However, if, based on observed precipitation, hydrologic forecasts and reservoir conditions indicate that the WSE will exceed 505 feet because of high inflow, the water control manager at the ROC will match inflow with outflow, up to 5,000 cfs to prevent the reservoir pool elevation from exceeding elevation 505 feet, or an elevation within 3 feet of the elevation of the lowest occupied vireo nest located lower than 505 feet. OCWD shall furnish the elevation of the lowest occupied vireo nest to the Corps Reservoir Regulation Section and shall update this information as necessary throughout the vireo nesting season (March 15 - July 31). If vireo nests can be relocated to a higher position, the level of the water surface can be raised to an elevation no higher than 3 feet below the elevation of the lowest relocated nest, to a maximum elevation of 505 feet. If no occupied nests exist below elevation 505 feet, water can be held to 505 feet as long as the lowest vireo nest is located no lower than 506 feet. If a pool elevation of 505 feet is exceeded, dam releases at the maximum nondamaging rate (i.e., 5,000 cfs) will be maintained until the pool level has declined to 505 feet.

  Typically, if sufficient inflow is available, the water conservation pool is incrementally raised (per the 1994 Water Control Plan and adjusted operations for water conservation) from 494 feet to 505 feet between March 1 and March 10. However, if the reservoir is empty and an impending storm may fill the water conservation pool after March 10, the

Corps will contact the Service and OCWD to coordinate the movement of vireo nests, if necessary.

The months of July, August and September are designated for maintenance purposes. However, if summer flood runoff occurs during these months, the dam can be operated to store water for water conservation up to WSE 505 feet, provided that the impoundment does not interfere with maintenance requirements.

WSE 494.0/505.0 - 520.0 (Release Range: 2,500 - 5,000 cfs or above). The water control manager computes a release magnitude based upon the criteria of not exceeding WSE 520 feet. If it is predicted that a pool elevation of 520 feet will be exceeded at any time, the release rate will be 5,000 cfs.

WSE 520.0 - 543.0 (Release: 5,000 cfs or above) Reservoir stages above 520 feet require the maximum scheduled release of 5,000 cfs.

WSE 543.0 - 544.3 (Spillway Flow) (Release: 5,000 cfs or above) Flood control releases through the outlet works are reduced as the reservoir pool level rises above the spillway crest so as to maintain outflow from spillway plus outlet works at a maximum outflow of 5,000 cfs. As the WSE approaches the spillway, frequent communication between the ROC and the dam tender should occur so that the transfer of reservoir outflow from the outlet works to the spillway can be closely monitored.

WSE 544.3 and above (Spillway Flow) (Release Range: 5,000 cfs and above) All outlet gates are closed at reservoir pool levels of 544.3 feet and above, which results in uncontrolled spillway discharge only. Under the extremely remote circumstance that the dam embankment was in danger of overtopping, the outlet gates are to be opened to minimize the possibility of dam failure. The maximum design release from the outlet works is 17,000 cfs and that the design capacity of the outlet stilling basin is 10,000 cfs.

The rates of change for water releases from the dam are dictated by the current version of the water control plan. The 1994 Water Control Plan also updated (from the 1991 version) the rates of change of releases under normal operating conditions, as follows:

Current rate of release (cfs)	Maximum rate of change per ½ hour (cfs)
0 - 300	100
300 - 1,000	250
1,000 - 2,500	400
2,500 - 5,000	625
5,000 +	625

These release rate adjustments were intended to allow rate changes to occur more quickly over a shorter, ½-hour time period.

Base Flows. As defined in the 27th Annual Report of the Santa Ana River Watermaster, base flow is that portion of the total surface flow passing a point of measurement (either Riverside Narrows or Prado Dam) which remains after deduction of storm flow, nontributary flows, exchange water purchased by OCWD, and certain other flows as determined by the Watermaster. Base flows were recorded at 38,402 acre-feet in the 1970-71 water year and increased to 136,676 acre-feet for the 1996-97 water year. Wastewater flows from wastewater treatment plants upstream of Prado Dam contribute to base flows into the dam; these flows have increased over time and are expected to further increase in the future.

Imported Water. OCWD purchases water for groundwater replenishment; however, this purchased water does not contribute to the water conservation pool (494 - 505 feet) behind Prado Dam between March 1 - September 30. In periods where water is pooled behind Prado Dam for water conservation, OCWD will not store additional imported water upstream of Prado Dam for groundwater recharge, unless an agreement has been reached by the Corps, OCWD, and Service.

Deviation from Normal Operations. The procedures for different kinds of deviations from normal dam regulation are contained in section 7-15 of the 1994 Water Control Plan. Occasionally the regulation of Prado Dam to needs to deviate from the established flood control plan described in the 1994 Water Control Plan. Prior approval of deviations is required from the South Pacific Division (SPD) office in San Francisco, except for emergencies as described below.

Emergencies may take the form of drownings or other accidents, chemical spills, and failure of operational facilities. In any action taken, assessment of the situation by the dam tender should rely on his knowledge of the dangers involved. The ROC must be informed of any deviations by the dam tender, due to emergencies, as soon as practical. Emergency deviations do not require prior approval by the Corps South Pacific Division (SPD), but coordination with SPD must be made as soon as practical.

In accordance with the section 7 regulations regarding emergencies (50 CFR § 402.05), the Service shall be notified of these emergency deviations as soon as practical. In addition, we are to be notified of planned and unplanned deviations as defined in the plan and included herein by reference.

Unplanned Minor Deviations. Instances arise periodically that require minor deviations from the normal regulation of the reservoir. Examples of minor deviations include, but are not limited to: construction work, maintenance, and inspection. Each request is analyzed on its own merits. Consideration is given to the potential of flooding and possible alternative measures. A formalized correspondence summarizing the proposed deviation should be sent to SPD for approval before the action. The Service and OCWD shall be notified of these minor deviations.

Planned Deviations. Planned deviations cover all other proposed deviations to approved water control plans. Each condition is analyzed on its own merits. A formalized correspondence summarizing the proposed deviation should be sent to SPD for approval before the action. The Service and OCWD shall be notified of these planned deviations.

Monthly Gate Exercise. To ensure that the outlet works gates remain functional throughout the year and to free any accumulations of sediment or debris from the gate pulley and cable mechanisms, a monthly gate exercise is performed on the first Monday of each month. This exercise may be postponed if conditions so warrant. The monthly gate exercise is as follows:

1) The dam tender checks with the ROC to determine the "wait" period between gate exercises.

2) The dam tender checks the downstream channel from the downstream gate to the outlet works to assure no one is immediately downstream of the outlet works.

3) All gates are closed.

4) Each gate is individually raised to 5-ft and then immediately closed. When an impoundment exists at Prado Dam, the water control manager will determine a wait period between the opening of each individual gate.

5) All gates are returned to the original settings.

6) The downstream gate is checked to verify the outflow has returned to pre-gate exercise conditions.

Drought Contingency Plan. Engineer Regulation 1110-2-1941 (Drought Contingency Plans) directs water control managers to "evaluate and establish the limits of flexibility under existing authorities to modify project regulation and to use existing storage to respond to periods of water shortages." Although the entire storage space of the normally dry Prado Reservoir is allocated for flood control, water conservation is a project purpose. Therefore, the adopted water control plan for Prado Dam was formulated with features that maximize the amount of water that can be conserved without adversely affecting the level of flood protection provided, or significantly impacting environmental resources.

An emergency water conservation operation plan for Prado Dam was implemented during March and April 1991 and 1992, in response to the region's 5-year drought. As part of the arrangements to permit the emergency water conservation operation, the OCWD agreed to either fund or directly implement appropriate environmental mitigation measures. Future drought contingency plans would require an agreement between the Corps, OCWD, and Service.

Agency Communication. Both the Corps and Service are committed to ensuring that open and direct communication occurs on all issues at Prado Dam that could ultimately result in impacts to

endangered species. Rapid and responsive communication between the two agencies is critical to the success of this mission. In many instances, early warning may allow the Service to take the necessary measures in the field to prevent the loss of endangered species, particularly the vireo.

The lead office biologist assigned to the Prado Basin (currently Loren Hays) will be the primary Service point of contact on environmental issues within the Prado Basin, and the person to be contacted during "emergencies" where endangered species may be affected. An alternate biologist assigned to Prado Basin (currently Jon Avery) and the Division Chief for Riverside-San Bernardino Counties (currently Jeff Newman) will serve as secondary contacts. Individuals in the Corps Reservoir Regulation and/or Hydraulics and Hydrology Sections (currently Joe Evelyn and Brian Tracy, among others) will contact the lead office biologist assigned to Prado Basin directly to inform him/her of current operations and the status of the rising pool elevations. The Corps has added a notification to this office to their Manual of Instructions for Reservoir Operations Center Personnel to better ensure that we are informed of rising pool conditions in the reservoir during vireo nesting season. The Manual of Instructions will be updated, at a minimum, each year prior to the flood season. With respect to deviations from the approved water control plan, the Corps will notify this office regarding emergency deviations, and will coordinate planned and unplanned deviations with this office and other agencies.

Conservation Measures

Impact avoidance, minimization, and compensation measures have been, and will be completed in accordance with the 1992 EIS, 1993 biological opinion, 1995 cooperative agreement, 1995 biological opinion and negotiations conducted during the informal and formal consultation processes associated with considerations of the currently proposed project. The adaptive management of the Prado Basin vireo and flycatcher populations and giant reed eradication and revegetation efforts funded by the project proponent have minimized (and will minimize) impacts to these species and their designated critical habitats and maximize the prospects for the regeneration of critical habitat elements.

As part of ongoing habitat conservation efforts,:

- OCWD contributed, in 1991, $450,000 to TNC to create a non-wasting endowment for the vireo management program for habitat management and restoration. The funds in this account have sustained the program through 1999 and have accumulated in excess of $990,000. These funds are now in the Santa Ana River Conservation Trust Fund.

- OCWD contributed, in 1991, and additional $450,000 to TNC to create 124 acres of vireo (and flycatcher) habitat on OCWD owned property in Prado Basin, as part of the ongoing vireo management program. TNC revegetated the restoration site in 1992 and 1993. The Orange County Environmental Management Agency reimbursed OCWD the $450,000 in 1992 as part of its compensation package for the Santa Ana River Mainstem project. Approximately $95,000 remains in the account today and approximately 100 acres are in

viable vireo habitat. The remaining funds are now in the Santa Ana River Conservation Trust Fund .

Current conservation measures within the Santa Ana River watershed are being undertaken, under the direction of this office, by the OCWD and a group of resource conservation districts known as the Santa Ana Watershed Association (SAWA). The FY 1999-2000 work summary calls for implementing measures to reduce the threat of invasive plants, particularly giant reed and tamarisk, on native habitat and river system function. The primary tasks currently being undertaken to achieve this goal are as follows:

- Complete an exotic plant management report for the Santa Ana River Watershed;
- Continue the development of a GIS data base to track and monitor treatment projects for the Santa Ana River watershed;
- Perform a total of 84 acres of exotic plant treatment within four of the resource conservation districts which are a part of SAWA;
- Continue the development of outreach materials and educational programs, and perform public workshops on exotic plant control that are directed at private landowners within the watershed;
- Continue to work on a watershed team structure that will coordinate and implement tasks and manage funds for those tasks in the future;
- Continue to support the SAWA field biologist position. This person will be responsible for coordinating and monitoring the SAWA invasive plant removal and habitat restoration program and for participating in the vireo/flycatcher management and monitoring program within the Santa Ana River watershed.

SAWA has additionally completed a document entitled *Santa Ana Watershed Management Five Year Program (1998 - 2003).* This document discusses the purpose and goals of continued work within the watershed. The purpose of the program is to effectively control giant reed and other invasive plants within the Santa Ana River watershed through cooperative partnerships. The long-term goals of the program are as follows:

- Perform first-time treatment on all upper watershed tributaries and mainstem Santa Ana river downstream to Riverside County Parks and Open Space District lands;
- Establish a follow-up program with each land management entity that will gradually increase their capabilities to perform long-term maintenance;
- Provide education to private landowners through written materials, workshops and hand-on assistance;

- Maintain a database that will include areas of infestation, current projects, sensitive species and native vegetation recovery.

Most recently, :

- OCWD has agreed to operate four cowbird traps, during the vireo and flycatcher nonbreeding seasons at dairies within close proximity of the Prado Basin;
- OCWD has agreed to continue to repair and store all cowbird traps;
- OCWD has agreed to supply seeds and other supplies for the cowbird traps year-round;
- OCWD has agreed to supply four-wheel drive vehicles to flycatcher/vireo management staff; and
- OCWD has agreed to propagate and plant, in coordination with the Service and Corps, 10,000 mulefat plants from 2-inch containers each fall on OCWD and Corps lands not already dedicated as restoration areas for other OCWD projects (OCWD letter #2).

STATUS OF THE SPECIES

Least Bell's vireo

The least Bell's vireo is a small, olive-gray neotropical migratory songbird that presently nests and forages almost exclusively in riparian woodland habitats in California and northern Baja California, Mexico (Garrett and Dunn 1981, Gray and Greaves 1981, Miner 1989; AOU 1998). Bell's vireos as a group are highly territorial (Barlow 1962, Fitch 1958, Salata 1983a) and are almost exclusively insectivorous (Chapin 1925, Miner 1989).

Least Bell's vireos generally begin to arrive from their wintering range in southern Baja California, and, possibly, mainland Mexico, and establish breeding territories by mid-March to late March (Garrett and Dunn 1981; Salata 1983a, 1983b; Hays 1989; Pike and Hays 1992). However, a singing vireo was on territory in the Prado Basin on March 2, 1994 (James Pike, pers. comm.). A large majority of the breeding vireos in the Prado Basin typically depart their breeding grounds by the third week of September and only a few Bell's vireos are found wintering in California or the United States as a whole (Barlow 1962, Nolan 1960, Ehrlich et al. 1988, Garrett and Dunn 1981, Salata 1983a, 1983b, Pike and Hays 1992).

Least Bell's vireo nesting habitat typically consists of riparian woodlands with well-developed overstories, understories, and low densities of aquatic and herbaceous cover (Zembal 1984, Zembal et al. 1985, Hays 1986, Hays 1989, Salata 1983a, RECON 1988). The understory frequently contains dense subshrub or shrub thickets. These thickets are often dominated by sandbar willow (*Salix hindsiana*), mule fat (*Baccharis salicifolia*), young individuals of other willow species, such as arroyo willow (*Salix lasiolepis*) or black willow (*S. gooddingii*) and one

or more herbaceous species (Salata 1983a, 1983b, Zembal 1984, Zembal *et al.* 1985). Significant overstory species include mature arroyo willows and black willows. Occasional cottonwoods (*Populus* sp.) and western sycamore (*Platanus racemosa*) occur in some vireo habitats and there additionally may be locally important contributions to the overstory by coast live oak (*Quercus agrifolia*).

Although the least Bell's vireo occupies home ranges that typically range in size from 0.5 to 4.5 acres (Regional Environmental Consultants 1988), a few may be as large as 10 acres (J. Greaves, pers. comm.). In general, areas that contain relatively high proportions of degraded habitat have lower productivity (hatching success) than areas that contain high quality riparian woodland (Jones 1985, RECON 1988, Pike and Hays 1992).

Because of a documented, drastic decline in numbers and continuing threats to the species and its riparian woodland habitats, the least Bell's vireo was listed as an endangered species by the State of California Department of Fish and Game in 1980. Subsequently, the vireo was listed as endangered by the Service on May 2, 1986 (51 FR 16474). Critical habitat for this species, which includes all riverine and floodplain habitats with appurtenant riparian vegetation in the Prado Basin below the elevation of 543 feet, was designated by the Service on February 3, 1994 (59 FR 4845).

Southwestern willow flycatcher

The southwestern willow flycatcher (*Empidonax traillii extimus* [Phillips]), a relatively small, insectivorous (passerine) songbird, is approximately 15 centimeters (5.75 inches) in length. Both sexes of southwestern willow flycatchers have grayish-green back and wings, whitish throats, light gray-olive breasts, and pale, yellowish bellies. The song is a sneezy "fitz-bew" or "fitz-a-bew" and the typical call is a breathy "whit" (e.g., Unitt 1987).

The southwestern willow flycatcher is a recognized subspecies of the willow flycatcher (*Empidonax traillii*). Although previously considered conspecific with the alder flycatcher (*Empidonax alnorum*), the willow flycatcher is distinguishable from that species by morphology (Aldrich 1951), song type, habitat use, structure and placement of nests (Aldrich 1953), eggs (Walkinshaw 1966), ecological separation (Barlow and MacGillivray 1983), and genetic distinctness (Seutin and Simon 1988).

In turn, the southwestern willow flycatcher is one of five subspecies of the willow flycatcher currently recognized (Hubbard 1987, Unitt 1987, Browning 1993). The willow flycatcher subspecies are distinguished primarily by differences in color and morphology. Although the subspecific differences in color have been termed "minor" (Unitt 1987), P.E. Lehman (recognized expert field biologist, pers. comm.) has indicated that the southwestern willow flycatcher in California is distinguishable in the field from other forms of willow flycatchers that might be present (in migration) within the breeding range of the former. Unitt (1987) and Browning (1993) concluded that the southwestern willow flycatcher is paler than other willow

flycatcher subspecies. Preliminary data also suggest that the song dialect of the southwestern willow flycatcher is distinguishable from other willow flycatchers.

The breeding range of the southwestern willow flycatcher includes southern California, southern Nevada, Arizona, New Mexico, and western Texas (Hubbard 1987, Unitt 1987, Browning 1993). The species may also breed in southwestern Colorado, but nesting records are lacking. Records of breeding in Mexico are few and confined to extreme northern Baja California and Sonora (Unitt 1987, Howell and Webb 1995). Willow flycatchers winter in Mexico, Central America, and northern South America (Phillips 1948, Ridgely 1981, AOU 1983, Stiles and Skutch 1989, Ridgely and Tudor 1994, Howell and Webb 1995).

Breeding southwestern willow flycatchers are often present and singing on territories in mid-May (exceptionally in late April in southern California). Southwestern willow flycatchers are generally gone from breeding grounds in southern California by late August (The Nature Conservancy 1994) and are exceedingly scarce in the United States after mid-October (e.g., Garrett and Dunn 1981). The first southwestern willow flycatcher of the 1998 Prado Basin breeding season were detected on May 4 and the last was noted on August 9. In 1997, the first bird of the breeding season was detected on May 7 and the last (a juvenile) was noted on September 10.

The southwestern willow flycatcher breeds in riparian habitats along rivers, streams, and other wetland habitats where dense growths of willows (*Salix* spp.), coyote-bush *(Baccharis* spp.), arrowweed (*Pluchea sericea*), buttonbush (*Cephalanthus occidentalis*) [not found in southern California], or other plants of similar structure and configuration are present. The flycatcher nests in thickets of trees and shrubs approximately 4 to 7 meters (13 to 23 feet) or more in height with dense foliages from approximately 0 to 4 meters (0 to 13 feet) above ground. Overstories are often present in occupied habitats and composed of willows or cottonwoods or, in some portions of the species' range, tamarisks (*Tamarix*, spp.) (e.g., Phillips 1948, Grinnell and Miller 1944, Whitmore 1977, Hubbard 1987, Unitt 1987, Whitfield 1990, Brown 1991, U.S. Fish and Wildlife Service 1993, 1995). Although nesting willow flycatchers of all subspecies generally prefer areas with surface water nearby (Bent 1960, Stafford and Valentine 1985, Harris et al. 1986), the southwestern willow flycatchers in the Prado Basin virtually always nest near surface water or saturated soil (e.g., The Nature Conservancy 1994).

All known southwestern willow flycatcher territories within the Prado Basin have been situated in relatively close proximity to water-filled creeks or channels. In addition, territories have usually consisted of overgrown clearings containing varying amounts of nettles and with, at least, a few moderately tall, often dense, willows. Among the five nests found in 1996, two were placed in arroyo willow, one was found in a red willow (*Salix laevigata*), one was placed in a sandbar willow, and one was placed in a tamarisk. During the 1997 season, both nests that were discovered had been placed in arroyo willow. Nests have been placed as low as 0.61 meters above ground level.

All three resident subspecies of the willow flycatcher (*E. t. extimus*, *E. t. brewsteri*, and *E. t. adastus*) were once considered widely distributed and common within California wherever suitable habitat existed (e.g., Grinnell and Miller 1944). The historic range of *E. t. extimus* in California apparently included all lowland riparian areas of the southern third of the state. Nest and egg collections indicate the bird was a common breeder along the lower Colorado River near Yuma in 1902 (T. Huels, University of Arizona, *in litt.*). Willett (1933) considered the bird to be a common breeder in coastal southern California. Most recently, Unitt (1987) concluded that the southwestern willow flycatcher was once fairly common in the Los Angeles basin, the San Bernardino/Riverside area, and San Diego County.

The southwestern willow flycatcher is apparently vulnerable to the same factors that have caused the decline of the vireo within those species' shared ranged in the Californias and thus has almost been extirpated as a breeding species throughout much of southern California (e.g., Garrett and Dunn 1981, Unitt 1987). Because range-wide, recent surveys have essentially corroborated these assumptions, the current status of *E. t. extimus* is likely much more precarious than that of the vireo, which has begun to recover in southern California.

On July 23, 1993, the Service proposed the southwestern willow flycatcher as an endangered species throughout its range (58 FR 39495) and simultaneously proposed critical habitat for the species. Although deferring a decision on the designation of critical habitat, the Service listed the flycatcher as endangered on February 27, 1995 (59 FR 10693). Critical habitat for the flycatcher, which includes much of the Prado Basin, was designated by the Service on August 20, 1997 (62 FR 39129 and 62 FR 44228). Breeding willow flycatchers are listed as endangered by the States of California and Arizona.

ENVIRONMENTAL BASELINE

Least Bell's vireo

During the 1999 breeding season, the least Bell's vireo population in the Prado Basin and environs was studied and managed for the fourteenth consecutive year. Study areas included the Basin proper and contiguous reaches of the Santa Ana River and Chino Creek. The data necessary to determine vireo status and distribution, breeding chronology, reproductive success, and nest site preferences were obtained, when possible, during daily visits to appropriate riparian woodland habitats throughout the basin. In addition, brown-headed cowbirds present in vireo home ranges were routinely censused, and modified Australian crow traps were once deployed throughout the basin and adjacent Santa Ana River in an attempt to control this brood-parasitic and rapidly expanding species.

Of the 336 territorial male vireos that were detected within the Prado Basin study area in 1999, 224 of these birds were found to be paired (Pike and Hays 1999). By contrast, 270 pairs were recorded in 1998, 195 pairs were detected in 1996, and 164 pairs were located in 1995 (Pike and Hays 1998). The reason for this substantial decrease in the number of breeding pairs remains unknown.

In 1999, a minimum of 489 known fledged young was produced by Prado Basin vireo breeding pairs, resulting in a 10 percent increase over the corresponding total recruitment (450) in 1998. Nesting success in 1999 was 57 percent, which exceeded the corresponding figures for 1998 (41 percent) and 1997 (50 percent) (Pike and Hays 1999). Although the average number of fledglings per breeding pair (2.2) in 1999 was the highest recorded since 1995, this average is substantially below the 1988-1991 fledglings-per-pair average of 3.1. In recent years, significantly fewer pairs have elected to renest after successfully fledging young on their first attempt (Pike and Hays 1999).

By the end of the breeding season in 1998, 2,333 cowbirds had been trapped and removed from vireo and flycatcher habitats within the Prado Basin and an additional 105 cowbirds were removed from Hidden Valley Wildlife Refuge adjacent to the Santa Ana River in Norco. More than 1,314 cowbirds were removed from in or near vireo and flycatcher habitat in 1997. Correspondingly, the 13 percent parasitism rate in 1998 was the lowest recorded within the Prado Basin. Vireos continued to demonstrate a strong preference for nesting and foraging in willows and mule fat (Pike *et al.* 1998). Of all nests in 1997 for which data were available (N=239), 54 percent were placed in various willow species and 40 percent were found in mule fat (The Nature Conservancy 1997).

The vireo has been historically described by multiple observers as common to abundant in the appropriate riparian habitats from as far north as Tehama County, California, to northern Baja California, Mexico (Grinnell and Storer 1924, Willett 1933, Grinnell and Miller 1944, Wilbur 1980). Widespread habitat losses have fragmented most remaining populations into small, disjunct, and widely dispersed sub-populations. The remaining birds are concentrated in San Diego and Riverside counties (U. S. Fish and Wildlife Service 1998).

Although the species has begun to recover and approximately 2,000 vireos were on territories within California in 1998 (Service, unpublished data), preliminary data indicate that the United States breeding population in 1999 was almost certainly smaller. Population declines were noted at Marine Corps Base, Camp Pendleton, the Prado Basin, and at other locales throughout the range of the species in 1999 (Service, unpublished data). The reason for this apparent, recent population decline is unknown. Nevertheless, the Prado Basin population of vireos remained the second largest overall and the largest by far north of San Diego County. The largest population of vireos range-wide continues to be located on Marine Corps Base, Camp Pendleton in San Diego County. In recent years, the Camp Pendleton and Prado vireo populations have represented over approximately 60 percent of all known vireo territories.

The past, unparalleled decline of this California landbird species (Salata 1986, U.S. Fish and Wildlife Service 1986a) has been attributed, in part, to the combined, perhaps synergistic effects of the widespread and relentless destruction of riparian habitats, habitat fragmentation, and brood-parasitism by cowbirds (Garrett and Dunn 1981). The historic loss of wetlands (including riparian woodlands) in California has been estimated at 91 percent (Dahl 1990). Much of the remaining habitat is fragmented or infested with alien plants (e.g., giant reed) and exotic animals (e.g., cowbirds). Reductions in vireo numbers in southern California and the San Joaquin and

Sacramento Valleys were evident by the 1930s and were "apparently coincident with increase of cowbirds which heavily parasitize this vireo" (Grinnell and Miller 1944).

Southwestern willow flycatcher

The Prado Basin southwestern willow flycatcher population was studied and managed for the 14th consecutive year within the Prado Basin, adjacent Santa Ana River, and environs during the 1999 breeding season. The data necessary to determine southwestern willow flycatcher status and distribution, breeding chronology, reproductive success, and nest site preferences were obtained whenever and wherever possible during daily visits to appropriate riparian woodland habitats throughout the basin. In addition, cowbirds present in southwestern willow flycatcher home ranges were routinely censussed, and modified Australian crow traps were once deployed throughout the basin and adjacent Santa Ana River in an attempt control this brood-parasitic species and thus maximize the local breeding success of the vireo, flycatcher, and a large number of other sensitive passerine bird species.

Despite 14 consecutive years of cowbird management and habitat conservation efforts within the Prado Basin, a total of only five flycatcher home ranges was detected within the Prado Basin during the 1999 breeding season. Four of the five territorial flycatchers were likely returning to home ranges that were occupied during the previous season. Pairs were eventually found in only three of these home ranges. Two of the three pairings resulted in successful breeding, producing a total of five fledglings.

Although flycatcher home ranges have been detected nearly throughout the surveyed portions of the Basin, successful breeding prior to 1996 had been detected only in North Basin and West Basin (Chino Creek). From 1996 to1998, however, the only successful breeding occurred in two adjacent home ranges in South Basin. Regardless, given that only three breeding pairs of southwestern willow flycatchers were present within the survey area during the 1999 breeding season, southwestern willow flycatchers likely are in danger of disappearing from the Prado Basin and environs.

The available information suggests that all three willow flycatcher subspecies breeding in California have declined substantially, with declines most critical in *E. t. extimus*, the southwestern willow flycatcher, which remains only in small, disjunct nesting groups (e.g., Unitt 1987, U.S. Fish and Wildlife Service 1995), like those found in the Prado Basin. Status reviews or analyses conducted before the listing of the southwestern willow flycatcher considered extirpation from California to be possible, even likely, in the foreseeable future (e.g., Garrett and Dunn 1981, Harris et al. 1986).

The Prado Basin population is one of only six permanent breeding sites that now exist in California, and only three southwestern willow flycatcher populations in California contain 20 or more nesting pairs. Despite the virtual elimination of impacts from livestock grazing to the large and important flycatcher population on the South Fork of the Kern River (Harris et al. 1986, Whitfield 1990), numerical declines in the population levels were observed in 1991 and 1992.

Fortunately, increases in nesting success were realized in 1992 and 1993; these increases were attributed to removing cowbird eggs or nestlings found in southwestern willow flycatcher nests, and cowbird trapping (Whitfield and Laymon, Kern River Research Center, *in litt.*, 1993). The Kern River population consisted of 29 pairs in 1996 (M. Whitfield, pers. comm., 1996). Another large, and relatively stable, nesting population is along the Santa Margarita River on Marine Corps Base Camp Pendleton, where cowbird numbers have also been reduced by trapping. Approximately 20 pairs were detected on Camp Pendleton in 1996. The third and last "large" population persists on the Upper San Luis River, where 25 pairs were detected in 1996 (Bill Haas, pers comm., 1996).

Although five other nesting groups were known in southern California in 1996, all but one of these consisted of four or fewer nesting pairs in recent years (Service, unpublished data). A total of 104 pairs of southwestern willow flycatchers was recorded in California in 1996 and preliminary data indicate that 100 pairs were present in the state in 1998 (Service, unpublished data).

Unitt (1987) reviewed historical and contemporary records of the southwestern willow flycatcher throughout its range and determined that the species had declined precipitously during the last 50 years. Unitt (1987) argued convincingly that the southwestern willow flycatcher is faring poorly throughout much of its breeding range (see also Monson and Phillips 1981, Garrett and Dunn 1981, U.S. Fish and Wildlife Service 1995). Unitt (1987) has postulated that the "total population of the subspecies is well under 1,000 pairs; I suspect that 500 is more likely." Recent range-wide surveys have corroborated Unitt's hypothesis.

Throughout the known range of the flycatcher, occupied riparian habitats have been, and remain, widely separated by vast expanses of relatively arid lands. However, the southwestern willow flycatcher has suffered the extensive loss and modification of these cottonwood-willow riparian habitats due to due to grazing, flood control projects, and other water or land development projects (e.g., Klebenow and Oakleaf 1984, Taylor and Littlefield 1986, Unitt 1987, Dahl 1990; U.S. Fish and Wildlife Service 1995). Estimated losses of wetlands between 1780 and the 1980's in the American southwest are; California (91 percent), Nevada (52 percent), Utah (30 percent), Arizona (36 percent), New Mexico (33 percent), and Texas (52 percent) (Dahl 1990). Changes in riparian plant communities have resulted in the reduction, degradation, and elimination of nesting habitat for the willow flycatcher, curtailing the ranges, distributions, and numbers of western subspecies, including *E. t. extimus* (e.g., Klebenow and Oakleaf 1984, Taylor and Littlefield 1986, Unitt 1987, Ehrlich et al. 1992).

The species is alos impacted by a variety of other factors, including brood parasitism by cowbirds (Unitt 1987; Ehrlich et al. 1992; U.S. Fish and Wildlife Service 1993, 1995). Parasitism rates of flycatcher nests have recently ranged from 50 to 80 percent in California (Whitfield 1990; M. Whitfield and S. Laymon, unpublished data) to 100 percent in the Grand Canyon in 1993 (U.S. Fish and Wildlife Service 1993). Mayfield (1977) concluded that a species or population might be able to survive a 24 percent parasitism rate, but that much higher losses "would be alarming." In any case, a composite of all current information indicates continuing declines, poor

reproductive performance, and continued threats to most of the extant populations of flycatchers (e.g., Brown 1991; U.S. Fish and Wildlife Service 1992; Whitfield and Laymon (Kern River Research Center, *in litt.*, 1993); U.S. Fish and Wildlife Service 1993, 1995; Service, unpublished data).

EFFECTS OF THE ACTION

The project involves conserving water within the flood control storage space behind Prado Dam both during and after the flood season (BA). Riparian habitat suitable for the flycatcher and vireo would be subject to inundation as a result of the project. Over the past 6 years, earlier water conservation programs have resulted in the prolonged inundation of riparian woodland habitats in the Prado Basin. For instance, during the 1998 breeding season, water conservation resulted in the holding of water at or above an elevation of 505 feet from February 25 until May 31, during which time habitats below that elevation were entirely unavailable to vireos and flycatchers.

Management of the vireo and flycatcher populations in the Prado Basin during past water conservation efforts, literature reviews, and analyses of the effects of other Prado Basin projects and activities have resulted in an elucidation of some of the real and potential effects associated with the implementation of the proposed project. In particular, the flooding of vireo riparian woodland habitats in 1995 and 1998 in conjunction with previously authorized water conservation projects in the Prado Basin have resulted in; (1) degradation and destruction of riparian habitat elements below an elevation of 505 feet and a resultant redistribution of vireo home ranges, (2) a marked increase in the use of exotic (primarily upland) plant species for nest placement, (3) an inability to deploy cowbird traps in optimum, proven locations, and, perhaps as a result, and (4) an elevated nest parasitism rate in the most affected area (West Basin) during, at least, 1 year (The Nature Conservancy 1995, The Nature Conservancy 1996, Pike and Hays 1998).

The proposed project is not likely to directly impact local flycatcher breeding pairs, home ranges, or habitats that are apparently "preferred" by the species. No known flycatcher nests within the Prado Basin, past or present, have been in home ranges established below an elevation of 510 feet, and no home ranges have been established below 505 feet, the maximum pool elevation allowed. However, a flycatcher male was observed at an elevation of 505 feet, and the establishment of home ranges or placement of nests in appropriate habitat below that elevation is not precluded or unexpected.

The pooling of water to an elevation of 494 feet during the winter (October 1 - February 28) would not directly affect the vireo, as the species is not present within the project area during this time period. Vireos typically arrive in the Prado Basin and southern California in mid to late March, with territory establishment and nesting taking place from March through late July (Pike and Hays 1999). Dispersal of fledglings and mature adults typically occurs in August and September. Vireos are only rarely detected in the Basin from 1 October to 15 March of each nonbreeding season (see, for instance, Pike and Hays 1999).

However, suitable habitat for the vireo and, apparently, flycatcher does occur below an elevation of 494 feet (Service, unpublished data). Thus, holding water at elevation 494 feet or below from March 1 to September 30 could directly impact the vireo and, possibly, the flycatcher. Water held from 494 feet to 505 feet during the nonflood season from March 1 to September 30 has, and could again, substantially inundate vireo habitat within the basin and thus preclude its use during the breeding season or displace or impact vireo pairs attempting to breed within that range of elevations. Based on 1999 data, approximately 70 pairs of vireos occurred in home ranges that could have been partially or substantially flooded if water was held at an elevation of 505 feet during the breeding season. The inundation of vireo habitat may reduce the number of successful breeding pairs for that particular season, cause a delay in breeding due to the forced relocation of pairs to areas of suitable habitat, and force a reduction in the number of nesting attempts.

Direct impacts to vireo (and flycatcher) nests, eggs, or nestling young are not expected to occur because the location and elevation of vireo nests will be closely monitored each year to ensure that flooding of occupied vireo nests does not occur. As is discussed in the BA and Corps project description, dam releases of up to 5,000 cfs will be made in an effort to prevent the reservoir pool elevation from exceeding elevation 505 feet, or an elevation within 3 feet of the elevation of the lowest occupied vireo nest located lower than 505 feet. If elevation 505 feet is exceeded, dam releases at the maximum nondamaging rate (i.e., 5,000 cfs) will be maintained until the pool level has declined to 505 feet. As a further safeguard, vireo nests may be relocated, if possible, to higher elevations to avoid swamping. Such measures should prevent the destruction of vireo nests and concomitant death of vireo young or eggs.

Although it is intended that vireo and flycatcher adults, nests, and young will not be directly impacted by the project and only occupied vireo habitat will be affected, the Corps has concluded in the BA that the loss of riparian habitat within the basin is an unavoidable adverse impact to the vireo, flycatcher, and both species' designated critical habitats.

Given the geographic distribution and elevations of vireo nests in the Prado Basin during the 1999 breeding season (OCWD letter #2; OCWD, unpublished data), the expected rebound of the vireo population to 1998 levels or beyond, and the anticipated redistribution of breeding pairs to higher elevations, we conclude that the habitat of as many as 90 pairs of vireos may be impacted as a result of the implementation of the project as discussed below. In addition, as many as 5 additional pairs may be harassed due to indirect effects of the project. Critical habitat for the vireo, which includes floodplains below 543 feet in the Prado Basin and all appurtenant vegetation, will be the most significantly affected.

Although the effects of flooding on riparian habitat are difficult to quantify, water conservation within Prado Basin may result in; (1) vegetation mortality (i.e., reduction in the aerial extent of willow riparian habitat); (2) reduction in species diversity, as plants intolerant of flooding are reduced within the basin; and (3) structural changes within the habitat, especially a loss of shrubby understory. The primary impacts on vireo include the indirect effects associated with the inundation of riparian habitat, the required nesting and foraging habitat for this species. .

Past studies of the effects of prolonged or periodic water storage in the Prado Basin have resulted in conclusions that the inundation of riparian vegetation can alter or permanently destroy constituent vireo and flycatcher critical habitat elements. Subsequent to comprehensive studies of riparian woodland habitats with the Prado Basin proper, the Service concluded that "the lack of plant species diversity and the sparsity of shrubby understory development below 490 feet in the Prado Basin is attributable to the past frequency, duration, and timing of inundation" (Zembal *et al.* 1985). Frederickson (1979) had previously concluded that plant species diversity at three Missouri study sites declined greatly as inundation levels became increasingly pronounced. In general, flooding of trees can cause "the depletion of oxygen to respiring roots, accumulation of carbon dioxide in the soil, establishment of anaerobic conditions around the roots, and accumulation of toxins (organic acids) in and around the roots" (Dames and Moore 1987). Submergence during the growing season (when plants are actively respiring) may be particularly damaging.

Impacts to vegetation from inundation depend upon the depth and duration of inundation, and time of year of flooding, among other factors. One of the primary effects of flooding is to create hypoxic or anaerobic soil conditions, which in turn can affect the physiological processes of the plant, including respiration and photosynthesis. Plants adapted to flooding exhibit a variety of mechanisms to cope with anaerobic soil conditions, including the formation of adventitious roots and hypertrophied lenticels for oxygen acquisition, and altered metabolic pathways which avoid the buildup of toxic end products associated with anaerobic respiration.

In general, willow species, especially black willow (*Salix gooddingii*) are fairly tolerant of flooding during the growing and dormant seasons. Black willow cuttings have survived flooded soil conditions (approximately 4 centimeters above the soil line) for a period from April 1997 through March 1998 (J. Altergott, Corps of Engineers, unpublished data). Flooding during the winter or dormant season is not expected to adversely affect deciduous species, which lose their leaves prior to becoming dormant.

Less information is known about understory species, particularly mulefat (*Baccharis salicifolia*), which may be less tolerant of flooding during both the growing season and the winter. Mulefat cuttings have survived flooded soil conditions (approximately 4 centimeters above the soil line) for a period from April 1997 through March 1998 (J. Altergott, unpublished data). Mulefat is not truly deciduous and during the non-growing season may have higher oxygen requirements than deciduous species, which reduces the species' flood tolerance during the winter. Mulefat and other understory shrub and herbaceous species would be more likely to be subject to complete rather than partial inundation, which may increase the adverse effects associated with water conservation.

Observations of riparian habitats in the Prado Basin in 1997, 1998, and 1999 revealed that mulefat was substantially impacted and almost entirely eliminated in the Basin below an elevation of 505 feet subsequent to storage of water at that elevation during the spring of 1998. Although not present in all vireo home ranges, mulefat is a primary component of the understory

used by most breeding vireos (and flycatchers); impacts to this plant species may affect the structural composition of the habitat, thus reducing its value for both the vireo and flycatcher.

In the extreme, prolonged water conservation may sufficiently damage critical habitat to the extent that is no longer vireo (or flycatcher) habitat. Vireos no longer breed in riparian woodlands in the far western portion of the South Basin that have been subjected to repeated, recent inundations (Pike and Hays 1992, The Nature Conservancy 1993, The Nature Conservancy 1997). These woodlands, although suitable (and occupied) as recently as 1989, are now almost entirely devoid of suitable nesting microhabitat. Essential nesting habitat elements in the lower (generally western) portions of the South Basin evidently have been markedly altered and reduced as a result of inundation. Apparently, the "niche-gestalt" (James 1971) of these areas has been altered to the extent that the habitats extant no longer have the characteristic vegetational requirements found in habitats that are normally selected, or "preferred" by vireos.

In 1991, the Corps prepared an EA/FONSI to document impacts associated with year-round water conservation between elevations 490 and 494 feet. No significant impacts to vireos were identified at that time. The Corps has concluded that flood control operations since the dam was built and more recent water conservation operations have resulted in the survival of only minimal amounts of vireo habitat within the geographic total of 313 acres (J. Altergott, Corps of Engineers, *in litt.*, 1999) that occur between 490 and 494 feet within Prado Basin. Nevertheless, riparian habitats below 494 feet were used by vireos during the 1999 breeding season (OCWD, unpublished data) and such habitats are increasingly available to the species during dry years, during which time the vegetation recovers to varying degrees.

Approximately 642 acres of critical habitat for the vireo are located between elevations 494 and 505 feet (Larry Munsey International 1999). Because the proposed conservation of water could, and eventually will, flood vireo critical habitat after essential habitat constituents have emerged from dormancy, we conclude that all vireo and flycatcher habitat between 490 and 505 feet eventually could, at least occasionally and temporarily, be directly impacted by the proposed project up to the target elevation. Because future climatological events or other extenuating circumstances cannot be predicted with any reasonable degree of precision, future project-related impacts to critical habitat are equally unpredictable. However, assuming that: (1) a long-term average of 50 percent of existing vireo habitat is degraded, destroyed, or otherwise rendered unsuitable or unavailable as a result of the project (e.g., EIS); and 2) 50 percent of the 311 acres between elevations 490 and 494 feet is vegetated, approximately 400 acres of vireo critical habitat, on average, could be substantially affected by the project. In any event, pursuant to the data and analysis in the Fish and Wildlife Coordination Act report prepared for the project (Zembal et al. 1985), as much as 228 acres of habitat capable of supporting the vireo and, potentially, flycatcher may eventually be lost in conjunction with the initial proposed project for water conservation up to an elevation up to 505 feet.

According to our regulations at 50 CFR § 402, we are required to analyze effects of the Federal action that may be interrelated to, or interconnected with, the subject proposed project and/or "reasonably expected to occur" as the result of the implementation of the project. Potential

interrelated or interconnected indirect effects of the action include, but are not necessarily limited to, an increased presence of humans in smaller habitat areas, increased ambient noise levels and vibration in habitats occupied by breeding vireos and flycatchers (due to the past documented movement of vireos to higher elevations closer to Prado Basin roads and airport operations), the infestation of exotic plants and animals and artificial concentration of predators and brood parasites in remaining (post-project) habitats, and the dispersal of environmental contaminants.

Because of the apparent degradation of habitats at relatively low elevations, the center or core of the South Basin population of vireos has moved significantly to the east and higher in elevation (see The Nature Conservancy 1993a,b). In addition, whenever water is stored at elevations approaching 505 feet, vireo pairs have been displaced to the far western portions of the Basin immediately adjacent to State Route 71. Thus, as a result of past water conservation, comparatively more vireo pairs are now breeding (or have bred) on or near the outer edges of protected habitats and thus are in closer proximity to roads and Basin facilities and developments, including the Corona Municipal Airport. We therefore conclude that the recent, water conservation-induced modification, destruction, or inundation of vireo and flycatcher habitats in the lower elevations of the Prado Basin have subjected vireos and, possibly, flycatchers, to a variety of indirect threats that are the result of an increased human presence in occupied habitats at higher elevations outside of the project area.

This increased presence in the outer portions of the Basin is problematical in part because, as has been repeatedly observed, vireos often react strongly to the close approach of humans, particularly when nestling or fledgling young are also present. Research has also documented that the presence of humans at or near cowbird traps compromises the success of trapping efforts, particularly if the traps are damaged or stolen (e.g., The Nature Conservancy 1997). Moreover, the available data (e.g., Salata 1987b) suggest that unnecessary human disturbances may otherwise jeopardize vireo nesting success. Predators and cowbirds may both be capable of "homing in" on agitated vireos and subsequently destroy nearby nests. In addition, much of the Prado Basin near higher elevation roads continues to be used for recreational shooting, dumping, camping, paint-ball games, and cultivation of illegal plants. Many of these activities have adversely affected occupied critical habitat for the vireo and flycatcher.

The project-related creation and maintenance of habitat that may favor exotic plants and animals could potentially significantly impact the vireo, flycatcher, and their riparian habitats and artificially concentrate predators in unflooded areas. Specifically, the routine flooding associated with the proposed project could: (1) induce the establishment or dispersal of castor bean and giant reed, two alien plants that displace and destroy native riparian habitats; or (2) degrade or modify riparian habitats to the benefit of the exotic cowbird.

The increase and spread of alien plants, notably giant reed, is continuing in the Santa Ana River in general and Prado Basin in particular. Although this escaped alien can colonize natural areas after natural flood events, invasion of this aggressive plant is greatly increased by disturbances such as changes in flow/flood regimes. Undisturbed areas vegetated with native species are much more resistant to invasion by this and other alien plants. The disturbance associated with

water storage is expected to substantially increase the potential for invasive species to propagate or become established in project area.

The cowbird populations in the Prado Basin and contiguous reaches of the Santa Ana River apparently are of a comparatively higher abundance and density (see Pike and Hays 1999). This apparent, relative abundance of cowbirds within the Prado Basin may well be the result of the rather close juxtaposition of host-rich riparian habitats and expansive feeding areas in and around nearby dairies, livestock operations, and agricultural fields (see, Zembal *et al.* 1985, Hays 1987, and Lowther 1993).

In support of this hypothesis, the available data reveal that the number of cowbirds removed from Prado Basin habitats from 1986 to 1989 (3,115) obviously far exceeds the number (1,282) that were removed during this same time frame (or any other 4-year period) from the well-managed and much larger Camp Pendleton locale (Salata 1987b; Slader Buck, Marine Corps Base, Camp Pendleton personal communication; Sweetwater Environmental Biologists 1989; Fish and Wildlife Service, unpublished data). Sweetwater Environmental Biologists (1989) reported a yield of 0.17 cowbirds per trap day at Camp Pendleton during 1988; the corresponding figure for the Prado Basin in 1988 and 1989 was 0.9 cowbirds per trap day. However, these same authors reported that the cowbird parasitism rate at Camp Pendleton had been reduced to less than 1 percent in 1988 and 1989, a figure that is far less than any 1-year average reported thus far for the Prado Basin (see Pike and Hays 1999).

Accordingly, because the rate of parasitism of vireo nests in the Prado Basin has been as high as 100 percent (Zembal *et al.* 1985), any project-related feature that prevents the management of this species is highly problematical. Previous studies have revealed that the storage of water in the Prado Basin has prevented the deployment of cowbird traps in optimum, proven locations, and, apparently as a result, caused or contributed to an elevated nest parasitism rate in the most affected area (West Basin) (The Nature Conservancy 1995, The Nature Conservancy 1996, Pike and Hays 1998). The available evidence also suggests that cowbirds are able to efficiently exploit nests that they are easily able to detect in fragmented landscapes or in habitats with reduced vegetation densities and volumes. In essence, because "female cowbirds find nests by watching other birds and by actively searching for nests" (Van Tyne and Berger 1976: 527), nest-finding by cowbirds and predators may be facilitated in areas that are devoid of luxuriant, near-ground vegetations or otherwise disturbed. In addition, the expected increase in human presence at less remote, higher elevations within the Prado Basin could compromise management efforts to effectively control cowbirds. The vandalism of cowbird traps has been, and remains, problematical in the higher (more accessible) portions of the Prado Basin and adjacent Santa Ana River and Temescal Creek.

Given the discussion immediately above and because implementation of the project will effectively reduce the amount and quality of habitat available to the listed species and predators alike, predation of vireo and flycatcher rates may increase. Not surprisingly, the 1998 rate of depredation on vireo nests (45 percent) was one of the two highest figures recorded during the 14 year monitoring and management effort in the Basin (Pike and Hays 1999). Due to the

availability of water and sustained water conservation during the 1998 breeding season, the pool elevation remained at 505 feet until June and did not fall to 500 feet until July (Corps, unpublished data).

Although the proposed project does not directly increase the potential for noise and vibration impacts to vireos, the displacement of vireos to the vicinity of the Corona Airport, State Route 71, and other Basin roads could pose an indirect, potential threat to the vireo and the flycatcher within the project action area (e.g, RECON 1988; Pike and Hays 1992). Noise and vibration are thought to be potentially harmful to a variety of bird species (Gunn and Livingston 1974, RECON 1988, Pike and Hays 1992). Many birds have acute senses of hearing (Dooling 1978, Knudsen 1978, Fay and Feng 1983) and researchers have documented and described the negative effects of noise on birds. For instance, Fletcher et al. (1971) reported that few, if any, of the reported or suggested effects of noise on wildlife would benefit them or increase their chances for survival, whereas known, detrimental noise effects may decrease their chances for survival or even lead to their death. In the extreme, the apparent effects of noise can be devastating to wildlife populations.

Upon reviewing the body of relevant scientific research, Dufour (1980) of the Environmental Protection Agency (EPA) identified four major categories of noise effects on wildlife: 1) auditory physiological, 2) nonauditory physiological, 3) behavioral, and 4) masking. Although masking (i.e., interference with the reception of auditory signals because of interfering environmental noise) and behavioral considerations are of primary concern in this instance, Dr. R. J. Dooling (1987), bioacoustics expert from the University of Maryland, stated and documented that "as studies with humans have shown, noise has other deleterious effects (other than masking) and there is no reason to think that noise would not effect animals in the same way." For instance, Gunn and Livingston (1974) reported that a bird population exposed to helicopter disturbances and human activity suffered (in contrast to the control population) lower hatching and fledging success and increased rates of nest abandonment and the premature disappearance of nestlings. Woolf et al. (1976) concluded that prenatal auditory stimulation can affect the development (and, therefore, the physiology) of an avian embryo inside an egg.

"Masking," however, may be most detrimental to small perching birds, like the vireo and flycatcher. In essence, "excess sound can interfere with the perception of important, relevant auditory signals" (Miller 1974). Whether a vireo or flycatcher receives potentially vital auditory information depends on such noise parameters as environmental attenuation, signal to noise ratios, and discrimination of the receiver given the background noise. The pertinent biological literature suggests that birds utilize their sense of hearing to locate their young and mates, to establish and defend territories, and to locate and evade predators (Scherzinger 1970 and Shen 1983). The latter author observed that the ability of a bird to detect vibration may be crucial for sensing approaching predators, particularly if the birds are sleeping. The life of a vireo or flycatcher may well depend upon its detection of an alarm call given by another vireo or flycatcher (or other source) that warns of the approach of potential predators.

Masking noise may also affect the breeding behaviors of affected birds. Dooling (pers. comm., 1987) concluded that, if "noise masks vireo song for the human (at some given distance) then it probably also significantly masks vireo song for the vireo." Dooling continued that "the human almost certainly does better than the vireo in hearing a signal in noise around 2 to 4 kilohertz (probably about twice as good)." Given Dooling's remarks concerning the relative acuities of human and vireo hearing and the aforementioned dependence of the vireo (and many other bird species) on their sense of hearing, unabated, masking noise could adversely affect vireo or flycatcher pairs or individuals that are present in, or adjacent to, the subject action area.

Over the course of the past 14-year study of the vireos and flycatchers in the Prado Basin, it has become increasingly apparent that ambient noise, particularly that caused by low-flying helicopters and fixed-wing aircraft involved in "touch and go" exercises, have posed a threat to vireos, flycatchers, and a large number of other species in the southern and western portions of the Prado Basin.

Most recently, aircraft noise was particularly problematical in 1997 in the southern portions of the Prado Basin. Routine censuses and data collection historically have been difficult in portions of the basin because of nearly continuous aircraft noise that masks the vocalizations of subject birds (and virtually every other ambient sound). Noise was often contributed simultaneously by three (or more) aircraft and was frequently, apparently problematical for periods up to 90 minutes in length (The Nature Conservancy 1997).

The continuing implementation of the project also creates an increased risk of habitat degradation and impacts to individual vireos and flycatchers resulting from the dispersal of environmental contaminants. The storage, use, and potential spillage of herbicides, oil, fuel, petroleum products, solvents, in an area that is within a designated flood control basin and water conservation project areas occupied by the vireo and the flycatcher would appear to be problematical. The unmitigated dispersal of environmental contaminants (e.g., crude oil) as result of the implementation of the project during spring and summer months could have catastrophic consequences to breeding vireos, flycatchers, and their designated critical habitats.

During the course of the current study of the vireos and flycatchers within the Prado Basin and environs, several apparently well-incubated vireo clutches failed to produce a single viable nestling (e.g., Hays 1989). Entire clutches failed to hatch in three cases and all vireo nestling young failed to survive in two other instances during the early part of the 1988 breeding season. In 1994, four full clutches failed to hatch. One apparently infertile female is thought to be responsible for 2 of these clutches. In 1997, a nestling with a deformed upper mandible was observed in a nest. Such abnormalities are often the expressed result of exposure to environmental contaminants.

Preliminary investigations by office personnel have resulted in the discovery of abnormalities in invertebrate specimens that were collected within the Prado Basin that often are attributable to toxic levels of various pollutants. Specifically, crayfish (*Procambius clarkii*) with abnormal appendages have been found and several Chinese river clam (*Corbicula fluminea*) specimens

exhibited shell ring patterns that indicated irregular growth (Service, unpublished data). The Service concluded also that several age classes of Chinese river clams appeared to be missing from the riverine habitats that were surveyed. This phenomenon may be the result of episodic, lethal exposures to toxic substances. Most importantly, preliminary data derived from the toxicological testing of specimen, abandoned vireo eggs from the Prado Basin by the Service have revealed the presence of DDE (a metabolite of DDT) in concentrations that could cause eggshell thinning (Service, unpublished data).

Given all available information on the subject, the bioaccumulation of toxic substances may have caused, or contributed to, observed vireo reproductive failures. Because of the potential toxic effects of all herbicides, pesticides, crude oil, aircraft and automobile fuels, and noxious chemicals that are normally associated with operations and maintenance activities, these environmental contaminants cannot be allowed to disperse within the Basin.

Given the scope and extents of the above-described potential project-related impacts, we conclude that project-induced habitat destruction and alteration in the project area is likely to significantly adversely affect the vireo, flycatcher, and their designated critical habitats. We further conclude that project-related activities, as described, could result in the further fragmentation and destruction of vireo and flycatcher habitat or otherwise significantly impact the species and their critical habitats. A composite of all such impacts likely could jeopardize the vireo and adversely modify critical habitat for the vireo and flycatcher in the absence of substantial impact avoidance, minimization, and compensation measures proposed by the project proponent.

Although management efforts evidently have resulted in significant increases in local vireo recruitment and population size (Pike and Hays 1999) and progress towards the eradication of giant reed in the Prado Basin and Santa Ana River Watershed as a whole, we do not believe that the Prado Basin population has entirely recovered or that it would continue to prosper in the absence of effective management, which largely depends on the detection and removal of exotic biota from vireo and flycatcher habitat and the elimination of other threats to the species. For instance, given the relevant data analysis regarding impacts of cowbird parasitism on the vireo and flycatcher and the efficacy of cowbird management programs (e.g., Pitelka and Koestner 1942; Mumford 1952; Barlow 1962; Salata 1983a,b, 1984, 1986, 1987a,b; Jones 1985; U.S. Fish and Wildlife Service 1986, U.S. Fish and Wildlife Service 1995, U.S. Fish and Wildlife Service 1998), it seems reasonable to conclude that the Prado Basin population of vireos would have been subjected to much higher rates of cowbird parasitism and suffered greater rates of reproductive failure in 1986 (Hays 1986), 1987 (Hays 1987), 1988 (Hays 1988), 1989 (Hays 1989), 1990 (Hays and Corey 1991), 1991 (Pike and Hays 1992), 1992 (The Nature Conservancy 1993a), 1993 (The Nature Conservancy 1993b), 1994(The Nature Conservancy 1994), 1995 (The Nature Conservancy 1995), 1996 (The Nature Conservancy 1996), 1997 (The Nature Conservancy 1997), 1998 (Pike and Hays 1998) and 1999 (Pike and Hays 1999), in the absence of an effective, proactive cowbird management program. Recent, published treatises on the efficacy of cowbird trapping programs as part of comprehensive vireo and flycatcher

management efforts corroborate this fundamental assumption (i.e, Kus 1999, Whitfield and Sogge 1999, and Whitfield *et al.* 1999).

Although approximately 228 acres of vireo habitat may be eventually destroyed or degraded as a result of the project and 400 acres of vireo critical habitat may be affected, we anticipate that the amount of vireo (and flycatcher) habitat will eventually increase in the Prado Basin in light of OCWD's past and present commitment to replace habitat values and proposal to manage their property to maximize resource (including riparian woodland) values. The OCWD has already replaced approximately 100 acres of vireo habitat and is committed to continue restoring (and allow the restoration of) floodplains and wetland habitats on OCWD lands. Based on additional compensation offered by the OCWD, we expect that an additional 130 acres of vireo and flycatcher habitat can be replaced within the next 5 to 10 years. Any habitat created above and beyond this amount on the remainder of OCWD or Corps lands would result in a net increase in habitat extent. Given the current and proposed size of the compensation fund endowments and the additional commitment of OWCD to replace substantial quantities of mulefat on OCWD and Corps lands, this net increase is fully expected within the next 10 to15 years.

Perhaps more importantly, the endowment established with proposed funding will permit the perpetual management of restored riparian habitats and habitats elsewhere in the Santa Ana River Watershed. As is reflected in the "Description of the Proposed Action" (above), this management will largely consist of exotic plant control. Without such control measures, giant reed and other exotic species likely would eventually degrade or destroy significant portions of the native riparian habitats present in the Basin and adjacent watershed now and in the future. Upstream reaches of the Santa Ana River are presently heavily infested with giant reed, a species that creates fire and flood hazards wherever it occurs. This species, which successfully invades (and ultimately replaces) native riparian habitats, has no known wildlife habitat value.

For these reasons, the Corps, Service, and OCWD have identified giant reed as a major threat to the ecosystem of not only Prado Basin but the entire Santa Ana River Watershed. Recently, the agencies have recognized the value of working cooperatively in pursuing a more holistic approach in managing the various resources in Prado Basin and have recognized that a dedicated giant reed removal program will ultimately prove to be essential in conserving and sustaining local wetland and riparian woodland habitats and thus enhance Prado Basin and Santa Ana River Watershed ecosystems occupied by the vireo, flycatcher, and a large array of other sensitive plant and animal species.

Fortunately, the Riverside County Parks and Open Space District and a multiagency task force led by the resource conservation districts of Riverside and San Bernardino Counties and the OCWD have begun the process of combating the spread of giant reed within the Santa Ana River watershed. As is noted previously, the OCWD has made substantial contributions to the Santa Ana River Conservation Fund, which funds exotic plant control projects administered by the aforementioned Resource Conservation Districts. In addition, the OCWD has committed to use their own personnel to eradicate giant reed on OCWD properties, selectively revegetate portions

of the Prado Basin, and fund a resource conservation district employee charged with overseeing giant reed eradication and revegetation efforts in the watershed as a whole.

Secondly, OCWD's commitments to fund the equivalent of four full-time seasonal employees to participate in the current vireo and flycatcher monitoring and management effort and continue the cowbird eradication efforts year-round will almost certainly maximize the potential for maximum reproductivity and population growth for both species. This recent implementation of this impact minimization measure has effectively doubled the person-hours dedicated to management efforts each year (see Pike and Hays 1999). Based on the results and analyses of 14 years of local vireo and flycatcher management efforts within the Basin and elsewhere within the range of the these two species, we fully expect that the numbers of vireos and, perhaps, flycatchers will increase as a direct result of increased management efforts (e.g., Salata 1983a,b 1984, 1986, 1987a,b; Hays 1986; Hays 1987, 1988, 1989, 1990; Hays and Corey 1991; Pike and Hays 1992; The Nature Conservancy 1993a,b; The Nature Conservancy 1994; The Nature Conservancy 1995; Pike and Hays 1998, 1999). In any case, past management efforts in the Prado Basin, which have been funded largely by the OCWD, apparently have been largely responsible for an increase in the vireo population from 19 pairs in 1986 to 224 pairs in 1999 and for potentially preventing the otherwise likely extirpation of the local flycatcher population.

In summary, although direct and indirect impacts to the vireo and designated critical habitats are substantial, the magnitude and nature of the impact avoidance and compensation measures that will be implemented and minor changes in the projects that have been invoked by the Service pursuant to the Federal regulations at 50 CFR §402.14(I)(2) are expected to prevent impacts that may otherwise threaten the survival and recovery of the vireo (and flycatcher) and irreparably damage those species Prado Basin habitats.

Because we cannot assess with any certainty the relative impacts of the repeated storage of water associated with future, as yet unknown, inflows, the present analysis assumes only that the average yearly precipitation during the life of the currently proposed project will not exceed the average for the past 14-year study period and that wastewater discharges above the Prado Basin will not will significantly increase base flows beyond the present average. The present analysis does not, for instance, include considerations of: (1) future, as yet unknown, water control operations at the Seven Oaks Dam; (2) any potential increases in base flow resulting from petitions by the project proponent to import additional water into the project area, including a proposal to "appropriate up to 800 cfs for storage and up to 146,800 afa by storage in Prado Dam" and additional locations in Orange County (State Water Resources Control Board, *in litt.*, 1999); or (3) wastewater effluent base flows above the recently-observed average of 260 cfs (Corps, unpublished data).

Although rising groundwater and watershed runoff inflows contribute, treated wastewater from the sewage treatment plants upstream currently is a significant input source and may eventually exceed 450 cfs (EIS). In fact, wastewater effluent discharged above the Prado Basin in the Santa Ana River watershed increased 39 percent from 1986-1987 (110,780 acre-feet) to 1996-1997 (154, 290 acre-feet) (Santa Ana River Watermaster 1997). However, recent proposals to reclaim

wastewater now discharged by the San Bernardino/Colton RIX facility and the Inland Empire Utilities District into the Santa Ana River watershed above the Prado Dam render as speculative future predictions regarding future base flows into the Prado Basin. Additional direct, indirect, or interrelated or interconnected effects of the action, as yet unknown, must necessarily be addressed if and when they become known or apparent per the regulations at 50 CFR § 402.

CUMULATIVE EFFECTS

Cumulative effects are those impacts of future non-Federal (State, local government, or private) activities on endangered or threatened species or critical habitat that are reasonably certain to occur during the course of the Federal activity subject to consultation. The action areas of several proposed Federal (e.g., Corps, Bureau of Land Management, Bureau of Reclamation) projects include, or overlap with, the action area of the project considered herein. In addition, the Corps owns the majority of land behind Prado Basin, much of which is leased out for recreation use. However, Federal projects and land use authorizations that affect listed species within the foreseeable future elicit direct Federal involvement through Federal regulatory processes. Moreover, the two species considered herein largely and routinely utilize habitats that are within jurisdictional wetlands or waters of the United States, under the jurisdiction of the Corps and EPA. Future Federal actions are subject to the consultation requirements established in section 7 of the Act and the implementing regulations pertaining thereto and, therefore, are not considered cumulative in the proposed project.

Other projects without a demonstrated federal nexus could result in significant cumulative effects to the species or its designated critical habitat. However, section 9 of the Act prohibits the take of the vireo and flycatcher. The development of a habitat conservation plan (HCP) is required for the issuance of an incidental take permit that would allow vireos to be taken outside of the conservation areas established pursuant to the terms and conditions outlined in an acceptable HCP and its accompanying implementing agreement. Thus far, the Service has not approved any such HCP within the project action area and, therefore, has not issued an incidental take permit for the vireo or flycatcher. In the absence of illegal take or the unauthorized destruction of protected wetlands or waters of the United States or riparian vegetations protected by State law, no further loss of occupied habitat would be anticipated unless and until a permit is issued pursuant to section l0(a) of the Act and its implementing regulations.

Given the history of land use in the project action area, other authorized and unauthorized land use activities may result in direct, cumulative effects to the species. Within the last few years, we have documented at least 30 instances where clearing or filling of riparian habitat has occurred in Orange and western Riverside counties. Most recently, a Corps lessee mowed, in 1998 and 1999, less than 2 acres of riparian habitat suitable for the vireo and flycatcher within the basin adjacent to Chino Creek. In addition, Corps operations and maintenance work completed in late 1998 resulted in the clearing of less than one acre of riparian habitat suitable for the vireo and flycatcher (see BA). The Corps Operation Branch is working with this office to address these issues. Also, in the fall of 1999, approximately 2 acres of critical habitat was destroyed or degraded in conjunction with the construction of roads, apparently on OCWD property, in the

western portion of the Basin. The Corps Regulatory Branch and Service are working to resolve this additional, apparently unauthorized deposition of fill involving concomitant impacts to occupied vireo habitat.

In addition, infrastructure repairs following storm events and other projects within the Prado Basin and adjacent Santa Ana River often have not been permitted by Federal and State regulatory agencies, or the permitting has occurred after the fact. Although some apparently unauthorized destructions of habitat have resulted in enforcement actions by the Corps and EPA, many unauthorized activities go unresolved. These types of activities all have the potential to impact the vireo and the flycatcher directly through mortality or indirectly due to loss or degradation of habitat.

Although the unauthorized destruction of riparian habitat within the Prado Basin seems to be slowing, overall, in recent years, the unauthorized destruction of this habitat type likely will continue in the foreseeable future within the ranges of the two considered species. Some of this habitat apparently could be utilized by the vireo and flycatcher for nesting and foraging. Nonetheless, the Santa Ana River Conservation Trust Fund is intended to manage sensitive biological resources from a watershed perspective, thus lessening the likelihood of future cumulative impacts (BA).

CONCLUSION

After reviewing the current status of the vireo and flycatcher, the environmental baseline for the action area, the effects of the proposed projects and the cumulative effects, and the commitment of the Corps and project proponent to prevent or minimize the destruction of occupied vireo and flycatcher habitat to the extent possible, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the vireo or flycatcher. Although the proposed action will alter designated critical habitats for both species, we conclude, on the basis of project-related impact avoidance, minimization, and conservation measures, that such alteration will not appreciably diminish the value of these critical habitats for the survival and recovery of both listed species and, thus, the proposed action will not result in the destruction or adverse modification of critical habitat for the vireo and flycatcher. We base this conclusion on the following reasons:

1) Although the number of vireos that may be harmed or harassed as a result of the project is anticipated to be large relative to the total population numbers remaining in the Prado Basin, substantial measures have been, and will be taken by the project proponent to minimize, overall, potential impacts to the vireo and flycatcher and provide for the recovery of both species.

2) The direct and indirect impacts of this proposed action to the vireo and flycatcher populations have been minimized through project conservation features.

3) Although the primary constituent elements supporting vireo and flycatcher are present within each project area and as much as 400 acres of vireo critical habitat may be impacted or altered, on average, over the life of the proposed project as conditioned herein, implementation of the proposed action, along with the proposed avoidance, minimization, and conservation measures, likely will not result in the destruction or adverse modification of designated critical habitat for either species by appreciably diminishing the value of these critical habitats for both the survival and recovery over time. Substantial measures have been taken, and will be taken, to sustain the quantity and quality of vireo and flycatcher critical habitat within the project action area and remainder of designated critical habitat within the Santa Ana River watershed.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are nondiscretionary, and must be undertaken by the Corps so that they become binding conditions of any grant, permit, or agreement issued to the OCWD, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the OCWD to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Corps and/or OCWD must report the progress of the action and its impact on the species to this office as specified in the incidental take statement. (50 CFR §402.14(i)(3))

AMOUNT OR EXTENT OF TAKE

We anticipate that the following amounts and types of take could occur as a result of the proposed action and hereby authorized over the life of the project:

1. The harassment of 10 vireos that may be indirectly impacted (e.g., depredated, parasitized, impacted by noise) as a result of the implementation of the project, and
2. The harm of 90 pairs of vireos or 180 individual vireos over the life of the project due to the periodic, temporary flooding, destruction or degradation of occupied habitat.

3. Zero take of the flycatcher is anticipated.

The death or harm of embryos in vireo and flycatcher eggs, the death or harm of vireo and flycatcher nestling or fledgling young, and the death or harm of juvenile and adult vireos and flycatchers is not expected as a result of the implementation of the proposed project and is, therefore, not authorized.

EFFECT OF THE TAKE

In the accompanying biological opinion, we determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

We believe the following reasonable and prudent measures are necessary and appropriate to minimize take of vireos and flycatchers:

1) Take of flycatchers shall be avoided and take of vireos shall be minimized through the implementation of best management practices, strict adherence to the project description including all proposed conservation features, compliance with all wildlife protection statutes to minimize direct and indirect impacts to the species, and the adherence to strictly-delineated project boundaries.

2) The degradation or destruction of vireo and flycatcher critical habitats in the project action area will be avoided or minimized by the conservation, to the extent possible, of existing riparian and wetland habitats in the project action area, the prevention of project-related impacts to critical habitat elements in the project action area, the proposed replacement of project-related losses of habitat values, and the conservation of vireo critical habitat in the Prado Basin and remainder of the Santa Ana River watershed.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Corps and OCWD must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are nondiscretionary.

1.1 The Corps and the OCWD shall implement the project exactly as described in the sections entitled "Description of the Proposed Action" and "Conservation Measures"

(above), and shall, in addition, implement all impact avoidance and minimization measures described above in the "Conservation Measures" section, biological assessment, and all other relevant letters and documents. The Corps or OCWD or their agents shall ensure that these measures are executed for the life of the project. In particular, the Corps and OCWD shall ensure that vireo and flycatcher monitoring and management efforts shall meet or exceed 1998 levels for the life of the project.

1.2 The Corps, OCWD, or their agents shall obtain all necessary local, State, and Federal permits to implement the project. In particular, the Corps and OCWD must obtain any necessary permits from California Department of Fish and Game. The incidental take authorization in this biological opinion is not in effect in the absence of any or all such permits.

1.3 If, in the event that raising the water conservation pool to elevation 505 feet threatens existing occupied nests of vireos or flycatchers, the Corps, OCWD, and the Service shall dedicate the necessary personnel to physically relocate nests or take other steps as necessary to prevent the unauthorized take of vireos and flycatchers.

1.4 The Corps and OCWD or their agents and lessees shall not attempt to implement the project if such implementation could result in the dispersal of crude oil, petroleum products, or any other toxic substance or hazardous material into vireo or flycatcher habitats. To this end, the Corps, OCWD, or their agents shall implement the project if and only if no crude oil, petroleum products, or any other toxic substance or hazardous material is detected that would be inundated or dispersed by water in the project area. No equipment that is determined to be leaking fuel or other fluids shall be utilized in the project area. No mechanized equipment shall be used within 10 feet of any pipelines or other infrastructure transporting or containing crude oil or petroleum, or petroleum products on Corps-owned lands. The Corps, OCWD, or their agents shall be responsible for inspecting the project area to insure that habitat and habitat restoration areas are free from petroleum products and contaminant spills prior to, and during, the implementation of the project.

1.5 The Corps, OCWD, or their agents shall, pursuant to the regulations implementing section 7 of the Act; (1) monitor pre-project and post-project conditions, and (2) report yearly on the extent of critical habitat altered and the number of vireos and flycatchers harmed or harassed as a direct or indirect result of the implementation or enabling of project-related activities. This report is due on December 15 of each calendar year. The report shall contain an introduction and methods, results, and discussion sections consistent with the scientific method.

2.1 The Corps, OCWD, or their agents shall create proposed replacement habitat pursuant to the following requirements:

a. Giant reed eradication and habitat restoration areas above 505 feet in elevation that are specifically and uniquely authorized for that purpose by the OCWD or Corps shall be identified prior to the initiation of the water conservation project.

b. Giant reed eradication and revegetation and restoration efforts, including appropriate monitoring and maintenance efforts, shall commence immediately upon the initiation of any project feature that results in the destruction or degradation of critical habitat and shall continue until the replacement habitat is deemed to be "acceptable." Replacement riparian habitat shall be deemed acceptable habitat if: (1) the habitat is occupied by a breeding pair of vireos or flycatchers; or (2) the habitat is occupied by breeding yellow-breasted chats (*Icteria virens*); or (3) the habitat is demonstrated, to the satisfaction of the Corps and Service, to be not significantly different statistically in terms of structure and composition from Prado Basin vireo-occupied habitat or willow woodland habitats with understory as characterized by Zembal *et al.* (1985) and Zembal (1986); or (4) the Corps and Service biologists concur that the habitat apparently has the appropriate "niche-gestalt" (James 1971) characteristics and is suitable for occupation by breeding pairs of vireos or flycatchers. Once any approved OCWD restoration project is proposed to be complete, the Service and the Corps must be notified in writing.

c. All revegetation efforts shall be conducted according to a plant palette subject to the approval of the Service and Corps.

d. To avoid conflicts with nesting vireos (and, possibly, flycatchers), the OCWD shall conduct giant reed eradication and restoration and revegetation activities only before March 15 or after September 15 of each calendar year unless specifically authorized to do otherwise by the Corps and Service. Although in some cases weeding and other restoration site maintenance activities will be necessary and prudent during the vireo and flycatcher breeding seasons, authorizations must be obtained in advance to preclude the unauthorized take of listed species, which is increasingly likely as the restoration habitat matures.

e. The OCWD or its agents or lessees shall develop methods and measures to protect created and restored habitat areas from attracting or propagating exotic predators (e.g., rats, *Rattus* sp.; bullfrogs, *Rana catesbiana*) and alien plants (e.g., giant reed). To this end, the OCWD or its agents or lessees shall ensure that trash, other dumped debris, abandoned vehicles, equipment, or other potential exotic rodent shelter is removed from habitat areas, habitat restoration areas, and their environs.

2.2 The Corps, OCWD, or their agents or lessees shall not disturb or destroy existing vireo habitat including willow riparian, riparian scrub, or marsh habitats during the implementation of the project except as specifically permitted pursuant to this biological opinion. The Corps, OCWD, and their agents or permittees shall immediately replace or restore, any and all critical habitat altered as a direct or indirect result of any dam

operation activities that are not consistent with the project description described herein. All habitat that is destroyed/ degraded that is not in the identified project footprint shall be disclosed immediately to the Service for possible reinitiation of consultation.

2.3 The Corps or its agents or lessees shall remove, under the supervision of the Service, all invasive, alien vegetation (e.g., giant reed, castor bean, tamarisk) to the extent practicable and feasible, from the project areas and habitat restoration areas for the life of the projects.

2.4 The Corps and its agents shall ensure that all habitat, conservation or habitat restoration areas are not used for any purpose that would change or otherwise interfere with their value as wildlife habitat. To this end, the Corps or its agents shall restrict land uses in the project area to those stated in the Corps permit application for the life of the project. Any deviations from stated land uses shall be disclosed and coordinated with the Corps and the Service.

2.5 The Corps, OCWD, or their agents or lessees shall not erect any permanent or temporary structure in the created habitat areas nor light these areas without the expressed consent of the and the Corps and Service.

2.6 The Corps, OCWD, or their agents or lessees shall provide access to the project area (including all restoration areas) and provide, upon request, keys to any locks placed on fences, steel ropes, or other structures in or adjacent to the habitat and habitat restoration areas and their environs to the Service, Corps, and other regulatory agency personnel to facilitate site inspections and the management and monitoring of protected and listed species.

2.7 All employees, agents, lessees, or sublessees of the Corps and OCWD involved in the implementation of the project, including associated giant reed eradication and revegetation efforts shall be: a) informed of the sensitivity of the habitat and restoration areas, and the associated federally listed species; and b) instructed as to the content of the this biological opinion, and special permit conditions or terms and conditions delineated herein.

2.8 The Corps and OCWD shall ensure that the Service retains the right to access and inspect the project site and restoration/enhancement areas for compliance with the proposed project description and with the terms and conditions of this biological opinion.

2.9 Unless specified otherwise above, the implementation and execution of all preceding terms and conditions shall begin immediately upon the issuance of this biological opinion and shall continue, in earnest, for the life the project and until all compensation measures have been fully implemented and executed.

2.10 All preceding terms and conditions shall be entered as a special permit condition or conditions for any and all Corps permits or other authorizations pertaining to the proposed project.

2.11 As the Federal action agency, the Corps is ultimately responsible for the implementation of all preceding terms and conditions in the event of the financial or institutional incapacity of the OCWD or their agents to perform them.

We believe that no more than 180 vireos will be taken in the form of harm and 10 vireos in the form of harassment, and zero flycatchers will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. We will not refer the incidental take of the any federally listed, migratory bird, including the vireo and flycatcher, for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein. If, during the course of the action, this level of incidental take is exceeded or if a vireo or flycatcher is taken in a manner not authorized above, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. In addition, the Corps and OCWD or their agents must cease the activity resulting in take, and the Corps and/or the OCWD or their agents shall provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

Disposition of Sick, Injured, or Dead Specimens

This office is to be notified within 3 working days should any endangered or threatened species be found dead or injured as a direct or indirect result of the implementation of this project. Notification must include the date, time, and location of the carcass, and any other pertinent information. Dead animals should be marked in an appropriate manner, photographed, and left on-site. Injured animals should be transported to a qualified veterinarian. Should any treated animals survive, this office should be contacted regarding the final disposition of the animals. The Service contact person is Mr. Hays, who may be contacted at the letterhead address or at (760) 431-9440.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. The term "conservation recommendations" has been defined as Service suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the Federal agency's section 7(a)(1) responsibility for these species.

Over the course of a 14-year study and management effort in the Prado Basin involving the Corps, Nature Conservancy and their contractors, OCWD personnel and office staff and volunteers, subpopulations of vireos, flycatchers and many other sensitive animal and plant species were subjected to risks and pressures that individually or collectively could potentially compromise the reproductive success of these species or otherwise jeopardize the survival of constituent populations, subpopulations, or individual organisms. Therefore, because the vireo population has increased from 19 to 224 confirmed pairs over the course of the study period, this species likely is a worthwhile management subject and a good candidate for recovery. Although current management efforts evidently have resulted in substantial increases in local vireo recruitment and population size, the Prado Basin population has not entirely recovered nor would the population continue to prosper in the absence of effective management. Many other vireo populations in the state are either declining, maintaining, or moderately increasing. Only the Camp Pendleton population has demonstrated similar, sustained, significant increases in population size since the vireo was federally listed in 1986. Also, the Prado Basin is one of only 6 locales in California that supports permanent populations of the flycatcher, which is apparently currently critically endangered.

Therefore, to ensure the recovery of the vireo and flycatcher and other sensitive or declining species in the Prado Basin and environs, we recommend the implementation or continuation of the following management and conservation practices in the Prado Basin as recommended by TNC (1997) and Pike and Hays (1999):

3. We recommend the Corps seek to restore and protect all habitats consisting of native plant communities and natural, physical features in the Prado Basin. During the course of the past 14 years, habitat within known vireo home ranges was destroyed or degraded as a result of livestock grazing, off-road vehicle activity, stream diversions, documented, apparently unauthorized dredge and fill operations, incursions of heavy equipment (including bulldozers, mowing machines, and road graders), repeated fires, oil spills, and vandalism. All such activities should be strictly prohibited, curtailed to the extent possible, or appropriately compensated. Past losses of habitat that can be traced to the responsible party or parties should be appropriately prosecuted or remediated. Because vireo and flycatcher habitat has been only rarely created, however, the avoidance of impacts to existing habitat is of paramount importance.

4. We recommend the Corps seek to control or remove all invasive/exotic biota from riparian habitats in the Prado Basin. The existing cowbird management program should be continued indefinitely and expanded to maximize the reproductive success of the vireo, flycatcher and many other sensitive avian species, and that invasive, exotic plants such as giant reed and castor bean be eliminated or controlled to the extent possible. Although cowbird trapping apparently is the single most effective means to initiate and sustain the recovery of a number of sensitive avian species, the large-scale control of noxious plants should be continued and expanded if riparian habitats are to continue to provide the elements necessary to accommodate the vireo, flycatcher, and a large variety of other sensitive animal taxa.

Fortunately, the prospects for long-term cowbird trapping, habitat creation and restoration, and vireo and flycatcher management seem to be assured because of current and projected compensation obligations that result from ongoing and planned projects within the Prado Basin. In addition, it is encouraging to note that a multi-agency task forces have begun a giant reed eradication in the basin and upstream reaches of the Santa Ana River in Riverside and San Bernardino counties. The Corps should continue to participate in, and expand, existing programs to adequately conserve the sensitive fauna (and flora) with the Prado Basin and environs.

5. We recommend the Corps seek to restrict human presence and activities in vireo and flycatcher home ranges and environs. During the course of the present study, vireos often react strongly to the close approach of humans, particularly when nestling or fledgling young are also present. Moreover, the available data (e.g., Salata 1987b) suggest that unnecessary human disturbances may impact vireo nesting success. Predators and cowbirds may both be capable of homing in on agitated vireos and subsequently destroy nearby nests. In addition, much of the Prado Basin continues to be used for illegal hunting and recreational shooting. Spent cartridges, freshly-broken skeet, and the carcasses of animals that had obviously been shot were found throughout most of the Prado Basin in 1986 and, to lesser extents, each year from 1987 to 1999. Obviously target shooting in or near habitats occupied by vireos places individual birds (or their breeding attempts) in jeopardy. Moreover, the presence of humans at or near cowbird traps appears to compromise the success of trapping efforts. "No trespassing" signs near occupied vireo habitats near Temescal Creek and the South Basin locale were apparently responsible for a reduction in the foot and vehicular traffic within wetland habitats at those locales in 1990, 1991, 1992, and 1993, but further measures to restrict or curtail unauthorized or unauthorized or illegal human activities (including paint ball games, illegal hunting and the destruction or theft of traps) appear to be in order throughout the Prado Basin and environs. As was reported above, cowbird traps have been repeatedly vandalized in recent years in scattered locales throughout the Prado Basin.

   Accordingly, we recommend the Corps implement the following specific conservation measures:

   a) Erect a gate where Butterfield Drive becomes Clearwater Drive within the City of Corona lease. The purpose of this gate would be to bar access to a dirt parking area that has become the site of trash dumping, the abandonment of automobiles, and other apparently illicit activities. We further recommend that a fence be constructed on the remainder of Clearwater Lane to prevent vehicles from traversing the agricultural field and thus circumventing the existing gate.

   b) Erect fencing or concrete or equivalent barriers around or below the highway turnouts along State Route 71 adjacent to lower Chino Creek vireo habitat. These turnouts are commonly used for trash-dumping, including hundreds of automobile

tires, and as unauthorized access points for human and automobile traffic. In 1996, two cowbird traps on Lower Chino Creek were closed after being vandalized by persons who apparently had driven into the Pardo Basin from the northernmost of the three State Route 71 turnouts.

c) Post "no trespassing" signs every 50 meters around the perimeter of key vireo and flycatcher breeding areas. Particular areas of concern are the turnouts along State Route 71 (see above), the northern border of vireo habitat along lower Chino Creek, Clearwater Lane and Rincon Street in Corona, and along the forest edge adjacent to Prado Regional Park in Chino. "Critical wildlife habitat" signs recently posted by the OCWD appear to be effective and are recommended for use in conjunction with "no trespassing" designations. Although unlikely to dissuade all potential trespassers, these signs would remove any ambiguity that exists as to where access is restricted or prohibited.

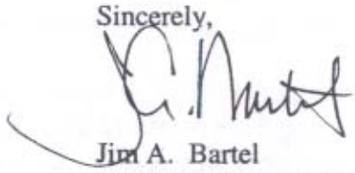
In order for that office be kept informed of actions that either minimize or avoid adverse effects or that benefit listed species or their habitats, we request notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the Prado Basin Water Conservation and Dam Operations Project on OCWD and Corps-owned lands in the Prado Basin, Riverside County, California. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. As required by 50 CFR § 402.16, reinitiation of formal consultation is required if the action is significantly modified in a manner not discussed above, if new information becomes available on listed species or impacts to listed species, or if the incidental take limit is exceeded.

We would appreciate notification of your final decision on this matter. Any questions or comments should be directed to Loren Hays of my staff at (760) 431-9440.

Sincerely,



Jim A. Bartel
Assistant Field Supervisor

Enclosures

LITERATURE CITED AND SELECTED REFERENCES

Acoustical Society of America. 1980. San Diego Workshop on the interaction between man-made noise and vibration and arctic marine wildlife. Acous. Soc. Amer., American Institute of Physics, New York. 84pp.

Aldrich, J. 1951. A review of the races of the Traill's flycatcher. Wilson Bulletin 63: 192-197.

Aldrich, J.W. 1953. Habitats and habitat differences in two races of Traill's Flycatcher. Wilson Bulletin 65: 8-11.

American Ornithologists' Union. 1983. Checklist of North American Birds, Sixth Edition. American Ornithologists' Union. Printed by Allen Press, Lawrence, Kansas. 877 pages.

American Ornithologists' Union. 1989. Thirty-seventh Supplement to the American Ornithologists' Union Checklist of North American Birds. Auk 106(3): 532-538.

American Ornithologists' Union. 1998. Checklist of North American Birds, Seventh Edition. American Ornithologists' Union, Washington, D. C. 829 pages.

Barlow, J. 1962. Natural History of the Bell Vireo, *Vireo bellii* Audubon. Univ. of Kansas Publ. Mus. of Nat. Hist. 12 (5): 241-296.

Barlow, J. and W. MacGillivray. 1983. Foraging and habitat relationships of the sibling species Willow Flycatcher (*Empidonax traillii*) and Alder Flycatcher (*E. alnorum*) in southern Ontario. Canadian Journal of Zoology 61: 1510-1516.

Bent, A. C. 1960. Life Histories of North American Birds. Volume II, Land Birds. Harper and Brothers, New York. 555 pp.

Bent, A. C. 1963. Life Histories of North American Flycatchers, Larks, Swallows, and Their Allies. Dover Press, New York.

Bond, J. 1971. Noise: it's effect on the physiology and behavior of animals. Science Review 9 (4): 1-10.

Brown, B.T. 1991. Status of nesting willow flycatchers along the Colorado River from Glen Canyon Dam to Cardenas Creek, Arizona. Endangered Species Report No. 20. U.S. Fish and Wildlife Service, Ecological Services, Phoenix, Arizona.

Browning, M.R. 1993. Comments on the taxonomy of *Empidonax traillii* (willow flycatcher). Western Birds 24: 241-257.

Chapin, E. 1925. Food habits of the vireos; a family of insectivorous birds. U. S. Dept. Agric. Bull. 1355: 1-44.

Coues, E. 1903. Key to North American Birds. Fifth Edition. The Page Company, Boston.

Dahl, T.E. 1990. Wetland Losses in the Unites States, 1780s to 1980s. U.S. Department of the Interior; U.S. Fish and Wildlife Service; Washington, D.C. 13 pp.

Dames and Moore. 1987. Supplemental Biological Information, Evaluation of Potential Impacts to the least Bell's vireo, Prado Basin Water Conservation Study. Unpublished report prepared for the Orange County Water District. Santa Barbara, California.

Dooling, R. 1978. The behavior and psychophysics of hearing in birds. Journal of the Acoustic Society of America 64 (Suppl. 1): S4.

Dooling, R. 1987. Letter to U.S. Fish and Wildlife Service dated 1 April, 1987. University of Maryland, College Park.

Dubois, P. 1980. Evolution des populations d'oiseaux d'eau nicheuses en Region Parisienne 1945-1978. (English abstract). Oiseaux Rev. Fr. Ornithol. 50 (1): 33-46.

Dufour, P. 1980. Effects of noise on wildlife and other animals: review of research since 1971. United States Environmental Protection Agency; EPA 550/9-80-100. 97pp.

Dunne, T. and L. B. Leopold 1978. Water in Environmental Planning. W.H. Freeman and Company, San Francisco.

Ehrlich, P., D. Dobkin, and D. Wheye. 1988. The Birder's Handbook: A Field Guide to the Natural History of North American Birds. Simon and Schuster, Inc. New York; 785 pp.

Ehrlich, P., D. Dobkin, and D. Wheye. 1992. Birds in Jeopardy. Stanford University Press, Stanford, California; 259 pages.

Fay, R. and A. Feng. 1983. Mechanisms for directional hearing among nonmammalian vertebrates. J. Acoust. Soc. Amer. 73 (Suppl. 1): S18.

Fitch, H. 1958. Home ranges, territories and seasonal movements of vertebrates in the Natural History Reservation. Univ. of Kansas Publ. Mus. of Nat. Hist. 11 (3): 63-326.

Fletcher, J. et al. 1971. Effects of noise on wildlife and other animals. U.S. Environmental Protection Agency. NTID 300.5. 74 pp.

Frederickson, L. 1979. Floral and faunal changes in lowland hardwood forests in Missouri resulting from channelization, drainage, and impoundment. U.S. Fish and Wildlife Service Publications, FWS/OBS-78/91. 130 pp.

Garrett, K. and J. Dunn. 1981. Birds of southern California: status and distribution. Los Angeles Audubon Society; 408pp.

Goldwasser, S. 1978. Distribution, reproductive success, and impact of nest parasitism by Brown-headed Cowbirds on least Bell's vireos. State of California, the Resources Agency; California Department of Fish and Game, Sacramento. Fed. Aid Wildl. Rest. W-54-R-10; Nongame Wildl. Prog. Job W 1.5.1; Final (unpublished) Report.

Goldwasser, S. 1981. Habitat requirements of the least Bell's vireo. State of California, the Resources Agency; California Department of Fish and Game, Sacramento. Unpublished report.

Goldwasser, S., D. Gaines and S. Wilbur. 1980. The least Bell's vireo in California: a de facto endangered race. American Birds 34: 742-745.

Gray, V. and J. Greaves. 1981. The riparian forest as habitat for the Least Bell's *Vireo (Vireo bellii pusillus*). Paper presented at the California Riparian Systems Conference, University of California, Davis; September, 1981.

Greaves, J. 1987. Least Bell's vireos at the Gibraltar Reservoir in Santa Barbara County, California in 1987. Unpublished report prepared for the Office of Endangered Species, U. S. Fish and Wildlife Service, U. S. Forest Service, and the California Department of Fish and Game.

Greaves, J., M.V. Gray, and T. Olson. 1988. Status of the least Bell's vireo in the Gibraltar Reservoir Area during 1988. Unpublished report prepared by Dames and Moore for the City of Santa Barbara, Department of Public Works.

Grinnell, J. and T. Storer. 1924. Animal life in the Yosemite. University of California Press, Berkeley.

Grinnell, J. and A. Miller. 1944. The distribution of the birds of California. Pacific Coast Avifauna Number 27: 1-608.

Gunn, W. and J. Livingston (Eds.). 1974. Disturbance to birds by gas compressor noise simulators, aircraft and human activity in the Mackenzie Valley and North Slope, 1972. Arctic Gas Biol. Rep. Ser. 14. 280pp.

Harris, J., S. Sanders, and M. Flett. 1986. The status and distribution of the willow flycatcher in California, 1986. California Department of Fish and Game, Wildlife Management Division; Administrative Report 88-1. Sacramento, California.

Hays, L. 1986. The status and management of the least Bell's vireo within the Prado Basin, California, during 1986. Unpublished report, California State University, Long Beach Foundation.

Hays, L. 1986. The status and management of the least Bell's vireo within the Prado Basin, California, during 1987. Unpublished report, California State University, Long Beach Foundation.

Hays, L. 1989. The status and management of the least Bell's vireo within the Prado Basin, California, 1986-1989. Unpublished report, California State University, Long Beach, California.

Howell, S.N.G. and S. Webb. 1995. A Guide to the Birds of Mexico and Northern Central America. Oxford University Press; Oxford (Great Britain); 851 pp.

Hubbard, J.P. 1987. The Status of the Willow Flycatcher in New Mexico. Report prepared for the New Mexico Department of Game and Fish.

James, F. 1971. Ordinations of habitat relationships among breeding birds. Wilson Bulletin 83: 215-236.

Jones, B. 1985. A report on the status of the least Bell's vireo on the San Diego, Sweetwater, and San Luis Rey Rivers, San Diego County, California. Unpublished Report.

Klebenow, D.A. and R.J. Oakleaf. 1984. Historical avifaunal changes in the riparian zone of the Truckee River, Nevada. Pages 203-209 *in*: California Riparian Systems, R.E. Warner and K.M. Hendrix, eds. University of California Press, Berkeley, California.

Knudsen, E. 1978. Strategies for sound localization in birds. J. Acoust. Soc. Amer. (Suppl. 1): S4.

Kus, B. E. 1999. Impact of Brown-headed Cowbird parasitism on productivity of the endangered Least Bell's Vireo. Studies in Avian Biology 18: 160-166.

Kus, B. E. and G. C. Collier. 1988. Status and management of the least Bell's vireo at the Sweetwater River, San Diego County, California, 1987. Unpublished report, San Diego State University, San Diego, California.

Larry Munsey International. 1999. Prado Dam Water Conservation and Supply Study, Riverside and San Bernardino Counties, California. Prepared for the U.S. Army Corps of Engineers.

Linsdale, J. 1928. Birds of a limited area in eastern Kansas. The Univ. of Kansas, Sci. Bull., 18 (11): 517-626.

Lowther, P.E. 1993. Brown-headed Cowbird (*Molothrus ater*). *In* The Birds of North America, No. 47 (A. Poole and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Marsh, K. 1987. Santa Ana River Canyon Resource Management Plan. Report submitted to the County of Orange, General Services Agency and Environmental Management Agency. Environmental Impact Report Biological Assessments, Silverado, California.

Mayfield, H. 1977. Brown-headed Cowbird: agent of extermination? American Birds 31: 107-113.

Miller, J. 1974. Effects of noise on people. J. Acoust Soc. Amer. 56 (3): 729-764.

Miner, K. L. 1989. Foraging ecology of the least Bell's vireo, *Vireo bellii pusillus*. Unpublished Master's Thesis, San Diego State University, San Diego California.

Monson, G. and A. Phillips. 1981. Annotated checklist of the birds of Arizona. The University of Arizona Press, Tucson. 240 pp.

Mumford, R. 1952. Bell's Vireo in Indiana. Wilson Bulletin 64:224-233.

Munz, P. 1974. A flora of southern California. University of California Press, Berkeley; 1086 pp.

Nature Conservancy, The. 1993a. The status and management of the least Bell's vireo in the Prado Basin, California, 1986-1992. Unpublished report prepared for the Orange County Water District, U.S. Army Corps of Engineers, California Department of Fish and Game, and U.S. Fish and Wildlife Service.

Nature Conservancy, The. 1993b. The status and management of the least Bell's vireo in the Prado Basin, California, 1986-1993. Unpublished report prepared for the Orange County Water District, U.S. Army Corps of Engineers, California Department of Fish and Game, and U.S. Fish and Wildlife Service.

Nature Conservancy, The. 1994. Status and management of the least Bell's vireo in the Prado Basin, California, 1986-1994. Unpublished report prepared for the Orange County Water District, County of Orange, California Department of Fish and Game, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service.

Nature Conservancy, The. 1995. Status and management of the least Bell's vireo and the southwestern willow flycatcher within the Prado Basin, California, 1986-1995. Unpublished report prepared for the Orange County Water District, County of Orange, California Department of Fish and Game, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service.

Nature Conservancy, The. 1996. Status and management of the least Bell's vireo and the southwestern willow flycatcher within the Prado Basin, California, 1986-1996. Unpublished report prepared for the Orange County Water District, County of Orange, California Department of Fish and Game, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service.

Nature Conservancy, The. 1997. Status and Distribution of the least Bell's vireo and southwestern willow flycatcher in the Prado Basin, California, 1986-1997. Unpublished report prepared for the Orange County Water District, County of Orange, California Department of Fish and Game, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service.

Nolan, V. 1960. Breeding behavior of the Bell Vireo in southern Indiana. Condor 62: 225-244.

Phillips, A.R. 1948. Geographic variation in *Empidonax traillii*. Auk 65: 507-514.

Pike, J. and L. Hays. 1992. The status and management of the least Bell's vireo within the Prado Basin, California, 1986-1991. Unpublished report, California State University, Long Beach Foundation and U.S. Fish and Wildlife Service, Laguna Niguel, California.

Pike, J., and L. R. Hays. 1998. Status and distribution of the least Bell's vireo and southwestern willow flycatcher in the Prado Basin, California, 1986-1998. Unpublished report prepared for the Orange County Water District, County of Orange, California Department of Fish and Game, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service.

Pike, J., and L. R. Hays. 1999. Status and distribution of the least Bell's vireo and southwestern willow flycatcher in the Prado Basin, California, 1986-1999. Unpublished report prepared for the Orange County Water District, County of Orange, California Department of Fish and Game, U.S. Army Corps of Engineers, and U.S. Fish and Wildlife Service.

Pitelka, F. and E. Koestner. 1942. Breeding behavior of the Bell's Vireo in Illinois. Wilson Bulletin 54: 97-106.

Pyle, P., S.N.G. Howell, R.P. Yunick, and D.F. DeSante. 1987. Identification Guide to North American Passerines. Point Reyes Bird Observatory (Slate Creek Press, Bolinas, California).

RECON (Regional Environmental Consultants). 1988. Comprehensive Management Plan for the Least Bell's Vireo. Unpublished report submitted to the San Diego Area of Governments (SANDAG); San Diego, California.

Remsen, V. 1978. Bird species of special concern in California. The Resources Agency, California Department of Fish and Game. Project W-54-R-9, Report 78-1.

Ridgely, R.S. 1981. A Guide to the Birds of Panama. Princeton University Press, Princeton, New Jersey. 404 pp.

Ridgely, R.S. and G. Tudor. 1994. The Birds of South America. Volume II. The Suboscine Passerines. University of Texas Press, Austin. 814 pp.

Salata, L. R. 1983a. Status of the least Bell's vireo on Camp Pendleton, California. Report on research done in 1982. U.S. Fish and Wildlife Service Contract Report No. 11100-0145-82, Laguna Niguel, California. 73pp.

Salata, L. R. 1983b. Status of the least Bell's vireo on Camp Pendleton, California. Report on research done in 1983. U.S. Fish and Wildlife Service Contract Report No. 10181-9373, Laguna Niguel, California. 73pp.

Salata, L. R. 1984. Status of the least Bell's vireo on Camp Pendleton, California. Report on research done in 1984. Prepared for U.S. Marine Corps, Natural resources Office, Camp Pendleton, California by the U.S. Fish and Wildlife Service, Division of Ecological Services, Laguna Niguel, California. 54pp.

Salata, L. R. 1986. Status of the least Bell's vireo at Camp Pendleton, California in 1985. Unpublished report, Sweetwater Environmental Biologists, Spring Valley, California.

Salata, L. R. 1987a. Status of the least Bell's vireo at Camp Pendleton, California in 1986. Unpublished report, Sweetwater Environmental Biologists, Spring Valley, California.

Salata, L. R. 1987b. Status of the least Bell's vireo at Camp Pendleton, California in 1987. Unpublished report, Sweetwater Environmental Biologists, Spring Valley, California.

Scherzinger, W. 1979. On the relations of predators of Hazel Grouse (*Bonasa bonasa*). Vogelwelt 100 (6): 325-217. English translation of abstract.

Seutin, G. and J. Simon. 1988. Genetic variation in sympatric willow flycatchers (*Empidonax traillii* and alder flycatchers (*Empidonax alnorum*)). Auk 105: 235-243.

Shen, J. 1983. A behavioral study of vibrational sensitivity in the pigeon (*Columba livia*). Journ. Comp. Physiology 152: 251-255.

Stadelman, W. 1958. Effects of sound of varying intensity on hatchability on chicken eggs. Poultry Sci. 37: 166-169.

Stafford, M.D. and B.E. Valentine. 1985. A preliminary report on the biology of the willow flycatcher in the central Sierra Nevada. California-Nevada Wildlife Transactions.

Stiles, F.G. and A.F. Skutch. 1989. A Guide to the Birds of Costa Rica. Cornell University Press, Ithaca, New York. 511 pp.

Sweetwater Environmental Biologists. 1989. Cowbird removal program during 1988 at Marine Corps Base, Camp Pendleton, California. Unpublished report prepared for U.S. Marines Corps Natural Resources Office, Camp Pendleton, California.

Taylor, D. M. and C. D. Littlefield. 1986. Willow flycatcher and yellow warbler response to cattle grazing. American Birds 40: 1169-1173.

Unitt, P. 1987. *Empidonax traillii extimus*: an endangered subspecies. Western Birds 18 (3): 137-162.

U.S. Army Corps of Engineers. 1987. Prado Dam Water Conservation Study, Unpublished Draft Engineering/Hydrology Report; May, 1987; U.S. Army Corps of Engineers, Los Angeles District, May, 1987.

U.S. Fish and Wildlife Service. 1987. Planning Aid Letter, Water Conservation in Prado Reservoir; Fish and Wildlife Enhancement, Laguna Niguel, California.

U.S. Fish and Wildlife Service. 1990. Fish and Wildlife Coordination Act Report dated July, 1990; Water Conservation in the Prado Basin, Riverside and San Bernardino Counties, California. Fish and Wildlife Enhancement, Laguna Niguel, California.

U.S. Fish and Wildlife Service. 1998. Draft Recovery Plan for the Least Bell's Vireo. Fish and Wildlife Service, Portland, Oregon. 139 pp.

Unitt, P. 1987. *Empidonax traillii extimus*: an endangered subspecies. Western Birds 18 (3): 137-162.

Van Tyne, J. and A. Berger. 1976. Fundamentals of Ornithology. John Wiley and Sons, New York. 808pp.

Walkinshaw, L.H. 1966. Summer biology of Traill's flycatcher. Wilson Bulletin: 78: 31-46.

Walters, M., R. Tesky, and T. Hinckley. 1980. Impact of water level changes on woody riparian and wetland communities; Volume VII, Mediterranean Region, western arid and semi-arid region. U.S. Fish and Wildlife Publications, FWS/OBS-78/93. 84 pp.

Whitfield, M.J. 1990. Willow flycatcher reproductive response to Brown-headed Cowbird parasitism. Master's Thesis, California State University, Chico; Chico, California.

Whitfield, M.J. and M. K. Sogge. 1999. Range-wide impact of Brown-headed Cowbird parasitism on the Southwestern Willow Flycatcher (*Empidonax traillii extimus*). Studies in Avian Biology 18: 182-190.

Whitfield, M.J., K.M. Enos, and S.P. Rowe. 1999. Is Brown-headed Cowbird trapping effective for managing populations of the endangered Southwestern Willow Flycatcher? Studies in Avian Biology 18: 260-266.

Whitmore, R.C. 1977. Habitat partitioning in a community of passerine birds. Wilson Bulletin 89: 253-265.

Wilbur, S. 1980. Status report on the least Bell's vireo. Unpublished report, U. S. Fish and Wildlife Service, Region 1, Portland, Oregon.

Willett, G. 1933. Revised list of the birds of southwestern California. Pacific Coast Avifauna 21: 1-204.

Woolf, N., J. Bixby, and R. Capranka. 1976. Prenatal experience avian development: brief stimulation accelerates the hatching of Japanese Quail. Science 194: 959-960.

Zembal, R. 1984. Santa Margarita River Project, San Diego County, California. Fish and Wildlife Coordination Act Report, United States Fish and Wildlife Service, Laguna Niguel, California. 91 pp. plus appendices (267 pp.)

Zembal R. 1986. The least Bell's vireo in the Prado Basin and environs, 1985. Unpublished report, U.S. Fish and Wildlife Service, Laguna Niguel, California.

Zembal, R., K. Kramer, and R. Bransfield. 1985. Survey of Vegetation and Vertebrate Fauna in the Prado Basin and the Santa Ana River Canyon, California. Unpublished report, U.S. Fish and Wildlife Service, Laguna Niguel, California.

Table 1. Maximum permitted water conservation pool elevation versus required acreages of vireo and wildlife habitat from 494 to 505 feet dependent.

Water conservation elevation	Required acreage of vireo habitat	Required acreage of wildlife habitat
495	50	86
496	67	109
497	83	133
498	100	156
499	116	180
500	133	203
501	152	218
502	171	233
503	190	248
504	209	263
505	228	278

Table 2. Dedicated lands for vireo and wildlife habitat restoration.

Required for elevation 505 feet	Vireo habitat (228 acres)	Wildlife habitat (278 acres)
CH-1, Chino Creek		34
CH-2, Chino Creek		90
PR-1, Small Pheasant Field	14	
PR-2 Southern Pheasant Field	65	
PR-3 Northern Pheasant Field	124	
PR-5 Southern Pheasant Field	32	
AR 1&2 *Arundo* Removal Areas		200
Total Required	228	278
Total Completed	235	324

Source: Corps Biological Assessment (August 1999)

Figure 1. Project Area Map

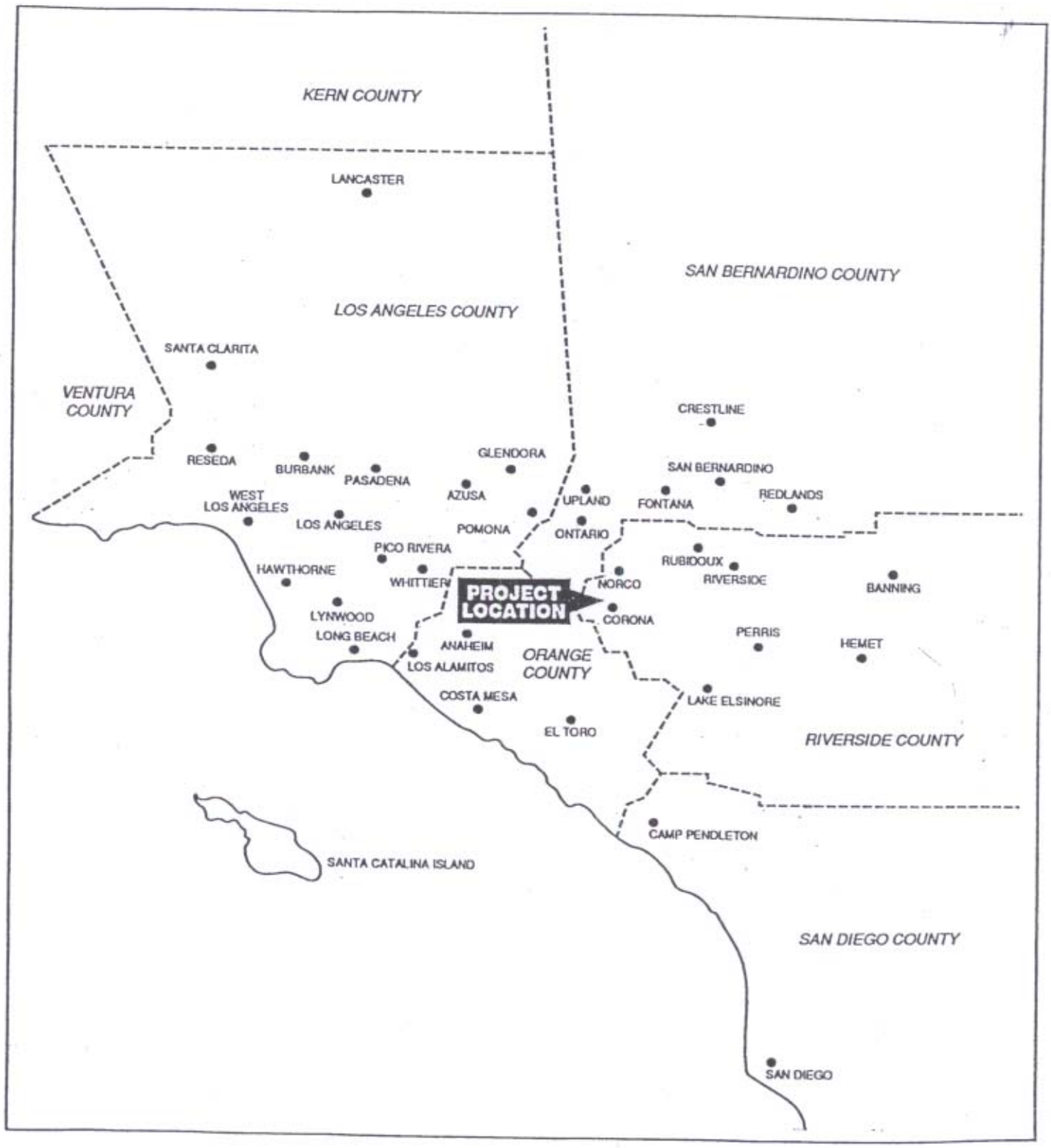


Figure 2. Project Vicinity Map