BIOLOGICAL OPINION
(1-6-95-F-02)

PROGRAMMATIC ACTIVITIES AND CONSERVATION PLANS

IN

RIPARIAN AND ESTUARINE/BEACH ECOSYSTEMS

ON

MARINE CORPS BASE, CAMP PENDLETON

prepared by:
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October 30, 1995

United States Department of the Interior

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October 30, 1995

Major General C.W. Reinke
Commanding General
United States Marine Corps
Marine Corps Base
Box 555010
Camp Pendleton, California 92055-5010

Re: Endangered Species Act Consultation on the Proposed Riparian and Estuarine Programmatic Conservation Plan, Marine Corps Base Camp Pendleton, San Diego County, California (1-6-95-F-02)

Dear Major General Reinke:

This Biological Opinion responds to your request for formal consultation with the Fish and Wildlife Service (Service) pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act). Your request was dated November 23, 1994 and received by us on November 28, 1994. The Biological Assessment (BA) addressing this action was received on November 3, 1994, and formal consultation was initiated on that date. At issue are the impacts that ongoing and planned training activities, infrastructural maintenance activities, several construction projects, and a Riparian and Estuarine Ecosystem Conservation Program may have on five federally-listed endangered species: the least Bell's vireo (*Vireo bellii pusillus*; "vireo"), southwestern willow flycatcher (*Empidonax traillii extimus*; "flycatcher"), tidewater goby (*Eucyclobius newberryi*; "goby"), arroyo toad (*Bufo microscaphus californicus*;), California least tern (*Sterna antillarum* (=*albifrons*) *browni*; "tern"), and one federally listed threatened species, the Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*; "plover").

BIOLOGICAL OPINION

It is the opinion of the Service that the activities associated with training, infrastructural maintenance, several proposed

construction projects, and the proposed Riparian and Estuarine Ecosystem Conservation Program are not likely to jeopardize the continued existence of the least Bell's vireo, southwestern willow flycatcher, tidewater goby, arroyo toad, western snowy plover, or California least tern. Critical habitat has not been designated for these species on Base; therefore none will be adversely modified or destroyed. *In lieu* of critical habitat designation on Base for the least Bell's vireo, the Base entered into a Memorandum of Understanding (MOU) with the Service in 1986 for the purpose of conserving and providing equivalent protection to the least Bell's vireo. Critical habitat for western snowy plover was not proposed on Base because of commitments made by the Base to provide equivalent protection as part of the proposed action being considered in this Biological Opinion.

Neither the light-footed clapper rail (*Rallus longirostris levipes*) nor the Pacific pocket mouse *(Perognathus longimembris pacificus)*, both listed as endangered species, would be affected by the proposed action and therefore will not be addressed in this Opinion. Two federally proposed endangered species, the California red-legged frog (*Rana auroura draytoni*) and Quino checkerspot *(Euphydras editha quino = E. e. wrighti;)*, as well as the clapper rail are not known to occur currently on Marine Corps Base Camp Pendleton (Base). In 1994, the Service conducted surveys for Pacific pocket mouse but did not discover any within the potential habitat on Base that was surveyed. This single survey effort was not necessarily conclusive in determining absence on Base.[1] This Biological Opinion will not analyze impacts on the light-footed clapper rail because of its current absence on Base and the absence of any adverse effects resulting from Base activities on the small amount of suitable habitat available. This Opinion does not address red-legged frog or Quino checkerspot due to the inconclusive information available on the status of these species on Base. Consultation may be appropriate in the future if any of these species are found to be present on Base. This Opinion does not address Pacific pocket mouse

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[1]In fact, the pocket mouse was discovered on the Base during the writing of this Opinion, but its distribution and abundance on the Base have not yet been determined. Surveys sponsored by the Base encountered the pocket mouse in "upland" habitat. Camp Pendleton intends to address the effects of training, infrastructure maintenance, and recreation on listed species, including the Pacific pocket mouse, occupying predominantly "upland" habitat types in a future programmatic consultation. Camp Pendleton is continuing its multi-year pocket mouse survey program and the Service is participating in this effort.

because it, along with other listed species of "upland" habitats, will be treated in a separate consultation(s).

This Biological Opinion was prepared using information contained in: the November 3, 1994, request for consultation; your letters of August 3, 5, and 12, 1994; a letter from the Army Corps of Engineers to the Marine Corps, dated September 16, 1994; the *Biological Assessment Riparian and Habitats Marine Corps Base Camp Pendleton* (BA), dated November 3, 1994; Carlsbad Field Office files; and several other documents, articles, and reports cited in the Reference section of this document.

The description in this Opinion of the many activities and projects that compose the "action" under consideration has been derived not only from the BA, but also from numerous discussions between the Service and the Base. Where there are differences between the text of the BA and this Opinion regarding the "project description," the text in this document is considered to supersede that of the BA, by mutual agreement.

PROJECT DESCRIPTION

The primary purpose of the proposed action is to plan and manage, as effectively as possible, ongoing and future military mission requirements affecting listed species in the riparian and estuarine/beach ecosystems on Marine Corps Base, Camp Pendleton, San Diego County, California. This consultation is "programmatic" because it is intended to cover all training and maintenance activities that fall within the current and future scope of the Base's military training mission and which affect the riparian and estuarine/beach ecosystems. The intent is to transcend the individual project-by-project approach that has characterized previous consultations. Several new construction projects also are included as part of the proposed action under consultation because the Base already has initiated the planning phase of these projects.

Base activities addressed in this Opinion fall into five categories (see Table 1):

1. Ongoing Training Activities and Requirements. Activities include all facets of amphibious operations, from landing at the beaches to movement inland in wheeled and tracked vehicles, to airborne movement of personnel and material, and foot traffic by infantry. Training is conducted predominately in upland areas but riparian, estuarine and beach habitats are traversed by Marines on foot patrol, or by vehicles along roads and at established crossings. Use of individual

training areas is relatively constant in number of operations over time.

2. Planned Training Activities and Requirements. Military training is constantly evolving to assimilate new weapons and tactics. These actions include new military helicopter training requirements, new stream crossings, new night firing requirements and facility renovation. In some instances, such as the Temporary Alternate Landing Area (TALA), actions must be taken to promote safety. In others, such as stream crossings, actions must be taken to increase training utility aboard the Base as national training lands are reduced.

3. Infrastructural Maintenance. Infrastructural maintenance includes the routine actions necessary to keep the installation in working condition. These include the maintenance of firing ranges, fire breaks, secondary roads, water and power utility lines, water well pumping and recharge facilities, and so forth.

4. Construction Projects. These proposed actions consist of projects generally resulting in significant spatial and temporal impacts. They range throughout the 5 different watershed basins on the Base and include flood control and bridge building projects, sewage treatment plant compliance projects, desiltation, and road building activities.

5. Recreational Programs. Recreational programs at Camp Pendleton consist of a variety of activities. Those occurring in and near riparian and estuarine areas are hunting, fishing, hiking, and camping activities.

These 5 activity categories are specifically described in greater detail in the BA and in Appendix 1 of this document.

Ecosystem Conservation Program.

In addition to the above activities, the Marines propose to implement an ecosystem conservation program for the purpose of minimizing the effects to listed species resulting from programmatic impacts. The goals of this program are to maintain healthy ecosystems on Base by implementing the United States Department of Defense's "ecosystem management" approach of training and maintaining fighting forces while improving ecosystem integrity and conserving sensitive species. The Base proposes to maintain native riparian and estuarine/beach habitat and species population numbers outlined under the Riparian Conservation and Estuarine/Beach

TABLE 1

PROGRAMMATIC ACTIVITIES AND CONSTRUCTION PROJECTS
MARINE CORPS BASE, CAMP PENDLETON

ONGOING TRAINING ACTIVITIES

Vehicle Operations
Infantry Operations
Engineering Operations
Helicopter Operations
Combat Training Towns
Military Ops in Urban Terrain
Firing Range Operations

PLANNED TRAINING ACTIVITIES

Military Helicopter Requirements
Temporary Alternate Landing Area (TALA)
Stream Crossings
Wilcox Range (103) Night Firing
Reconnaissance up the Santa Margarita River
Renovation of Camp DeLuz

INFRASTRUCTURE MAINTENANCE

Range Maintenance
Fire Breaks
Secondary Roads
Telephone Cable/Electrical Power Line Installation and Maintenance
Sewage Treatment Plant Pond Weed Control
Groundwater Recharge and Pumping
Water Well Maintenance and Repair

RECREATIONAL PROGRAMS

Hunting Program
Fishing Program
Camping and Hiking Programs

CONSTRUCTION PROJECTS

Santa Margarita River Drainage

SMR Flood Control-Construct Flood Levee
Basilone Bridge Replacement
STP Effluent Compliance
Demolition and Removal of Railroad Tracks
Desiltation of the SMR at the Lake O'Neill Diversion Weir
Air Station Construction Projects
Replace SMR and DeLuz Creek Crossings
Blue Beach Inland Access
New Potable Water Wells in the SMR Floodplain

Las Flores Creek Drainage

STP Compliance in Las Pulgas
Las Flores Marsh Enhancement

San Onofre Creek Drainage

STP Compliance

San Mateo Creek Drainage

STP Compliance/Effluent Pipeline and Infiltration Pond

San Luis Rey Drainage

Fire Road Crossing/Pilgrim Creek Dam

ECOSYSTEM CONSERVATION PROGRAM

Riparian Ecosystem Plan
Estuarine/Beach Ecosystem Plan

Conservation Programs in the BA, as well as implement various enhancement actions, such as cowbird trapping, predator management, and research studies.

The Base proposes a set of "programmatic instructions" to avoid and/or reduce and minimize adverse impacts to the ecosystem. Military training and facilities maintenance units will follow the guidance given in the programmatic instructions to avoid incidental take and adverse impacts, such as scheduling activities during the non-nesting season if feasible or selecting construction sites that would impact the least amount of riparian and estuarine habitat possible. When adverse impacts cannot be avoided, the Base proposes to offset species/habitat loss of value and function by a program of habitat enhancement. Camp Pendleton also proposes to monitor habitat, species populations, and management actions, as appropriate, and thereby establish "baselines" from which to track progress toward goals.

The BA and the project description in Appendix 1 of this document contain a more detailed characterization of the proposed ecosystem conservation program.

The riparian plan is designed to sustain and improve the biological diversity of the riparian ecosystem on Base, as primarily evidenced by the abundance and distribution of endangered neotropical migrant birds--least Bell's vireo and southwestern willow flycatcher--to the extent that Camp Pendleton's conservation activities contribute to recovery of these birds to a non-threatened status. The philosophic approach behind this Conservation Plan is to sustain and restore riparian ecosystem dynamics, such that natural plant and animal communities on Base are sufficiently resilient to withstand an expanded array of disturbances and incursions occasioned by military training activities. The Base's practical intent in proposing this plan is to provide the basis for increasing Mission flexibility in the Santa Margarita River (SMR) basin area. At present, Mission flexibility in the SMR basin is substantially constrained by the MOU.

To achieve greater Mission flexibility in the SMR, the plan calls for the maintenance of suitable vireo quality habitat not only in the SMR basin but also in the other major drainages on the Base, enhancement of degraded areas in these drainages, maintenance of the least Bell's vireo population at a minimum of 400 singing males on Base, and fostering the continued expansion of the southwestern willow flycatcher population above the 1994 level of 22 singing males.

The estuarine/beach conservation plan is designed to sustain and enhance natural resources located along the coastline of the Base emphasizing coastal lagoons and the SMR Estuary. Implementation of this plan is expected to maintain and improve the integrity of the estuarine/beach ecosystem to an extent that impacts associated from military activities would not impede. Evidence of the plan's success will be gauged by the abundance of the endangered California least tern and western snowy plover. In addition, the estuarine/beach conservation plan is intended to preclude the need for Federal designation of critical habitat for the snowy plover on the Base.

The plan calls for the designation of specific management zones along the coastline. Within these established zones, management activities would focus on maintaining wetland values of coastal lagoons, protecting and maintaining tern and plover nesting areas, and maximizing the probability of a metapopulation persistence within the lagoon complex for tidewater gobies.

SPECIES ACCOUNTS

Least Bell's Vireo. Primarily attributable to the synergistic effects of habitat loss and brood-parasitism by the brown-headed cowbird (*Molothrus ater*), the vireo was listed as an endangered species on May 2, 1986 (51 *Federal Register* [FR] 16474). Critical habitat for the vireo was designated in 1994, but Camp Pendleton was not included because the Marines and the Service agreed that a conservation plan in the form of an MOU would provide equivalent protection. Historically, a common to abundant breeding bird in valley bottom riparian habitats the least Bell's vireo ranged from Red Bluff, California in the north, to northwestern Baja California, Mexico in the south, and as far east as the Owens Valley, Death Valley, and along the Mojave River. Currently, the species is restricted to Southern California south of the Tehachapi Mountains. In 1994, approximately 70 percent of the United States vireo population was concentrated in just 5 localities, with the largest along the lower SMR on Base.

In 1986, surveys estimated the range-wide population at 397 territorial male vireos. Since that time, legal protection and active management have resulted in a substantial population increase, to an estimated 927 territorial males in 1994.

Since systematic vireo surveys were initiated, the number of territorial males on Base has increased from 27 in 1981 to 348 in 1994. A cowbird trapping program begun in 1983 is primarily responsible for this dramatic population increase. Until 1987,

vireos on Base were found primarily on the lower SMR. Though vireos have since expanded to at least 9 major drainages on Base, the SMR still supports 67% of the vireos on Base.

Southwestern Willow Flycatcher. The flycatcher was listed as an endangered species on February 27, 1995 (60 FR 10694). Designation of critical habitat on Camp Pendleton was proposed in 1993; a final decision is pending.

The wintering range of this neotropical migrant is not well known but thought to extend from Mexico south to northern South America. Ranging From southern California, southern Nevada, southern Utah, Arizona, New Mexico, southwestern Texas, and southwestern Colorado. Once considered widely distributed and common, the flycatcher now exists only in small disjunct groups and has been extirpated from the lower Colorado River. The estimated rangewide population for the flycatcher is 300 to 500 nesting pairs, possibly as low as 200 pairs (L. Hays, USFWS, pers. com.), with approximately 70 pairs and 8 single flycatchers occurring in California.

The flycatcher population that breeds in the SMR drainage represents one of two nesting groups in California that have remained stable or increased in recent years. The number of singing males recorded on Base has ranged from 4 in 1981 to 22 in 1994. Flycatchers are vulnerable to brood parasitism and have benefitted from the cowbird control program on Base.

Arroyo Toad. The arroyo toad was listed as an endangered species on December 19, 1994 (59 FR 64859). Urbanization, agriculture, dam construction, suction dredging, off-highway vehicle activities, predation by exotic aquatic species, and isolation and fragmentation of populations are the primary threats.

Arroyo toads are habitat specialists restricted to rivers and streams with shallow, gravelly pools adjacent to sandy terraces. Arroyo toads were historically found along the length of drainages in southern California from San Luis Obispo to San Diego County, Baja California, Mexico, south to the vicinity of San Quintin. They now survive primarily in headwaters as small isolated populations. Most remaining populations in the United States occur on privately owned or U.S. Forest Service lands. They have been extirpated from an estimated 75 percent of their former range in the United States.

Only preliminary results of an on-going study of the distribution and abundance of arroyo toad on Base have been submitted to the Service. According to a March 20, 1995, report from Camp Pendleton

to the Service, confirmed arroyo toad localities are known from four drainages.

California Least Tern. The California least tern was listed as an endangered species on October 13, 1970 (35 FR 16047). Loss of nesting habitat in conjunction with increased loss of foraging areas, human disturbance, and predation at remaining breeding colonies are the major threats to the species' survival and recovery.

The discontinuous breeding range of the California least tern in the U.S. extends from the Mexican border to San Francisco Bay. The majority of the population is concentrated in Los Angeles, Orange, and San Diego counties. In 1993, least terns nested at 35 locations rangewide. Once considered as common along the central and southern California coast, to the extent of being described as numberless on the beaches of Los Angeles County, the least tern population declined to a known low point of between 623 and 763 breeding pairs around 1973. Upon its designation as endangered, statewide efforts to protect nesting and foraging areas has resulted in a breeding population increase to an estimated 2733 pairs in 1994.

Nesting colonies have been documented at Camp Pendleton since 1969, at the SMR Estuary and at more recently White Beach, about 5.8 km north of the Estuary. Presently, the SMR Estuary represents one of the few relatively unmodified nesting areas remaining in southern California supporting the largest number of breeding pairs in the State. Throughout the 1990's, approximately 18% of the Statewide population has nested on Base.

Western Snowy Plover. The Pacific coast population of the western snowy plover was listed as a threatened species on March 5, 1993 (58 FR 12874). Designation of critical habitat was proposed in 1995, but the Base was not included because of an agreement between the Marines and Service to address conservation of the plover in this programmatic consultation. Threats to the species' survival and recovery include human disturbance, predation, and loss of nesting habitat.

The breeding range of the western snowy plover extends along coastal beaches from southern Washington to southern Baja California, Mexico. The largest concentrations of breeding birds occur in southern California. Prior to 1970, snowy plovers bred at 53 locations along coastal California. Presently, breeding occurs at only 20 locations, representing a 62% decline in breeding sites. The greatest losses of habitat have occurred in southern California, where breeding has vanished from parts of San Diego, Ventura and

Santa Barbara counties, most of Orange County, and all of Los Angeles County.

The breeding population in California has declined from an estimated 1565 adults in 1980 to 1386 adults in 1989, with a 55% decline occurring in north San Diego County and a 41% decline in San Diego Bay.

Camp Pendleton supports the largest mainland breeding population south of Ventura County. In addition to the SMR Estuary, other on Base areas utilized by snowy plovers at include beaches near Del Mar, Margarita (North) Beach, French Lagoon, Cockleburr Canyon, Las Flores Creek, and San Onofre Creek.

Tidewater Goby. The tidewater goby was listed as an endangered species on February 4, 1994 (59 FR 5494) as a result of past and continuing loss of coastal and riparian habitats. Critical habitat for the tidewater goby has not been designated.

The tidewater goby is restricted to brackish water habitats in the upper portions of coastal lagoons along the California coast. The species range is restricted currently to California, ranging from Del Norte County south to San Diego County.

Historically the tidewater goby occurred in at least 87 of California's coastal lagoons. Since 1900, it has disappeared from approximately 50 percent of these. Currently, the goby is restricted to approximately half its former range and is declining rapidly. Of the 43 remaining populations most are small and threatened by a variety of human and natural factors, including commercial development, stream channelization, water quality degradation, groundwater overdrafting, cattle grazing, and predation by non-native fishes. It is known from only 14 localities south of Point Conception, California. North of the Base, the closest self-sustaining populations inhabit the Santa Clara River, although a population was reintroduced recently to Malibu Creek. No known populations exist south of the Base.

Tidewater gobies on Camp Pendleton historically were known from 6 creek/lagoon systems and currently are known from 3 of these. Dispersal among lagoon systems on and off Base is suspected. The meta-population on Base is now isolated from all other goby populations. The goby populations on Camp Pendleton represent the southern-most extant population of the species, south of the Santa Clara River. The Base meta-population is genetically unique and is located at the southern edge of the species range.

Please refer to Appendix 2 for more detailed accounts of the species addressed in this Opinion.

ENVIRONMENTAL BASELINE

Riparian Ecosystem

More than 95% of the riparian habitat historically occurring in southern California has been lost to agriculture, development, flood control, and other human-caused impacts (Bell, 1993). Oberbauer (1990) reports a 60.8% loss of riparian woodland in San Diego County. Much of the remaining riparian area has been degraded by a variety of human activities, especially as a result of habitat fragmentation and detrimental edge effects. These areas no longer support numerous species formerly extant.

Of the approximately 9,800 acres of floodplain on the Base, riparian habitats currently cover about 8,200 acres; disturbed/developed lands account for the remaining 1,600 acres of floodplain. Compared to the rest of coastal southern California, a high proportion of the riparian acreage on Base is still relatively intact. Over 5,500 acres of riparian habitat on Base retains at least some value for listed species.

The lower SMR floodplain is a mile wide in places and supports extensive riparian forest, woodland, and scrub habitats from the edge of the braided channel to the base of riverain terraces. The upper SMR, from the confluence of Murrieta and Temecula Creeks (off Base) to the lower floodplain, is contained within a gorge varying from less than 100 to over 1000 feet in width. The SMR is the most biologically intact riparian corridor remaining in southern California (USFWS 1984).

Other areas on Base that support riparian communities include the drainages of the San Mateo, San Onofre, Las Flores, Aliso, and French watersheds and portions of Pilgrim Creek (San Luis Rey). Three listed species occur or have the potential to occur along these creeks--least Bell's vireo, southwestern willow flycatcher, and arroyo toad. Riparian habitat complexes on Base support a diverse avifauna, with over 100 breeding species and densities of up to 650 territorial males (various species) per 100 acres. Particularly well represented are neotropical migrants.

The SMR never supported a rich native fish fauna; only four species or subspecies of true freshwater fishes are native to the coastal streams of southern California (Moyle 1976). The only native lotic fish identified from the river today is the arroyo chub (*Gila*

orcuttii). It is not known if three other listed species--speckled dace (*Rhinichthys osculus*), Santa Ana sucker (*Catostomus santaanae*), and three-spined stickleback (*Gasterosteus aculatus*)--ever occurred in the SMR or have been extirpated due to changes in the hydrology, introduction of exotic fishes, or other factors. The river supported a native steelhead trout (*Oncorhynchus [=Salmo] mykiss irideus [=Salmo gairdneri]*) spawning run until the 1970's.

The riparian forest, woodland, and scrub habitats along the SMR and other streams on Base depend upon periodic flooding to provide substrate, nutrients, and physical energy to cycle the community back to earlier successional stages. Periodic floods of large magnitude, and migration of the river channel, are essential to the deposition of fresh alluvial sediments where seeds of willow and cottonwood can germinate and propagules of willow can take root. Adequate moisture and an absence of heavy flooding is particularly critical to the survival of young trees through their first year. As seedlings and resprouts mature into saplings, and eventually into mature trees, the river continues to deposit sediment on the floodplain. This process results in the formation of river terraces and as they rise other plant species colonize, resulting in further diversification in the floodplain community.

When cottonwood-willow riparian scrub reaches 4 to 5 years of age, it begins to exhibit the structural diversity required by breeding least Bell's vireo. The vireo, along with southwestern willow flycatcher and many other species may continue to use this diverse community for another 10 to 20 years. Gradually the canopy of the maturing willows and cottonwoods begins to shade out the diverse understory of vascular plants required by these birds. While older riparian gallery forest are valuable to many other species, they do not provide suitable vireo and flycatcher habitat. Annual flooding and occasional large flood events maintain this cycle of succession needed for a mosaic of diverse natural communities.

Giant reed (*Arundo donax*) and salt cedar (*Tamarix* spp.) are plants from Eurasia that readily invade riparian channels in southern California, especially in areas that are disturbed. *Arundo* is very competitive, difficult to control, and generally does not provide either nesting or foraging habitat for native animals. Spreading mainly by stolon and other vegetative parts, giant reed invades riparian communities at any stage of succession. It grows very quickly (up to 2 inches per day), is highly flammable and resprouts rapidly after a fire. Because of these characteristics, once giant reed invades a riparian area, it redirects the succession of the community towards pure stands of reed, usually through increasingly frequent fire events.

Native riparian communities are not adapted to repeated fire, and therefore, cannot withstand invasion by these disturbance-adapted plants. Moreover, any type of disturbance, even natural flooding to which native riparian communities are adapted, can open vegetative stands to colonizing propagules and perpetuates *Arundo* spread.

Giant reed has likely been on Base for many years and is apparently visible in the movie "Sands of Iwo Jima" [circa 1950], reportedly filmed on Base (Jeff Caspers, pers. comm.). Base activities from the 1960's through early 1980's were observed to greatly expand the areas infested with *Arundo* (Larry Salata pers. comm.). Phreatophyte control and flood control channelization of the lower SMR during this period were noted as covering miles of riverbed and led to expanding *Arundo* infestations along the SMR (Ibid.). In the Fall of 1980 several miles of the lower SMR were channelized downstream from the air station (MCAS). Dike repairs on the River were accomplished during this period as well. Large flood flows from the late 1970's and early 1980's caused further disturbance and introduced *Arundo* propagules over large areas, extending to the SMR Estuary. Between 1980 and 1985, impenetrable thickets of *Arundo* colonized most of these areas disturbed by human activities. Unintentional fires resulting from Base activities have burned riparian areas on the River. These burned areas have largely responded with greatly increased *Arundo* infestation. The edges around the off-channel spreading structures constructed and maintained for infiltration of surface flows in the floodplain of the SMR are currently dominated by *Arundo*. In-channel infiltration and de-siltation efforts on the SMR have disturbed areas of floodplain in the past. Base construction and maintenance activities involving bridges, levees, river crossings, roads, and culverts continue to contribute to the expansion of *Arundo* through disturbance of the floodplain.

Judging from the observation of *Arundo* spread in other riverine systems, such as the Santa Ana River, the Service anticipates that *Arundo* stands will continue to expand along the SMR.

Estuarine/Beach Ecosystem

The SMR Estuary is at the terminus of the last major unmodified river in the southern California region. Approximately 75% of the historical coastal saltmarsh and lagoon acreage in southern California has been lost to human activities (Zedler 1982). Most remaining coastal wetlands are now small, degraded fragments that have lost much of their former productivity and species richness. Numerous local extinctions in the region have been documented, including the four estuarine species considered in this Opinion.

Approximately 18 miles of undeveloped coastline exists within the borders of Camp Pendleton. Drainages with outlets to the ocean include San Mateo Creek, San Onofre Creek, Las Flores Creek, Aliso Creek, Cockleburr Creek, and the SMR. Many of these outlets are open to the ocean on a seasonal basis and support a variety of salt marsh, brackish, and freshwater marsh vegetation.

Construction of the railroad and coastal highways necessitated filling in portions of these coastal wetlands, resulting in the constriction of the main river channels and their flows. During the 1930's, the southern portion of the SMR Estuary was used as a landing field and in the 1930's farming began on the northerly bluffs adjacent to the Estuary and still continues today. In 1942, 153 acres of salt marsh and approximately 4 miles of tidal channels were filled at the SMR Estuary to create a boat basin for Marine amphibious training. In subsequent years, the salt marsh and open salt pan were used for military training activities. Since 1981, the Estuary has been considered out of bounds for all vehicular traffic and military maneuvers (Salata 1981). This was reaffirmed in the Final Environmental Impact Statement for the Landing Craft Air Cushion project in 1983.

The SMR Estuary supports four major habitat types--salt marsh, brackish marsh/willow swamp, salt flats, and coastal sand dunes. These habitat support about 148 plant species, 9 species of reptiles and amphibians, 24 fish species, 184 bird species, and 17 mammalian species, including several Federal and State listed species, such as the California brown pelican, California least tern, light-footed clapper rail, western snowy plover, tidewater goby, and Belding's savannah sparrow.

The regularity and extent of tidal flushing, the magnitude and frequency of freshwater runoff, sedimentation rates, soil types, salinity and nutrient relations, and human disturbance all influence the structure of coastal wetland systems. Watershed flows and tidal prism are important factors in maintaining the viability of the SMR Estuary. A strong correlation exists between the regularity of tidal flushing and the diversity and abundance of the flora and fauna present in a wetland habitat. Interruption of tidal flow has drastic effects and can greatly reduce the overall wildlife value of the Estuary. Tidal circulation provides moisture during periods of low precipitation typical of the southern California summer months. Nutrient concentrations, salinity, temperature, oxygen, strength of water currents, and light penetration all respond to the open or closed condition of the river mouth. Changes in these factors are stressful for many invertebrate species which require a more stable estuarine environment. Because of their importance as a food

source, the reduced abundance and diversity of invertebrate species within an estuary adversely affects the populations of fish, birds, and mammals. Without tidal influence, small fish such as anchovy and topsmelt, are prevented from entering the estuary. These species are important prey items for least terns and other birds. Mouth closure also prevents mudflat exposure during low tide conditions precluding the use of these prime foraging areas for resident and migratory shorebirds, including western snowy plover.

EFFECTS OF THE PROPOSED ACTION

This analysis examines the effects on listed species found in the riparian and estuarine/beach ecosystems resulting from the proposed action. Direct, indirect, interrelated, interdependent, and cumulative effects of either a permanent or temporary duration, are analyzed at the ecosystem and species levels. The effects of ongoing activities (training and maintenance) and individual construction projects are analyzed in more detail in Appendix 3. Indirect and temporary impacts associated with activities and projects typically were not addressed in the BA. Such impacts were discussed at more length between the Service and Camp Pendleton personnel during the course of the extended consultation.

Training Activities/Requirements

Effects to listed species of predominantly riparian areas resulting from ongoing training activities--vehicle, infantry, helicopter, combat training towns, and firing ranges--include limited, temporary damage to habitat and adverse impacts from noise, dust, accidents, weed propagation, predator attraction. Such adverse impacts are expected to occur on a regular, albeit relatively infrequent, basis. Many of the most serious potential effects to the vireo and flycatcher that could result from these activities will be avoided by implementation of programmatic instructions restricting such activities from occurring in riparian areas during the breeding season of these species. On-going and future training activities will result in some take in the way of harass and even harm of the vireo, flycatcher and arroyo toad. If the habitat management measures and programmatic instructions of the proposed riparian conservation program are effectively implemented, then the net effect on these species is expected to be positive. This conclusion is based on the fact that the training activities have been ongoing, and the vireo population on the Base has progressively increased in numbers since the time in the mid 1980's that many of the proposed habitat management measures and programmatic instructions were instituted.

Effects to listed species in estuarine/beach areas resulting from ongoing and future training activities eg. vehicle, infantry, helicopter include limited temporary damage to habitat and adverse impacts from noise, dust, accidents, and predator attraction. Such adverse impacts are expected to occur on a regular basis. Many of the most serious potential effects to the tern and plover that could result from these activities will be avoided or minimized by implementation of programmatic instructions which will place conditions and/or restrictions on activities that occur along the coastal areas during the tern and plover breeding season. There will occasionally be some take in the form of harassment and harm of the tern, plover, and tidewater goby. If the habitat management measures and programmatic instructions of the proposed estuarine/beach conservation plan are effectively implemented, then the net effect on these species is expected to be positive. This conclusion is based on the assumption that ongoing management strategies have contributed to the increase in the number of breeding terns on base concurrent with military training activities.

Infrastructure Maintenance Activities

Effects to listed species in riparian areas resulting from infrastructure maintenance activities--covering firing ranges, firebreaks, secondary roads, telephone cable and electrical power lines, sewage treatment ponds, groundwater pumping and recharge, and extraction wells, and the like--include periodic removal of vireo, flycatcher and arroyo toad habitat that tends to reestablish itself, temporary disturbance of adjacent habitat due to vegetation trimming, ground disturbance, noise, dust, weed dispersal and the like that may occur in the course of performing the maintenance activities. Since such activities are performed on a regular basis, it is expected that take of species in the form of harass and harm will occur on an annual basis. Secondary road maintenance at stream crossings in particular is expected to impinge on the arroyo toad. It is not likely to be frequent, and even less so if the programmatic instructions of the proposed riparian conservation program are carefully followed. The adverse effects of maintenance-related activities on the vireo and flycatcher is not expected to offset the advantages accruing to these species from the various habitat enhancement and management features of the Base's proposed riparian conservation program. This conclusion is partially predicated on the fact that infrastructure maintenance activities have been ongoing, and the vireo population on the Base has progressively increased in numbers since the time in the mid-1980's that many of the proposed management measures and programmatic instructions were instituted.

Effects to listed species in estuarine/beach areas resulting from proposed infrastructure maintenance eg. telephone cables, electric lines, could result in the temporary disturbance, by way of noise and dust, to nesting terns and plovers if carried out during the breeding season. Sediment deposition associated with secondary road maintenance could indirectly affect the tidewater goby. Although it is expected that such activities could result in occasional take of species in the form of harm and harassment, the adherence to the proposed programmatic instructions and the implementation of the proposed estuary/beach conservation plan is expected to avoid and minimize such occurrences. This conclusion is predicated on the fact that infrastructure maintenance activities have been ongoing, and both the tern and goby populations on Base have increased. These population increases are believed to be a result of management measures which have been in place and are reiterated in the proposed estuarine/beach conservation plan and programmatic instructions.

Construction Projects

Effects to listed species in riparian areas resulting from proposed construction projects--SMR Flood Control Levee, Basilone Bridge Replacement, Sewage Treatment Plant Effluent Discharge Compliance, Stream Crossings, and others--include permanent and temporary removal of occupied and unoccupied, but presumably suitable vireo, flycatcher and arroyo toad habitat. Many of the impacts from these projects will be direct and are relatively easy to quantify. Other impacts are indirect, potentially occurring several years after completion of project construction, and potentially having substantial adverse effects on the population numbers of the vireo and flycatcher.

The proposed sewage treatment compliance projects, for example, could reduce depth to groundwater and surface flows in all major drainages on Base, particularly during periods of prolonged drought, thereby exacerbating stress to riparian vegetation. The proposed SMR Flood Control Levee around the Marine Corps Air Station will change the flood regime of a large segment of the SMR. These alterations could result in significant adverse consequences to listed species currently utilizing habitat on both sides of the proposed levee. Both the functional integrity and biological value of the affected areas are subject to significant conversion. Altered scouring and sedimentation regimes could well reduce system diversity, promote wildfire, and reduce localize habitat carrying capacity for vireo and flycatcher by impeding vegetation succession. As noted in a study sponsored by the Base:

> ...the relocation of STP 3 [sewage effluent] may significantly alter riparian habitats downstream along the SMR in the Ysidora and the western end of the Chappo subbasins during periods of sustained drought. A combination of riparian vegetation removal in the past (particularly the 1950s) and natural low water flows have resulted in an invasion of exotic weeds, such as giant reed, along large segments of the SMR within these portion of the basin.....Thus, potential alteration of the willow riparian community structure, either through habitat loss during extended drought...or through replacement of willow habitat with exotic reed, may cause significant impacts to the sensitive birds currently occupying riparian habitat in the Ysidora and western Chappo subbasins. Although the projected increases in groundwater depth during drought years may eventually be replenished during normal or heavy precipitation years, exotic weed infestation would be likely to alter the existing willow-dominated habitat due to the fact that it is already degraded.....As a consequence, giant reed may invade once healthy willow stands during periods of stress by spreading vegetatively from existing *Arundo* clumps already surrounding those willows. Such a scenario would reduce the amount of suitable habitat available to the vireo and flycatcher (Camp Pendleton 1995a).

The direct effects of all proposed construction projects in terms of permanent and temporary habitat loss has been estimated by the Base with the use of geographic information system technology. The numbers of individuals of vireo and flycatcher that might be vulnerable have likewise been estimated on basis of past surveys. Permanent, direct loss of riparian habitat (of varying quality) resulting from the proposed construction projects is 71.3 acres. Over half of these permanent habitat losses are associated with the SMR Flood Control and MCAS Clear Zone projects. Temporary loss of habitat function is 27.8 acres. Up to 113 vireos and 7-14 flycatchers could be directly affected during the course of proposed construction projects, mostly in the form of harass, it is presumed. Several of the proposed construction projects occur in areas recently discovered to support arroyo toad[2].

The indirect impacts of construction projects may be less amenable to quantification. However, the SMR Flood Control project alone will isolate at least 118 acres of riparian habitat from its current hydrologic regime. This area supports approximately 32 vireos and

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[2]These estimates by the Base are summarized in Appendix J, Table 3B of the BA. Surveys subsequent to the initiation of consultation may result in different estimates from those in the BA.

is used regularly by at least one flycatcher. The acreage on the river side of the proposed new flood control structure and immediately upstream and downstream that will be subject to a modified hydrologic regime is substantially greater. An even larger number of vireos and flycatchers occupy these areas of the SMR. Without the level of periodic flooding to which this acreage is subject currently, the structure and species composition of the habitat will be converted eventually to some form not as well suited to the vireo and flycatcher.

The Base will apply best management practices to insure that potential impacts resulting from project activities are either avoided or reduced to the maximum extent practical. The Base will further minimize the effects resulting from any permanent loss of riparian habitat by enhancing currently degraded riparian habitat. The amount of acreage enhanced would depend on the quality of the habitat being permanently lost, but would not drop below a 1:1 ratio. In the extraordinary case of the SMR Flood Control Levee project, the Base has agreed to mitigate the direct loss of habitat value for listed species by enhancing severely degraded riparian habitat at a ratio of 3:1, including revegetation. The Base, through its proposed riparian habitat conservation program, is committed to implementing an adequate monitoring program to evaluate potential long-term project effects on species distribution and abundance, and to managing the ecosystem to maintain at a minimum the value of the current baseline.

The proposed construction projects could noticeably compound the existing exotic weed problem on the Base, particularly with *Arundo*, which is now entrenched in the floodplain to the point that its continued expansion over the next 10 to 20 years likely would be irreversible[3] barring intensive control measures. At present, the situation on Base is at a manageable level. Most of the lower SMR, and much of its upper portions, as well as the remaining drainages on Base, likely would become dominated by *Arundo* and *Tamarix* within the next 20 years without the aggressive ecosystem approach that characterizes the Base's riparian and estuarine habitat conservation program.

Although substantial and potentially very significant, the effects of the proposed construction projects on the vireo and flycatcher and other listed species is not expected to undermine the benefits

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[3]In a parallel situation along the Santa Ana River floodplain, *Arundo* has spread exponentially over the last 10 years in this highly disturbed system.

to these species from the management and habitat enhancement measures of the Base's proposed riparian conservation program. The vireo population on Base has steadily expanded its distribution and increased in numbers since the Base began to implement many of the proposed management measures and programmatic instructions. The Base has assured the Service that their commitment and management strategy will translate into a viable, less vulnerable, more robust riparian ecosystem.

Effects to listed species in estuarine/beach areas resulting from proposed construction activities---Santa Margarita Flood Control Levee, Blue Beach Inland Access, Sewage Treatment Plant Effluent Discharge Compliance, and others---include permanent loss and temporary impacts to habitat utilized by those species associated with the estuarine/beach ecosystem. Many of these impacts will be associated with indirect effects as a result of activities proposed to occur upstream and may not be manifested until after several years beyond project completion. For example, the proposed flood control levee may result in increased sedimentation of the SMR Estuary which in turn may exacerbate existing sedimentation problems and contribute to the dynamics of mouth closure for extended periods of time. River mouth closure severely impairs the function of an estuarine system including the reduction in fish as a prey base for terns and inundation of mudflat foraging habitat for plovers. Effects associated with the STP Compliance in Las Pulgas drainage are also difficult to predict given the uncertainty as to whether or not changes in flow regime will have an adverse effect on the tidewater goby.

Ecosystem Conservation Program

The uncertainty of funding mechanisms that would assure the accomplishment of conservation goals, particularly the elimination of exotic vegetation within the riparian and estuarine/beach ecosystems, must be noted. The implementation of the ecosystem conservation program, however, particularly compliance with programmatic instructions and execution of management programs, is anticipated to offset current and planned training requirements and infrastructural maintenance activities. In the case of the major construction projects, however, the proposed ecosystem conservation program will need to be supplemented by additional measures established in the reasonable and prudent measures and terms and conditions of this Opinion.

Adverse effects to listed species in riparian areas resulting from the proposed ecosystem conservation program--compliance with programmatic instructions, implementation of habitat enhancement

(cowbird control, Arundo removal), pursuit of listed species' population goals--include limited, temporary destruction to habitat and adverse impacts from habitat enhancement and maintenance activities. Such impacts are expected to occur on a regular basis. The destruction of habitat will be targeted only to the most degraded habitat infested with exotic plants species. Many of the most serious potential effects to the vireo, flycatcher and arroyo toad that could result from these efforts will be avoided by implementation of programmatic instructions restricting such activities from occurring in riparian areas during the breeding season of these species. There will be occasional take in the way of harass and even harm of the vireo, flycatcher and arroyo toad.

Goals. The identification of conservation goals that are grounded in the requirements of healthy ecosystem functioning is expected to substantially contribute to the conservation of the ecosystems on which listed species depend. The incorporation of specific habitat and listed species population objectives into on-the-ground management strategies will assist in the recovery of listed species. The Base has stated its commitment to achieving these goals. Unless this commitment is supported by adequate funding, the Base will not be able to accomplish the achievement of these goals. This could result in serious setbacks to listed species' recovery on the Base.

Programmatic Instructions. Programmatic instructions are identified within the ecosystem conservation program to minimize and avoid impacts to listed species and riparian habitats. These instructions "adapt conservation needs to instructions for military training activities, facilities maintenance activities, new construction, recreational activities, and habitat enhancement activities." The overall effect of these instructions is to reduce the impact of these activities on listed species. See Section 4.1.3 in the BA and Sections 10-12 in Appendix 1 regarding programmatic instructions for their application to specific construction projects and operational programs.

Mitigation/Compensation Procedures. Proposed compensation procedures include a Compensation Bank to administer compensation for Base activities, formulas to determine compensation ratios for direct permanent losses of habitat, and specific methods of compensation, including out-of-kind mitigation and resource trade-offs. Proposed compensation ratios and habitat management involving *Arundo* removal would extend for 5 years. Creation of wetlands is not proposed as part of this program although supplemental plantings in the exotic vegetation removal (habitat enhancement) strategy is not precluded. Federal mitigation policies established pursuant to the goals and objectives of the Clean Water Act require that

unavoidable wetland loss is mitigated by in-kind habitat creation with equal value and function. The proposed compensation procedures are not wholly in accord with this policy. (The Service formulated term and condition 1.f of this Opinion to address this proposed alternative.)

The Base proposes to mitigate for "temporary" impacts by habitat enhancement (exotic vegetation removal) at an acreage ratio based on the number of breeding seasons. Thus, if the nature of the disturbance persists through four breeding seasons, then the enhancement ratio would be 1:1. If the duration of the activity covers between one and four breeding seasons, then the enhancement ratio would be 0.25-0.75:1. If the duration is less than one breeding season, then no mitigation is offered. The Base also proposes to weed the temporarily affected areas of disturbance for one year. The BA makes mention of temporary disturbances to habitat that may persist through ten years.

Indirect adverse effects from projects impact that cannot be measured would go unmitigated. The indirect adverse effects to listed species potentially resulting from the SMR flood control project is a case in point. The indirect effects of this project could put the resource at considerable risk. These have been addressed by incorporating the requirement for inclusion of stringent management and monitoring measures into the SMR Flood Control project description. In such situations it will be necessary to incorporate a similar approach in the mitigation/compensation protocol and activity class system.

Overall, activation of the proposed mitigation/compensation procedures could result in a loss of potential vireo, flycatcher and arroyo toad over the short term. This is based on the fact that habitat enhancement that consists solely of exotic vegetation removal does not immediately translate into suitable habitat for these species.

Riparian Plan.

The riparian ecosystem plan as proposed is expected to be sufficient to effectively deal with the effects to listed species resulting from the ongoing and planned activities and projects associated with the Base's overall Mission. While Camp Pendleton copes with meeting new requirements of increased Mission flexibility, the Base attempts to address both the increased potential for take of listed species and the more insidious threats to the ecosystem posed by the spread of *Arundo* and other exotics, through its proposed ecosystem conservation program.

It is noted that the Base entered into an MOU with the Service for management of the vireo on the SMR (see Section 4.2.1.2 of the BA) in order to avoid the designation of vireo critical habitat on the Base. The proposed construction projects and requirement for greater training flexibility make it difficult for the Base to totally avoid the destruction and significant adverse modification of vireo habitat. The Base has stated that the completion of this programmatic consultation and adoption of the Conservation Plans will render the MOU obsolete. During the course of this consultation the Base has assured the Service that this does not mean that the goals and management strategies that have been implemented in accord with the MOU are obsolete. The proposed riparian ecosystem conservation plan is intended to go beyond the MOU by addressing potential vireo and flycatcher habitat over the entire Base (not solely the SMR basin) and achieving relevant recovery goals for listed species.

Population goals for the vireo and flycatcher are compatible with recovery goals as currently understood. The Base will promote arroyo toad populations in drainages where this species is found by avoiding and minimizing impacts to natural ecosystem function and value. It is not known how currently contemplated habitat enhancement strategies will affect the status of arroyo toad and its habitat niche on the Base.

Estuarine/Beach Plan

The estuarine/beach ecosystem plan as proposed focuses largely on management of beach and dune nesting colonial breeding birds. Most of the proposed conservation measures already are being implemented by the Base or the U.S. Navy in compliance with the mitigation program established in the Final Environmental Impact Statement addressing the construction, operation and maintenance of the Landing Craft Air-Cushion (LCAC) facility.

Beach/Dune Habitat. The snowy plover is likely benefitting from certain management activities provided for least terns, such as restricted access to nesting areas and predator control. However, management strategies to protect least tern nesting colonies from vehicular and foot traffic along the beaches are not as effective in assuring plover chick survivorship. This issue revolves around the chick barrier fencing employed to keep least tern chicks from escaping the enclosure into ongoing vehicle traffic which presently occurs adjacent to the North Beach and White Beach terneries. Unlike least tern chicks, precocial plover young need access to the tideline and/or mudflats to forage. Fencing precludes snowy plover chicks hatched inside the least tern colony to exit while also

preventing snowy plover chicks hatched outside the fence from using the vegetated foredunes to roost or escape beach disturbances and predators. Foredunes can be particularly valuable, especially during high tides at the North Beach colony when flightless birds can be sandwiched between oncoming tides, vehicles and the fence. The fence at the North Beach colony at times has extended greater than 500 meters in length. Although effectively protecting least tern chicks from vehicular traffic, the chick fencing has reduced the functionality of the foredune, mudflat, and tideline interface for snowy plovers. Direct mortality as a result of being trapped in the mesh fencing has been documented for snowy plover chicks hatched inside the enclosure (Powell and Collier 1994). In addition, fence construction activities not completed prior to the onset of the snowy plover breeding season (1 March) may disrupt courtship, nest site selection, and cause desertion of nests already initiated. The Base has agreed to implement a programmatic instruction for traffic along the beach in the vicinity of the SMR management zone that should assure safer plover foraging habitat in this area. The Base currently is funding a multi-year study of this endangered species management quandary.

The management zone as proposed excludes the White Beach and French Creek breeding sites utilized by least terns and snowy plovers. But these breeding areas are nevertheless protected by fencing, signage, monitoring and predator control. No protection is provided to foraging areas along the beach at White Beach and French Creek for snowy plovers however the French Creek lagoon in this area is virtually off-limits to Base activities and does provide forage utility.

Proposed population levels for the least tern and western snowy plover do not reflect the full potential of the existing habitat within the designated management zone to support these species. The proposal would protect a minimum of two nesting areas containing 5 "colonies" on Base. The minimum threshold for the least tern of 340 pairs at two colonies which was proposed in the BA has been exceeded since 1991.

The original goal proposed in the BA was modified in the conservation plan by mutual agreement to "maintain the current population and promote its growth" (Section 12.2.4 of Appendix 1). In addition, the amount of habitat presently available within the designated management zone is expected to support a greater number of breeding individuals. If the acreage of essential habitat for each species is maintained, enhanced, and protected within the designated management zone, populations of both species would be

expected to continue expanding until the natural carrying capacity of the available habitat is reached.

Estuary/Lagoon Habitat. The Conservation Plan for this habitat type establishes management objectives for the tidewater goby. These objectives appear to be realistic for the goby. The plan identifies a set of programmatic instructions that will contribute partially to achieve the desired end result, that is, the maintenance of suitable goby habitat.

STP modifications could reduce estuarine inflows to the SMR estuary during non-drought/wet periods, thereby increasing salinity levels that could curtail the amount of available goby habitat. Under existing conditions the SMR is not a perennial stream. Current levels of STP discharges are not of sufficient volume to maintain a perennial flow, thus not affecting the SMR estuary in any significant manner. The goby apparently was extirpated from the SMR estuary in the recent past. Degraded habitat quality, particularly salinity levels, could adversely affect the likelihood of successful recolonization in the future.

Summary Findings

Least Bell's Vireo. Camp Pendleton currently supports the largest remaining vireo population throughout its range. Over the last 10 years, the vireo population on Base has dramatically increased and currently represents nearly 40% of all known vireos in the U.S. The Base population currently supports twice as many birds as the next largest population.

Approximately half of the vireos on Base could be affected, largely in the form of harass, by the training and maintenance activities and proposed projects. The indirect effects of these activities could have consequences adversely affecting the long-term suitability and viability of vireo habitat on the Base. Several of the activities falling within the scope of the proposed action could directly and indirectly contribute to the continued invasion and spread of exotics plant species which result in the degradation of vireo habitat. Without the Base's proposed riparian ecosystem conservation plan with its strict avoidance instructions, there is a high probability that the degradation of riparian habitat will continue to proceed. The proposed riparian ecosystem conservation plan will have to achieve its objectives in order to avoid undermining the probability of survival and recovery of the vireo.

Southwestern Willow Flycatcher. As noted in the species account, the total U.S. population of flycatcher is likely less than 300

pairs and possibly as low as 200 pairs. The Base population represents 6-11 percent of the current U.S. population. The direct, short-term effects of the action are not likely to reduce the likelihood of species survival and recovery. It is possible that the indirect effects of the levee project and the relocation of sewage effluents could have serious consequences adversely affecting the long-term suitability and viability of flycatcher habitat in the lower SMR basin. As with the vireo above, however, the greater threat to the flycatcher would be the gradual degradation and eventual loss of flycatcher habitat by the spread of *Arundo* and other invasive weeds. The Base's commitment to the elimination of such invasive plant species and to the maintenance of suitable flycatcher habitat should be sufficient to assure at least the minimal breeding requirements on the Base for the flycatcher and is therefore not likely to jeopardize the continued survival and recovery of the species.

Arroyo Toad. Based on the limited information that is currently available regarding the distribution and abundance of the arroyo toad over its range and the positive data from preliminary arroyo toad surveys on the Base, the effects of the proposed action are not likely to jeopardize the continued existence of this species. An ongoing two-year herpetofaunal study is being performed on Base that is not yet complete. Pending final results of this study, the Service and the Base will reassess the impacts of the proposed action on this species.

Tidewater Goby. The proposed action could adversely affect water quality and water quantity, two factors of paramount importance to tidewater goby survival. Recent extirpations, presumably due to flood events, from three of the six historically occupied lagoon/creek systems on Base appear to make the survival of the tidewater goby on Base moderate at best. There is not, however, sufficient evidence to indicate that the proposed action would reduce appreciably the likelihood of the survival and recovery of the goby.

California Least Tern. Given the scope of the proposed action, including the estuarine/beach habitat conservation plan as submitted by the Base, and the avoidance and protective measures contained therein, the project is not likely to jeopardize the least tern.

Western Snowy Plover. For the reasons discussed above for the least tern, the impacts described are not expected to jeopardize the continued existence of the snowy plover.

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. Future Federal actions are subject to the consultation requirements established in section 7 of the Act and, therefore, are not considered cumulative to the proposed project.

Riparian Ecosystem

Continuing State and private actions in the region indirectly pose serious threats to the lower SMR floodplain, as well as to the vireo and flycatcher. For instance, the increase of cowbirds throughout the coastal slope of southern California is the result of the increase of suitable cowbird feeding areas (e.g., golf courses, and parks). The Service concludes that the continuing destruction of riparian woodland habitats, cowbird parasitism, and other indirect impacts resulting from a variety of projects presently limit the distribution and potential expansion of vireos and flycatchers throughout the ranges of these species. Although cowbird management efforts continue to expand throughout the action area and southern California as a whole, a much greater effort is necessary to ensure the survival and recovery of the vireo, flycatcher, and many other birds susceptible to brood parasitism.

Altered flood regime, erosion rates, and sediment loads occurring off Base in upstream watersheds will continue to degrade habitat quality and compromise ecosystem integrity of the riparian forest and other riverine communities on Base. Degradation of watershed integrity is associated primarily with increasing urban and agricultural development and channelization and, to a lesser extent, live stream discharge of treated waste water.

Urban and agricultural (primarily avocado and citrus groves) development and grazing are expected to continue to contribute significantly to changes in the hydrologic processes of the SMR watershed. It is expected that flows in the river will continue to increase due to the contribution of imported water from the Colorado River and Sierra Nevada that reach the river as runoff from orchards and from waste water discharge.

Much of the lower reach of the SMR, including the estuary, is located within Camp Pendleton and is therefore protected from private development; however, the upper watershed, including Murrieta and Temecula Creeks, has undergone a rapid transformation

from a rural to an urban and intensive agricultural landscape within the past 20 years. This development will likely continue. Such development promotes significant losses of native vegetation and decreased soil permeability resulting in greater runoff and soil erosion and reduced groundwater recharge.

Urban development in the floodplain of Murrieta and Temecula Creeks has led to construction of levees and clearing of the streambeds of vegetation. If this continues, it may ultimately conclude with the construction of concrete-lined flood channels on the lower reaches of both creeks. These changes in the morphology of the floodplain and the stream channels will reduce spreading of flood waters in the flood plain, reduce friction in the stream channel, and therefore tend to move flood waters through the upper drainage system faster. This in turn leads to reduced infiltration, reduced groundwater recharge, and increased flood peaks; even though most of these actions are subject the federal Clean Water Act compliance, these impacts will likely continue to go unmitigated.

As a result of increasing grazing, agricultural and urban development, and channelization, increasing runoff rates and reduced infiltration in the upper watershed are expected to enhance the ephemeral nature of the SMR, alter the seasonality and rate of flow, and lower the groundwater table.

Increases in highly impermeable surfaces from development in the upper watershed is expected to continue. This will continue to increase runoff rates and reduce infiltration. As development in the upper watershed off Base approaches build-out, sediment loads in the river will decrease. At the same time, flood peaks, and therefore sediment carrying capacities of the river, will increase. Without an upstream source of sediment to satisfy this capacity we can expect downcutting of previously deposited sediments (Schumm et al. 1984) in the broad sediment basins of Temecula and Murrieta Creeks and on the lower reaches of the SMR on Camp Pendleton during winter flood flows. Such streambed incising will eventually reach a new equilibrium with stabilized sedimentation rates, but could result in a lower water table, stranding riparian forest terraces. A new, narrower flood-plain would likely result which would support a much narrower riparian corridor than the original broad flood plain.

Upstream development off Base will continue to cause an alteration of flow regimes on the SMR. The ultimate impact of enhancing flood peaks is to increase the return-frequency of floods of any given magnitude. If the trend towards impermeable surfaces and channelization increases in the upper watershed this shift could

easily result in a doubling of the frequency of a given flood magnitude (Nature Conservancy 199?). More frequent major flood events will keep the river in a higher state of disturbance, perhaps preventing the re-establishment of old cottonwood-willow forest (Figure 1(c)). This shift might be expected to increase the proportion of young riparian scrub at the expense of old riparian forest and/or cause an increase in *Arundo* invasion into new areas.

Estuarine Ecosystem

Habitat reduction continues to threaten all native coastal freshwater fishes in southern California (Swift 1993). Some of the activities that affect tidewater goby and arroyo toad occur off Base. Construction of small dams to store water for fire suppression and irrigation, and stocking these ponds with predatory warm water fishes (Swift 1993) are commonplace and will continue to threaten tidewater goby populations throughout the foreseeable future. Drought conditions, though natural, generally result in low water, which concentrate tidewater goby (and other native fish) and arroyo toads in the larger pools favored by introduced centrarchids, particularly green sunfish (Swift 1993).

In the SMR, secondary water sources off Base, mostly sewer treatment plant effluent, often provide more surface water than was available historically. Although potentially useful to preserve riparian habitats, this water is often detrimental (Swift 1993). More nutrient rich than natural waters, waste water encourages a different suite of species and can put native fauna and flora at a competitive disadvantage (Morris 1991). These conditions favor introduced aquatic vertebrates like red shiners, grass carp, goldfish, common carp, sailfin mollies, tilapia, and clawed frogs. These are all known to impact native fish species and the severity of impact seems related to the degree of habitat alteration (Ross 1991). The upstream (off Base) flows of secondarily treated sewage will likely increase given ongoing increases in human populations.

Continually growing human populations along coastal California will exert greater beach recreation impacts in the future to coastally dependent species, such as the California least tern, western snowy plover, and tidewater goby. Past management problems, such as unauthorized entry into nesting areas by persons and/or vehicles, non-military aircraft flying below 300 ft over nesting areas, and unauthorized jet ski invasion onto beaches and into the Estuary is expected to continue on and off Base.

Cumulative effects, in combination with those of the proposed action, are not sufficiently severe to appreciably increase the

likelihood of jeopardy to the least Bell's vireo, southwestern willow flycatcher, arroyo toad, tidewater goby, California least tern, or western snowy plover.

INCIDENTAL TAKE

Section 9 of the Act prohibits the take of listed fish and wildlife without special exemption. Taking is defined as harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such conduct. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral patterns that include but are not limited to breeding, feeding or sheltering. Under the terms of section 7(b)(4) and 7(o)(2) of the Act, 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 this Incidental Take statement. The terms and conditions described below are nondiscretionary, and must be undertaken by the Marine Corps. The Marine Corps has a continuing duty to regulate the activities covered by this incidental take statement. If the Marine Corps fails to adhere to the terms and conditions of the incidental take statement, the protective coverage under section 7(o)(2) may lapse.

Based on the analysis of impacts above, the Service anticipates that the following forms and extent of take are likely to result from implementing the proposed action:

Least Bell's Vireo. The Service anticipates that 25 least Bell's vireos per year would be taken as a result of this proposed action. The take may be in the following forms: Five (5) vireos per year in the form of direct mortality through accidental death; twenty (20) vireos per year in the form of harassment through impacts from direct and indirect destruction of habitat, and degradation of habitat from human activity, noise, lighting, dust.

Southwestern Willow Flycatcher. The Service anticipates that four (4) flycatchers per year would be taken as a result of ongoing and planned training activities/requirements, infrastructure maintenance and recreation in the form of harassment. The take may be in the form of harassment only.

Arroyo Toad. The Service anticipates that as many as 40 adult arroyo toads per year would be harmed or harassed in the course of training and maintenance activities. Early life stages of the arroyo toad that occupy the pools within 25 meters upstream and 75 meters downstream of secondary road stream crossings would be taken as a result of similar activities.

California Least Tern. The Service anticipates that one adult least tern or fledgling, one nest (eggs), and two chicks would be taken on an annual basis as a result of the proposed action. The incidental take is expected to be in the form of harm through military training and recreational activities along the beach. Take in the form of harassment is not quantifiable since breeding colony size will vary during the nesting season as well as year to year and the response of individuals to activities associated with the proposed action is unpredictable.

Western Snowy Plover. Although predicting incidental take accurately for snowy plover chicks is uncertain, the Service anticipates an annual take of one adult snowy plover or fledgling, one nest, and three chicks as a result of the proposed action. The incidental take is expected to be in the form of harm and harassment through military and recreational activities along the beach.

Tidewater Goby. The Service anticipates that 150 goby would be taken as a result of this proposed action. The take may be in the form of harm, harassment, or killing. The Service anticipates the following forms of incidental take: fifty (50) gobies per year in the form of accidental death or injury which occurs as a result of sedimentation or trampling associated with Base activities; and one hundred (100) gobies per year in the form of harassment which occurs as a result of impacts associated with ongoing and planned Base activities.

Reasonable and Prudent Measures

The following reasonable and prudent measures are necessary and appropriate to minimize the impact of incidental take. The measures below are nondiscretionary and must be undertaken by the Marine Corps.

1. The Marine Corps will adopt and implement the Riparian Habitat Conservation Plan, as specified in Section 4.1 of the BA and in the Project Description (Appendix 1) of this Opinion, including the programmatic instructions to regulate all training & other mission-related operations, Base infrastructure maintenance, and recreational activities, in

and adjacent to riparian habitats to help ensure that the population and habitat goals are achieved and the impact of incidental take is avoided and minimized to the maximum extent practicable.

2. The Marine Corps will adopt and implement the Estuarine/Beach Ecosystem Conservation Plan, as specified in Section 4.2 of the BA and in the Project Description (Appendix 1) of this Opinion, including the programmatic instructions to regulate all training and other Mission-related operations, Base infrastructure maintenance, and recreational activities, in and adjacent to estuarine/beach habitats to help ensure that the population and habitat goals are achieved and the impact of incidental take is avoided and minimized to the maximum extent practicable.

3. The Marine Corps will institute a monitoring program to assess the effectiveness of the programmatic ecosystem conservation plans based on high resolution aerial photography, GIS maps/data, and ground-truthing techniques, and reliable population censusing methods. The elements of this monitoring program are specified in Appendix 4. This monitoring program should accommodate an adaptive management approach.

4. The Marine Corps will take measures to assess threats to the survival and recovery of the tidewater goby and arroyo toad on Base.

5. The Marine Corps will continue to examine the environmentally least damaging alternative in the further planning stages of the SMR Flood Control - Construction Flood Levee/Wall Project and all other activities and construction projects involving the permanent loss of riparian and estuarine/beach habitat.

6. The Marine Corps will develop and implement a monitoring program that tracks compliance with the levels of take, and the measures and terms and conditions of the Incidental Take Section of this Opinion.

Terms and Conditions

To be exempt from the prohibitions of section 9 of the Act, the following terms and conditions, which implement the reasonable and prudent measures described above, must be complied with in their entirety.

1. To assure the implementation of reasonable and prudent measure #1 above, the Marine Corps shall:

   (a) Adopt and implement the Riparian Ecosystem Conservation Plan, as specified in Section 4.1 and 4.3 of the BA and outlined in the Project Description (Appendix 1) of this BO, and as modified in Appendix 5, including the programmatic instructions to regulate all training & other mission-related operations, infrastructure maintenance, and recreational activities which affect riparian habitats on Base.

   (b) Obtain concurrence from the Service that impacts are adequately offset by the Riparian Ecosystem Conservation Plan for any activity not specifically addressed in the Programmatic Instructions or otherwise covered herein.

   (c) Develop and implement mitigation measures (e.g., habitat enhancement) for future proposed training and maintenance actions (i.e., those not addressed in this Opinion) that may affect listed species or riparian habitat. Funding for measures that minimize (mitigate) the potential adverse impacts on the riparian and estuarine/beach ecosystems shall be identified as part of these future proposed actions during the planning process and shall be secured prior to initiation of such actions.

   (d) Restore riparian and estuarine/beach areas temporarily disturbed due to non-routine maintenance and construction activities to original or better condition, including: A combination of exotic vegetation control and vegetation management (including replanting if necessary) that will permit native species to regenerate in a timely manner (approximately 3-8 years). This method is to be implemented on areas temporarily disturbed during project construction, or affected by non-routine maintenance, fire, or other activity. This restoration shall include weeding and monitoring of affected areas for a minimum of 3 years. Rehabilitation of natural (non-weedy) areas disturbed by construction shall use the original topsoil to the maximum extent practical. Salvaging of native vegetation shall be implemented where feasible. In addition the Base shall mitigate for the disruption and temporary loss of habitat function by performing habitat enhancement per the compensation formula specified in the Base's Riparian Ecosystem Conservation Plan (section 11.5.4 of Appendix 1).

(e) Once exotic vegetation has been removed from the floodplain as a mitigation measure, the Base shall assure that the enhanced area remains free of recolonization by exotic vegetation for a minimum period of 5 years. Thereafter the Base shall make a reasonable effort to maintain the enhanced status of the area consistent with the goals of the ecosystem conservation plans.

(f) Treat any future action which is not described in the Project Description and which may result in a permanent loss of riparian wetland, no matter its quality, as a Class II or Class I activity,[4] requiring informal consultation with written concurrence from the Service or initiation of formal consultation with the Service pursuant to section 7 of the Act.

2. To assure the implementation of reasonable and prudent measure #2 above, the Marine Corps shall:

(a) Adopt and implement the Estuarine/Beach Ecosystem Conservation Plan, as specified in Section 4.2 and 4.3 of the BA and outlined in the Project Description (Appendix 1) of this BO, and as modified in Appendix 5, including the programmatic instructions to regulate all training & other mission-related operations, Base infrastructure maintenance, and recreational activities, that affect estuarine/beach habitats on Base.

(b) Obtain concurrence from the Service that impacts are adequately offset by the Estuarine/Beach Ecosystem Conservation Plan for any activity not specifically addressed in the Programmatic Instructions or otherwise covered herein.

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[4]A programmatic albeit unorthodox method of dealing with actions which involve permanent loss of riparian habitat was mutually developed by the Base and the Service as reflected in section 13 of Appendix 1 of this Opinion. Such an approach was predicated on the Base being able to project that exotic vegetation could be eliminated in incremental stages over a 40-year period. The Marine Corps, however, was unable to offer a sufficient level of assurance in this regard due to budgetary constraints that prohibit commitment of funds in out-years. If this option is pursued in the future, it will benefit from coordination with the U.S. Army Corps of Engineers and the Environmental Protection Agency.

3. To assure the implementation of reasonable and prudent measure #3 above, the Marine Corps shall:

   (a) Institute a monitoring program to assess the progress toward the accomplishment of the ecosystem, habitat and species goals specified in the Base's riparian and estuarine/beach habitat conservation plans. The monitoring program shall be based on high resolution aerial photography, GIS maps/data, and ground-truthing techniques, and reliable population censusing methods. The minimum requisite elements of this monitoring program are specified in Appendix 4.

   (b) Identify and notify by way of periodic correspondence proposed program and monitoring adjustments (adaptive management) needed to achieve the goals and meet management objectives. These adjustments shall be submitted to the Service on at least an annual basis during the fourth quarter of each calendar year. A follow-up meeting shall occur between the Base and the Service within 60 days of receipt of the notification but no later than January 31.

   (c) The Base shall informally consult with the Service in developing the monitoring program to track the effectiveness of the exotic vegetation control program. At a minimum, this program shall employ aerial photography and ground surveys. Transects and monitoring control plots shall be used where deemed necessary for specific projects.

4. To assure implementation of reasonable and prudent measure #4 above, the Marine Corps, with assistance of the Service, shall assess the severity of threats to tidewater goby and arroyo toad posed by green sunfish, bullfrog, and other likely predators/competitors. If mutually deemed a threat of sufficient magnitude that may preclude attainment of recovery objectives on Base for these listed species, the Base shall implement specific control programs for invasive non-native plants and predatory animals.

5. To assure implementation of reasonable and prudent measure #5 above, the Marine Corps shall:

   (a) Continue to examine with the Service and other appropriate regulatory agencies the environmentally (biologically) least damaging alternative in the further

planning stages of all proposed activities considered herein potentially resulting in the permanent loss of riparian and estuarine/beach habitats, including the SMR Flood Control - Construction Flood Levee/Wall Project.

(b) Assure that whichever alternative is selected is designed to reduce loss of endangered species habitat and wetlands/floodplains to the maximum extent feasible. The Service shall review and concur with the final SMR flood control structure design and construction footprint prior to initiation of construction in order to design management capability and assure the maintenance of endangered species habitat isolated behind the flood control structure.

(c) Assure that the extent of any clearing of riparian woodland/scrub outside the footprint of the flood control structure is minimized to the maximum extent feasible. The Service shall review and approve any clearing or other modification of riparian vegetation associated with the maintenance and operation of the flood control structure prior to any such disturbance.

(d) Restore the functional value of wetland habitat currently dominated by *Arundo* to offset the permanent loss of listed species habitat resulting from all activities covered in the proposed action at a 3:1 ratio; and adopt any additional habitat replacement requirements deemed necessary through applicable Federal wetlands policies and the U.S. Army Corps of Engineers 404 regulatory program. The area from which the *Arundo* is removed shall be revegetated to a point that it replaces the endangered species value of the permanently disturbed area. The restoration effort shall begin before or immediately upon approval of the individual activity/project and avoid the breeding season of the vireo and flycathcer. Since habitat dominated by *Arundo* is considered "wetland," creation of wetland is not being required. Consequently a grading and irrigation plan will not be necessary. However, a planting, monitoring and maintenance plan shall be required. These plans shall be approved by the Service.

The latter revegetation effort may be substituted by additional *Arundo* control; in this case the acreage of *Arundo* removed shall be at a 10:1 ratio.

(e) Once exotic vegetation has been removed from the floodplain as a mitigation measure, the Base shall assure that the enhanced area remains free of recolonization by exotic vegetation for a minimum period of 5 years. Thereafter the Base shall make a reasonable effort to maintain the enhanced status of the area consistent with the goals of the ecosystem conservation plans.

6. To assure the implementation of reasonable and prudent measure #6 above, the Marine Corps shall develop and implement a monitoring program that includes the minimum requisite elements described in Appendix 4. The monitoring program shall track and document:

(a) Compliance with the provisions of the Base's ecosystem programmatic instructions;

(b) Compliance with the authorized take, measures and terms and conditions of the Incidental Take Section of this Opinion.

Unless otherwise specified herein, incidents of non-compliance shall be reported in writing to the Service within one working day.

Emergency Actions

Emergency situations, defined as situations involving acts of God, disasters, casualties, and national defense or security emergencies, shall be handled in accordance with 50 CFR 402.05, which allows for after-the-fact review of impacts incurred by necessary response actions to such situations.

Reporting Requirements

The Marine Corps and any agents or contractors shall report immediately any information about unauthorized take of the species at issue. The Marine Corps shall immediately notify the Service within 1 working day of any such information. Notification must include the date, time, and precise location of the incident/specimen, and any other pertinent information. A report of any take authorized under this Opinion shall be submitted to the Service on an annual basis. Service contacts are the Field Supervisor, John Bradley, or Pete Sorensen at 619/431-9440.

If, during the course of the action, the amount or extent of the incidental take limit is reached, the Marine Corps shall immediately

notify the Service in writing. If the incidental take limit is exceeded, the Marine Corps must immediately cease the activity resulting in the take, and reinitiate consultation with the Service immediately to avoid further violation of section 9 of the Act. The Marine Corps should provide an explanation of the causes of the taking.

The Service anticipates that the likelihood of take may increase with the successful implementation of the riparian and estuarine/beach ecosystem conservation plans because the numbers of individuals would show increases. The Service expects at some point in the future to have to increase the amount of take in some commensurate fashion by way of an amendment to this Opinion.

Disposition of Sick, Injured, or Dead Specimens

Upon locating a dead, injured, or sick endangered or threatened species specimen, initial notification must be made to the nearest Service Law Enforcement Office (Torrance (310) 984-0062. Care should be taken in handling sick or injured specimens to ensure effective treatment and care in handling dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

CONSERVATION RECOMMENDATIONS

Sections 2(c) and 7(a)(1) of the Act direct Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of listed species and the ecosystems upon which they depend. Conservation recommendations are suggestions by the Service regarding discretionary agency actions to promote the recovery of listed species. Our recommendations below are intended to (1) promote the recovery of listed species, (2) conserve and manage candidate species, and (3) improve the ecosystem conservation plans to be implemented on Base.

1. Successful partnerships are essential to effective ecosystem conservation. They require adaptability, risk-taking, innovation, shared vision, active participation, and commitment by all parties involved. As described above and pending approval by the Base, the Service commits to devote necessary staff resources to assist the Base in implementing and monitoring the ecosystem conservation plans discussed herein and the Base's natural resources management program in

general. The Service recommends that the Base match the Service's commitment by providing funding for one FTE to jointly monitor and study Base resources and activities. Among other objectives, the monitoring program should:

- Employ aerial photography (Base), GIS maps/data (Service), and ground-truthing techniques to monitor plant community dynamics, habitat function and value, listed and candidate species' distribution and status, etc.

- Document observations of all exotic competitors/predators found in riparian/estuarine zones on Base during other survey efforts.

- Finish a 2-year herpetological inventory and develop/implement conservation strategies for sensitive species.

- Continue California red-legged frog surveys. If determined to be extirpated on Base and suitable habitat exists, reintroduce and maintain two red-legged frog populations on Base as experimental populations pursuant to section 10(j) of the Act (no section 7 or 9 protection against take).

- Restore the SMR and San Mateo Creek on Base to re-establish and support two runs of steelhead trout.

- Continue to survey for Pacific pocket mouse to definitively determine its status on Base.

- Facilitate annual light-footed clapper rail surveys on Base.

2. The Base should pursue the feasibility of halting the introduction of mosquito fish into waters on Base for the control of mosquitos. The Base should promote the use of Bti (*Bascilus thuringiensis isaelensis*), if Bti is found to be an effective/efficient replacement of other forms of mosquito control. Bti is a naturally occurring bacteria that produces a spore toxic only to mosquitoes and black flies. Research is reported to have shown that Bti kills only the larval stage of the mosquito and apparently does not affect other wildlife, beneficial insects, or people.

3. The Base should restore extirpated tidewater goby populations in previously occupied lagoon systems by curtailing threats and restoring suitable habitat, including excavation of sediment traps and creation of refugial habitat to reduce

vulnerability to flood/sedimentation threats and non-native predatory fishes.

4. The Base should establish a protected least tern/snowy plover nesting site at the mouth of San Mateo Creek. Providing an additional secure nesting area would assist in the recovery of both the least tern and snowy plover, as well as provide an alternate site for the breeding population on Base in the event a natural disaster, such as severe winter storms, alters or reduces the habitat at the SMR mouth.

5. Other tamarisk control methods beyond those described in the BA should be evaluated. For example, multiple burns followed by herbicide treatment may be effective. Single burns followed by chemical treatment is also likely to be effective.[5]

6. Funding for the riparian and estuarine/beach habitat conservation plans, as currently proposed, are what the Service characterizes as "mitigation-driven." That is, funding for plan implementation is at least partially dependent on construction projects that destroy or degrade habitat function or value. The Base is trying to implement conservation policies and strategies promulgated by the highest DOD management levels. The Base is required to adopt

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[5]Cut stump application, although costly, is very controlled, generally does not affect non-target organisms, and probably cause the least negative environmental impact. Foliar applications may appear less expensive, but degree of control much more variable. Start all tamarisk control with larger tree on higher elevations, with those trees likely to survive floods and reseed downstream areas. Younger saplings in low flow channels can reportedly be largely ignored, as they will likely be washed away. Grub individual plants; cut established plants to within 2-inches of soil line; higher cuts have been found to be less effective. Continually monitor in late winter (before flowering); remove new seedlings. Late spring (April to June) may be the only time for the "semi-trained" to look for seedlings when mixed with other vegetation; this is the period when it can easily be distinguished by pink flowers. Replacing tamarisk with native species may lessen or delay recolonization; tamarisk seems to occupy areas not currently used by native plants (unoccupied niche). Tamarisk is reportedly highly susceptible to shading, with shaded plants having greatly altered leaf morphology and reduced reproductive effort. Habitat alteration (disturbance), natural and to a greater extent unnatural, is generally favorable to tamarisk; this includes generation of sandy soils, frequent flooding or drought, salty soil surface (tamarisk sheds leaves that produce salty soils). Road shoulders should be monitored closely as these disturbed areas often create ideal conditions for tamarisk.

and implement an ecosystem approach but suitable budget mechanisms do not appear to be in place that allow the Base to conserve the environment without first impacting it. A budget and funding arrangement for establishing a long-term management program to mitigate for the Base's habitat damage should be pursued vigorously by the Marines. The habitats in the Base's 8,000+ acres of floodplains that support significant populations of sensitive fish and wildlife species are seriously threatened by the intensifying pressure from *Arundo*. Effective long-term maintenance of the Base's riparian resources requires an on-going effort focused on the steady elimination of *Arundo* from its drainages.

7. The Base should publish guidance which promotes operation of aircraft above 500 feet AGL over occupied riparian and estuary areas during sensitive species breeding seasons, to the maximum extent practical, when mission requirements do not dictate application of lower profiles. In addition, the Base should study the effects of aircraft operations associated noise on sensitive wildlife in riparian and estuarine/beach habitats.

CONCLUSION

Conservation challenges posed by complex, dynamic, and often unpredictable ecosystems will require a flexible, creative, and cooperative problem solving process between the Marine Corps and Service if the ecosystem conservation plan goals established through this consultation are to be achieved. An effective monitoring program will be critical to gauge programmatic conformance with management prescriptions and detect ecosystem/species response to conservation measures. The Service anticipates that the management framework developed by our agencies will make large strides toward contributing to the survival and recovery of listed and candidate species on Base and throughout their respective ranges.

One of the practical benefits of restoring and maintaining ecosystem functions and values is that future actions could be accommodated that otherwise would not have been possible without further undermining ecosystem viability and reducing the likelihood of species' survival and recovery. Implementation of the ecosystem conservation approach described in the BA and Appendix 1 of this Opinion and further bolstered in the reasonable and prudent measures, terms and conditions, and conservation recommendations of this Opinion would allow the Service to review and approve many new operations and activities through an informal concurrence process without the need for initiation of formal consultation. The Service

anticipates that any future activity that does not reduce the likelihood of attaining of the habitat and species goals established through this programmatic consultation could be approved through the informal consultation and concurrence process. However, any activities whose impacts are not offset through the implementation of the ecosystem conservation plans and/or additional mitigation measures agreed upon through informal consultation shall require initiation of formal consultation.

In adhering to the project description and the terms and conditions of this Opinion, the Base will have fully complied with the requirements of the Act. However, this Opinion does not address additional regulatory responsibilities related to wetlands and waters of the United States that both the Service and the Marines have pursuant to the Clean Water Act, Fish and Wildlife Coordination Act, and NEPA.

This concludes formal consultation on the proposed action. Reinitiation of formal consultation is required if (1) the action is significantly modified in a manner not discussed above, (2) the amount or extent of incidental take is exceeded, (3) the provisions and requirements of the INCIDENTAL TAKE section are not adhered to, (4) new information reveals effects of the proposed action that may affect listed species or critical habitat in a manner that was not considered in this Opinion, (5) commitments made in the proposed action to offset, avoid, minimize and reduce project related impacts are not met or implemented, (6) a new species is listed or critical habitat is designated that may be affected by the action, and/or (7) funding and other resources are not devoted in adequate measure to implement or make satisfactory progress towards achieving the commitments established in the Riparian and Estuarine/Beach Ecosystem Conservation Plans.

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

Please contact Gail C. Kobetich, Field Supervisor, Carlsbad Field Office at (619) 431-9440 for further assistance in this matter.

Sincerely,

Bruce Babbitt, Secretary of the Interior

Wayne White, State Supervisor

Gail C. Kobetich, Field Supervisor

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APPENDIX 1

PROJECT DESCRIPTION

The primary purpose of the proposed action is to plan and manage, as efficiently and effectively as possible, ongoing and future military mission requirements affecting fish and wildlife resource values in riparian and beach/estuarine areas. This consultation is "programmatic" in that it is intended to cover actions that fall within the scope of the Base's military training and support mission, including military training activity, Base facility construction, operations, maintenance and recreation programs. The Base's intention in consulting with the Service was to address the impacts on Federally listed and proposed species. This consultation also is "programmatic" in the sense that it is the Marines' intent to address the impacts of the Base's overall program on fish and wildlife resources in a comprehensive, "programmatic" fashion, namely by developing and implementing long-term, Base-wide conservation programs. These conservation plans are programmatic in their strategy: habitat management actions will be planned and evaluated in the context of achieving and maintaining a "healthy ecosystem" for sensitive species. It is the intention of the Marines to apply this programmatic consultation to all ongoing and future actions at Camp Pendleton, as they potentially affect the integrity of riparian and beach/estuarine ecosystems.

The mission of Marine Corps Base, Camp Pendleton is to operate an amphibious training base, while protecting the environment and providing facilities, services, and support to prepare Marines and Sailors for combat. Camp Pendleton's 124,642 acres (approximately 200 square miles) of ocean front beach, coastal plains and terraces, hills, mountains and stream valleys, with the Base's associated restricted airspace, offer a unique combination of natural resources that assure well-prepared national security forces.

Camp Pendleton's military mission is combat training and support of Marine Corps units and other Department of Defense (DoD) forces. Training activities include, but are not limited to: amphibious landings, fixed and rotary-winged aircraft flights and landings, tracked/wheeled vehicle and personnel maneuvers, artillery and small arms firing, aerial weapons delivery, engineer unit operations, organization of supply, field combat service support, employment of communications, airlifting of troops and weapons, equipment maintenance, and field medical treatment.

Camp Pendleton's training and combat service support functions share

the use of Base lands with several non-military functions. Such uses include: a Department of Justice border patrol check point, a California State Parks and Recreation campground and beach, the San Onofre Nuclear Generating Station, agriculture and grazing outleases, and public schools. These functions are important uses of Camp Pendleton's land, and they require additional land management attention to assure the Base meets its primary commitments to the military mission and conservation.

The Base manages access to sensitive wildlife habitat and acknowledges the importance of this practice as a necessary precaution to preserve wildlife corridors and vital habitat for listed species and to enable the Base's mission to co-exist with sensitive wildlife communities.

1 ONGOING TRAINING ACTIVITIES & REQUIREMENTS

Since 1942, the United States Marine Corps has been actively conducting military training on Camp Pendleton. This ongoing training consists of all facets of amphibious operations, from landing at the beaches, to movement inland in wheeled and tracked vehicles, to airborne movement of personnel and material, and foot traffic by infantry.

All of the Marine Corps' weapons systems and equipment is used in training. Vehicles used include tracked Amphibious Assault Vehicles (AAV), wheeled Light Armored Vehicles (LAV), light High Mobility Multi-Wheeled Vehicles (HMMWV or "HumVee"), 5-ton trucks, and Landing Craft, Air Cushioned (LCAC) as well as a variety of pick-up trucks. Other equipment includes rafts and small boats, communications equipment, electrical generators, artillery, tents, engineering equipment including fork lifts, bulldozers, excavators and small cranes, and trailers to haul water and supplies. Rotary wing operations involve the UH-1, AH-1, CH-46, and CH-53 helicopters. Fixed wing aircraft participate in exercises by facilitating command and control, the delivery of live ordnance in established Impact Areas, and landing at fixed vertical and short take-off and land sites (VSTOL) or the Marine Corps Air Station in the Santa Margarita River floodplain.

Training is conducted predominately in upland areas, but riparian, estuarine and beach areas are traversed by Marines on foot patrol, or by vehicles along roads and at established crossings. Use of individual training areas is relatively constant in number of operations over time. Future training operations may include

limited training activities in riparian zones.

1.1 Vehicle Operations

Vehicle travel has been occurring along riparian and beach areas since Camp Pendleton became a military base. Military training operations involve travel on established roads alongside riparian areas and fording rivers and streams at established crossings. Some operations involve driving on beach areas, along established secondary roads/exits in the dune areas and through dry stream crossings. Movements may be by individual vehicles or by convoy and occur year-round. Vehicles types include rubber-tired vehicles, tracked vehicles, and LCACs.

1.1.1 Riparian

Cross-country vehicle travel within riparian areas is not permitted, but some flexibility in this regard is being considered. Vehicle travel on existing roads alongside riparian areas is highly variable. Factors such as the location on Base, size of the road, season of year and time of day all affect usage. Well established dirt roads such as North River Road paralleling the Santa Margarita River between Stuart Mesa Road and Range 104 may have up to 50 vehicles/day during the dry season. Traffic along the Las Pulgas tank trail may sustain 25 tracked/wheeled vehicles per day during the dry season. Military vehicle use on weekends and holidays is much reduced.

1.1.2 Estuary/Beach

In general, vehicles are not permitted within the estuary areas on Base. The primary exception in terms of training activities is the vehicle crossing at the Santa Margarita River mouth immediately adjacent to the surf line. Other exceptions include vehicles driven by wildlife survey/monitoring and enforcement personnel. The majority of tracked vehicles are maintained at the 21 Area (Del Mar), south of the Santa Margarita Estuary. These vehicles frequently transit the beach to and from northern training areas. In doing so they pass within a few meters of fenced nesting colonies used by terns and plovers. If birds are identified nesting outside of fenced areas Base biologists immediately place protective fencing around the newly discovered nest. During the breeding season, approximately 35-40 military vehicles per weekday travel past the tern colonies. The Base desires some additional flexibility with respect to use of these areas for limited training exercises.

Transit corridors are marked during the breeding season; California least Tern colonies and Western Snowy Plover Nests are fenced to preclude inadvertant destruction during the nesting season; and the Base proposes to transit the Beach from the edge of Del Mar Beach to the south side of the LCAC ramp with both tracks in the water to avoid and minimize harm to plovers from their transit.

1.2 Infantry Operations

Infantry operations consist of battle skill training conducted on foot. These activities vary from small groups (4 to 13 Marines) to several hundred Marines participating in patrol and land navigation exercises or in an organized march (along existing roads). Infantry operations in riparian areas do not include discharge of live ammunition or use of pyrotechnics. This training occurs year round.

1.2.1 Riparian

Foot traffic currently is not allowed off established roads within dense riparian habitat during the breeding season (15 March - 1 September). Cutting vegetation is prohibited under Base Order.

1.2.2 Estuary/Beach

Foot traffic is not allowed within Base estuary areas during nesting season. Limited activity is permitted within estuary areas in the non-nesting season, if determined under the National Environmental Policy Act that no permanent damage will result. Foot traffic inside fenced tern areas is restricted to researchers, animal damage control personnel, and Base biologists.

1.3 Engineering Operations

Engineering Operations involve squad-sized units (13) of Marines that use various equipment - graders, fork lifts, bulldozers, excavators, small cranes, and light and heavy trucks - to do minor earth moving and to move and store logistical material.

1.3.1 Riparian

Due to the density of riparian vegetation and the need for a relatively large area for this training, engineering operations do not occur within riparian areas.

1.3.2 Estuary/Beach

Graders and bulldozers are used to make temporary storage sites on the beach (designated colored beaches on the Camp Pendleton Special Training Map) and to provide temporary road surfaces for transit of wheeled vehicles disembarking from landing craft to transit to uplands areas along permanently established beach exits in the dune/uplands area. This on occasion necessitates laying of plastic matting over the temporary road surface to facilitate trafficability in the soft sand. Matting is retrieved by training Marines and Sailors on completion of the exercise and the area of disturbance is returned to its normal gradient and condition. Bulldozers are also used on occasion at the water line to align landing craft or assist them in backing off of the shore into the ocean. This activity occurs only within unvegetated sand. It does not fill wetlands. Grading of beach sand is not done within 300 meters of least tern and snowy plover nesting areas. Landing exercises are conducted at only "colored" beaches, and snowy plover and least tern nests are marked and fenced by biological monitoring staff to avoid harm from transiting vehicles and Marines during the exercise.

1.4 Helicopter Operations

Helicopter training occurs year-round. Presently, there are 120 helicopters stationed at Marine Corps Air Station, Camp Pendleton (MCAS). The MCAS is located in the floodplain of the Santa Margarita River. Additional helicopters from Marine Corps Air Stations at El Toro and Tustin also operate out of the MCAS. Operations that occur in or adjacent to riparian areas include takeoffs and landings from MCAS, practice landings and takeoffs from established Landing Zones (LZs), Confined Area Landing (CAL) sites, and Vertical Short Takeoff and Landing (VSTOL) pads. Helicopters operate over all areas of Camp Pendleton (Figure 3-2 of BA). Most of the flights on Camp Pendleton are conducted at altitudes greater than 300 feet above ground level, except during takeoffs and landings. Flight altitudes over tern and plover nesting colonies in the Santa Margarita Estuary are limited to a minimum of 300 feet above ground level (AGL) during the breeding season (15 April through 31 August).

Since the MCAS is located adjacent to riparian woodland, helicopter activity over this habitat occurs routinely. These aircraft take off and land into the prevailing winds which almost always originate from the south and southwest. Low altitude (500 feet AGL) helicopter training flights originating from MCAS turn northward

immediately after takeoff and fly over riparian habitat to avoid flying over the occupied buildings south and southwest of the airfield.

1.5 Combat Training Towns/Military Ops in Urban Terrain

1.5.1 Combat Training Towns (CTTs)

"Mock" deserted and simulated urban areas (CTTs) are used to train small groups of Marines in infiltration, sweeping of built-up areas, and patrolling in urban environments. Training is enhanced by artificial distractors including simulated artillery, machine gun noise and CS (tear) gas. The 52 Area CTT is located close to riparian vegetation and is therefore included in this consultation. Training at this facility is conducted approximately three days per week in all seasons.

This facility consists of buildings, asphalt roads and clear areas. The primary use is for Marine infantry training in infiltration, sweeping vegetated areas of enemy troops, patrolling of towns, and house to house searches. Realism is added through simulated artillery and machine gun fire (from propane cannons) and the use of CS gas and colored smoke. The CS gas and colored smoke dissipate within a 200' radius of their dispenser. The artillery simulators fire approximately once every 1-2 minutes per day and the machine gun simulators fire in 3-6 second bursts about once per minute, 200-300 times per day, when the 52 CTT is in use. The 52 CTT is used about 3-4 times per week supporting 75-125 Marines per day.

1.5.2 Military Operations in Urban Terrain (MOUT)

The MOUT facility is located in the Aliso Creek drainage in a broad valley floor vegetated mainly with non-native grasses. An access road crosses Aliso Creek and leads to a grenade range. The MOUT facility consists of concrete buildings, asphalt roads and clear areas. Its primary use is for Marine infantry training in infiltration, sweeping vegetated areas (enemy detection), patrolling of towns and house to house searches. There is simulated use of artillery and machine gun fire (from propane cannons), as mentioned for 52 CTT, and use of CS gas and colored smoke. The application of simulated gun fire is conducted at this facility infrequently and only upon special request. The MOUT area is used about three times per week supporting up to 500 Marines per day.

1.6 Firing Range Operations

1.6.1 Riparian

Firing of live and "dud" producing ammunition/ordnance is an essential part of military training. Camp Pendleton has many established firing ranges and artillery firing areas (AFA) in riparian areas, where Marines train in the use of weapons systems. Ranges are permanently established areas with access routes, berms, targets and firing safety arcs. AFA's are areas designated for set-up and firing of artillery. These are generally less maintained to allow for more realistic training. Allowable weapons and frequency of use vary depending on the facility. Access to the ranges varies and can be either on foot, privately owned vehicle, bus, or tactical vehicle.

1.6.2 Estuary/Beach

There are no ranges on or near estuary/beach areas.

2 PLANNED TRAINING ACTIVITIES & REQUIREMENTS

2.1 Military Helicopter Requirements

By 1999, in accordance with the mandate of Congress and the Base Realignment and Closure Commission (BRAC), 4 squadrons of 12 CH-46 helicopters (48 total aircraft) will be added to the existing rotary wing aircraft inventory of 120 helicopters presently using Marine Corps Air Station (MCAS) Camp Pendleton. Although all 48 aircraft will be assigned to MCAS Camp Pendleton, 12 of the helicopters should be deployed at any one time. This will result in a net increase of 36 additional helicopters operating out of MCAS Camp Pendleton on a routine basis, from the present total. The average number of rotary wing air operations at MCAS will increase from approximately 120,000 operations per year to approximately 144,000. Use of the airfield and surrounding riparian and upland areas by these additional CH-46 helicopters will be similar to present operations. An Environmental Impact Statement (EIS) about these requirements is being prepared under contract with the U. S. Navy as part of the Base, Realignment, and Closure (BRAC) process.

2.2 Temporary Alternate Landing Area (TALA)

The TALA is located within the Santa Margarita River floodplain in theYsidora subbasin. It is a 2,000-foot x 300-foot runway,

constructed by mowing vegetation to within 0.1 m of the ground. It is similar to the "Right Grass Area" that is immediately north of the main runway on MCAS. The TALA will support helicopter slide-on landings and take-offs (by "skid" mounted aircraft) and pattern operations associated with basic flight training. A slide-on landing is a helicopter skid (primarily AH-1, "Cobra" and UH-1, "Huey" aircraft) landing where forward momentum has not ceased. The TALA is necessary to relieve congested air traffic at MCAS and ensure safe training for new helicopter pilots, who are based at the MCAS upriver in resident training and operational aircraft squadrons. The vegetation strip and associated air traffic pattern dimensions support operations of up to3 training helicopters working in a standard traffic pattern at an altitude of 500 feet above ground level. In a standard traffic pattern, helicopters circle the runway in an oval approximately 2,000 feet wide by 8000 feet long to practice landings, take-offs, and related flight maneuvers or wait for landing clearance. Communications with MCAS Traffic Control Tower and Crash Crew support is available either on-site or in close proximity to the TALA (at the MCAS), in the event of accident or fire.

Planned use of the TALA will average 55, 3-minute helicopter flight patterns (1- helicopter landing and take off) per day at a rate of 10 to 12 per hour. Operations will be conducted 7 days per week, day and night.

The TALA is a temporary facility; it shall only be in use until the permanent Helicopter Outlying Landing Field (HOLF) is operational (programmed for 1998). If the need to operate the TALA extends beyond 1998, the Service and Camp Pendleton has agreed to revisit the premise that this is a temporary facility. The HOLF will be a larger, permanent facility with supporting infrastructure. Size, geographic location of the Ysidora subbasin, and subjection of area to infrequent flood regimes currently prohibits it from being considered as the permanent HOLF location by the Base in its NEPA alternatives analysis.

Compensation for TALA and its associated operations will include returning the area to its original condition (based on aerial photographs taken before the construction of the TALA) after "temporary use" terminates; compensation will be provided for the 5.5 acres Riparian Scrub and 8.3 acres of Grass Forb Mix temporarily disturbed by this facility, in the form of *Arundo* eradication, using formulas contained later in the conservation plan; minimization of helicopter use of the TALA during the peak vireo foraging time

(0600-1100), to the extent practical, during the breeding season; adjustment of helicopter flight patterns and protocol, to the extent practical, during the breeding season, to minimize potential effects resulting from noise and turbulence associated with low elevation flights; conduct of periodic breifings to flight personnel who use the TALA concerning measures to avoid and minimize the potential for adverse effects; and continuance of cowbird control management measures in the immediate vicinity of the TALA to improve the success of vireo population growth, currently being experienced on the Base. Further, Camp Pendleton is montoring the breeding success of vireos and flycatchers in the vicinity, by documenting egg production and fledging success as part of annual vireo surveys during the temporary "life" this facility is in use.

2.3 Stream Crossings

2.3.1 Santa Margarita River Crossings

These currently, undeveloped crossings will allow personnel and vehicles to travel across the Santa Margarita River into training areas on the south side of the river. Currently, there are no access corridors linking these training areas, from the north side of the river, except along hard surface roads at either end of the Ysidora and Chappo subbasins.

This proposed project involves construction of two separate "unimproved" crossings within the lower Santa Margarita River flood plain. They are "unimproved" to the extent that no concrete and culvert, "Arizona" style crossings will be emplaced. The first crossing will be 30' wide and will follow an existing roadway from grid coordinate (GC) 646822 to GC 654820 and then parallel Vandegrift Boulevard to GC 654818. The second crossing will be 30' feet wide and also follow an old road alignment from GC 648798 to GC 656796. It will then cross Vandegrift Boulevard and follow an existing road southeasterly across Ysidora Basin for an additional 2400 feet. Both crossings will consist of a graded roadway crossing at the river channel (Figure 3-5a, 3-5b of the BA). Construction will involve trimming vegetation along the sides of the existing roadway, filling ruts, importing decomposed granite or shale for resurfacing, and regrading the existing trail roadbeds. Construction will take place during the non-breeding season to avoid disturbance to nesting vireos and flycatchers.

Daily training use of the crossings will be light, except during approximately 2 major fleet exercises per year (amphibious operations, as defined in Table 3-1 of the BA), when traffic will be moderate to heavy for a few days.

2.3.2 San Mateo Creek Crossings

Existing creek crossings in the San Mateo Creek are not wide enough to support traffic during major fleet exercises. This project involves the improvement of an existing crossing at grid coordinate (GC) 472978 and the creation of a new crossing in grid square 5097 (figure 3-6 of the BA). The crossings will consist of a 20-foot wide, graded roadway with an undeveloped crossing at the river channel. Daily, vehicle traffic use of the crossings will be light, except during approximately 2 major fleet exercises per year, when traffic will be moderate to heavy for a few days.

The new crossing will be constructed at a location where there is current vehicle use. The preferred location minimizes riparian impacts because it is adjacent to areas with existing vehicle use and would require the least amount of additional road building or vehicle operation in previously undisturbed areas.

2.3.3 Las Flores Creek Crossings

The crossings will allow personnel and vehicles access corridors to/from training areas on both sides of the drainage. Existing crossings at Las Flores Creek are narrow and unsuitable for two way traffic and transit by tracked vehicles. This project involves improvement (widening) of two existing crossing sites and associated roads crossing Las Flores Creek in the Las Pulgas Canyon, at grid coordinates (GC) 590862 and 616884 (figure 3-7 of the BA). The crossings will consist of a 30 foot wide graded roadway leading to an undeveloped (natural streambed condition) crossing at the river channel.

2.4 Wilcox Range (Range 103) Night Firing

Wilcox Range is an established range which has been in use since the 1940's. This range has been continually used for rifle firing and qualification during daylight hours. Night time use of this range has occurred occasionally, but not as a regularly scheduled exercise. Current use occurs primarily during the morning hours from sunrise to noon, daily. Current use and maintenance requirements are described in the BA.

New Marine Corps infantry training standards for rifle qualification with the M-16 rifle became effective 1 October 1994 (figure 3-8). These requirements call for reduced visibility, firing (night time qualification) with artificial illumination, in addition to existing day time firing. Artificial illumination will be provided by illumination hand grenades (ground) for back lighting targets and 40 mm, parachute flares (air) fired overhead by Marines using M203 grenade launcher attachments on their M-16 rifles for frontal illumination. Hand grenades will be placed within the existing, developed range area, probably at the bullet impact "butt" area. Both types of illumination burn for about 1.5 minutes. Most firing will be scheduled between sunset and midnight.

Firing will be conducted approximately, 4 nights per month throughout the year. Firing will normally be conducted in 5 relays (groups of shooters) each qualification night, with each relay using 6 ground and 6 air illumination grenades. For each relay, all ground illumination grenades will be fired at once, followed by all air illumination grenades. The time duration between relays is about 0.5 hour. The total illumination per month will be 15 minutes per qualification night, equating to 60 minutes per month.

To minimize fire risk, ground illumination grenades will be placed in empty ammunition cans on an asphalt surface, the impact area for air illumination grenades will be controlled burned annually, to minimize fuel sources and tthe risk of fire spread beyond range boundaries. The Base monitors moisture and fuel source availability on a daily basis, publishing fire danger ratings, with associated curtailment of fire inducing activities as the condition worsens, under a Fire Danger Rating System (FDRS) to manage and minimize risk of fire from training related activity.

2.5 Reconnaissance up the SMR

These types of exercises are intended to be quiet and secretive approaches to a variety of inland objectives. Movement through the Santa Margarita River estuarine and riparian zones will involve only small boat and foot traffic. Marines will travel up a section of the river in small boats, disembark, and move on foot or in vehicles to objectives inland. All vehicles associated with the training will travel on existing roads or stream crossing sitess. These activities will only be authorized during the non-breeding seasons of the snowy plover, tern and vireo (1 September - 15 March).

2.5.1 Small Boat Operations in the SMR

This activity will include small boat operations in the Santa Margarita River, with a maximum of 75-125 personnel traveling in 10-15 small boats. The operations are expected to occur infrequently (5-15 times/year) and may occur during hours of darkness. They will enter the Santa Margarita River from the ocean and may proceed upstream until the water is not deep enough to continue (most likely 0.5 miles above Stuart Mesa Road Bridge). From there, Marines will proceed to inland training areas. Training will periodically involve operations continuing upstream by foot in the riparian zones along side the river or occasionally along the sides of the river channel during low-flow events. This activity will occur in the Santa Margarita River only during the non-breeding season.

2.5.2 Infantry Foot Operations in the SMR

During the non-breeding season (1 September-15 March), infantry units of 75-125 personnel may move on foot upstream within the Santa Margarita flood plain from a beginning point at the Stuart Mesa Road Bridge. These movements are intended to be quiet and secretive, utilizing the river channel, game trails, existing roads, and jeep

trails as primary travel routes and using the riparian vegetation for cover and concealment. Personnel will not be permitted to cut native vegetation.

This activity is the follow-on segment of the boat reconnaissance operations described in paragraph 1.2.5.1 above. The Marines disembark from the boats and travel afoot to their objectives. The infantry action is interrelated and interdependent with that from the riverine boating action.

2.6 Renovation of Camp DeLuz

Camp DeLuz consists of 8 older wooden buildings within a 300 foot by 400 foot paved area along the western side of DeLuz Creek, centered at grid coordinate 700924. This project will remove the existing obsolete buildings and replace them with 2-3 mobile home-type structures, 10 wooden structures and 4 metal storage containers. A water line will be brought in and electricity and telephone services will be restored, using existing poles. This area is currently being used daily by 1st Force Service Support Group (FSSG), a major tenant unit aboard the Base. The mobile home, trailers will be used to temporarily house Marines (for up to one week) as they temporarily reside at the Camp and train in the adjacent India Training Area, as well as to house the 1st FSSG Battle Skills Training School. The School will train up to 100 Marines per class in land navigation, offensive and defensive operations, weapons use, and similar military skills. This training will avoid habitat for listed species.

Construction will take approximately six months. All construction, with the exception of the water line which will provide potable water supply to the camp, will be within the existing developed area. The water line will be trenched within the boundaries of DeLuz Road, thus avoiding direct impact to riparian habitat other than noise and dust during its construction. The water pipeline section that crosses DeLuz Creek will be completed during the non-breeding season.

3 INFRASTRUCTURE MAINTENANCE

Infrastructure maintenance includes the routine actions necessary to keep Base ranges, facilities, buildings, utility systems, and roads in working condition.

3.1 Range Maintenance

Maintenance of ranges is essential to minimize hazardous conditions created by erosion, overgrown vegetation, and normal wear. Tasks frequently performed during routine maintenance include brush and tree trimming, mowing, fire lane grading, removal of destroyed targets, sign replacement, digging for target emplacement, repair of bleachers and observation towers, and maintenance associated with repair of existing buildings and mechanized targets. These tasks are generally accomplished by the use of hand crews (without the use of heavy equipment) and are strictly limited to established facilities and developed areas. The duration of the maintenance activities varies depending on the job and the range facility function, but generally last between 2 days and 2 weeks.

Range maintenance potentially affecting riparian areas include 9 firing ranges and 2 Artillery Firing Areas (AFAs). Both AFAs and 7 of the ranges are not located in the riparian area, but on the bordering upland area. These are included due to potential concerns regarding dust from access roads and noise disturbance during maintenance activities which may indirectly effect the adjacent riparian areas. The remaining two ranges (Range 102 and 103) are in the Santa Margarita floodplain, and have similar effects directly on species occupying riparian habitat surrounding these ranges.

3.2 Fire Breaks

Existing fire breaks are maintained throughout the Base in order to minimize fire risk to facilities, residences, training areas, and habitat. Fire breaks are maintained through annual discing, bulldozing, and controlled burning. Typical breaks range from 50 to 200 feet in width. Controlled burning is conducted where archaeology, or endangered Stephens' kangaroo rat colonies must not be disturbed by physical fire break maintenance methods or when required for fire fighter training in unoccupied habitat areas. Discing occurs adjacent to all housing areas and some facilities, and bulldozing is conducted on the remaining breaks. Fire break reconstruction is completed annually between approximately 15 May and 15 July, once the ground is dry enough to accommodate the clearing activity, but prior to the fire season. The approximate sum total of riparian areas crossed by firebreaks is 0.75 miles. Riparian vegetation is also periodically removed to maintain culverts. This Base-wide culvert cleaning occurs in the Spring following the rainy season and typically consists of removing twigs, branches, and other debris which accumulates in and immediately upstream from the culverts. The area cleaned outside each culvert is usually 5-20 square meters.

3.3 Secondary Roads

Numerous secondary roads traverse the four major drainages on Camp Pendleton, as well as the lesser tributaries. These roads are used for a variety of military training exercises as well as access for the Fire Department, maintenance of utilities infrastructure, and recreational activities such as hunting and hiking. Most secondary roads are hard packed dirt, which may require annual maintenance, such as grading, stream bar repair and culvert clearing during April and May to reduce erosion potential and improve trafficability after the winter rain damages them. Most damage is caused by water flow associated with the yearly rain cycle.

Maintenance consists of grading activities, culvert cleanout and repair, and generally occurs on an annual basis. These roads are graded to approximately 12 feet in width. Maintenance may also include cutting vegetation overhanging the roads and is done on an as needed basis. Work requests are usually forwarded to Facilities Maintenance Department by military commands that regularly use certain roads. Spot contracts are awarded as money becomes available. Surface applications of gravel or pavement are rarely applied to secondary roads.

There are approximately 102 secondary roads located on the Base totaling over 278 miles. Of these secondary roads, 38 occur in the Santa Margarita, 21 in Las Flores, 20 in San Mateo, 18 in San Onofre, and 6 in the San Luis Rey drainage. More than 64[1] of these roads cross or occur in or adjacent to riparian areas. Secondary roads pass through virtually every plant community on the Base.

The roads listed below require major road repair work. New creek crossings and road widening projects are presented in section 3.3 of the BA as new training requirements or 3.5 of the BA as new road/crossing construction.

- Lima Area Bypass Road (GC 718818). This is a trail required by the Fire Department to obtain access between two sections of fire break. Under the current situation they drive across the face of a dam which is unsafe because it requires the dozers to tilt excessively sideways and is damaging the dam. This road would directly impact approximately 50 X 14 feet (0.02 acre) of riparian vegetation.

- Santa Margarita River Road from DeLuz Creek Crossing to the Hospital. This road is impassable but the road bed still exists. Vegetation will need to be trimmed (to accommodate fire trucks) and imported fill is required.

- Install culvert or rock at the confluence of Roblar and DeLuz Creeks. This crossing is currently large rock; it is difficult to traverse, but has no vegetation.

- Roblar Creek Trail in grid square 6895 has three creek crossings which require new culverts or rock emplaced to restore their functionality.

- Roblar Loop Road at Roblar Creek. Requires rock and culverts to be emplaced to restore their functionality.

3.4 <u>Utility Line Installation and Maintenance</u>

Telephone and fiber optic cables, water, sewer and gas pipelines follow major roads throughout Camp Pendleton. Periodic maintenance is required. Weeds are controlled within 10 feet of above ground

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[1]The figure of 6,482 miles noted in the BA is in error. The mileage estimates used in this paragraph represent correct figures.

telephone pedestals. New fiber optic lines are being installed beneath or immediately adjacent to Vandegrift Boulevard and Stuart Mesa Road within the riparian area. Electrical transmission lines follow roads and cross wetlands, streams, and riparian habitats. Tree trimming is occasionally required to protect overhead lines from damage. Other pipelines carrying water, sewage and gas run underground and require periodic monitoring and maintenance.

3.5 Sewage Treatment Plant Pond Weed Control

Weed control is required for sewage ponds in the following areas: Stuart Mesa, 22 Area, Camp Margarita, Las Pulgas, Horno, San Onofre, and San Mateo. Treatment of weedy areas immediately adjacent to sewage effluent ponds is performed on a monthly basis using a tractor with attached boom sprayer, which applies Rodeo herbicide. This activity is performed to maintain integrity of the structures and prevent encroachment and interferance with operation of the ponds by vegetation. The total acreage affected is approximately 7 acres.

3.6 Groundwater Recharge, Pumping and Well Maintenance

3.6.1 Groundwater Recharge

Basin recharge is accomplished utilizing various water conservation techniques. In the Santa Margarita River Basin, off-channel water spreading structures (scarified dirt basins, with clay banks and a network of inlet channels linked to the Santa Margarita River through a diversion ditch that also fills Lake O'Neill) and the filling and draining of Lake O'Neill are the most commonly used management techniques currently employed. On-Channel spreading within the Chappo subbasin has been conducted in the past, but due to the direct effects of disturbing riparian habitat, this technique is no longer employed.

The Lake O'Neill system begins at the steel, sheet pile and rock weir diversion structure which crosses the narrow Santa Margarita River valley near the Naval Hospital. A diversion box and gate is used to divert flows from the river to direct water to a diversion ditch which feeds the spreading structures and Lake O'Neill IAW a permit from the Basin Water Authority. From this ditch, water is conveyed to Lake O'Neill and/or a 49 acre off-channel water spreading basin. The off-channel system consists of a series of interconnected sand causeways forming five spreading basins. The bottoms of these basins consist of very absorptive sands and gravels

that readily infiltrate and percolate water through the soil matrix to recharge the groundwater basin.

Lake O'Neill, which is also replenished by Fallbrook Creek, receives river water from the diversion ditch where it is impounded by a low earthen and rock dam constructed in the late 1800's. This earthen dam is presently covered by an improved road surface (Santa Margarita Road) that leads to the Naval Hospital. It is this dam that forms Lake O'Neill. The Lake, constructed in the early 1880's, was used by the O'Neill's (then Rancho Santa Margarita) to irrigate their vineyards and croplands, where the MCAS, Camp Pendleton presently exists.

The Base has a water license from the State Department of Water Resources to operate the spreading basins and a pre-1914 water right to divert water to the lake. These operations will continue, as they are crucial to the Base's water resources program for potable water supply and recharge of the aquifer which supports the biota in the Chappo subbasin. Water used to fill the lake in the Winter is released to recharge the Santa Margarita River Basin in the early Fall, through a drainage ditch which leads to the Santa Margarita River.

Incidental to the operations of the O'Neill system is the need to remove sand and silt that is carried with the water to the ditch and spreading basins, usually on an annual basis. To decrease the roughness of the ditch, and to allow more water to flow through it, vegetation is chemically or mechanically removed annually, during the non-breeding season for vireo and flycatcher. When water is released from the lake in the Fall, vegetation must be removed through a ditch that flows from the southernmost corner of the lake, back to the river, again during the non-breeding season.

3.6.2 Groundwater Pumping

Since the Base was purchased in 1942, Camp Pendleton has remained water, self-sufficient through use of pumping wells for potable water supply, to be chemically treated and distributed for use by Marines and others in the various basins described in Section 2.1.3 of the BA. It is the intent of the Base to continue to pump these basins within the safe perennial yield of these basins, to preclude damage to the aquifer. Annual Basin evaluations, climatological, historical data and computer models are used to determine Basin safe yield, which is used in management decisions affecting pumping parameters for the water year and also to generate conservation

measures for both camp supply and biological vegetation protection.

3.6.3 Water Well Maintenance/Repair Activities

Potable and agricultural water production wells are located in the following areas: Santa Margarita, 12; Las Flores, 3; San Onofre, 5; and San Mateo, 5. Routine activities include maintenance of vehicular access for pickup trucks and large vehicles (such as drill rigs); trimming of tall vegetation to prevent interference with power supply lines; and weed abatement adjacent to well heads. The roads leading to the well heads and their adjacent shoulders are approximately 30 feet wide. Maintenance of roads includes periodic grading and trimming of vegetation during the non-breeding season. Weed abatement consists of mechanical control.

Repair time per well varies from 1 to 3 days. The wells and access roads are used by maintenance and monitoring personnel year round, travelling generally in single vehicles on a weekly or less frequent basis when repairs aren't needed.

4 CONSTRUCTION PROJECTS - SANTA MARGARITA RIVER DRAINAGE

4.1 SMR Flood Control - Construct Flood Levee/Wall (P-010)

The proposed flood control levee/wall will extend 14,500 feet along the south side of the Santa Margarita River from less than ½ mile above the Ranch House to the 22 Area sewage treatment plant (STP 3) (Figure 3-11 of the BA). The levee is one of 7 alternatives examined in the *1994 Floodplain Analysis Report of the Lower Santa Margarita River* (USACOE, preliminary draft). The purpose of the project is to provide a more adequate level of protection to the facilities and personnel of the MCAS. The facilities had sustained over $70 million in damages from the winter floods of 1993. The levee alternative represents the least environmentally damaging alternative of those examined in the above report. The exact configuration will be determined upon approval of the final design. The loss of active floodplain habitat values (namely, the approximately 118 acres of undeveloped land to be isolated behind the levee) will be minimized to the maximum extent practical. The final design may use either a rip-rapped or a soil-concreted surface covering an earthen levee on the riverside surface.

The levee/wall is intended to be designed to provide protection for the MCAS in at least a 100-year storm event. The protection of the MCAS provided by the design of the levee/wall will strive to avoid

the need for future channel clearing within the Santa Margarita River to achieve storm event protection, (that is, the levee configuration is intended to be "self-cleaning" in the vicinity of the levee to maintain its integrity and function). Future channel clearing may become necessary and/or the construction of silt fences or groins in areas immediately upstream of the levee may be required by subsequent design modifications. Such modifications would be subject to programmatic instructions and "action classification" system described in the Riparian Conservation Plan and section 1.13.3 below. The design will minimize disruption of the riverine dynamics of the Santa Margarita River, to include the present low-flow channel of the river. Additionally, the design footprint will minimize the habitat isolated by the footprint (currently an aggregate of 118 acres of mixed plant communities), while presenting a smooth hydraulic surface and conforming, where possible, closely to the FAA imposed clear zones surrounding the MCAS.

This levee would be higher and wider at the base than the existing levee which was constructed immediately after the flood of 1992/1993 as a repair action on an older earthen levee of undetermined age and length which had breached during that winters storm. Construction of the new levee will permanently remove Rifle Range Road and its associated Arizona crossing of the Santa Margarita River. This alignment also requires either realignment or re-construction of the Basilone Bridge and Road to maintain its flood intensity protection capability. The Basilone Bridge project is described below.

Construction of the levee will require significant earth moving activities (from borrow pits outside the Santa Margarita River channel) and cover a construction foot print approximately 150 ft wide. There will be several construction access points into the river bed. The majority of construction will be completed during the non-breeding season. All native-habitat clearing required for the project will be accomplished during the non-breeding season. All activity which could result in "excessive" noise levels, hourly, within vireo/flycatcher habitat will occur during the non-breeding season. The time-frame for "non-noisy" construction activities partially coincides with the nesting season of the vireo and flycatcher. A maximum of one known historical location for flycatcher will be affected by the project, by isolating the habitat where it has been observed to occur from the dynamics of the main river channel. The completed levee will cover permanently approximately 32 acres. Disturbance to another approximately 10 acres will occur during construction of the levee. The effects of this latter disturbance are expected to occur for some period into

the future, but not be permanent. Construction is projected to take up to one year to complete. Best construction management practices will minimize erosion dynamics and soil contamination by fuel/lubricant leaks or spills.

Compensation intended to minimize the impacts to listed species will include returning the temporarily disturbed 10-acre area to original condition and performing 33.4 acres of Arundo removal in the Santa Margarita drainage for five years. Additionally, a 10-year monitoring program will be developed to monitor the effects on phreatophytes within the area enclosed by the levee footprint, with associated mitigation measures for potential impacts to be implemented should they occur. The Base recognizes that the effect of the levee will be to cut off the vegetation enclosed behind it from the surface flows of the river, which serves to regenerate the habitat by destruction of older willow trees and generation of saplings rooted in the sediment deposited there. This will be compensated for by periodic maintenance of the system and planting of new saplings to maintain the habitat mix presently encompassed by the levee.

This project is slated to begin fiscal year 1998, though it may be expedited due to Base Realignment And Closure (BRAC) 1993 requirements.

4.2 Replace Basilone Bridge (P-030)

This project will replace the existing two-lane temporary bridge which was constructed after the flood of 1992-1993 washed out Basilone bridge. The temporary bridge is not adequate nor certified by the Department of Transportation to handle the current (other than temporarily until a permanent structure is built to replace the welded railroad cars suspended over piers currently in place) or projected future transportation on Basilone Road (since Rifle range Road is closed). This bridge will be replaced with a permanent, four lane bridge. The present bridges alignment and position creates a bottleneck for water within the SMR contributing to the build-up of sediment upstream of MCAS. The new bridge is also required due to a need to close a gap in the existing levee surface created by the present bridge, which lies at a lower level (approximately 4 feet) than the levee banks adjacent to the structure. The new bridge is presently intended to be constructed 15 ft. north and parallel to the current bridge location. The 80 foot wide concrete bridge will have two lanes, a pedestrian walkway and night lighting. The lights will be equipped with deflectors

that minimize the overflow of light away from the bridge. It will extend for 1,000 feet and will be high enough to accommodate the new levee and allow free flow during flood conditions; 4-foot diameter columns supporting the bridge structure will be placed approximately 125 feet apart along the bridges length. The roadway will be realigned to assure smooth traffic flow. The bridge will be designed to withstand a 100 year flood and constructed to conform with the final SMR Flood Protection Management Plan. Additionally, due to impingement of the FAA and NAVAIR required clear zone at the end of the present MCAS runway, the actual location of the bridge may shift to provide for safe takeoffs and landing of aircraft. Should the original design change due to the aforementioned considerations, subsequent design modifications will be subject to the programmatic instructions and the Class II activity system described in the Riparian Conservation Plan and section 1.13.3 below.

Construction will include concrete footings within the SMR with concrete foundations on either side of the river. Foundations and footings will be protected by concrete rip-rap. Construction will involve heavy equipment including bulldozers, cranes, backhoes, air compressors, jack hammers, pile drivers, and cement trucks. Careful management of the construction activity will minimize erosion and soil contamination by fuel/lubricant leaks/spills. Lay-down areas will be located outside high and medium quality riparian habitat. Temporary impacts will affect approximately 3 acres, although the actual bridge will permanently impact 0.1 acre of quality riparian habitat.

This project is slated to begin fiscal year 1998, though it may be expedited due to Base Realignment And Closure (BRAC) 1993 requirements. The majority of construction will take place during the dry season (breeding season). Ongoing maintenance will consist of replacement of lights and infrequent repair work as the need arises.

The speed limit on Basilone Bridge will remain at 35 mph after the new bridge is completed, to minimize vibration and noise impacts to the structure and surrounding habitat.

Compensation will include returning temporarily disturbed areas to original condition and performing 1.59 acres of Arundo control for the permanent direct impact and temporary impact of the project, which is projected to be constructed over two breeding seasons.

4.3 Sewage Effluent Compliance (P-527B)

4.3.1 Construct Sewage Effluent Discharge Pipeline From 22 Area STP to Oceanside

Approximately 7 miles of effluent pipeline will be constructed following Vandegrift Boulevard (on old railroad bed, where convenient) from the STP 3 in 22 Area to STP 13 in the 20 Area (near junction of Vandegrift Blvd. and Stuart Mesa Road) to Oceanside. This will result in the diversion of sewage effluent from STP's 3 and 13 of an average of 0.7 and 1.5 million gallons per day, respectively, from these plants.

Construction, slated for fiscal year 1996, will involve trenching and filling along the pipeline route. Construction activities will primarily involve excavation along 7 miles of the existing railroad bed and should not extend more than 5 feet into riparian scrub or woodland habitats.

Camp Pendleton has commissioned a Programmatic Groundwater/Riparian Habitat Assessment of the Base. This study has found that depth to groundwater will increase slightly in the area of STP-3 (Santa Margarita River drainage) during periods of extended drought (7 or more years of less than average rainfall), however depths to groundwater in the other basins, including the upper San Onofre basin, are projected to remain consistent with current levels and are not anticipated to affect riparian vegetation.

Areas of potential habitat loss due to an increase in depth to groundwater under conditions of severe drought are found in the study (CPEN, 1995a). As the model used to project this was only a link-node model, the definitive area of loss requires further refinement. Further, this study assumed that existing conditions would continue, resulting in a loss of vegetation due to groundwater table lowering. The Base has speculated that this is interrelated and interdependent to the new potable wells in the Santa Margarita floodplain project (section 1.4.9 below), in that pumping wells in the vicinity of the STP 3 and STP 13 percolation/oxidation pondes would be relocated to the new locations, and consequently there would be more water available in the aquifer to support vegetation in this local vicinity. Additionally, the Base has proposed to conduct periodic basin evaluations for safe yield, combined with computer simulation/modelling of the aquifer responses to pumping and recharge due to natural and man induced activities. This in an effort to develop conservation measures and changes in pumping

regimes that would minimize the drawdown below the 15 foot depth to groundwater level where riparian habitat may be unable to survive.

In order to prevent loss of riparian vegetation once effluent discharge ceases, Camp Pendleton will monitor the effects that discharge elimination from STP-3 will have on the Santa Margarita River riparian system, then establish compensation based on these data, using the Class II activity class system and programmatic instructions under the Riparian Conservation Plan below. A dual approach will be taken that involves monitoring of both riparian vegetation and hydrology. The vegetation monitoring program will qualitatively and quantitatively document changes in riparian vegetation and predict future effects. The hydrological monitoring program will document fluctuations in both groundwater and surface water and develop a hydrological model that will be "tied" to the vegetation monitoring effort. Both programs will involve sampling above, at, and below the points of discharge of STP-3 in order to ensure adequate baseline data.

Vegetation monitoring will be standardized for all sites as much as possible, but may vary slightly due to the variations in the amount of discharge, hydrology, vegetation composition, and density. Line intercept transects will be used as the primary mode of sampling. Transects will be established perpendicular to the water flow and will be sampled for plant species diversity and overall biomass. Upstream of the discharge, transects will run bank-to-bank and will be placed in similar habitats to be comparable to downstream transects. Since the major focus is on monitoring the effects of discharge, transects will be placed downstream at several distances from the point of discharge. In these locations transect length will be adjusted so as to maximize data collection for the area of concern. Additionally, photo documentation points will be established with a primary focus on the riparian areas immediately downstream of the discharge point.

4.3.2 Construct Sewage Effluent Discharge Pipeline From 33 Area STP (STP 8) to the 22 Area STP (STP 3)

The proposed 2 mile pipeline alignment runs along the Santa Margarita River on the riparian woodland edge for 1500 ft. then follows existing roads from STP 8 in 33 Area to the vicinity of well #33924 (figures 3-12a and 3-12b of the BA). From there it will cross the Santa Margarita River to STP 3 in 22 Area. At STP 3, the line will connect to the new line carrying effluent from STP 3 to Oceanside. This will result in the diversion of 0.29 million

gallons per day sewage effluent from this plant. The existing effluent chlorination stations will be relocated within the existing plant.

Construction, slated for fiscal year 1996, will involve trenching and filling along the pipeline route. Construction activities will primarily involve excavation or horizontal drilling across the Santa Margarita River. The construction width should not exceed 30 feet, with a construction length of approximately 5,800 feet. The final alignment and feasibility of horizontal drilling under the River has not been determined. Construction activity will be minimized during the nesting season. Careful management of the construction activity will minimize erosion and soil contamination from fuel or lubricant leaks and spills.

4.3.3 Renovation of the 22 Area STP (STP 3)

This project will renovate STP 3 in 22 Area by installing new and additional equipment to increase the capacity of the plant (figure 3-8 of the BA). An additional sludge bed will also be installed. The new sludge bed will occupy an additional ¼ acre of previously disturbed ground. Construction will be conducted during fiscal year 1996. All construction will occur in previously disturbed areas. Careful management of the construction activity will minimize erosion and soil contamination from fuel/lubricant leaks/spills. Noise and human activity at the facility will not change.

4.4 Demolition and Removal of Railroad Tracks

The Camp Pendleton railroad was heavily damaged during the January 1993 flood. This project will consist of demolition (removal of rails and ties from existing gravel, track bed) of approximately eleven miles of railroad along the Santa Margarita River, with the exception of about 6,600 ft of railroad track adjacent to MCAS, Camp Pendleton that have already been removed (Figures 3-4a, 3-4b, and 3-4c of the BA). Removal will include all railroad tracks, ties, spikes, joint bars, tie plates, shims, bolts, switching apparatus and appurtenances. Some sections were damaged in the flood of 1993, and the remainder has not been used since the flood damaged the railroad. The track bed remaining (gravel surface areas) will be graded or left as unpaved road crossings. All rails and wooden ties embedded in asphaltic concrete paving or treated wood plank crossing (such as road crossings) will be left in place. Careful management of the construction activity will minimize erosion and soil contamination from fuel/lubricant leaks/spills.

All work adjacent to sensitive areas will be done from the Vandegrift Blvd side of the railroad bed or the railroad bed itself. Work will not extend beyond a boundary of 5 feet on the river side of the railroad bed. The work will be done by hand with man-portable tools in most instances, and will be completed during the non-nesting season.

4.5 Desilting the SMR at the Lake O'Neill Diversion Weir

The Lake O'Neill diversion structure supplies water to Lake O'Neill and to infiltration ponds which are used to recharge groundwater during the wet season (figure 3-13 of the BA). The structure also acts as a trap for sediment from the upstream watershed. In order to facilitate diversion of water into Lake O'Neill and the infiltration ponds, annual removal of approximately 30,000 cubic yards of sand/sediment from 7 acres of the Santa Margarita River bed is necessary. Annual sediment removal, beginning in fiscal year 1995, will facilitate water diversion and prevent sediment transport from upstream to areas downstream from the weir where flooding due to sediment accretion is a recurring problem. This activity has been a regularly scheduled maintenance activity in past years, occurring once every 3-5 years. The last time this activity occurred was in winter 1993-94.

The proposed area of sediment removal is approximately 300 ft wide and 1,000 feet long (figure 3-10 of the BA). Removal will take place in the fall when breeding birds are absent and water levels are at their annual low point. Heavy equipment and large trucks will be used to excavate and transport the sediment over established roads. Careful management of the construction activity will minimize erosion and soil contamination from fuel and lubricant leaks or spills.

The idea of a desilting basin in the vicinity of the weir for trapping of sediment during flood conditions is being considered. The final siting and design of such a basin will be examined in the subject to the programmatic instructions and the Class II activity system described in the Riparian Conservation Plan and section 1.13.3 below.

4.6 Marine Corps Air Station Construction Projects

MCAS Camp Pendleton occupies approximately 410 acres within the Santa Margarita River floodplain. Approximately 90% is developed land, while the remaining 10% consists of riparian woodland, mixed

willow exotic and lesser amounts of riparian scrub and non-native grasslands. There are currently three major categories of construction projects slated to commence within the next three years on MCAS. These categories are Base Realignment and Closure (BRAC), Military Construction (MILCON) and flood protection. Appendix C of the BA outlines the types and numbers of projects and a short description of each within each major category.

During the initial review of each project description, the Service determined that only three of these projects would possibly remove riparian habitat. All other projects will take place within the currently developed industrial area. The three projects are described below.

4.6.1 Ultimate Clear Zone (Project PA303M)

Aircraft operation safety guidelines established by NAVAIR requires that a zone cleared of all obstructions be established at the end of all active runways. This zone shall extend 500 feet either side of the center of the concrete runway and shall extend 1,000 feet from the end of runway; additionally, an additional glide/takeoff slope clearance is required both laterally and from either end of the runway. This takeoff clearance zone starts 200 feet from the end of the runway, sloping at an angle of 1:40, whereby 1 foot of elevation must be attained for every 40 feet of distance longitudinally from the initial 200 foot threshold (from a plane extending from the elevation of the end of the runway). A lateral side slope also must be cleared of vegetation on a slope of 1:7 from the edge of the 500 foot clear zone from the center of the concrete runway. Construction activity will include clearing all vegetation except grass within a 27 acre area. The proposed mitigation site for this project is located north of the Ranch House near Lake O'Neill(Figure 3-8 of the BA) and includes 4 acres of revegetation/enhancement and 13 acres of experimental enhancement involving weed control, currently scheduled for to begin late 1995. Clearing is expected to occur 3-5 years after planting substitute habitat.

4.6.2 Convert Short Approach Landing System to Airfield Lighting Sequence Flashing System (Project PA403R)

This project, to be constructed during 1996, will upgrade the Short Approach Landing System (SALS) approach lighting to an Airfield Lighting Sequence Flashing system (ALSF-1). The current system is inadequate and does not provide proper illumination for safe operations for approaching aircraft at night and in inclement weather. The ALSF-1 system will extend from the end of the existing SALS on MCAS 1500 feet northeast into the Santa Margarita River (figure 3-8 of the BA).

Each lighting unit consists of support poles with cross arms for the light mountings. Electrical cables will be buried in duckbanks beneath the river bed. Each unit will have a "skirt" that will help prevent water borne debris from accumulating against and upstream from the unit. Additionally, they will have Nixalite applied to prevent birds from using the units as perches. Construction will involve placing the poles in concrete footings and cutting a ditch for the duckbank. Work will need to be completed during the dry season (partial breeding season), in order to facilitate construction access within the river.

4.6.3 Aircraft Parking Apron and Fueling Pits (Project P-026T) and Upgrade to Existing Compass Calibration Pad (P-518S)

This project, to be constructed during fiscal year 1996, will extend the current aircraft parking apron north toward the runway from the developed side of the MCAS to accommodate relocating aircraft within MCAS. This project will also relocate the Bulk Fuel Station to an uplands area across Vandegrift Blvd. from its current location, and associated Hot Fuel Pits south within the developed area of the MCAS. The existing Compass Calibration Pad will be cleared of vegetation along the edges to make it more functional for aircraft; an interrelated and interdependent effect of this pad is to require the new levee to extend on a direct line,along its current path, beyond this location, before it can begin "fairing" in toward STP 3.

The location of the fuel tanks and compass calibration pad may change in the future due to aircraft operational and safety requirements associated with this activity, and human health and safety concerns with its presently designed location near the junction of Vandegrift and Basilone roads. Should this project come to fruitition, this would necessitate moving of the Compass Calibration pad to a position roughly north of the western end of the existing runway in riparian habitat; and relocation of the hot-fueling pad to a location westward of the explosive safety arc encompassing the ammunition arming station (on the northern side of

the runway), but between the end of the runway and the crash crew pad presently located at midlength along the runway. This alternative would require conversion of approximately 7.2 acres of riparian habitat (inside the levee) to a disturbed area.

Exact siting of these alternatives is undetermined at this time. However, the present siting of the fuel pits is outside of riparian habitat in the previously disturbed area near the present fuel farm. Should the original design location change due to the aforementioned considerations, subsequent design modifications will be subject to the programmatic instructions and the Class II activity system described in the Riparian Conservation Plan and section 1.13.3 below. Due to protection considerations within the floodplain, the Hot Fuel Pits will not be constructed until after the levee is completed.

4.7 Replace and Improve SMR and DeLuz Creek Crossings

This project will construct two low water (Arizona) crossings for DeLuz Road at the Santa Margarita River (GC 702913) and at DeLuz Creek (GC 701721) in order to provide ongoing use by emergency and operational vehicles during conditions other than high water periods (figure 3-9). These crossings will replace the existing undeveloped crossing with reinforced concrete slab pavement sited to permit unimpeded flow at all water levels. The work will be done using bulldozers, backhoes, dump trucks, and loaders. The Santa Margarita River crossing will cover an area 300 feet long by 30 feet wide. The DeLuz Creek crossing will cover an area 50 feet long by 30 feet wide. Construction will affect an area 30 feet around the perimeter of the crossing. Construction will be planned to occur between 1 September and 15 February to avoid the breeding season of the vireo, flycatcher, and arroyo toad.

4.8 Blue Beach Inland Access

The Marine Corps has identified the ability for Battalions to land on the beach and tactically move inland with their equipment as the Base's number one priority. The widening of existing roads is necessary to accomplish this and to simulate realistic training. The project will widen 6.2 miles of North River Road along the Santa Margarita River. The widening will facilitate inland access of tactical vehicles during major amphibious exercises and increase access for fire protection. Widening will begin at the agricultural fields west of Interstate 5 (grid coordinates 619774), cross under the Interstate, and extend to Range 102 (GC coordinate 646839)

(figures 3-12a and 3-12b of the BA). Widening will occur over most of this length, however, several stretches are already wide enough. The road will be widened 15 feet, and the construction area will extend another five feet, for a total of 20 feet of disturbance in most areas. Construction will be limited to non-breeding season and is expected to last approximately five-six months. After the consultation was initiated, new information was developed concerning the scope of this project. The project change envisions cutting six vehicle access roads through the bluffs from Blue Beach to the agricultural fields above. It is intended that vehicle traffic would transit along the dirt road through the agricultural fields to link up with North River Road in the vicinity of the I-5 Bridge over the SMR. No biological information for impacts associated with this change and consequently will need to be addressed in the context of the programmatic instruction and class activity system described in section 13 of this appendix.

4.9 New Potable Water Wells in the SMR Floodplain

Six deep wells for potable water production are proposed within the Santa Margarita River floodplain between STP 3 (22 Area) and Lake O'Neill.

Each new well will have an access road, well pad and well machinery. Access roads are 15 ft. wide with an all weather gravel surface. The well pads will be approximately ¼ acre in size. Wells located within riparian habitat will permanently eliminate up to ½ acre of habitat at the well site and 0.035 acres per 100 feet of access road. Installation of pipe lines from each well to the distribution system will require a construction zone 25 feet wide or 0.06 acres per 100 feet of length. Electrical lines will be installed along the roads to provide power for the pumps. Daily monitoring and routine maintenance will occur throughout the year when the wells are in operation. Construction during the non-breeding season will reduce impacts to wildlife.

Well 1 will be located northwest of the Navy Hospital in a cleared area (figure 3-13 of the BA). Well 2 will be located southwest of O'Neill Lake near an existing road (figure 3-13 of the BA). Less than 100 feet of road will be needed to access this well. Well 3 will be located approximately 600 feet southwest of Wilcox Rifle Range and 200 feet from an existing access road (figure 3-8 of the BA). Wells 4 and 5 will be located south of the MCAS levee extension and west of the runway (figure 3-8 of the BA) and will require a shared access road up to 1600 feet long. Well 6 will be

located on the east side of the Air Station in a developed area at GC 676845. The Base has speculated that an interdependent and interrelated effect of this project is with the relocation of effluent from STP-3 project, in that drawdowns from pumping wells will be lessened in the area where recharge previously occured by the oxidation and percolation ponds in the western Chappo and eastern Ysidora subbasins. This may cause the depth to ground water in this region to be at a level where riparian habitat may be supportable during periods of extended drought. However, this has yet to be modelled and supported by data.

5 CONSTRUCTION PROJECTS - LAS FLORES DRAINAGE

5.1 STP Compliance in Las Pulgas Drainage P-529(S)

This project, to be constructed during 1996, consists of a pipeline connecting the Las Pulgas Sewage Treatment Plant (STP 9) to a series of injection wells west of Interstate 5, buried in casemates under the Las Pulgas (Red) beach. This wastewater disposal program has been designed to comply with the Cease and Desist Orders (CDOs) issued by the San Diego Regional Water Quality Control Board (SDRWQCB), and was based upon the engineering feasibility study conducted by the U.S. Marine Corps in 1991.

Approximately 2.9 miles of pipeline will be constructed along existing roads which partially border riparian habitat (figure 3-7 of the BA). The existing sewage ponds will be rebuilt and lined. Additionally, the access road to the ponds will be repaired with an Arizona crossing to be installed where the road was cut by the January 1993 flood. Existing effluent chlorination stations will be relocated.

5.2 Las Flores Marsh Enhancement

The Las Flores Marsh is an artificially created wetland designed for wildlife habitat enhancement with emphasis on open water that may be used by waterfowl. Secondary goals are to provide nesting and breeding habitat for a diversity of wildlife, to develop an area for outdoor wildlife education, and to enhance habitat for sensitive and endangered species. This area will not be used for hunting. The marsh was created in 1971 when a series of levees was constructed to capture rising groundwater from a spring and develop part of the area as a marsh, in mitigation for the construction of I-5. Extensive flooding in 1980 damaged the existing levees, caused the marsh to lose its water holding capacity and resulted in damage to adjacent railroad tracks and a temporary cessation in railroad service between Los Angeles and San Diego . The marsh was reconditioned and expanded in 1986, however, water control structures are inadequate to retain water and the marsh currently has limited water holding capacity. Low water levels have resulted in the marsh becoming overgrown with emergent aquatic plants. A well has recently been drilled to enhance water delivery to the ponds once the water control structures are repaired.

Current management includes annual controlled burning in the fall to reduce the amount of emergent aquatic vegetation and to prevent a build-up of dead aquatic vegetation in the ponds, and annual road maintenance by mowing, grading, spraying to control weedy growth on the main road bed and to maintain access for fire control. The ponds were burned in the fall of 1992 and 1993. Future plans include repair of the water control structures, enhanced open water for waterfowl and construction of educational displays and a nature trail with bird observation blinds. Displays will include four interpretive plates (3' x 4') that were developed by interpretive staff at the USFWS regional office. Long term goals involve a permanent self-guided facility that will be regularly utilized by local schools, conservation groups, military and civilians. A docent program will be established and this area will be placed in the Watchable Wildlife Program.

6 CONSTRUCTION PROJECTS -SAN ONOFRE DRAINAGE

6.1 STP Compliance in San Onofre Drainage P-527N

This project is part of the overall upgrading of Camp Pendleton sewage systems discussed in section 3.5.3 of the BA.

The proposed project, stated to begin during the fall of 1995, consists of the construction of a 5.7 mile pipeline that will connect the Horno Sewage Treatment Plant (STP 10) to the San Onofre Sewage Treatment Plant (STP 11), then continue west to 12 infiltration ponds adjacent to Interstate 5 near San Onofre Creek (figure 3-14). The project will relocate the effluent discharge points from the STP's to the infiltration ponds. A pump station will be constructed at the San Onofre STP and the pipeline route will be alongside Basilone Road for most of its length. This wastewater disposal program has been designed to comply with the Cease and Desist Orders (CDOs) issued by the San Diego Regional Water Quality Control Board (SDRWQCB), and was based upon the engineering feasibility study conducted by the U.S. Marine Corps in 1991.

The 12 new infiltration ponds will vary in size from 1-5 acres and cover approximately 30 acres. Dikes and roadways associated with the ponds will cover an additional 10-15 acres. The existing effluent chlorination stations will be relocated from the present sewage ponds to the treatment plant.

Periodic maintenance of the ponds includes monthly herbicide application to the pond edges to control vegetation, monthly scraping to remove fine sediment (desilting), and annual deep ripping of the pond bottoms to maintain an adequate infiltration rate.

In order to compensate for the adverse impacts to wildlife habitat, disturbed habitat will be returned to its original condition. Habitat that is permanently lost will be compensated through an approved habitat enhancement program.

7 CONSTRUCTION PROJECTS - SAN MATEO DRAINAGE

7.1 STP Compliance in San Mateo Drainage P-529(N)

The proposed project, slated for 1996, consists of the construction of a 2.25-mile pipeline from the San Mateo Sewage Treatment Plant

(STP 12) to a 60 acre infiltration pond complex in the lower San Mateo basin near Interstate 5 (figure 3-6 of the BA). The existing sewage ponds at STP 12 will be converted to lined storage ponds. The existing effluent chlorination stations will be relocated. This wastewater disposal program has been designed to comply with the Cease and Desist Orders (CDOs) issued by the San Diego Regional Water Quality Control Board (SDRWQCB), and was based upon the engineering feasibility study by the U.S. Marine Corps in 1991.

8 CONSTRUCTION PROJECTS - SAN LUIS REY DRAINAGE

8.1 Fire Equipment Road Crossing at Pilgrim Creek Dam

A 14 foot-wide rock and gravel roadway will be constructed across Pilgrim Creek at the base of Pilgrim Creek Dam. The roadbed will be constructed of packed earth and will support heavy trucks and dozers used for fire suppression. The roadbed will be able to withstand overflow from the dam spillway without eroding. Large trucks, dozers, excavating and grading machinery will be used during construction.

8.2 Sewage Effluent Discharge Pipeline from STP's in Areas 14 and 17 to City of Oceanside (San Luis Rey) STP

A sewage effluent pipeline is to be constructed from STP 1 in the 14 Area along an existing unimproved road which follows Pilgrim Creek to STP 2 near the Rodeo Grounds in the 17 Area. After leaving STP 2, the proposed pipeline route crosses approximately 330 feet of riparian woodland habitat, then runs westerly along an unimproved road to Windmill Canyon. From there it will go south along the edge of the golf course and down Windmill Canyon to the City of Oceanside's San Luis Rey STP (figure 3-15 of the BA). The pipeline will pass the edge of a wetland at the Camp Pendleton boundary.

9 RECREATIONAL PROGRAMS

Recreational programs at Camp Pendleton consist of a variety of activities. Those occurring in and near riparian and estuarine areas are hunting, fishing, hiking, and camping activities. These activities have occurred on Camp Pendleton since the creation of the installation. These activities provide recreational opportunities for thousands of active duty military personnel, their dependents, and the general public.

9.1 Hunting Program

Camp Pendleton offers waterfowl, small game, and deer hunting to active duty military, retired military, civilian personnel, and general public. Hunters are required to physically check in and out with the Base Game Wardens before and after hunting on the Base. Hunting seasons and bag limits are determined by the California Department of Fish and Game.

9.1.1 Waterfowl Hunting

Waterfowl hunting occurs in the Santa Margarita River and Estuary, French Creek Lagoon, and other ponds on Base. By federal law, all waterfowl hunting must be done with steel (non-toxic) shot. Camp Pendleton provides the only coastal waterfowl hunting opportunity remaining in southern California. Waterfowl hunting opportunities on Camp Pendleton are extremely limited. Use is frequently limited by existing water conditions in the ponds and river. Hunters are further limited by the number of hunters allowed access to any one blind or area. Hunters are not authorized to cut vegetation or excavate for blind construction. The waterfowl season consists of two different hunting periods in the months of October through January. The Base further restricts waterfowl hunting to weekends, holidays, and Wednesdays before 0730 or after 1630.

Hunting in the Santa Margarita estuary is a long standing tradition on Camp Pendleton. Up until the mid-1980's, hunting occurred from as many as 12 fixed blinds in the marsh. Subsequent to that time, hunting in the estuary has been authorized from non-motorized boats only in order to minimize damage to wetland habitats. The only authorized access to the estuary for hunting is from under the Interstate 5 bridges. Hunters must hunt from their boats and may only leave their boat to retrieve their decoys and birds taken. A maximum of four boats are allowed in the estuary at any one time, with each boat authorized a maximum of 3 persons.

Hunting at French Creek Lagoon is limited due to water availability but at no time supports more than two blinds and a maximum of two hunters per blind. Hunting further inland occurs at selected infiltration ponds in riparian habitat, upland ponds, and along the Santa Margarita River. At ponds, waterfowl hunters must hunt from fixed blind locations. Access to each blind area is limited to two hunters per blind. In the Santa Margarita River itself, hunting is allowed from the Stuart Mesa Road Bridge up to 22 Area and then from the Base hospital up to the Base boundary. Access to the river is limited to four hunters in the lower zone and four hunters in the upper zone. Hunting in these areas may be "jump shooting" or by decoying.

9.1.2 Other Hunting Programs

Small game and deer hunting occurs throughout the undeveloped areas of Base which do not have the potential to contain unexploded ordnance. Ground squirrel (*Spermophilus beechyi*) hunting is held year-round; rabbit (*Sylvilagus* spp. *and Lepus californicus*) from July through January; mourning dove (*Zenaida macroura*) from September through December; California and mountain quail (*Callipepla californica* and *Oreotyx pictus*) from October through January; band-tailed pigeon (*Columba fasiata*) in December; and mule deer (*Odocoleus hemionus*) hunting in October and November.

9.2 Fishing Program

Camp Pendleton has both a surf-fishing and freshwater fishing program. Freshwater fishing is limited to active duty military, retired military, and civilian employees of Base. Surf-fishing is available to both military and civilian personnel.

9.3 Camping and Hiking Programs

Campground facilities are located at Del Mar and San Onofre Beaches. Undeveloped camping is permitted on the bluffs at Cockleburr Beach and on Red Beach. Military personnel and civilian employees of Camp Pendleton are permitted to hike aboard Base in maneuver areas not in use for military training.

10 ECOSYSTEM CONSERVATION PROGRAM

10.1 Overview

The Department of Defense has embraced "ecosystem management" as its tool for conserving natural resources. The BA states that in a memorandum of August 8, 1994, concerning implementation of ecosystem management in the Department of Defense, the Deputy Under Secretary of Defense (Environmental Security), Ms. Sheri W. Goodman, promulgated the following policy statements:

> Ecosystem Management is the basis for future management of DoD lands and waters. It will blend multiple-use needs and provide a consistent framework for managing DoD installations, ensuring the integrity of ecosystems.
>
> Ecosystem management is a goal-driven approach to environmental management at a scale compatible with natural processes, recognizes social and economic viability within functioning ecosystems, and is realized through effective partnerships among private and government agencies.
>
> Ecosystem management is a process that considers the environment as a complex system functioning as a whole, not as a collection of parts, and recognizes that people and their social and economic needs are an integral part of the whole.

In applying the principles and guidelines for DoD ecosystem management, military installations will:

> Develop a vision of ecosystem health. Existing natural resource, social, and economic conditions should be factored into the vision;
>
> Develop coordinated approaches to work toward ecosystem health. Since ecosystems rarely coincide with ownership and political boundaries, cooperation across ownerships is an important component of ecosystem-based management;
>
> Maintain and improve the sustainability and native biological diversity of ecosystems;
>
> Support sustainable human activities. People and their social, economic, and security needs are an integral part of ecological systems, and management of ecosystems depends upon sensitivity to

these issues;

Use benchmarks to monitor and evaluate outcomes and establish milestones to ensure accountability.

The Bases conservation program starts with recognition of Camp Pendleton's military mission. In fact, the conservation management

plans assume that only through continuance of that mission will the objectives of the plans be accomplished.

The conservation program also proceeds with recognition of the following biological principles: (1) ecosystems are dynamic by nature; (2) the functioning of ecosystem components operate at different rates; (3) all components are interrelated; (4) the ecosystem is a complex, dynamic system functioning as a whole, not as a collection of parts; and (5) ecosystem integrity may be disrupted by excessive "interference" of any single component.

The Base, in establishing programmatic instructions, will use these guidelines for military training, facility and range maintenance, recreation, and new project planning. This approach will be used to develop prudent and reasonable alternatives, which seek to avoid and minimize impacts to species and their habitats and maintain ecosystem integrity.

The Base conservation programs were developed to maintain and improve the sustainability and native biological diversity of the riparian, estuarine and beach ecosystems, while supporting MCB Camp Pendleton's mission of training Marines. The Marines intend that the program provide a comprehensive framework for assuring the consistent management of the Camp Pendleton ecosystems.

The thrust of the conservation program is to manage habitat on an ecosystem basis. Benchmarks will be established to monitor and evaluate the integrity and functioning of the ecosystems aboard Camp Pendleton. Specific habitat and species goals will be established and aimed at contributing to threatened and endangered species recovery. Based on periodic assessments, the program calls for management objectives and strategies to be modified to meet changing circumstances and requirements.

The program will depend on the development of formal and informal partnerships among private and government agencies to achieve its goals. It is based on the assumption that without such partnering the integrity of the ecosystems cannot be maintained. The plan further assumes that successful partnering will not happen without each party respecting the legitimate needs of the other.

10.2 Integration With Regional Conservation Planning

The MCB Camp Pendleton conservation program depends on its integration with regional conservation planning efforts. The Base

acknowledges the Service's broader role in the regional planning process and expects the Service to be its advocate in this arena. The Base assumes that the Service will view the Base's ecosystems in a ecoregional context, setting appropriate goals for the subareas thereof. This means that the responsibility for conservation of wildlife in the southern California coastal ecoregion does not fall solely on the MCB Camp Pendleton. The Base's conservation program expects that the Service, in its oversight and wildlife advocacy role in the region conservation planning process, will promote the distribution of information and consistent application of Section 7 and Section 10 procedures to foster species recovery throughout the ecoregion.

10.3 Management Activity Funding

The conservation program is premised on the understanding that funding and achievement of the plan's goals are interrelated with assuring and enhancing the on-going maintenance and flexibility of the Base's military mission. Currently funding for management activities aimed at the conservation of the Base's ecosystems derive from 1) agricultural leases and resource utilization programs and 2) new projects. In the past, policy has resulted in single project related, on-site, in-kind mitigation measures. This focus did not promote an ecosystem approach to resource management. This plan promotes a policy that will tailor individual project mitigation to the needs of the ecosystem. In addition, this plan recognizes the Service's proposal to assume (see conservation recommendations) some of the costs associated with the conservation program by in-kind resources. This is intended to increase the flexibility of Camp Pendleton to devote more effort towards the ecosystems goals previously established, and in turn enhance its operational flexibility. However, this approach is tempered in light of the current legislative proscription, under the Anti-Deficiency Act, from obligation of funds prior to Congressional authorization. Should this proscription be changed or legislation enacted that addresses the challenge of long-term funding for recurring ecosystem maintenance and enhancement requirements, Camp Pendleton and the Service will reexamine the current funding and management strategies aimed at achieving the program goals.

10.4 Ecosystem Boundaries

Camp Pendleton recognizes that the ecosystem habitat's observe no specific delineation, tending to merge together in a very fluid and continuous manner, and that whatever ecosystem boundaries it

designates are artificial. However, to facilitate the consistent mapping, monitoring, assessment and other management activities for each ecosystem, the following artificial boundaries will be used. The **riparian ecosystem** aboard Camp Pendleton will be comprised of those lands lying within the 100-year flood plain of the drainages flowing through the Base to the estuary and beach systems at the stream/river mouths junction with the Pacific Ocean. The **estuary ecosystem** will consist of those coastal areas and associated salt/fresh water marshes between the head of tidal action and the low tide line at the beach , which support unique estuarine species. The beaches under consultation are the coastal beaches with associated dune systems which border estuary and riparian regions of the Base and along the coast.

10.5 Programmatic Instructions

The Base has incorporated into the plan a system of "Programmatic instructions" that will be used to avoid and minimize adverse impacts to the ecosystem. If adverse impacts cannot be avoided, appropriate compensation procedures will be implemented, per sections 1.11.5.2 and 1.12.4.3. Activities will be scheduled during the non-breeding season where possible. Military training units will follow guidance given in the Programmatic Instructions to avoid incidental take and adverse impacts. Construction sites will be selected to impact the least amount of riparian and estuarine/beach habitat possible.

10.6 General Goals

Camp Pendleton has proposed to maintain habitat acreage goals and species population numbers outlined under the Riparian Conservation and Estuarine/Beach Conservation Plans in the BA. Additionally, the Marines propose to implement enhancement actions specified within these Conservation Plans.

11 RIPARIAN ECOSYSTEM CONSERVATION PLAN

This riparian ecosystem conservation plan is designed to maintain and enhance the biological diversity of the riparian ecosystem on MCB Camp Pendleton. The conceptual approach behind this conservation plan is to sustain and restore riparian ecosystem dynamics so that natural plant and animal communities on the Base are sufficiently resilient to coexist with current and future military training activities.

The success of this plan will be primarily measured by the abundance and distribution of endangered endangered species and an increase in ecosystem health and value.

The plan identifies the major riparian habitats and quantifies the baseline (as present in 1994) acreage for each. The plan also assigns values to habitat types based on their suitability for currently listed threatened and endangered species. These values were qualitatively developed based on information related to the distribution and abundance of sensitive species and what is currently known about their life history requirements.

The proposed riparian ecosystem conservation plan demonstrates a commitment to promote an increase in the quantity of riparian

woodland and riparian scrub habitat throughout all the Bases watersheds, beyond the baseline established through the existing Santa Margarita River Memorandum of Understanding (MOU). Further, it promotes the maintenance of the open water/gravel areas and marsh areas within the baseline. Conservation efforts will be focus on the eradication of exotics from various habitat categories and conversion of this acreage to riparian woodland, riparian scrub or open gravel areas in pursuit of the goal of promoting growth in sensitive species (primarily vireo, flycatcher and arroyo toad) populations.

11.1 Background

Throughout the recent past, the Base and the Service have collaborated in protecting riparian habitats from the impacts of many types of activities. Much of this collaboration was based on the Santa Margarita River MOU related to the least Bell's vireo. This MOU provided protection for this species through the Bases commitment to maintain 1200 acres of suitable habitat in the Santa Margarita River Basin for least Bell's vireo. This resulted in the *de facto* establishment of an endangered species management area on the Base that was largely off-limits to military training. This policy of avoidance, in conjunction with an aggressive monitoring and cowbird control program, has led to a dramatic increase in the least Bell's vireo population on Base. The increasing vireo population in the Santa Margarita River basin (the focus of the MOU), has overflowed into other drainages on the Base that were not addressed in the MOU.

11.2 Goals

The primary goals of the riparian ecosystem conservation plan are to:

11.2.1 Base Management

1) Facilitate greater latitude in conduct of training activities;

2) Provide a framework for consistency in mitigation related to current and future riparian impacts resulting from Base activities;

3) Preclude the need for designation of critical habitat and supersede the existing least Bell's vireo MOU;

4) Establish partnerships for ecosystem conservation. Conduct enhancement activities and studies off-Base that benefit regional habitat conservation. Studies (both on and off Base) will also be used to guide habitat enhancement. The Service will continue to be MCB Camp Pendleton's advocate on a regional basis.

11.2.2 Ecosystem

1) Provide a framework for managing riparian habitats from an ecosystem perspective;

2) Supersede the single-drainage focus of the MOU by explicitly promoting the maintenance and enhancement of riparian habitats Base-wide;

3) To eliminate Arundo (and other exotic riparian species) on Base in partnership with jurisdictions upstream;

4) Provide for viable riparian corridors;

5) Provide for largely unimpeded hydrologic and sedimentary floodplain dynamics so that the physical template is available to support the maintenance and enhancement of biota throughout the Base;

6) Maintain natural flood plain processes and area extent by avoiding and minimizing the further permanent loss of floodplain habitats. As a federal entity, the Base is obligated to adhere to Executive Orders 11988 and 11990 of 1977 concerning floodplain development and maintenance of ecosystem integrity;

7) Flood regimes on Base will be maintained to as close to natural a condition as possible. Artificial influences on flooding regimes shall be avoided and minimized to the maximum extent possible, necessary to protect life and property;

8) Stream and river flows needed to support riparian (and estuarine) habitats shall be maintained to the extent practicable. Riparian water quality and quantity shall be

in conformance with approved Regional Water Quality Control Board basin plans. The Service will support the Base by monitoring upstream water withdrawals and discharges, to enable maintenance of a viable water balance within the watershed riparian ecosystems both on and off of the Base;

9) Groundwater levels shall be monitored and basin withdrawals managed to avoid loss and degradation of habitat quality, to the extent practicable. Where vegetation monitoring programs demonstrate effects on habitat, compensation will be implemented, based on the best available hydro-geochemical and biological modeling available. The Base will not be penalized for upstream development, use and their (upstream)over-withdrawals from the Basin;

10) Promote land conservation practices to effectively reduce unnatural sedimentation and siltation resulting from the activities on Base. The Service will promote same with upstream users in the basins that flow through Camp Pendleton.

11.2.3 Habitat

It is Camp Pendleton's intent to manage riparian habitats to preclude long-term damage and degradation. Habitat management will continue toward exceeding the habitat goals established under this plan. The Base seeks to:

1) Manage native vegetation to promote optimal community succession for ecosystem integrity with focus on sensitive species. Native riparian plant communities shall be maintained by natural processes and not be artificially manipulated, except as needed to restore depleted natural resources, or where areas are isolated from natural dynamics of the ecosystem;

2) Promote connectivity of native riparian habitats through project avoidance of currently constrained areas and enhancement procedures;

3) Enhance the value of the ecosystem by targeting mitigation towards eradication of exotic plant communities (*Arundo* and *Tamarix* spp.) and promotion of successional stages of riparian scrub and riparian woodland habitat;

4) Eliminate/control exotic plants whenever practical, including after flood, fire, construction, or other disturbance. Control existing exotic vegetation by: aerial or ground herbicide application followed by cutting or, cutting followed by herbicide application. Additional herbicide application during the original treatment growing season plus herbicide treatment of regrowth for an additional 2 growing seasons;

5) Prevent new weed introductions in riparian zones and to control/eliminate aggressive invasive exotic plants already established on Base. The Marines are willing to mitigate for projects on Base through removal of exotic vegetation off Base;

6) Restore areas to their original condition after disturbance. A combination of exotic vegetation control and vegetation management (including replanting if necessary) that will permit native species to regenerate. This method is to be implemented on areas which are temporarily disturbed during project construction or by other temporary impacts such as fire damage. Compensation program for temporary impacts, exclusive of those effects resulting from fires, shall include exotic plant control measures such as weeding and monitoring of affected areas for 5 years, in addition to compensation per section 1.11.5.2. Whenever practical, the original topsoil will be restored to areas of native vegetation which have been disturbed by construction;

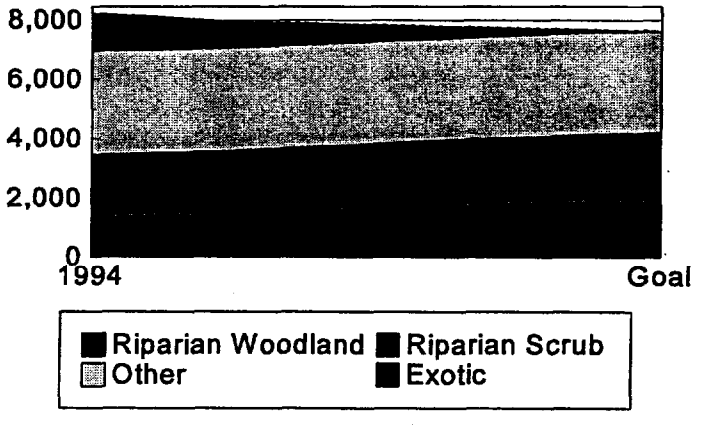
7) Minimize occurrence of unnatural fires in riparian zones caused by Base activities. Riparian zones subjected to unnatural fires shall be managed for improvement of native habitat values and prevention of soil erosion. This should mainly include the immediate control of invasive exotic species as appropriate. However, controlled burns, as part of MCB Camp Pendleton's Fire Management Plan, are essential to preventing runaway destruction of significant quantities of riparian habitat;

8) Conserve habitat assigned to "Base" and "Bank" categories;

9) Distribute vireo quality habitat across all Basins, while maintaining the maximum amount of habitat per the spirit of the MOU;

10) Achieve the riparian ecosystem habitat goals depicted in Figure 1 below.

Figure 1. Riparian Habitat Goals



11.2.4 Species

1) Achieve greater biological diversity and distribution of sensitive species populations in the three other principal drainages(San Mateo, San Onofre, and Las Flores) on the Base;

2) Promote long-term increase in singing male vireos beyond the 300 singing males stipulated in the MOU and flycatchers beyond the 22 singing males detected during the 1994 Base survey within ecosystem through continuation of Base management efforts. The vireo population on Camp Pendleton has previously increased significantly because of the Base's

commitment to reduce activities in riparian habitat during the breeding season and trap brown-headed cowbirds in the lower Santa Margarita River Basin. The Base will continue to minimize impacts to riparian habitats through use of programmatic instructions to guide activities and through control brown-headed cowbirds on all drainages;

3) Establish self-sustaining populations of listed species that require little human intervention for maintenance. Animal Damage Control (ADC) efforts will be focused toward management of "problem" species and minimization of the disruption of natural native animal population dynamics;

4) Minimize periods of excessive continuous noise levels (an average, hourly, continuous noise level above 60 DBA L_{eq} as measured over the entire daylight period) to which sensitive species are subjected;

5) Minimize effect of direct and indirect night time lighting in riparian areas (exclusive of ongoing night firing activities associated with existing range and training usage) year round;

6) Promote increased arroyo toad populations in watersheds, where found, through perpetuation of natural ecosystem processes and programmatic instruction application for avoidance and minimization of impacts;

7) Evaluate habitat suitability for potential reintroduction of red-legged frog;

8) Examine Base for habitat qualities necessary to support steelhead runs and determine feasibility of establishing such runs.

11.3 Riparian Ecosystem Baseline

11.3.1 Habitat Components

Riparian Woodland: characterized by dense, broad leafed, winter-deciduous riparian thickets, with greater than 70% constituted by several species of willow, including Gooding's (Black) willow (*Salix goodingii*), sandbar willow (*S. hindsiana*), and arroyo willow (*S. lasiolepis*). Other species that may be present are scattered individuals of Fremont's cottonwood (*Populus*

fremontii), oaks (*Quercus* spp.), and California sycamore (*Platanus racemonsa*). This habitat was once extensive along major rivers of coastal southern California, but its extent has been greatly reduced by entities exclusive of MCB Camp Pendleton, urban flood control, agriculture and development (Holland, 1986). This habitat is crucial for support of three federally endangered species, least Bell's vireo, the southwestern willow flycatcher and the arroyo southwestern toad. Under a habitat value ranking system, this habitat is assigned the numerical score of five (5) for comparison to other habitat types, in recognition of its principle use by currently listed species.

Riparian Scrub: characterized as being dominated by mulefat (*Bacharris glutinosa*), and often represents an early stage in the establishment of cottonwood- or sycamore-dominated riparian forests or woodlands (Holland, 1986). Other characteristic species include Mexican elderberry (*Sambucus mexicana*), sandbar willow, arroyo willow, and stinging nettle (*Urtica holosericea*). This habitat type is considered an early succession stage which will grow to riparian woodland, eventually, given the right conditions ecologically. The least Bell's vireos and southwestern willow flycatchers use this habitat for foraging and, in the more well-developed (mature) stands, for nesting. Under the habitat ranking system this habitat is assigned a score of three (3).

Open Water/Open Gravel[2]: encompasses non-vegetated or very sparsely vegetated areas. Included here are sand and gravel washes, mud banks, and open water. This habitat type may be used by least Bell's vireos and southwestern willow flycatchers when it is within close proximity of riparian habitats supporting these species. This habitat may be used by arroyo southwestern toads when sandy or gravely substrates are present. Assigned a habitat ranking system value of four (4), due to its utility to the arroyo southwestern toad.

Freshwater Marsh[2]: wetlands which are permanently flooded by standing freshwater lacking a significant current (Holland, 1986). Characteristic species include woolly sedge (*Carex lanuginosa*), yellow nutsedge (*Cyperus esculentus*), cattail (*Typhia* spp.), bulrush (*Scirpus* spp.), and southern mudwort (*Limiosella aquatica*). The light footed clapper rail, if found aboard MCB Camp Pendleton, could be expected to utilize coastal areas of this habitat type. Juvenile and adult California least terns may use this community type for

[2]This habitat type is grouped under the category of "Other" in the accompanying figures.

feeding through the breeding season, when it is near their nesting areas. Least Bell's vireos and southwestern willow flycatchers will use this habitat type as foraging habitat when it is in close proximity to other riparian habitats. Assigned a habitat ranking system value of three (3).

Mixed Woodland: characterized by riparian woodlands containing less than 70% willows and low occurrence of exotic vegetation (giant reed and tamarisk). Plant species included in this community are sycamores, oaks, willows, and Mexican elderberry. Least Bell's vireos and southwestern willow flycatchers are not commonly found using this habitat type aboard Camp Pendleton, but areas with little understory vegetation may support arroyo southwestern toads. Assigned a habitat ranking system value of two (2).

Sycamore Grassland[2]: grasslands containing sycamore. Primarily associated with drier ephemeral washes and generally consists of a fairly open canopy. This habitat type is not expected to solely support any of the species of interest, but could be utilized to a limited extent when associated with other riparian habitats. Assigned a habitat ranking system value of two (2).

Grass-Forb Mix[2]: includes such species as the exotic, mustard (*Brassica* spp.), and sweet fennel (*Foeniculum vulgare*); annual grasses (*Bromus* spp., *Vulpia* spp., etc.), goldenbush (*Isocoma menziesii*), and others. This habitat type may be used by least Bell's vireos and southwestern willow flycatchers when it is within close proximity to riparian habitats supporting these species. Assigned a habitat ranking system value of one (1).

Arundo[3]: characterized as having greater than 70% giant reed. This exotic species has established itself in large stands along the watersheds of southern California and out competes native vegetation, thereby reducing habitat for several listed species. Assigned a habitat ranking system value of zero (0), as being unsuitable for listed species management efforts.

Tamarisk[3]: characterized as having stands of greater than 70% tamarisk. This habitat type, like giant reed is of no benefit to the targeted species and will be targeted for eradication as a high priority under any management mitigation efforts. Assigned a habitat ranking system score of value (0), as being unsuitable for listed species management efforts.

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[3]This habitat category is grouped under the category "exotic" in accompanying figures.

Mixed Willow-Exotic[2]: characterized as containing less than 70% willows with large percentages of exotic plants. Other plant species associated with this group include giant reed, tamarisk, Mexican elderberry and mulefat. This habitat may support the least Bell's vireo, southwestern willow flycatcher, and arroyo southwestern toad, but at lower densities than could be expected for "pure" stands of riparian woodland or well, developed mature riparian scrub. This habitat may be cleared of exotics under the riparian conservation plan mitigation compensation actions to upgrade it to a higher habitat quality. Assigned a habitat ranking system value of one (1), as it is of marginal utility to listed species.

Disturbed/Developed Lands: land on which the native vegetation has been significantly altered by agriculture, construction, or other land clearing activities is termed "neutral". Such habitat is typically found in vacant lots, roadsides, construction staging areas, and abandoned agricultural fields and is dominated by non-native annual and perennial broadleaf plant species. This habitat generally includes few native plant species that support the species of interest. Assigned a habitat ranking system value of zero (0), as being of no use to listed species.

11.3.2 Habitat Baseline

This was based on a photographic (1:12000) survey, digitized using the Camp Pendleton's Geographic Information System (GIS) and delineated by field surveys in 1994.

The riparian ecosystem was determined in 1994 to contain the mix of habitat types tabulated in Figure 2 and Table 1 below. This is considered the benchmark for initiation of ecosystem management. An update of Camp Pendleton habitat acreages will be accomplished using photographic analysis digitized to be compatible with the Camp Pendleton Geographic Information System within 3-years. Thereafter, photographic analysis concerning the status of habitat and changes in the habitat mix will be assessed every five years by the Base in partnership with the Service. The periodicity of such analysis may be modified, depending upon circumstances and when mutually agreed to.

Figure 2. 1994 Riparian Ecosystem Baseline

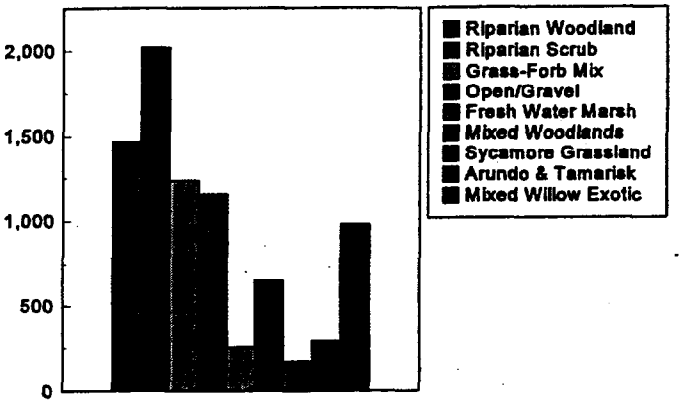


Table 1. 1994 Benchmark Survey for Riparian Habitat

Habitat Type	1994 Benchmark (Acres)	Percent of Ecosystem (%)	Habitat Ranking System Value (Points/Acre)	Ecosystem Health Value (Points)
Riparian Woodland	1467	15	5	7335
Open Water/ Gravel	1160	11.80	4	4640
Riparian Scrub	2020	20.60	3	6060
Fresh Water Marsh	254	2.60	3	762
Mixed Woodland	651	6.60	2	1302
Sycamore Grassland	172	1.80	2	344
Grass/Forb Mix	1236	12.60	1	1236
Mixed Willow Exotic	982	10.00	1	982
Arundo	283	2.90	0.00	0
Tamarisk	13	0.10	0.00	0
Disturbed/ Developed	1565	16.00	0.00	0
Total	9803	100.00		22661

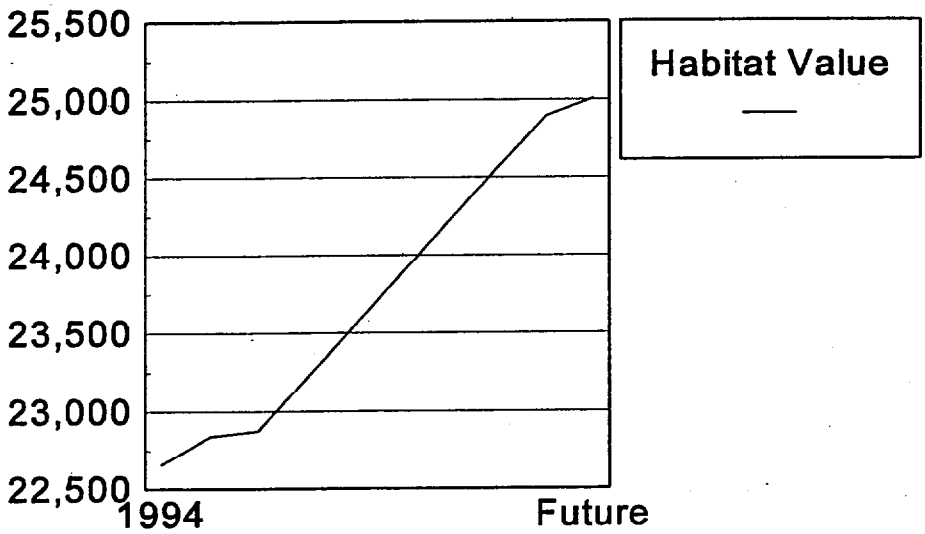
11.3.3 Increasing Ecosystem Value

The plan is designed to achieve an increase in relative value of the riparian ecosystem resulting from the gradual elimination of exotic plant species from the system as shown in Figure 3. The assumption is that if exotics are removed, the riparian plant community will offer more suitable habitats for listed species. The plan proposes a formula (Equation 1) for qualitatively measuring progress toward achievement of this goal. The purpose of the formula is simply to

provide a descriptive indicator. The numeric values assigned to each habitat type are not intended to denigrate the value of those assigned lesser value versus higher value. Habitat numeric value assessment is dependent upon the overall management objectives at a given point in time. At initiation of the ecosystem management plan these values were assessed based on the goal of enhancing Vireo, Flycatcher and Arroyo Toad populations within this ecosystem.

Equation 1: Ecosystem Value =5 x (riparian woodland acres) +
4 x (open area/open water acres) +
3 x (riparian scrub acres) +
3 x (freshwater marsh acres) +
2 x (mixed woodland acres) +
2 x (sycamore grassland acres) +
1 x (grass-forb mix acres) +
1 x (mixed willow exotic acres)

Figure 3. Ecosystem Value Growth



11.4 Management Accounting

The least Bell's vireo (LBV) MOU goal of 1200 acres of "suitable LBV habitat" will be used as a "Base" (conservation category) for Camp Pendleton's regional participation in recovery plans for the LBV, and other listed species which share similar riparian habitat. This 1200 acre "Base" consists of a mix of 600 acres of riparian woodlands habitat and 600 acres of riparian scrub habitat which the

Base intends to maintain and distribute in all of its basins in order to create corridors of suitable riparian habitat and encourage species distribution beyond the Santa Margarita River basin.

Currently, the Camp Pendleton has an additional inventory of 2287 acres of riparian woodlands and scrub habitat that is suitable for neotropical migratory birds such as the vireo and the willow flycatcher. Of these 2287 acres, the management plan initially designates 1000 acres (600 acres of riparian woodlands and 400 acres of riparian scrub) as an additional conservation bank ("bank"). The balance of habitat in this "bank" does not represent a habitat "line of credit", as compensation for actual or future destruction of the remainder of the habitat in the ecosystem. Rather, the "bank" balance serves as an entry argument in the calculation of mitigation ratios for compensation for unavoidable impacts resulting from current and future actions that may affect the remainder of the riparian ecosystem.

This "bank" was not created to be depleted, but rather to be used to determine/ generate in-place mitigation compensation ratios and to provide an accounting mechanism, which will graphically measure and depict the results and status of the Base's mitigation and management efforts within the riparian ecosystem. The "bank" is planned to be maintained or to grow, not to be reduced.

The plan has assigned the remaining 5038 acres of riparian ecosystem to a conservation ledger account designated as a "flexibility" account. The purpose of the "flexibility" account is to provide habitat areas (of all types) which may be used for facilitating the Base's mission. When impacts to the riparian ecosystem, resulting from activities and projects associated with the Base's mission, are unavoidable, these activities and projects will be targeted in habitat areas on the Base in the following order: (1) exotic dominated; (2) "other" riparian; (3) riparian scrub; and (4) riparian woodland habitats. Currently there are 1278 acres of exotic dominated habitat, 3473 acres of "other" habitat (habitat other than exotic, riparian woodland or scrub), 820 acres of riparian scrub, and 267 acres of riparian woodland habitat assigned to this "flexibility" account.

As projects or actions within the ecosystem are planned, Camp Pendleton intends to continue to emphasize avoidance and then minimization of impacts to the remaining habitat types within the ecosystem, primarily through the habitat management system above and through programmatic instructions. When impacts are unavoidable,

mitigation compensation will be targeted, consistent with Service guidance, to eradicate exotic plants in the riparian ecosystem. The assumption of the plan is that as exotic habitat is cleared, that area will gradually be converted into other habitat types of the riparian ecosystem. Riverine dynamics and vegetative succession result in habitats ranging from open pool/gravel habitats to riparian scrub and woodland type habitats. As the amount of riparian woodland and scrub habitats increase in the "flexibility" account,habitat may be added to the "bank" balance in order to facilitate lower mitigation ratios for Camp Pendleton.

This base-bank-flexibility arrangement is being considered in light of Camp Pendleton's past accomplishments in enhancing the value of the ecosystem for endangered species. It has also been designed to provide management direction and incentives.[4] It is intended that this plan will provide Camp Pendleton planning personnel with a tool to evaluate impacts and associated costs of future actions. It should encourage the targeting proposed actions at lower value habitat and discourage actions or impacts to that of higher value to sensitive species. Finally, Camp Pendleton intends that it will provide consistent mitigation compensation ratios for programmatic application in future informal and formal consultations between the Base and the Service.

In other words, it is intended that the in-place mitigation "bank" will provide incentives for conservation and exert "self-discipline" on Camp Pendleton in its application, so that the overall habitat value of the ecosystem progresses in an increasing fashion (Figure 3). Should an occasion arise, though not envisioned, that will necessitate use of the habitat assigned to the "bank", the Base will re-initiate formal consultation with the Service. The Commanding General of Marine Corps Base, Camp Pendleton is designated as the approving official for use of the in-place mitigation bank and flexibility categories.[5]

Camp Pendleton will develop a ledger to account for habitat quantities and impacts thereon. This ledger will start with the 1994 habitat baseline (Table 1 and Figure 2). An annual report,

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[4]Were this bank not in place, higher mitigation ratios would likely ensue (on the order of 5:1 for riparian woodland habitat, 3:1 for riparian scrub habitat, and 2:1 for other quality habitat).

[5]These actions will fall into the Class 1 category, as discussed in section 1.13, paragraph 1.13.4.

submitted by the Base to the Service, will provide a year-to-date balance based on debits associated with project impacts and mitigation actions (credits). As previously mentioned the ledger balances will be realigned based on the periodic riparian ecosystem analysis.

11.5 Plan Implementation

11.5.1 Avoidance and Minimization

The plan places a premium on avoiding and minimizing destruction or disturbance of sensitive species and their habitat. A major component of the plan is a bundle of "programmatic instructions" that are followed during the planning and implementation of projects and activities. These instructions are aimed at assuring the avoidance and/or minimization of adverse effects to sensitive species and habitats within the riparian ecosystem. The programmatic instructions direct that projects must first try to avoid impacts and then focus on minimizing unavoidable impacts. Siting priorities for projects that must occur in riparian habitat are in descending order: (1) exotic infested habitat, (2) "other" habitat, (3) riparian scrub, and (4) riparian woodland (from the "flexibility" account).

11.5.2 Mitigation

With respect to mitigating for unavoidable impacts, the plan focuses, at least initially, on exotic plant control because eradication of exotic invasive plant communities is considered crucial to maintaining the health of the overall ecosystem. The actual implementation of eradication efforts will be based on individual (future) project impacts or on-going activity impacts, and conservation enhancement programs, funds permitting in the latter case. It is expected that eradication operations will occur annually in significant, cost-effective blocks, and will not be tied to the timing or location of individual projects (other than their aggregate contribution to the annual total of mitigation requirements).

Compensation for activities that do not fit within the Riparian Conservation Plan (e.g. Riparian Resources Floodplain Goals) or Programmatic Instructions shall be subject to informal or formal consultation with the Service.

To determine the amount of mitigation compensation acreage associated with any project, the plan incorporates a sliding mitigation scale to enable determination of mitigation ratios. These ratios are keyed to the size of the current "bank" balance. This will exert further discipline in the exercise of land use management planning within the riparian ecosystem, through imposition of penalties (increasing mitigation ratios) for maintenance of a relatively small bank and incentives (decreasing mitigation ratios) for increasing the bank balance. In essence, the lower the available bank balance, the higher the mitigation compensation which will be required. Conversely, the higher the bank balance, the lower the mitigation ratio which will be used.

11.5.3 Permanent Impact Compensation

The plan proposes a set of exponential functions which will be used to determine mitigation compensation ratios. These are indexed relative to the acreage retained within the bank. With a bank balance of zero (0), mitigation ratios would be on the order of 5:1 for high quality; 3:1 for medium quality; and 2:1 for low quality habitat. Given the Base's current base and bank balance of 2200 acres of habitat, lower mitigation ratios on the order of 2.0:1 (two acres of arundo eradication for loss of 1 acre of habitat) for Riparian Woodland and Open/Gravel area habitat; 1.5:1 for Riparian Scrub, Freshwater Marsh, Mixed Woodlands, and Sycamore Grassland habitat; and 1.1:1 for all other habitat types (to include Arundo and Tamarix, are proposed by the plan (see Figure 5). The function was developed to significantly increase compensation requirements should the bank balance decrease from its current level and to gradually decrease mitigation ratios as the bank balance increases.

Mitigation compensation ratios, as depicted in Figure 5, will be accomplished for projects sited in the ecosystem habitat on the basis of the following equations:

Equation 2: (for riparian woodland and open water/open gravel area habitat type impacts)

$$CRH2(bb) = 3.40e^{-bb/450} + 1.60$$

Equation 3: (for riparian scrub, fresh water marsh, mixed woodland, and sycamore grassland habitat type impacts)

$$CRM2(bb) = 1.7e^{-bb/450} + 1.3$$

Equation 4: (for all other quality habitat type impacts[6])

$$CRL2(bb) = 1.00e^{-bb/450} + 1.0$$

where e = Inverse natural logarithm
where bb = In-place conservation bank balance

Appropriate mitigation compensation ratios are determined (based on the annual bank balance), mitigation compensation costs (in acreage) will be determined by the following equations:

Equation 5: (for riparian woodland and open water/open gravel

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[6]Although the Service does not generally consider habitat dominated by exotic invasive vegetation to be suitable for support of sensitive wildlife, compensation calculated using this function will also be applied to include *Arundo* and *Tamarix* categories of habitat, as compensation for loss of floodplain acreage.

habitat type impact)

$$Cost_{RW}=(Impact_{RW})\,CRH2\,(BB)$$

Equation 6: (for riparian scrub, freshwater marsh, mixed woodlands, and sycamore grassland habitat type impacts)

$$Cost_{RS}=(Impact_{RS})\,CRM2\,(BB)$$

Equation 7: (for other quality habitat impacts)

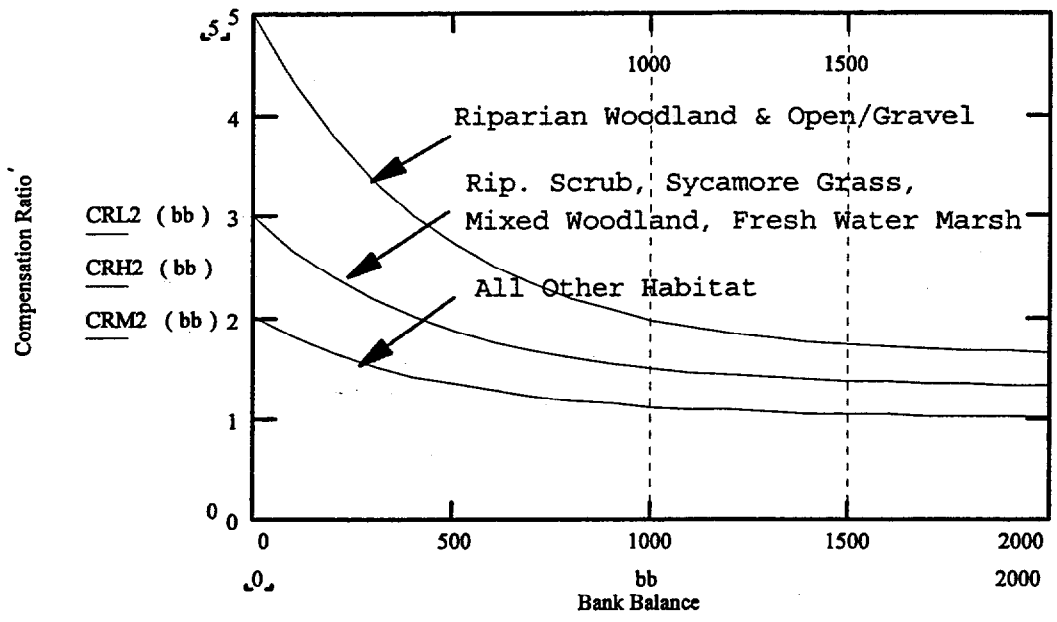
$$Cost_{Other}=(Impact_{Other})\,CRL2\,(BB)$$

The total compensation required (Equation 8) for permanent impact associated with a project will be the sum of the costs calculated through equations 5, 6, and 7.

Equation 8: (for total costs)

$$Compensation=Cost_{RW}+Cost_{RS}+Cost_{Other}$$

Figure 5. Mitigation Compensation Ratios



11.5.4 Temporary Impact Compensation

Temporary impacts are impacts associated with a project which do not result in the permanent removal of habitat from the ecosystem (impacts other than fire), but are temporary in nature (0-4 years). Compensation for temporary impacts will be in accordance with the following table (based on time related to vireo breeding season):

Table 2. Temporary Impact Compensation

Temporary Effect Period (Breeding Season [X] of Vireo)	Compensation Percentage of Permenent Effect Value (Of Equations 6, 7, & 8)
X < 1.0	0%
1.0 <= X < 2.0	25%
2.0 < = X < 3.0	50%
3.0 <= X < 4.0	75%
X => 4.0	100%

11.5.5 Alternative Mitigation Methods

The plan also incorporates some flexibility into its mitigation strategy by allowing up to 20% of future mitigation requirements to be fulfilled by conservation actions other than exotic plant control. These other actions will also promote the maintenance of riparian ecosystem integrity. This flexibility is not intended to reduce the scope of current conservation efforts on the Base.

In partnership with the Service or other entities, the Base also may elect to focus compensation actions elsewhere within the ecoregion that promote recovery efforts of endangered and threatened species or their habitat. Such off-base compensation efforts could occur with the caveat that species population and habitat goals continue to be met on Camp Pendleton.

The plan proposes that the expenditure of $12,000[7] for other conservation measures be considered comparable to performing an acre of exotic plant eradication. Such other measures considered to benefit wildlife and habitat in general would include: 1) cowbird trapping; 2) predator management; 3) fencing; 4) biological studies (as approved by the Service to fill voids in knowledge concerning species); 5) signs for conservation areas; 6) biological monitoring; 7) erosion control; 8) surveys of candidate species; and 9) habitat mapping. The mix of compensation measures proposed for any particular mitigation requirements will be based on the goal of achieving and maintaining a healthy riparian ecosystem.

11.5.6 Balancing the Habitat Ledger

The final phase of mitigation calculations is the task of balancing the books based on the actual mitigation transactions that have occurred during the previous fiscal year. The plan proposes to accomplish this in the following manner:

1) Debit the project direct impacts from the appropriate habitat accounts.

2) Credit the appropriate accounts with whatever habitat enhancement was accomplished.[8]

3) Determine appropriate non-exotic control compensation measures required to complement conservation plan goals (to fulfill the remaining 20% of compensation required).

11.5.7 Habitat Goals Through Time

Using the procedures in the preceding paragraphs, the plan assumes that over time the balance of habitat for the respective accounts will increase from the 1994 Baseline (Figure 6), successively (Figure 7), to the goal (Figure 8) whereby exotic plant communities have been eradicated from the riparian ecosystem (Figure 9).

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[7]In 1994 dollars or other mutually agreed upon index.

[8]Target eradication toward 80% (the minimum allowable amount) of the mitigation compensation acreage required (Equation 8) in the exotics category and subtract this amount from the exotics ledger. Transfer a "credit" of this acreage total to the appropriate habitat type created in either the Bank or Flexibility categories as management determines.

Figure 6. 1994 Ecosystem Habitat Ledger Baseline and Mitigation Strategy

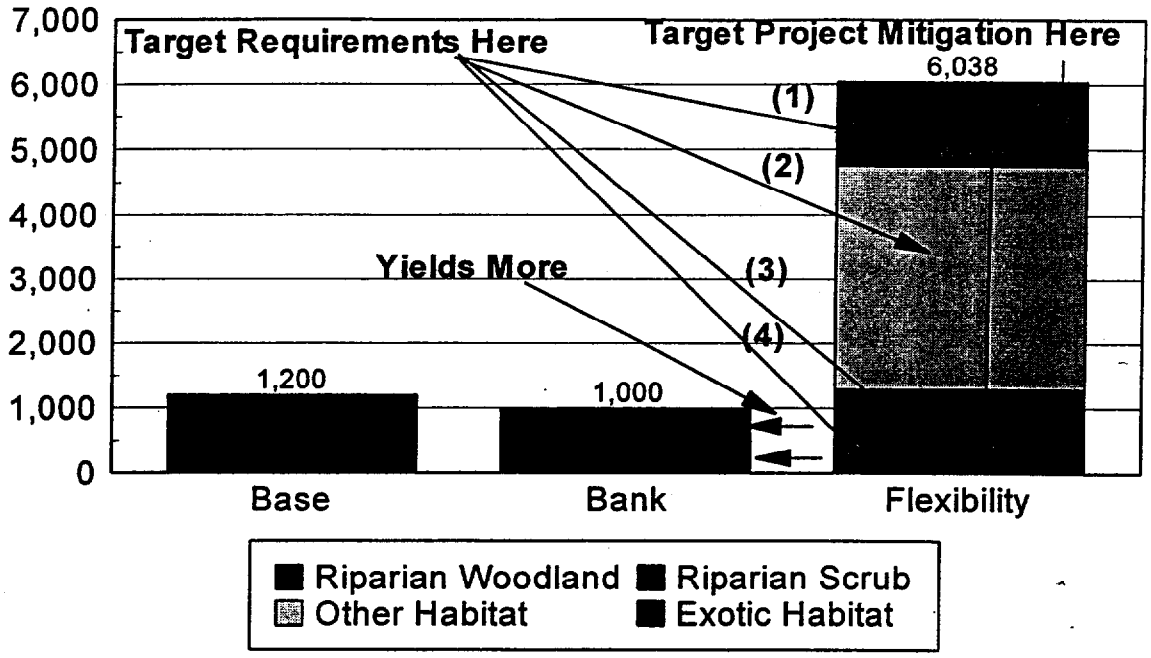


Figure 7. FY-2000, Ecosystem Habitat Ledger (Projected)

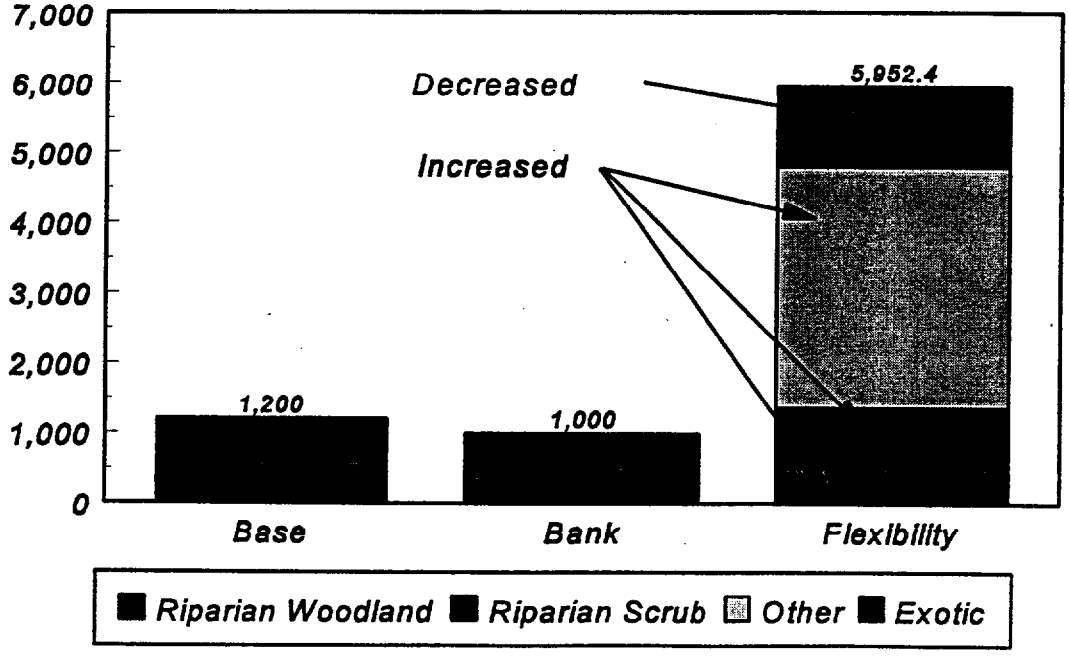
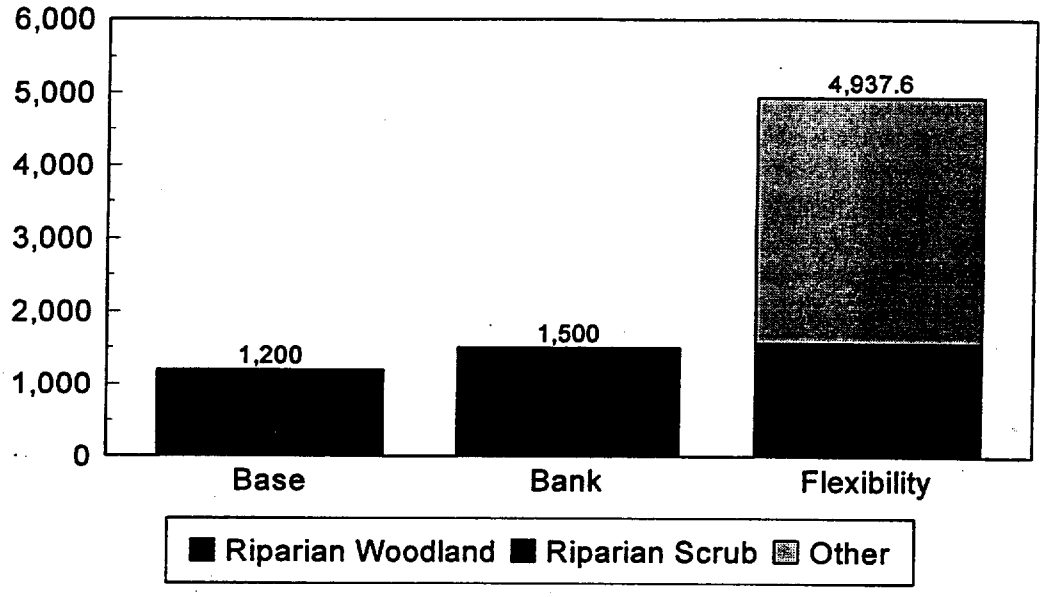
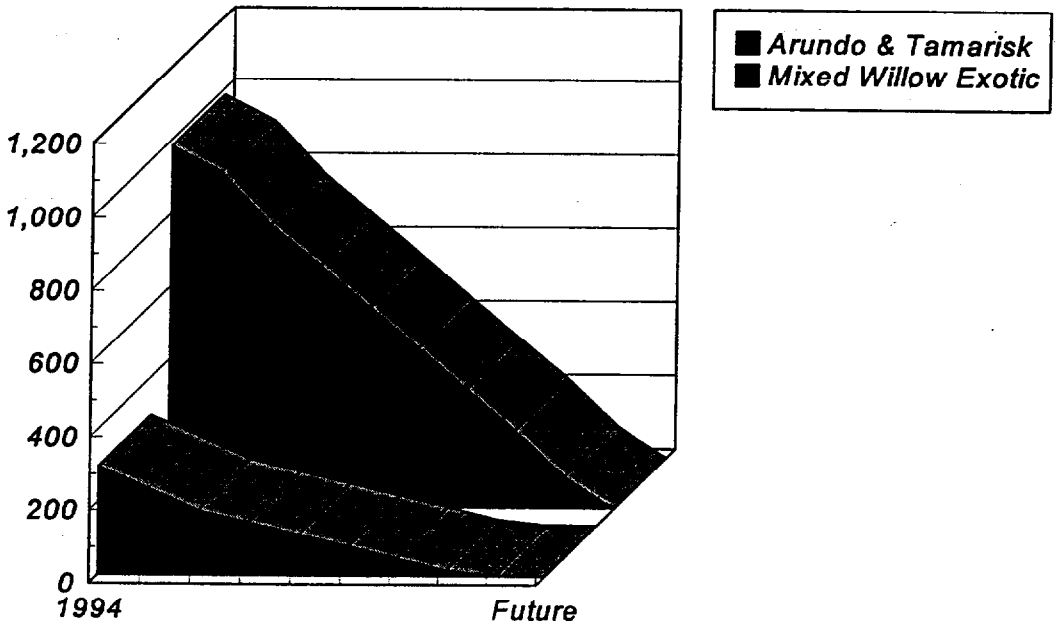


Figure 9. Exotic Habitat Eradication



11.5.7 Monitoring



Sound management of species and their habitats requires accurate and current data regarding their status and trends. In order to acquire and maintain this data, the plan proposes to:

1) Finish a two year herpetological inventory; identify additional toad sites. Use data from above surveys to establish long-term arroyo toad population/habitat goals in consultation with the Service.

2) Share all applicable digital GIS data for biological resource mapping on Base (existing survey, topography, vegetative layers, etc.) in with the Service.

3) Inventory the Bases riparian, esturary and beach habitat within 3 years of issuance of BO using aerial photography. Thereafter, the habitat inventory will be updated as necessary, but not more frequently than once every 5 years. However, the periodicity of such analysis may be modified to a more or less frequent basis depending upon circumstances and when mutually agreed to.

4) Continue ongoing surveys of listed species, provided funding remains available.

5) Pursue funding to conduct surveys/studies of candidate and other sensitive species to determine their status on Base.

11.6 Programmatic Instructions

The following programmatic instructions have been developed in order that Base on-going and planned actions will avoid and minimize adverse effects on listed and other sensitive species to the maximum extent practical.

11.6.1 General Instructions

1) All actions which?"take (develop)" habitat or degrade riparian habitat shall be compensated for pursuant to the program activity classifications identified in Section 1.11.14.

2) Avoid and minimize impacts as much as possible.

3) All activities shall comply with NEPA.

4) Conduct enhancement activities and studies that will benefit regional habitat conservation. Appropriate compensation credit will be given to the Base for these activities and studies.

11.6.2 Instructions for Military Training Activities

1) All units must follow FDRS.

2) Vehicle movement in riparian areas shall remain on existing roads.

3) Helicopters shall operate at an altitude in excess of 200 feet AGL over riparian areas except when landing or taking off between 3/15 and 8/31.

4) Helicopter use is to be minimized between 0600 and 1100 during the breeding season at the TALA.

5) Ground troop movements in riparian areas are authorized year round only on existing roads, trails & crossings.

6) Foot traffic shall remain outside of all fenced or posted sensitive areas during the breeding season. Foot traffic in the beach and estuary areas is authorized year-round outside fenced or posted areas.

7) No bivouacking or trenching is allowed in riparian areas.

8) No vegetation may be cut except exotic plant species, in consultation with AC/S,ES.

9) No engineering, grading, or filling activities in riparian areas without prior approval from AC/S,ES.

10) Small boats are authorized in riparian/estuarine areas outside breeding season.

11) Foot traffic associated with small boats activities is authorized in the river bed.

11.6.3 Instructions for Facilities Maintenance Activities

1) No tree trimming in natural areas during breeding season. Trimming of landscape trees may occur all year in compliance

with MBTA.

2) Tree trimming shall avoid entire trees except exotics or landscape plantings.

3) Exotic species shall be removed.

4) Tree trimming equipment shall be operated from roads only.

5) No maintenance vehicles shall operate in riparian areas without approval from AC/S,ES.

6) Trimming shall extend no more than 10 feet from communication/power lines.

7) Trimming for improved road safety shall extend no more than 10 feet from road edge.

8) No road/culvert repairs shall be scheduled during breeding season.

9) Water bars on roads and firebreaks are required to the extent practical.

10) Exotic vegetation shall be thoroughly dried and properly disposed.

11) Sediment runoff shall be contained on construction sites.

12) Proper erosion control on slopes shall be implemented.

11.6.4 Instructions for New Construction

1) NEPA planning and review process shall be followed.

2) New construction sites will be identified in following priority: (1) previously disturbed; (2) Exotic dominated habitat; (3) Other habitat; (4) Riparian Scrub, mixed woodlands, or sycamore grassland habitat; and (5) Riparian Woodland habitat. Impacts to Freshwater marsh and open water/gravel areas will be minimized to the extent practical

3) New construction sites will avoid already severely constricted riparian habitat.

4) Funding for habitat compensation will be identified as part of construction cost during planning process. To the maximum extent possible, funds for habitat compensation will be secured before contracts are awarded.

5) The NEPA process will be used to assess biological impacts.

6) Conservation goals addressing habitat protection shall be met.

7) Compensation formulae shall be followed.

8) No construction shall occur in occupied riparian habitat during the breeding season to the maximum extent practical.

9) No habitat shall be cleared during breeding season. Cutting or mowing will be used in place of blading or uprooting vegetation whenever practical.

10) Temporarily affected habitat will be treated for a minimum of five years for weed control; compensation is required for impacts extending beyond one breeding season.

11.6.5 Instructions for Recreation Activities

1) No motor vehicles are authorized off-road or off-trail.

2) No ORV, ATV, motorcycles or other vehicles are authorized in riparian areas except on existing roads.

3) Foot and vehicular traffic is prohibited from posted or fenced areas during breeding season.

4) No littering.

5) No cutting of vegetation.

6) No fishing with live bait fish or amphibians.

7) No gasoline powered motorized watercraft except on Lake O'Neill.

12 ESTUARINE/BEACH ECOSYSTEM CONSERVATION PLAN

12.1 Background

This estuarine/beach conservation program is designed sustain and enhance MCB Camp Pendleton's natural resources along its coastline emphasizing coastal lagoons and the Santa Margarita River Estuary. This includes conservation of listed species and their associated habitat, maintaining and enhancing the functionality and biodiversity of the Santa Margarita River Estuary, and the coastal lagoons located at Cockleburr, French, Aliso, Las Flores, San Onofre, and San Mateo Creeks. This will be done through continuation of the active management programs conducted by MCB Camp Pendleton and through application of the Programmatic Instructions contained herein, for the 319 acres of habitat associated with this ecosystem. Further, acreage assigned to estuary and beach areas will be managed to avoid future, permanent project impacts (other than transient training traffic or exercises) from construction. Permanent impacts to this habitat will be consulted on separately with the Service.

Entirely compatible with this objective is the support of Camp Pendleton's foremost mission--the training of Marines to defend the sovereignty of the United States. The philosophic approach behind this Conservation Program is to sustain and enhance estuarine and beach ecosystem dynamics, such that estuarine and beach communities on MCB Camp Pendleton are sufficiently resilient to withstand a continued array of disturbances and incursions occasioned by military training activities.

The dynamics of the estuarine and beach conservation plan are outlined in the context of the ecosystem goals, terms and conditions and conservation recommendations below. Within the land areas designated as management zones, programmatic instructions and minimization measures will be enforced to protect these areas from permanent intrusion or effects which will disrupt the balance which has been achieved between Marines pursuing training activities and threatened and endangered species residing in these areas. Protective fencing; warning signs; predator management; exotic vegetation management; monitoring of estuary salinity and tidal conditions are central tenets of the conservation program. Funding for future enhancement activities listed under the conservation recommendations, terms and conditions and reasonable and prudent measures will be actively pursued to promote recovery of the appropriate species. These activities have fostered a growth in the California least tern population over the years and with further study should promote the same in the western snowy plover population.

12.2 Goals

The overall objective of the estuarine/beach ecosystem conservation plan is to manage and protect the natural resources along the Base's coastline emphasizing coastal lagoons and the Santa Margarita River Estuary. This includes protection of listed species and their essential habitat, maintaining the functionality and biodiversity of the following focused management areas to be designated as: the Santa Margarita River Estuary, and the coastal lagoons located at Cockleburr Creek, French Creek, Aliso Creek, Las Flores Creek, San Onofre Creek, and San Mateo Creek.

The primary goals of the estuarine/beach ecosystem conservation plan are to:

12.2.1 Base Management

1) Facilitate greater latitude in conduct of training activities;

2) Provide a framework for consistency in mitigation related to current and future estuarine/beach impacts resulting from Base activities;

3) Preclude the need for the designation of critical habitat for the western snowy plover and other listed species;

4) Promote partnership with the Service for estuarine/beach ecosystem conservation in the region.

12.2.2 Ecosystem

Implementation of the following conservation strategies should maintain and improve the integrity of estuarine/beach ecosystems and support viable, expanding populations of sensitive species. The plan proposes to implement specific management practices for listed species, including the western snowy plover, in lieu of Federal designation of critical habitat.

1) Provide a framework for managing estuarine/beach habitats from an ecosystem perspective;

2) Maintain connectivity with riparian and upland ecosystems;

3) Promote natural hydrological processes to maintain estuarine

water quality and quantity in conformance with approved basin plans.

4) Minimize reduction or loss of upland buffers surrounding coastal wetlands;

5) Restore the dune system in the vicinity of the Santa Margarita Estuary following the guidance developed by The Nature Conservancy, as funds become available.

12.2.3 Habitat

It is Camp Pendleton's intent to manage estuarine/beach habitat to preclude long-term damage and degradation. Habitat management will continue toward meeting the following goals:

1) Maintain natural processes and areal extent of estuarine/lagoon and beach/dune areas by avoiding and minimizing the permanent loss of the habitat value of these areas

2) Maintain integrity of listed species' habitat.

3) Eliminate/control exotic plants whenever practical.

4) Maintain suitable tidewater goby habitat in the complex of lagoons associated with the creeks listed above

12.2.4 Species

1) Promote the growth of current tern populations over the entire SMR estuary (not only the North Beach colony) and at both Aliso Creek and French Creek Lagoons.

2) Maintain the integrity of the least tern nesting colonies.

3) Promote growth of current population of snowy plovers in the vicinity of the tern nesting colony sites.

4) Maximize the probability of a metapopulation persistence within the lagoon complex for tidewater gobies. The dynamic fluctuations in numbers of individuals associated with habitat types prone to episodic catastrophic events, such as drought and flooding, prevent the specification of precise population objectives.

12.3 Estuarine Ecosystem Baseline

The plan intends to conduct enhancement activities and studies that benefit regional habitat conservation, as funds and personnel permit. Appropriate compensation credit will be afforded to Camp Pendleton for such actions.

12.4 Plan Implementation

Existing management efforts for listed species conservation will be continued at these locations. Management Zones shall be established as follows:

1) SMR Management Zone: The beach area extending from southern edge White Beach (MG 594795) to the southern end of the SMR

Estuary delineated by the dirt access running seaward at the southern edge of the Estuary (MG 621758). This Management Zone shall encompass Cockleburr Canyon outlet and the Santa Margarita River Estuary extending east to Stuart Mesa Bridge. Habitats within this zone include least tern foraging areas; inter-tidal beaches (between mean low water and mean high tide) for snowy plover foraging; all nesting locations for the western snowy plover, California least tern, and light-footed clapper rail; salt pan; dune systems in nesting areas; salt marsh; mud flats; and all wetlands.

2) Other Management Zones: Habitats for listed species within the coastal lagoon systems of French, Aliso, Las Flores, San Onofre, and San Mateo watersheds.

12.4.1 Avoidance and Minimization

Programmatic Instructions are provided below which outline activities which are authorized in the Management Zones.

1) In the event nesting by California least tern or western snowy plovers should occur outside the traditionally fenced nesting areas within the management zones, individual nests and any young produced shall be afforded protection by posting and fencing around the immediate vicinity of the nest(s).

2) Prior to each nesting season an evaluation of vegetative cover shall be made at all nesting sites and any necessary vegetation control may be implemented utilizing herbicides or mechanical techniques prior to the breeding season. Enhancement of nesting areas decreases the likelihood of birds nesting outside the management zones.

3) In addition to signs posted at wetlands and nesting sites, the Management Zone will be posted in strategic locations including the Del Mar recreation area, atop the bluffs at Cockleburr Beach, beach access from the agriculture field just north of the North Beach least tern colony, the dirt road running along the southern and eastern portions of the Santa Margarita River Estuary, and on the beach ½ mile south of the LCAC ramp.

4) The Base is adopting and implementing all Programmatic Instructions described in the Biological Assessment, as

modified below, to regulate the operational, maintenance, and recreational programs in and adjacent to estuarine and beach habitats to help ensure that the impact of incidental take is avoided and minimized to the maximum extent practicable. Any activity not specifically addressed in the Programmatic Instructions or otherwise covered herein under the class system for future consultations, shall require concurrence from the Service to determine if impacts are offset by the ecosystem conservation plans described in this Opinion. If the proposed project is compatible with the objectives established in the ecosystem conservation plans described above, the Service shall approve the proposed action. Indirect effects for noise and dust are considered mitigated by the conservation plans.

5) Weather permitting, construction of fencing at California least tern nesting colonies shall be completed by 15 March. This will supersede term and condition 4 of the White Beach Biological Opinion (1-6-92-F-49) in order to accommodate the snowy plover. The conservation plan will be updated as recovery plans for listed species are published so that conservation efforts contribute to regional recovery goals.

6) All terms and conditions identified in the Biological Opinion 1-6-92-F49 will be implemented.

7) Tidewater goby populations on MCB Camp Pendleton will be monitored to determine if there are any impacts to gobies from relocation of the effluent infiltration ponds. Populations shall be surveyed to determine their status at least once every three years or as funding permits.

8) Conservation measures currently in place as a result of the LCAC FEIS will continue until completed, including the restricted status of the Santa Margarita River Estuary (with the exception of small boat raid operations up the river) and management of the designated Cockleburr Sensitive Area.

9) Protection measures.

- Signs will be posted at entrances (along assess roads or beaches) to all wetlands, nesting sites, and the management zones, to deter unauthorized entry.

- In addition to the permanent fence at the White Beach tern colony, a buffer shall be demarcated along the northern border of the colony during the breeding season with an additional barrier i.e., communication wire. This is especially necessary on the northern end of the colony where vehicular and troop movements will occur.

- A seasonal fence extension from the White Beach tern colony extending to the French Creek Lagoon shall be constructed.

- The chick fencing which is employed at the North Beach colony to protect least terns from vehicular traffic shall be breached in several locations on the eastern boundary. This will allow movement of flightless snowy plover chicks which have hatched inside the least tern

fencing to escape in order to reach foraging areas. Openings shall be placed according to nest distribution of snowy plovers within the fenced areas. Breaches shall be closed during monitoring or other activities in the colony which could potentially scatter least tern chicks resulting in the separation of siblings on both sides of the fence. Monitoring will be scheduled to avoid, as much as possible, periods of activity on the beaches adjacent to the colonies in order to minimize risk of tern siblings becoming separated by the fence. Chick barriers at White Beach shall be maintained open ended at French Creek Lagoon.

9) Non-native animal predators/competitor species that threaten listed species will be controlled.

10) All lighting in estuaries will be fully minimized year round. Indirect illumination from pyrotechnics may be used during the non-breeding season in accordance with the FDRS.

11) Information will be published by Base notices to Base personnel regarding sensitive species and habitat areas along the coastal areas.

12) The breeding/nesting season for the western snowy plover and California least tern shall be designated as 15 March - 31 August. The non-breeding season shall be designated as 1 September - 14 March for all activities authorized to occur outside of the breeding season.

13) Introduction of exotic vegetation into estuarine and beach habitats shall be controlled to the extent possible, and existing infestations will be targeted for suppression, with an ultimate goal of eradication. Priority will be placed on the control of Arundo, Tamarix, and iceplant. Primary emphasis will be on preventive measures for existing California least tern and western snowy plover nesting sites. Prevention of exotic plant invasion will be done by removing sprouting giant reed stalks which are deposited on the beach during winter storms whenever possible.

14) The dune restoration plan developed for Camp Pendleton by The Nature Conservancy will be implemented as funds become available.

12.4.2 Maintenance and Enhancement of Estuarine/Beach Ecosystem

These are management actions which should be implemented to maintain the ecosystem's ability to support listed species and may be implemented to enhance the estuaries and beaches of Camp Pendleton.

1) Manage estuarine zones to maintain wetland values of coastal lagoons.

2) Fence nesting areas.

3) Control predators.

4) Restore dunes within nesting areas.

5) Explore habitat enhancement techniques including: (a) deepening smaller estuarine lagoons, and (b) controlling and removing exotic plants and fish.

6) Continue annual fencing of least tern nesting colonies; construct of seasonal fencing; post warning signs at colonies; publish Base notices; monitor breeding activities (ICW LCAC FEIS funded monitors); study long term population trends; and manage nest predators at colonies.

7) Complete multi-year(3-5 year) study of breeding biology and affect of tern management on western snowy plovers with banding.

8) Monitor snowy plover breeding activity.

9) Protect last known nesting location of light-footed clapper rails (SMR).

10) Additional conservation activities included in the mitigative measures set forth in the LCAC FEIS, which are currently in progress and will continue until completed, include:

- Maintain restricted status to the Santa Margarita Estuary;

- Protection and management of Cockleburr Sensitive Area.

- Assure no loss of Belding's savannah sparrow habitat.

- Monitoring the breeding status of the least tern to determine effects of LCAC operation and facility construction.

11) Vehicle access to estuary is authorized for the following activities during the non-breeding season:

12) Removal of exotic plant species from the large sand deposition which occurred along the south bank of the river at eastern end of salt flats, to promote establishment of a nesting area for snowy plovers.

13) Transporting and distributing sand on the Salt Flats Island to enhance this nesting site, should funding become available.

14) Maintain occupied tidewater goby habitat as well as maintaining historic habitat locations for recolonization.

15) Natural regeneration of native vegetation shall be emphasized.

16) Use best management practices based on current site conditions to implement adaptive management.

17) Sites will be selected based on the following criteria:

- Previously disturbed areas;

- Beach areas outside Santa Margarita River Estuary and plover management zone;

- Beach areas within plover management zone;

- Santa Margarita River Estuary.

18) Specific instructions for enhancement techniques are contained in Enclosure 4 to the BO and Appendix J of the BA.

12.4.3 Mitigation

Activities that cause permanent destruction of wetlands and sensitive dune areas will require replacement in kind by enhancement of degraded components of the ecosystem in consultation with the Service.

12.4.4 Compensation

Programmatic Instructions will be used to avoid and minimize adverse impacts to the appropriate species and its associated habitat. When these instructions are inadequate, the Table 3 compensation procedures will be implemented to mitigate for habitat losses and other indirect adverse affects to the species. These compensation procedures will apply to new projects or changes to current activities that affect estuarine or beach habitats. Although there are no foreseen losses of estuarine or beach habitat on the Base, these compensation procedures are applicable as long as the estuarine conservation goals (habitat and species) for the sensitive species affected are being met.

Compensation for the appropriate habitat will be calculated by means of Equation 10:

Equation 10: Compensation Required (Acres) =

3 x (Nesting Habitat{Acres}) +
1.5 x (Foraging habitat {Acres})+
3 x (Dune Habitat {Acres})
2 x (Indirect Effect {Acres})

Compensation enhancement activities which may be applied, both on and off MCB Camp Pendleton, subject to the Services recommendation as the ecoregion manager, will be prioritized in descending order to be credited on the basis of $25,000 per acre of compensation required in accordance with Table 3.

Table 3. Compensation for Estuary/Beach Impacts

Bird Habitat	Tidewater Goby Habitat
Creation of nesting islands/new breeding colonies	Dredging of lagoons/new channels
Exotic Plant Control	Exotic fish control
Dune Restoration	Sedimentation traps
Predator control	Water quality monitoring

Warning signs/fencing	**Warning signs/marker buoys**
Studies	**Studies**

12.4.5 Monitoring

1) Water quality within the Santa Margarita River Estuary will continue to be monitored until estuary enhancement actions under the LCAC EIS are completed.

2) Oversee the Navy responsibilities in monitoring, minimizing, and determining impacts of the Landing Craft Air Cushion (LCAC) Facility at Camp Pendleton as identified in the Final EIS are carried out:

   - Watersheds need to remain healthy;

   - Natural hydrological regime of lagoons needs to be maintained or improved;

   - Marsh habitat adjacent to lagoons needs to be improved;

   - Maintain/enhance buffers surrounding wetlands;

   - Water quality in lagoons should be maintained or if necessary improved.

3) Least terns and snowy plovers shall be monitored at least biennially to determine number of pairs, hatching success, and reproductive success in order to assess the effectiveness of the conservation plan.

4) Survey tidewater goby populations and monitor their status every 3 years, or as funding is available.

5) Continue to permit access for clapper rail surveys by statewide survey efforts.

6) Conservation plan shall be updated as recovery plans are published so conservation efforts are consistent with recovery goals. The Base should participate in review of recovery plans to ensure compatibility with the Base's mission requirements.

12.5 <u>Programmatic Instructions</u>

The plan proposes instructions which activities are required to comply with to avoid and minimize impacts to estuarine/beach ecosystems and listed species.

12.5.1 General

1) All actions which develop/remove or degrade estuarine/beach habitat shall be compensated for pursuant to the program activity classifications identified in Section 1.11.14.

2) Avoid and minimize impacts as much as possible.

3) All activities shall comply with NEPA. Alternatives shall be fully considered.

4) Conduct enhancement activities and studies that will benefit regional habitat conservation. Appropriate compensation credit will be given to the Base for these studies.

12.5.2 Instructions for Military Training Activities

Troops

1) All training units using estuarine and beach areas shall be familiar with and follow the Fire Danger Ranking System (FDRS).

2) Military activities shall be kept to a minimum within the Santa Margarita Management Zone during the breeding season. During the breeding season, all activities involving smoke, pyrotechnics, loud noises, blowing sand, and large groupings of personnel (14 or more) must be kept at least 1000 feet (300 meters) away from fenced or posted nesting areas. All other activities must be kept at least 15 feet (5 meters) from these areas.

3) No native vegetation shall be cut for military training purposes, except exotic plant species when approved be AC/S, ES.

4) All training foot traffic within the management zones shall be prohibited within 15 ft. (5 meters) of posted nesting areas during the breeding season with the exception of Environmental Security, animal damage control, law enforcement, research, and life guard personnel.

5) Estuary wetlands and salt flats shall not be entered unless specifically authorized in another section of these programmatic instructions.

6) Military activities will be kept to a minimum within the Management Zone during the non-breeding season (September 1-March 14) in order to minimize disturbance to wintering snowy plovers.

7) Foot traffic in coastal lagoons and the Santa Margarita River Estuary shall be minimized.

8) Boat traffic is not authorized in the Santa Margarita River and White Beach estuary/lagoon at any time during the breeding season (15 March-31 August). Boat traffic in other lagoons will avoid foraging birds, and transit as far away as possible from nesting sites.

Vehicles

1) Motorized vehicles shall remain at least 15 feet from nesting areas during the breeding season, with the exception of amphibious tracked vehicles, vehicles using the White Beach access road, vehicles required for animal damage control, law enforcement, Environmental Security staff, and lifeguards. Vehicle traffic within the management zones during the breeding season shall be kept to a minimum. Vehicles will remain on hard packed sand unless parked, outside posted (signed) areas during the breeding season and as much as possible at other times, and will avoid the dune system at the base of the bluffs, as well as coastal wetlands. Travel speeds are not to exceed 25 mph.

2) Vehicles shall be excluded from the edges of bluffs between the White Beach/French Creek nesting areas during the breeding season.

3) Amphibious tracked vehicles shall traverse the management zones while maintaining both tracks in water at all times. Upon entering the beach from Camp Del Mar vehicles shall transit in a direct line along a marked corridor bordering the southern edge of the Santa Margarita Management Zone before heading up-coast. During returns, vehicles shall proceed along the same marked corridor. During the breeding season, amphibious tracked vehicles shall not traverse the

Santa Margarita Management Zone (see Paragraph 12.4) in excess of a monthly, average of 20 traverses per day (one traverse equals one round trip to and from Camp Del Mar).

4) The Landing Craft Air Cushion (LCAC) shall not traverse the beach/estuary areas of the management zones (see Paragraph 12.4) during the breeding season.

5) Vehicles and troops accessing the beach at White Beach during the breeding season shall follow a route along the base of the northerly bluff to maintain the maximum distance from the tern colony.

Aircraft

1) During the breeding season, aircraft shall not land within 300 meters of fenced nesting areas on Blue Beach or White Beach as identified on the CP Special Training Map.

2) Aircraft shall maintain an altitude of 300 feet AGL or more above nesting areas.

3) Helicopter landing in the Santa Margarita estuary, wetlands, and salt flats shall not be authorized, except on an in-flight emergency basis and at LZ21 (Camp Del Mar).

4) Aircraft landing is authorized in established Landing Zones (LZ), CAL Sites, and VSTOL pads.

Engineering

1) No digging of fighting positions or bivouacking shall be authorized in the vicinity of nesting areas within the management zones during the breeding season.

2) Engineering training operations outside of NEPA approved landing operation support shall be prohibited within the management zones. At beaches, earth moving activity is authorized only for areas of unvegetated sand as least 300 meters from posted nesting areas unless specifically approved or requested by AC/S, ES.

12.5.3 Facilities Maintenance Activities

1) No tree or brush trimming shall occur within management

zones during the breeding season.

2) Tree trimming shall avoid entire trees except exotics.

3) Exotic plant species shall not be used to landscape areas adjacent to estuary and coastal wetlands.

4) Tree trimming equipment shall operate from roads as much as possible.

5) With the exception of the access road immediately west of I-5, no vehicles shall enter estuarine areas without prior approval from the AC/S, Environmental Security.

6) Trimming of landscape trees may occur all year in compliance with the Migratory Bird Treaty Act.

7) Trimming of vegetation shall not exceed 10 feet from communication or power lines.

8) Trimming for improved road safety shall be no more than 10 feet from the road shoulder.

9) No road/culvert repairs shall be conducted during breeding season except under emergency conditions.

10) Exotics shall be thoroughly dried and properly disposed.

11) Proper erosion control on slopes shall be implemented as funding becomes available.

12) Sediment runoff shall be contained on construction sites.

12.5.4 Recreation Activities

1) Recreational activities shall be kept to a minimum within the Santa Margarita Management Zone during the breeding season.

2) All foot traffic within the management zone shall be prohibited within 150 ft. (50 meters) of posted nesting areas during the breeding season.

3) Surf fisherman shall stay at least 300 ft. from posted nesting areas during the breeding season. No live bait fish

or amphibians will be allowed for use in fishing.

4) Fishing shall be prohibited within coastal lagoons except the Santa Margarita Estuary, from under the Interstate 5 freeway bridge access point to the Santa Margarita River mouth.

5) Watercraft shall not be permitted within coastal wetlands (except up to four non-motorized boats may be allowed in the Santa Margarita Estuary three days per week during the waterfowl hunting season).

6) Illumination from the Del Mar ball field will be shielded (when replaced) to deflect lighting away from the Santa Margarita River Estuary. Lights shall be extinguished when field is not in use.

7) Beach raking will be limited to the Del Mar and San Onofre Recreational Beaches.

8) Recreational use of all terrain vehicles, motorcycles, and off-road vehicles is prohibited within the management zones.

9) Cutting of vegetation is prohibited, except along recreational beach at San Onofre and Del Mar.

10) Beach fires are prohibited within the management zones.

11) Dogs on the beach must be on a leash when within 1000 feet of nesting areas during the breeding season.

12) Camping at Cockleburr Canyon beach access will be limited to the non-breeding season (September 1 -14 March).

13 ACTIVITY CLASSIFICATION SYSTEM FOR FUTURE CONSULTATION

The Conservation Plan proposes a system to manage the conduct of future consultations between the Service and the Base. The purpose of this system is: (1) to reduce staffing requirements; (2) to provide a systematic approach to deal with future proposed projects, activities and operations; (3) to increase the Base's mission flexibility; (4) to satisfy section 7(e)20 of the Act requirements for future programmatic consultations; (5) to define activities which require formal consultation with the Service.

This "activity class" system is not intended to negate the requirement for consultation in the future. On the contrary, it is intended to define activities whose consultation requirement is programmatically covered by this Opinion or those for which no further consultation is required. This system establishes an annual reporting procedure for newly initiated Base activities, the effects of which are relatively minor and easily covered under the conservation plans. Further, the system defines types of activities for which an expedited consultation process can be implemented.

The plan proposes that Base activities be sorted into the following four categories: Class IV, III, II and I.

13.1 Class IV

13.1.1 Definition

Class IV activities are defined as any activity that does not have the potential to affect listed or proposed species. No section 7 consultation is required for such activities.

13.1.2 Examples

1) Foot traffic on existing roads during all seasons.

2) Light foot traffic (movement by individuals) off of existing roads during the non-breeding season outside of posted nesting areas.

3) Vehicle operations on existing paved and dirt roads, including established creek crossings, during all seasons.

4) Vehicle operations off of existing roads in habitat assigned to the flexibility category in the riparian ecosystem and outside the Tern/Plover Management Zone in the estuarine/beach ecosystem during the non-breeding season.

5) Aircraft operations over riparian habitat during the breeding season above 300 feet AGL, to include take-offs and landings at designated LZ's, CAL sites and VSTOL pads.

6) Live firing on established ranges.

7) New construction within cantonment areas that do not result in additional habitat degradation.

8) Vegetation management during the non-breeding season:

- Limb Trimming of all vegetation within 10 feet of roads or above ground transmission cables.

- Exotic Plant Control in all areas.

9) Maintenance activities during the breeding season:

- Use of existing facilities and ranges, that do not result in take of occupied habitat.

- Culvert Clearing of all vegetation within 15 feet of culvert entry and exit points.

- Road Maintenance of existing roads.

- Desilting of inlet and outlet channels for Lake O'Neill and infiltration ponds.

- Night-time Lighting including lighting from existing facilities and indirect illumination from pyrotechnics to the extent the Fire Danger Rating System allows.

- Exotic Plant Control in areas greater than 100 feet from occupied habitat during the breeding season.

- Recreational Access pursuant to Marine Corps Order P5090, Base Order P5000 and programmatic instructions.

- Vehicle traffic on existing roads.

- Foot traffic during state authorized hunting seasons.

- Maintenance activities that do not remove native vegetation within 100 feet of occupied habitat.

- Hunting of game during authorized seasons, except posted or fenced areas.

- Hiking, running, and bird watching along established trails.

- Fishing within waterways, along designated beaches and within lakes or ponds.

13.2 Class III

13.2.1 Definition

Class III activities are those discrete projects that "may affect" listed or proposed species. Potential effects to the species and their habitat are limited and considered offset by the on-going implementation of the riparian or estuarine/beach conservation plans. An annual report of activities occurring under this class will be sent by the Base to the Service at the end of each fiscal year.

Class III activities are those which may potentially result in adverse effects to species in the riparian ecosystem that:

1) Are temporary (≤12 months) disturbance regardless of species: individual activity: less than 150 acres of Arundo, Tamarix, or Grass Forb Mix habitat, less than 30 acres of Fresh Water Marsh or Open/gravel habitat areas; less than 10 acres of Mixed Willow Exotic habitat; less than 10 acres of Riparian Scrub, Sycamore Grassland, Mixed Woodlands or Riparian Woodlands habitat.

2) Result in less than 10 acres of disturbance of arroyo toad habitat per year.

3) Cumulative temporary disturbance per year less than 200 acres.

4) Permanent disturbance regardless of species: less than 10 acres of Grass Forb Mix, Arundo, Tamarix; less than 3 acres of Fresh Water Marsh, Mixed Willow Exotic, Sycamore Grassland, Mixed Woodlands, Open water/gravel habitat; less than 2 acre Riparian Scrub or Riparian Woodland habitat.

5) Cumulative permanent disturbance per year of less than 15 acres.

Class III activities are those which may potentially result in adverse effects to species in the estuarine/beach ecosystem that:

1) Are temporary disturbances to Plover Management Zone which is eliminated when activity ends.

2) Are temporary degradation of nesting areas during non-breeding season which can be restored before nesting season begins.

13.2.2 Examples

1) Aircraft overflights below 300 feet AGL over occupied territories of listed species during the breeding season along established Terrain flight (TERF) routes.

2) Small boats in the Santa Margarita River during the non-breeding season (military training and hunting).

3) Off-road troop movement (large groups) during the non-breeding season.

4) Indirect lighting of habitat during breeding season.

5) Weed control activities:

- that result in the use of power tools during the breeding season within 100 feet of occupied habitat.

- that result in affecting native vegetation of occupied habitat.

- that use Rodeo or equivalent cut-stump or aerial spraying in occupied habitat.

6) Controlled burns conducted for habitat enhancement and protection during the non-breeding season.

7) Temporary sustained noise levels above 80 dBA L_{eq} hourly as measured over a 7 day period during the breeding season.

8) Vehicle access for enhancement activities.

13.3 <u>Class II</u>

13.3.1 Definition

Activities that may affect listed species and for which impacts may or may not be offset by the conservation plan with associated compensation measures and that require concurrence from the Service via a separate project concurrence letter. Concurrence letter will

specify the project description for the proposed action; avoidance and minimization measures effected; programmatic instructions recommended for implementation; assessment of the impact to listed species and associated habitat for direct and indirect effects (with the exception of dust and noise); annual bank balance; compensation requirements using Equation 9; and mitigation compensation measures proposed.

Riparian

- Temporary (≤12 months) disturbance regardless of species: individual activity: more than 150 acres of Arundo, Tamarix, or Grass Forb Mix, more than 30 acres of Fresh Water Marsh or Open water/gravel habitat; more than 10 acres of Mixed Willow Exotic habitat; more than 10 acres of Riparian Scrub, Sycamore Grassland, Mixed Woodland or Riparian Woodland habitat.

- Cumulative temporary disturbance per year that exceeds 200 acres.

- Permanent disturbance regardless of species: more than 10 acres of Grass Forb Mix, Arundo, Tamarix; more than 3 acres of Fresh Water Marsh, Mixed Willow Exotic, Sycamore Grassland, Mixed Woodland, Open water/gravel habitat; more than 2 acre Riparian Scrub, Riparian Woodland habitat.

- Cumulative permanent disturbance per year that exceeds 15 acres.

Estuarine/Beach

- Permanent development of beach habitat in excess of 1 acre.

- Permanent development of more than 1 acre of pickleweed salt marsh or 2 acres of coastal dune habitat.

13.3.2 Examples

General

1) Aircraft overflights below 300 feet AGL over occupied territories of listed species during the breeding season.

2) Results in lighting of habitat during breeding season that directly affects listed species.

3) Weed control activities that occur during the peak of the breeding season (March through June).

4) Aerial spraying of pesticides between March through August.

5) Result in more than 10 acres of disturbance of arroyo toad habitat per year.

6) Result in permanent sustained noise levels above 80 dBA l_{eq} hourly calculated over a 7 day period during the breeding season.

7) Aircraft overflights below 300 feet AGL over nesting sites of listed species during the breeding season.

Project Examples

1) Levee modification from that of BA and repair of existing levee.

2) Desilting activities in the river bed, in addition to that of the BA.

3) Major utility installation exceeding Class III acreages.

4) New road construction exceeding Class III acreages.

5) New facilities, structures or habitat modification that affects significant quantities of habitat.

6) Construction of new nesting island in Santa Margarita Estuary.

7) Design changes to Basilone Bridge (P-030), Compass Calibration Pad and Hot Fuel Pits for MCAS.

13.4 Class I

13.4.1 Definition

Activities whose impacts are not offset by the Conservation Plan and/or additional mitigation not agreed upon through informal consultation. These activities will trigger the requirement to enter into formal consultation and require preparation of a separate biological assessment by the Base, and consequent issuance of a

Biological Opinion by the Service. Reference may be made to measures within this Opinion as guidelines for avoidance or minimization measures. However, credit for conservation plan activities conducted under the proposed plan will not accrue to this "new consultation" and for which significant, separate compensation will be required (using guidelines of the opinion).

Riparian

- Activities that result in the potential to lower ground water greater than 5 feet from existing conditions for vegetation demonstrated to be groundwater dependent.

- Activities which result in permanent cutoff of riparian habitat from the effects of scour and aggregation caused by flood effects.

- New flood control levees.

- New roads in previously undisturbed riparian areas.

Estuarine/Beach

- Activities that require construction or degradation of Santa Margarita Esturary, plover management zone, Cockleburr Canyon, and Red Beach Estuary.

- Activities whose indirect affect has potential to significantly degrade water quality and quantity of the Santa Margarita Estuary.

13.4. Examples

1) Major increases (beyond historical withdrawals)in groundwater extraction, and major changes in groundwater basin management plans.

2) Projects which significantly affect the floodplain dynamics, and destroy wetlands (beyond the criteria previously established).

3) Projects which will extirpate or will have a significant effect on a species in a single drainage.

4) Manuever corridors through the San Mateo Basin.

APPENDIX 2

SPECIES ACCOUNTS

1 LEAST BELL'S VIREO

Because of the decline of least Bell's vireos (*Vireo bellii pusillus*) (vireo) (Salata 1986), attributable in part to the combined, perhaps synergistic effects of the widespread destruction of riparian habitats and brood-parasitism by the brown-headed cowbird (*Molothrus ater*) (Garrett and Dunn 1981), the vireo was officially listed as endangered by the Service on May 2, 1986 (*Federal Register* 51: 16474-16483).

Critical habitat was proposed at the same time, but the decision was delayed for further review. After several additional delays, critical habitat was designated for the vireo on February 2, 1994 (*Federal Register* 59: 4845-4867). Critical habitat is defined in section 3(5)(A) of the Act as: (I) The specific areas within the geographical area occupied by a species on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection, and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon determination that such areas are essential for the conservation of the species.

The features or elements of habitat that are essential to the conservation of the vireo can be described as riparian woodland vegetation that generally contains both canopy and shrub layers, and includes some associated upland habitats. General activities that could cause destruction or adverse modification of vireo habitat include: (1) removal or destruction of riparian vegetation, (2) thinning of riparian growth, especially near ground level, (3) removal or destruction of adjacent chaparral or other upland habitats used for foraging, and (4) increases in human-associated or human-induced disturbances. Specific actions that could adversely affect vireo critical habitat include stream channelization, water impoundment or extraction, water diversion, intensive recreation, and development.

About 9,600 acres on Camp Pendleton Marine Corps Base were removed from the vireo critical habitat designation based on the finding that an existing Memorandum of Understanding (MOU) between the Service and the Marine Corps for vireo management was providing an adequate level of protection for the vireo and its habitat.

Although this area is essential to the conservation of the species, the Service found that a formal critical habitat designation was unnecessary because the MOU contained provisions for section 7 consultation for proposed actions that may destroy or adversely modify vireo habitat. The Service also found that a level of protection equivalent to or greater than that provided by a critical habitat designation could be achieved for the vireo on this portion of the Santa Margarita River through cooperation with the Marine Corps under this MOU. However, it was stated that the Service would reconsider its position to designate critical habitat on the Camp Pendleton reach of the Santa Margarita River if conditions warrant.

Specifically, the MOU between the Service and the Marine Corps stated that the Marine Corps would: (1) maintain at least 1,200 acres of suitable vireo habitat on the Santa Margarita River through management, habitat restoration, and removal of exotics, (2) continue the cowbird trapping program as necessary to maintain at least 300 pairs of vireos on the Santa Margarita River, (3) conduct annual censuses to determine the number of territorial males, the number of breeding pairs, and the reproductive success of vireos on Base, and (4) conduct research studies as indicated in the "Draft Recovery Vireo Management Plan" (U.S. Fish and Wildlife Service 1986b). The Marine Corps also agreed that "Prior to implementation of military construction projects or other activities, any habitat replacement required to comply with the ESA will be in place" and that "consultation on routine maintenance should include work such as maintenance of roads to the wells, well rehabilitation, pipeline repair, servicing transmission lines, and reconstruction of water spreading structures".

Historically, the least Bell's vireo ranged from Red Bluff, California in the north, to Northwestern Baja California, Mexico in the south, and as far east as the Owens Valley, Death Valley, and along the Mojave River, and was described as common to abundant in the appropriate riparian habitats (Grinnell and Miller 1944; Grinnell and Storer 1924; Willett 1933). Currently, the species occupies a very small fraction of its former range (Goldwasser et al. 1980; United States Fish and Wildlife Service 1986). In 1994, approximately 70 percent of the United States vireo population was concentrated in just 5 localities, the most significant of which is a portion of the Santa Margarita River within the boundaries of the Camp Pendleton Marine Corps Base (U.S. Fish and Wildlife Service unpublished data).

As noted in the Endangered Species Technical Bulletin (Vol. 10, No.

6, p. 3, 1985), "no songbird in California has declined as dramatically in historical times as the Least Bell's Vireo." In 1986, surveys indicated that there were approximately 397 territorial male vireos. Since that time, legal protection and active management have resulted in an increase in the population. Surveys conducted in 1994 indicated that there were approximately 927 territorial male vireos in the United States.

The is a small, olive-gray migratory songbird that nests and forages almost exclusively in riparian woodland habitats (Garrett and Dunn 1981; Gray and Greaves 1981; Miner 1989). All subspecies of Bell's vireo (*Vireo bellii*), including the least Bell's vireo, are almost exclusively insectivorous (Chapin 1925) and highly territorial (Barlow 1962; Fitch 1958; Salata 1983a).

Least Bell's vireos generally begin to arrive from their wintering range in southern Baja California in late March (Garrett and Dunn 1981; Salata 1983b; Hays 1989; Pike and Hays 1992), and exceptionally as early as March 15 (Salata 1983a). A majority of the breeding vireos depart their breeding grounds by the third week of September, and only very few are found wintering in the United States (Garrett and Dunn 1981; Pike and Hays 1992; Salata 1983a, 1983b).

The least Bell's vireo is apparently more restricted in its choice of nesting habitat than other subspecies of Bell's Vireo (RECON 1988). Least Bell's vireo nesting habitat typically consists of well-developed overstories, understories, and low densities of aquatic and herbaceous cover (Hays 1986; Hays 1989; Salata 1983a; Zembal 1984; Zembal et al. 1985). The understory frequently contains dense subshrub or shrub thickets. These thickets are often dominated by of sandbar willow (*Salix hindsiana*), mule fat (*Baccharis salicifolia*), young individuals of other willow species such as arroyo willow (*Salix lasiolepis*) or black willow (*S. goodingii*) 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. Coast live oak (*Quercus agrifolia*) may also make locally important contributions to the overstory.

As much as 90 percent of the original extent of riparian woodland in California has been eliminated, and much of the remaining 10 percent is in a degraded condition (Katibah 1984). It appears that vireos nesting in areas containing a relatively high proportion of degraded

habitat have lower productivity (e.g. hatching success) than those in areas of high quality riparian woodland (Pike and Hays 1992). Additionally, widespread habitat losses have fragmented most remaining populations into small, disjunct, widely dispersed subpopulations (Franzreb 1989). Habitat fragmentation negatively affects abundance and distribution of neotropical migratory songbirds, in part by increasing incidence of nest predation and parasitism (Whitcomb et al. 1981, Small and Hunter 1988, Yahner and DeLong 1992).

Territory sizes of nesting vireos range from one to four acres (Gray and Greaves 1981). Although the least Bell's vireo occupies home ranges that typically range in size from 0.5 to 4.5 acres, a few may be as large as 10 acres. In some areas, vireos will also use adjacent upland habitats for foraging (Salata 1983a).

Vireos are known to be sensitive to many forms of human disturbance including noise, night lighting, and consistent human presence in an area. Excessive noise can cause vireos to abandon an area. Noise levels above 60 dBA Leq can significantly decrease the reproductive success of vireos (see Noise Appendix). Greeves (1989) hypothesized that the lack of breeding vireos in apparently suitable habitat is due to human disturbances (eg. bulldozers, off-highway vehicles, and hiker travel). He further suggested that buffer zones between natural areas and surrounding degraded and disturbed areas could be used to increase the suitability of some vireo habitat.

Since 1981, when systematic surveys for vireos were initiated on Base, the number of territorial males on Base have increased from 27 to 348 in 1994 (Pavelka and Vizgardis 1995). When the species was listed in 1986, there were 100 known territorial male vireos on Base. This represented approximately 25 percent of the total number counted throughout the species' range in the United States. By 1988, the number of vireos on Camp Pendleton had risen sharply and represented approximately 44 percent of all known vireos in that year. Camp Pendleton's contribution to the overall numbers of vireos has remained relatively stable in recent years representing 51 percent in 1993 and 49 percent in 1994 (U.S. Fish and Wildlife Service unpublished data). Although vireo numbers have increased considerably on Base since the listing, the present number may be lower than historic numbers due to habitat loss and degradation on the Base.

During the 1982 breeding season, nest destruction and nest parasitism by brown-headed cowbirds were noted as important factors

reducing vireo nesting success and productivity on Base (Salata 1983a). The Base began to trap cowbirds on the Santa Margarita River in 1983, before the vireo was listed as endangered. The Base began trapping cowbirds in other drainages in 1988. Cowbird trapping program has likely been very important in reversing the decline of the vireo on Base.

Up until 1987, vireos on Base were found primarily on the lower Santa Margarita River (between the Naval Hospital and the Stewart Mesa Road bridge; Pavelka and Vizgardis 1995). Since that time, territorial male vireos have been detected on at least 9 major drainages on the Base including San Mateo Creek, San Onofre Creek, Las Flores Creek, Santa Margarita River, and Pilgrim Creek. Because the majority of the vireos on Base occur on the Santa Margarita River (67 percent in 1994), this drainage likely serves as a source of vireos for populating other drainages on base.

2 SOUTHWESTERN WILLOW FLYCATCHER

On July 23, 1993, the Service proposed the southwestern willow flycatcher (*Empidonax traillii extimus*) (flycatcher) as an endangered species throughout its range, and that critical habitat be designated (*Federal Register* 58: 39495-39522). The flycatcher was officially listed as endangered on February 27, 1995 (*Federal Register* 60: 10694-10715). However, the final determination on critical habitat was deferred to provide the Service time to gather further comments and reconsiders the prudence of designation and the appropriate boundaries of any area to be designated.

Constituent elements of critical habitat, essential to the conservation of the flycatcher, listed in the initial proposal for critical habitat include: the riparian ecosystem (thickets of riparian shrubs and small trees) above the water's surface (water that is available throughout the May through September breeding season) within 100 meters of the waters edge, or areas where such vegetation may become established. The entire portion of the Santa Margarita River on the Base was recommended as critical habitat in the initial proposal.

The initial critical habitat proposal listed activities that could cause destruction or adversely modification of flycatcher habitat. They include: (1) removal, thinning, or destruction of riparian vegetation, (2) water diversion or impoundment, groundwater pumping, or other activities that may alter the quantity or quality of surface or subsurface flow, (3) mismanagement of livestock, and (4)

increases in recreation or human-induced disturbances.

The breeding range of the flycatcher includes southern California, Arizona, New Mexico, southern portions of Nevada and Utah, western Texas, southwestern Colorado, and extreme Northwestern Mexico (Hubbard 1987; Unitt 1987; Browning 1993). Willow flycatchers winter in Mexico, Central America, and northern South America (Phillips 1948; AOU 1983; Stiles and Skutch 1989).

Flycatchers were once considered widely distributed and common in California, occurring wherever suitable habitat existed in the Los Angeles Basin, San Bernardino/Riverside area and San Diego County, as well as the lower Colorado River (Grinnell and Miller 1944, Unitt 1987, Wheelock 1912, Willet 1912, 1933). California may have once supported the majority of nesting flycatchers. Currently, in California, flycatchers exist only in small disjunct groups and have been extirpated from the lower Colorado River (Hunter et al. 1987, Unitt 1987, Rosenburg et al. 1991). Flycatchers were almost certainly more common on Base in historic times (Loren Hays pers. comm.).

Throughout the known range of the southwestern willow flycatcher, occupied riparian habitats tend to be widely separated. The southwestern willow flycatcher has suffered the extensive loss and modification of these riparian habitats due to habitat destruction or modification due to grazing, flood control projects, and other water or land development projects (see, in particular Dahl 1990, Klebenow and Oakleaf (1984), and Taylor and Littlefield (1986). The species is additionally 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). Parasitism rates of southwestern willow flycatcher nests have recently ranged from 50 to 80 percent in California (Whitfield 1990; M. Whitfield and S. Laymon, unpublished data) to 100% in the Grand Canyon in 1993 (U.S. Fish and Wildlife Service 1993). Mayfield (1977) thought that a species (or population) might be able to survive a 24% percent parasitism rate, but that much higher losses "would be alarming."

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 flycatcher is faring poorly throughout much of its breeding range (see also Monson and Phillips 1981; Garrett and Dunn 1981; Unitt 1987). Unitt (1987) postulated that the "known Southwestern willow flycatcher population in the California range of *extimus* consists of 87 pairs" and that the "total population of the subspecies is well under 1000 pairs; I suspect that 500 is more likely". Hays (1995 pers. comm.), after reviewing the 1994 flycatcher survey data for the entire U.S. population, stated that the total U.S. population was likely less than 300 pairs and may be less than 200 pairs. A composite of current information indicates continuing declines, poor reproductive performance, and continued threats to most remaining populations (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).

Only two nesting groups (subpopulations) have remained stable or increased in recent years: the South Fork of the Kern River; and the Santa Margarita River within the boundaries of the Base. The South Fork population experienced numerical declines in 1991 and 1992, but increased slightly in 1993 and 1994. The Santa Margarita population has remained relatively stable since 1989. In both locations, stability, and/or slight increases in numbers have likely been the result of cowbird management.

The southwestern willow flycatcher is a one of four subspecies of the willow flycatcher (Empidonax traillii) recognized in North America (Hubbard 1987; Unitt 1987; Browning 1993). The southwestern willow flycatcher is a relatively small insectivorous bird with a whitish throat, grayish-green back, a light olive breast, and a pale yellowish belly.

Flycatchers are late spring breeders, typically raising one brood per year. They are generally present and singing on breeding territories by mid-May and fledge young in early July (Willett 1912, Ligon 1961, Brown 1988, Whitfield 1990). Southwestern willow flycatchers are generally gone from breeding grounds in southern California by late August and are exceedingly scarce in the United States after mid-October (Garrett and Dunn 1981). The typical production of only one brood makes disturbance, parasitism, or predation of seasons nesting attempt very problematic.

The southwestern willow flycatcher occurs in riparian habitats along rivers, streams, and other wetland habitats where dense growths of willows (*Salix* sp.), *Baccharis*, arrowweed (*Pluchea* sp.), buttonbush (*Cephalanthus* sp.), or other plants of similar structure and configuration are present (Grinnell and Miller 1944, Phillips 1948, Whitmore 1977, Hubbard 1987, Unitt 1987, Brown and Trosset 1989, Whitfield 1990, Brown 1991). Overstories are often present in occupied habitats and composed of willows or cottonwoods (Unitt 1987, Whitfield 1990, Brown 1991, U.S. Fish and Wildlife Service 1993).

Riparian communities provide both nesting and foraging habitat for the flycatcher. Flycatcher nests are in thickets of trees and shrubs approximately 4-7 meters (13-23 feet) tall with a high percentage of canopy cover and dense foliage from 0-4 meters (0-13 feet) above ground. The nest site plant community is typically even-aged, structurally homogeneous, and dense (Brown 1988, Whitfield 1990, Sedgwick and Knopf 1992, Sogge et al. 1993). Due to the nests being placed low in willow clumps, the nests are highly vulnerable to upset (Flett and Sanders 1987, Serena 1982). Several studies have reported high percentages of nest failure due to nests being upset by cattle grazing within the riparian zones (Valentine et al. 1985).

The southwestern willow flycatcher invariably nests near surface water or saturated soil (Phillips et al. 1964, Muiznieks et al. 1994). Riparian habitats not selected for either nesting or singing are narrower, with greater distances between willow patches and individual willow plants (Sedgwick and Knopf 1992).

Even though the requirements of vireo and flycatcher appear to largely overlap, significant differences are probable. The flycatcher has not responded like the vireo by re-expanding population numbers more proportional to those expected historically on Base and in Prado Basin. Although high quality habitat may appear available in these areas, some essential feature or combination of features is likely missing to allow flycatcher numbers to expand to more viable numbers.

Habitat elements that appear to be necessary for flycatcher survival and recovery include: (1) adequate area, width, and location of floodplain acreage, (2) a natural flood regime, (3) a lack of exotic invasive plants (eg. *Arundo*) and exotic animals (eg. cowbirds), and (4) a lack of disturbances such as human activity within or adjacent to otherwise suitable habitat.

Habitat rarity, and small, isolated populations of flycatchers make the species increasingly susceptible to local extirpation through stochastic events such as flood, fire, brood parasitism, predation, and land development. Habitat fragmentation can negatively affect the abundance and distribution of flycatchers by increasing incidence of nest predation and parasitism (Whitcomb et al. 1981, Small and Hunter 1988, Yahner and DeLong 1992). Whitfield (1990) found that predation on southwestern willow flycatchers nests increased with decreasing distance from nests to thicket edges, suggesting that habitat fragmentation may increase the threat of predation. McCabe (1991) reported that cowbirds lay their eggs in songbird nests closest to the edge of the habitat.

Proper hydrology, natural flood regimes, and a stable watertable are essential to support the riparian habitats necessary for flycatcher occupancy. In addition, surface water must be present within 100 meters of any active nest throughout the nesting season (Muiznieks et al. 1994).

Flycatcher habitat can be degraded and direct disturbances can result from human activity within or adjacent to riparian areas (Taylor 1986). Blakesley and Reese (1988) found a negative correlation between human activity in the riparian corridors and flycatcher abundance. Human activities that can affect flycatchers include excessive noise, excessive dust (coats the leaves of the plants and probably reduces populations of insect or prey species), night lighting, and consistent human presence in an area.

Although the flycatcher population on Base is believed to be stable at this time (Pavelka and Vizgardis 1995), the number of singing males detected has varied considerably over the years. Prior to 1993, flycatcher "sightings" (including audible detections only) were recorded incidentally to vireo surveys. In 1993 and 1994 surveys were conducted specifically for flycatchers on most major drainages on the Base. The number of singing males recorded on Base has ranged from 4 in 1981, when only the Santa Margarita River was surveyed (Salata 1981) to 18 in 1989, 25 and 24 in 1990 and 1991, to a low of 4 in 1992 (Sweetwater Environmental Biologists 1993). Nine flycatchers were detected on Base in 1993, and 23 in 1994. It is unknown whether or not any of the singing male flycatchers detected were paired and breeding, or even if they were separate individuals.

No flycatchers were reported from San Onofre Creek until 1994 when 7 were recorded on that drainage (Pavelka and Vizgardis 1995). In 1993, flycatchers were found in riparian habitats on the following

drainages: Santa Margarita River, Las Flores Creek, Pilgrim Creek (Pavelka and Vizgardis 1995). It is likely that the cowbird management program on Base is contributing to and/or maintaining the recent stability of the flycatcher population. This program likely stemmed, at least temporarily, the apparent downward trend of the flycatcher on Base.

3 ARROYO SOUTHWESTERN TOAD

Destruction and degradation of arroyo southwestern toad (*Bufo microscaphus californicus*) habitat have contributed to its decline and local extinction. Urbanization and dam construction beginning in the early 1900's in southern California caused most of the extensive habitat degradation. Other factors include artificial flow regulation, suction dredging, off-highway vehicle activities, predation by exotic aquatic species and isolation and fragmentation of populations. Dam construction alone is noted as responsible for the loss of 40 percent of the original range.

In January 1993, the U.S. Fish and Wildlife Service received a petition from Dr. Samuel S. Sweet, of the University of California, Santa Barbara, and Dr. Mark Jennings, of the Department of Herpetology, California Academy of Sciences, to list the arroyo toad as endangered. The arroyo southwestern toad was proposed for listing as endangered on August 3, 1993 (*Federal Register* 58: 41231-41237)

and listed on December 19, 1994 (*Federal Register* 59: 64859-64866). The listing went into effect on January 17, 1995.

Arroyo southwestern toads were historically found along the length of drainages in southern California from San Luis Obispo to San Diego County. Its distribution also included the Northwestern coastal region of Baja California, Mexico, from the United States border with Mexico to the vicinity of San Quintin. They now survive primarily in the headwaters as small isolated populations (Sweet 1992). Most remaining populations in the United States occur on privately owned or Forest Service lands. They have been extirpated from an estimated 75 percent of their former range in the United States.

The arroyo southwestern toad is a small, light greenish grey or tan toad with warty skin and dark spots. its underside is buff colored and often without spots. A light colored stripe crosses the head and eyelids, and a light area usually occurs on each sacral hump and in the middle of the back. Its movement consists of hopping more often than walking. Its courtship vocalization is a high trill, usually lasting 8 to 10 seconds.

Arroyo southwestern toads are habitat specialists restricted to rivers that have shallow, gravely pools adjacent to sandy terraces. Breeding occurs on large streams with persistent water from late March to mid-June (Sweet 1989). Eggs are deposited and larvae develop in shallow pools with minimal current and little or no emergent vegetation and with sand or pea gravel substrate overlain with flocculent silt. The larvae feed on suspended organic detritus rather than vegetation like most species of the Bufo genus. After metamorphosis (June-July), the juvenile toads remain on the bordering gravel bars until the pool no longer persists (3 to 8 weeks depending on site and year) (Sweet 1992). Juveniles and adults forage for insects on sandy stream terraces that have nearly complete closure of cottonwoods, oaks, or willows, and almost no grass and herbaceous cover. Adult toads excavate shallow burrows on the terraces for shelter during the day when the surface is damp, or during longer intervals in the dry season (Sweet 1989).

Major threats to the continued existence of arroyo southwestern toads are as follows: 1) short and long term changes in river hydrology, including construction of dams, water diversions, and flood control projects; 2) alteration of riparian wetland habitats by agriculture and urbanization; 3) construction of roads; 4) microhabitat damage by off-highway vehicle use; 5) development of

campgrounds and other recreational activities; 6) over-grazing; and 7) disease or predation and 8) placer and gravel mining (*Federal Register* 58: 41231-41237). These impacts to arroyo southwestern toads have resulted in fragmentation of surviving populations into isolated subpopulations.

Dams have significant effects on habitat quality downstream. Artificial flow regulation disrupts the natural processes that produce the terrace and pool habitats required by arroyo southwestern toads, and unseasonal water releases may either prevent arroyo southwestern toads from breeding altogether or may wash away eggs and larvae if releases are made after breeding has occurred (Sweet 1992). Siltation from increased stream flow or from disturbances upstream may affect survival by covering the food supply and inhibiting feeding by larval toads.

The arroyo southwestern toads breeding season occurs after the normal rainy season, contributing to this species extreme sensitivity to stream diversions. Water diversions that alter normal flows have degraded habitats and adversely affected arroyo southwestern toads by: 1) the early drying of breeding pools, causing breeding failures or loss of the larval population; 2) restricting the time period essential for rapid growth when newly-metamorphosed toads can forage on damp gravel bars; and 3) the loss of damp subsurface soil which may result in high adult mortality during late summer and early fall (Sweet 1992).

The most significant factor adversely affecting the arroyo southwestern toad is drought in combination with non-natural events, such as water reduction. This combination reduces the amount of water in riparian ecosystems beyond natural conditions and creates stressful conditions for most aquatic species. Reduction in water affects female arroyo southwestern toads the greatest. Female toads must feed for at least two months in order to develop the fat reserves needed to produce a clutch of eggs (Sweet 1992). In drought years, females may find insufficient insect prey to produce eggs before males cease calling, resulting in no reproduction in that year.

Development in riparian wetlands have caused permanent losses of riparian habitats and are the most conspicuous factor in the decline of the arroyo southwestern toad (Sweet 1991). Stream terraces have been converted to farming, road corridors, and residential and commercial uses, while the streams themselves have been channelized for flood control. Large stretches of riparian corridors have also

been degraded or destroyed by cattle grazing practices and feral pig activities. Horse and cattle grazing in riparian areas may also trample eggs and larvae of arroyo southwestern toads (Sweet 1991).

Periodic fires may adversely affect arroyo southwestern toads by causing direct mortality, by destroying streamside vegetation, or by eliminating vegetation that protects the watershed (Sweet 1991).

The use of heavy equipment in reconstruction of roads and stream crossings after storm events have had significant and repeated impacts to arroyo southwestern toads. In one instance, Sweet (1993) noted several hundred juvenile arroyo toads were visible at various sites along a creek in the Los Padres National Forest in mid August. During spot surveys in mid September and early October he noted that large numbers of juvenile/subadult arroyo toads had burrowed into deep sand beds associated with stream banks of some undeveloped road crossings. Most animals had dug down 4-7 inches into the damp sand interface, and were inactive, as judged by the absence of recent burrowing on the sand surface. Grading associated with maintenance of these road crossings occurred in mid November; it is not likely that many of the estivating arroyo toads in these areas survived. In addition to maintenance, off-highway vehicles cause extensive damage to the shallow pools in which arroyo southwestern toads breed (Sweet 1992).

Recreational activities in riparian wetlands have had substantial negative affects to arroyo southwestern toads and their habitats. Streamside campgrounds have frequently been located adjacent to arroyo southwestern toad habitat. Recreational use of campgrounds is heaviest in early summer, when arroyo southwestern toad larvae and juveniles are present and most vulnerable, and has resulted in alteration of stream and breeding pool morphology, and trampling of juvenile toads (Sweet 1992). Adult arroyo southwestern toads, which forage in open areas in campgrounds, are frequently killed on campground roads at night (Sweet 1992). Light and noise pollution from adjacent developments or campgrounds may also reduce arroyo southwestern toad reproductive success by disrupting calling males during the breeding season. Sweet (1993) noted silt released from human activity (swimming) in a creek released large amounts of silt in an otherwise nearly clear creek. This silt settled out in low current areas with arroyo toad egg clutches and immobile, recently-hatched larvae, and asphyxiated the majority of the eggs and larvae. The recurrence of this siltation at 5-day intervals (weekends) did not permit any clutches to hatch and disperse without mortality (Sweet 1993).

Over the past 20 years, at least 60 species of fishes have been introduced to the western American states, 59 percent of which are predatory (Hayes and Jennings 1986). Introduced predators are thought to be highly significant in reducing the size of all extant populations of arroyo southwestern toads, and may have contributed to regional extinctions. This includes green sunfish (*Lepomis cyanellus*), large-mouth bass (*Micropterous salmoides*), mosquitofish (*Gambusia affinis*), black bullhead (*Ictalurus nebulosus*), prickly sculpin (*Cottus asper*), stocked trout (*Oncorhynchus mykiss*), oriental gobies (*Tridentiger* spp.), and red shiners (*Neotropis lutrensis*) (Sweet 1992).

Most streams with populations of arroyo southwestern toads also have populations of introduced bullfrogs (*Rana catesbeiana*). Adult bullfrogs are highly predatory and are believed to prey on adult arroyo southwestern toads (Sweet 1992). Artificially maintained perennial flows below dams enhance the habitat for bullfrogs to the detriment of arroyo southwestern toads.

Camp Pendleton provided the Service with the latest information on arroyo southwestern toad locations on Base. As of March 20, 1995 there are 10 confirmed arroyo southwestern toad sightings in 4 drainages. Three sightings on the Santa Margarita river, 2 sightings on Jardine Creek, 3 sightings on San Mateo Creek, and 2 sightings on Talega Creek. The toads have been located in a variety of microhabitats. Arroyo southwestern toads have been seen in river pools, stream banks, flooded roadbeds and other areas of overflow, in willow scrub and giant cane, and roads.

4 CALIFORNIA LEAST TERN

The California least tern (*Sterna antillarum browni*) (least tern) historically nested along sandy beaches close to estuaries and embayments along the coast of California from San Francisco Bay to Baja California, Mexico. Human encroachment along California beaches for recreation, residential, and industrial development has severely diminished the availability of suitable nesting habitat. This loss of nesting habitat in conjunction with increased loss of foraging areas, human disturbance, and predation at remaining breeding colonies resulted in a Federal designation of endangered status in 1970 (FR 35(199).

The discontinuous breeding range of the California least tern in the U.S. extends from the Mexican border to San Francisco Bay. The

majority of the population is concentrated in southern California within the Counties of Los Angeles, Orange, and San Diego. In 1993, least terns nested at 35 locations rangewide (Caffrey 1994).

Once widespread and common along the central and southern California coast, to the extent of being described as numberless on the beaches of Los Angeles County (McCormick 1899, as cited in Bent 1921), the least tern population declined to a known low point of between 623 and 763 breeding pairs around 1973 (Bender 1974a). The loss of nesting and breeding season feeding habitats, as a result of human activities, is largely responsible for the decline.

Upon its designation as endangered, statewide efforts to implement protection for least tern nesting and foraging areas has resulted in a breeding population increase from 623 pairs in 1969 to an estimated 2733 pairs in 1994.

California least terns are the smallest of our U.S. terns measuring about 9 inches long, with a wingspan of about 20 inches. Males and females look alike with a black cap, gray wings with black tips, orange legs, and black-tipped yellow bill. Immature birds have darker plumage and a dark bill with distinctive white heads and dark eye stripe.

These migratory birds usually arrive in California from Central and South America beginning in mid-April and complete their breeding cycle by the end of August. Unfrequented sandy beaches close to estuaries and coastal embayments have traditionally served as nesting sites for the least tern. Human use of beaches for recreational, residential, and industrial development has severely diminished the availability of suitable least tern nesting areas. In recent years, many non-beach sandy surfaces in coastal areas have been successfully utilized by least terns for nesting (Massey and Atwood 1979 through 1985).

The nest of the least tern is a simple scrape or depression in the sand that the birds sometime adorn with small fragments of shell or pebbles. One to 3 eggs are laid, usually 2, and incubated usually for 20-25 days with a mean time of about 21 days. This is followed by an approximately 3 week period of the adults tending the flightless but quite mobile chicks. Least tern nesting is characterized by two waves of nesting. Most of the initial nesting attempts are made by experienced breeders and are completed by mid-June. A second wave of nesting usually occurs from mid-June to early August which is comprised of re-nests after initial failures

and second year birds nesting for the first time (Massey and Atwood 1981).

Least terns exhibit a high degree of nest site fidelity from year to year (Atwood and Massey 1988). Factors which can effect colony site fidelity include reproductive failure and the physical attributes of the nest site such as the amount of vegetative encroachment.

Least terns feed exclusively on small fishes captured in shallow, nearshore waters, particularly at or near estuaries and river mouths (Massey 1974, Collins et al. 1979, Atwood and Minsky 1983, Atwood and Kelly 1984, Minsky 1984, Bailey 1984). After their eggs hatch, breeding adults catch and deliver small fish to the flightless young. The young begin to fly at about 20 days of age, but continue to be fed and are taught how to feed by their parents for some time after fledging. Reproductive success is, therefore, closely related to the availability of undisturbed nest sites and nearby waters with adequate supplies of appropriately sized fishes.

California Least Terns are opportunistic in their foraging strategy and are known to take many different species of fish. However, they seem to select fish based on certain morphological characteristics. Massey and Atwood (1981) conclude that prey items are generally less than 9 cm in length and have a body depth of less than 1.5 cm. Thirty-seven different species of fish dropped at the Venice Beach nesting site were recorded by Massey and Atwood (1981) including northern anchovy (*Engraulis mordax*), topsmelt (Antherinops affinis) and jacksmelt (Atherinopsis californiensis).

The adult tern does not dismember larger fish in order to feed its small chick. The adult captures a fish and disables it by shaking, and delivers it whole to the chick. A small, newly hatched least tern chick cannot swallow a fish that is too large or relatively deep-bodied. The chicks can only eat small, elongate fish, but if the parent cannot supply them, the chick will perish. Therefore, despite an abundance of larger fish that may be preferred food for an adult least tern, an inadequate supply of smaller fish will reduce chick survival.

Conflicting uses of southern California beaches during the tern nesting season have precluded the use of natural nesting sites. Because of the lack in availability of large expanses of beach, many colony sites have been restricted to small discrete areas often protected by fencing. Although this species is loosely colonial in nature, least terns have been artificially concentrated within these

fenced areas, often off to one side of heavily used public beaches or on tiny man-made islands, since beach front property is at such a premium for human usage. The adults, eggs, and young are thus confined rendering them susceptible to major problems such as predation and disturbance events with limited options to relocate. Hence, predator control constitutes one of the most crucial management strategies for reproductive success. Known problem predators of least tern adults, young, or eggs include the red fox, house cats and dogs, American kestrel, American crow, burrowing owl, loggerhead shrike, common raven, coyote, and others.

Episodic losses have also been attributed to cold, wet weather, extreme heat, dehydration and starvation, unusually high surf or tides, and human disturbance. Human disturbance is a primary problem at several colonies. Additionally, the "El Niño" warm sea current phenomenon can have deleterious long term effects on the entire least tern population. During the El Niño event of 1982-1983 diminished fish populations throughout the southern California bight caused a drastic reduction in least tern breeding success resulting in the lowest annual production of fledged young on record (Massey 1988, Massey et al. 1992). Subsequently, it took 5 years for the population to recover from this event. El Niño conditions were also evident during the 1992 breeding season which also resulted in a much reduced statewide production of fledglings (Caffrey 1993).

Breeding activity of least terns has been documented at Camp Pendleton since 1969. Beginning in 1983, the Naval Surface Forces, Pacific Command on behalf of Assault Craft Unit-Five and the Landing Craft Air Cushion has funded specific management efforts. These activities include an intensive nest monitoring program to determine reproductive success, an adult banding program to study the demographics of the North Beach ternary, and implementation of a predator control program. This continued effort by the U.S. Navy as part of their mitigation obligation under the Final Environmental Impact Statement (FEIS) for Alternative Location of a Landing Craft Air Cushion (LCAC) Operational Complex on the West Coast of the United States (Naval Facilities Engineering Command 1983) with additional support in the form of fencing, posting, and fence maintenance by MCB Camp Pendleton has significantly contributed to the protection of least tern breeding areas on Camp Pendleton.

Mitigative measures set forth in the LCAC FEIS include a number of measures to be implemented which protect sensitive coastal resources. Among these are: the designation of a Cockleburr Sensitive Area which includes all land lying west of Interstate 5

and north of the Cockleburr Beach Access Road to the southern bluffs of the French Creek Marsh; continuation of the Santa Margarita River Estuary as a restricted area in order to eliminate human disturbance; no activities are to be permitted within the Santa Margarita River Estuary that would reduce the amount of Belding Savannah Sparrow nesting habitat; expansion of the least tern management program to include any nesting sites found south of French Canyon; re-establish displaced AMTRAC lanes to avoid sensitive biological areas; study the food chains which support least tern and light-footed clapper rail; and conduct annual Belding Savannah Sparrow surveys.

In 1992 MCB Camp Pendleton entered into formal consultation with the Service regarding training activities at the White Beach ternary. A Biological Opinion (1-6-92-F-49) was rendered which included Reasonable and Prudent Measures to minimize incidental take. In addition, the Service set forth terms and conditions that included the construction of a permanent fence, substrate modification to alleviate soil compaction due to flooding conditions prior to each breeding season, and continued protection, monitoring, and management of the White Beach tern colony.

Within the confines of MCB Camp Pendleton, least terns nest at the Santa Margarita River Estuary (North Beach, Salt Flats, Salt Flats Island) and at White Beach (Aliso Creek extending down coast to French Creek Lagoon) which is approximately 5.8 km north of the Estuary. Least terns nested along the most northern portion of the Base at San Mateo Creek mouth in 1981 but have since not been documented at this location which is now leased to the California State Parks Department.

Presently, the Santa Margarita River Estuary represents one of the few relatively unmodified nesting areas remaining in southern California supporting the largest number of breeding pairs in the State. Between 1990 and 1994, the number of breeding pairs at the Estuary ranged from 244 to 446 representing 17% to 18% of the Statewide population. In addition, the number of fledglings produced during this same time period ranged from 201 to 455 representing from 14% to 25% of the total Statewide least tern production (Caffrey 1994, Caffrey 1993, Johnston and Obst 1992, Obst and Johnston 1992).

The breeding colony at White Beach has not been as productive relative to the Santa Margarita River nesting area although nesting pairs have increased subsequent to the total abandonment of the

colony in 1987 through 1988 as a result of predation pressures. The White Beach site has at time experienced higher rates of abandonment during some years as in 1993 when 14% of the eggs were abandoned compared to 6% abandonment of eggs at the North Beach colony. Chick survivorship rates have also been lower at this nesting area as was in 1993 with only 0.26 survivorship compared to the nest sites located at the Estuary which had a survivorship rate of 0.59. Although chick survivorship data can be biased at the White Beach site because of increased vegetation and the difficulty of recapturing chicks at this location, it as been suggested that the higher abandonment rate may be a result of human disturbance (Belluomini 1994).

The White Beach nesting site is a relatively natural setting relative to the numerous managed urban sites within southern California and, because of its distance from the Santa Margarita River Estuary, provides an alternate nesting location in the event of natural or human induced perturbations at the Estuary.

Least tern foraging areas which have been identified on Camp Pendleton include near shore ocean waters, Santa Margarita River Estuary, Stuart Mesa sewage ponds, Windmill lake, and French Creek Lagoon (Atwood and Minsky 1983).

Despite efforts to protect least tern nesting areas on Camp Pendleton, human disturbances have been documented at the nesting colonies including helicopter flyovers below 500 ft, unauthorized persons entering fenced nesting areas, unauthorized vehicle entry into nesting areas, destruction and vandalism of nesting colony fences, unauthorized camping activities adjacent to nesting areas, and jet ski invasion into the estuary during the breeding season as well as jet skiers unauthorized use of the beaches directly adjacent to the North Beach nesting colony (Belluomini 1991a, 1991b, 1992, 1994). Vehicular traffic along the beachfront is believed responsible for the death of a juvenile least tern found within vehicle tracks outside the fenced area at North Beach (Belluomini 1991b).

Responses to helicopter disturbances has varied from no response from least terns to the flushing and continued disruption of the entire North Beach colony for 7 minutes. Most of the reported disturbances occurred during helicopter flights less than 500 feet above ground including the flight pathway over the Santa Margarita Estuary to a landing zone located at Camp Del Mar.

5 WESTERN SNOWY PLOVER

Poor reproductive success resulting from human disturbance, predation, and inclement weather, combined with permanent or long-term loss of nesting habitat to urban development and the encroachment of the introduced beachgrass (*Ammophila arenaria*) has led to the decline in active nesting colonies as well as an overall decline in the breeding and wintering population of the western snowy plover (*Charadrius alexandrinus nivosus*) (snowy plover) along the Pacific coast of the United States. As a result of these factors , the Pacific coast population of the western snowy plover was listed as a threatened species on March 5, 1993 (58 FR 12864).

Proposed critical habitat designation considers those physical and biological attributes that are essential to the conservation of the species and that may require special management considerations or protection. Primary physical and biological features (constituent elements) which are determined to be essential for the conservation of the western snowy plover are provided by intertidal beaches (between mean low water and mean high tide), associated dune systems, and river estuaries (60 FR 11768). Important components of the beach/dune/estuarine ecosystem include surf-cast kelp, sparsely vegetated foredunes, interdunal flats, spits, intertidal flats, and salt flats. Functional suitability is also contingent upon isolation from human disturbance and predation (60 FR 11768). Activities that could adversely affect proposed critical habitat include human associated disturbance of beaches including the operation of off-road vehicles, vehicles driven at night, actions which promote unnatural rates of predation, actions that would promote the invasion of non-native vegetation, shoreline erosion projects, and contamination events (60 FR 11768). The proposal to designate western snowy plover critical habitat was published on March 2, 1995 (60 FR 11768).

Key nesting areas on Camp Pendleton were not proposed for critical habitat designation with the understanding that the present consultation would ensure adequate protection to the snowy plover and its habitat in lieu of official designation (60 FR 11768).

The breeding range of the western snowy plover extends along coastal beaches from the southern portion of Washington State to southern Baja California, Mexico. Larger concentrations of breeding birds occur in the south than the north, suggesting that the center of the plovers' coastal distribution lies closer to the southern boundary of California (Page and Stenzel 1981). Prior to 1970, snowy plovers

bred at 53 locations along coastal California (Page and Stenzel 1981). Presently, breeding occurs at only 20 locations representing a 62% decline in breeding sites. The greatest losses of habitat have occurred in southern California where breeding western snowy plovers have vanished from parts of San Diego, Ventura and Santa Barbara counties, most of Orange County, and all of Los Angeles County. In all these areas the plovers' absence can be correlated with industrial or residential development and/or heavy recreational use of former beach nesting areas (Page and Stenzel 1981).

In addition to the loss of nesting habitat, the breeding population of the western snowy plover in California, Oregon, and Washington has experienced a 17% decline between 1977 and 1989 (Page et al. 1991). The breeding population in California has declined from an estimated 1565 adults in 1980 (Page and Stenzel 1981) to 1386 adults in 1989 with a 55% decline occurring in north San Diego County and a 41% decline at San Diego Bay (Page et al. 1991). Survey data also indicate a decline in wintering snowy plovers, particularly in southern California. Christmas Bird counts conducted from 1962 to 1984 show a significant decrease in the number of snowy plovers in southern California despite increased observer participation (Page et al. 1986). The coastal population of the western snowy plover consists of both resident and migratory birds with some birds wintering in the same areas used for breeding (Warriner et al. 1986, Powell and Collier 1994).

Snowy plovers breed in loose colonies with the number of adults at coastal breeding areas ranging from 2 to 318 (Page and Stenzel 1981). Sand spits, dune backed beaches, sparsely to unvegetated beach strands, open areas around estuaries, and beaches at river mouths are the preferred coastal nesting areas of the western snowy plover (Stenzel et al. 1981, Wilson 1980). Other areas utilized by nesting snowy plovers include dredge spoil fill, dry salt evaporation ponds, and salt pond levees (Widrig 1980, Wilson 1980, Page and Stenzel 1981). Nest sites typically occur in flat, open areas with sandy or saline substrates with little or no vegetation (Widrig 1980, Wilson 1980, Stenzel et al. 1981). The majority of snowy plovers are site faithful returning to the same breeding location in subsequent breeding seasons.

The breeding season of the western snowy plover extends from March 1 through September 15. Egg laying begins in mid-March and continues through mid-July. Generally, 3 eggs are laid in a nest which consists of a shallow depression scraped in sandy or saline substrates. Incubation does not begin until the full clutch is laid

and continues for 27-33 days with an average of 27 days before eggs are hatched (Warriner et al. 1986). Both sexes incubate the eggs. Snowy plover chicks are precocial and leave the nest within hours of hatching in search of food. Broods rarely remain within the nesting territory (Warriner et al 1986, Stern et al 1990b). Birds are able to fly within approximately 31 days of hatching. Snowy plovers will renest after loss of a clutch or brood (Wilson 1980, Warriner et al. 1986). Double brooding and polygamy have been observed in snowy plovers along coastal California (Wariner et al. 1986). If polygamous, snowy plover females may abandoned chicks as young as 6 days old to find another mate. This leaves the male as the only adult to care for the brood (Warriner et al. 1986). Males attend their young for 29-47 days (Warriner et al. 1986). Renesting may occur within the initial colony or snowy plovers may move to another nesting site (Warriner et al. 1986, Powell and Collier 1994).

Snowy plovdr adults and young forage on invertebrates along intertidal areas, along beaches in wet sand and surf cast kelp, in foredune areas of dry sand above the high tide, on salt pans, and along the edges of salt marshes and salt ponds. Page et al. (1981) observed snowy plovers moving between salt pans, tidal flats, and beaches indicating these areas function together in providing habitat for the species.

Human activities which have a detrimental effect to nesting snowy plovers include unintentional disturbance and destruction of eggs and chicks, off-road vehicle use, horse-back riding, and beach raking. Intensive beach use by humans has resulted in abandonment of nesting sites, and reductions in nesting density and nesting success.

Human disturbance can interfere with normal snowy plover behavior. Disturbances to incubating adults can leave nests exposed to extreme temperatures resulting in non-viable eggs or blowing sand which buries the eggs. Snowy plover chicks which are separated from their attending adult as a result of human disturbances or predators may become more susceptible to hypothermia since young chicks are unable to thermoregulate. It has been shown that increased human disturbance forces piping plover chicks (*Charidrius melodius*) to expend more energy avoiding disturbances and less time foraging (Flemming et al. 1988). Frequently disturbed piping plover chicks fed less often and at a reduced rate with fewer chicks surviving to 17 days in areas heavily disturbed by humans (Fleming et al. 1988).

Areas which receive significant off-road vehicle activity support

lower densities of plover nests (Page and Stenzel 1981). Powell and Collier (1994) reported a shift in beach usage by snowy plovers from areas of heavy vehicular traffic to more protected sites. Direct mortality to snowy plovers as a result of vehicular activity on beaches has been documented (Persons 1994). Research has shown a decrease in piping plover chick survivorship with as little as 10 vehicular passes per day (Melvin et al. 1994). Snowy plovers, especially the flightless young, are particularly vulnerable to being run over or trampled since crouching in depressions such as footprints and tire tracks appears to be a behavioral characteristic.

Western snowy plovers are present year-round along the 27 km coast of Camp Pendleton (Page and Stenzel 1981, Page et al. 1986, James et al. 1992, Powell and Collier 1994). The breeding population is estimated at 110 individuals (A. Powell pers. com.) and is concentrated along the southern portion of Camp Pendleton's coastline including the salt pan of the Santa Margarita River Estuary. Snowy plovers are often found nesting in association with California least terns.

During the 1994 nesting season, snowy plover breeding surveys were conducted throughout San Diego County. Snowy plover nesting was reported at 11 sites including 5 locations at Camp Pendleton (North Beach, Salt Flats, Salt Flats Island, White Beach and French Creek Lagoon). The results of this investigation reported that more than half of the western snowy plover breeding population in the County is located at Camp Pendleton supporting 54% of the total nest initiations (Powell and Collier 1994). Reproductive success was reported at 0.40 fledglings/nest for Camp Pendleton and ranged County-wide from 0.25 to 1.67.

Of the 43 nests located at Camp Pendleton in 1994, 44% (19) nested within fenced least tern colonies while the remaining 56% (24) initiated nests outside fenced areas. The majority of nests were found along the beach fronting the Santa Margarita River Estuary (North Beach). The Salt Flats had the second highest number of nest initiations followed by French Creek Lagoon and White Beach.

Not only does Camp Pendleton support a significant proportion of breeding snowy plovers relative to San Diego County, it has the largest breeding population south of Ventura County. In addition, Camp Pendleton represents the only active nesting location, with the exception of Bolsa Chica in Orange County (3 pairs reported in 1993), in the geographical gap spanning from the northern border of

San Diego County to Ventura County.

Other areas utilized by snowy plovers at Camp Pendleton include Del Mar beach, the beach area extending north of the fenced North Beach least tern colony, Cockleburr Canyon pocket beach, Las Flores Creek mouth, and San Onofre Beach (Page et al. 1986, James et al. 1992, Powell and Collier 1994, C. Waters unpubl. data). Nonbreeding birds averaged 50 individuals for the months of September and October with a number of color-marked individuals remaining after breeding on site (Powell and Collier 1994). Identified foraging areas include the mudflats of the Santa Margarita River Estuary, the tide-line along the beaches from North Beach to White Beach, and French Creek Lagoon.

Since the western snowy plover nests among California least terns at Camp Pendleton, snowy plovers would be subjected to the same human disturbances reported for the least tern colonies. These disturbances include helicopter flyovers below 500 ft, unauthorized persons entering fenced nesting areas, unauthorized vehicle entry into nesting areas, destruction and vandalism of nesting colony fences, unauthorized camping activities adjacent to nesting areas (a snowy plover nest containing one egg was found in the midst of an encampment), and jet ski invasion into the estuary during the breeding season as well as jet skiers unauthorized use of the beaches directly adjacent to the North Beach nesting colony (Belluomini 1991a, 1991b, 1992, 1994).

6 TIDEWATER GOBY

The tidewater goby (*Eucyclogobius newberryi*)(goby) was first classified as a category 2 candidate for federal listing in 1982 (47 FR 58454). The species was reclassified as a category 1 candidate in 1991 (56 FR 58804). A proposed rule to list the tidewater goby as endangered was published on December 11, 1992. As a result of past and continuing loss of coastal and riparian habitats within the historic range of the tidewater goby, a final rule designating the tidewater goby as endangered was published on February 4, 1994 (59 FR 5494-5498). Critical habitat for the tidewater goby has not been designated.

The goby, a California endemic (Swift et al. 1993), is restricted to brackish water habitats in the upper portions of coastal lagoons along the California coast. Gobies are discontinuously distributed throughout California, ranging from Tillas Slough in Del Norte County south to Santa Margarita River (Swift 1993 et al.) or

Cockleburr Lagoon (Swift et al 1994), both in San Diego County. Areas of precipitous coastlines that preclude the formation of lagoons at stream mouths have created three natural gaps in the distribution of the goby. Gobies are apparently absent from three sections of coastline between: 1) Humboldt Bay and Ten Mile River, 2) Point Arena and Salmon Creek, 3) and Monterey Bay and Arroyo del Oso. Roughly 10% of the coastal lagoons presently containing populations of gobies are under Federal ownership. Around 40% of the habitat is either entirely or partly owned and managed by the State. The remaining 50% is privately owned.

Historically the tidewater goby occurred in at least 87 of California's coastal lagoons (Swift et al. 1989). Since 1900, it has disappeared from approximately 50 percent of formerly occupied lagoons. A rangewide status survey conducted in 1984 found that 22 historic populations of tidewater goby had been extirpated (Swift et al. 1989). Only 5 years later, a status survey documented the disappearance of an additional 21 populations. Losses in southern California have been the greatest, including 74% of the coastal lagoons south of Morro Bay. Over a 6 year period a 35% decline in the tidewater goby species has occurred rangewide (Swift et al. 1991, Holland 1991, 1992). Of the 43 remaining tidewater goby populations identified by Swift et al in 1990, only 14 localities exist south of Point Conception (Swift et al 1993).

Tidewater gobies have disappeared from many localities, are continuing to disappear rapidly (Swift et al 1993), and rarely recolonize (Swift et al 1989). The tidewater goby only survives in a few coastal lagoons and river mouths in southern California that are, at least partially, in a natural state (Swift et al 1993). Of the remaining tidewater goby populations identified by Swift et al. (1993), most are small and threatened by a combination of human and natural factors. Loss of tidewater goby populations have been largely attributed to coastal development, stream channelization, alteration in flow regime, water quality reductions and salinity, changes of coastal lagoons, groundwater overdrafting, predation by non-native fishes, cattle grazing, and feral pigs. In addition, the tidewater goby's decline is exacerbated by its low vagility (tendency to become widely dispersed) relative to other California estuarine gobies and its narrow adaption to, and preference for, the low salinity conditions of the, upper portions of coastal lagoons and estuaries in California (Swift et al. 1994).

Water reductions and drought have combined to cause reduction in the habitat of the tidewater goby. The reductions in habitat make it

less likely that native fishes like tidewater goby will be able to expand their range with the return of wetter conditions. Low water conditions concentrate gobies in the larger pools which are favored by some introduced species, particularly green sunfish, one of the noted predator/competitors of tidewater goby. (Swift et al. 1993)

The goby is a small fish, rarely exceeding 50 mm in length, and is characterized by large pectoral fins and a ventral sucker-like disk formed by the complete fusion of the pelvic fins.

A member of the family Gobiidae, the tidewater goby is the only species in the genus *Eucyclogobius* and is almost unique among fishes along the Pacific Coast in its restriction to waters with low salinities in California's coastal wetlands. All life stages of the goby are found at the upper end of the lagoons in salinities less than 10 parts per thousand. Although its closest relatives are marine species, the tidewater goby does not have a marine life history phase. This lack of a marine phase severely restricts the frequency of genetic exchange between coastal lagoon populations and significantly lowers the potential for natural recolonization of a locality once extirpated. Studies by Crabtree (1985) noted that some populations of gobies have differentiated genetically, indicating a long period of isolation. Tidewater gobies have a short lifespan and seem to be an annual species (Irwin and Stoltz 1984, Swift 1990), further restricting their potential to recolonize habitats from which they have been extirpated.

The basic habitat requirements for the tidewater goby within coastal brackish water include sufficient quality and amount of water, suitable temperature and salinity regimes, suitable substrates for burrowing and nesting, adequate food base, a lack of exotic competitors/predators, and sites for protection from hydrological extremes.

Good water quality is the most critical parameter in terms of fish survival (U.S. Fish and Wildlife Service 1995 [Jerry Berg memo 03/10/95]). These parameters include temperature, dissolved oxygen, pH, nitrogen, carbon dioxide, phosphates, biological and chemical oxygen demand, alkalinity and hardness, bicarbonate, total dissolved solids, chloride, sulfate, and silicon.

Tidewater gobies generally occur in loose aggregations of a few to several hundred individuals on the substrate in shallow water less

than 1 meter deep (Swift et. al. 1989), although gobies have been observed at depths of 1.5 to 2.3 meters (Holland, in litt. 1993). Peak nesting activities commence in late April through early May, when male gobies dig a vertical nesting burrow 10 to 20 centimeters deep in clean, coarse sand. Suitable water temperatures for nesting are 18 to 22°C with salinities of 5 to 10 ppt. Male gobies remain in the burrow to guard eggs, which are hung from the ceiling and walls of the burrow until hatching. Larval gobies are found midwater around vegetation until they become benthic (Swift et. al.1989). Although the potential for year round spawning exists, it is probably unlikely because of seasonal low temperatures and disruptions of lagoons during winter storms. Ecological studies performed at two sites documented spawning as early as the first week in January (Swenson in litt. 1993). Although usually associated with lagoons the tidewater goby has been documented in ponded freshwater habitats as far as 5 miles upstream from San Antonio Lagoon in Santa Barbara County (Irwin and Stoltz, 1984).

No brackish marshes or coastal lagoon exist in southern California in the conditions that were present at first European contact. A few, mostly small streams have remained relatively unchanged by human activity, including four lagoons on Camp Pendleton. The Santa Margarita Lagoon was noted as particularly important as it is (or was) one of only two remaining lagoons in southern California with a full complement of bay gobies. (Swift et al 1993)

The tidewater gobies present on Camp Pendleton represent the only known extant populations of the species south of the Santa Clara River (Holland 1992), besides a population re-introduced to Malibu Lagoon in 1991 (Swift et al. 1993). Crabtree (1975) found distinctive genetic features in gobies taken from San Onofre Creek which was the southernmost goby population sampled. Because the goby populations on Camp Pendleton represent the southern most extant population of the species, their existence may be tenuous since small peripheral populations of a species are more susceptible to extirpation (Lawton, 1993).

Surveys conducted in 1990-1991 by Holland (1992) reported the presence of tidewater goby at only three watercourses: San Onofre Creek, Las Flores Creek, and the Santa Margarita River Estuary. These three populations of goby were estimated to constitute approximately 7% of the entire Statewide goby population at that time. During surveys conducted on Camp Pendleton in 1993, tidewater gobies were located within four lagoons: San Mateo, Las Flores, Hidden, and Cockleburr (Swift et al. 1994). Although gobies were

absent or so scarce as to not be detected at the Santa Margarita River Estuary or San Onofre Creek in 1993, Hidden Lagoon represented a new locality for the species. It is estimated that San Mateo, Hidden, and Cockleburr lagoons each have fewer than 1,000 tidewater gobies, and in Las Flores Lagoon about 7,000 (Swift et al. 1994). Hidden lagoon was noted to be dry in 1994 (Camp Pendleton 1994a).

On Base, Swift et al. (1994) noted "the small numbers of fish per lagoon and the drastic changes in population sizes in the last twenty years indicates that these populations and the other lagoons that have held gobies in recent years need protection." "The tidewater goby is the only [southern California] coastal fish in jeopardy, but a whole suite of other threatened organisms requires this habitat for survival." (Swift 1993 et al.)

A total of six coastal lagoons and creek mouths on Camp Pendleton Marine Corps Base have been known to support tidewater goby. Populations on Camp Pendleton are remnants isolated in southern California, and are the southernmost populations known today. Native populations no longer occur in Los Angeles or Orange counties, or elsewhere in San Diego County. Las Flores lagoon has the largest population and is the least impacted by human activities (Swift et al. 1993). San Mateo and Cockleburr have smaller, viable populations, but both localities have histories of wide fluctuations in population size, including complete loss of the fish. Hidden lagoon supported a large population, but was hypersaline at the time of Swift's study (1994) and may have dried up in 1994 (Camp Pendleton 1994a). Winter floods filled much of the San Onofre lagoon area with sediment in 1992-93, and that lagoon virtually dried up in the summer of 1993; No tidewater gobies were detected in San Onofre Lagoon in 1993; 99 percent of the watershed for San Onofre is on Base (Camp Pendleton 1995a). In the Santa Margarita Lagoon, tidewater gobies were absent or so scarce that none were detected in 3.25 days of intensive collecting. The reasons for their absence are not known but could include being flushed out by high winter flows (1992-93) and predation by, or competition with, introduced fishes (Swift et al 1994).

Poor water quality impacts most, if not all, of the lagoons on Base (Swift et al. 1994). Sewage effluent provides surface water that is much warmer than natural waters emerging from underground sources and carries a high nutrient load which favors introduced aquatic species and puts the native fauna at a competitive disadvantage (Swift et al 1993). Enriched sewage effluent can increase the consumption of dissolved oxygen, and therefore decrease the

available oxygen for fish(Swift et al. 1994). Non-point source farming activities could severely impact the lagoons (Swift et al. 1994). San Mateo and Santa Margarita rivers are adjacent or below farming activities that apply fertilizer and pesticides which run off into the watershed. In addition, Holland (1992) noted that an accident on Interstate 5 or the railroad tracks that cross at or just above each lagoon could severely threaten a whole lagoon.

Arundo and tamarisk are prominent exotics on Base and are known to alter channel conditions and harm native species elsewhere (Ohmart et al. 1998) and may impact lagoons here as well (Swift et al 1994).

The tidewater goby on Base is almost undoubtedly an isolated meta-population. Since re-colonization has apparently occurred numerous times, the potential on Base must be considered moderate. Of the eight coastal lagoons and creek mouths on Base, (at a minimum) the six lagoons with historic populations have potential to support gobies in the future. In order to protect against expected natural (flood, drought, etc.) and unnatural (non-native competitors, pollution, accidents, unnatural sedimentation, etc.) stochastic events, all potential lagoon sites need to be viable. All six historic lagoon locations are tidewater goby habitat.

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APPENDIX 3

EFFECTS OF THE PROPOSED ACTION

1 INTRODUCTION

This analysis examines the impacts resulting from the entire suite of proposed actions. The purpose of this analysis is threefold: 1) to enable the Service to reach a conclusion with respect to jeopardy; 2) to enable the Service to estimate the number of species individuals that will be incidentally taken; and 3) to enable the Service to formulate reasonable and prudent measures (or alternatives) and terms and conditions. Focus will be on impacts that may occur in both riparian and estuarine/beach ecosystems. These impacts may be direct or indirect, permanent or temporary. Before analyzing the impacts of each specific action or project, we will consider various potential impacts in a general fashion.

The proposed project involves training and operations, facilities maintenance, recreation, nineteen (19) currently proposed construction projects, future Base activities and projects, and conservation plans. Most of these have indirect, interdependent and inter-related activities and effects associated with them. The conservation plans have been designed to address currently proposed activities and projects as well as future actions not presently specified. Many of the specific activities and projects could affect riparian and estuarine/beach ecosystems and result in loss of habitat values. Many of them could have significant impacts to the species considered herein.

2 ONGOING TRAINING ACTIVITIES/REQUIREMENTS

2.1 Vehicle Operations

2.1.1 Riparian

Vehicle travel occurring on existing roads has minimal direct effect on the riparian vegetation dependent upon by vireo and flycatcher. Since little vehicle operation occurs off-road, direct destruction of native vegetation is generally expected only during accidents and illegal activity.

Although numerous roads traverse alongside and within riparian zones, two known occurrences of vehicles colliding with vireo have been recorded on Base. Most vehicle strikes undoubtedly go

unnoticed and unreported. Nevertheless, military vehicle strikes of vireo and flycatcher are likely to be minimal. Approximately 185 to 287 miles (Appendix G in BA) of secondary dirt roads pass through or are adjacent to riparian areas, approximately half of which occur in the Santa Margarita River and San Mateo Creek drainages. As part of training activities, up to approximately 50 cars and 25 track vehicles a day will use these roads, mostly during daylight hours.

Substantial localized mortality to arroyo toads may result from vehicle operations on dirt roads. Within or adjacent to riparian zones, a high potential exists for this low mobility animal to occur in unvegetated areas like dirt roads during certain times of the year. If arroyo toads are present, vehicles fording riparian areas at crossings could easily crush toad eggs, juveniles, and/or adults (Sweet 1991) or cause eggs of juveniles to be swept downstream (Sweet 1993).

Noise[1] and vibration associated with military vehicle travel within and alongside riparian areas during the breeding season likely causes temporary disturbance to vireo and flycatcher. Disturbance can occur during the day (mainly due to song/call masking) or night (disruption of rest, etc.). Arroyo toads may be disturbed by vehicle operations during the night (noise, lights, spot lighting, etc.) although vehicle operations at night are expected to be comparatively infrequent. During dry periods, dust associated with vehicle passage may blanket riparian vegetation adjacent to roads, reducing the photosynthetic activity of affected plants and community functioning. Dust from vehicles will also reduce the availability of invertebrate forage for arroyo toad, flycatcher and vireo adjacent to unpaved roads. Dust may also affect the vireo and flycatcher through reduction in air quality, causing abandonment of otherwise occupiable habitat. Nighttime lighting impacts associated with vehicle operations are likely restricted to the immediate areas alongside of roads, and are probably infrequent enough to be considered minor.

Weed propagation from vehicle activities may affect vireo, flycatcher, and arroyo toad habitat. The propagules of invasive weeds (such as *Arundo*, sweet-fennel, tobacco tree, pampas grass, tamarisk, Russian thistle. etc.) may be carried by equipment. The transport of these weed propagules (seeds mostly), plus the soil

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[1]Refer to Appendix 6 for more extended discussion of effects resulting from noise.

disturbance from the activity itself may increase the propagation of weeds in riparian areas adjacent to the shoulders of the roads on Base. Arroyo toad, vireo, and flycatcher habitat is generally degraded by invasion of exotic plant species.

Reduction in water quality can be anticipated from vehicle activity. Many vehicles lose fluids such as oil and coolant, as drips or leaks, which ultimately may enter receiving waters as run-off. Vehicles in contact with water in streambeds on Base exacerbate this problem. Vehicles traveling on unpaved roads constantly loosen soil material which may be transported in surface run-off to receiving waters as sediment. Although sediment in run-off is natural, especially following natural fire, constant large quantities of sediment in waters year after year is abnormal and reduces their quality. Data is limited regarding the Base's contribution to soil erosion runoff and sediment loads in the various watersheds.

Re-mobilization of silt can be expected by vehicle activity within the many crossings on Base. This mobilization of silt blankets gravel and sand substrate in pools. Arroyo toad eggs and hatched larvae up to the free swimming stage, are unable to avoid being killed by burial in this sediment (Sweet 1993).

Reductions in water quality has undetermined impacts on vireo and flycatcher forage bases, but these impacts may be minimal.

2.1.2 Estuary/Beach

During the breeding season approximately 20 military vehicles per weekday travel within a few meters of fenced least tern and snowy plover breeding sites and foraging areas. These 20 vehicles equate to 40 traverses (one trip up coast and one trip to return x 20 vehicles) per day along breeding and foraging areas of snowy plovers and least terns. Chick fencing employed at the least tern colony prevents the majority of least tern nests and chicks from encounters with traffic. Nests and chicks located outside the barrier could be subjected to being crushed as a result of direct impacts from vehicular beach traffic, but management measures, in this case vehicles staying in the shallow water, will significantly reduce this impact. This is especially true for flightless snowy plover chicks which forage at the tide-line and are prevented from seeking refuge in the foredunes by the existing tern colony fence. Incorporation of openings in the fences as suggested by the Service should provide a better management option for the species which will minimize this impact.

Direct mortality to both species may occur when roosting fledglings and adults are flushed by passing vehicles. As the amount of vehicle traffic increases, the likelihood of vehicles inadvertently entering nesting areas also increases.

Vehicular operations along the beach may adversely effect snowy plover chick survivorship by: a) separating young snowy plover chicks from the single attending parent, leaving them susceptible to hypothermia; b) forcing plover chicks to expend energy reserves attempting to avoid vehicles; and c) disrupting their foraging behavior.

Vehicle traffic within foredunes along the beach could damage dune habitat and preclude snowy plovers from utilizing these areas for nesting, foraging, and refuge, but this is averted by avoiding such areas and using existing ingress/egress routes. Noise and visual impacts associated with vehicular traffic may temporarily disrupt adult snowy plover and least tern behaviors including roosting, foraging, and incubation of nests. Vehicular traffic during the non-breeding season is expected to disrupt feeding and roosting behavior of adult snowy plovers[2].

Persistent disturbance by vehicular traffic may result in nest abandonment by both species.

Vehicular traffic along beaches may be precluding snowy plovers from nesting at areas such as Cockleburr Beach and Red Beach (Las Pulgas), but without more data this is conjectural.

Depressions in the sand created by vehicular traffic, although temporary, may entrap snowy plover chicks, prevent young from reuniting with adults, expose chicks to predators, and prevent chicks from fleeing ongoing military and recreational activities. Management activities, including predator control and customized fencing would minimize the chance of take in such situations.

Reductions in water quality due to vehicular operations upstream could affect the tidewater goby, but it is not anticipated that vehicular operations will result in significant water quality reduction. Water quality monitoring performed in the estuary could be used to evaluate the situation.

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[2]The resident or migratory status of wintering plovers on Base is not clear.

2.2 Infantry Operations

2.2.1 Riparian

Noise and other disturbance resulting from large groups of Marines moving on roads alongside riparian areas during the breeding season may cause disturbance to vireo and flycatchers (Appendix 1). Foot traffic in riparian areas during nesting season could destroy vireo and flycatcher nests and cause disturbance. The Base has taken precautions, including signage, patrols and education, to minimize unauthorized foot traffic to the maximum extent practical. Authorized foot traffic adjacent to vireo and/or flycatcher occupied habitat may also disturb these species. Marines patrolling through riparian areas during the non-nesting season may negatively affect these areas by matting or breaking vegetation, transporting weed seed, creating trails, and compacting soils. These effects would mostly be short-lived if not repeated. Adult and juvenile arroyo toads may be susceptible to crushing by trampling as a result of troop foot traffic at riparian crossings and other (particularly sandy) areas, including roads. Foot traffic occurring during the dry periods of the non-breeding season when adult toads are estivating would likely have minimal impacts to arroyo toad, as their burrows would not likely be crushed under the weight of limited foot traffic. Silt released from human activity (crossings) in water bodies can cause mortality to arroyo toad eggs and larvae. The recurrence of this siltation at intervals of less than 5 days can prevent all or large portions of arroyo toad clutches in the area from hatching and/or dispersing without mortality (please see the species account for the arroyo toad).

2.2.2 Estuary/Beach

Although fencing is maintained to protect their nesting colonies, inadvertent trampling of snowy plover and least tern nests and chicks located outside fenced areas may occur as a result of infantry operations conducted in the vicinity of nesting sites.

Infantry troop movement along the beach is likely to disrupt foraging behavior of snowy plover chicks and adults that are present. These movements may cause snowy plover chicks to become separated from the attending adult resulting in increased susceptibility to hypothermia. Infantry movements likely cause increases in energy expenditures which may subsequently decrease chick survival; this could occur as snowy plover chicks attempt to relocate out of the path of marching troops.

Several hundred Marines marching adjacent to least tern and snowy plover nesting areas could create dust, human presence, and noise that may disrupt incubating or brooding adults. This is likely to result in exposure of eggs or chicks to extreme temperatures, blowing sand, and predators. Persistent disturbance by foot traffic may result in abandonment of least tern and snowy plover nests. Each of these potential impacts are avoided or significantly reduced by programmatic instructions that do not allow such congregations of troops within 1000 feet of posted or fenced nesting areas.

Ongoing infantry training may be precluding snowy plovers from nesting at areas such as Cockleburr Beach and Red Beach (Las Pulgas). This merits further study.

Unauthorized disposal of garbage from infantry troops in the vicinity of breeding least tern and snowy plover locations attracts predators which subsequently could depredate eggs and chicks of both species. The Base requires troops to maintain the integrity of sensitive (and non-sensitive) areas during operational exercises. This includes use of latrines, proper trash disposal, policing areas after exercises for trash, and other measures. Also, the Base's predator control program monitors and suppresses predators in the vicinity of the nesting areas.

2.3 Engineering Operations

2.3.1 Riparian

No impacts to riparian areas appear to be associated with this activity since it is not proposed in riparian areas.

2.3.2 Estuary/Beach

Although grading activities are not proposed to occur within 1,000 feet of estuarine/beach nesting areas, equipment accessing and traversing the beaches in the vicinity of breeding areas may crush nests and flightless snowy plover and least tern chicks outside of the fenced nesting areas. Vehicular traffic associated with engineering operations may result in collision with least terns and snowy plovers as they flush to avoid vehicles and cause separation of snowy plover chicks from adults. It may also cause the disruption of foraging behavior of both chicks and adults. Least tern adults and fledglings roosting along travel lanes may be temporarily disturbed by engineering activity.

Deep ruts in the sand created by vehicles/equipment such as dozers, graders, and heavy trucks may entrap snowy plover chicks. This may prevent young from reuniting with adults and expose them to predators, as well as prevent them from fleeing the encroachment of engineering operations. Persistent disturbance from vehicle traffic may result in abandonment of least tern and snowy plover nests.

2.4 Helicopter Operations

2.4.1 Riparian

An increase in disturbance from helicopters would be expected with the proposed reassignment of 48 helicopters to Camp Pendleton (for a total of 166 helicopters).

Accidents occurring in riparian zones can have profound impacts on all listed riparian species. Helicopter accidents do occur occasionally on Base. An accident occurring in a riparian area could result in fire, chemical contamination, or disruption of habitat from wreckage recovery efforts. Nevertheless, most of the direct effects anticipated from helicopter operations will likely result from noise. The Service has used 60 dBA L_{eq} hourly as a practical threshold above which significant impacts to least Bell's vireo may occur (please see Appendix 6).

There is some data sets to support the hypothesis that noise beyond a certain level can be detrimental to the reproductive success of vireos. A 1989 SANDAG study theorized that noise levels above 60 dBA in vireo breeding areas might impact their reproductive success. The 60 dBA threshold is based on a theoretical analysis of continuous highway noise and may not be applicable to intermittent helicopter noise. In a study sponsored by the Base, Mock (1994) superimposed noise contours generated from an acoustic model specific to MCAS operations on nesting locations identified by Griffith and Griffith (1991). Those nests located outside "high level" noise contours were 3-11% more successful (fledging 1 or more young) than those nests located inside. Ogden Environmental and Energy Services has been contracted by the Base to test the validity of these results by ground truthing the predicted noise values generated by the acoustic model used by Mock. Preliminary results, indicating that noise levels predicted by the model are incorrect, appear to invalidate the conclusion of adverse effect on vireo of the Mock study. The Base's investigation into the actual effects of aircraft noise on the vireo are being continued.

Until the results of further study into the matter, the Service assumes that noise associated with helicopters flying at altitudes below 500 feet over riparian areas during the breeding season could cause disturbance to vireo and flycatcher from 500-1000 feet horizontally depending on actual altitude. Continuous operations below 100 feet could reduce air quality from aircraft exhaust pollution. Aircraft operations normally do not violate this assumed threshold over known vireo/flycatcher habitat except in the designated landing/take-off zones on the Base.

Arroyo toads are not likely to be significantly affected by helicopter operations during the non-breeding season. There is the possibility of some adverse effect during the breeding season due to call suppression by noise from helicopter operations below 500 feet at night.

Aircraft accidents could impact vireo, flycatcher, and arroyo toads to undetermined levels depending on the many variables.

2.4.2 Estuary/Beach

An increase in disturbance from helicopters could be expected with the proposed reassignment of 46 helicopters to Camp Pendleton (for a total of 166 helicopters).

Aircraft accidents occurring in estuarine zones can have profound impacts on all listed estuarine species. Inadvertent landing of a helicopter within the nesting areas has occurred on Base in the past. As a result the Base has proposed a programmatic instruction to preclude such an occurrence in the future.

Aircraft accidents may impact terns, plover, and tidewater goby to undetermined levels. Accidents include inadvertent landings within the breeding colony, crashes with the potential for fire and other destruction of habitat, as well as failure to heed altitude restrictions. An catastrophic accident within the Santa Margarita River estuary tern colony could have significant repercussions to the tern population statewide. Tidewater goby is otherwise not likely affected by operations as proposed.

Helicopter flight activity as proposed would allow operations below 300 feet above ground in all estuarine/beach areas outside of Santa Margarita River Estuary and French Creek/ Aliso Creek Lagoons on a year-round basis. Within the airspace over Santa Margarita River Estuary and French Creek/Aliso Creek Lagoons, a 300-foot AGL minimum

will be in effect from 15 April to 31 August. Unrestricted flights are authorized from 1 September to 14 April these areas. The latter flight period occurs during the snowy plover nesting season, 1 March through 15 September. Flights outside the breeding season could affect non-breeding resident and migratory snowy plovers.

Unrestricted helicopter operations could expose tern and snowy plover eggs to blowing sand, extreme temperatures, increased rates of predation, and nest abandonment. It is assumed that flights 500 feet above ground will have minimal effects on tern, plovers, or other listed species, considering the frequency of activity proposed.

A flight restriction of 300 feet above ground level is currently imposed by the Base over the Santa Margarita River Estuary and French Creek/Aliso Creek Lagoons from 15 April to 31 August. Although the effects of flights from 300-500 feet above ground level have on terns and plovers during this period have not been well documented, there is evidence that noise, vibration and visual effects from low elevation overflights disrupts incubating terns. Increases in the tern and plover populations over the past several years might indicate that flight activity at 300-500 do not have significant adverse effects.

2.5 Combat Training Towns and Military Operations in Urban Terrain (MOUT)

2.5.1 Riparian

Riparian habitats in the floodplain of San Onofre Creek are reported to be suitable for vireo and flycatcher (Camp Pendleton 1994a). It is undetermined if the area adjacent to the 52 CTT site is suitable for arroyo toad, but it is probable based on their reported presence nearby (Karen Jensen, pers. comm.).

The direct effects on listed species associated with use of the 52 CTT would primarily result from smoke, noise, and human activity. CS gas and other smoke generated at the facility is reported to dissipate approximately 200 feet from the point of discharge. Currently, the nearest vireo habitat is apparently 800 feet to the north of the facility. Potential (future) habitat for vireo or flycatcher could be as close as 500 feet from 52 CTT, as the riparian habitat in San Onofre Creek cycles through different successional stages associated with normal flooding and regrowth. Prevailing winds are apparently normally from the west, pushing

smoke generated at the 52 CTT to the east, away from known occupied habitat. Easterly winds generally occur outside of the breeding season. Smoke could make habitat temporarily unusable for vireo or flycatcher, but because these operations happen continuously, the net effect continues for as many breeding seasons as the activity continues. The use of propane cannons includes firing once every several minutes up to 60 times per day to simulate artillery and more frequently to simulate machine gun fire; this may result in noise levels in potential vireo/flycatcher habitat that reduce habitat quality or even make habitat unusable. The noise effects resulting from these operations has not been determined. The suitable habitat in this area is not occupied currently by either vireos or flycatchers.

Access roads to the these facilities are approximately 1000 feet from presently used vireo or flycatcher habitat. To what extent dust and noise from vehicle traffic might reduce the usefulness of otherwise suitable/potential habitat for vireo, flycatchers, or arroyo toads located within 200 feet of these roads is not known.

It is possible that some riparian areas that are otherwise usable for vireo/flycatcher, go unused due to the activities occurring at 52 CTT. Noise, activity, and/or smoke impacts could result in otherwise suitable habitat being avoided altogether. This may be the reason vireos and flycatcher have not been detected close to the 52 CTT. The vireo nesting population is increasing in the San Onofre drainage, including areas upstream and downstream from the 52 CTT, as the native vegetation recovers following the 1993 floods.

Non-native grassland is the dominant vegetation type in the MOUT area, with Aliso Creek located along its southern border. It is an ephemeral creek at this location and is approximately 20 feet wide. Vegetation along this portion of the creek consists mainly of sycamore, mulefat, elderberry, and willow. Annual grasses and forbs within the training area are mowed regularly. Aliso Creek is not known to support vireo or flycatcher in the vicinity of the MOUT. Since the closest known location of a vireo is a breeding pair on Aliso Creek about 2 miles downstream from the facility and no flycatchers have been recorded in the area, training operations at this facility are not expected to result in direct adverse effects to these species. The arroyo toad has not been documented in Aliso Creek. The Service does not know if this drainage had been adequately surveyed for arroyo toad.

Landscape maintenance of these training facilities could exacerbate the introduction and propagation of invasive exotic plants but the conservation plan contains measures to prevent the spread of non-native vegetation into adjacent areas of natural habitat.

2.5.2 Estuary/Beach

Increased sedimentation/siltation occurring downstream from ground-disturbing activities in the San Onofre watershed could affect re-colonizing tidewater goby downstream by reducing habitat quality in San Onofre Lagoon, but there is no data to indicate significant increases in such effects resulting from the operations of these facilities. Tidewater goby is not known currently or historically from Aliso Creek Lagoon.

2.6 Firing Range Operations

2.6.1 Riparian

The greatest impact associated with firing range operations is the potential loss or degradation of vireo and flycatcher habitat in the event of fire which could spread to riparian areas adjacent to the ranges. All three artillery firing areas have documented vireos within 800 feet and the birds have been located as close as 50 feet from firing ranges. Willow flycatchers locations mostly exceed 1000 feet from ranges but do occur 50 feet from Range 218 and within 500 feet of Range 217 and 219 all located on San Onofre Creek. Flycatchers were reported from these locations in 1994, but not encountered in 1993 or 1995.

Disturbance to nesting vireos and flycatchers from noise could be anticipated from firing rounds, vehicles on access roads to the ranges, and human activity especially since range activities tend to coincide with the early morning hours at which time the vireos are most active in their vocalization. Nonetheless, annual vireo nesting surveys indicate they have successfully used the available riparian habitat adjacent to these ranges. See also the discussion of road use by arroyo toads (in the impacts analysis of Vehicle Operations in section 3 of Appendix 2, Species Accounts.

2.6.2 Estuary/Beach

There are no known firing ranges in the estuary/beach areas proposed by this action.

3 PLANNED TRAINING ACTIVITIES AND REQUIREMENTS

3.1 Military Helicopter Requirements

3.1.1 Riparian

Noise disturbances associated with helicopter flyovers is expected to increase in frequency with the addition of 48 helicopters reassigned to Camp Pendleton. For further discussion refer to Section 2.4 above.

3.1.2 Estuary/Beach

See Section 2.4 for effects analysis of current actions, which incorporate requirements for exercises involving helicopters over these areas in the future.

3.2 Temporary Alternate Landing Area (TALA)

The portion of the site identified for the TALA (landing strip) covers approximately 13.8 acres of the Ysidora Basin. Of that area, approximately 5.5 acres was riparian scrub in 1994, with the remainder mapped as grass/forb mix. Areas of riparian woodland lie approximately 1,000 feet from the TALA to the north and south, and approximately 1,200 feet to the east. Riparian scrub borders the TALA on the south.

Up until the 1994 nesting season the nearest detected nesting vireo were located in riparian woodland located approximately 1,300 feet from the TALA landing strip. During the 1994 season, vireos used the riparian scrub in the vicinity of TALA. The Service found 23 nesting pairs and 10 male vireos during 1994 surveys on Ysidora Flats (Ysidora Basin east of Vandegrift Boulevard), the areas to be used for overflights by student pilots practicing touch-and-go landings at the TALA. Many (generally higher) overflights will occur west of Vandegrift Boulevard over areas of high value for vireo and flycatcher.

The effect of helicopter noise on vireos and flycatchers nesting within the Ysidora Basin will likely be influenced by the flight pattern, frequency of flight operations, and surrounding topography. Possibly 20-35 pairs of vireos could be affected by the noise and activity associated with operations at the TALA. Please see Section 2.4 for a more complete discussion of the effects of helicopter noise on vireo and flycatcher. The Base is implementing measures to

avoid and minimize the potential impacts to the maximum extent practicable, including continued cowbird control and customized flight profiles and hours of operation. If during the period of operations using TALA there is indication that disturbance has resulted in decreased reproductive success of the vireo/flycatcher, then the Base will also compensate such loss through additional habitat enhancement per the proposed conservation plan.

Operation of the TALA as proposed would require periodic mowing of the vegetation growing on the actual landing strip. Mowing would cease and the vegetation would be allowed to regenerate when the permanent HOLF begins operation. The length of time that TALA will be in operation is currently undetermined. Recovery of the vegetation is expected within five years following termination of TALA operations if the restoration to original condition includes eradication of exotic plant species, and assuming that the recovery period does not occur during drought conditions. While disturbance to the habitat at the TALA facility is of a temporary nature, it is expected to extend over more than one breeding season. The Base's conservation plan calls for offsetting the loss resulting from such extended, albeit temporary loss, through enhancement of riparian habitat based on the compensation formula in the proposed conservation plan.

3.3 Stream Crossings

Most of the proposed crossings are located at the sites of existing roads and trails. These crossings are currently in use to varying degrees. Camp Pendleton policy limits use of roads such as these crossings to military training and fire suppression activities. The proposed improvements would stabilize soil and vegetation conditions at the crossings. Vireos are known to nest near some of the crossings and are potentially subject to disturbance during the construction, maintenance and use of the proposed crossings. Arroyo toads have been observed in the vicinity of the proposed crossings on the Santa Margarita River and San Mateo Creek. Establishment of these crossings will confine vehicle traffic to fixed paths, resulting in limited vegetation impacts and reducing impacts to arroyo toads that are estivating or otherwise utilizing areas outside the actual footprint of the crossing. The crossings also may create pools above and below the actual crossing which would provide toad breeding habitat that is isolated from direct disturbance by vehicles.

3.3.1 Santa Margarita River Crossing

The vegetation within the proposed crossing sites consists of open sand/gravel, riparian woodland, grass-forb mix, riparian scrub, fresh water marsh and willow mixed with *Arundo*. The route for the first crossing intersects 950 feet of riparian woodland mixed with *Arundo*, 650 feet of *Arundo*, and 600 feet of open sand/gravel. The route crosses 500 feet of grass-forb mix and 500 feet of riparian scrub where it parallels Vandegrift boulevard. There is an existing roadway that leads to a well. This road is currently 10-15 feet wide and is passable by vehicles except within the river channel.

The second crossing traverses 375 feet of riparian woodland, 720 feet of willow mixed with *Arundo*, 630 feet of grass-forb mix, and 225 feet of open sand/gravel. The existing roadway west of Vandegrift Boulevard at the second crossing has been partially invaded by vegetation. East of Vandegrift it crosses the proposed TALA, passes through 2,000 feet of grass-forb mix and 400 feet of riparian scrub.

In 1993 and 1994, there were 12 and 16 vireo locations identified within 250 feet of the proposed crossings (Camp Pendleton 1994a). During vireo surveys, six different flycatcher use areas were mapped within 500 feet of the crossing routes between 1989 and 1994, with up to three flycatchers detected in this zone in any one year. Two flycatchers were mapped within 250 feet of the crossings in 1990; one was mapped in this zone in 1994.

Arroyo toads are known to occur less than 6000 feet upstream from the more upstream crossing. Although there is potential toad habitat in the vicinity of both crossing sites, the presence, extent and abundance of arroyo toads awaits determination by surveys in progress. Sweet (1993) noted in mid-September and early October that large numbers of juvenile and subadult arroyo toads burrowed 4-7 inches into the damp sand near a road crossing in the Los Padres National Forest (off Base), and were inactive (estivating). In mid-November of the same year, the U.S. Forest Service bulldozed these crossings. The sand beds where the arroyo toads were noted were excavated and compacted to form the re-built road crossings. Site surveys 2-4 days after the work failed to locate any arroyo toads, dead or alive. Sweet (1993) concluded that it was not likely that many of the estivating toads survived. Impacts to arroyo toads from construction and maintenance of the proposed crossings similar to those described in Section 3 of Appendix 2, Species Accounts could be expected.

Loss of these linear strips of habitat may reduce vireo or flycatcher habitat. Roadway construction at the first river crossing would result in the permanent loss of approximately 0.26 acre of mixed willow-*Arundo* habitat, which may be vireo or flycatcher habitat. Less than 0.2 acre *Arundo* and less than 0.2 acre of open sand/gravel would be permanently lost as well. Some portion of this lost habitat may be arroyo toad habitat.

Because the roadway at the second crossing site has become overgrown with vegetation that may be suitable for nesting or foraging by vireos and flycatchers, construction of this river crossing will result in the permanent loss of approximately 0.13 acre of riparian woodland and 0.25 acre of willow-*Arundo* mix. These acreage figures take into consideration an existing 15 foot-wide trail.

Construction and maintenance of the crossings could have significant effects to arroyo toads that may estivate or otherwise use the area. Siltation from construction and maintenance of the crossings could affect downstream eggs and young, if they are present. The stream channel in this area is normally dry 6-8 months of the year; it provides only marginal toad habitat most years.

Currently, training within this area travels parallel to the river. A wide, permanent creek crossing at these locations will result in an increase in day-to-day traffic in an area that has previously had no traffic. At the same time, however, it would reduce the volume of traffic along the north side of the river by allowing access to areas south of Vandegrift Boulevard. As proposed, these crossings would support training exercises during all seasons, including when vireos and flycatchers are present. The training exercises and other traffic may cause disturbances as vehicles and personnel pass by.

3.3.2 San Mateo Creek Crossings

At grid square 5097, the vegetation consists of open sand/gravel, riparian scrub, sycamore grasslands, and limited riparian and mixed woodland. Grid square 4797 vegetation consists of open sand/gravel, riparian scrub, and *Arundo*. The existing crossing at GC 472978 is approximately 18 feet wide.

No vireos were found in grid square 5097 during surveys performed in 1993 and 1994. In grid square 4797, one territorial male vireo was found within 250 feet from the existing crossing in 1993. No vireos were detected at this location in 1994 and no flycatchers were

detected during vireo surveys in either location in 1993 and 1994. (Camp Pendleton 1994a). Depending on when the project is implemented, at least one vireo could be adversely affected.

Extensive arroyo toad locations have been reported from this watershed (Karen Jensen pers. comm.). Three locations for arroyo toad are noted upstream of GC472978 (Camp Pendleton 1995b). Of these three locations, one detection is likely within 400 feet of the crossing proposed at GC 5097. At grid square 4797, the existing creek crossing is predominately open sand, bordered by riparian scrub. Improvement of the existing creek crossing would result in the permanent loss of approximately 0.08 acre of riparian scrub, which could be used as habitat by vireos and the permanent disturbance of currently unvegetated open sand.

Since there are no established crossings at grid square 5097, a creek crossing here will result in the permanent loss of approximately 0.50 acre of vegetation, primarily riparian scrub and sycamore grassland in a long strip. This area apparently does not currently support vireo or flycatcher, but very likely supports arroyo toad.

Long-term indirect effects are expected due to the high potential for invasive weed propagation along the shoulders of these new crossings. Increased expansion of *Arundo* and other exotic species into areas adjacent to the roadway is typically a result of roadway/crossing construction, maintenance, and use of this type. This construction may also contribute to colonization in estuarine areas. Long-term weed control of this and other roadways of this type is not part of the proposed action. A Base-wide exotic vegetation control program will address these and other vegetation control problems as funding permits.

3.3.3 Las Flores Creek Crossings

The disturbed areas (sand, gravel, and open water) are approximately 12 feet wide. At GC 590862, the crossing is bordered by riparian scrub. The site at GC 616884 is bordered by well developed riparian woodland. In 1993 and 1994, no vireos were detected within 250 feet of the crossing at GC 590862. At GC 616884, 3 male vireos were detected approximately within 250 feet from the existing crossing in 1993, and 1 male within 250 feet from the crossing in 1994 (Camp Pendleton 1994a). No flycatcher detections were noted from vireo surveys of this portion of Las Flores Creek from 1989 to 1994.

Surveys during the spring of 1995 detected no arroyo toads within this watershed.

Widening the existing crossing at GC 590862 will result in the permanent loss of up to 0.04 acre of riparian scrub, which could be used by vireos. Widening the existing crossing at GC 616884 will result in the permanent loss of up to 0.06 acre of dense riparian woodland habitat, which could be used by vireo. One vireo territory may be directly affected.

Construction is scheduled to be completed during the non-nesting season; this would avoid direct disturbance associated with construction (noise, activity, etc.) to vireos and flycatchers potentially in the area.

Impacts similar to those noted for vireo and flycatcher could be expected at these two proposed Las Flores Creek crossings if construction does not occur outside the breeding season. The most viable population of tidewater gobies south of the Santa Clara River is likely located downstream in Las Flores Creek Lagoon (Swift 1993). Except during winter-spring high water events, surface water goes underground before it reaches the lagoon and sediment is not transported downstream to the lagoon where it might affect gobies.

3.4 Wilcox Range (103) Night Firing

Wilcox Range is bordered on three sides by riparian vegetation within which access roads and parking areas have been developed. Bordering vegetation has been classified as riparian woodland, riparian scrub, and grass/forb mix. The vegetation at the bullet impact end of the range is grass/forb mix transitioning to uplands.

In 1993 and 1994, respectively, 15 and 12 vireo locations were identified within 250 feet of the range (Camp Pendleton 1994). These locations border the rear and both sides of the existing facility. From 1989-1991, 1-3 flycatcher detections were noted (to the southwest) during vireo surveys performed within 1000 feet of the range. Arroyo toads have been found on a road directly adjacent (southwest) to the range (Camp Pendleton 1995b [fax from R. Griffiths]).

Direct loss of native riparian vegetation is generally not associated with the use of firing ranges. Maintenance activities and fire could result in unintended destruction to habitat. Disturbance to vireos and flycatchers would not be realized through

the use and operation of this range for night time rifle firing qualification during the non-breeding season. During the breeding season when vireos and flycatchers may be present, direct effects could result due to an increased level of activity during nighttime from increased noise, illumination, and activity. The distribution of vireos and flycatchers around Wilcox Range suggest that these birds are able to tolerate the existing daytime use levels of the range, although the breeding success of these bird is unknown. The new night firing would likely create an added noise disturbance of the same type as currently experienced. Night time lighting will be added in 5 firing relays of illumination events, 3 minutes in duration separated by 30 minutes between relays. Timing of this use will be at a period when vireo or flycatcher are not expected to be actively calling or foraging, but may be resting or sleeping. The effect of disturbance during this period is undetermined. This disturbance may adversely affect current vireo and flycatcher use of riparian habitat adjacent to the range to the level of abandonment of breeding areas. The infrequent use of the range at night reduces the potential for abandonment of otherwise suitable habitat.

Disturbance/mortality to arroyo toads could be realized during summer periods. Increased activity at night increase the chances of mortality to adult arroyo toads. Please see discussion of road use by arroyo toads in the species account of Appendix 2. Increased night-time noise and illumination disturbances may disrupt arroyo toad breeding activity, but the infrequency (nights per month) of the disturbance may greatly reduce the significance of this disturbance.

The proposed fire avoidance measures should help reduce the danger of accidental fire.

Some portions of the riparian areas on Base burned by fire have responded with greatly increased cover of non-native plants, most significantly *Arundo*. Once an area is colonized by *Arundo*, artificial enhancement measures are the only known way to restore native habitats. The Base's conservation plan proposes restoration of these burned areas through aggressive exotic plant control. Such restoration efforts could result, over time, in long-term enhancement over pre-burn conditions where exotic vegetation is already part of the existing plant community.

3.5 Reconnaissance up the Santa Margarita River: Small Boat Operations & Infantry Foot Operations

3.5.1 Riparian

Impacts to vireos and flycatchers could result from the trampling of riparian vegetation but, since this activity will only occur during the non-breeding season there will be no effect to nesting vireos or flycatchers. If arroyo toads are active, foot traffic may directly impact the arroyo toad, including harassment and harm resulting from trampling and siltation effects in the water course during their breeding season. The arroyo toad occurs at low density in the portion of the lower Santa Margarita River floodplain below the MCAS. These training activities are expected to be of such low intensity and frequency that they will have minimal effects on the overall arroyo toad population.

3.5.2 Estuary

The tidewater goby was documented from the Santa Margarita Estuary up to approximately 400 meters east of Stuart Mesa Bridge in 1990 and 1991 by Holland (1992). Swift (1994) was unable to find gobies in the estuary during surveys in the fall of 1993. Re-colonizing tidewater gobies may be adversely affected by direct mortality, disturbance to nesting burrows, and increased siltation.

Since this activity is scheduled to potentially occur during the initial portion of the breeding season for plovers, disturbance associated with human activity may disrupt roosting, foraging, and incubating snowy plovers. Inadvertent destruction of nests located outside designated nesting areas is unlikely since the boats will come directly into the estuary from the ocean and proceed to the head of navigation before troops disembark.

Reconnaissance and infiltration activities up the Santa Margarita River Estuary in the non-breeding season may result in disruption of roosting and foraging behavior of resident and migratory snowy plovers. Since the object of these maneuvers is to escape detection, lights and vehicles are not expected to be used in sensitive beach areas normally frequented by shorebirds. Disturbance of wintering plovers could occur from the limited ground reconnaissance by small groups in the dune area preceding the remainder of the trainees in the small boats entering the estuary. Foot traffic in the vegetated portions of the estuary may occur if, during reconnaissance, tides change and water depth decreases

requiring portage of rafts. This could result in damage to native marsh vegetation. The effects of foot traffic on mudflats, if it were to occur, are undetermined. The anticipated low frequency and intensity of these activities should preclude any permanent or long-term impacts.

3.6 Renovation of Camp DeLuz

Camp DeLuz is in an open area bordered by riparian woodland and riparian scrub along DeLuz Creek. During surveys performed in 1994, two vireo males, status undetermined, were detected within 250 feet of the Camp DeLuz boundary. One or more flycatchers have been detected approximately 1000 feet downstream of the Camp (Mark Pavelka pers. comm.). Arroyo toads are known from upstream and less than 3000 feet downstream of the Camp (Camp Pendleton 1995b). The Camp itself is not likely arroyo toad habitat.

This project would likely result in a decrease in traffic along DeLuz Road, since Marines would be stationed at the Camp and would not have to be shuttled in and out daily. Lights in the Camp would result in an increase in illumination surrounding the Camp, likely including potential habitat for vireo, flycatcher, and arroyo toad. A small increase in noise is anticipated during daylight hours. Effects to the 2 vireo locations nearby are unknown.

A water line is proposed to be installed. All construction, with the exception of the water line, would be within the existing developed area. The water line would be trenched within the boundaries of DeLuz Road avoiding riparian habitat. The section that crosses DeLuz Creek would be completed during the non-breeding season in concert with the DeLuz Creek Crossing. Impacts of this crossing are discussed in Section 5.7. Please see discussion of the effects of concreting activities on arroyo toads discussed in New Potable Water Wells in section 4.6.

4 INFRASTRUCTURAL MAINTENANCE

4.1 Range Maintenance

Trimming vegetation that grows on existing ranges to maintain visibility is expected to occur once each year at the various ranges bordering riparian areas and will be conducted outside the nesting season as per the programmatic instructions for facilities maintenance, therefore, no impacts to listed species are anticipated.

4.2 Fire Breaks

Approximately 0.75 mile of firebreaks occur within riparian areas on Base. Routine annual maintenance prevents the establishment of riparian vegetation on these existing firebreaks. In areas, where riparian vegetation does not return, continual disturbance is most likely perpetuating non-native species and precludes the establishment of native riparian habitat. Since this activity occurs during the breeding season adverse effects to adult vireos or flycatchers as well as inadvertent destruction of nests could occur as a result of this activity. Noise and the creation of dust from bulldozing operations also could indirectly affect these species.

Heavy equipment operations in riparian areas may result in harm and harass to arroyo toads. However, most firebreak stream crossings do not hold sufficient water to support eggs or tadpoles at the time this activity is scheduled. Sedimentation associated with fire break maintenance may adversely affect subject species habitat by reducing or preventing native riparian vegetation regeneration, or covering eggs of aquatic species. However, the wide distribution of firebreak intersections with riparian zones throughout the entire Base, precludes sedimentation from having a large effect on any specific area.

Regular maintenance of existing firebreaks will not change existing conditions and may help preclude extensive habitat damage and degradation by wildfire.

4.3 Secondary Roads

Approximately 103 secondary roads occur aboard the Base totaling over 278 miles.[3] Of these secondary roads, 38 occur in the Santa Margarita, 21 in Las Flores, 20 in San Mateo, 18 in San Onofre, and 6 in the San Luis Rey drainage. More than 64 miles of these roads cross or occur in or adjacent to riparian areas. Secondary roads pass through virtually every plant community on the Base.

Road maintenance and repairs involve re-grading road surfaces and may also use fill materials obtained off-site from the repair

[3]The figure of 6,482 miles noted in the BA was in error. The mileage estimates used in this paragraph represented correct figures.

itself. These off-site borrow areas may be contaminated with invasive weeds. Formal borrow sites are generally constantly disturbed by definition and these sites are prime locations for propagation of many invasive exotic plants. Soil derived from borrow sites or different drainages and then used for fill can easily contain invasive weed propagules, resulting in transfer and introduction to different drainages and locations.

Vireo, flycatcher, and arroyo toad are potentially affected by this activity (Camp Pendleton 1994a). Road maintenance conducted during the breeding season may inadvertently destroy vireo and flycatcher nests. Disturbances to vireos and flycatchers associated with heavy equipment use within riparian habitat include noise and dust. The following is an estimate of the number of vireo territories within 250 feet of roads in each watershed: 4 in Santa Margarita, 5 in San Luis Rey, 29 in Las Flores, 3 in San Onofre, and 4 in San Mateo (Camp Pendleton 1994a).

A loss of 14 x 15-foot (0.01 acres) of nesting and foraging habitat for the vireo and flycatcher is associated with the major road repair at the Lima Bypass.

Indirect effects may occur from erosion and consequent sedimentation in riparian and estuarine areas. This may adversely affect subject species habitat by reducing or preventing native riparian vegetation regeneration or covering eggs of aquatic species. Excessive sedimentation may lead to favorable growing conditions for tamarisk, cockleburr and other exotic weeds. This may result in degradation of riparian woodland habitat or preclude natural regeneration. Additionally, tidewater goby and the arroyo southwestern toad biology could be affected by excessive sediment deposition. Effects of sediment deposition are relieved during flooding events which "scour" drainage channels and "flush" estuaries. Recent goby surveys indicated a population increase from 2,000-3,000 in 1990 to over 11,000 in 1993 at Las Flores Creek Lagoon on Red Beach (Swift et. al. 1994, Holland 1992). This suggests that sedimentation in lagoons has not had a substantial adverse effect on gobies.

Indirect effects would be similar to those for fire breaks as discussed above.

Road maintenance supports rapid Fire Department response for wildland fire fighting, thus reducing the impacts of wildland fires. Secondary roads also provide access for beneficial conservation

activities such as brown-headed cowbird trapping, population monitoring, and habitat enhancement.

4.4 Telephone Cable/Electrical Power Line Installation and Maintenance

Installation and maintenance activities could affect vireo and flycatcher during the breeding season, but is likely to be very minimal. Perching and foraging habitat would not be allowed to develop in some areas of riparian habitat where it might otherwise occur.

4.5 Sewage Treatment Plant Pond Weed Control

Inadequate weed control around the sewage ponds could result in the propagation of invasive weeds on and off site. Some of the ponds are in the immediate vicinity of vireo and flycatcher habitat and thus noise and herbicidal spraying associated with maintenance during the breeding season could have some effect on these species.

The Stuart Mesa sewage pond is a least tern foraging area. Inland sources of food can be important particularly during El Niño events when ocean prey are scarce. Potential impacts to least tern forage base may occur as a result of overspray into surrounding waters or if rain should occur within 48 hours of application. Actual impacts can be minimized by careful selection of an appropriate herbicide and application technique.

4.6 Groundwater Recharge, Groundwater Pumping, and Water Well Maintenance/Repair Activities

Maintenance activities associated with off-channel spreading structures could exacerbate the propagation of *Arundo* and other exotic species on and off the site. This activity involves the regular diversion of flows out of and into the Santa Margarita River. These diversions could have affected vireo, flycatcher and arroyo toad habitat in the past. Off channel diversions may promote riparian habitat in areas where it would not otherwise occur. The primary purpose of this activity is the recharge of the groundwater basin and this sustains the hydrology supporting some types of wetland habitat.

Although increased pumping over 1994 levels is not anticipated, such increases could result in added distance to groundwater and reduced surface flow, particularly in times of drought. These conditions

could adversely affect habitat utilized by vireo, flycatcher, arroyo toad and possibly tidewater goby. Increased distance to groundwater and reduced surface flows may promote the invasion of *Arundo* and other exotic vegetation which can survive in conditions that would be lethal to native woody vegetation. Maintaining a "safe, perennial yield" of the groundwater basins does not by definition assure avoidance of adverse effects on sensitive habitat and listed species. Camp Pendleton's water conservation program is adjusted to prevailing conditions; thus groundwater withdrawal is reduced during drought to avoid unnecessarily depleting the aquifer.

Water well maintenance and repair activities result in ground disturbance (grading), noise, dust and trimmed and crushed vegetation. Wildlife habitat within 60 feet of the existing well sites is very minimal. Access roads to the sites already exist. Please see discussion of the impacts of concreting activities on arroyo toads discussed in New Potable Water Wells in section 4.6.

Generally, minor impacts are anticipated during the breeding season to flycatcher and arroyo toad in the vicinity of these facilities. These activities also may promote the invasion of *Arundo* and other exotic vegetation if they are not combined with adequate exotic plant management.

5 CONSTRUCTION PROJECTS - SANTA MARGARITA RIVER DRAINAGE

5.1 Santa Margarita Flood Control-Construct Flood Levee/Wall (P-010)

Over 100 vireos (pairs or males) and seven or more flycatcher "use-areas" are within the potential action area for this project. An existing levee extends for approximately 5,200 foot along the proposed levee route. The proposed project would extend the existing levee by 9,300 feet and would cover approximately 32 acres of wetlands. Vegetation within the footprint of the proposed levee is mapped as mixed willow-exotic, *Arundo*, riparian woodland. The area proposed for levee construction is adjacent to the area of the proposed Runway Clear Zone (discussed in the BA) which will encompass 27 acres of floodplain at the south end of the runway adjacent to the levee, and the hot fuel pit project (also discussed in the BA).

The loss of 32 acres of wetlands habitat resulting from the construction of the levee under the current design includes approximately 8 acres of riparian woodland, 14 acres of mixed willow-exotic, and 10 acres of *Arundo*. As mapped in the BA from 1994 vireo surveys, one flycatcher and 9-10 vireos (nesting pairs, territorial males, or undetermined status males) made use of the area to be directly affected by the permanent footprint of the levee. Arroyo toads have been recorded (Camp Pendleton 1995b) from the areas immediately adjacent to the proposed levee, near the existing Basilone Bridge; they are expected to make use of some of the proposed project site. Please see discussion of the potential effects of concreting activities on arroyo toads discussed in New Potable Water Wells in section 4.6

Direct, but temporary (5-10 years), impacts to an additional 10 acres of wetlands, outside the footprint of the levee, will occur during project construction. This area consists of at least 2 acres of riparian woodland, 6 acres of mixed willow-exotic, and two acres undetermined. Approximately 3-4 vireos (pairs or males) were mapped in this 10-acre area; no flycatchers were noted from this 10-acre area in 1994. Arroyo toads also are expected to make use of this area (Camp Pendleton 1995b).

Noise, ground disturbing activities, vehicle travel and pollution, night-time lighting and other construction-related activities can adversely affect nesting, reproductive, foraging and feeding behavior of listed species. The construction of the levee is likely

to extend into the breeding period of the vireo, flycatcher and arroyo toad for one season. Although the Base is committed to minimizing the nature and time of disturbance during the breeding period, weather conditions will determine what and how much construction can be accomplished outside the breeding season. Construction-related activity which will result in "excessive" noise levels hourly within vireo/flycatcher habitat will occur during the non-breeding season. Erosion and soil contamination will be avoided by best management practices. The Base proposes to perform 33.4 acres of Arundo removal in the active floodplain and to return temporarily disturbed areas resulting from project construction to "original condition."

The levee design is intended to be "self-cleaning" in terms of silt normally deposited in the vicinity of the levee. This could be accomplished by a number of options including clearing of vegetation in the channel, construction of groins and silt fences immediately upstream, or the construction of a siltation basin farther upstream. Depending on final design decisions, an undetermined amount of habitat will be affected in the course of implementing such options. No time schedule nor affected acreage estimate for these options is identified in the BA. Numerous vireos and flycatchers have been detected in the area adjacent to and upstream of the proposed levee since 1989. The areas affected by these options, as well as by future associated maintenance activities, also include potential habitat for arroyo toads.

Under the proposed design, approximately 118 acres of wetlands[4] would be isolated behind the levee. This area would be subject to a changed flooding regime, including elimination of river meanderings that would otherwise occur. The natural meandering of the river along this stretch has already been subject to modification by the agricultural dikes constructed prior to the establishment of the Base in the late 1930's. Storm flows which are defining factors for most riparian habitat types will be essentially eliminated from 118-acre containment area by the currently proposed levee design. If left unmanaged, these isolated riparian habitats would eventually change their character due to the lack of the scour and deposition which is critical to sustaining and regenerating the character of vireo, flycatcher and arroyo toad habitat. The groundwater basin in this stretch of the river, because it is not expected to be

[4]This acreage was determined by analysis of November, 1994 aerial photographs by Camp Pendleton.

significantly affected by the flood control structure, reportedly gives assurance that the area behind the levee will retain a wetland character and habitat for other species.

This area is very important to flycatcher (please see Figure 8 and 9 [flycatcher maps]), generally supporting at least 1-3 detectable males or pairs. Approximately 18 vireos (males or pairs) were detected in this area in 1994. The Base proposes to manage the habitat isolated behind the levee in such a manner as to sustain at least current listed species population numbers as they exist in 1994. If this objective is not achieved, then habitat enhancement would be accomplished in accordance with the Riparian Conservation Plan mitigation/compensation procedures and Class II Activity protocol.

In addition to loss of wetlands to the footprint of the project and the conversion/modification of riparian habitats isolated from the 100-year floodplain, the proposed levee project will affect a much larger acreage by changes in flood regime.

Under the proposed levee design, an additional area of the remaining floodplain (500-1000 acres), will be subjected to an altered flood regime due to the more constricted flow area. The proposed design reduces the 100-year floodplain by approximately 20 per cent in the affected stretch of river, although upstream a similar area will be "added" to the floodplain due to the increased height of the "backed-up" flood waters (Jeff Caspers, pers. comm.). This stretch alongside the levee and for some distance downstream will experience increased floodwater velocities (up to 45 per cent greater than existing conditions). This could result in the changed composition and early successional character of the vegetative community in this area. Such a change would be detrimental to the vireo and flycatcher, which favor intermediate stages of willow riparian succession.

Over 70 vireos were mapped in 1994 within this area of modified flood regime on the channel side or downstream of the levee. Also at least 4 flycatcher "use-areas" were consistently mapped from 1989-1994 within this area. The arroyo toad could also be affected. A narrower floodplain would reduce the potential for a suite of vegetation successional stages and pools. The loss of pools for breeding and maturing of juvenile arroyo toads could be very significant (Swift 1993). The increased scour effects associated with the disturbance from an increased floodwater velocities are

expected to increase the propagation of *Arundo* in the area (Larry Salata, pers. comm.).

A final impact resulting from the levee, namely increased sedimentation in the Santa Margarita River estuary caused by increased scour effects upstream, could reduce foraging habitat for terns and reduce or eliminate suitable habitat for re-colonizing tidewater gobies.

5.2 Replace Basilone Bridge (P-030)

This project will replace the existing temporary bridge. Its current alignment and position create a bottleneck for water within the Santa Margarita River contributing to the build-up of sediment upstream of MCAS. The proposed 80-foot-wide bridge would cause shading to a larger wetland area than the existing bridge. Construction impacts would affect approximately 3 acres although the actual bridge would permanently impact a smaller area. The majority of construction is proposed to take place during the dry season; the initial two-thirds of this period are generally the period of greatest potential impacts to breeding vireo. Ongoing maintenance may periodically disturb habitat in the immediate area around the bridge.

Much of the riparian vegetation in this area was scoured during the January 1993 flood. Subsequent to this, desiltation activities disturbed much of this area (Camp Pendleton 1994a), likely reducing the reproduction of new native riparian seedlings, leaving mostly open sand. About 6 isolated mature willow trees remain near or in the proposed construction zone. Most of the area has been invaded by *Arundo* which is growing vigorously (Camp Pendleton 1994a).

Two male vireos of undetermined status were observed within 250 feet of the existing bridge and roadway north of the river in 1994. No vireos were observed in this area in 1993, possibly due to the loss of vegetation. No flycatchers have been detected during vireo surveys performed near the bridge site (Mark Pavelka pers. comm). The arroyo toad is known from the bridge site (Camp Pendleton 1995b). The stands of *Arundo* that are currently developing in this area are likely degrading the habitat for the arroyo toad.

There will be a permanent loss of approximately 1 acre of riparian habitat, since the new bridge and its approaches will be wider than the existing bridge. As of 1994, much of the site was apparently disturbed by previous activity and/or invaded by *Arundo*, or in early

stages of native riparian habitat succession. According to the BA, only 10% of the affected area is suitable habitat for vireos because most of the site is dominated by *Arundo* (Camp Pendleton 1994a). This area was heavily scoured again by the heavy flows of 1995. Early stages of riparian scrub usually require 3-5 years to develop into vireo habitat. The existing levee at this location (in concert with the existing bridge), constructed after the storm of January 1993, may be precluding the development of vireo habitat through repeated and directed heavy flows (increased flood frequency) through this area. This increased flood frequency is apparently preventing the later stages of riparian succession needed by vireo. Only minimal existing suitable vireo habitat will be affected by bridge construction. Future development of vireo habitat at this location can be expected with appropriate exotic vegetation control, but may be limited by the existing levee. The new proposed bridge design may improve the degraded hydrology of this area and avoid the need for habitat destructive desiltation activities. This should allow the development of higher function vireo and arroyo toad habitat.

Construction is proposed to be timed to avoid the peak of the breeding season. If construction occurs during the nesting season the birds would likely avoid the construction vicinity until completed. Based on documented past vireo use of this area, only 3-4 territories would be affected by this degradation of habitat (Camp Pendleton 1994a).

Construction during any time of the year may cause mortality to arroyo toads. Construction during the spring and summer may affect arroyo toad breeding in the area and downstream. Please see discussion of the impacts of concreting activities on arroyo toads discussed in New Potable Water Wells in section 4.6.

The placement of lighting on the new bridge may result in the surrounding habitat becoming less desirable to wildlife, including vireos and flycatchers (Camp Pendleton 1994a).

5.3 Sewage Treatment Plant (STP) Compliance in Santa Margarita P-527B

This project would result in the diversion of between 2.5 million and 4 million gallons per day of secondarily treated sewage effluent from the Santa Margarita River. Construction of the two pipelines may disturb or harm vireo, flycatcher, or arroyo toad. Over 200 vireos are found within the lower Santa Margarita River basin, that

is, from the confluence of the De Luz Creek to the estuary. The sewage effluent discharge compliance action affects three subbasins within the lower Basin. Between 1989 and 1991, 15-18 flycatcher territories were detected during vireo surveys in this action area each year; 1994 surveys for vireo noted 8 flycatchers detected in this area. Preliminary results of the 1995 surveys indicates only 5 flycatchers in the same area.

The proposed pipelines are approximately 9 miles in length; most of this length is adjacent to or within riparian habitats of the Santa Margarita River. At some points a swath of vegetation up to 30 feet in width will temporarily be cleared during construction. Most of the pipeline alignment, however, will be on the edge of, or under existing paved roads and on an abandoned railroad grade. Approximately 24 (pairs or males) vireos were noted as being within 250 feet of the pipeline construction routes (Camp Pendleton 1994a). Approximately 22 vireos (pairs or males) occur within 100 feet of the pipeline alignments. Approximately 11 vireo territories may be affected by pipeline construction through temporary removal of roadside vegetation (Camp Pendleton 1994a). Three flycatchers were noted within 250 feet from these routes in 1994 (Camp Pendleton 1994a). At least 1 flycatcher territory may be affected by pipeline construction through temporary removal of vegetation (Camp Pendleton 1994a).

The arroyo toad is known to occur near/in the area to be disturbed by construction (Camp Pendleton 1995b).

If construction is performed during the breeding season, disturbance, harm, or mortality to nesting birds may occur due to dust, noise, activity, and removal of habitat. If construction activities involve horizontal drilling across the Santa Margarita River, then direct damage to riparian habitats can be significantly reduced. Construction activities could cause mortality to arroyo toads. Please see discussion of the impacts of concreting activities on arroyo toads discussed in New Potable Water Wells in section 4.6.

Renovation of the 22 Area STP 3 involves installing equipment plus a sludge bed occupying ¼ acre of ground in previously disturbed areas. Noise, air quality degradation, dust and increased human activity could disturb nesting if construction occurred during the vireo and flycatcher breeding season.

Propagation of invasive weeds including *Arundo* through project construction ground disturbance can have adverse effects on the passive recovery of the areas temporarily affected. Without adequate exotic vegetation control removal for a period of years, the restoration of native habitat values to these construction disturbed areas is not assured. Degradation of adjacent habitats not disturbed by construction through the invasion of exotic plants from disturbed areas is also possible unless these exotics are actively suppressed.

Camp Pendleton commissioned studies to predict the potential impacts of the sewage effluence compliance projects. The projects will reduce the contribution of effluent discharges to surface flow and groundwater recharge along approximately 10 miles of the Santa Margarita River. Vegetation in the Chappo and Ysidora basins are primarily groundwater dependent, as evidenced by median streamflows of five cubic feet per second into the upper Ysidora Subbasin and that of zero cubic feet per second in the lower Ysidora Subbasin during the period of 1924-1992. By eliminating discharge of effluent to the Santa Margarita River, the project is expected to increase the depth to groundwater in some areas of the Basin under conditions of long-term drought. These riparian areas are known to support vireo, flycatcher, and arroyo toad.

Groundwater pumping (the source of water later discharged as sewage effluent) in the lower Santa Margarita River basin has averaged 5,000-6,000 acre-feet per year. The presence of pumping wells causes the river to support less dense riparian vegetation in the wellhead areas of the basin (Camp Pendleton 1995a). Wastewater discharges from STPs 1, 2, 3, 8 and 13 amount to 2,300 acre-feet per year. Basin capacities for these regions are approximately 48,000 acre-feet. Total stream, subsurface and precipitation recharge to the Basins was estimated at 11,150 acre-feet per year. The sewage effluent discharge that is being relocated represents 17 percent of annual recharge to the Basin water balance under present conditions.

The flows of 800 acre feet, eliminated from STPs 1 and 2 (more than 10 miles upstream), were noted in the BA as "relatively low" (Camp Pendleton 1994a, 1995a). The flows from STPs 1 and 2 are considered low because very little reaches the Santa Margarita River. Most of the STP 2 discharge is used at the Camp Pendleton golf course or stored in holding ponds away from the River. The STP 1 discharge flows through a holding pond and a long ditch where most of it evaporates, is used by vegetation, or percolates into the ground before it can reach the River. The removal of 800 acre-feet per

year of recharge contributed by STP's 1 and 2 is not projected to significantly affect long-term average depths to water in the Upper Ysidora Subbasin. Differences in depth to water associated with relocating the wastewater discharges were projected to be on the order of zero to four feet. Relocation of the Camp Pendleton wastewater discharges was not projected to discernibly influence phreatophyte growth or area of cover in the Upper Ysidora Subbasin. In this area, subbasin recharge is almost totally dominated by streamflow, not from sewage effluent. The relocation of recharge from the wastewater treatment plant in this area, therefore, is not projected to influence depth to groundwater more than three feet in prolonged drought regimes. Consequently riparian vegetation in this area is not expected to be affected significantly by the removal of the STP 1 discharge based on the assumption that riparian vegetation can adjust to such changes in depth to groundwater.

Relocation of effluent discharges terminating in the Chappo and Ysidora subbasins may have more significant effects on depth to water during periods of prolonged drought. During such times, depths to groundwater may decrease by five feet or more. It is uncertain whether the growth and vigor of the riparian vegetation will be adversely affected during a severe drought regime. During such periods, the vegetation becomes more dependent on soil moisture derived from groundwater, and less dependent on soil moisture derived from precipitation. The potential exists for phreatophytic vegetation in the western end of the Chappo Subbasin and in the Ysidora Subbasin to be adversely effected by the removal of the STP 3 discharge. The magnitude of the effect on phreatophytic vegetation will be determined by the duration and severity of drought conditions.

At STP 3, approximately 5 miles from the ocean, 0.7 million gallons per day (500 acre-feet per year) would be directed to Oceanside. The effects to vegetation within this region, which is primarily groundwater dependent, would occur regardless of STP 3 discharge termination. Due to heavy groundwater use in the Chappo area, a groundwater drop below 15 feet (15 feet below ground surface has been used as the upper limit of willow riparian root zone depth, beyond which plants are unable to utilize groundwater) is likely to occur in Elements 16 and 17 of the Camp Pendleton Study (1995a) regardless of continued discharge from STP 3. Only Element 18 of the study showed a modeled effect due to discharge termination alone, which would be a less likely affected area within the basin, than the former two elements. All other elements within the Basin are considered to not be affected by these dewatering activities.

The relocation of STP 3 discharge effluent may significantly alter riparian habitats downstream along the Santa Margarita River in the Ysidora and the western end of the Chappo subbasins during periods of sustained drought. The area most likely to be influenced during long-term drought by termination of discharge from STP 3 is located directly adjacent to and surrounding the STP 3 oxidation ponds. This approximately six (6) acre area, at certain times is under surface water influence due to effluent discharge in addition to groundwater influence. This area supported 3 vireos in the 1994 survey. Another area which may be affected by discharge cessation is that of Element 17, which would add a further area of 80 acres as being potentially affected during long term drought conditions. This area supported 10 vireos and 4 flycatchers in the 1994 survey. Element 18, which is the least likely of the three areas to be affected under conditions of long term drought, covers an additional 67 acres of riparian habitat, supporting 18 vireos and 1 flycatcher in the 1994 survey. Potential alteration of the willow riparian community structure, either through habitat loss during extended drought periods (more than seven consecutive years) or through replacement of willow habitat with exotic giant reed, may cause significant impacts to the vireo and flycatcher which inhabit these regions. It is very unlikely that groundwater drop during drought years will cause the immediate death of riparian vegetation stands in localized areas downstream of STP 3. Instead the effects to vegetation may be gradual and not noticeable for an extended period of time, i.e. ten years. Depending on underlying soil composition and water holding capacity of the soil, different areas of riparian habitat may respond differently to extended periods of water loss. It is assumed that shallow-rooted, herbaceous vegetation will disappear rather quickly, responding to groundwater drops as low as two or three feet. Mature, woody vegetation will be more resistant to lowering of groundwater. The loss of younger riparian vegetation in restricted areas could potentially impact vireo and flycatcher populations if groundwater drops below 15 feet for a prolonged period of time and no water has been stored in the soil. A change of community structure is likely due to a weakened vegetative state, making them susceptible to succession by exotic plant species. Although, the projected groundwater decline during drought years may eventually be replenished during normal or heavy precipitation years, exotic weed infestation might be likely to alter the existing willow-dominated habitat due to the fact that it is already partially degraded. In all these cases, the magnitude of the effect will be determined by the duration and severity of future drought conditions. These "predictions" on the extent and locations of

potential effects on willow woodlands are based on the model used by the Base's consultants.

At STP 8, approximately 6 miles upstream of the ocean, 0.3 million gallons per day (230 acre-feet per year) would be diverted to Oceanside. The STP 8 sewage effluent discharge recharges an area that is significantly affected by pumping. The relocation of this discharge is not expected to have a discernible effect on depth to groundwater supporting riparian vegetation within the Upper Ysidora Subbasin, during average or above average rainfall conditions. Modeling studies sponsored by Camp Pendleton indicate that although elimination of discharge from STP 8 would not have a significant effect on riparian stands further downstream, such elimination could (indirectly) exacerbate the effects resulting from severe drought conditions in the immediate vicinity of the STP 8 retention ponds by lowering groundwater further. This potential impact would affect approximately 10 to 25 acres adjacent to and immediately downstream of STP 8, and which connect the river-associated riparian habitat with the percolation ponds (Camp Pendleton, 1995a). The magnitude of the effect would be determined by the duration and severity of the drought.

At STP 13, approximately 2 miles from the ocean, 1.5 million gallons per day (750 acre-feet per year) would be diverted. Prior to 1993, discharges from STP 13 went to two locations: first to oxidation ponds in the vicinity of the plant and then via pipe to percolation ponds in the Ysidora subbasin. The percolation ponds in the Ysidora subbasin were damaged during the 1993 flood event and have not been restored to original pre-flood conditions. Consequently the secondary-treated effluent is directly discharged into the River. A change of five to 10 feet in depth to groundwater may be expected during drought years.

Overall, the potential reductions in surface water flow and ground water levels during sustained drought conditions could have substantial adverse effects on the viability of localized riparian areas in which the vireo, flycatcher, and possibly the arroyo toad live. Since drought conditions are normal expected events, the probability of occurrence is high. The reduction in surface water is likely to be less detrimental than the effects to riparian vegetation from lowering of groundwater, due to the greater dependence of vegetation on groundwater rather than surface flows.

The Base has noted that relocation of effluent may significantly alter habitats downstream along the Santa Margarita River in the

Ysidora and the western end of the Chappo sub-basins during periods of sustained drought. Alteration of the willow riparian community structure, either through death during extended drought or through opportunistic displacement by *Arundo* and other exotic species, may cause significant impacts to sensitive birds currently occupying riparian habitat in the Ysidora and Chappo sub-basins. Although the projected increase in groundwater depth during drought years is reversed and the basin replenished during normal or heavy precipitation years, *Arundo* could spread aggressively before native vegetation can sufficiently respond and recover to more favorable conditions following a sustained drought. Other exotics, such as Tamarix, once they have become established during wet periods, can survive drought conditions that are lethal to willows. Such a scenario would reduce the amount of suitable habitat available to the vireo and flycatcher (Camp Pendleton 1995a).

The Chappo and Ysidora sub-basins support approximately 200 vireos (pairs or males) and 5 flycatchers (pairs or males). The world population of vireos is approximately 1,200 pairs (Loren Hays, pers. comm.). The world population of flycatcher is probably less than 300 pairs and may be less than 200 pairs (Loren Hays pers. comm.). Because the amount that the current sewage effluent discharge contributes to the groundwater basin is relatively small, the effect of this project is not likely to result in immediate and permanent loss of vireos and flycatcher habitat in this portion of the project action area. Under the conditions of a prolonged drought, however, even this small loss could exacerbate the normal effects of drought on riparian vegetation in selected sections of the river basin, and thus indirectly vireo and flycatcher habitat in the area. It is very unlikely that groundwater drop during drought years will cause the immediate death of riparian vegetation stands in localized areas downstream of STP 3. Instead, the effects to vegetation may be gradual and not noticeable for an extended period of time, i.e. ten years.

The current population expansion as vireos colonize new areas throughout the ecoregion makes it difficult to accurately predict the impacts of possible habitat loss within the lower Santa Margarita watershed on the viability of this species. The impact on flycatchers is even more uncertain; they have declined precipitously (>50%) in the project area since 1991 with no obvious major habitat changes.

Changes in flood regimes and hydrology may have negative effects on arroyo southwestern toads. Dewatering of drainages on Camp

Pendleton could alter the stream flow, disrupt stream terrace production and reduce or eliminate breeding pools. Currently arroyo toads have not been found in reaches that are affected by these projects. Arroyo southwestern toads lay eggs in pools that are typically less than 30 cm. deep (Sweet 1992). Slight changes in the water levels during the breeding season would easily eliminate such shallow pools. The juvenile and adult toads rely on sandy/gravelly stream terraces for foraging. They also burrow into the sandy terraces to escape daylight and heat (Sweet 1992). Lack of sufficient flow may cause early drying of breeding pools, restrict the growth period for larvae, and cause loss of damp subsurface soil which may result in high adult mortality during late summer and early fall (Federal Register 58).

These hydrological changes may also cause an adverse affect on the habitat of this species by encouraging growth of a stable riparian corridor which confines and deepens a stream channel and lowers water temperature below that necessary for larval development (Sweet 1991). These changes may also favor exotic vegetation over native species. Exotic plants and regenerating native species tend to choke stream banks, impede flow, and prevent sunlight from filtering down onto the bank. This lowers the soil temperature. Immature arroyo southwestern toads avoid stream banks and bars choked with dense vegetation, presumably because of lower soil temperatures (Sweet 1992). Periodic flooding tends to reverse these conditions and create habitat suitable for toads.

Since, in the estimation of the Base, the potential indirect adverse effects to existing riparian habitat and the listed species it supports are indeterminate, the Base has proposed a monitoring program to quantify any future effects over time and to compensate for any harm to species or reduction in habitat value.

The Base will monitor for depth to water, "vegetation health, vigor and cover." The Base has stated that the discharge of tertiary treated effluent by upstream users should more than offset the water balance loss. The groundwater basin will be evaluated on a periodic basis to facilitate predictive modeling of the Basin dynamics and management of groundwater extraction. The Base has committed to an exotic vegetation control program as part of the conservation plan and a focused cowbird trapping program to reduce parasitism or depredation of vireos and flycatchers on the Base. Should demonstrated effects occur, the Base has stated that compensation would be provided based on the mitigation protocols established in the ecosystem conservation program.

Reduction in water quantity associated with the elimination of secondarily treated sewage downstream could affect the suitability of habitat for the tidewater goby in the Santa Margarita River Estuary. Future re-colonizing tidewater goby may be adversely affected by this reduction in water quantity. The significance of the contribution from STP 13, located directly upstream of the estuary, to the water quality of the estuary is not known at this time. Effluent relocation could be offset by the increase in tertiary treated water input into the system by upstream discharge sources which will double the flow released (over loss from dewatering) initially and potentially will have 11 times the flow if the proposed 17 MGD flow is approved by the Regional Water Quality Control Board. However, should flows released upstream not contribute to surface flow replacement due to groundwater recharge in upper reaches of the Santa Margarita River, the reduced flows may put tidewater goby in contact with exotic predators and/or competitors through increases in salinity and/or reduced and modified habitat areas. This is the subject of further studies in progress by the Rancho California Water District and Camp Pendleton as part of their negotiations under the 1941 stipulated agreement for resolution of the Santa Margarita River litigation. These studies are examining the dynamics of upstream water extraction on the historical surface flow regimes of the lower Santa Margarita River and the degradation in depth to water this has caused through time. Other components of water quality in the estuary may improve from the elimination of secondarily treated sewage effluent flow which is high in nutrients and temperature.

Increased sedimentation/siltation occurring downstream from ground disturbing activities in the watershed (mainly construction activities) could affect tidewater goby downstream by reducing lagoon habitat quality. Except during floods and high winter flows, most sediments are deposited before they can reach a lagoon/estuary when the streams go underground. Floods and high water flows tend to scour the lagoon/estuary and transport sediments to the ocean.

5.4 Demolition and Removal of Railroad Tracks

This work will result in temporary degradation of vireo/flycatcher habitat along at least one mile of railroad bed. Since work will be done outside the breeding season, no noise impact to listed species is anticipated. Without follow-up weed control, the activity could result in the propagation of invasive weeds, such as *Arundo*, fennel, castor bean and tamarisk.

5.5 Desilting the Santa Margarita at the Lake O'Neill Diversion Weir

In this consistently disturbed area, the river channel supports a scattering of annual and perennial forbs and rushes. Adjacent stream banks support willows, tamarisk and *Arundo*. In 1994, there was no established woody riparian vegetation growing on the area targeted for sediment removal.

Three (3) vireo pairs or males were detected within 250 feet of the proposed desilting area in both 1993 and 1994; 2 pairs were mapped within or directly adjacent to the de-silting area in both years. Flycatcher use has been detected very near the upstream end of the desiltation site and approximately 1000 feet downstream (Mark Pavelka pers. comm). The existing habitat is suitable for arroyo toads, which have been reported from an area above the weir in 1994 (Camp Pendleton 1994a) and upstream at the confluence of De Luz Creek and the Santa Margarita River (Camp Pendleton 1995b).

Noise, dust and human activity associated with sediment removal should not affect vireo or flycatchers. Since this activity is scheduled to occur during the non-breeding season of vireos or flycatchers, it is not expected to have direct effects on the species. Likewise, little damage to existing riparian habitat is anticipated. Downstream sedimentation could be reduced if the weir downstream from the site traps much of the water-transported sediments.

Construction outside of the vireo/flycatcher nesting season will not necessarily avoid adverse effects to arroyo toads. Excavation activities will likely adversely affect individual arroyo toads if they are making use of the project area as reported. Adults and subadults could be killed or displaced by construction activities. Destruction of eggs is unlikely as desilting is not practical during the rainy season when toads are breeding. Adult toads excavate shallow burrows on (sandy) terraces where they shelter during day when the surface is damp or during longer periods in the dry season (Fish and Wildlife Service 1994[fed register vol 59 12/16/94]). Sheltering adult arroyo toads could be in the de-siltation area at any time. Reports of this species occurring in the project area following desilting activities in winter 1993-94 does suggest that such activities may be compatible to the continued existence of the species at this location. But with the potential for significant along-stream dispersal by some adult males and subadults of both sexes (Sweet 1993), this is inconclusive, as re-colonization or

supplementation from other areas could have occurred. Ponding subsequent to desilting could enhance breeding habitat for toads, leading to increased production of juveniles that could disperse throughout the area prior to the next desilting cycle.

Silt mobilization could affect arroyo toads downstream; silt stirred up by activities may settle out in breeding pools. Performing this operation before the first rains of the season would help minimize adverse effects resulting from silt mobilization. Tamarisk, *Arundo*, and other exotic plants may become established in the project's disturbed areas, but these plants may not become well established if this project occurs annually. Nevertheless, the continued propagation of invasive weeds at and around this site will likely provide significant propagules to areas upstream (tamarisk) and downstream causing further degradation of the drainage. Limited exotic plant control measures could, with low to moderate effort, keep any such invasive plants eliminated from within and adjacent to the site area, but it is undetermined if this is part of the project description.

5.6 Marine Corps Air Station Construction Projects

5.6.1 Ultimate Clear Zone (Project PA303M)

Construction activity for the clear zone will include clearing all vegetation except grass within a 27 acre area. Clearing is expected to occur 3-5 years after planting substitute habitat. Wetland vegetation within the proposed project area includes 6.6 acres of riparian woodland, 5.3 acres of mixed willow and *Arundo*, 1.1 acres of tamarisk, 1.2 acres of *Arundo*, 0.8 acres of disturbed ground, and 12 acres of currently mowed grasses and forbs.

The proposed mitigation site is located north of the Ranch House and is further discussed in the BA. The current schedule calls for planting of substitute habitat near Lake O'Neill in late 1995. An alternative mitigation is control of exotic riparian vegetation at a cost equivalent to the proposed habitat creation. This alternative could ultimately result in more high quality habitat, per dollar expended, than planting and irrigating native riparian species.

Six undetermined status male vireo were detected within 250 feet of the proposed clear zone in 1994. Three territorial and 3 undetermined status vireo males were detected in the same area in 1993. Three to 4 nesting vireos were detected within the direct footprint of the clear zone in 1993. One flycatcher was detected

within the project foot print during vireo surveys in 1990?. An additional 1-2 flycatchers were detected in the project vicinity during 1989, 1990, 1991, and 1993 vireo surveys.

The potential for arroyo toad in this area has not been determined, but they are known from approximately 8000 feet upstream. Suitable habitat for arroyo toads may not currently exist because of the thick understory vegetation in this area.

The project will convert 15 acres of native riparian and exotic vegetation to mowed grass (the remaining 12 acres is already mowed grass). Initial vegetation removal will be accomplished during the non-nesting season to avoid noise and dust disturbance to nesting birds. It is undetermined if maintenance of the area (mostly mowing) would occur during the vireo/flycatcher breeding season.

5.6.2 Convert Short Approach Landing System to Airfield Lighting Sequence Flashing System (PROJECT PA403R)

The project will involve individual lighting units within the river and on upland areas between the runway and the river. Within the river, the project area was described in 1994 as almost entirely open river channel with a narrow strip of riparian scrub on the south bank of the river and riparian woodland on the north bank where the lighting would terminate. Much of the proposed construction area was apparently scoured/disturbed in the heavy river flows of January 1993 and by silt removal activities. This area has been colonized by grasses and forbs, scattered clumps of *Arundo*, and a small (0.01 acre) patch of cattails (fresh water marsh) inland from the south bank of the river (Camp Pendleton 1994a).

Six vireo (pairs or males) were detected within 250 feet of this project site in 1993; 2 territorial males, 2 unidentified status males, 2 pairs (nested within 250 feet of the proposed terminus of the approach lights). Four unidentified status males were observed within 250 feet of the project during 1994 surveys. Flycatchers are not known from this general area. Arroyo toads have been detected in the project area (Camp Pendleton 1995b).

Approximately 1-2 acres of the river channel will be disturbed by construction. The post-construction footprint will be approximately 0.1 acre and will include only the lighting supports. Ongoing maintenance will be limited to infrequent, temporary human presence to replace/adjust lighting.

Riparian habitat will be disturbed by construction. Native riparian vegetation could recover if *Arundo* and other exotics are adequately controlled. Returning the area to original condition is part of the project description, but the specifics of this are unclear. Less than 0.1 acre or wetlands/habitat is likely to be permanently lost due to placement of the lighting supports. Flood-borne debris may accumulate against the supports affecting stream flow. Human entry for light maintenance, control of vegetation or debris removal around the light supports could result in disturbances or harm to vireo and arroyo toad during breeding/nesting seasons. The scheduling or scope of these activities is undetermined, but the Base has stated that the implementation of these activities may be necessary during the nesting season. Maintenance involving vehicles could cause disturbance or mortality to arroyo toads during all times of the year. Maintenance performed in the fall (September 15 - November 15) before the first rains of the season would likely have the least impact. Structures placed in the Santa Margarita River are proposed to have Nixalite to prevent birds from using them as perches. Work is proposed to be completed during the dry season (Camp Pendleton 1994a). Please see discussion of the impacts of concreting activities on arroyo toads discussed in New Potable Water Wells in section 4.6.

Operation of the lighting system could affect birds flying over it at night through distraction, confusion, and other effects. The lights would be directed upward at an angle, but unshielded or reflected light may increase illumination levels in the vicinity of the lights. Light that reaches arroyo toad habitat, especially breeding or maturing pools, is not expected to have a positive effect. Overall, this lighting and associated activity would likely degrade the quality of the habitat for vireo and possibly arroyo toad in the vicinity.

5.6.3 Aircraft Parking Apron and Fueling Pits (Project P-026T)

There are two alternatives being considered for the location of this project. One of the options, "alternative A," involves a small area within the confines of the existing airfield and does not contain wildlife habitat. The following analysis is based on the "alternative B" location, a 23-acre area between the existing runway and the proposed levee extension.

Vegetation on the alternative B site is approximately 75% disturbed ground supporting a mixture of grass and forbs, 10% riparian woodland, 5% riparian scrub and 10% *Arundo*.

One territorial male vireo was detected within 250 feet of the project area in 1993. During the 1994 nesting season, one nesting pair and three undetermined status male vireos were detected. One to 3 flycatchers per year have been detected within 2000 feet west of the runway end during vireo surveys performed in 1989, 1990, 1993. The arroyo toad has not been found within the project vicinity, but the Service is unaware of comprehensive surveys of this area. Please see the discussion for the ultimate clear zone (above).

This project, in conjunction with the proposed levee extension, could permanently eliminate the sensitive wildlife value of the 23-acre strip of riparian woodland, riparian scrub, mixed grass and forbs, and *Arundo*, between the runway and the existing low flow of the Santa Margarita river, an area occupied by approximately 9 vireo males in 1994.

Without the levee extension, this project would further narrow the existing riparian habitats associated with the river.

Noise and disturbance associated with the project could affect vireos in the adjacent area. The levee as currently designed would function as a partial sound barrier between ground operations and the remaining riparian habitat north of the MCAS, but re-design of the levee to reduce floodplain/habitat loss and degradation may eliminate or cause the re-design of this proposed project to another location.

The actual habitat loss resulting from this project would depend on the exact size and location of the completed project which is yet to be determined. The maximum possible vireo habitat directly affected by this project is 3 acres according to the original BA. The loss of habitat value due to fragmentation would also depend on the final siting and design of the project. Should the alternative B site be selected, mitigation requirements could be addressed under Class 2 activity protocol.

5.7 Replace and Improve Santa Margarita River Crossing[5]

This project would construct a low water (Arizona) crossing for DeLuz Road at the Santa Margarita River (GC 702913). The Santa

[5]This project does not include the De Luz Creek crossing that was originally described in the Biological Assessment.

Margarita River crossing would cover an area 300 feet long by 30 feet wide. Construction would affect an area 30 feet around the perimeter of the crossings. Construction will be planned to occur between 1 September and 15 March to avoid the breeding season of the vireo and flycatcher, and most of the arroyo toad breeding period.

The existing river crossing is open sand that is disturbed by frequent vehicle passage. It consists of an open water/sand crossing 15-20 feet wide. Beyond this is a narrow band of freshwater marsh, with adjacent grass/forb mix, mixed willow/*Arundo*, and riparian woodland.

At the Santa Margarita River crossing, approximately 0.10 acre of riparian woodland and 0.10 acre freshwater marsh vegetation would be permanently lost. Up to 0.15 additional acres of both riparian woodland and freshwater marsh vegetation may be lost due to construction activities. This vegetation is expected to passively return with appropriate weed control. The permanent loss of vegetation may affect foraging area of 2-3 vireo territories by 0.1 to 0.2 acres in a linear strip (Camp Pendleton 1994a).

Construction activities would directly effect any arroyo toads located at the construction site. Construction will occur during the fall and winter and would avoid most of the toad breeding season. Please see discussion of the impacts of concreting activities on arroyo toads discussed in New Potable Water Wells in section 4.6.

The addition of this crossing is not expected to increase traffic flow into the area. An established crossing would centralize much of the traffic, deterring most vehicles from crossing the river at other locations. This would allow sand stabilization and revegetation off the developed concrete crossing. This may allow establishment of a riparian habitat more useful to vireo and flycatcher in an area currently disturbed by vehicles crossing. It will also decrease the number of arroyo toads that burrow into the sand of a soil crossing from being crushed by vehicles crossing the river. By stabilizing pools that may form above and below the crossing will increase breeding and larval habitat for toads.

5.8 Blue Beach Inland Access

West of Stuart Mesa Road, the existing inland access road to be widened is bordered by 0.5 miles of disturbed coastal sage scrub, 0.1 miles of agricultural fields, 0.1 miles of open water estuary,

0.1 miles of mixed freshwater/pickleweed marsh, and 0.05 miles of disturbed/degraded riparian scrub. The major portions of widening work needed involves crossing under the Interstate freeway 5; much of this widening would occur within the Santa Margarita River Estuary.

East of Stuart Mesa Road, the existing inland access road is bordered by riparian scrub and woodland, of varying quality: pure stands of *Arundo* and tamarisk, grass and weedy areas, and coastal sage scrub. About 2.8 miles of the existing road follows the upland/riparian habitat boundary.

Vireos and flycatchers have been documented as nesting along the Santa Margarita River, east of Stuart Mesa Road. In 1994, there were 40 vireo (pairs and males) and 1 flycatcher (pair or male) detections mapped within 250 feet of the existing road (Camp Pendleton 1994a).

Since the arroyo toad was recently recorded on a road immediately upstream (Camp Pendleton 1995b), it is expected on site.

Effects to vireos and flycatchers would occur east of Stuart Mesa Road. The widening of the road will result in permanent habitat loss of approximately 10 acres inland of Stuart Mesa Road. This acreage would include 1.8 acres and 0.6 acres of riparian woodland, 4.2 acres and 1.4 acres of riparian scrub/mixed willow exotic and 3.4 acres and 0.9 acres of degraded riparian scrub/exotics/adjacent uplands that would be permanently and temporarily affected, respectively. Portions of the project where the upland/riparian habitat boundary occurs provides vireo and flycatcher foraging habitat. The temporarily disturbed habitat will revert to native vegetation within 3-5 years following construction if appropriate weed control is performed.

Road improvement will encourage more vehicle use, leading to increased dusting of vegetation and pools and thus diminishing the value of the habitat for the vireo, flycatcher and arroyo toad. Increased traffic would also increase the potential for arroyo toad roadkill. However, with the exception of a few large training exercises per year, little actual increase in vehicle activity is anticipated for this road (Dave Boyer, pers. comm.).

The widening of North River Road along its length by 15 feet will result in a permanent loss of tidewater goby habitat in the Santa Margarita River Estuary. The tidewater goby was reported from a

sampling station located within the proposed widening area under Interstate 5 in 1991 but was absent from samples in late 1993. Increased run-off and sedimentation into the estuarine system immediately following construction is expected to temporarily decrease water quality and degrade otherwise suitable tidewater goby habitat. In addition, the decrease in water quality within the estuary/river may also result in a temporary degradation of least tern and snowy plover foraging areas.

The proposed widening of North River will be constructed to accommodate inland access of tactical vehicles during major amphibious landing exercises. Increased beach activity in the form of vehicle and foot traffic is anticipated at Cockleburr Beach access and/or the access road directly north of the North Beach least tern colony as these would be the only connections to the North River Road from the beach. If conducted during the nesting season, increased military operation activities would likely result in disturbance to nesting least terns and snowy plovers at the access nearest the least tern colony. Disturbance to foraging and roosting snowy plovers would be expected with increased human activity at Cockleburr Canyon and along North River Road as it goes by the estuary. Increased human activity in the vicinity of Cockleburr Beach may preclude nesting by snowy plovers. The widening of North River Road would result in a loss of natural upland buffer zones adjacent to the estuary and river and a permanent loss of potential open water foraging areas. This road improvement will contribute to further constriction of flows under the I-5 bridge. Increased disturbance from noise and dust to snowy plovers foraging or loafing on mudflats and to foraging or roosting least terns can be expected during major amphibious training exercises.

5.9 New Potable Water Wells in the Santa Margarita Floodplain

Six deep wells for potable water production are proposed within the Santa Margarita River floodplain between STP 3 (22 Area) and Lake O'Neill. Wells located within riparian habitat will permanently eliminate up to ½ acre of habitat at each well site and 0.035 acres per 100 feet of access road. Installation of pipe lines from each well to the distribution system will require a construction zone 25 feet wide or 0.06 acres per 100 feet of length. Construction during the non-breeding season would avoid disturbance impacts to vireo or flycatcher.

The habitat at three well locations is riparian scrub. The vegetation at the sixth well location is riparian scrub mixed with *Arundo*. Two wells are located on upland areas. It is reported that none of the proposed well sites or access road sites have suitable habitat for arroyo toad (Camp Pendleton 1994a).

Two vireo pairs nested within 250 feet of the well 1 site 1993. An undetermined status male vireo was in the same area in 1994 (Camp Pendleton 1994a). A flycatcher has been detected in this area during vireo surveys (Mark Pavelka pers. comm.).

Two undetermined status male vireos were observed within 250 feet of the well 2 site in 1994. Two males and a nesting pair were within the same radius in 1993. (Camp Pendleton 1994a) .

Three unidentified status vireo males were observed within 500 feet of well site 3 in 1994; a territorial male and a nesting pair were present in 1993. (Camp Pendleton 1994a) Of these three unidentified status males, one is mapped as detected within 100 feet of well site 3. One to 3 flycatchers have been detected using the area within 400 feet of this site during vireo surveys performed in 1990 and 1991.

Four undetermined status male vireos were detected within 500 feet of the proposed well 4 and 5 sites in 1994; four territorial males and a nesting pair were detected in 1993 (Camp Pendleton 1994a). Consistent use of the area within 600 feet to the east of well 4 site and within 1000 feet south of well 5 site by 1-2 flycatchers was detected during vireo surveys in 1989, 1990, 1991, and 1993.

The area within and surrounding well 6 site is expected to be fully disturbed/developed with no potential for significant use by listed species.

Arroyo toads are known from the areas near well 1 site and could be affected by activities at well 2-5 sites. Concreting activities that result in concrete (or affected water) reaching water bodies can adversely affect arroyo toads. Sweet (1993) noted that installation (in May of 1993) of well casing posts in a streambed caused the hydrolyzing products of catalyzing cement to enter a creek in the Los Padres National Forest. This produced pulses of highly alkaline water (pH ca. 11) that apparently caused mortality to 6 clutches of arroyo toad eggs downstream, while eggs upstream survived and hatched normally. Also extensive deposition of white flocculent material (apparently concrete) blanketed the creek bed

downstream possibly killing much of the algae downstream. At pH 11, *Bufo* larvae died in the lab within 5-7 minutes (Sweet 1993).

Access roads would eliminate 0.35 acre of riparian scrub at well 2, 0.7 acre at well 3, and 0.56 acre at wells 4 and 5. There would be no vegetation loss expected with construction at wells 1 and 6. Up to 1.14 acre would be disturbed during installation of the water and power lines; this area could be passively restored if appropriately weeded for a number of years. The well pads at sites 2,3,4 and 5 will each permanently remove 0.25 acre (or less) of riparian scrub, resulting in a reduction of potential vireo and flycatcher habitat at these locations.

Noise, dust and reduced air quality, associated with heavy equipment operation, and human activity may disturb bird/animal activity near the well sites during drilling and well installation if birds/animals are present in the area.

Access roads will allow increased human entry into the habitat although access to the well sites will be restricted to a very limited number of authorized personnel. Construction could also result in the creation of habitat edges which may be attractive to vireos, but Whitfield (1990) found that predation on flycatchers nests increased with decreasing distance from nests to thicket edges, suggesting that habitat fragmentation may increase the threat of predation. McCabe (1991) reported that cowbirds lay their eggs in songbird nests closest to the edge of the habitat. The Base's cowbird control program should substantially minimize potential cowbird impacts. Well monitoring and maintenance would create recurring disturbances and vehicle traffic in these habitats. The linear nature of the vegetation removed to create the access roads is expected to create constant invasion lines for invasive weeds such as *Arundo*. These invasive weeds can easily invade surrounding areas, degrading them and reducing suitable vireo and flycatcher habitat. However, exotic vegetation control by the Base can prevent the establishment of these weeds along the new access roads and prevent a reduction of habitat use by vireos or flycatchers.

These wells are intended to replace, not supplement existing wells and no net increase in groundwater withdrawal is anticipated. However, there is a potential for increases in distance to groundwater associated with these pumping wells within a undetermined zone (less than 200 feet) around the wells (Camp Pendleton 1995a) and this could eliminate the potential for woody riparian vegetation. Increases in distance to basin groundwater are

discussed in the Santa Margarita STP project impact analysis in section 5.3.

6 CONSTRUCTION PROJECTS - LAS FLORES DRAINAGE

6.1 STP Compliance in Las Pulgas Canyon P-529(S)

The existing sewage ponds and access road are in and adjacent to riparian woodland. The proposed pipeline route follows Pulgas Road (along the shoulder) from the sewage treatment plant (STP) southwesterly through riparian woodland (1.2 miles) and coastal sage scrub upland (1.1 miles) to Stuart Mesa Road where it turns south through riparian scrub for 0.3 miles and then westerly for 0.4 miles along an unimproved road through riparian woodland to the injection well site above Las Pulgas Beach.

Effluent discharged from STP 9 reportedly results in surface flows in Las Flores Creek for about 0.7 mi. during late summer. The January 1993 flood cut 5-6 foot deep channels through the alluvium above and below the STP. Willows growing on higher ground away from the current effluent surface flow appear to be suffering from inadequate soil moisture.

In 1994, 5 nesting pairs and 4 territorial male vireos were found within 250 feet of the pipeline route. One territorial male vireo was located within 250 feet of the STP improvement area. Three flycatchers were reported within 250 feet of the pipeline route. Comprehensive surveys have not detected the arroyo toad within the project area (Dave Boyer pers. comm.).

Pipeline construction would temporarily impact less than one acre of riparian habitat. Construction during the nesting season may disturb up to 12 least Bell's vireo pairs and up to 3 southwestern willow flycatcher pairs. Construction during the non-nesting season would have minimal impacts as long as the equipment and materials are kept out of the riparian vegetation. Repair and lining of the existing ponds and road repairs will result in the trimming/removal of some riparian vegetation which may temporarily alter the foraging habitat used by 1-2 vireo pairs.

The impact on riparian vegetation from eliminating the effluent discharge at STP 9 Los Flores Creek is unknown. Loss of up to 260 acre feet per year of effluent currently discharged into the creek may adversely impact riparian vegetation downstream from the STP. The effect of increased distance to groundwater and reduced surface

flow may reduce the amount and quality of vireo and flycatcher , and arroyo toad habitat in the approximately 15,000 feet of Las Flores Creek drainage. Thirty-three (33) vireo pairs or territorial males were detected in this portion of the drainage in 1994 surveys.

Western snowy plovers have been observed at Las Pulgas (Red) Beach, but this project would not likely affect them. Increased sedimentation/siltation occurring downstream from ground disturbing activities in the watershed (mainly construction activities) could affect tidewater goby downstream by reducing lagoon habitat quality (if Las Flores Creek is flowing continuously to the ocean at the time of the disturbance). The most viable population of tidewater gobies south of the Santa Clara River is likely located in Las Flores Creek Lagoon (Swift 1993). The changes to the flow regime in the estuary may have adverse effects on tidewater goby. Reduced surface flows may put tidewater goby in contact with exotic predators and/or competitors through changes in salinity or modified habitat areas. The actual effects are difficult to predict since there are natural water sources above and below the STP and the lagoon is often cut off from the ocean by a sand bar.

6.2 Las Flores Marsh Enhancement

This project will involve repair of water control structures and on-going management activities including vegetation control through mowing, grading, spraying and prescribed burning. In 1993, one territorial vireo was found within the Las Flores marsh although no vireos were detected in 1994. Controlled burns conducted during the fall would burn understory vegetation and aquatic emergent vegetation when much of it is dormant. The reduced understory vegetation may reduce the likelihood or even preclude vireos from nesting within this area, although vireos used the area in 1993 following a fall 1992 burn. It is anticipated that habitat disturbance will occur regularly with annual maintenance. Interpretive displays and self-guided tours of the area would result in an increased human presence which may result in the disturbance to vireos and an increase in predators attracted to human litter. Such activities could also result in area for non-native predators/competitors such as bullfrogs or mosquito fish.

7 CONSTRUCTION PROJECT - SAN ONOFRE DRAINAGE

7.1 Sewage Treatment Plant Compliance, San Onofre Drainage MCON Project P-527N

Loss of habitat includes 3.5 acres of mixed woodland (sycamore-alder riparian woodland) and 1 acre of riparian scrub (mulefat scrub) to the proposed construction of 12 infiltration ponds in San Onfre Creek (Camp Pendleton 1994b). No listed animals were detected within these areas. Arroyo toads have been found near STP 10 but outside of the project area; they have not been found in the area of the infiltration ponds (Dave Boyer, pers. comm.). Placement of structures (e.g. ponds) within the floodplain will generally increase vehicle activity in this area increasing the potential for mortality to arroyo toads. Please see discussion of road use by arroyo toads in the impacts analysis of Blue Beach Inland Access in section 5.8. The existing sewage treatment ponds will no longer be filled with water. Flycatchers were noted from these ponds in 1994 (Camp Pendleton 1995).

Approximately 0.85 acre of mixed woodland (0.21 acre coast live oak riparian forest and 0.64 acre of southern sycamore-alder riparian woodland), less than 1 acre of "undisturbed riparian habitat", 2.1 acres of disturbed mixed woodland (disturbed southern sycamore-alder riparian woodland), and 6.37 acres of "disturbed habitat" would be temporarily disturbed by pipeline construction. Mixed woodland habitats are not generally adapted to disturbance and would likely take considerable time to recover. Without appropriate weed management activities, these areas would likely remain degraded for several years. Total footprint for all project construction is less than 50 acres.

Construction activity during the nesting season could cause adverse effects to listed species from noise, human activity, vehicle travel, pollution, and nighttime lighting.

Two territorial vireo males are noted within 1000 feet of the areas within San Onofre Creek to be used for the 12 infiltration ponds. Four vireos (territorial males or nesting pairs) were detected in 1994 surveys within 500 feet of all project construction areas.

Five potable water wells exist within San Onofre Basin, most are in the lower Basin. Presently these wells produce 750 acre feet per year (Camp Pendleton 1994b). Water levels in the Basin have apparently remained stable or have risen since 1962, since agriculture pumping was reduced and finally eliminated: no Basin groundwater has been pumped for irrigation since 1965 (Camp Pendleton 1994b). Since discharges from STP 10 and 11 would be relocated to the downstream portion of the Basin, no-net differences in water imports are anticipated from the "no project" conditions on

a basin wide basis (Camp Pendleton 1995a). Relocating the discharges, however, may lead to increased stream flow infiltration in the upper portion of the Basin (Camp Pendleton 1995). Approximately 770 acre-feet per year (2.1 acre-feet per day) will be diverted 12,000 to 26,000 feet downstream. This is 44% of the total basin flow per year (Camp Pendleton 1995a).

Riparian habitats are dependent on water. Reduction in effluent discharge may have concomitant and continuous effect related to the amount reduced. Depending on the vegetation affected, the diversion of 2.1 acre feet per day may be significant for listed species.

It was projected by the Base that relocation of the STP 10 discharge would result in changes in depth to groundwater of: zero to five feet within 3000 feet downstream; zero to two feet approximately 7000 feet downstream; zero to five feet 11,000 feet downstream (Camp Pendleton 1995). Relocation of STP 11 discharge was simulated as causing depths to water to increase from zero to ten feet in the immediate vicinity of the retention ponds of STP 11 and zero to five feet 4000 feet downstream. Relocation of the STP 10 and 11 discharges was simulated as increasing depth to water (downstream from STP 11) from zero to ten feet 6000 feet downstream and zero to two feet 9000 feet downstream. Near the proposed site for the relocated wastewater discharge (lower basin), simulated depth to water was modeled as being closer to the surface, zero to four feet. Relocation of the discharges may move approximately one-third of the overall groundwater recharge within the San Onofre Basin from the upper to the lower segment of the basin (Camp Pendleton 1995).

One way that impacts of dewatering can be visualized is by picturing the expected effects of a constant drought. Large areas of the floodplain will only receive surface flows after storms. Some fringe wetland areas may lose wetland indicators, while wetland areas remaining will be generally drier. Vegetation communities will shift/convert to drier or more intermittent flow adapted types. Recovery/recruitment of riparian woodland/scrub vegetation types in these drier areas after floods and droughts is very problematic. For example, in McBride and Strahan (1984), very high drought induced mortality of willow and cottonwood seedlings was noted in Sonoma County, California, from gravel bars that had dried up completely prior to September; high winter flows the following season scoured the sediments and killed the vast majority of remaining seedlings. Generally, seedlings are in an inferior position in a plant community, in part, due to their small root systems (Walters et. al 1980). Seedlings have a low capacity to

withstand prolonged period of environmental stress like a lowered water table. On the Verde River in Arizona, a high rate of mature cottonwood tree mortality coincided with the 1977 drought when water releases from Barlett Dam were nearly eliminated. Tree mortality was greatest (60-84%) in the stream reach influenced by groundwater withdrawals by the City of Phoenix (McNatt et al. 1980); this report went on to recommended maintaining surface flows to maintain fish and wildlife resources and riparian habitat.

Under existing conditions, continuous sewage retention pond recharge of groundwater causes the San Onofre Basin to remain filled, contributing to surfacing groundwater downstream from the ponds (Camp Pendleton 1995a). Removal of the discharge to these ponds would reduce or eliminate surfacing groundwater downstream from the ponds. Flycatchers are presumed to be dependent on surface water. Arroyo toads are dependent on having breeding pools until late in the breeding season. Reduction in surface flows and groundwater levels may make some areas of San Onofre Creek unsuitable for these species. Reduction in water levels generally may reduce habitat quality necessary for supporting breeding vireos. However, habitat in the vicinity of the effluent infiltration ponds may be enhanced.

Two flycatchers (possibly a single bird) have been reported in the 5.7 mile long area to be affected by effluent discharge removal. Five vireos, either territorial males or nesting pairs, were noted from this area in 1994. Arroyo toads are known from just upstream of the action area as well as from artificial ponds on San Mateo Creek (Fish and Wildlife Service, A. Davenport] unpublished data, 1993). If the effluent discharge is relocated, a significant portion of the existing and potential habitat areas for these species could be degraded (or even eventually lost) in the upper portion of the basin while it may be enhanced at the lower end of the basin .

Possible reduction in water quality associated with the diversion of secondarily treated sewage downstream may affect future tidewater goby recolonization in San Onofre Lagoon. A potential reduction in water quality can be expected from the relocation of treated sewage discharge points from STPs 11 and 10, to percolation ponds 12,000 feet and 26,000 feet closer respectively, to the Lagoon. The percolation basins would be within 1200-4500 feet of the Lagoon although no direct discharge to the creek is anticipated. Undoubtedly, the time and space afforded by an upstream discharge point results in improved water quality (compared to the treated sewage when first discharged, e.g. reduction in nutrients,

temperature, pollution, etc.) before reaching the Lagoon. Although the proposed downstream percolation basins will likely generally maintain water quantity to the Lagoon as existing, a reduction in water quality may result if subsurface percolation of the effluent does not adequately filter it between the ponds and any surface emergence point that may develop very close to the Lagoon. Since the percolation basins are in the floodplain of San Onofre Creek, it is conceivable that extremely high storm flows could overtop the basin levees and carry large quantities of treated sewage downstream directly into the Lagoon. It is undetermined what level of storm protection the percolation basins are designed for.

Increased sedimentation/siltation occurring downstream from ground disturbing activities in the watershed (mainly construction and maintenance activities) could affect tidewater goby downstream by reducing lagoon habitat quality when surface flows are occurring and if gobies were present.

8 CONSTRUCTION PROJECT - SAN MATEO DRAINAGE

8.1 STP Compliance, MCON Project P-529N - San Mateo Effluent Pipeline and Infiltration Pond

Currently, effluent flowing directly from the STP supports riparian woodland along a narrow ditch about 0.3 miles long on the north side of the creek. There are small patches of fresh water marsh upstream from the STP. The existing sewage ponds 400 meters south of the STP currently support riparian scrub and fresh water marsh habitat.

No vireos or flycatchers were detected within 250 feet of the project construction areas in 1993 or 1994 vireo surveys. Flycatchers have not been detected in the San Mateo drainage (Mark Pavelka pers. comm.). Extensive arroyo toad locations have been reported from this watershed both upstream and downstream from the STP (Karen Jensen pers. comm.)

The reconstruction and lining of the existing sewage ponds will eliminate the riparian scrub and freshwater marsh they are now supporting. Constructing the pipeline will have little direct impact on riparian vegetation except where the new line will connect to the existing line in the vicinity of the existing ponds. There are 1.6 acres of riparian scrub along the edge of the agricultural fields which will be temporarily affected.

Noise, dust, and other construction related disturbances during the breeding season may disrupt could disrupt vireos or flycatchers if any nest or forage near the sewage pond site or the STP. Most construction activity will occur away from riparian habitats.

Periodic maintenance of the new infiltration ponds will include monthly herbicide application to the pond edges to control vegetation, monthly scraping to remove fine sediment and annual deep ripping of the pond bottoms to maintain an adequate infiltration rate.

The infiltration ponds will likely raise the groundwater level in the vicinity of the ponds. This increased groundwater may become available to convert existing riparian vegetation to different (generally wetter) types. This may locally benefit vireo, flycatcher, or arroyo toad. The benefit could be small since the infiltration ponds are within ¾ mile of the ocean, which limits the riparian potential.

This project will eliminate the effluent discharge from the present sewage ponds near the San Mateo STP, approximately 2.7 miles from the ocean. The effect of this action on riparian vegetation is unknown. A rapid rate of infiltration is reported in this area; presently there appears to be limited high ground water/surface water dependent vegetation growing immediately below the discharge point (Camp Pendleton 1994a, 1995a). Overall, this may be an indication that the distance to groundwater is generally large and the infiltration rate is high. Distance to groundwater would increase 0-3 feet in portions of the drainage (Camp Pendleton 1995a). The effluent diverted amounts to 10 percent or less of the total basin recharge (Camp Pendleton 1995a). Current groundwater pumping performed on and off Base may be significantly affecting the riparian resources in this drainage.

Tidewater goby were first reported in the San Mateo lagoon in 1930. They were present in 1974 and 1981, but not in 1986, 1988 or 1990-91 (Holland 1992). They reappeared following the January 1993 flood. (Swift 1994). Increased sedimentation/siltation occurring downstream from ground disturbing activities in the watershed (mainly construction activities) could affect tidewater goby downstream by reducing lagoon habitat quality if construction takes place during periods of surface flow to the ocean/lagoon. Almost all of the project will be located away from the stream channel. If there are changes to the flow regime in the estuary there may be adverse effects on tidewater goby. Reduced surface flows may put

tidewater goby in contact with exotic predators and/or competitors through changes in salinity or modified habitat areas. Water quality may be reduced by discharging effluent ½ mile from the Lagoon, instead of the present 2 miles upstream where there is greater time and space afforded to the effluent to improve its quality through natural "cleansing" as it moves through the drainage.

9 CONSTRUCTION PROJECTS - SAN LUIS REY DRAINAGE

9.1 Fire Equipment Road Crossing at Pilgrim Creek Dam

The vegetation at the project site is riparian woodland along the stream bed and grass-forb mix/coastal sage scrub on the drier soils. The road will be 14 feet wide and cross less than 200 feet of riparian habitat. Three pairs of vireos and two flycatchers were documented breeding in the riparian woodlands within 250 feet of the proposed crossing in 1993. Five territorial male vireos detected in surveys in 1994 are within 250 feet of the project site.

Extensive surveys have not located any arroyo toads in this area (Dan Holland, pers. comm).

Up to 0.1 acre of riparian woodland would be removed directly below the dam spillway. Construction during the non-breeding season would avoid disturbance of nesting vireos and flycatchers. Removal of riparian habitat may reduce foraging areas for vireos and flycatchers. Use of the crossing would create temporary dust and noise disturbance. Since this crossing is intended only for fire fighting equipment, disturbance would be infrequent and primarily during annual maintenance of the Camp Pendleton firebreaks in late spring or summer and when fires occur in the area.

An increase in propagation of invasive exotic plant species could be expected on-site and adjacent as a result of habitat disturbance, although *Arundo* does not occur in this drainage at this time.

9.2 Construct Sewage Effluent Discharge Pipeline From 14 and 17 Area Sewage Treatment Plants to Oceanside (San Luis Rey) Sewage Treatment Plant

The proposed pipeline route crosses approximately 330 feet of riparian woodland habitat. A narrow band of riparian woodland in the Pilgrim Creek drainage exists between STP 1 to STP 2. From STP 2 downstream to the Camp Pendleton boundary, the riparian woodland

broadens. Most of the habitat transected by the pipeline from STP 2 to the San Luis Rey STP is grassland, coastal sage scrub or is considered developed/disturbed (existing pipeline, rodeo grounds, golf course). The wetland at the edge of Camp Pendleton supports fresh water marsh vegetation.

Vireos have nested in the Pilgrim Creek drainage for many years, and flycatchers are also known to be present. Almost all vireo and flycatcher detections have been made south of Vandegrift Blvd. No vireos or flycatchers have been detected in Windmill Canyon. Surveys in the spring of 1995 indicate that there are no arroyo toads in Windmill Canyon or Pilgrim Creek (Dan Holland pers. comm.).

Riparian woodland downstream from STP 1 will be disturbed by pipeline construction. No vireos or flycatchers have been observed in this area. If the pipeline is routed from STP 2 across the riparian habitat to the west, approximately ½ acre of riparian woodland would be lost. Construction within riparian habitat will be scheduled during the non-breeding season to avoid destruction of vireo and flycatcher nests, as well as the noise and dust associated with pipeline construction that could disrupt nesting and foraging vireos.

Effluent from these STP's does not discharge directly into Pilgrim Creek or the Santa Margarita River. Effluent is held in several ponds, used for irrigation at the golf course, and discharged to the Santa Margarita River when it exceeds the capacity of the holding ponds (usually in the fall and winter). When this project is completed, water will still be used to irrigate the golf course, but none will be discharged to the River. The effect of eliminating this flow on riparian vegetation is discussed in the Santa Margarita River STP impact analysis.

10 RECREATIONAL PROGRAMS

Hunting and fishing have been part of the recreational program on Camp Pendleton for 50 years with no reported adverse effects on threatened or endangered species.

10.1 Hunting Program

Since waterfowl hunting is conducted only 2-4 days per week from October through January no direct impacts to the vireo or flycatcher are expected. Mortality to arroyo toads may occur as a result of trampling of burrows by hunters. Certain indirect effects to

habitat, from trampling of vegetation to accidental outbreak of fire, could occur as a result of hunting activities. In fact, there has never been a hunter-caused fire on Camp Pendleton. Smoking by hunters is limited to vehicles and cleared areas such as firebreaks; fires are prohibited.

Misdirected gunshot may result in direct mortality to resident and migratory snowy plovers. Loud noises such as those generated from shotguns are often used to haze birds from a particular area. Shotgun blasts from hunters at the Santa Margarita and French Creek Lagoon would most likely temporarily disrupt resident and migratory snowy plovers foraging and roosting in the immediate vicinity. Migratory birds rely heavily on undisturbed areas to forage and rest in order to continue their migration. Shotgun blasts may preclude snowy plovers from utilizing the food resource in the immediate vicinity of hunters.

Hunting by boat in the SMR estuary could affect tidewater goby, if present. Trampling of burrows and stirring up silt could occur. Most hunting in the Santa Margarita Estuary, however, occurs downstream of the historical goby locations (Dave Boyer, pers. comm.).

10.2 Fishing Program

Fishing activities between 15 March and 1 September could result in temporary disturbance of vireos and flycatchers from foot traffic. Occasional harm or harassment to arroyo toad could occur through trampling and silt mobilization.

Direct mortalities affecting least terns may occur as a result of fishing line breakage and subsequent entanglement of foraging terns although such incidents have not been observed on Base (Dave Boyer, pers. comm.). The presence of persons fishing in proximity to least tern colonies may disrupt adult nesting behavior for both the least tern and snowy plover. Foot traffic along beaches may inadvertently destroy nests located outside fenced areas and may disrupt foraging snowy plovers and roosting snowy plovers and least terns.

Persistent disturbance from foot traffic may result in the abandonment of least tern and snowy plover nests.

10.3 Camping and Hiking Programs

Recreational activities occur at Red Beach (Las Flores Creek), Cockleburr Beach, San Onofre, and Del Mar. Recreational activities occurring in and near riparian and estuarine/beach areas are hunting (although not on the beach), fishing, hiking, and camping. Although camping is confined to the bluffs of Cockleburr and designated areas at Red Beach and Del Mar and San Onofre, foot traffic, dog walking, and sun bathing do occur in close proximity to tern and plover nesting and foraging areas. Human disturbances can disrupt incubating adults leaving eggs exposed to extreme temperatures, blowing sand, and predation. Young chicks may become separated from the attending adult and may become more susceptible to hypothermia. Nests of both least terns and snowy plover outside fenced areas may inadvertently be crushed. Increased foot traffic increases the likelihood of unauthorized entry into areas designated as off-limits. Peak recreational beach activities coincides with the breeding season of the least tern and snowy plover.

Persistent disturbances caused by people and dogs may result in abandonment of least tern and snowy plover nests. However, frequent beach patrols, fencing and other management actions by the Base are correlated positively with an overall increase in tern and plover populations on the Camp Pendleton beaches. Successful nesting within a protected segment of a beach subjected to high human activity can also be found at Venice Beach which is even more accessible to the public than the Camp Pendleton beaches.

Recreational activities may be one of the factors precluding snowy plovers from nesting at areas such as Cockleburr Beach, Red Beach, and Del Mar.

Refuse generated from humans in the vicinity of breeding least tern and snowy plover locations may attract predators which subsequently could depredate eggs and chicks of both species. However, an active predator management program around the nesting areas presumably precludes most predator impacts.

11 RIPARIAN ECOSYSTEM CONSERVATION PLAN

The BA states "By addressing least Bell's vireo conservation on all areas, the resultant program will supersede the existing Memorandum of Understanding (MOU) between Camp Pendleton and the Service concerning least Bell's vireo." In addition, the BA states that "The program will also prevent the need for future designation of critical habitat aboard Camp Pendleton." To accomplish these objectives, the MOU was formulated to provide equivalent protection

to that otherwise afforded by critical habitat designation, such as by (1) requiring habitat restoration or replacement to occur prior to any habitat loss occasioned by construction projects; (2) requiring that riparian areas are defined as off-limits to military training with the exception of ground troop movements; (3) removal of exotic plant species; (4) annual cowbird trapping; (5) conducting research studies; (6) annual censuses; (7) assessing impact of cowbird parasitism on reproductive success; and (8) consultation on routine maintenance should include work such as maintenance of roads to the wells, well rehabilitation, pipeline repair, servicing transmission lines, and reconstruction of water spreading structures. This consultation demonstrates the Marines' commitment to consult on programmatic operations and routine maintenance activities.

The 1986 MOU required the maintenance of at least 1,200 acres of suitable vireo habitat and maintain at least 300 pairs of vireos along the Santa Margarita River. The proposed protection of a minimum of 2200 acres of high quality riparian woodland over the whole Base is represents an extension of the Base's commitment in the MOU, moving beyond the Santa Margarita River and recognizing the potential importance of other drainages on the Base.

The most recent version of the plan, as described in Appendix 1, contains more balanced and realistic goals and objectives. As an approach to ecosystem management it is on more solid footing. The most obvious challenge now appears to be whether or not the Base will be able to secure the funding in the future to adequately deal with the threats resulting from the invasion of exotic vegetation.

Programmatic Instructions. Programmatic Instruction are identified within the Ecosystem Conservation Program to minimize and avoid impacts to listed species and riparian habitats. These instructions adapt conservation needs to requirements for military training activities, facilities maintenance activities, new construction, recreational activities, and habitat enhancement activities. The overall effect of these instructions is to partially reduce the impact of these activities on listed species. See Appendix 1 for application of these instructions on specific construction projects and operational programs.

The Plan as proposed is adequate to effectively deal with the direct effects of the current Program. However, it does not reduce human and mechanical disturbances to the point of eliminating the spread

of *Arundo* and other exotics. Ongoing and future planned activities will continue to contribute to this problem.

Mitigation Bank/Compensation Procedures. Proposed compensation procedures include a Compensation Bank to administer compensation for Base activities, formulas to determine compensation ratios for direct permanent losses of habitat, and specific methods of compensation, including out-of-kind mitigation and resource trade-offs. Proposed compensation ratios involving *Arundo* removal (weeding) would extend no more than 5 years. Creation of wetlands is not proposed as part of this program. Also, the compensation identified in these ratios is for direct permanent impacts only. Temporary impacts will be mitigated on the basis of the duration of effects on sensitive species. Indirect impacts would go unmitigated.

Overall, given the lack of funding mechanisms needed to address the spread of invasive exotic plants, implementation of the proposed ecosystem conservation plan could result in an unknown net loss of riparian, vireo, flycatcher and arroyo toad habitat. On the other hand, the successful execution of the plan could substantially assure the long-term health of the ecosystem.

12 ESTUARINE/BEACH CONSERVATION PLAN

The Conservation Plan goals focus almost exclusively on management of beach and dune nesting colonial breeding birds. Most of the proposed conservation measures are currently being implemented by the U.S. Navy in compliance with the mitigation program established in their Final Environmental Statement addressing the construction, operation and maintenance of LCAC facility.

Beaches/Dunes. The western snowy plover is most likely benefitting from certain management activities provided for least terns, such as restricted access to nesting areas and predator control. However, management strategies to protect least terns from vehicular and foot traffic along the beaches may be affecting snowy plover survivorship. This issue revolves around the chick barrier fencing employed to keep least tern chicks from escaping the enclosure into ongoing vehicle traffic which presently occurs adjacent to the North Beach and White Beach terneries. Precocial plover young need access to the tideline and/or mudflats to forage. Fencing precludes snowy plover chicks hatched inside the least tern colony to exit while also preventing snowy plover chicks hatched outside the fence from using the vegetated foredunes to roost or escape beach disturbances

and predators. Foredunes can be particularly valuable, especially during high tides at the North Beach colony when flightless birds can be sandwiched between oncoming tides, vehicles and the fence. The fence at the North Beach colony at times has extended greater than 500 meters in length. Although effectively protecting least tern chicks from vehicular traffic, the chick fencing has reduced the functionality of the foredune, mudflat, and tideline interface for snowy plovers. Direct mortality as a result of being trapped in the mesh chick fencing has been documented for snowy plover chicks hatched inside the enclosure (Powell and Collier 1994). In addition, fence construction activities not completed prior to the onset of the snowy plover breeding season (1 March) may disrupt courtship, nest site selection, and cause desertion of nests already initiated.

The general population levels that are proposed for the least tern and western snowy plover reflect the current lack of specifics regarding recovery goals for these species. The full potential of the existing habitat within the designated management zones on Base is not known. Already previous targets for the least tern colonies on the Base have been exceeded. The Service expects that the amount of habitat presently available within the designated management zones could support a greater number of breeding individuals. If the acreage of essential habitat for each species is maintained, enhanced, and protected within the designated management zone, populations of both species would be expected to continue expanding until the natural carrying capacity of the available habitat is reached.

Estuary. The Conservation Plan for this ecosystem establishes management objectives for the tidewater goby. In establishing objectives for the goby, it does not identify a means to achieve the desired end result. Though apparently extirpated in the recent past, maintenance and enhancement of habitat quality may foster their recolonization in the future.

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APPENDIX 4

MONITORING PROGRAM

The following guidelines shall be used to develop a monitoring program:

(1) The monitoring program will be designed to determine:

- Attainment of management objectives in the programmatic ecosystem conservation plans;
- Compliance with the provisions of the Base's ecosystem programmatic instructions, and the Service's reasonable and prudent measures and incidental take statement;
- Adjustments needed to achieve management objectives and compliance with terms and conditions of this Opinion.

(2) The monitoring program will be based on high resolution aerial photography, GIS maps/data, and ground-truthing techniques, and reliable population census methods.

(3) The monitoring program will:

- Track plant community distribution, habitat function and value, listed and candidate species' distribution and status.
- Provide Service with all applicable digital GIS data for biological resource mapping on Base [existing survey, topography, vegetative layers, etc.] for input onto the Service GIS system in 1995.
- Monitor habitat status by providing the Service color aerial photography at appropriate scale and quality of all drainages on Base, including coastal areas, every 2 years (or as mutually modified in the course of annual program review), starting in 1996. The Base will supply copy prints of the September 1994 photos used for the current vegetation mapping done on Base.
- The Base will continue its groundwater monitoring in all drainages where groundwater is extracted to determine and manage the potential effect on listed species habitat.
- The Base will monitor stream water quality, flood

regimes, and storm event frequency.

- The Base will monitor the effects of sedimentation in SMR Estuary and coastal lagoons which are subject to upstream disturbance from programmatic and construction activities addressed in this Opinion.

- The Base will continue to monitor the SMR Estuary for water quality and tide level and document the periods when the other coastal lagoons are subject to tidal influence.

- The Base will provide annual surveys for the vireo and flycatcher. Annual population levels will be calculated and locations mapped. Vireos and flycatchers will be surveyed for by detecting singing males.

- The Base will provide an annual report of animal damage control, predator management, and cowbird control activities on Base. This report will note the species, both native and exotic, affected by these management activities. In addition, the location by drainage, the numbers trapped or dispatched or translocated will be noted. Exotics noted will include brown-headed cowbird, bullfrog, green sunfish, bluegill, mosquito fish, largemouth and smallmouth bass, and others as appropriate for purpose of adaptive management of riparian and estuarine/beach ecosystems.

- The Base will monitor the population status of the tidewater goby on Base at least every three years.

- The Base will provide breeding population estimates and reproductive success of tern and plover on the Base on an annual basis.

- Provide for submission to the Service annual reports involving each of the monitoring activities.

(4) The monitoring program will:

- Track the occurrence of accidents and unauthorized activities in riparian and estuarine/beach ecosystems on Base. These events will be reported to the Service

within 24 hours.

- Develop a tracking system that records the level of on-going programmatic activities in order to document trends in the frequency, magnitude, and extent of these activities on an annual basis.

- Track the early planning phases of future activities, including major training exercises, and construction projects in order to assure the implementation and compliance with programmatic instructions and early consultation with the Service if appropriate.

APPENDIX 5

TERMS AND CONDITIONS - DETAIL

The following terms and conditions have been developed in order to implement the reasonable and prudent measures set forth in the Incidental Take section of this Opinion. Several of these terms and conditions enhance or otherwise add to the basic elements of the Base's ecosystem conservation plans described in the BA and Appendix 1 of this Opinion, including the goals, programmatic instructions and mitigation protocol.

General

- The Base shall assure that project proponents consult with AC/S,ES staff early in the planning process, and that priority is given to the siting of proposed projects in areas that are not in riparian or estuarine/beach habitats.

- Where there are discrepancies between the project description, including the ecosystem conservation plan, as specified in the BA and the project as described in the Project Description section and Appendix 1 of this Opinion, the description in the latter shall take precedence. The Project Description section and Appendix 1 of this Opinion were developed mutually between the Base and the Service and reflect in many instances a modification and refinement of the project as originally described in the BA.

- Excessive noise (above 60 dBA leq hourly) related to all Base activities in or adjacent to riparian areas shall be avoided and minimized year round, but particularly during the breeding season. Noisy activities shall be concentrated spatially and temporally, particularly during the breeding season, to the maximum extent practical.

On-going and Planned Training

- The Base shall comply with the programmatic instructions enumerated in Section 4.1.3.1 of the BA.

- Vehicle traffic occurring at night on roads in potential arroyo toad habitat during the period of 15 March through 1 July shall be minimized to the maximum extent possible.

- Vehicle traffic in undeveloped crossings in potential arroyo toad habitat during the period of 15 March through 30 August shall be minimized.

- Dust produced in or adjacent to riparian areas shall be minimized to the maximum extent practical.

- The Base shall assure that aircraft operations shall be conducted not lower than an altitude of 300 feet AGL over vireo and flycatcher occupied riparian areas, to the maximum extent practical. The following aircraft operations are exceptions:

  - When landing and take-off from designated CAL, LZ, VSTOL, TALA/HOLF and airstation runways;

  - When operating under the control of the tower in an airport traffic area;

  - When complying with regulations related to operations, weapons delivery profiles, emergencies, special visual flight rule (VFR) conditions;

  - Low-level flight (100-200 feet AGL) operations required by the mission and when operating, training or exercising contour and nap of the earth tactics (0-100 feet AGL) along designated TERF routes.

- The Base shall assure that helicopter use at TALA is minimized between 0600 and 1100 during the breeding season to the maximum extent practical.

<u>Infrastructural Maintenance</u>

- The Base shall comply with the programmatic instructions enumerated in Section 4.1.3.2 of the BA.

- The Base shall assure that no engineering, grading, or filling activities in riparian areas occurs without prior approval from the AC/S,ES.

- Secondary roads shall be maintained to the extent practical in order to avoid ponding of water on the road surface in and adjacent to potential arroyo toad habitat.

Proposed and New Construction

- The Base shall comply with the programmatic instructions specified in Section 4.1.3.3 of the BA.

- Sediment runoff shall be contained on construction sites through the use of siltation fences, hay bales, sand bags, silt ponds, or other methods as determined by AC/S,ES.

- Dust produced in or adjacent to riparian areas shall be minimized. Measures (such as chemical treatment) used on the ground surface to minimize dust shall be biologically sound.

- All riparian and estuarine/beach areas temporarily disturbed by construction activities will be treated for a minimum of 3 years post-construction to control the establishment of exotic vegetation within the cleared or otherwise disturbed area.

- The Base shall assure the implementation of biological monitoring and reporting during construction activities occurring in or adjacent to riparian and estuarine/beach areas.

- The Base shall assure the placement of signs indicating the necessity for all activities to be strictly confined to the project site.

- The Base shall assure that construction site boundaries are clearly delineated on the ground by flagging, survey lath or wooden stakes.

- The Base shall assure that all construction project personnel are briefed by the prime contractor(s) during all project phases regarding the potential presence of listed species, the requirements and boundaries of the project, the importance of complying with measures designed to avoid and minimize adverse effects to listed species potentially resulting from project activities, and problem reporting and rectification.

Recreational Activities

- The Base shall comply with the programmatic instructions specified in Section 4.1.3.4 of the BA.

- The Base shall assure that recreational activities are designed, organized, implemented, and regulated in such as way so as to

avoid and minimize impacts to listed species to the maximum extent possible. All proposals for new recreation (and modifications of existing program activities) shall be reviewed by AC/S,ES personnel for compliance with this term and condition. Ongoing activities that may result in take of listed species shall be reviewed on an annual basis.

Ecosystem Conservation Program

Riparian Plan

- The breeding season for the vireo and the flycatcher shall be designated from 15 March to 31 August. The non-breeding season shall be defined as 1 September to 14 March.

- The breeding season for the arroyo toad shall be designated from 15 March to 15 June. Juvenile maturation shall be designated to extend an additional 8 weeks, that is, until 15 August. The non-breeding/non-maturation period shall be designated from 16 August to 14 March.

- The Base shall comply with the programmatic instructions specified in Section 4.1.3.5 of the BA and section 11.6 of Appendix 1 of this Opinion.

Monitoring

- The Base shall share data from the on-going herpetological inventory with the Service as it becomes available.

- The Base shall monitor habitat status by providing the Service color aerial photography at Service approved scale and quality for vegetation mapping of all drainages on Base every 2 years (1996, 1998, etc).

- The Base (or the Base in partnership with the Service) shall facilitate the annual monitoring of species population levels for vireo, flycatcher, and arroyo toad on Base. Determinations of species population trends shall be an integral part of the overall monitoring program.

- The Base (or the Service in partnership with the Base) shall facilitate the monitoring of floodplain and habitat acreage within the major drainages on Base. Determinations of

achievement of acreage goals shall be an integral part of this monitoring.

- The Base shall prepare and submit to the Service for review and comment an annual report. This report shall include:

  - A general summary of all projects that have been initiated on Base within the one year reporting period and will include:

    - A list of projects which implemented the provisions of this biological opinion;

    - The total acreage of listed species habitat lost or disturbed;

    - A summary of the effectiveness of take minimization measures; and

    - A discussion of any problems encountered.

  - A specific summary of each project undertaken. This report will detail:

    - Project name,

    - Project description,

    - Project location (map),

    - Total acreage of the project,

    - Acreage of listed species habitat lost and its relative condition,

    - Measures taken to ensure that "take" has been minimized or eliminated,

    - Total number of listed species that were taken, through injury, mortality, or harassment,

    - Data on take, if it occurs, and

    - Any problems encountered with respect to implementing the provisions of the management plan.

Estuarine/Beach Plan

- The Base shall develop additional programmatic instructions designed to minimize to the maximum extent practical the take of western snowy plover potentially resulting from activities in the French Creek and Aliso Creek Lagoon areas.

- The breeding season for the snowy plover and least tern shall be designated 1 March through 15 September. The non-breeding season shall be defined 16 September to 28 February.

- The management actions specified in section 12.4.2 of Appendix 1 shall be implemented within a reasonable time frame. The implementation status of these proposed actions shall be reviewed on an annual basis.

- The Base shall adjust the Estuarine/Beach Ecosystem Conservation Plan to reflect the findings resulting from the multi-year study of the effects of tern management on snowy plovers.

- The Base shall implement the following strategies to maintain the beach/estuary ecosystem and support viable, expanding populations of sensitive species:

  - New activities that could cause degradation to coastal wetlands, including reductions in water quality, and sensitive dune areas shall be considered a Class 2 activity.

  - Conservation measures currently in place as a result of the LCAC FEIS shall continue including the "off-limits" status of the Santa Margarita River Estuary (except as modified by this Opinion), and the protection and management of the Cockleburr sensitive area.

  - The conservation plan shall be updated as recovery plans for listed species are published so conservation efforts are consistent with recovery goals.

  - Information to Base personnel regarding sensitive species and restricted areas along the coastal areas shall be provided by publishing Base notices and establishing an interpretive kiosk for the Del Mar Beach recreational area.

  - Least terns and snowy plovers shall be monitored on an annual basis to determine number of pairs, hatching success, and

reproductive success in order to assess the effectiveness of the conservation plan.

The Base shall assure that the following instructions shall be complied with to avoid and minimize impacts to estuarine ecosystems and listed species:

Military Training Activities

- During the tern and plover nesting season, the Base shall publish instructions which restrict aircraft from operating at an altitude below 300 feet AGL over the SMR plover management zone and the White Beach nesting area (see paragraph 12.4 of Appendix 1), except operations involving landing or taking off from LZ 21, manuevering to avoid aircraft flying in FAA controlled airspace not subject to the restrictions of Airspace Restricted Areas R-2503A and B, and complying with regulations related to operations, emergencies, special visual flight rule (VFR) conditions (i.e., when weather conditions dictate a lower altitude must be flown for safe flight of the aircraft).

- Helicopter landings at Del Mar (LZ21) shall be minimized during the least tern/snowy plover breeding season to the maximum extent practical.

- Foot traffic in coastal lagoons and the Santa Margarita River Estuary shall be minimized to the maximum extent possible.

- Military and recreational activities will be kept to a minimum within the management zone during the non-breeding season in order to minimize disturbance to wintering snowy plovers.

New Construction Projects and Activities

- Future proposed construction projects that could result in the permanent loss of coastal wetland and major changes to current training activities that may affect listed species along the beach/estuary shall require informal or formal consultation with the Service (as a Class II or Class I activity).

Recreation Activities

- The Base shall develop programmatic instructions and measures to assure that recreational foot traffic, including fishermen,

remain outside the nesting and foraging areas of the SMR management zone during the breeding season.

- Recreational activities shall be kept to a minimum within the management zone during the non-breeding season.

- Litter shall be deposited in proper disposal bins.

APPENDIX 6

Noise Appendix

Many of the proposed ongoing and planned activities on Base result in noise. Noise, as referenced here, will refer to human generated sound that may be hypothesized to have deleterious effect on wildlife. Specific proposed construction, maintenance, and operation activities will necessitate, for instance, earth-moving activities and helicopter overflights. Range activities and vehicle use have also been noted to contribute significantly to noise levels in riparian areas on Base (Camp Pendleton 1994a). Because of this, vireos and flycatchers could be subjected, in the absence of appropriate avoidance measures, to noise and vibration impacts. Noise and vibration are thought to be potentially harmful, in general terms, to a variety of bird species (see, for instance, Gunn and Livingston 1974, RECON 1988 and Pike and Hays 1992).[1]

Although often not sufficient to thoroughly evaluate the impacts of noise and vibration on listed species, some data is available regarding the effects of noise and vibration on wildlife species. From the information available on these potential effects, the Service has developed the following analysis of impacts.

Many bird species have an acute sense of hearing (Dooling 1978;

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[1]Noise and vibration can cause "harm" as provided in the definition of "take" in the Endangered Species Act of 1973, as amended. The regulations provide: "'Harm' in the definition of 'take' in the Act means an act which actually kills or injures wildlife. Such acts may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavior patterns behavioral patterns, including breeding, feeding, and sheltering." (50 CFR 17.3)

Federal agencies requesting formal consultation have the responsibility to provide the Service with the best scientific and commercial data available during the consultation to enable the Service to make an adequate assessment of the effects that an action may have upon listed species (50 CFR 402.14(d)). The Service has the responsibility to issue a biological opinion using the best scientific and commercial data available (50 CFR 402.14(e)). In formulation of its biological opinion, the Service must provide the "benefit of the doubt" to the species concerned [H.R. Conf. Rep. No. 697, 96th Cong., 1st Sess. 12, *reprinted* in 1979 U.S. Code Cong. And Admin. News].

Congress has noted that action agencies have a "continuing obligation" to develop more scientific and commercial data, even after the Service issues a biological opinion [H.R. Conf. Rep. No. 697, 96th Cong., 1st Sess. 12, *reprinted* in 1979 U.S. Code Cong. And Admin. News 2572, 2576.].

Knudsen 1978; Fay and Feng 1983). 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. It is noted by the Base that: Researchers have also documented that many 'harmful' effects are transitory and that many species become conditioned to such stimuli or disturbance in their environment (Buck, pers. comm.). Transitory impacts can still cause significant degradation of habitat. In the extreme, the apparent effects of noise can be devastating to wildlife populations. Dubois (1980) reported that some bird species that spend the summer in Paris can no longer breed there because of excessive noise.

Effects of noise on wildlife vary from serious to negligible in different species and situations. Direct adverse effects such as decreased reproductive success have been documented to be present in some studies for some species and lacking in others for other species. Decreased responsiveness to repeated noises with time is frequently observed and usually attributed to habituation (Larkin, 1994).

Vehicle noise can interfere with animal communication essential for reproduction. On the other hand, people afoot may cause stronger behavioral reactions than people in vehicles in wilderness situations. Noise from helicopters is complex and varies especially with aspect and model of helicopter. Responses to helicopters from several kilometers distant are documented (generally for larger mammals). However, both the response to helicopters and the degree to which such a response is habituated to over time may vary greatly. Vehicles and helicopters pose difficulties for researchers trying to separate acoustic from visual and other indications of their presence (Larkin, 1994).

Harrison (1978) noted that a great deal of information is available on how to measure noise, but that it is difficult to determine what significance any particular noise actually has for a wildlife species in terms of reproduction and survival. Much is understood regarding human reactions, but they may not apply to wildlife in the same manner. Mock's team (1994) determined that vireos can compensate to some degree for noise impacts. The fact that vireos nest in noisy environments that most humans would not tolerate (i.e., at the end of an airfield runway) suggests that the effects of noise on birds is not the same as the effects on humans.

The San Diego Association of Governments (SANDAG) in a 1989 study (SANDAG 1989) suggested that noise levels above 60 DBA L_{eq} in vireo breeding areas (habitat) may impact the reproductive success of this species during the breeding season from March 15 to September 15. The Service has used 60 DBA L_{eq} hourly as a practical threshold above which impacts to least Bell's vireo may occur as described above.

Upon reviewing the body of relevant scientific research, the Environmental Protection Agency (Dufour 1980) identified four major categories of noise effects on wildlife: auditory physiological, nonauditory physiological, behavioral, and masking. Woolf et al. (1976) concluded that prenatal auditory stimulation can affect the development (and, therefore, the physiology) of an avian embryo inside an egg. Noise also can result in deleterious changes in the behavior of wild birds. Gunn and Livingston (1974) reported that a bird population exposed to a combination of helicopter disturbances and human activity suffered lower hatching and fledging success and increased rates of nest abandonment and the premature disappearance of nestlings (in contrast to the control population).

Of the four EPA categories of noise effects on wildlife (Dufour 1980), "masking" may be the most detrimental to small perching birds such as the vireo. In essence, "excess sound can interfere with the perception of important, relevant auditory signals" (Miller 1974). And, if "noise masks vireo song for the human (at some given distance), then it probably also masks vireo song for the vireo" (Dooling 1987).

However, Frank Awbrey (1993) studied the vocal behavior of the California gnatcatcher and other species in "noisy" southern California environments. He found that traffic noise did not affect the frequency or volume of calling. A model, based on data from the noisiest location where gnatcatchers successfully nested in the vicinity of a roadway, predicted that a gnatcatcher's call would not be completely masked until the calling bird was within 50-feet of the slow lane. At 118 feet from the slow lane, 94% of the sound in a gnatcatcher's call exceeded the level of traffic noise in the same one-third octave bands. In other words, although the traffic noise at 118 feet was 69.1 dBa, there was no significant masking of the gnatcatcher's call because the sounds were at different frequencies.

Dremond (1977) found that the efficiency of the wren's song may be impaired by natural background noises such as the song of sympatric birds which decrease the receiving bird's alertness. This may be detrimental to communication between wrens in an acoustically rich

natural environment. However, masking of the wren's song by artificially generated sounds is seldom complete, and the apparent decrease in received information is largely compensated by the song's inherent redundancy.

It is important to note that attempts to repel various bird species where they have become a "nuisance" with a variety of sounds have been generally unsuccessful (J.Wild.Mgmnt, *circa* 1990-92). Thissen *et al.* (1957) determined that Peking ducks were most sensitive to lower frequency sounds, had an irritation threshold of about 70 dBa, and their response to noise declined with repeated exposure. They also found that the threshold for wild waterfowl was higher and that the wild birds rapidly acclimated to a 100 dBa siren that was intended to repel them.

Nevertheless, it is reasonable to conclude that noise can affect vireo communication and reproductive success. The degree of impact is highly variable and difficult to measure precisely. Rogers *et al.* (1994) reported that preliminary results of a North Carolina study into the effects of aircraft noise on waterfowl indicated there were negative effects on reproduction in penned ducks exposed to high noise levels.

In their discussion of highway impacts, van der Zande *et al.* (1980) concluded that disturbance distance and intensity is related to traffic volume. They also found that the effects of roads are not the same for all species. The density of some bird species in a meadow habitat increased as the distance from the road increased, while other species distribution showed no relationship to distance from the road.

The life of a vireo may well depend upon its detection of an alarm call given by another vireo (or other source) that warns of the approach of potential predators. Whether or not a vireo receives this vital information depends on such noise parameters as environmental attenuation, signal to noise ratios, and discrimination of the receiver given the background noise. Obviously, when an alarm call is masked by environmental noise, an individual vireo or vireos may be at increased risk. Scherzinger (1979) observed that background noise may have negative consequences on predator avoidance by hazel grouse. Shen (1983) further observed that a bird's ability to detect vibration may be crucial for sensing approaching predators, particularly if the birds are sleeping. (Likewise predators who key in on the location of the vireo by virtue of its song, may be unable to locate the bird due to

masking.)

Given Dooling's comments 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, it is reasonable to conclude that unabated, "masking" noise could adversely effect vireo or flycatcher pairs or individuals that are present in, or adjacent to, project areas. Accordingly, the Service notes and appreciates the Base's general willingness to minimize as much as possible noisy activities in the vicinity of vireo and flycatcher home ranges during the breeding season.

More information regarding the issue of the potential effects of noise on sensitive species on the Base is presented in section 3.1.4 of the BA. "The noise effects [on LB vireo] associated with the MCAS appear to be subtle, variable between years, and may be autocorrelated with some other spatially biased factors such as habitat quality or edge effects." (Mock et al. 1994). The effect of noise on the SW Flycatcher is unknown at this time.

Annual surveys indicate that the presence of helicopter activity has not precluded a substantial increase in the LB Vireo population within the Santa Margarita River drainage since 1981 (Pavelka, 1994). Nesting has occurred at the very end of the runway and adjacent to the runways every year since surveys began. Annual survey maps indicate that heaviest concentration of nesting LB Vireo appears to be guided by the quality of riparian habitat rather than distance to MCAS.

Future research should stress quantification of exposure of subjects to noise, favor experimental approaches such as broadcasting recorded sounds, and take into account observer effects. When possible, researchers should seek to separate acoustic from visual and other potential clues and should build practical management measures into the research design. Because the field of study is young and exceptionally interdisciplinary, investigators should be aware of the danger of launching and interpreting narrowly -focused management oriented studies when fundamental issues of natural history, bioacoustics, and techniques remain poorly understood.