

4. Alternatives

4.1 Introduction

An important step in the CCP process is the development and analysis of alternatives. Alternatives are developed to identify and analyze different ways to achieve Refuge purposes, contribute to the mission of the NWRs, meet Refuge goals, and resolve issues identified during scoping and throughout the planning process. The development of alternatives is also an important component of the NEPA process, and as described in Chapters 1 and 2, compliance with NEPA for this CCP is being accomplished through an integrated document, a draft CCP/EA, which addresses both the requirements of NEPA and the CCP process. As such, this chapter describes the process that was followed to develop a range of management alternatives for the San Diego NWR; provides detailed descriptions of the alternatives developed for the Refuge; identifies the preferred alternative; compares the way in which each alternative addresses identified issues; summarizes the similarities among the alternatives; and presents those alternatives that were considered but eliminated from detailed study.

4.2 Alternative Development Process

The alternatives development process for the San Diego NWR was an iterative process that required consideration of a number of factors, some of which were known at the beginning of the process and others that became evident during the process as a result of public comments, analysis by the planning team, and information provided by other agencies and interested parties. The issues, constraints, and opportunities affecting management of the Refuge (described in Chapter 2) were all taken into consideration during alternatives development. Also influencing this process were Refuge purposes, as well as the Refuge vision, goals, and objectives (see Chapter 6).

One of the first steps in the alternatives development process was identifying and describing the various programs and management actions currently being implemented on the Refuge, as these practices represent the “no action” alternative. Under the no action alternative, the current management of the Refuge would continue to be implemented for the next 15 years or until management direction is revised through a revision to the CCP. It is important to describe the no action alternative accurately because it serves as the baseline to which all other alternatives are compared.

Next, the planning team considered a wide range of management actions (or strategies) that would address the issues, constraints, and opportunities identified for the Refuge and would assist in achieving Refuge goals and objectives. These actions were refined during several planning team meetings and then clustered into logical groupings to form the action alternatives. Many actions are common to more than one alternative, but the various actions described for each alternative reflect a common management approach for that particular alternative, as presented in detail in this chapter.

4.3 Past and Current Refuge Management on the San Diego NWR

4.3.1 Background

The San Diego NWR, which is situated on the eastern edge of the San Diego metropolitan area, was established in 1996. The creation of this Refuge coincided with an effort by the Service and the City of San Diego, as well as a variety of other public agencies and interest parties, to develop a Multiple Species Conservation Program (MSCP) for the southwestern San Diego region. The lands acquired for inclusion in the San Diego NWR represent the Service's contribution towards the implementation of the San Diego MSCP (USFSW 1997a). The establishment of the Refuge and the implementation of the MSCP share many of the same purposes, including protecting and managing key habitats for a range of endangered, threatened, and rare species, and maintaining the high biological diversity of southwestern San Diego County.

In April 1997, the Service approved a boundary for the Otay-Sweetwater Unit of the San Diego NWR that encompassed approximately 43,860 acres (refer to Figure 1-3) and a boundary for the Vernal Pools Stewardship Project that encompassed approximately 8,220 acres (refer to Figure 1-5). These boundaries are often referred to as the Refuge acquisition boundary, and it is within these boundaries that the Service is able to negotiate with willing participants to acquire their lands. As indicated in Chapter 1, the boundary of the Otay-Sweetwater Unit was expanded by approximately 327 in 2012 to accommodate the donation of surplus lands from the California Department of Transportation.

Not all lands included within the approved acquisition boundary will become part of the Refuge. Some lands have already been or will be developed, others will continue to be held by the current public or private landowner, and still other parcels will likely be acquired by the Service, other public agencies, or land trusts for the purpose of conserving native habitat and species. The lands acquired by the Service become part of the San Diego NWR. Generally, the lands incorporated into a refuge are acquired as a result of a direct sale from a willing seller at fair-market value; however, there may be occasions in which a parcel is acquired through a donation, partial donation, transfer, or an exchange. Refuge lands are never acquired through condemnation.

The lands included within the Otay-Sweetwater Unit acquisition boundary were selected based on a number of factors. These include a determination that the lands supported "very high" to "moderate" habitat values, high biological diversity and species richness, priority target species, vernal pool habitat, and/or that the lands would provide appropriate habitat connections (wildlife corridors) between larger areas of preserved land (City of San Diego and USFWS 1997). An additional factor that has been considered during the ongoing acquisition process is improving the contiguity (i.e., eliminating inholdings, reducing edge/area ratio) of the lands preserved within and surrounding the Refuge.

Although the boundary for the Vernal Pools Stewardship Project was not approved until 1997, planning for this area was actually initiated in 1989 to ensure the conservation of outstanding vernal pool resources in the San Diego Region. The lands within the boundary of the Vernal Pools Stewardship Project consist of both private and public lands, including lands on MCAS Miramar and the City of San Diego's Montgomery Field. The Land Protection Plan (LPP) for the Vernal Pools Stewardship Project describes a variety of habitat protection methods, including leases and cooperative agreements, conservation easements, and fee-title acquisition. The intent of developing an LPP for the vernal pools of southwestern San Diego County was to coordinate efforts with landowners, local jurisdictions, government agencies, and the Department of Defense to protect native habitats for rare species (USFWS 1997b). The LPP for the Stewardship Project

acknowledges that not all of the lands in the proposed acquisition boundary would become part of the Vernal Pools Unit of the San Diego NWR, and to date the vast majority of the lands included within the Vernal Pools Stewardship Project boundary have not been acquired by the Service.

4.3.2 Current Ownership Pattern and Acquisition History

As of August 2013, approximately 26 percent (about 11,470 acres) of the area included within the acquisition boundary for the Otay-Sweetwater Unit has been acquired by the Service for inclusion in the San Diego NWR (refer to Figure 1-3). Other portions of the acquisition boundary (approximately 19,000 acres) have been acquired for habitat and species conservation by other public agencies and land trusts, including the CDFW and The Nature Conservancy (TNC) (refer to Figure 1-4). An additional 6,000 acres are managed by other public agencies to protect the watersheds around two major reservoirs, Sweetwater Reservoir and the Otay Lakes. The Service will likely enter into additional acquisition agreements over the life of the CCP, as various blocks of land within the approved acquisition boundary remain undeveloped and privately held. The lands within the Otay-Sweetwater Unit that have already been acquired by the Service are generally located within several non-contiguous blocks of land, situated to the south of Interstate 8, east of Highway 54, north of Otay Lakes Road, and west of the unincorporated community of Beaver Hollow in the north and to the west of Jamul Creek in the south (refer to Figure 1-6).

Only 77 acres of the 8,220 acres included within the approved boundary of the Vernal Pools Stewardship Project (refer to Figure 1-5) have been acquired by the Service; of this total, 17 acres are located near the Sweetwater Reservoir within the Otay-Sweetwater Unit. The other 60 acres are located within the Del Mar Mesa Vernal Pool Unit. An additional 5,400 acres within the Stewardship Project boundary are owned by other local, State, or Federal agencies or non-profit land trusts.

Land acquisition efforts for the San Diego NWR began in 1992 when approximately 1,840 acres of undeveloped land owned by Home Federal Savings and Loan were placed in Federal receivership under the control of the Resolution Trust Corporation (RTC). Based on the quality of the habitats and populations of listed species supported by these habitats, the Service entered into a purchase agreement with the RTC to acquire approximately 1,826 acres of this land. With this acquisition, the San Diego NWR was established in 1996.

As of August 2013, 75 fee-title acquisitions totaling approximately 11,530 acres had been completed. In addition, four access easements have been acquired. A complete listing of the Refuge's acquisition history is provided in Appendix H. Some of the most significant acquisitions include the acquisition of about 1,700 acres of the western and northern slopes of Mother Miguel Mountain in August 1997; the Las Montañas area in 1998; several large parcels on the lower northern slopes of McGinty Mountain, as well as some smaller parcels near the top of San Miguel Mountain, in 1999; and a large area along the lower western slopes of McGinty Mountain and over 500 acres near the top of San Miguel Mountain in 2000. Also in 2000, the vernal pool parcels located adjacent to the Sweetwater Reservoir, referred to in this document as the Shinohara parcel, were acquired. In 2012, the 1,905-acre Hidden Valley area was acquired, filling a large gap in Refuge ownership between the San Miguel Mountain and Las Montañas management areas.

Over the next few years, approximately 700 additional acres of land located in various portions of the acquisition boundary are expected to be transferred to the Service from Caltrans (refer to Figure 1-4), including 2.4 acres along Highway 94 near Millar Ranch Road.

4.3.3 Existing Management Plans

Prior to the development of this CCP, the Refuge had no comprehensive management plan to direct Refuge management and operations. There was, however, a *Conceptual Management Plan for the San Diego National Wildlife Refuge*, which was prepared by the Service in 1997. This plan presented a broad overview of the Service's proposed management approaches for wildlife and habitats, public uses and wildlife-dependent recreational activities, wildfire suppression and prescribed burning, rights-of-way and easements, law enforcement, facilities, interagency coordination with the MSCP preserve, and public outreach (USFWS 1997b). The key area of management focus in this initial plan was management of native habitat and plant communities for the recovery of endangered, threatened, and rare species. Active modification and manipulation of intact native plant communities was to be avoided, while enhancement and restoration actions on disturbed or degraded sites was encouraged. Monitoring of distribution and abundance patterns for selected species was also proposed. The plan also encouraged opening the Refuge for compatible recreational uses to ensure opportunities for the public to gain a better appreciation for and understanding of the region's unique wildlife heritage and to enjoy the Refuge's open spaces. In so doing, the plan acknowledged that high-quality wildlife-dependent recreational uses rely on healthy habitats and healthy populations of birds and other wildlife; as a result, the plan acknowledged that some constraints on public use and recreation would be necessary and that certain core areas within the Refuge would not be open to public use (USFWS 1997b).

The other planning process that provides guidance for how the Refuge should be managed is provided within the various components of the San Diego MSCP (City of San Diego 1998a), including the framework management plans and resource management plans associated with each MSCP subarea plan prepared by the participating jurisdictions (i.e., cities of San Diego [City of San Diego 1997] and Chula Vista [City of Chula Vista 2003], County of San Diego [County of San Diego 1997]). The management direction provided in the MSCP focuses primarily on preserve management activities intended to ensure that preserved lands, such as those included in the San Diego NWR, are managed for the long-term conservation of biological resources. In addition, the MSCP envisioned standardized monitoring practices throughout the preserved lands to document ecological trends, evaluate the effectiveness of management activities, provide new data on species population and wildlife movement, and evaluate indirect impacts of adjacent land uses and construction.

4.3.4 Management History and Past Refuge Actions

4.3.4.1 Refuge Management History

The lands within the San Diego NWR are dominated by coastal sage scrub, chaparral, and grassland habitats. Several parcels contain regionally significant vernal pool habitat, and a variety of other sensitive native upland and wetland habitats occur throughout the Refuge. The Refuge protects habitat that supports or has the potential to support at least 16 federally listed species and at least one candidate species. The majority of the Refuge ownership is included in the Otay-Sweetwater Unit; the remaining acreage, about 60 acres, is included within the Del Mar Mesa Vernal Pool Unit.

Following approval of the Refuge boundary in 1997, two permanent full-time employees—a Refuge Manager and Refuge Wildlife Biologist—were assigned to the San Diego NWR to manage Refuge resources and facilitate daily Refuge operations. A Refuge office was opened on Lyons Valley Road in Jamul. Also in 1997, the Refuge Complex (which oversees the management of several Refuges including the San Diego NWR, San Diego Bay NWR, Tijuana Slough NWR, and Seal Beach NWR) contracted with BLM to provide part-time law

enforcement in an effort to reduce the extent of illegal activities (e.g., off-road vehicle use, dumping, homeless encampments) occurring on Refuge lands. Some of the initial management activities implemented by the new Refuge staff, with assistance from the Refuge Complex, Ecological Services and the Regional Office, included:

- initiation of Quino checkerspot butterfly surveys,
- conducting cultural resource reviews of several existing structures on the Refuge,
- facilitating on-Refuge research by two Dartmouth College students on the sensitivity of the rufous-crowned sparrow (*Aimophila ruficeps*) to residential edge effects, and
- supporting herpetofaunal monitoring by USGS and San Diego State University's Department of Biology.

Today, the Refuge staff includes a Refuge Manager, Refuge Operations Specialist, and a Wildlife Biologist. Refuge offices are located off-Refuge on the Rancho Jamul Ecological Reserve in space shared with CDFW and BLM. The San Diego NWR staff also receives assistance from the Complex staff, including Federal Wildlife Officers, the Environmental Education Specialist, Park Ranger, and Maintenance Mechanic. The Refuge Complex maintains a fire crew, which is stationed at Fire Station Number 36 on Highway 94 and Peaceful Valley Ranch Road in Jamul. The fire crew is responsible for the protection of Refuge resources and adjacent private property. The crew also assists in controlling other wildland fires on public lands when the need for additional crews is identified.

4.3.4.2 Past Refuge Actions

A variety of management actions have been implemented on the Refuge since its establishment, with many focused on improving habitat conditions for listed species. Some of the more significant actions are summarized here.

Installation of Nest Boxes to Support Burrowing Owls

Artificial nest boxes have been installed on the Refuge in multiple locations to provide nesting habitat for burrowing owls. In 1997, 10 boxes were placed in the disturbed coastal sage scrub and grassland habitats near Par Four Drive. Burrowing owls that were habitually preying on federally endangered California least terns (*Sternula antillarum browni*) at coastal areas were translocated to the Par Four site. Disturbance by coyotes and/or domestic dogs interfered with the introduction, and burrowing owls no longer persist at this site. In October 2007, 10 nest boxes were installed at the Shinohara vernal pool restoration site, and another 10 boxes were added east of that location in 2010. At least 14 owls fledged from these boxes from 2009 through 2011.

Recovery of Otay Tarplant

This project was initiated as part of a Stipulated Settlement Agreement and Order (Case No 99CV1454 L (LAB) finalized on December 21, 2000, for the purpose of conserving and recovering the federally threatened plant, Otay tarplant. The project was implemented on an area of about 70 acres located just to the west of State Route 125 (SR-125) between San Miguel Ranch Road to the north and Proctor Valley Road to the south. This site has now been incorporated into the Refuge as mitigation for impacts related to an associated housing development with the land transfer of this and three other mitigation parcels finalized in 2013.

Initiated in 2005, work on the site, referred to as the San Miguel Ranch (formerly Trimark) Otay Tarplant Preserve, involved the removal of the dense thatch of dead exotic vegetation that covered the site, followed by a series of herbicide treatments implemented to control

non-native plants. Tarplant seeds and seeds from other native plant species from the surrounding area were collected and distributed over the prepared site. The population of Otay tarplant at this site has benefitted from this restoration work; however, weed control has not been consistently effective throughout the life of the project. Though exotic annual grass species have been drastically reduced, the site continues to support abundant broadleaf annual weeds, most notably short-pod mustard. The distribution of Otay tarplant increased from 1.1 acres in 2005 to 6.25 acres in 2006, despite dramatically lower rainfall in 2006. Work on the project ended in January 2011. In 2011, despite continuing weed problems, the Otay tarplant population remained abundant and productive, occurring over an area of about 13.4 acres; in fact, tarplant on the site in 2011 was more extensive than it has been in the history of tarplant monitoring on this site (since 2001). Individual tarplants have been tall and vigorous, apparently producing large amounts of seed. It is likely that the Otay tarplant seed bank on this site is much larger than it was at the outset of the project.

Stabilization of the Historic Barn at the Oaks

In 2006, efforts were initiated to stabilize the Barn at the Oaks, a historic structure located in the Las Montañas area of the Otay-Sweetwater Unit. Stabilization was necessary to prevent any further structural deterioration and to reverse the effects of ongoing vandalism. Stabilization of the existing barn structure involved removing the existing roof, which was in danger of caving in and collapsing the entire structure; constructing a new roof; realigning and bracing some of the walls of the structure to prevent collapse from lateral and seismic forces; repairing decayed wood; salvaging historic materials for later reuse; and replacing an existing chain link fence to prevent trespass and vandalism. The project was completed in 2009.

Translocation of San Diego Ambrosia

In June 2006, San Diego NWR began a project to reduce the likelihood of extinction of San Diego ambrosia. Prior to initiation of this project, there were three occurrences on the Refuge, all of which were subject to deleterious disturbances (e.g., foot, bicycle, horse, and off-road vehicle traffic; weeds; wildfire). Establishment of a new protected population of ambrosia was proposed in an effort to increase the likelihood of persistence of this species on the Refuge and throughout its range.

Prior to planting, three receptor sites, approximately 33 x 66 feet (10 x 20 meters) each and approximately 985 feet (300 meters) apart, were mowed with weed-whackers, raked to reduce the amount of thatch, and then treated with glyphosate herbicide to reduce weeds that may compete with the translocated plants. Cuttings from the wild population on the Refuge were collected to use as donor stock. In November 2006, 600 plants in one-gallon pots were planted at the receptor sites. Plants were placed at 1.6 to 3.3 foot (0.5 to 1.0 meter) intervals and watered as needed to ensure survival during the first four months after planting. In late 2009, two additional receptor sites were prepared. An assessment done in April 2010, showed that the sites were dominated by exotic annual weeds (primarily broadleaf species), though the receptor sites are less weedy than the adjacent untreated non-native grassland. Despite the presence of these weeds, the ambrosia appears to be well established, showing similar stem densities to the donor population at Par Four Drive. Many of the plants have spread via rhizomes at least 17 inches (50 centimeters) from the site of original planting. An additional 400 plants were installed at these sites in late 2010.

Protection of San Diego Ambrosia

The three native occurrences of San Diego ambrosia on the Refuge were initially threatened by impacts from pedestrians, bicycles, and horses on trails adjacent to or within the ambrosia patches. In three separate projects, Eagle Scout candidates worked with Refuge staff to supervise other scouts and volunteers in erecting post-and-rail fences to redirect traffic in and near the ambrosia patches. The projects have successfully excluded traffic from native occurrences of San Diego ambrosia, and the plants have responded by spreading via rhizomes into previously trampled areas.

Translocation of Mexican Flannelbush

In August 2006, San Diego NWR began a project to reduce the likelihood of extinction of Mexican flannelbush. Prior to initiation of this project, the species was known to occur only in two canyons on Otay Mountain in extreme southern San Diego County. Though location information associated with historic collections of Mexican flannelbush is not as precise as that customarily recorded with modern plant collections, the information suggested that the species formerly occurred in Jamul and may have occurred on lands now managed by the Refuge. Seeds were collected from the wild population in August 2006, and a local native plant nursery was contracted to grow container stock from this seed. In November 2010, 141 plants were planted in two canyons on the southwest and northeast sides of Mother Miguel Mountain. As of July 2011, approximately 75 percent of the plants had survived. The mortality rate for these plants is expected to decline after their first dry season in the field.

Vernal Pool Restoration on the Shinohara Parcel

The restoration of approximately 30 acres of vernal pool habitat, including a surrounding matrix of coastal sage scrub/foothill needlegrass grassland ecotone, was initiated in spring 2007. The restoration site is located in the southwesternmost corner of the Otay-Sweetwater Unit to the south of Sweetwater Reservoir. The site had been degraded by agriculture, grazing, and exotic plant invasion. Weed control began in April 2007 and continued through the present January 2012. Thirty-three vernal pool basins were re-contoured in 2007, and an additional 30 were created in 2009. Planting of native shrubs and perennial grasses began in January 2011. Soil inoculum from contiguous vernal pool habitat was spread in selected basins in November 2008. Seed of native vernal pool plants was broadcast into selected basins in December 2009 and November 2010. Vegetation change has been monitored annually using permanent transects, and species have been inventoried in vernal pool basins. As of January 2012, the site supported five federally listed plant species, 10 vernal pool obligates, and six additional regionally sensitive species. Qualitative and quantitative monitoring show that native species richness and cover are increasing throughout the site, but the need for weed control to maintain populations of listed and sensitive flora and fauna continues. The site is contiguous with another vernal pool restoration site maintained by the Sweetwater Authority, which enhances the effectiveness of both projects in conserving vernal pool species and ecological function.

Reestablishment and Enhancement of Oak Woodland

Though oak woodlands currently occur on less than two percent of the Refuge, these woodlands constitute especially valuable wildlife habitat. It is likely that the area historically supported more extensive oak woodlands than it does today. Oaks were probably consumed for fuel and young oaks destroyed by grazing cattle. To address this historic loss, and to mitigate potential future loss of oak woodlands due to depredation by the recently introduced goldspotted oak borer, we began to plant oaks on the Refuge in 2007. Since then, volunteers and Refuge staff have direct-seeded acorns in many locations.

As of early 2013, acorns (about three per location) had been planted in approximately 290 locations on the Otay-Sweetwater Unit where conditions are appropriate for supporting oak woodland habitat. As expected, mortality has been high. However, in response to new information on oak woodland restoration, we plan to incorporate weed control into future oak planting efforts, which is expected to increase the rate of successful oak establishment.

Construction of a Trail Bridge for the Sweetwater Loop and River Trail

To reduce disturbance to sensitive riparian habitat from ongoing trail use and improve conditions for users of the county's Sweetwater Loop and River Trail, the Refuge partnered with the County of San Diego in 2005 to construct a 170-foot-long multiple use trail bridge over the Sweetwater River to the south of Highway 94. This bridge, constructed in April 2008 and dedicated in July 2008, provides access for hikers, equestrians, and bicyclists to cross the Sweetwater River with minimal impact to sensitive riparian habitat. With the installation of the bridge, a two-mile trail loop was created that allows users to travel on both sides of the Sweetwater River between the bridge and Singer Lane at Highway 94.

Habitat Rehabilitation in Burned Areas

With over \$750,000 in funding from the Burned Area Emergency Response and Emergency Stabilization and Rehabilitation Programs, the Refuge implemented a San Diego NWR Emergency Stabilization Plan for impacts related to the Harris Fire of October 2007. Infrastructure damage to guardrails, signs, and radio equipment were repaired under the plan. In addition, the Refuge has been managing selected habitat polygons within the over 4,000-acre burn area to increase the likelihood that high-quality habitat for sensitive species on the Refuge will regenerate and be retained. This habitat rehabilitation focused on two different species and their critical habitats: the Quino checkerspot butterfly and the coastal California gnatcatcher.

The work implemented to support Quino checkerspot involved de-thatching approximately 138 acres in fall 2008. Invasive weedy plants were controlled with selective application of glyphosate in spring 2009 and 2010. In 2010, the initial herbicide application was a non-selective broadcast, using either glyphosate or the grass-specific herbicide fluazifop, depending on the species composition of the weeds and native vegetation in the area. Native seed was collected to reestablish native plants on the sites. The objective was to reestablish an open coastal sage scrub/grassland ecotone, with larval host plants and nectar source plants used by Quino checkerspot.

Site rehabilitation in fall 2009 for the coastal California gnatcatcher involved de-thatching approximately 90 acres of previously occupied gnatcatcher habitat. In 2010, the initial herbicide application within the de-thatched areas was once again a non-selective broadcast of either glyphosate or fluazifop, depending on the species composition of the weeds and native vegetation in the area. Native seed was collected to reestablish native coastal sage scrub vegetation suitable to support gnatcatchers.

In addition to Quino checkerspot and California gnatcatcher, these treatments are expected to benefit a variety of MSCP-covered species including burrowing owl, peregrine falcon (*Falco peregrinus*), rufous-crowned sparrow, coastal cactus wren, ferruginous hawk (*Buteo regalis*), golden eagle, northern harrier, orange-throated whiptail, San Diego horned lizard, Otay tarplant, San Diego barrel cactus, San Diego goldenstar, and variegated dudleya.

Reduction of Hazardous Fuels in the Sweetwater River

With funding provided by the Service's Fire Management Wildland-Urban Interface Program, a five-year project was initiated in 2008 to remove exotic, invasive plants along portions of the Sweetwater River and Steele Canyon Creek that traverse the San Diego NWR (totaling 4.6 linear miles of riparian habitat). Plants removed from this area included giant reed, salt cedar, and various species of non-native trees and palms.

Restoration of Cactus Wren Habitat

To facilitate and accelerate recovery of cactus wren nesting habitat damaged by the 2007 Harris Fire, in 2009 with funding from a Transnet Environmental Mitigation Program grant, several hundred pounds of cactus stem sections ("joints"), primarily coastal cholla but including smaller amounts of coastal prickly pear, were salvaged from the construction footprint of the Bayshore Bikeway, located adjacent to the San Diego Bay NWR. From this material and other salvaged cactus, including specimens of foothill prickly pear, over 6,000 cactus plants were grown in a nursery at Rancho Jamul Ecological Reserve. In fall 2010, a contractor was retained to collect and plant an additional 6,000 cactus for this restoration project. In early 2011, these 12,000 cactus plants were planted on three large areas, totaling approximately 123 acres, west of Mother Miguel Mountain. In 2011, mortality of the planted cacti was negligible, and moderate growth was observed during the 2011 growing season.

Restoration on the Jamacha Parcel

In November 2008, we began a project to enhance habitat quality for Otay tarplant and other grassland and coastal sage scrub species on the Jamacha parcel: a 30-acre parcel adjacent to Jamacha Boulevard in Spring Valley. The site includes several acres dominated by purple needlegrass and supports other clay-soil grassland species. The entire site was de-thatched in late 2008. From 2009 through 2011, weeds were controlled with glyphosate. Herbicides with the active ingredients fluazifop and chlorsulfuron have also been used to a lesser extent to control exotic annual grasses and onionweed (*Asphodelus fistulosus*), respectively. In 2012, efforts continued to remove large amounts of old, dumped concrete from the site to further habitat enhancement.

Refuge Fencing and Boundary Sign Project

In 2011, a project was initiated to remove and/or repair existing fencing and to install new fencing within the McGinty Mountain and San Miguel Mountain areas of the Otay-Sweetwater Unit. This project was necessary to improve wildlife movement within the Refuge, as well as to secure the boundaries of the Refuge to minimize trespass and habitat damage. At the time that some of the parcels now incorporated within the Refuge were acquired, they included fencing used in the past to delineate property lines, contain livestock, and protect property. As part of this project, fencing located within the interior of the Refuge was removed to improve wildlife movement, and fencing located along the Refuge boundary was either repaired or replaced with new fencing. In total, the project removed approximately 37,400 feet of interior fencing and repaired and replaced approximately 1,800 feet of boundary fencing. Boundary signs were also installed, as necessary, along portions of the Refuge boundary. In addition, this project included the completion of cadastral surveys in two locations, near the confluence of Steele Canyon Creek and the Sweetwater River and the vicinity of a private parcel on the western slopes of Proctor Valley. These surveys were required to determine and define land ownership and boundaries at these locations. This project was completed in 2012.

Golden Eagle Nest Platforms

In 2007, a rock ledge on San Miguel Mountain that had supported golden eagle nesting collapsed. While eagles continued to be seen in the general area, potential nesting sites suitable for accommodating a golden eagle nest are extremely limited. To address this issue, in 2012 the Refuge working in partnership with BLM advanced a proposal to install artificial eagle nesting platforms in the area. Funding was subsequently secured through the Transnet Environmental Mitigation Program, and in 2013, a contractor fabricated and installed two metal mesh platforms: one on the Refuge on San Miguel Mountain and one on BLM land in the Jamul Mountains. Each platform was bolted into the rockface and braced. Branches and sticks will be added to encourage nesting. Refuge staff will monitor the sites for use by eagles or other raptors.

4.3.5 Current Refuge Management Activities

Current Refuge management involves maintaining, enhancing, and restoring native upland and riparian habitats, monitoring a variety of listed and sensitive species and plant communities, controlling non-native invasive upland and wetland plant species, providing fire protection and law enforcement, and posting Refuge boundaries. The Refuge Manager is also responsible for ensuring the protection of cultural resources; coordinating issues related to contaminants with the Service's Environmental Contaminants Program; and working cooperatively with other agencies, tribes, non-profit organizations, private landowners, and the public on a variety of Refuge-related issues. A detailed description of the range of management activities currently being implemented on the Refuge is provided under Alternative A - No Action.

4.4 Proposed Management Alternatives

Four management alternatives, including a no action alternative and three action alternatives, were developed for evaluation in the draft CCP/EA. The four alternatives differ in the extent and focus of wildlife and habitat management actions to be implemented and in the types and levels of public use opportunities to be provided. Management Alternative D represents the Service's preferred alternative, however, after considering the comments received during public review, this alternative may be altered to include one or more of the actions addressed in another alternative, a different alternative may be selected, and/or elements described in the alternative could be modified or deleted. The selected management alternative will be described in the Final CCP.

4.4.1 Alternatives for the San Diego NWR

The four management alternatives evaluated for the San Diego NWR are summarized here and described in detail in the sections that follow.

Alternative A - No Action

Alternative A proposes no changes to the present wildlife and habitat management actions implemented on the Refuge, and no new public use programs would be implemented. This alternative represents the baseline from which other "action" alternatives will be evaluated.

Alternative B - Maximize Habitat Values and Species Protection

New and expanded wildlife and habitat management actions would be implemented under Alternative B to protect, restore, and enhance habitat values for listed and sensitive species on Refuge lands. The wildlife-dependent recreational uses currently occurring on the Refuge (i.e., wildlife observation, photography, environmental education, interpretation) would be managed to minimize disturbance to plants and wildlife, while also providing opportunities for the public to observe and appreciate the native species and natural lands protected within the Refuge.

Opportunities for wildlife observation, photography, resource interpretation, and environmental education would be restricted to a designated trail system, and large areas of the Refuge would remain closed to public access, minimizing disturbance to sensitive resources. Within the Otay-Sweetwater Unit, the designated trail system would include some trail with uses limited to hiking and other trails open to non-motorized multiple uses (i.e., hiking, mountain biking, horseback riding). No dogs would be permitted on the Otay-Sweetwater Unit under Alternative B. Public uses on the Del Mar Mesa Vernal Pool Unit would be permitted in accordance with the City of San Diego's Carmel Mountain and Del Mar Mesa Preserves Management Plan, and such uses would be limited to the designated trail system on the Refuge. Access to areas beyond the limits of the designated trails would be prohibited.

Alternative C - Expand Opportunities for Wildlife-dependent Recreational Uses

Alternative C proposes to expand the opportunities for wildlife-dependent recreational uses on the Otay-Sweetwater Unit, including providing hunting opportunities in three designated locations within this Unit. The wildlife and habitat management activities proposed for the Refuge under Alternative C would remain consistent with those described under Alternative B. Additionally, public uses and access on the Del Mar Mesa Vernal Pool Unit would be consistent with those proposals presented in Alternative B.

Under Alternative C, the designated trail system within the Otay-Sweetwater Unit would include additional trails not proposed in Alternative B and all trails would be designated for multiple use. In addition, interpretive and environmental education programs would be expanded; dogs would be permitted on the trails, provided they are maintained on a leash; and hunting, conducted in accordance with Refuge-specific regulations, would be permitted on portions of the following management areas: McGinty Mountain (400 acres), Las Montañas (300 acres), and Otay Mesa and Lakes (160 acres).

Alternative D (Preferred Alternative) - Optimize Species Protection While Providing Opportunities for Compatible Public Use

Alternative D, the preferred alternative, proposes to optimize species and habitat protection, while expanding opportunities for compatible public use over those currently provided on the Refuge. In addition to the wildlife and habitat management activities proposed under Alternative B, this alternative also proposes to implement a feral pig monitoring and eradication plan on the Refuge. No feral pigs are currently known to occur on the Refuge, but feral pigs and the damage to resources associated with feral pig activity have been identified in the San Diego region. The initial implementation of this plan by the Refuge would therefore involve monitoring for the presence of pigs, with further action on the Refuge becoming necessary only if pigs are identified on Refuge lands.

Existing interpretive and environmental education programs would be expanded on the Otay-Sweetwater Unit under Alternative D, and hunting for big game (i.e., deer, feral pig), resident small game (i.e., rabbits), and resident and migratory upland game birds (e.g., dove, quail, wild turkey) is proposed, subject to refuge-specific conditions, on a portion of the Otay Mesa and Lakes management area. The designated trail system would consist primarily of non-motorized multiple use trails, with hiking only trails also provided in a few areas; unauthorized trails would be subject to closure. Leashed dogs would only be permitted on those trails designated for multiple use.

Habitat management and public use on the 60-acre Del Mar Mesa Vernal Pool Unit would occur as described under Alternative B.

4.4.1.1 Similarities among the Alternatives for the San Diego NWR

Although there are differences among the range of alternatives presented for managing the San Diego NWR, the alternatives also include various features and management components that would be part of the CCP regardless of the alternative selected for implementation.

Features Common to All Alternatives

Features common to all alternatives are summarized here. To reduce repetition in the alternatives descriptions, those features that are common among all of the alternatives are described in detail only under Alternative A – No Action.

- *Listed and Sensitive Species Conservation* – Protect, restore, and enhance habitat to support the Refuge’s listed and sensitive wildlife (e.g., birds, insects, reptiles, amphibians, mammals), and protect and reestablish, where appropriate, listed and sensitive plant species throughout the Refuge.
- *Listed and MSCP-Covered Species Monitoring* – Conduct monitoring and targeted studies of listed and MSCP-covered species, as well as the plant communities that support these species.
- *Invasive Species Control* – Conduct periodic control of invasive plant species on the Refuge through manual control and the use of Service-approved herbicides. Pesticide approvals would include a detailed evaluation of the proposed pesticide, noting environmental hazards, efficacy, vulnerability of the target pest, and the State-issued Certified Pesticide Applicators’ identification number for proposed use of any restricted use pesticides.
- *Environmental Contaminants Coordination* – Continue to coordinate with the Service’s Environmental Contaminants Program to ensure that trust resources are not being adversely affected by contaminants originating on site, as well as from off-site sources.
- *Protection of Cultural Resources* – Manage recorded and future discoveries of cultural resources located within the Refuge in accordance with Federal regulations and Service policy. The Refuge Manager would continue to consider the effects of all proposed actions on cultural resources. Prior to implementing any ground-disturbing projects, the Refuge Manager would consult with Service cultural resources staff, and, when appropriate, the State Historic Preservation Office (SHPO), federally recognized tribes, and interested parties.
- *Wildlife Observation and Photography* – Provide opportunities for wildlife observation and photography along public use trails.
- *Interpretation* – Maintain the existing interpretive signage on the Refuge.
- *Environmental Education* – Support the use of the Refuge as an outdoor classroom.
- *Trail Use* – Allow trail use on the Refuge that is compatible with Refuge purposes.

- *Research* – Encourage scientific research activities that are consistent with Refuge purposes and the mission of the NWRS, and that will provide information valuable to the management of the habitats and wildlife present on the Refuge.

Features Common to All Action Alternatives

Features common to the three action alternatives are summarized here.

- *Species-Specific Activities* – Initiate various actions intended to increase support for listed and sensitive species on the Refuge including improving the efficiency of species and habitat monitoring, adaptively managing Refuge habitats to support listed and sensitive species, and continuing to implement specific habitat restoration and enhance projects to supported listed and MSCP covered species.
- *Habitat Restoration and Enhancement* – Expand habitat restoration and enhancement efforts on the Otay-Sweetwater Unit.
- *Management of the Del Mar Mesa Vernal Pool Unit* – Manage the Del Mar Mesa vernal pool parcels consistent with the Carmel Mountain and Del Mar Mesa Preserves Management Plan.
- *Integrated Pest Management (IPM)* – Implement an integrated approach to pest management throughout the Refuge in accordance with the proposals outlined in the draft IPM Plan (Appendix D), which provides a comprehensive, environmentally sensitive approach to managing pests through a combination of strategies that pose the least hazard to people, property, and the environment.
- *Interpretation* – Develop a one- to two-mile interpretive trail on the Otay-Sweetwater Unit and install new interpretive elements along the trail.
- *Environmental Education* – Expand existing partnerships with nearby schools to create formal and informal environmental education programs using selected areas of the Refuge for outdoor classroom activities.
- *Establish Designated Trail Access Points* – Identify and sign designated access points onto the Otay-Sweetwater Unit that will result in minimal impacts to Refuge resources and avoid illegal trespass through private landholdings by trail users attempting to access the Refuge.
- *Designated Trail System* – Establish a designated trail system within the Otay-Sweetwater Unit to support trail uses that are compatible with Refuge purpose of conserving listed and sensitive species. Support a designated trail system on the Del Mar Mesa Vernal Pool Unit that is consistent with the City of San Diego’s Carmel Mountain and Del Mar Mesa Preserves Management Plan.
- *Visitor Services Facilities* – Provide appropriate facilities and programs (e.g., parking areas, visitor contact station, environmental education programs) to support the level of public use anticipated under the action alternatives.

4.4.1.2 Detailed Description of the Alternatives for the San Diego NWR

ALTERNATIVE A - NO ACTION

The no action alternative (Figures 4-1 through 4-6) proposes no changes to the present wildlife and habitat management actions implemented on the Refuge and no new public uses. The proliferation of user-created trails on the Refuge, as illustrated in Figures 4-1 through 4-6, are not intended to represent officially recognized Refuge trails. In fact, only the Sweetwater Loop and River Trail and the trail to the west of Par Four Drive have been officially recognized as trails on the Refuge. All other trails and pathways are subject to closure or realignment under this alternative as deemed necessary to achieve Refuge purposes.

A. Wildlife and Habitat Management

The majority of the wildlife and habitat management and monitoring activities occurring on the Refuge are currently being implemented per the guidance provided in the Conceptual Management Plan for the San Diego NWR (USFWS 1997b) and the various planning documents associated with the San Diego MSCP (City of San Diego 1998a).

Endangered, Threatened, and Sensitive Species Monitoring and Management

The Refuge supports or has the potential to support at least 16 species listed as endangered or threatened under the Federal Endangered Species Act (ESA), and at least one candidate species, as well as at least 35 narrowly endemic, sensitive, or regionally important species covered under the San Diego MSCP (City of San Diego 1998a). A significant amount of staff time is dedicated to the management and monitoring of these species, with the majority of this effort occurring in the Otay-Sweetwater Unit. Refuge staff coordinates with the City of San Diego and other partners on the management of listed and sensitive species on the Del Mar Mesa Preserve, which includes the 60-acre Del Mar Mesa Vernal Pool Unit of the San Diego NWR.

Monitoring. Monitoring and targeted studies of listed and MSCP-covered species are essential activities conducted on the Refuge. Depending upon the species or habitat, monitoring may be conducted by Refuge staff, Ecological Services staff, other Federal or State agencies (e.g., CDFW, USGS), non-profit organizations, volunteers, and/or private contractors. Species and habitat monitoring, which is conducted in accordance with established monitoring protocols when available, is implemented to assess the status and trends of conserved resources and the effectiveness of ongoing management actions.

The MSCP Biological Monitoring Plan (Ogden 1996) provided initial guidance for monitoring MSCP-covered species, with much of the work focused on presence or absence surveys, particularly with respect to rare plants (McEachern et al. 2007). The intent of the initial monitoring plan was to document the conditions of the habitats and species to be conserved under the MSCP, with recommended locations for monitoring specific habitats and regional wildlife corridor linkages and a list of monitoring priorities for plant and animal species.

The specific biological monitoring objectives of the initial MSCP Biological Monitoring Plan (Ogden 1996) included:

- documenting the protection of habitats and covered species;
- documenting changes in preserved habitats or preserved populations of covered species;

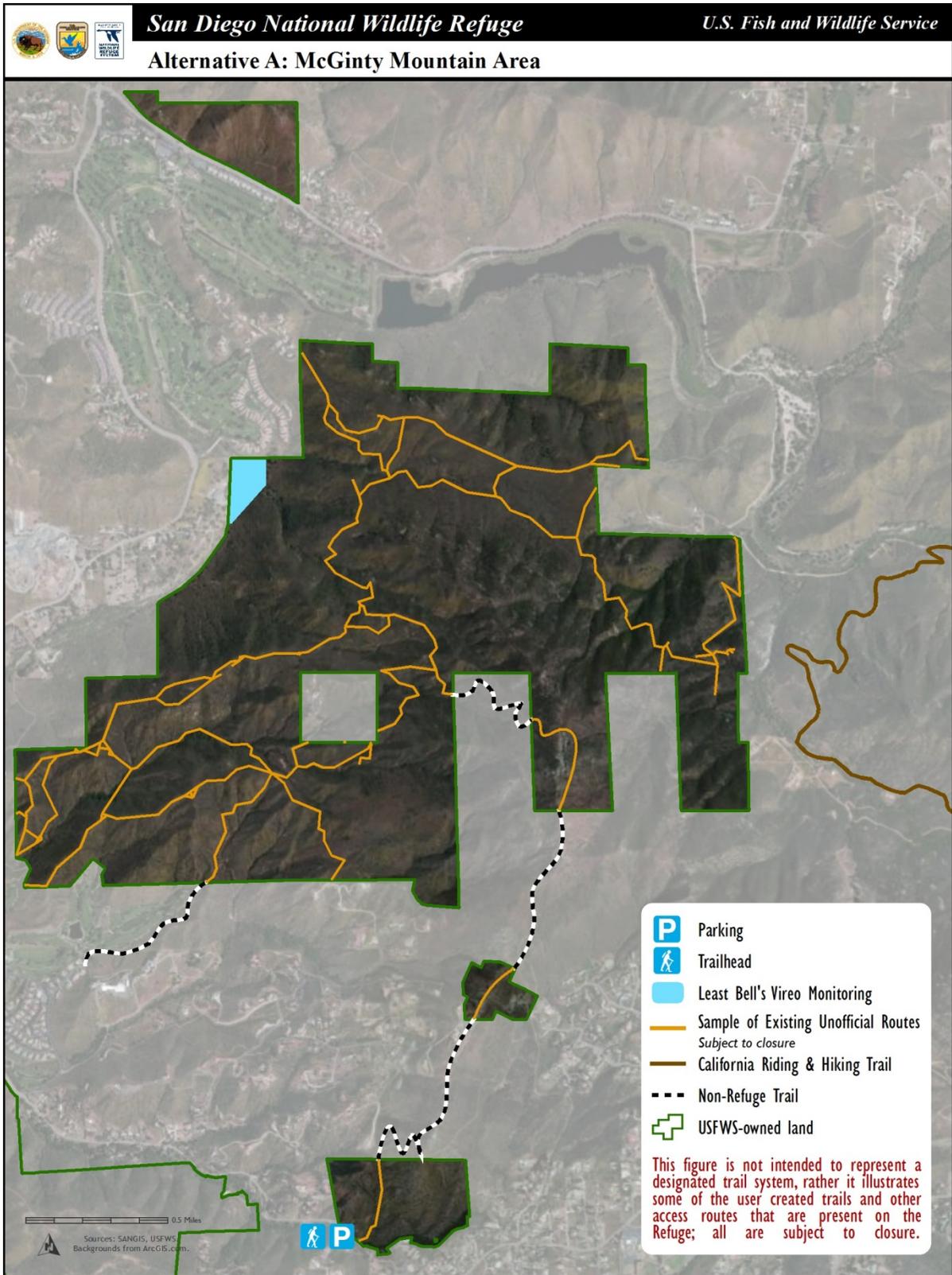


Figure 4-1. Alternative A - McGinty Mountain Area, Otay-Sweetwater Unit

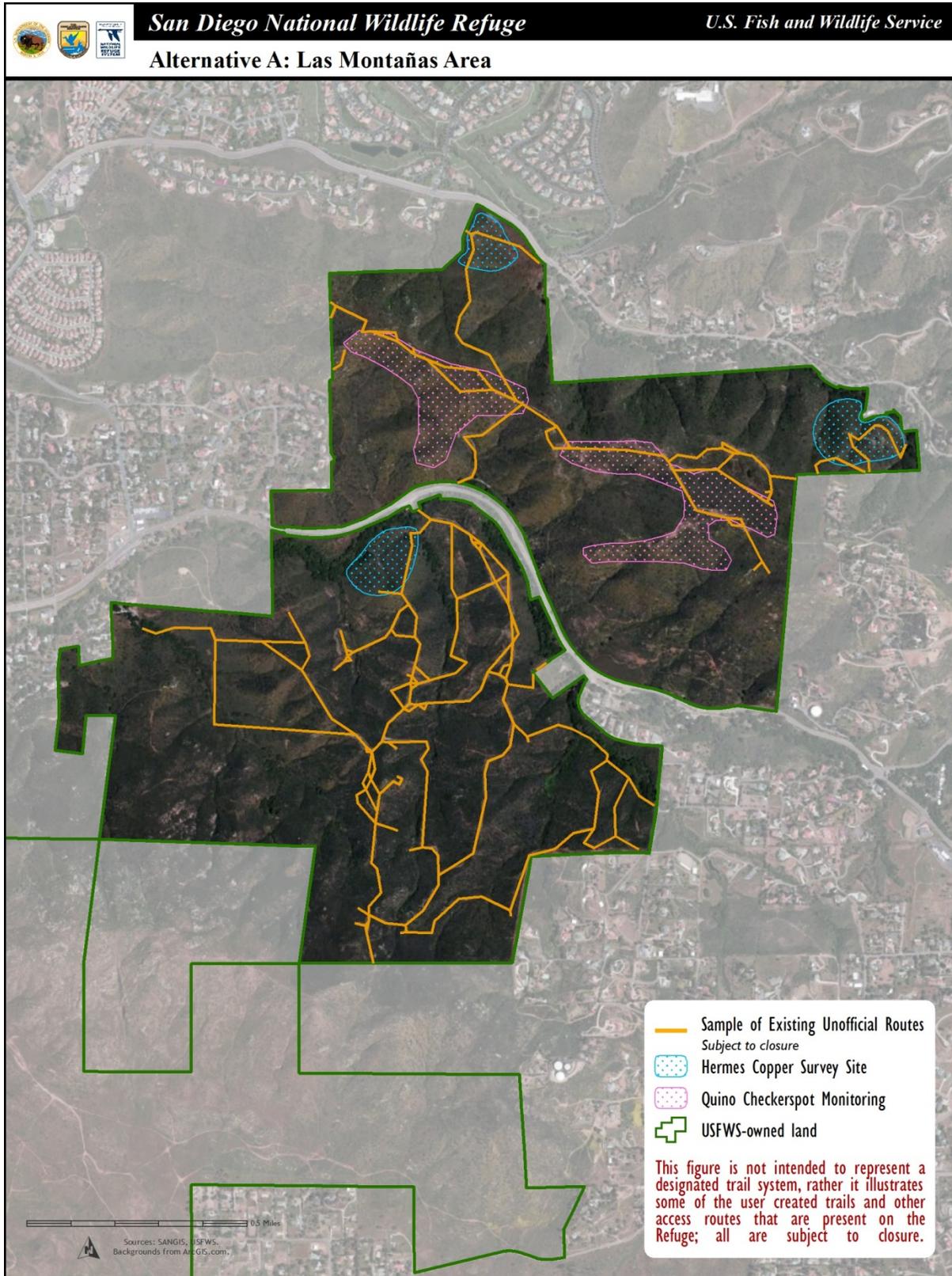


Figure 4-2. Alternative A - Las Montañas Area, Otay-Sweetwater Unit

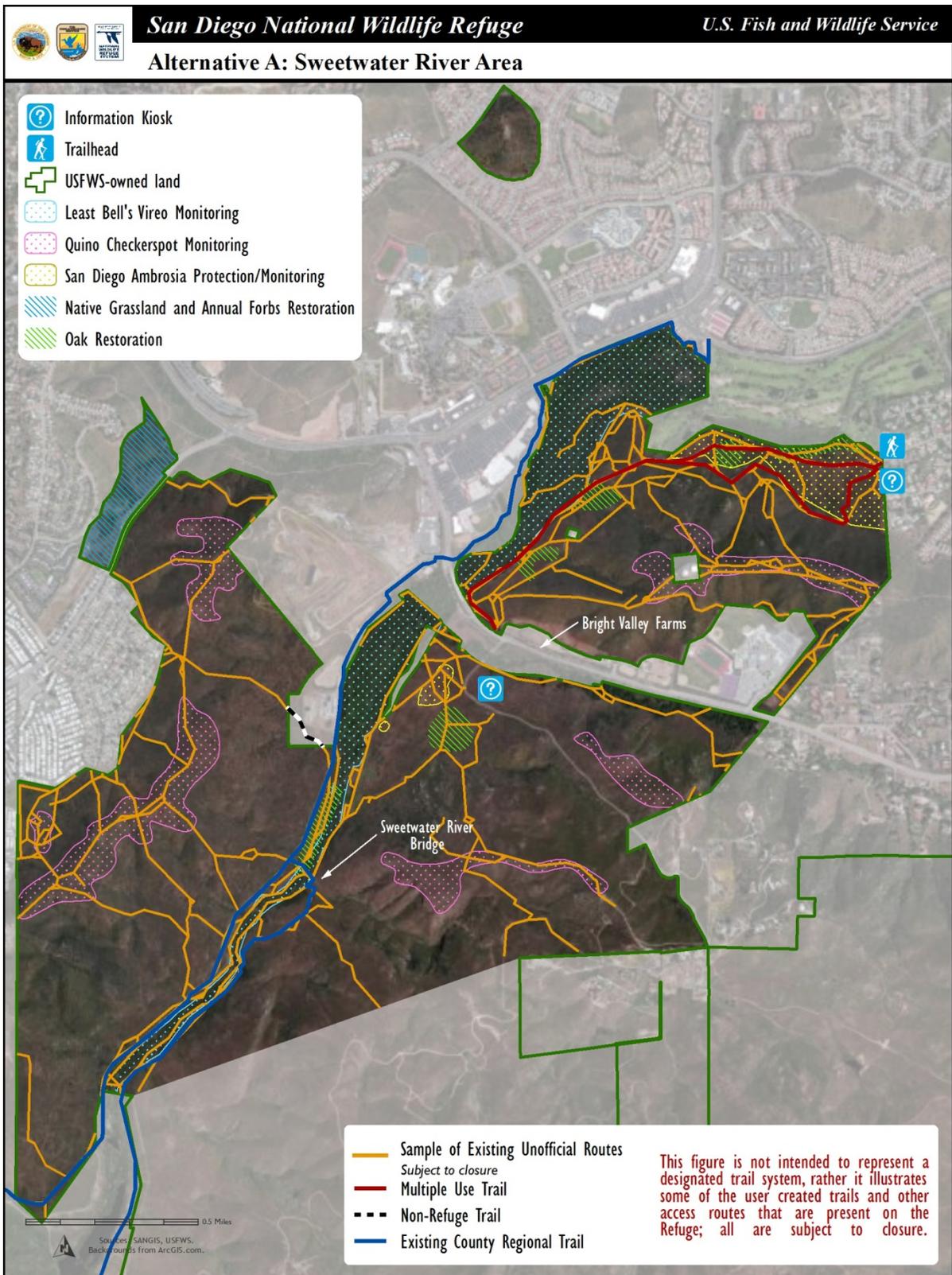


Figure 4-3. Alternative A - Sweetwater River Area, Otay-Sweetwater Unit

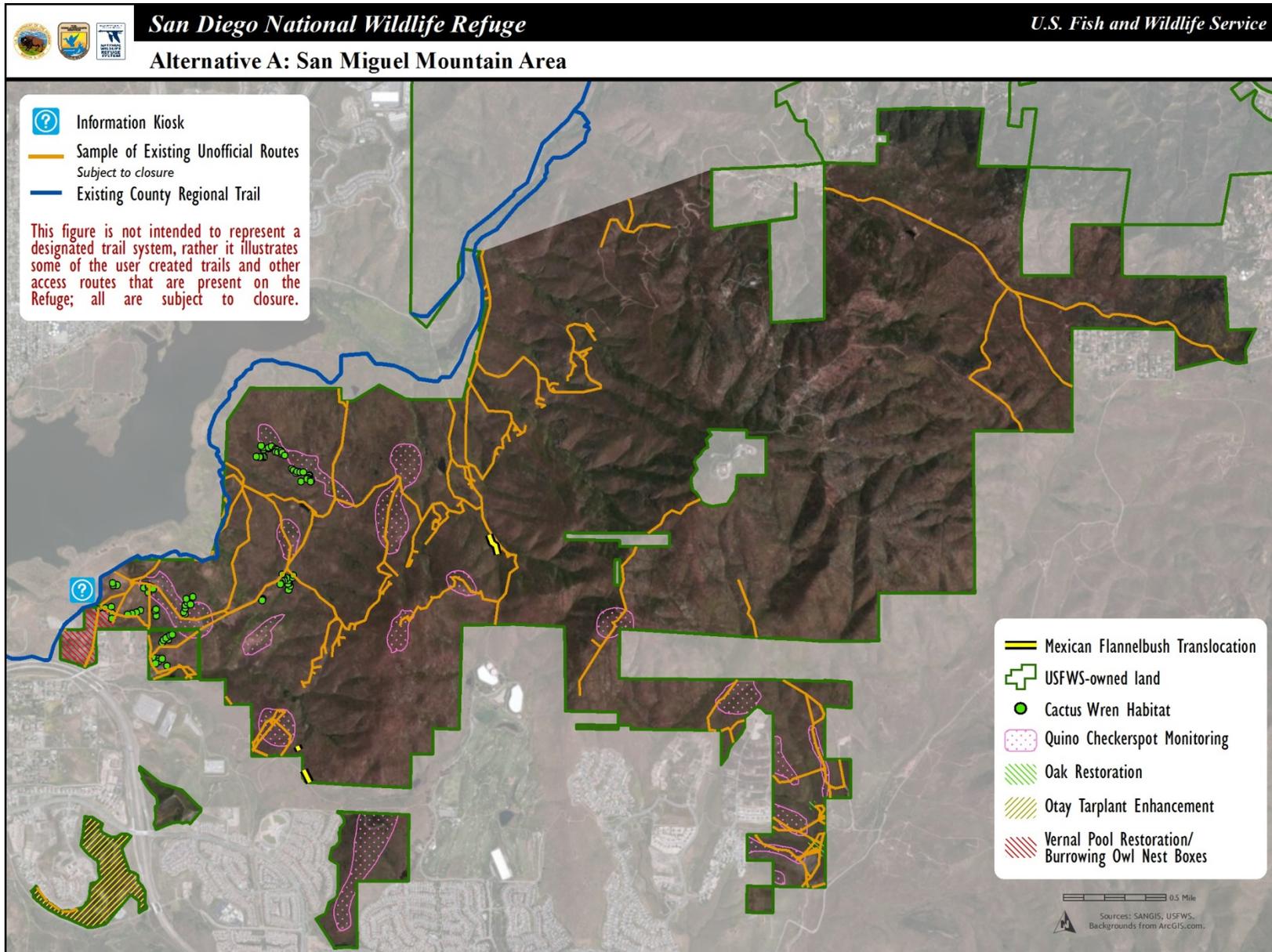


Figure 4-4. Alternative A – San Miguel Mountain Area, Otay-Sweetwater Unit



Figure 4-5. Alternative A - Otay Mesa and Lakes Area, Otay-Sweetwater Unit

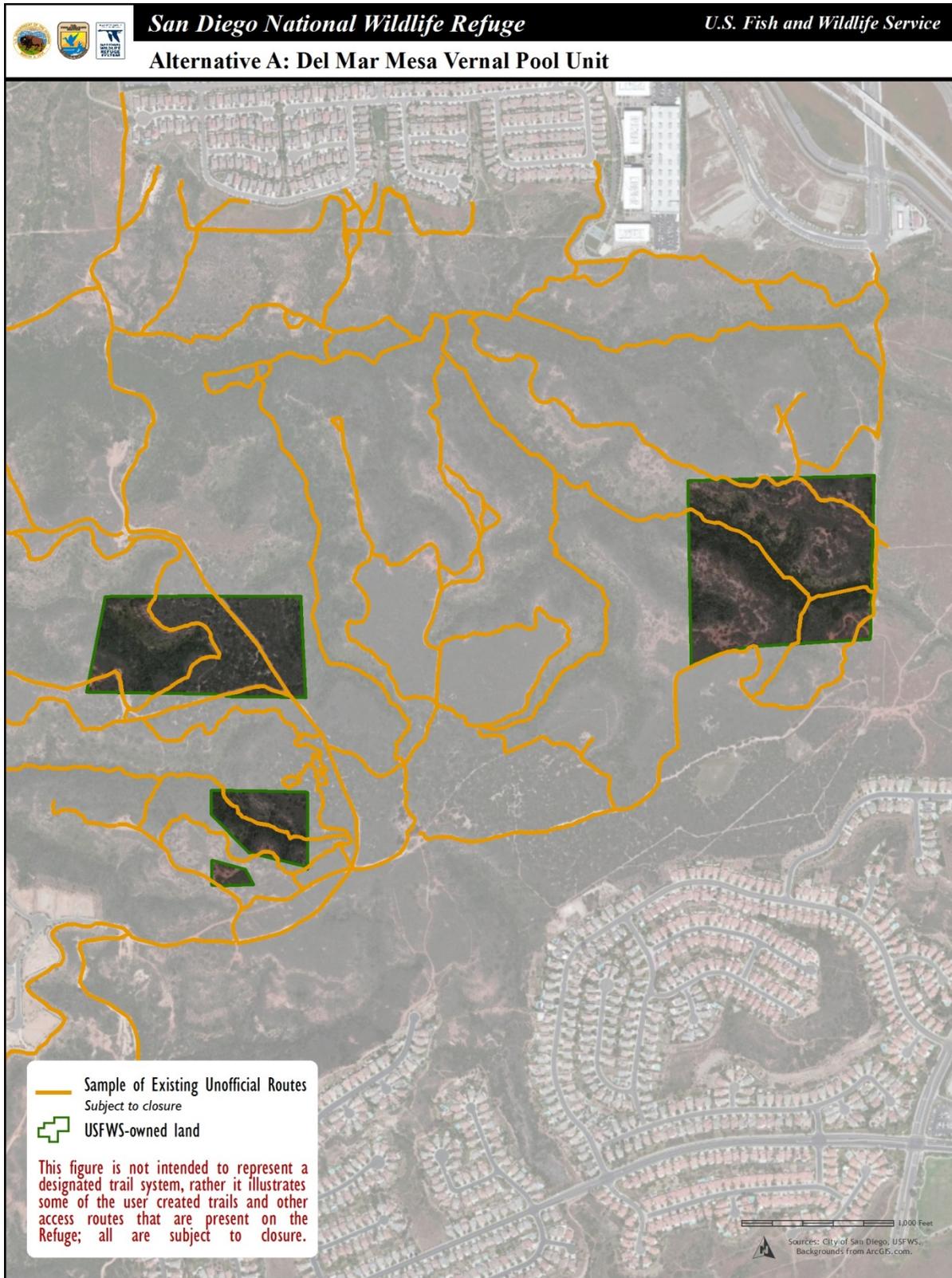


Figure 4-6. Alternative A - Del Mar Mesa Vernal Pool Unit

- describing new biological data collected, such as new species sightings and information on wildlife movements and corridors;
- evaluating impacts of human disturbance in and adjacent to preserved lands;
- evaluating management activities and enforcement difficulties; and
- evaluating funding needs and the ability to accomplish resource management goals.

The MSCP anticipated that the monitoring program would evolve over time and provided the authority for the Wildlife Agencies, in collaboration with the Permittees, to make changes in monitoring protocols and priorities. As a result, it was determined that a new monitoring approach involving an adaptive management framework with clearly defined measurable goals and objectives should be developed. The development and refinement of new approaches to monitoring and adaptive management was done in a stepwise progression that resulted in a series of documents being produced with each document building on the previous ones. These documents are available for review on the San Diego Management and Monitoring Program website (http://www.sdmmmp.com/monitoring/Monitoring_MainPage.aspx) and/or the CDFW Natural Community Conservation Planning website (<http://www.dfg.ca.gov/habcon/nccp/publications.html>).

Evaluation of the MSCP monitoring protocols and the overall design of the MSCP monitoring program by the Wildlife Agencies and participating jurisdictions is ongoing. An extensive review and analysis of the San Diego MSCP Biological Monitoring Plan is underway in an effort to improve the scientific robustness of the monitoring program and enhance the ability of the participating jurisdictions and agencies to determine if the biological goals of the MSCP are being met (Hierl et al. 2005). Through this review process, various program topics have been addressed including:

- assessing the original biological monitoring plan for the San Diego MSCP (Hierl et al. 2005);
- developing a revised rare plant monitoring framework (McEachern et al. 2007);
- prioritizing species for monitoring (Regan et al. 2006);
- developing a step-by-step procedure for developing effective monitoring programs in an adaptive management context (Atkinson et al. 2004);
- grouping and prioritizing natural communities for monitoring (Franklin et al. 2006); and
- developing conceptual models to improve the biological monitoring plan (Hierl et al. 2007).

Refuge staff is actively participating in the development and review of updated monitoring programs and protocols, which when completed will likely result in changes to current monitoring procedures conducted on the Refuge.

Researchers at San Diego State University, under the direction of Dr. Douglas Deutschman, have also undertaken a research project to refine the MSCP vegetation community monitoring program. The project uses a variance decomposition approach to examine the effects of number of sites, number and size of plots, sampling frequency, sampling methodology, and observer experience on accuracy, precision, and cost of estimating several variables associated with the structure and floristic composition of the chaparral and coastal sage scrub vegetation communities. The goal is to arrive at a monitoring program that will not only enable biologists to assess whether: 1) the MSCP is

conserving the diversity and function of the ecosystem; and 2) the specific species covered by the MSCP are being conserved adequately to meet the take authorization issuance standards of the ESA and the NCCP, but can also achieve these goals at the lowest cost.

This research program is continuing, with the expectation of completion in 2014. San Diego NWR personnel have worked with the research team as they have shared their preliminary results with the community of MSCP biologists. We expect to implement the MSCP-wide monitoring program that results from this research on refuge lands in cooperation with other agencies and land managers in the MSCP preserve system, as Refuge staffing and funding allow.

Current monitoring efforts include for some species adhering to the protocols issued by the Service as part of the ESA Section 10(a)(1)(A) permit that was prepared in association with the approval of the San Diego MSCP, while monitoring other species using updated methods developed cooperatively with the Wildlife Agencies and jurisdictions participating in the MSCP. Still other species on the Refuge are monitored opportunistically, which may be of limited utility in rigorous quantitative estimation of population trends over time. However, such surveys are likely to contribute valuable information on presence or absence, seasonality, distribution, and threats to population persistence.

Monitoring efforts for MSCP covered species have been prioritized according to Regan et al. (2006) who used a step-down approach for prioritizing MSCP covered species, categorizing species based on a number of factors including their at-risk classification (e.g., NatureServe global and state rankings, IUCN ranks, California Native Plant Society rankings). The species were classified as Risk Group 1 (most endangered), Risk Group 2 (moderately endangered), and Risk Group 3 (less endangered). Next, the threats and/or risk factors facing the species were identified. Finally, the habitat associations used by the species and their general spatial distribution in the County (e.g., widespread but sparse) were described. Species in Risk Group 1 are considered the highest priority for monitoring.

Monitoring protocols for rare plant species continue to be refined. In 2011, Tracey et al. prepared a San Diego Rare Plant Monitoring Plan for the monitoring of rare plants in the San Diego region to establish regulatory compliance with the adopted regional habitat conservation plans and to inform land managers on the status of rare plants for potential management efforts. The plan assumes annual modifications as additional species protocols are added. The results of monitoring efforts assist in refining adaptive management models, monitoring objectives, and management objectives, as well as further define the general distribution of the species. While it is the intent of the plan to apply the protocols toward a regional effort, the protocols are flexible enough to be used by individual land managers who wish to contribute information to the regional effort (Tracey et al. 2011).

Table 4-1 identifies the MSCP covered species that occur on or for which there is suitable habitat included within the San Diego NWR, the risk group for each species, and the monitoring methods, if any, currently (as of 2013) being implemented on the Refuge for each species listed.

Table 4-1 Current Monitoring Methodology for MSCP-Covered Species on the San Diego NWR		
Species	Risk Group (Regan et al. 2006)	Monitoring Methodology
San Diego thornmint (<i>Acanthomintha ilicifolia</i>)	1	Monitored at two permanent plots using method of McEachern et al. (2007)
San Diego ambrosia (<i>Ambrosia pumila</i>)	1	Known locations are mapped approximately every five years
California Orcutt grass (<i>Orcuttia californica</i>)	1	Pool-specific presence/absence surveys; annual categorical cover estimate at Shinohara vernal pool restoration site
Dehesa beargrass (<i>Nolina interrata</i>)	1	Cooperating with CBI in an investigation of this species' abundance, distribution, and ecology
Del Mar manzanita (<i>Arctostaphylos glandulosa</i> var. <i>crassifolia</i>)	1	Monitoring protocols currently being developed
Encinitas baccharis <i>Baccharis vanessae</i>	1	Not currently known to occur on the Refuge
Dunn's mariposa lily (<i>Calochortus dunnii</i>)	2	Monitored at one permanent plot using methods of McEachern et al. (2007)
Gander's butterweed (<i>Senecio ganderi</i>)	2	Presence/absence noted during habitat-based monitoring; protocols currently under development
Gander's pitcher-sage (<i>Lepechinia ganderi</i>)	2	Presence/absence noted during habitat-based monitoring; protocols currently under development
Otay manzanita (<i>Arctostaphylos otayensis</i>)	2	Presence/absence noted during habitat-based monitoring; protocols currently under development
Otay mesa mint (<i>Pogogyne nudiuscula</i>)	1	Pool-specific presence/absence surveys; annual categorical cover estimate at Shinohara vernal pool restoration site
Otay tarplant (<i>Deinandra conjugens</i>)	1	Mapped annually at Rancho San Miguel Otay tarplant preserve, Shinohara vernal pool restoration site, Mother Miguel grassland, Jamacha parcel, and Spring Valley fuel break
Palmer's goldenbush (<i>Ericameria palmeri</i>)	2	Of limited occurrence; future monitoring per McEachern et al. (2007), as appropriate
Parry's tetracoccus (<i>Tetracoccus dioicus</i>)	3	Presence/absence noted during habitat-based monitoring; protocols currently under development
San Diego barrel cactus (<i>Ferocactus viridescens</i>)	3	Monitored at two permanent plots using method of McEachern et al. (2007)
San Diego goldenstar (<i>Muilla clevelandii</i>)	2	Of limited occurrence; future monitoring per McEachern et al. (2007), as appropriate

Table 4-1
Current Monitoring Methodology
for MSCP-Covered Species on the San Diego NWR

Species	Risk Group (Regan et al. 2006)	Monitoring Methodology
San Diego button celery (<i>Eryngium aristulatum</i> var. <i>parishii</i>)	2	Pool-specific presence/absence surveys; annual categorical cover estimate at Shinohara vernal pool restoration site
San Diego mesa mint (<i>Pogogyne abramsii</i>)	2	Monitoring to be implemented by Del Mar Mesa Preserve partners
San Miguel savory (<i>Satureja chandleri</i>)	3	Monitoring protocols currently under development
Snake cholla (<i>Cylindropuntia californica</i>)	2	Of limited occurrence; future monitoring per McEachern et al. (2007), as appropriate
Spreading navarretia (<i>Navarretia fossalis</i>)	1	Pool-specific presence/absence surveys; annual categorical cover estimate of Shinohara vernal pools
Tecate cypress (<i>Cupressus forbesi</i>)	1	Not currently monitored; only small portion of species' distribution is on refuge
Variiegated dudleya (<i>Dudleya variegata</i>)	2	Monitored at one permanent plot using method of McEachern et al. (2007)
Peregrine falcon (<i>Falco peregrinus</i>)	Excluded, no known threats	Not currently monitored
Burrowing owl (<i>Athene cunicularia</i>)	1	Artificial nest boxes at Shinohara and Mother Miguel grassland monitored monthly; juveniles banded and color-marked to monitor movements
California gnatcatcher (<i>Polioptila californica</i>)	2	Refuge is included in MSCP-wide monitoring conducted by USFWS, using methodology developed by Winchell and Doherty (2010)
Rufous-crowned sparrow (<i>Aimophila ruficeps</i>)	3	Not currently monitored
Canada goose (<i>Branta canadensis</i>)	Excluded, no known threats	Not currently monitored
Cactus wren (<i>Campylorhynchus brunneicapillus</i>)	1	Focused surveys of limited suitable habitat conducted opportunistically
Cooper's hawk (<i>Accipiter cooperii</i>)	3	Not currently monitored
Ferruginous hawk (<i>Buteo regalis</i>)	3	Not currently monitored

Table 4-1 Current Monitoring Methodology for MSCP-Covered Species on the San Diego NWR		
Species	Risk Group (Regan et al. 2006)	Monitoring Methodology
Golden eagle (<i>Aquila chrysaetos</i>)	2	Focused surveys of limited suitable habitat conducted opportunistically
Least Bell's vireo (<i>Vireo bellii pusillus</i>)	2	Focused surveys of limited suitable habitat conducted annually
Northern harrier (<i>Circus cyaneus</i>)	3	Focused surveys of limited suitable habitat conducted opportunistically
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	1	Focused surveys of limited suitable habitat conducted opportunistically
Tricolored blackbird (<i>Agelaius tricolor</i>)	1	Focused surveys of limited suitable habitat conducted opportunistically
Western bluebird (<i>Sialia mexicana</i>)	Excluded, no known threats	Focused surveys of limited artificial nest boxes conducted opportunistically
Riverside fairy shrimp (<i>Streptocephalus woottoni</i>)	1	Not currently monitored
San Diego fairy shrimp (<i>Branchinecta sandiegonensis</i>)	1	Annual focused surveys of suitable habitat; Shinohara vernal pools visually inspected annually
Thorne's hairstreak butterfly (<i>Mitoura thornei</i>)	1	Not currently monitored
American badger (<i>Taxidea taxus</i>)	3	Badger surveys were conducted in western San Diego County by Brehme et al. (2012)
Mountain lion (<i>Felis concolor</i>)	3	Cooperating with UC Davis Wildlife Health Center (UC Davis School of Veterinary Medicine) and Western Tracking Institute to monitor species' occurrence and movements in rural western San Diego County
Southern mule deer (<i>Odocoileus hemionus fuliginosus</i>)	3	Not currently monitored; surveys to estimate relative abundance of deer populations on the Refuge were conducted by Dudek in 2008
Arroyo toad (<i>Anaxyrus californicus</i>)	2	Focused surveys of limited suitable habitat conducted opportunistically. Protocol surveys of suitable habitat in Sweetwater River conducted from 1997 through 2005 (Madden-Smith, et al.), and in 2010 (RECON)
Orange-throated whiptail (<i>Cnemidophorus hyperythrus beldingi</i>)	3	Not currently monitored; past monitoring of herpetofauna by USGS for the MSCP (2001 Rochester et al.), and as part of investigations of the effects of wildfire on the herpetofauna community in coastal sage (Rochester et al. 2008)

**Table 4-1
Current Monitoring Methodology
for MSCP-Covered Species on the San Diego NWR**

Species	Risk Group (Regan et al. 2006)	Monitoring Methodology
San Diego horned lizard (<i>Phrynosoma coronatum blainvillii</i>)	3	Not currently monitored; past monitoring of herpetofauna by USGS for the MSCP (2001 Rochester et al.), and as part of investigations of the effects of wildfire on the herpetofauna community in coastal sage (Rochester et al. 2008)
Southwestern pond turtle (<i>Clemmys marmorata pallida</i>)	3	Focused surveys of suitable habitat conducted opportunistically. In 2002 and 2003, USGS conducted surveys MSCP-wide, including sites along the Sweetwater River (Madden-Smith et al. 2005); after a sighting in April 2010, USGS surveyed Steele Canyon Creek but had no sightings

On the Otay-Sweetwater Unit, targeted surveys for Quino checkerspot butterfly are conducted in areas of known historical occurrences and other sites with appropriate habitat, along with opportunistic surveys to determine if Hermes copper butterfly is present in appropriate habitat areas on the Refuge. Known occurrences of San Diego thornmint on McGinty Mountain, as well as opportunistic inspections of the Jamacha and Trimark parcels and the Mother Miguel grassland, are also monitored to determine listed and sensitive species presence or absence.

Other monitoring-related activities currently occurring on the Refuge include:

- conducting qualitative assessments of the status and threats to the naturally occurring and restored populations of San Diego ambrosia on the Refuge;
- supporting the Center for Natural Lands Management in their research of effects on San Diego ambrosia of physical and chemical weed control techniques, as the results of this research can benefit future management practices for this species;
- surveying for the presence of Quino checkerspot butterfly in areas where protocol surveys are not currently being conducted, particularly in areas of known historical occurrences, as well as where appropriate habitat has been identified;
- monitoring San Diego barrel cactus at established plots (Otay-Sweetwater Unit);
- conducting annual inventories of the plant and animal species present in the Refuge's Otay-Sweetwater vernal pools;
- inventorying and repairing or replacing physical structures such as burrowing owl boxes and bluebird nesting boxes installed on the Otay-Sweetwater Unit in previous years; and
- monitoring the cactus wren habitat restoration sites on the Otay-Sweetwater Unit.

The MSCP also addresses the need for wildlife corridor monitoring. The plan identified four regional habitat linkages on the Refuge: the portion of the Sweetwater River that extends from the McGinty Mountain area to the Sweetwater River area (Rancho San Diego); habitat connections between San Miguel Mountain, Proctor Valley, and the Jamul Mountains; the lands connecting the Jamul Mountains and the southeast side of Lower Otay Lake; and Little Cedar Canyon, which provides a linkage between the Jamul Mountains and the San Ysidro Mountains. The MSCP proposed that the presence of focal species within these linkage areas be determined through the detection of animal sign (tracks and scat) and visual sightings. In 2011, the San Diego Tracking Team established tracking transects in the Las Montañas management area of the Refuge to obtain data that will improve our understanding of how and to what extent this area functions as a wildlife corridor. Also in 2011, the San Diego Management and Monitoring Group issued a Connectivity Monitoring Strategic Plan for the San Diego Preserve System (the plan and additional details are available at http://www.sdmmp.com/monitoring/connectivity_monitoring.aspx). This strategic plan provides direction for connectivity monitoring that will facilitate an assessment of how the goals of ensuring the persistence of species across the MSCP preserve system and preserving ecosystem functions across the landscape are being achieved.

Herpetofaunal (i.e., reptiles, amphibians) monitoring on the Refuge began in 1995 as part of a larger USGS and San Diego State University project (Rochester et al. 2001) involving the autecological study of the herpetofauna of San Diego County. The goal of the study was to identify the reptile and amphibian species present, when they are active, and in which habitats they occur. The Refuge study site, where 10 pit-trap arrays were constructed, is located along both sides of the Sweetwater River just to the south of Highway 94. The monitoring effort as of 2001 involved 295 sampling days in which 30 species were identified.

Management. Since the Refuge was established in 1996, more than 15 projects, many of which are described here under Past Management Actions, have been initiated on the Otay-Sweetwater Unit to restore and/or enhance habitat for the primary purpose of supporting listed and MSCP-covered species. Other ongoing projects that support listed and sensitive species in the Otay-Sweetwater Unit include:

- Control of invasive plant species in recent burn areas and in restored/enhanced areas (e.g., cactus wren habitat restoration areas, vernal pool restoration on the Shinohara site, and Otay tarplant habitat enhancement on the Jamacha parcel);
- Installing fencing and/or signage to reduce disturbance and minimize direct impacts related to unauthorized off-trail activities;
- Documenting reintroduction, enhancement, and restoration project results to determine how best to design and implement future projects to maximize benefits to listed species;
- Coordinating with other agencies and organizations to investigate the potential effects to native species, particularly listed plant species, of various types of herbicides used to control non-native grasses and other invasive plants in natural areas; and
- Repairing or replacing physical structures such as burrowing owl boxes and bluebird nesting boxes.

No specific projects related to listed or sensitive species are currently being implemented by San Diego NWR on the Del Mar Mesa Vernal Pool Unit. While some trash removal and fencing to limit illegal trail use has been conducted, the primary Refuge activities for this area include general oversight, periodic monitoring of habitat and species, and coordination with other agencies that manage wildlife habitat on Del Mar Mesa to develop and implement a Del Mar Mesa Preserve Management Plan.

Habitat Restoration and Enhancement Activities

In addition to habitat restoration and enhancement projects implemented for the primary purpose of supporting listed species, several other restoration and enhancement projects have also been implemented on the Refuge to restore or improve habitat quality for a range of plant and wildlife species. These activities include controlling invasive non-native plants in recent burn areas; controlling invasive non-native grasses and forbs in other disturbed areas; removing non-native shrubs and trees from riparian areas; planting and maintaining oak seedlings in appropriate habitat throughout the San Diego NWR; and maintaining and monitoring restored cactus patches in recent burn areas.

Habitat and Wildlife Protection

Various management actions are currently implemented on the Refuge to minimize the potential for disturbance to plants and wildlife and to reduce adverse effects to habitat and water quality from erosion, illegal encampments, and dumping. These management actions include the installation and maintenance of fencing and/or signage intended to discourage visitors from off-trail activity, as well as general site surveillance, and, when necessary, the issuance of citations by Federal Wildlife Officers. Gates, fencing, and/or signage are also used to delineate those areas of the Refuge that are closed to public use. Control of illegal motorized vehicle activity on the Refuge involves the use of gates, other types of barriers, and/or signs, as well as interagency patrol of vulnerable areas. The Refuge is also partnering with adjacent landowners to find mutually agreeable ways of preventing motorized access onto the Refuge through these adjacent parcels. Abandoned mine shafts are closed to human access using wildlife-friendly gates that allow bats and smaller wildlife to continue to use the shafts as habitat. The San Diego NWR fire crew assists in minimizing adverse effects to Refuge resources through the control of wildland fires both on and off the Refuge.

General Site Management

General site management includes activities such as invasive species control; fence and sign maintenance around trails and trail parking areas; working with partners to remove homeless encampments; and working with volunteers to implement small habitat restoration projects. Refuge staff will also continue to work with the appropriate agencies and Service personnel to secure existing mine shafts discovered on the Refuge.

Refuge staff will also continue to cooperate with and support partner agencies, organizations, and/or contractors in the implementation of region-wide projects that not only benefit the overall goals of multiple species conservation, but also the long-term management of the plant and wildlife resources on the Refuge. One such project involved the creation of a fine-scale vegetation map for approximately 450,000 acres of conserved lands in western San Diego County, including conserved lands within the boundaries of the San Diego NWR. This project, which began in 2009, was conducted in accordance with CDFW and national standards for field data collection, vegetation and mapping classification, and mapping of vegetation. This updated vegetation mapping will assist the Refuge in the planning and implementation of various projects, including habitat

monitoring and restoration or enhancement. The Refuge will also continue to provide logistical and permitting support for research projects that have the potential to benefit Refuge resources. Such projects include the San Diego Natural History Museum's Plant Atlas project and several research projects being conducted by graduate student researchers from local and out-of-state universities.

The invasive species control currently implemented on the Refuge employs both chemical and physical/mechanical control methods. Some control is implemented by Refuge staff, while other control may be performed by contractors. Herbicides, which are chemicals that kill or injure plants, are widely used for controlling weeds and are generally considered an effective eradication tool, particularly when the size of the invasive plant infestation and/or the characteristics of the invasive plant species cannot be controlled solely by physical or mechanical methods. Herbicides are generally classified by their mode of action. Some include growth regulators, amino acid inhibitors, grass meristem destroyers, cell membrane destroyers, root and shoot inhibitors, and amino acid derivatives, all of which interfere with plant metabolism in a variety of ways (Bussan and Dyer 1999). Herbicides can be categorized as selective or non-selective. Selective herbicides kill only a specific type of plant. Some herbicides used for noxious weed control are selective for broad-leaved plants, leaving grasses unaffected. Other herbicides, such as glyphosate, are non-selective, affecting much of the vegetation; therefore, care is required when using this product around desirable, non-target plants (Rees et al. 1996).

All herbicides used on the Refuge must be reviewed and approved as part of the Service's Pesticide Use Proposal System (PUPS). The PUPS identifies specific pesticides approved for use on each Refuge and includes details on target pests, products applied, application dates and rates, method of use, number of applications, site description, sensitive habitats, and best management practices (BMPs) to avoid impacts to sensitive resources. The herbicides currently used on the Refuge are presented in Table 4-2. This table also provides information regarding target pests and application methods. When controlling invasive plants using chemical methods, Refuge staff applies herbicides to target plants or cut stumps by using spray bottles, backpack sprayers, or a tank and hose mounted on a gator or other type of all-terrain vehicle (ATV).

A variety of mechanical methods are used to remove invasive plants including pulling or digging the invasive plants out by hand, using a nylon filament trimmer (weed "whacker") or chain saw, and uprooting the plant with a "weed wrench." As part of controlling invasive weedy species, some areas on the Refuge have been mechanically de-thatched and the dead herbaceous material removed to facilitate subsequent herbicide treatment.

Managing Habitat and Species Conservation Banks on the Refuge

During the initial years of Refuge establishment, the formation of conservation or mitigation banks was one tool used to acquire lands for incorporation into the Refuge. Three areas of the Refuge were acquired in association with the establishment of conservation banks (i.e., Rancho San Diego, San Miguel, and Singing Hills); in all three cases, the Refuge was identified as the party responsible for management and monitoring of sensitive habitats and covered species on the bank properties. The agreements for establishing the banks also required the development of management plans for those areas incorporated into the banks. The final CCP serves as the management plan for these conservation banks, and the Carlsbad Fish and Wildlife Office is responsible for maintaining the accounting records for each bank. The three banks included within the Refuge are described here.

**Table 4-2
Pesticides Currently Used on the San Diego NWR**

Active Ingredient	Common Product Names	Target Pests	Treatment Area Location/Size	Application Method Application Rate Application Equipment	Applications per year
Glyphosate (formulated as a water-soluble liquid containing surfactant)	RoundUp Pro Prosecutor	Non-native, invasive weeds/grasses (post-emergent)	Shinohara parcel (30 acres), Jamacha parcel (30 acres)	Ground spot treatment 0.87 ounces/acre Hand-held equipment	1 application per year at each site
Glyphosate (formulated as a water-soluble liquid for mixing with water or nonionic surfactant)	Rodeo Aquamaster	Non-native, invasive broadleaf weeds and shrubs in wetland areas (post-emergent)	Shinohara parcel (30 acres)	Ground spot treatment 0.65 ounces/acre Hand-held equipment	1 application per year
Fluazifop-P-butyl	Fusilade DX Fusilade II	Non-native annual grasses, filaree, tocolote (post-emergent)	Jamacha parcel (30 acres) and Par Four parcel (0.57 acre)	Broadcast 0.188 gallons/acre Boom	1 application per season
Chlorsulfuron	Telar XP	Onion weed (pre-emergent or early post-emergent)	Jamacha parcel (5 acres)	Ground spot treatment 0.80 ounces/acre Hand-held equipment	1 application per year

Rancho San Diego Mitigation Bank. This mitigation bank was established in 1996 to offset impacts to sensitive habitats and species from transportation and other government sponsored projects, as well as development projects by others, occurring in western San Diego County below the 2000-foot elevation. Under this agreement, the 1,832 acres of land included within the bank were acquired by the Service to be managed as part of the National Wildlife Refuge System. The owners of the bank include the San Diego Association of Governments (SANDAG), Caltrans, and the County of San Diego. Percentage of credit available to each owner is allocated as follows: SANDAG 53 percent, Caltrans 23 percent, and the County of San Diego 24 percent. The bank permits the use of existing vegetation communities as mitigation for habitat impacts and includes a wetland mitigation component that permits the creation of wetland habitat, provided the habitat to be impacted approximates the existing wetland communities on the Bank.

Under the authorizing agreement, the Service was given the responsibility for preparing a management plan for the lands within the bank that addresses species monitoring in accordance with the requirements of the MSCP, habitat restoration, fire management, control of invasive plant species, and provisions for compatible public use. No endowment was provided to assist in the management of the lands within this conservation bank. As of 2013, the majority of the credits available from this bank had been expended.

San Miguel Conservation Bank. Established in 1997, the San Miguel Conservation Bank includes 1,186 acres on the western slopes of San Miguel and Mother Miguel Mountains. The lands within the bank support a variety of native plant communities, including “Very High Quality” (as defined by the MSCP) coastal sage scrub habitat, as well as lesser acreages of other habitats, such as chamise and mixed chaparral, perennial grasslands, riparian scrub, and other wetlands, all of which promote the multi-species values of the property. The desire to preserve these high habitat quality lands coupled with the landowner’s need to mitigate for impacts to sensitive species on adjacent lands led to the formation of the conservation bank. The size of the bank was large enough to offset impacts associated with the development of the lands to the south of the bank and to provide additional credits that could be sold to third party purchasers in need of off-site mitigation. The original conservation bank owner, Emerald Properties Corporation, sold the remaining credits in the bank to the San Diego County Water Authority in 2003. The Water Authority plans to use the remaining credits to mitigate for impacts to species covered by the San Diego County Water Authority Subregional Natural Community Conservation Plan/Habitat Conservation Plan (October 2010).

An endowment was established for San Miguel Conservation Bank that required an initial payment of \$100,000 and \$500 for each additional credit sold after the first 140 credits are sold. As of 2012, the endowment totaled \$623,000.

Singing Hills Conservation Bank. Established in 1998, the Singing Hills Conservation Bank is located on a 79-acre property located on the north side of Dehesa Road, just to the east of the intersection of Dehesa Road and Willow Glen Drive. The County of San Diego is the owner of this bank, which included 69.7 credits when established. As of 2013, only 0.69 credits have been used. The primary intent of this conservation bank was to provide mitigation for County of San Diego Department of Public Works projects; however, the county does have the ability to permit the use of the existing

credits for other projects. The credits serve as mitigation on a one-acre for one-acre credit basis for adverse impacts to like habitat within the western portion of San Diego County below the 2,000-foot elevation.

As with the other two banks, the Service, as the owner of the property, is responsible for managing and maintaining the property within the bank in perpetuity. Management requirements include the development of a habitat management plan and consideration of monitoring, habitat and species recovery, fire management, and appropriate public use activities. An endowment fund of \$20,910 was created to assist with conservation and restoration of these lands.

B. Public Use

Public Access

When the Refuge was established, public access on the Refuge was officially only open for use of the county's Sweetwater Loop and River Trail and a trail within the northern portion of the Sweetwater River area that was proposed to accommodate equestrians from Bright Valley Farms. Today, numerous other trails are present most of which have been created by users or follow old access roads and existing utility easements. Users have also created pathways onto the Refuge through adjacent private properties. These unofficial trails and access paths represent more than 210 miles of disturbance within the Otay-Sweetwater Unit.

Under Alternative A, official access to the trails present on the Refuge would continue to be limited to a few designated entry points. For instance, in the McGinty Mountain area, trail access is available from a parking area located along the north side of Jamul Drive, approximately one-half mile west of Lyons Valley Road. There are also existing easements to the north of Jamul Drive. Another less frequently used access point is an area located immediately to the south of Model A Ford Lane along Sloane Canyon Road near the northeastern portion of the Refuge.

No authorized access points are currently available within the Las Montañas area; however, the public appears to be entering this part of the Refuge from several locations, including from points off Highway 94, locations south of Jamul Drive, Vista Sage Lane, and through privately held parcels in the Vista Sage and Echo Valley areas.

The Sweetwater River area is currently being accessed from a variety of locations, such as public trails, public roads, and privately owned lands. Appropriate access to this area can be gained by using the county's Sweetwater Loop and River Trail, which extends north along the Sweetwater River from the Refuge's San Miguel Mountain area and from a small county-maintained parking area located to the south of Highway 94 at Singer Lane.

Although no parking area has been established at Par Four Drive, a kiosk is maintained here on Refuge property that establishes an official entry point onto the Refuge from this public street. Equestrians from Bright Valley Farms, located along Highway 94 just to the west of Steele Canyon High School, also gain access to the Refuge along a trail that connects the horse stable to Refuge property near the Sweetwater River. Unauthorized access to this portion of the Refuge occurs along Jamul Drive and Steele Canyon Road in the northeast; along Jamacha Boulevard, Trace Road, Doubletree Road, and Millar Ranch Road near the center of this area; and through Sweetwater Authority property and a user-created extension of a trail system established for the Pointe development in the south.

Access onto the San Miguel Mountain area appears to be taken from a variety of locations, including via the official Sweetwater Loop and River Trail. Parking and staging areas are available for this trail at the nearby County of San Diego Sweetwater Summit Campground site. There also appears to be unauthorized access occurring off Millar Ranch Road, Proctor Valley Road, and through San Diego Gas & Electric (SDG&E) property, a private golf course, the Rolling Hills Ranch housing development, and other privately-held parcels to the south.

All areas of Refuge land included within the Otay Mesa and Lakes area are posted as closed to public access. Some trespass by off-road vehicles is occurring in the easternmost parcel, where an access road accommodates Refuge and Department of Homeland Security management and monitoring responsibilities.

Wildlife-dependent Recreational Use

Hunting and Fishing. The Refuge is not currently open to hunting or fishing.

Wildlife Observation, Photography, and Interpretation. Opportunities for wildlife observation and photography are available along existing trails, particularly along the Sweetwater Loop and River Trail. Interpretive signs describing the endangered and threatened plants and animals occurring in and around the Sweetwater River are provided along a segment of the Sweetwater Loop and River Trail near the old steel bridge, and additional interpretation of Refuge resources occurs as part of various Refuge events and during monthly “Hike with a Ranger” outings.

Environmental Education. Activities related to environmental education are currently limited to occasional visits overseen by the San Diego Refuge Complex’s education program and conducted in partnership with Earth Discovery Institute. Elementary school students visit the Refuge and walk on the trails with teachers to fulfill a nature-based curriculum. The Refuge has also partnered with San Diego Audubon Society to identify and establish relationships with local elementary and high schools that may be incorporated into existing Refuge-based nature programs. The San Diego Audubon offers an experiential OutdoorExplore! nature program and a curriculum-based “Nearby Nature School Field Trips” program that could eventually be offered at the Refuge.

Other Public Uses

Trails. Trail use conducted solely for recreation, fitness, and commuting purposes is not considered a wildlife-dependent recreational use. However, trails do play an important role in accommodating wildlife-dependent recreational uses such as wildlife observation, photography, and resource interpretation. As described previously, a few trails were opened for public use when the Refuge was established, and an interim Compatibility Determination was prepared to address trail use at that time. There are, however, a significant number of user-created trails, maintained utility roads, and other unmaintained dirt roads that have not been officially opened or incorporated into a designated trail system (refer to Figures 4-1 through 4-6). These unofficial trails are currently used by hikers, joggers, dog-walkers, bicyclists, and equestrians. We have attempted to identify the majority of these unofficial trails, accessways, and easements in order to access the potential effects of their use on sensitive Refuge resources. There are clearly additional rogue trails and pathways being used on the Refuge that will require future analysis.

Only the county's Sweetwater Loop and River Trail, which extends along the Sweetwater River, and a trail located in the area west of Par Four Drive were considered for use when the Refuge was established. Under the no action alternative, trail use would continue more or less as it is occurring today. Trail users would be required to stay on designated trails, and entry onto the Refuge through unauthorized locations and creation of unauthorized trails would be addressed through signage, barriers, and/or law enforcement activity. With the exception of the two trails described, trails could be closed as necessary to address habitat and wildlife disturbance issues, as well as to eliminate safety or water quality issues related to severe erosion or steepness of slope. Dogs on leashes have been permitted to use the trails, but the lack of adherence to leash requirements, off-trail activity, and/or accumulation of dog waste along the trails and at trailheads could result in the prohibition of dogs from the Refuge at any time and without prior notice.

Geocaching. According to Geocaching.com, traditional geocaching is a “real-world outdoor treasure hunting game” in which players using GPS-enabled devices try to locate geocaches (containers that include a logbook and possibly a trinket, coin, or other object) that are hidden, often in outdoor locations, by other players. The GPS coordinates for a cache are provided on a website such as Geocaching.com, and players using their GPS devices seek out the hidden geocache. When a geocache is located, the player signs the logbook, when applicable, removes and replaces the object in the cache box, and returns the geocache to its original location. In general, the placement of geocaches on national wildlife refuges is prohibited. This is due in part to Federal regulations that prohibit the abandonment of property (50 CFR 27.93) on any national wildlife refuge, but also because such activity can result in disturbance to or destruction of refuge resources. As a result, all caches found on the Refuge are removed. Other forms of geocaching, such as virtual geocaching, which do not involve the placement of a physical object on the Refuge, or placement of caches by Refuge staff in association with wildlife-dependent recreational uses (e.g., environmental education, interpretation) may be permitted but must first be found appropriate and compatible with the purposes of Refuge establishment.

Research. The Refuge supports a variety of research and resource survey work conducted in association with graduate work at various universities and/or implemented by other public (e.g., USGS, CDFW), private, and non-profit researchers (e.g., California Native Plant Society, Center for Natural Lands Management, San Diego Natural History Museum, Conservation Biology Institute). All research conducted on the Refuge is evaluated to ensure that the work being conducted is compatible with Refuge purposes and is likely to result in benefits to Refuge management and/or Refuge resources. Work conducted on the Refuge by outside individuals, organizations, or agencies may only be conducted after a Special Use Permit (SUP) has been issued by the Refuge Manager that documents the purpose(s) of the work to be conducted and includes specific conditions intended to protect trust resources and ensure adherence to applicable Refuge regulations and policies.

C. Refuge Operations

Staffing and Facilities

The staff at the San Diego NWR currently includes a Refuge Manager, Refuge Operations Specialist, and Wildlife Biologist. Refuge staff shares office space with CDFW and BLM at the Rancho Jamul Ecological Reserve management offices. These offices, which are located on the old Daley Ranch off Highway 94, are approximately five miles driving distance from the nearest Refuge land.

The Refuge maintains a storage facility along the upper portion of Millar Ranch Road, a 17-stall parking area at Jamul Drive, a 170-foot-long trail bridge across the Sweetwater River, and several kiosks at entry points onto the Refuge.

Operational Access

To accommodate Refuge operations, maintenance, fire management, law enforcement, and other Refuge-related purposes, a system of access routes are maintained throughout the Refuge. These access routes are gated and, depending upon where these access routes are located, are either posted as closed to all unauthorized motorized vehicles or closed to all public access.

Maintenance

The primary maintenance activities on the Refuge include maintaining gates, fencing, and boundary signs; removing illegally discarded materials ranging from trash to tires to large household items; working with the county sheriff's office to remove and clean up homeless campsites; maintaining the parking area off of Jamul Drive; keeping kiosks, interpretive and informational signage, and the trail bridge at the Sweetwater River in good repair; and addressing serious trail tread issues as funding allows. The Refuge also assists in maintaining the lower portion of Millar Ranch Road and a portion of upper San Miguel Road.

D. Fire Management

In accordance with the Fire Management Plan for the San Diego NWR (USFWS 2004a), the primary strategy for fire management on the San Diego NWR is full fire suppression. Successful fire management under this strategy involves hazardous fuels reduction, interagency fire response, and community fire preparedness. Under any of the alternatives, fire management on the Refuge would be implemented consistent with the most current Fire Management Plan for the Refuge Complex.

To assist in the protection of Refuge lands and resources, the San Diego NWR Complex (NWRC) includes a Service-funded fire crew that operates as part of the Southern California Fire Management Zone. In addition to providing fire management services to the Refuges on the San Diego NWRC (i.e., Seal Beach NWR, San Diego Bay NWR, Tijuana Slough NWR, and San Diego NWR), the Zone also provides fire management services to the Blue Ridge, Bitter Creek, Guadalupe-Nipomo Dunes, Hopper Mountain, Coachella Valley, and Sonny Bono Salton Sea NWRs. The Zone also supports interagency fire suppression and fuels management efforts in southern California. Interagency partners include San Diego Rural Fire Protection District, California Department of Forestry and Fire Protection (Cal Fire), San Miguel Consolidated Fire Protection District, the Fire Safe Council of San Diego County, the San Diego Forest Area Safety Taskforce, and the Border Agency Fire Council.

The Southern California Fire Management Zone maintains two fire crews (Engines 56 and 58) consisting of one engine captain and two crew members at Fire Station 36 in Jamul; two additional firefighters for each engine are typically hired during fire season. The Service's fire staff is collocated with the San Diego Rural Fire Protection District at Fire Station 36, which is located at 14024 Peaceful Valley Ranch Road just off Highway 94 in Jamul. The crews assist in fire protection activities on and off the Refuge, including providing interagency fire response for wildfires in the San Diego community and throughout the Southern California Fire Management Zone, as well as participating in out-of-area wildland fire assignments.

Another component of the Service's wildland fire protection strategy has been the Wildland-Urban Interface Program. The wildland-urban interface (WUI) is defined as the line, area, or zone where structures and other human developments meet or intermingle with undeveloped wildland or vegetative fuels. Most Refuge lands in San Diego County are surrounded by developed areas that meet this definition. The Refuge fire staff work closely with neighboring communities to reduce future wildfire risks to homes, businesses, and critical infrastructure. This is accomplished primarily by reducing fuels in the wildland-urban interface and collaborating with local, State, and Federal partners.

Fuels reduction in the WUI has focused on high-risk communities and adjacent natural resources that are inherently important to social and/or economic stability. These projects increase public and firefighter safety, reduce risk of unwanted fire, protect recreational opportunities on Service lands, strengthen rural economies, and increase public understanding of fire management. Fuel reduction projects funded and implemented by the Refuge have included construction and maintenance of fuel breaks, invasive species removal, and a residential chipping program. In most cases, projects are accomplished through contracts with local businesses or cooperative agreements with local fire agencies.

Through the Fire Safe Council of San Diego County and several local fire safe councils, the Service emphasizes the importance of homeowner responsibility for maintaining property according to local fire safety standards. The Refuge also assists local communities with the development of Community Wildfire Protection Plans, which prioritize local fuel reduction treatments and address ways in which a community can work to reduce structural ignitibility and keep homes safe from wildfires.

As described earlier, the WUI Program has provided funding to support a partnership with San Diego Rural Fire Protection District in which local landowners have received assistance with chipping vegetation and removing debris piles around their homes and structures. This community chipper program has treated up to 2,000 acres annually around homes in the wildland-urban interface (USFWS website, <http://www.fws.gov/cno/fire/socal/>, accessed on 6/13/11). Unfortunately, reduced fire program budgets in fiscal years 2012 and 2013 resulted in insufficient funds to support the community chipper program. Unfortunately, reduced fire program budgets in fiscal years 2012 and 2013 resulted in insufficient funds to support the community chipper program.

Through existing Federal, State, and local fire management partnerships in San Diego County, between 1,600 and 2,500 acres per year of San Diego NWR lands and adjacent public and private lands have been treated over the past few years to provide community protection, reduce hazardous fuels, and enhance native habitat. The activities implemented to accomplish these objectives have emphasized mechanical, chemical, and biological treatment. Mechanical treatment involves the physical removal of flammable materials such as invasive woody species growing in natural riparian zones, the thinning of native shrub vegetation in fire management zones, and chipping vegetation that has been removed from fire management zones. Chemical treatment is used to control non-native invasive plants which when present in natural areas have the potential to increase fire frequency and intensity, as well as extend the traditional fire season (Zouhar et al. 2008). Biological treatment would include seeding recent burn areas with a site-appropriate native seed mix and/or actively planting native container stock in burn areas in an effort to reduce the potential for invasion by non-native weedy species. The Service's contribution to these efforts would continue to occur per available funding under any of the management alternatives described in this document.

The actions described are implemented to reduce long-term fire suppression costs. Other actions taken by the Refuge in an attempt to reduce these costs include control of illegal motorized off-road vehicle activity, timely response to illegal dumping, and continuous surveillance for and rapid closure and cleanup of illegal encampments. All of these activities would continue under all of the alternatives addressed in this document.

Unfortunately, the potential for wildland fire increases when native vegetation is replaced with non-native woody and annual species. Excessively frequent wildland fire tends to shift vegetation communities from native shrub-dominated to non-native annual-dominated. With respect to the San Diego NWR, this is occurring in areas within and adjacent to the Refuge that are subject to repeated fires over relatively short time intervals. Approximately 4,200 acres of the Refuge's coastal sage scrub and chaparral habitats have burned in past fires, including the Harris Fire of 2007, the Millar Fire of 2007, and the Otay Fire of 2003. The Harris and Otay Fires also impacted significant areas of native vegetation outside the boundaries of the Refuge. The disturbance to habitat and soil as a result of these fires has favored the proliferation of non-native weedy species in various locations and as such has altered the natural fire regimes in these areas. A major effort has been undertaken on the Refuge to reduce the extent of non-native vegetation present, but additional work remains unfunded.

Even with the steps being taken by the Refuge to reduce the effects of wildland fire on sensitive resources (e.g., removal of highly flammable invasive weeds, active community involvement in the WUI program), factors such as climatic trends and residential and commercial development within the WUI continue to have a direct effect on fire suppression costs (Strategic Issues Panel on Fire Suppression Costs 2004). Costs associated with fire suppression activities on the Refuge, as well as rehabilitation costs following recent fires, have increased in recent years on the Refuge. This is particularly true of the costs associated with the Harris Fire of 2007, which burned almost 50 percent of the Otay-Sweetwater Unit, as well as significant areas of other Federal, State, and local agency-owned lands and private properties.

Under Alternative A, fire management would be implemented consistent with the direction and procedures outlined in the currently approved Fire Management Plan for the San Diego National Wildlife Refuge Complex (USFWS 2004a). If the Fire Management Plan for the Refuge Complex is updated, any new procedures would be implemented following approval of the updated Fire Management Plan.

E. Law Enforcement

Law enforcement on the Refuge is the primary responsibility of the Service's Federal Wildlife Officers. Currently, the Refuge Complex has one supervisory Officer and two Refuge Officers assigned to the San Diego NWR Complex. A zone Federal Wildlife Officer who serves other southern California Refuges is also stationed at the Complex. These officers enforce Federal wildlife laws on Service-owned lands within the National Wildlife Refuge System. They are charged with protecting wildlife and wildlife habitat, protecting Service facilities, and ensuring employee and visitor safety. Duties may include patrols, surveillance, investigations, apprehensions, seizures and arrests, and interaction with the judicial system. Refuge officers often work with other Federal, tribal, State and local law enforcement agencies that have overlapping jurisdiction within and adjacent to the San Diego NWR. Law enforcement activities currently occurring on the Refuge would continue under all alternatives.

F. Land Acquisition

As described in earlier in this chapter, land acquisition efforts for this Refuge are still ongoing. Under all of the alternatives, the Service will continue to work with willing sellers to acquire additional lands within the acquisition boundary per available funding.

G. Cultural Resources

It is the policy of the NWRS to identify, protect, and manage cultural resources located on Service lands and affected by Service undertakings for the benefit of present and future generations and in accordance with applicable laws and regulations.

Cultural resources, including both archaeological and historic sites, are known to be present within the Refuge boundaries. Some of these sites have been previously evaluated to determine if they are eligible for inclusion on the National Register of Historic Places (NRHP), while others have not yet been evaluated. It is highly likely that additional sites occur on the Refuge that have not yet been detected and/or recorded. Because cultural resources are known to be present on the Refuge, any Refuge project that would result in subsurface ground disturbance or would affect a structure that is considered more than 50 years old must be reviewed by the Service's Cultural Resources Program for compliance with Section 106 of the Historic Preservation Act.

The Cultural Resources Review process involves the preparation of a Request for Cultural Resources Compliance (Appendix I), which is submitted to the Regional Cultural Resources Office for review. With information about the project location and extent of the proposed ground-disturbing activity, the Cultural Resources Office will determine the potential effect of the proposal on cultural resources. Those projects that would be not likely to affect subsurface materials could fall under the Service's programmatic agreement with the SHPO, while other projects requiring greater ground disturbance could require SHPO review and concurrence. When there is a potential for disturbance to cultural resources, consultation with federally recognized tribes, interested parties, and the SHPO is required. Review and consultation requirements are applicable to all alternatives evaluated in the CCP.

H. Environmental Contaminants Coordination

The Service's Contaminants Program is available to assist the Refuge Manager in issues related to contaminants, as well as to conduct studies related to the effects of contamination on Refuge trust resources. The Contaminants Program at the Carlsbad Fish and Wildlife Office has assisted in addressing potential contaminants issues on the San Diego NWR on several occasions. Under all alternatives, the Refuge Manager would continue to consult with the Contaminants Program on potential contaminants issues.

I. Volunteers and Partners

The Refuge's volunteer program has grown due to involvement by Conservation Biology Institute (CBI) in supporting a Community Outreach Coordinator for south San Diego County with funding by a grant from San Diego Foundation, TNC, and the Transnet Environmental Mitigation Program. As of 2013, the current coordinator position, fulfilled by the Earth Discovery Institute with funding from Transnet, works with the Refuge and partner agencies CDFW and BLM, and others to involve the public in stewardship projects and interpretive events. Over 200 volunteers participated in stewardship projects, such as weeding endangered plant habitat, and provided over 800 hours in labor. Over 500 people attended interpretive events, including the Refuge's 15th anniversary celebration and Hike with a Ranger events, for over 1,000 hours of participation.

The South County Land Managers group is a partnership forged by the Refuge with CDFW, BLM, CBI, TNC, and other State and local conservation landowners. The group meets quarterly to discuss management and monitoring actions, share successes, and coordinate on mutual challenges. The partnership has resulted in coordinated efforts to control illegal off-road activity in Proctor Valley, development of a matrix of sensitive species distribution and threats to those populations, and a study on behalf of the managers by CBI, funded by the Environmental Mitigation Program under Transnet, to understand methods to restore habitat to benefit Quino checkerspot butterfly, Otay tarplant, and burrowing owl.

ALTERNATIVE B – MAXIMIZE HABITAT VALUES AND SPECIES PROTECTION

Under Alternative B (Figures 4-7 through 4-12), the wildlife and habitat management activities described in Alternative A would be implemented along with additional actions intended to further restore and enhance habitat values and support listed and sensitive species.

Opportunities of wildlife-dependent recreational uses including wildlife observation, photography, environmental education, and interpretation would be provided under Alternative B. Public access on the Refuge for these and other uses would be restricted to a designated (e.g., officially recognized, signed) system of trails. All other trails, which for the most part are user-created trails, would be subject to closure and rehabilitated to support habitat and species conservation. Specific trail alignments will be defined in a step-down trail plan to be prepared upon approval of the Final CCP. No dogs would be permitted on the Otay-Sweetwater Unit under this alternative.

Public uses on the Del Mar Mesa Vernal Pool Unit would be permitted in accordance with the City of San Diego's Carmel Mountain and Del Mar Mesa Preserves Management Plan, and such uses would be limited to the designated trail system on the Refuge. Access to areas beyond the limits of the designated trails would be prohibited.

A. Wildlife and Habitat Management

In addition to continuing to implement the wildlife and habitat management actions described under Alternative A, Alternative B proposes to expand wildlife and habitat management activities to maximize habitat values and species protection on the Refuge to the extent feasible based on available funding. The majority of the actions proposed under this alternative would be implemented on the Otay-Sweetwater Unit. The design and implementation of management actions on the Refuge will incorporate regional management strategies and adapt management practices as appropriate in response to new information and site-specific conditions.

Management of listed and MSCP-covered species will continue to evolve based on the outcomes of research efforts related to species and habitat management that are ongoing in western San Diego County. A Management Strategic Plan (MSP) (San Diego Management and Monitoring Program 2013) was recently prepared for the San Diego Association of Governments (SANDAG) that addresses a comprehensive approach for managing multiple plant and animal species within western San Diego County.

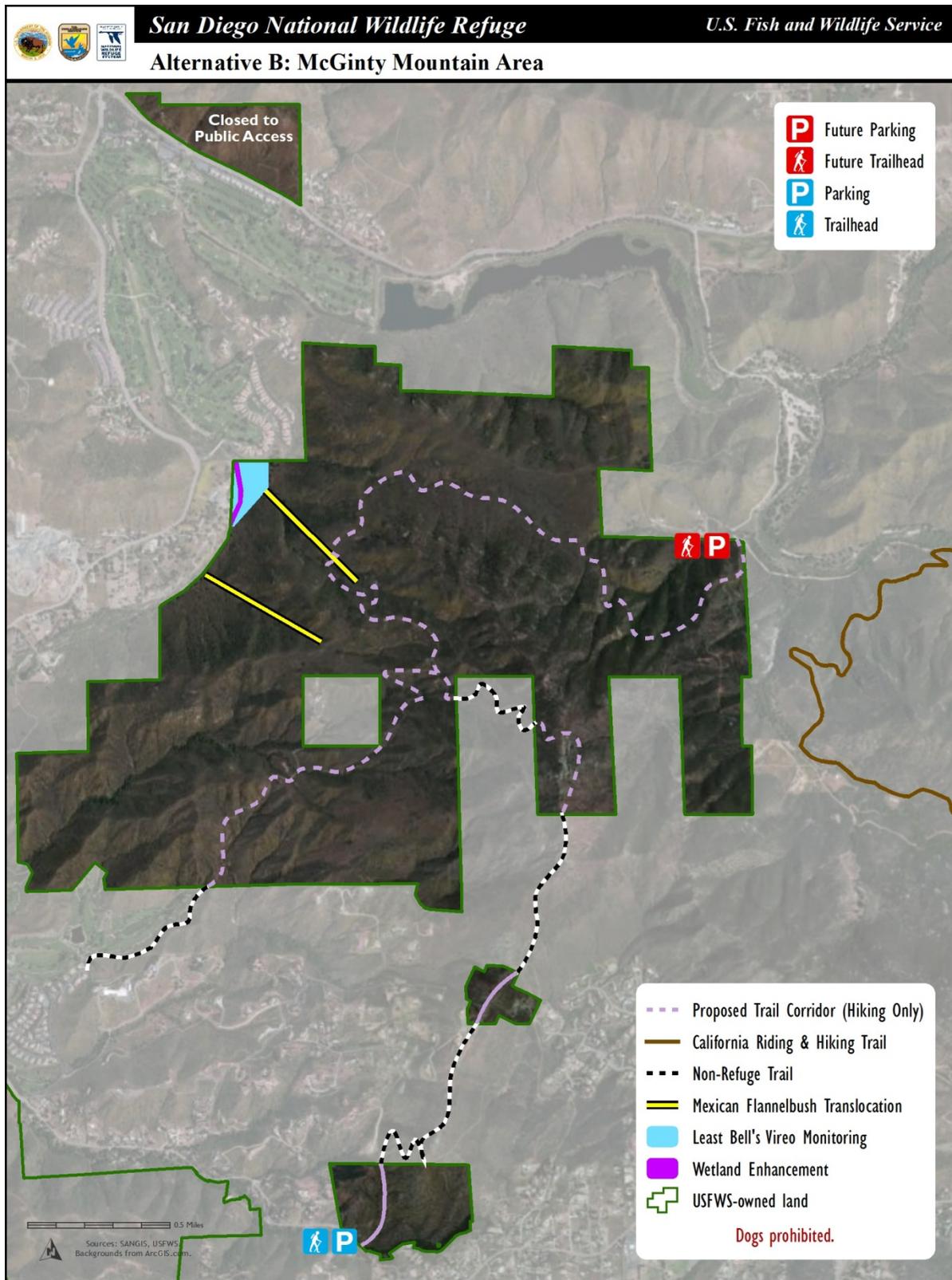


Figure 4-7. Alternative B - McGinty Mountain Area, Otay Sweetwater Unit

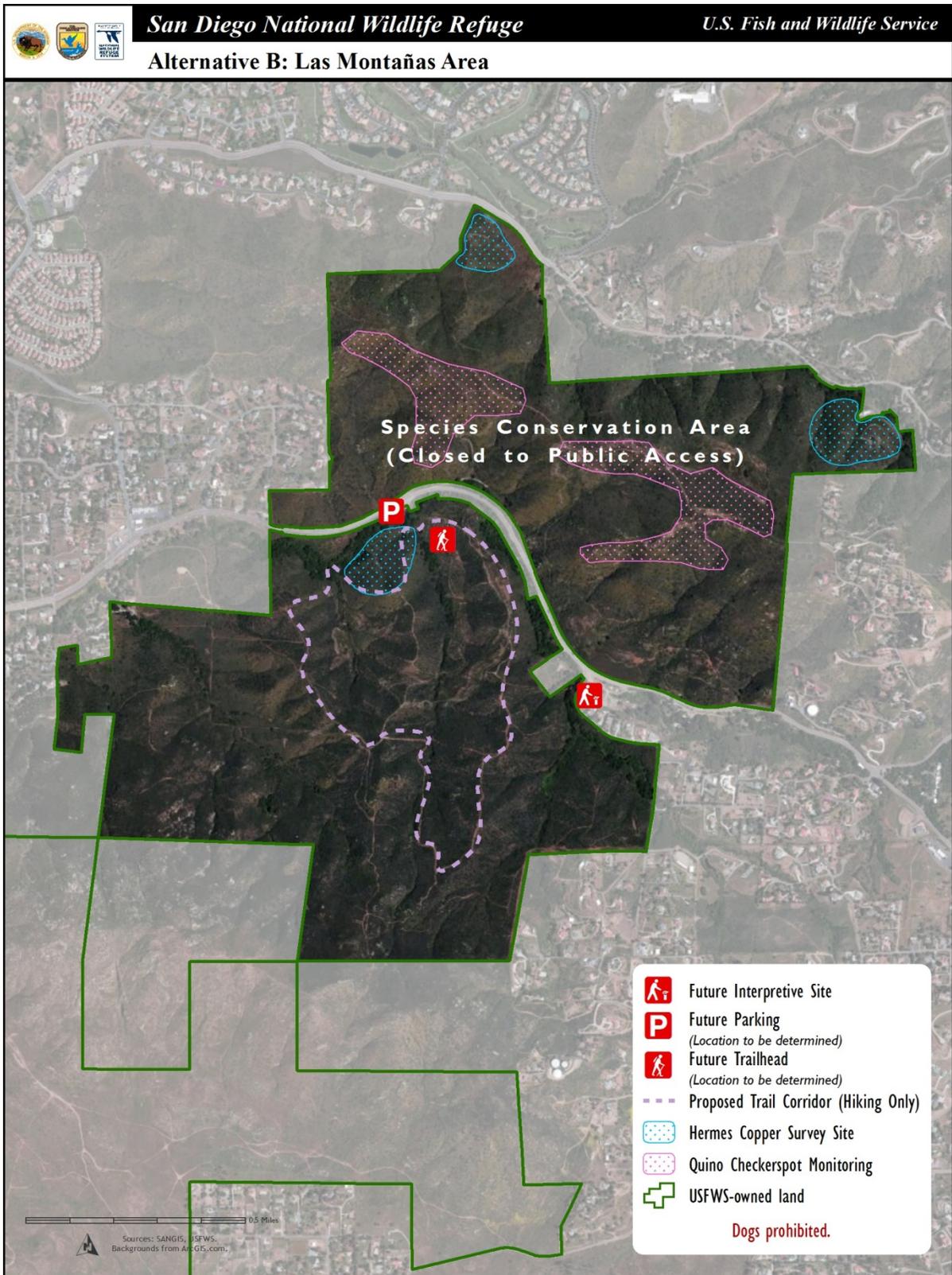


Figure 4-8. Alternative B - Las Montañas Area, Otay Sweetwater Unit

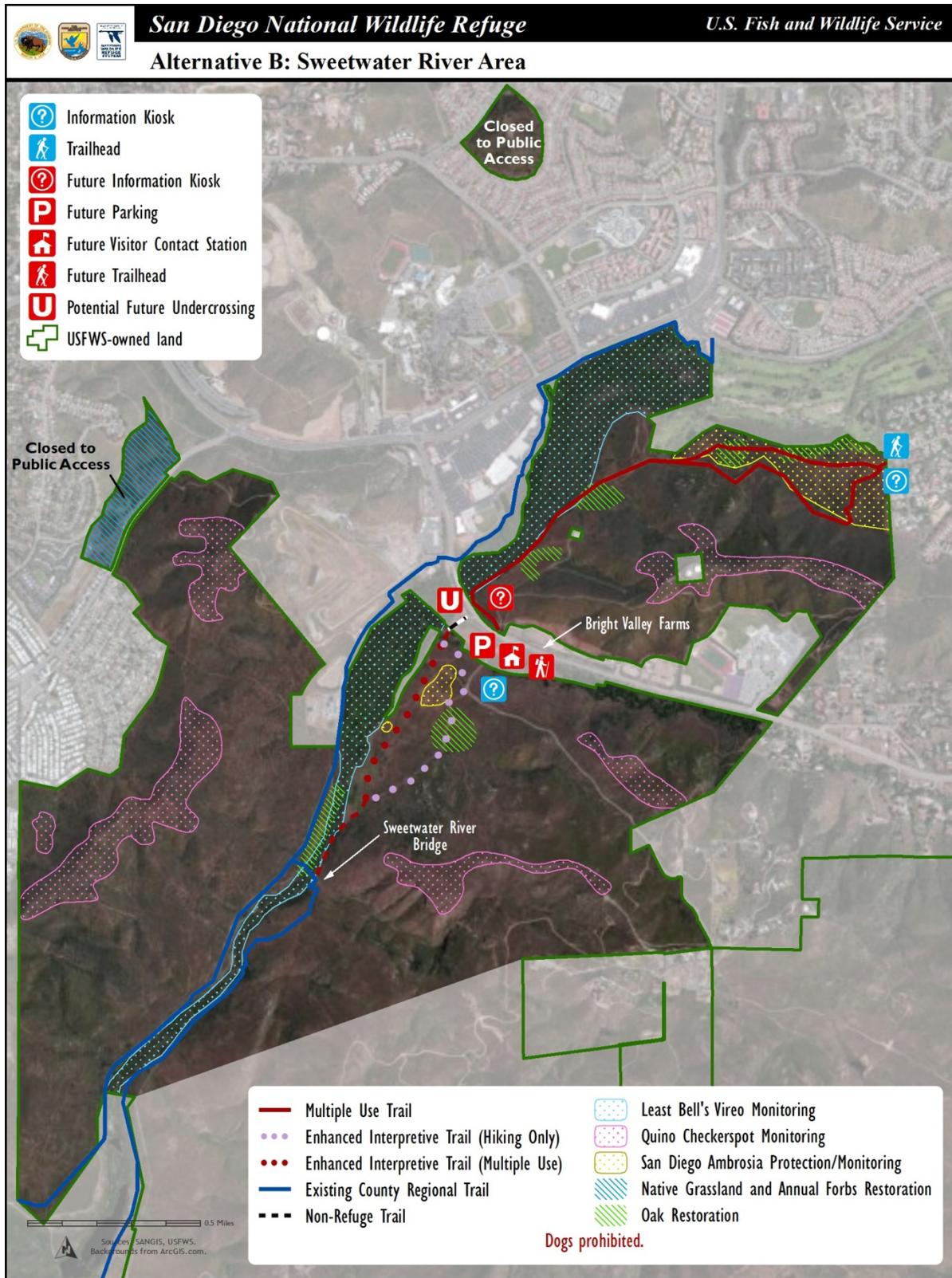


Figure 4-9. Alternative B - Sweetwater River Area, Otay Sweetwater Unit

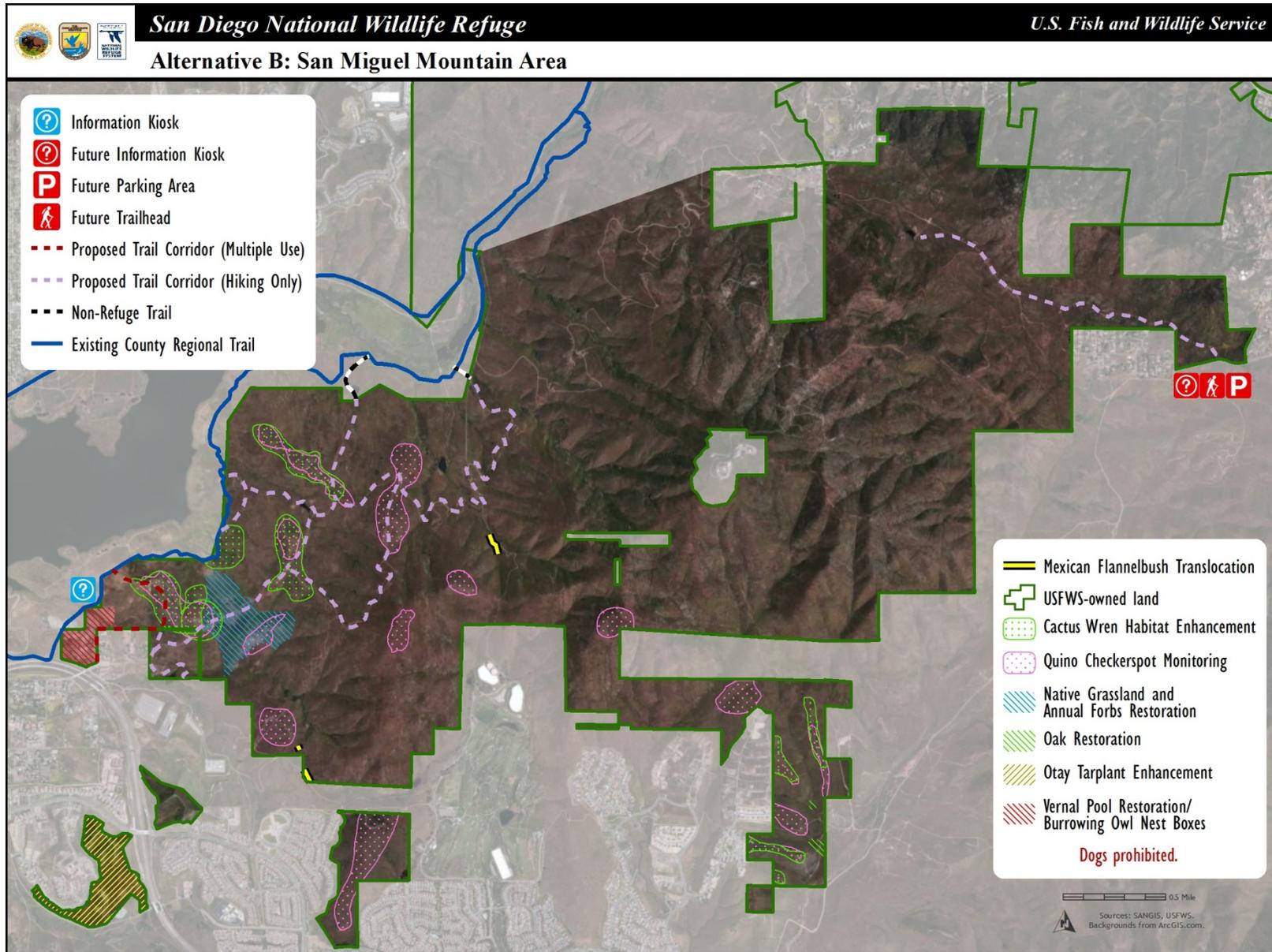


Figure 4-10. Alternative B - San Miguel Mountain Area, Otay Sweetwater Unit



Figure 4-11. Alternative B – Otay Mesa and Lakes Area, Otay Sweetwater Unit

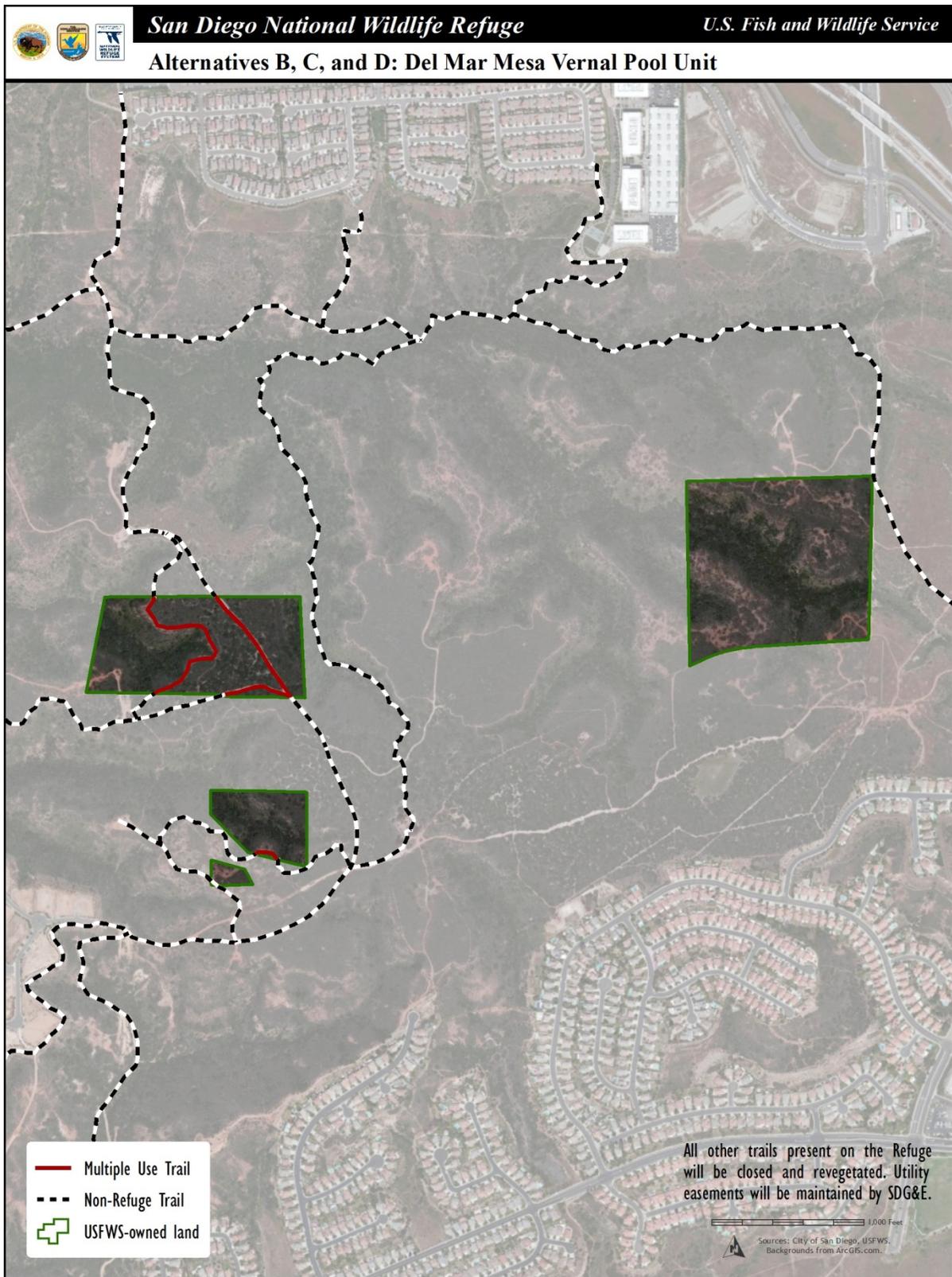


Figure 4-12. Alternatives B, C, and D - Del Mar Mesa Vernal Pool Unit

The MSP presents biological goals and measureable objectives that are intended to facilitate a coordinated effort in implementing management actions. The MSP categorizes and prioritizes species and vegetation communities, identifies geographic locations for management actions, provides specific timelines for implementation, and establishes a process for coordination and implementation. As a living document, the MSP will be revised over time to incorporate new information or to address changes in current conditions (e.g., wildfire). Refuge staff have and will continue to actively participate in the development of this effort, as well as the other regional efforts related to the adaptive management and monitoring of species and habitats within the MSCP preserve areas.

The Del Mar Mesa Vernal Pool Unit requires less active management than does the Otay-Sweetwater Unit due in part to the smaller size of the area, the nature of the habitats present in the area, and the potential for cooperative management opportunities among various agencies. The Service, City of San Diego, County of San Diego, and CDFW all own and manage property on Del Mar Mesa.

In 2001, the City of San Diego, recognizing the need to coordinate the resource management efforts and public uses occurring in this area, initiated the development of a management plan for approximately 980 acres on Del Mar Mesa. This management area is referred to as the Del Mar Mesa Preserve. The City of San Diego, through a cooperative effort with the other agency landowners in the preserve, has produced the draft Carmel Mountain and Del Mar Mesa Preserves Management Plan (City of San Diego 2011), that when approved by the San Diego City Council will provide coordinated management direction for the entire Del Mar Mesa Preserve. Upon approval of the plan, the City of San Diego, County of San Diego, CDFW, and the Service are expected to enter into a Memorandum of Agreement (MOA) that will define by what mechanism the Del Mar Mesa Preserve will be managed.

Although the logistics of day-to-day management responsibility for the lands within the preserve are still being considered, the draft management plan suggests several options for preserve management. These options, outlined in the draft plan, include hiring an individual with biological resource management experience to oversee management activities; hiring a private or non-profit resource management organization to oversee management activities; deferring to the City of San Diego to act as the land manager; or having each landowner agency responsible for implementing the management strategies on their own properties. Under any option, a management committee comprised of representatives from each of the agency landowners would be formed to oversee preserve management.

All of the action alternatives, including Alternative B, propose to implement habitat and species management activities on the Del Mar Mesa Vernal Pool Unit in accordance with an approved Carmel Mountain and Del Mar Mesa Preserves Management Plan. The habitat and wildlife management activities addressed in the draft management plan (City of San Diego 2011) are summarized in Table 4-3. Additional information is presented in the draft management plan, which is incorporated by reference into this document and available for review at <http://www.fws.gov/sandiegorefuges/new/ccp2/ccp2.htm>.

Table 4-3 Species and Habitat Management Actions Proposed for the Del Mar Mesa Vernal Pool Unit per the draft Carmel Mountain and Del Mar Mesa Preserves Management Plan (City of San Diego 2011)¹	
Management Topic	Management Activities
MSCP Species Monitoring and Management	
Monitoring Protocols for Rare Plants	Monitor rare plants in accordance with the current rare plant monitoring protocols, which are based on the findings of a scientific review conducted by the U.S. Geological Survey, Western Ecological Research Center (McEachern et al. 2007) and revised as necessary per the San Diego Rare Plant Monitoring Plan (Tracey et al. 2011).
Del Mar Manzanita	Survey for and map any newly discovered locations of this species; control invasive weeds as necessary to reduce fuel sources near the ground, thereby reducing the effects of fire on seeds and plant crowns; control invasive weeds to improve the potential for expansion of the population beyond the limits of the current population; and implement measures to reduce the potential for trampling.
Orcutt’s Brodiaea	Reduce edge effects along trails and roads through fencing and/or signage, monitor the effectiveness of these measures, and implement additional measures such as enforcement if necessary to protect the species; and implement weed control where necessary to restore habitat quality.
San Diego Button Celery	Reduce edge effects along trails and roads through fencing and/or signage or realign the trail or roads to avoid impacts; monitor the effectiveness of these measures and implement additional measures such as enforcement, if necessary, to protect the species; control invasive species as necessary; and restore and/or enhance vernal pool habitat (e.g., restore the natural hydrology to disturbed pools, remove exotic plants, and reintroduce plant propagules) to support this species as funding becomes available.
Coast Barrel Cactus	Reduce edge effects along trails and roads through fencing and/or signage or realign the trail or roads to avoid impacts; monitor the effectiveness of these measures and implement additional measures such as enforcement, if necessary, to protect the species; and implement aggressive weed control to reduce the effects fire could have on these plants.
San Diego Goldenstar	Reduce edge effects along trails and roads through fencing and/or signage or realign the trail or roads to avoid impacts; monitor the effectiveness of these measures and implement additional measures such as enforcement, if necessary, to protect the species; and implement weed control as necessary.
San Diego Mesa Mint	Reduce edge effects along trails and roads through fencing and/or signage or realign the trail or roads to avoid impacts; monitor the effectiveness of these measures and implement additional measures such as enforcement, if necessary, to protect the species; implement measures to maintain surrounding habitat for native pollinators, and protect and maintain vernal pool watersheds. Restore vernal pool habitat per available funding by restoring the correct hydrology, removing exotic plants, and repopulating the pools with appropriate vernal pool species.

Table 4-3
Species and Habitat Management Actions Proposed for the Del Mar Mesa Vernal Pool Unit
per the draft Carmel Mountain and Del Mar Mesa Preserves Management Plan (City of San Diego 2011)¹

Management Topic	Management Activities
San Diego Fairy Shrimp	Conduct surveys to determine the distribution of this species within the existing vernal pools; restore disturbed vernal pools; close or reroute roads and trails that are directly impacting vernal pool habitat; install fencing and signage around sensitive areas, and routinely patrol these areas to ensure their long-term protection.
Belding's Orange-throated Whiptail	Manage suitable habitat areas and linkages to off-site habitat area in a manner that will ensure good habitat quality (e.g., maintain woodpiles and natural leaf litter to attract native prey species, minimize the potential for edge effects, address issues related to domestic pets and invasive ants).
San Diego Horned Lizard	Maintain suitable habitat areas and linkages to off-site habitat area in a manner that will ensure good habitat quality; maintain native ant species and control Argentine ant populations; protect the species against detrimental edge effects; restore appropriate native habitat to support this species; and avoid the construction of new trails or roads in areas where this species is present.
California Gnatcatcher	Maintain or restore, per available funding, appropriate habitat to support this species; monitor nesting habitat for the presence of brown-headed cowbirds; and protect nesting areas from human and domestic animal disturbance.
Northern Harrier	Maintain appropriate foraging habitat for this species.
Southern California Rufous-crowned Sparrow	Maintain the native herbaceous component within the sparrow's habitat through prescribed burns or manual methods.
Western Bluebird	Protect occupied habitat and nesting areas from human and domestic animal disturbance.
Burrowing Owl	Monitor the preserve to identify occupied habitat areas and determine owl use and nesting success; implement predator control measures as necessary; and establish a 300-foot impact avoidance area around occupied burrows.
Mountain Lion	Monitoring to detect presence.
Southern Mule Deer	Monitoring to detect presence.
Management of Sensitive Species Not Covered by the MSCP	
Plants	For sensitive plant species not covered by the MSCP, minimize the potential for trampling by redirecting activities to less sensitive areas; and reduce impacts related to competition with exotic weeds by implementing a weed management program per available funding.

**Table 4-3
Species and Habitat Management Actions Proposed for the Del Mar Mesa Vernal Pool Unit
per the draft Carmel Mountain and Del Mar Mesa Preserves Management Plan (City of San Diego 2011)¹**

Management Topic	Management Activities
Reptiles and Amphibians	Encourage herpetofaunal monitoring in conjunction with partners to better understand existing species diversity; and redirect recreational activity that could impact sensitive herptiles to less sensitive areas.
Birds	Enhance open foraging areas by implementing a weed control program; confine recreational activity to the designated trail system; and restore coastal sage scrub habitat where appropriate to support Bell’s sage sparrow (<i>Amphispiza belli</i>) and other coastal sage scrub-dependent species.
Mammals	Maintain the integrity of natural open space areas to support the San Diego black-tailed jackrabbit.
Other Management Actions	
Native Species Introduction	Reintroduce native species whose historic range included the project site, provided there is prior consensus among the preserve owners and the agency(ies) with jurisdiction over that species.
Habitat Protection	Restrict activities in native habitat to: natural resource surveys and monitoring; emergency response; and hiking, biking, and equestrian activities on designated trails; and all such activities shall be conducted in a manner that avoids or minimizes impacts to native habitat and species.
Exotic Plant Control and Reestablishment of Native Species	Implement site-specific non-native plant removal strategies, as funding is available. Focus initial efforts on habitat patches that support sensitive species. Following removal of non-native species, reestablish native species by hand seeding or propagation off-site and outplanting.
Native Pollinator Population Enhancement	Provide adequate habitat for pollinator assemblages (e.g., restore and maintain areas of open ground within associated native vegetation to support ground nesting bees and other invertebrates, reintroduce nectar-producing plant species with overlapping flowering periods that extend throughout the Southern California growing season).
Exotic Animal Control	Monitor for impacts related to Argentine ants and non-native mammalian predators, including uncontrolled pets, and implement appropriate controls necessary to protect sensitive species.
Cryptogamic/Microbiotic Crust Enhancement and Restoration	Promote conditions that are appropriate for the growth of cryptogamic/microbiotic crusts in part by eliminating human-related disturbance and increasing soil stability.

¹ As of December 2013, the Carmel Mountain and Del Mar Mesa Preserves Management Plan had not yet been approved by the San Diego City Council and is therefore subject to some revision. The Del Mar Mesa Vernal Pool Unit will be managed in accordance with a final preserve management plan that has been agreed upon by all partner agencies identified in the plan.

Endangered, Threatened, and Sensitive Species Monitoring and Management

Just as described under Alternative A, monitoring and management of listed and sensitive species under Alternative B would require a significant time commitment from Refuge staff. Currently, MSCP covered species are monitored on the Otay-Sweetwater Unit by Refuge staff, other Federal, State, and local agency staff, and/or public and private researchers.

Under this alternative, monitoring efforts would be increased for Risk Group 1 MSCP covered species (Regan et al. 2006). In addition, current survey efforts for San Diego thornmint on the Otay-Sweetwater Unit would be expanded to include any areas that appear to support suitable habitat for this species. Quino checkerspot butterfly surveys would also be expanded to include all habitat with the potential to support this butterfly in order to increase our understanding of the status and distribution of the Quino checkerspot butterfly within the Refuge.

Another action proposed for implementation under this alternative when funding is identified is a comprehensive Refuge-wide (Otay-Sweetwater and Del Mar Mesa Vernal Pool Units) survey to identify, map, and assess existing populations of sensitive plant species and establish baseline species data for the vernal pools present on each Unit.

Under Alternative B, the following species-specific activities would be implemented per available funding on the Otay-Sweetwater Unit:

- Least Bell's Vireo – Evaluate data from ongoing monitoring efforts to identify any adverse population trends. If populations appear to be declining, investigate potential causes and implement those management actions that, if taken, could reverse these trends. Such management actions could include mosquito control to address West Nile virus (which would first require the preparation of a Mosquito Management Plan and accompanying Compatibility Determination), Argentine ant control, nest predator control, cowbird control to reduce nest parasitism, habitat manipulation, and/or permanent or seasonal trail closures or trail relocations to reduce disturbance during the nesting season.
- Burrowing Owl – Install additional nesting boxes in appropriate locations within the San Miguel Mountain area, and conduct annual burrowing owl breeding surveys in appropriate locations to determine where and how many owls are present on the unit during the breeding season. Release rehabilitated or relocated burrowing owls in appropriate habitat on the Refuge as opportunities occur.
- Mexican Flannelbush – Establish additional populations of this species on alluvial benches of low-gradient canyons within the McGinty Mountain area of the Otay-Sweetwater Unit. Implementation of this proposal, which is consistent with the recommendations of the *Fremontodendron mexicanum* (Mexican flannelbush) 5-Year Review: Summary and Evaluation (USFWS 2009c), will be coordinate with Ecological Services and other interested Federal, State, and local agencies.
- San Diego Ambrosia – Continue to support research into herbicides that can effectively control non-native grasses without adversely affecting existing populations of San Diego ambrosia. If such an herbicide is identified, use this product to control non-native grasses in areas that currently support or have the appropriate site and soil characteristics to support San Diego ambrosia and other

sensitive plant species. Also, evaluate the effects of human disturbance (i.e., trampling) on this species, and implement management actions (e.g., trail fencing, trail realignments, signage) to avoid and minimize adverse effects from both on- and off-trail activity.

- Quino Checkerspot Butterfly – Seek funding to implement Quino habitat restoration and/or enhancement projects that will result in improved connectivity within and between known species occurrences. Such enhancement projects could include the control of non-native invasive weeds in those areas that support potential Quino habitat. As part of the annual monitoring efforts for this species, identify and assess potential sites for population augmentation using captive bred Quino checkerspot butterflies.
- Arroyo Toad – Enhance riparian areas along the Sweetwater River by removing exotic plant species and mimicking the natural disturbance regime in an effort to create shallow, sand- or gravel-bottomed sunny pools, suitable for supporting breeding arroyo toads. Concurrently, work with other property owners along the Sweetwater River to improve habitat linkages between appropriate arroyo toad habitat on the Refuge and existing populations of arroyo toads upstream of the Refuge to facilitate the natural recolonization of arroyo toads on the Refuge.
- Townsend’s Big-eared Bat, Western Red Bat, and Other Bat Species – Seek funding to create and install artificial bat roosting habitats that provide conditions suitable for obligate cave-roosting species, and install bat boxes in suitable locations on the Otay-Sweetwater Unit to support other bat species. When closing abandoned mine shafts, include provisions for continued bat access where appropriate.
- Golden Eagle – Protect the areas surrounding the recently installed golden eagle breeding platforms from human disturbance during the nesting season.
- Southwestern Pond Turtle – Work with USGS and other partners to determine if suitable habitat is present on the Refuge in the vicinity of the Sweetwater River and Steele Canyon Creek to establish populations of this species on the Refuge.
- California Red-legged Frog - Working with USGS and/or other partners, initiate actions to re-establish the California red-legged frog on the Refuge, as the Sweetwater River watershed is identified in the Recovery Plan for the California Red-legged Frog as a priority watershed for focused recovery efforts (USFWS 2002c). Re-establishment would involve a multiple step process that begins with the selection of donor populations for translocation and habitat assessment of potential translocation sites. Donor populations would be identified using DNA fingerprinting techniques for up to 30 individuals from each of 16 different populations in the Sierra San Pedro Mártir Mountains of Baja California, where frogs have been tentatively identified as appropriate genetic sources. This strategy is critical to the success of re-establishment efforts, as frogs with similar genetic backgrounds have the highest probability for survival under a given set of environmental conditions. Site assessments would also be performed to identify appropriate translocation sites. One potential site identified on the Refuge is the Mother Miguel pond located in the San Miguel Mountain area of the Otay-Sweetwater Unit.

- Coast Live Oak – Periodically monitor oak stands for signs of goldspotted oak borer infestation and/or the presence of *Phytophthora ramorum*, an introduced plant pathogen responsible for sudden oak death.

Activities related to the protection and recovery of vernal pool species on the Otay-Sweetwater Unit are addressed in subsequent text under Habitat Restoration and Enhancement Activities.

Under Alternative B, the species-specific activities to be implemented per available funding on the Del Mar Mesa Vernal Pool Unit are described in Table 4-3. A proposal to seek funding to survey and map sensitive species on the Del Mar Mesa Vernal Pool Unit in an effort to establish a baseline for future monitoring and management efforts is also included in Alternative B.

Avian Monitoring on the Otay-Sweetwater Unit

The establishment of Monitoring Avian Productivity and Survivorship (MAPS) stations on the Otay-Sweetwater Unit would provide monitoring data for listed and sensitive species, as well as other bird species present within this area. Under Alternative B, the Refuge would seek partners to develop two MAPS stations in this area—one located in oak woodland and the other within chaparral or coastal sage scrub habitat. MAPS stations are designated bird banding stations operated by Federal and State agencies, private organizations, and individual bird banders. The MAPS program, which is coordinated through the Institute for Bird Populations (IBP), uses a standardized protocol of constant-effort mist netting at over 500 stations. MAPS has proven to be a valuable tool for providing critical information relating to the ecology, conservation, and management of North American landbird populations and the factors responsible for changes in their populations.

The establishment of MAPS stations on the San Diego NWR was recommended by the Institute of Bird Populations (DeSante et al. 2004) in a study that looked at the current status and future direction of MAPS Stations on national wildlife refuges in Washington, Oregon, California, Nevada, and Idaho. This study was conducted to enhance the usefulness of MAPS data through thoughtful selection of target species and the siting of stations on refuges that include habitats of special concern, are located in an area that would fill a gap in the existing MAPS data, and support substantial numbers of individuals of the selected target species. The study concluded that new MAPS stations in several locations throughout the region would benefit the program, including stations on the San Diego NWR, particularly in oak woodland and chaparral habitats (DeSante et al. 2004).

Habitat Restoration/Enhancement Activities

In addition to the habitat restoration and enhancement projects described in Alternative A, Alternative B proposes the following additional projects that would be implemented on the Otay-Sweetwater Unit over the life of the CCP per available funding:

- Vernal Pool Habitat – Design and seek funding to implement proposals for restoring or enhancing vernal pools habitat where appropriate site conditions (e.g., soils, topography) are present. Also seek funding to restore native upland habitat, including coast barrel cactus and native bulb plants, around restored vernal pools on the Shinohara site, including controlling non-native weed species.

- Coastal Sage Scrub Habitat – Improve habitat quality in coastal sage scrub habitat through a variety of efforts, including controlling non-native weed species and revegetating weeded areas with a combination of appropriate native shrub species, sensitive native geophytes, and herbaceous flowering plants. In addition, per available funding, restore coastal sage scrub habitat on sites where conditions indicate this habitat type occurred in the past. Working with other partners, support the region-wide effort to develop and implement methods to reduce the percent coverage of exotic invasive species in coastal sage scrub habitat, and continue to support MSCP preserve-wide monitoring of coastal sage scrub habitat quality.

In coastal sage scrub habitat where cactus species are present, manage these areas to maintain healthy stands of cactus to support cactus wrens. Reduce the effects of fire on these habitat areas by removing non-native vegetation such as annual grasses and mustard. Control tree tobacco (*Nicotiana glauca*) and other shrubs to reduce “predator ladders” in cactus wren nesting habitat.

- Riparian Habitat – As part of a step-down habitat management plan, identify locations within the Sweetwater River corridor where riparian habitat has been lost or degraded, and restore or enhance those areas to support a range native plant and wildlife species. As part of this step-down planning effort, identify portions of the riparian habitat within the McGinty Mountain and Sweetwater River management areas where habitat could be managed to mimic the natural disturbance regime observed in unaltered riparian corridors. These actions would be taken to support listed and sensitive species such as the least Bell’s vireo, southwestern pond turtle, and arroyo toad.
- Isolated Wetlands – Maintain and enhance native habitat around the Refuge’s various impoundments, particularly in the San Miguel Mountain management area, to improve habitat quality for a range of wildlife, including the tricolored blackbird (*Agelaius tricolor*), which does not regularly breed on the Refuge.
- Native Grasslands – Reestablish native grassland habitat, including a suite of appropriate annual and perennial forbs, in areas with suitable clay soils such as on the Jamacha parcel and on the gentle lower western slopes in the San Miguel Mountain area.
- Cryptobiotic Crust – Encourage research related to the restoration of cryptobiotic crust, and seek funding to implement restoration in select areas of the Refuge.
- Tree Planting – Expand the Refuge’s current oak planting project to other areas of the Refuge and include the planting of a variety of appropriate tree species, including coast live and Engelmann oak, California sycamore, and Southern California black walnut.
- Invasive Species Rapid Response Program – Develop a program to assist in the identification of new invasive plant species on the Refuge in an effort to ensure quick control of these new species before they become a significant problem. This program could involve a collaborative effort with other landowners to implement a regional invasive species strategic plan and/or a combination of research, interagency coordination, public outreach, citizen science, and rapid response in

the form of mechanical and/or chemical control. Under the latter program, Refuge staff would keep apprised of those plant species that have been identified as having significant potential for invading Refuge habitats, such as perennial pepperweed and Wards weed (*Carrichtera annua*). Pictures of problem plant species could be posted on the Refuge webpage and/or at trail kiosks with information provided for how to contact and provide information to Refuge staff about an observation of one of these species on the Refuge. Potential partnerships with Calflora and the Southern California Weeds Observation Hotline could benefit this program. Researchers and monitors would also be encouraged to record the location of any problem species. Potential infestation sites would be investigated, and new invasive plants would be promptly controlled to avoid further distribution on the Refuge. As a start to such an invasive plant detection and treatment program, the Refuge is establishing a partnership with Friends of San Diego Wildlife Refuges and Earth Discovery Institute to develop a volunteer “weed team” to map and treat weeds, and evaluate treatment effectiveness in the Par Four Trail area.

- Nest Boxes – Install nest boxes in appropriate locations on the Otay-Sweetwater Unit to provide additional nesting opportunities for secondary cavity-nesting birds such as western screech owl (*Otus kennicottii*), American kestrel (*Falco sparverius*), and western bluebird.
- Invertebrates – Obtain needed data regarding the diversity and abundance of terrestrial invertebrates present on the Refuge, including both native species and invasive species by designing and implementing an inventory and sampling plan for terrestrial invertebrates present in chaparral vegetation on the Otay-Sweetwater Unit, when adequate funding is identified.

Within the Del Mar Mesa Vernal Pool Unit, proposed actions related to restoration and enhancement include restoration of habitats to support sensitive bird species; control of invasive, non-native plant species; enhancement of habitat to support native pollinators; and restoration and enhancement of cryptobiotic crust (refer to Table 4-3).

Another habitat restoration effort that would be implemented on both units of the Refuge, per available funding, is the conversion of unnecessary roads and trails to appropriate habitat by restoring the natural contours of the site and establishing a mix of appropriate native species. The habitats to be restored will be determined based on such factors as adjacent native vegetation, soil type, slope aspect, and site hydrology.

Habitat and Wildlife Protection

The management actions described in Alternative A to protect habitat and wildlife would also be implemented under Alternative B. In addition, this alternative includes a number of new actions that would be implemented to protect Refuge resources. Actions proposed for implementation on the Otay-Sweetwater Unit include:

- Evaluating the existing network of trails and pathways to determine how best to accommodate opportunities for public access while protecting the range of listed and sensitive species and habitats supported on this Unit (discussed in greater detail under Public Use);
- Prohibiting dogs on the Otay-Sweetwater Unit;

- Installing fencing and gates behind the commercial development at Jamacha Road and Willow Glen Drive to reduce disturbance to riparian habitat from homeless activity and other unauthorized access;
- Working with adjacent landowners to keep goats and cattle from entering Refuge lands;
- Impounding domestic animals, such as goats and cattle, that are found on Refuge land and disposing of them in accordance with 50 CFR 28.42, which addresses notification procedures, public sale of unclaimed animals, expenses to owners for capture, impoundment, advertising, care, forage, and potential damage claims, when redeeming an animal;
- Coordinating with other agencies to determine the status of wild turkey and feral pig populations in the vicinity and, when necessary, conducting annual surveys of the Otay-Sweetwater Unit to identify signs of the presence of these species on the Refuge;
- Initiating actions necessary to permit the control of feral pigs and wild turkeys on the Refuge if and when their presence is confirmed on the Refuge;
- Implementing a program to control non-native predators, including dogs and cats, when site monitoring indicates that such action is necessary to protect ground and shrub nesting birds, lizards, and other sensitive species from excessive predation;
- Installing signs and/or fencing around intact areas of cryptobiotic crust to minimize the potential for damage due to trampling;
- Completing the mapping of vegetation types on recently-acquired lands on the Otay-Sweetwater Unit and documenting the current status of non-native and pest plant species on these parcels;
- Reducing the potential effects of wildland fire on highly sensitive habitat areas, such as large concentrations of mature cactus and areas known to support host plants for the Quino checkerspot butterfly, by focusing invasive plant species control in these areas, as well as providing fuel breaks and thinning existing vegetation in strategic locations; and,
- Expanding invasive plant control to include mechanical and chemical control of invasive plants along trails, roads, and within other disturbed areas.

The control of non-native predators such as dogs and cats would be implemented on a case-by-case basis per available funding. The following guidelines would be followed in controlling non-native predators:

- Trapping of non-native predators would be limited to strategic locations where determined feasible to protect ground and shrub-nesting birds, lizards, and other sensitive species from excessive predation;
- Actions to control non-native predators would be implemented on a temporary, short-term basis and would only be implemented when potential for take or harm to listed or sensitive species has been identified;
- All control methods would be humane, providing adequate shade and water for any trapped animal;
- Traps set out overnight would be checked within two hours of sunrise, and traps left out during daylight hours would be monitored regularly and checked a minimum of four times per day;
- Prior to implementing trapping in a particular area, signs at trail access points would be posted to notify adjacent residents of the proposed activity and to provide information on where trapped animals can be retrieved;

- Domestic animals inadvertently trapped would be taken to an approved shelter facility operated by a cooperating local unit of government, humane society, or veterinary care facility;
- A public outreach campaign would be initiated to inform the public of the importance of controlling pets and the need for predator control on the Refuge to protect sensitive species; and
- In accordance with 50 CFR 28.43, dogs and cats running at large on the Refuge and observed by an authorized official in the act of killing, injuring, harassing, or molesting humans or wildlife may be disposed of in the interest of public safety and protection of wildlife.

Habitat and wildlife protection on the Del Mar Mesa Vernal Pool Unit would be implemented consistent with the approved Carmel Mountain and Del Mar Mesa Preserves Management Plan.

Integrated Pest Management

Under Alternative B, an integrated pest management (IPM) approach would be utilized to eradicate, control, or contain a variety of plant, animal, and insect pests on the Refuge. To the extent practicable, pest management on the Refuge would be coordinated with adjacent landowners, as well as upstream and downstream landowners, to ensure effective control of invasive wetland plants and aquatic animal species, particularly those that occur within the Sweetwater watershed.

In accordance with 517 DM 1 and 569 FW 1, the IPM approach would use control methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to non-target species and the Refuge environment. Control of pest species is necessary when these pests are resulting in environmental harm. Environmental harm by pest species refers to a biologically substantial decrease in environmental quality as indicated by a variety of potential factors, including declines in native species populations or communities, degraded habitat quality or long-term habitat loss, and/or altered ecological processes. Environmental harm may be a result of direct effects of pests on native species, including preying and feeding on them; causing or vectoring diseases; preventing them from reproducing or killing their young; outcompeting them for food, nutrients, light, water, nest sites, or other vital resources; or hybridizing with them so frequently that within a few generations, few if any truly native individuals remain. Environmental harm also can be the result of an indirect effect of pest species. For example, decreases in native pollinator diversity and abundance may result from invasive plant infestations that reduce the availability and/or abundance of native upland plants that support native pollinator species.

Environmental harm may also involve detrimental changes in ecological processes. For example, invasive non-native plant species can outcompete and ultimately replace native species of forbs and shrubs, altering the function of the historic plant community. Environmental harm may also cause or be associated with economic losses and damage to human, plant, and animal health; such as invasions by fire-promoting non-native grasses that alter entire plant communities, increasing fire frequency and intensity, which in turn increases firefighting costs and threats to adjacent development.

The details of the IPM Plan proposed for implementation on the San Diego NWR are provided in Appendix D. One or more methods may be employed to meet the objectives of

the IPM Plan, including cultural, physical/mechanical, biological, and/or chemical control. These methods are summarized here and presented in detail in Appendix D.

Cultural control can involve the management and manipulation of competitive interactions so that weeds are placed at a disadvantage. This type of cultural control includes a broad range of normal management practices that can be modified or manipulated to manage one or more pest problems, either by minimizing the conditions those pests need to live (e.g., water, shelter, food), or minimizing opportunities for introduction. Cultural control can also mean modifying human behavior or activities in an effort to avoid invasive seed transport and the improper disposal of non-native and pest plant debris. To this end, cultural control, as discussed here, consists of awareness of the ways seeds are transported, disposal of non-native and pest plant debris, and public and staff education.

Physical control involves the removal; destruction; disruption of growth; interference with pest reproduction using treatments that can be accomplished by hand, hand tools (manual), or power tools (mechanical); and the physical removal of plants by pulling, grubbing, digging out root systems, cutting plants at the ground level, and removing individual competing plants around desired species. Other methods may include “topping” annual weeds prior to seed set, placing mulch around desired vegetation to limit competitive growth, tilling/disking, cutting, swathing, grinding, sheering, girdling, mowing, or mulching of the pest plants. Other types of physical control could include solarization, prescribed fire, and the use of flamers, where permitted.

Classical biological control involves the deliberate introduction and management of natural enemies (e.g., parasites, predators, or pathogens) to reduce pest populations. The Service strongly supports the development of and the legal and responsible use of appropriate, safe, and effective biological control agents for nuisance and non-indigenous or pest species. To date, the intentional use of biological control agents has not been implemented on the San Diego NWR.

Under the IPM, pesticides may be used where physical, cultural, and biological methods or combinations thereof are impractical or incapable of providing adequate control, eradication, or containment. If a determination is made that the most appropriate control for a particular pest or group of pests on the Refuge is the use of a pesticide, the most specific (selective) chemical available for the target species (or multiple species) would be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. In accordance with 517 DM 1, pesticide usage would be further restricted because only pesticides registered with the U.S. Environmental Protection Agency (USEPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and as provided in regulations, orders, or permits issued by USEPA may be applied on lands and waters under Refuge jurisdiction.

Throughout the life of the CCP, pesticides proposed for use on the Refuge would be evaluated by the IPM Regional Coordinator for potential effects to Refuge biological resources and environmental quality; the results of this evaluation, including the potential effects of each product, would be documented in “Chemical Profiles.” The product would also require approval through the PUPS process, which is described under Alternative A.

When a proposal is submitted requesting approval for the use of any new products on the Refuge, chemical profiles will be prepared for those products; it is based on the information provided by those chemical profiles that a decision to approve or disapprove a

product will be made. Only those pesticides that are likely to result in only minor, temporary, and/or localized effects to species and environmental quality based upon non-exceedance of threshold values in Chemical Profiles would be approved for use on the Refuge. In all cases, best management practices would be implemented during the handling and application of pesticides, and, in some cases, non-exceedance of threshold values may be achieved through the implementation of additional BMPs that further define how, when, where, and to what extent a specific pesticide may be applied.

Chemical profiles, provided in Attachment B of Appendix D, have already been completed for those pesticides currently being used or being considered for use on the Refuge. These pesticides are presented in Table 4-4, along with information regarding the pests to be targeted and the areas in which they may be applied.

When addressing the use of herbicide, it is also important to consider the method of application to be used. The application method chosen depends upon:

- treatment objective (removal or reduction);
- accessibility, topography, and size of the treatment area; characteristics of the target species and the desired vegetation;
- location of sensitive areas and potential environmental impacts in the immediate vicinity; anticipated costs and equipment limitations; and
- meteorological and vegetative conditions of the treatment area at the time of treatment.

Herbicides can be applied with manual application devices or from vehicles such as all-terrain vehicles with a boom sprayer attachment. Manual applications of herbicides are used only in small areas, in areas inaccessible by vehicle, and/or to minimize potential impacts to non-target plants. Herbicides may be applied to green leaves with a backpack applicator or spray bottle, wick or gloves (wiped on), or wand (sprayed on). Herbicides can be applied to trees around the circumference of the trunk on the intact bark (basal bark), to cuts in the trunk or stem (frill, or “hack and squirt”), to cut stems and stumps (cut stump), injected into the inner bark, or to the soil before the target species’ seeds germinate and emerge (Tu et al. 2001).

There are several drawbacks and limitations to herbicide use. Herbicides have the potential to injure or kill non-target plants even when the herbicide is not applied directly to the plant, through drift, runoff, and possibly through root leakage. The herbicides considered for use on the San Diego NWR are regarded as posing relatively low risk for use in natural areas because they are not likely to contaminate groundwater if used properly and are of low toxicity to animals (Tu et al. 2001).

Restricted use herbicides must be applied by someone with a California Restricted Use License or by a person under their direct supervision. Federal law states all herbicides must be applied according to the label. Herbicide treatments on the Refuge would be combined with other control methods and could use any of the application methods listed here, depending on the situation. All applications would be conducted in accordance with the specifications described in the chemical profile and/or PUPS approval and would adhere to any special BMPs listed in the chemical profile.

**Table 4-4
Pesticides Proposed for Use on the San Diego NWR under Alternative B**

Active Ingredient	Common Product Names	Selective/Non-Selective	General Mode of Action	Target Pests	Potential Treatment Areas
Glyphosate (formulated as a water-soluble liquid containing surfactant)	Prosecutor RoundUp Pro	Broad-spectrum, non-selective, systemic herbicide (post emergent)	Prevents the production of several essential amino acids essential to growth	Non-native, invasive weeds/grasses	Upland habitats where invasive grasses and forbs are affecting listed and sensitive plants
Glyphosate (formulated as a water-soluble liquid for mixing with water or nonionic surfactant)	Rodeo, Aquamaster	Non-selective aquatic herbicide (post-emergent)	Prevents the production of several essential amino acids essential to growth	Emerged, non-native aquatic weeds and shrubs in aquatic areas	Sweetwater River floodplain, around man-made ponds
Fluazifop-P-butyl	Fusilade DX Fusilade II	Selective, systemic herbicide that targets grasses (post-emergent)	Stops meristematic activity by inhibiting the synthesis of lipids, which are essential to the new cell production	Non-native annual and perennial grasses	Upland habitats where invasive grasses are affecting listed and sensitive plants
Oryzalin	Surflan AS	Selective, annual grasses, broadleaf weeds, woody shrubs and vines (pre-emergent surface-applied herbicide)	Inhibits the growth of germinating weed seeds	Non-native, invasive broadleaf weeds and grasses (control or suppression depending upon the species)	Upland burn areas and other areas impacted by invasive grasses and annual weeds
Clethodim	Envoy Plus	Selective cyclohexenone herbicide used to control annual and perennial grasses (post emergent)	Lipid inhibitor damages the integrity of cell membranes and inhibits new plant growth	Annual Fescue (Vulpia myuros)	Upland burn areas and other areas impacted by invasive grasses and annual weeds

**Table 4-4
Pesticides Proposed for Use on the San Diego NWR under Alternative B**

Active Ingredient	Common Product Names	Selective/Non-Selective	General Mode of Action	Target Pests	Potential Treatment Areas
Chlorsulfuron	Telar XP	Selective, systemic herbicide that targets broadleaf weeds and undesirable grasses (pre-emergent or early post-emergent)	Acetolactate synthesis inhibitor that stops cell division in plant roots and shoots, causing plants to stop growing	Non-native, invasive onion weed	Upland habitats where onion weed is affecting listed and sensitive plants
Triclopyr, butoxyethyl ester with surfactants	Garlon 4 Ultra	Selective, systemic herbicide that targets woody and herbaceous broadleaf plants (little or no impact to grasses)	Mimics the plant growth hormone auxin, causing uncontrolled and disorganized plant growth and ultimately plant death	Invasive, woody vegetation (salt cedar, eucalyptus, ailanthus); primarily for cut-stump or drill applications	Upland areas infested with non-native woody species
Triclopyr, butoxyethyl ester	Pathfinder II	Selective, systemic herbicide that targets woody and herbaceous broadleaf plants (little or no impact to grasses)	Mimics the plant growth hormone auxin, causing uncontrolled and disorganized plant growth and ultimately plant death	Invasive, woody vegetation (salt cedar, eucalyptus, fennel)	Upland and wetland areas infested with non-native woody species

Due to differences in species tolerance and the variety of habitats within the Refuge, the ability to use a number of different herbicides is necessary in order to choose the one that is most effective for a particular species in a particular environment. The potential for weeds to develop a resistance to a particular herbicide over time is another reason for developing a variety of herbicide options, as rotating herbicides with different biochemical pathways (from different herbicide groups) can help delay the development of herbicide resistance.

Compounds referred to as adjuvants are often added to an herbicide formulation or tank mix to facilitate the mixing, application, or effectiveness of that herbicide. Spray adjuvants often improve spray retention and absorption by reducing the surface tension of the spray solution, allowing the spray droplet to spread more evenly over the leaf surface. Herbicide absorption may be further enhanced by interacting with the waxy cuticle on the leaf surface. They are sometimes included in the formulations of herbicides (e.g., RoundUp®), or they may be purchased separately and added into a tank mix prior to use (Tu et al. 2001).

Adjuvants are chemically and biologically active (not chemically inert) compounds. Some adjuvants have the potential to be mobile and pollute water. The Material Safety Data Sheet (MSDS) for an adjuvant and the herbicide label (if the adjuvant is included in the formulation) should be checked for conditions in which the adjuvant should not be used.

The extent of invasive plants known to occur on the Refuge necessarily requires some prioritization both with respect to control, but also with respect to monitoring. In 2012, management priorities for invasive, non-native plants were outlined in a strategic plan for San Diego County prepared for SANDAG by the Conservation Biology Institute (CBI), Dendra, Inc., and Cal IPC (CBI et al. 2012). This strategic plan for managing invasive plants prioritizes on-the-ground projects based on invasive plant impacts along with considerations for regional management goals, feasibility of successful implementation, and the needs of narrow endemic species covered by NCCP programs. A total of 29 species were identified as priorities for near-term management and monitoring in this regional strategic plan (CBI et al. 2012). The strategic plan's recommendations, along with data gathered on the Refuge as part of the implementation of a national strategy for management of invasive species in 2011, will be used to identify priority species in need of control, as well as to develop monitoring and inventory priorities for various areas on the Refuge.

In addition to invasive, non-native plant control, the IPM Plan for the San Diego NWR also addresses the control of non-native aquatic pests. A variety of non-native aquatic and semi-aquatic organisms present on the Refuge have the potential to impact future proposals to reintroduce listed species that historically occurred along portions of the Sweetwater River and Steele Canyon Creek. These non-native species include largemouth bass, green sunfish, carp, bullfrogs, African clawed frogs, red swamp crayfish, North American crayfish, and red-eared sliders.

Although a variety of control methods are described in the IPM Plan (Appendix D) for controlling non-native aquatic species, the most common method is trapping using nets, traps, and spears. In the case of non-native fish, frogs, and crayfish, once these organisms are trapped, they would be euthanized and disposed of in an appropriate manner. Non-native turtles that are trapped would, if deemed in good health, be placed with the San Diego Turtle and Tortoise Society or comparable organization that has an established

adoption program that adopts turtles to people who have demonstrated a commitment to their long-term care. Regular monitoring on Refuge lands is essential to detecting new non-native species and preventing their spread.

Another important aspect of managing aquatic invasive species is education and public outreach. The hazards (e.g., serious illness, starvation, death by predation) to an unwanted pet and the impacts to the native wildlife of releasing a pet “back into the wild” could be described in a brochure or on an information bulletin at a trailhead kiosk. Explaining to the public that their pet does not naturally occur in the habitats found on the Refuge is particularly important because all of the exotic animals that currently or potentially present problems for Refuge wildlife have been introduced intentionally.

It is unlikely that adequate funding and staff would be available to control the numbers of exotic aquatic animal species on the Refuge; therefore, the IPM Plan proposes to rank target species by the extent of the species ecological impact, current distribution and abundance, trend in distribution and abundance (e.g., rapidly increasing numbers), and difficulty of management. Impacts that are considered in this ranking include the threat to endemic and listed species, the threat to ecosystems that support listed species (e.g., reduced aquatic productivity), the threat to previous habitat restoration projects (i.e., the continued success of previous projects), and the level of effort needed to eradicate or contain the invasive species. The species that rank highest should receive the highest management priority; however, new infestations of non-native, invasive species should take precedence, as early action provides the greatest opportunity to contain and, ideally, eradicate the new species.

An essential element of the IPM Plan is monitoring the results of all activities implemented under the IPM Plan. Ongoing monitoring of invasive species’ response to IPM treatment is critical in order to evaluate the effectiveness of different treatment methods and to apply adaptive management practices when deemed necessary.

General Site Management

General site management would include the actions described in Alternative A, as well as the following:

Water Monitoring – Seek funding to conduct periodic monitoring of surface and groundwater quality on the Otay-Sweetwater Unit and annual monitoring of groundwater levels within riparian and oak woodland areas of the unit.

B. Public Use

Public Access

Under Alternative B, specific areas of the Refuge, primarily the designated trail system, would be officially opened to public use. Any off-trail use would be limited to supervised environmental education and interpretive programs and research projects conducted in accordance with a Refuge Special Use Permit. Large areas of the Refuge would remain closed to the public to protect listed and sensitive species and other natural resources.

No dogs or other pets would be permitted within the Otay-Sweetwater Unit under Alternative B. The regulations regarding dogs and other pets on the Del Mar Mesa Vernal Pool Unit will be consistent with the regulations included in the approved management plan for the larger Del Mar Mesa Preserve.

On the Otay-Sweetwater Unit, official access points onto the Refuge would be established as trailheads and would be indicated on future trail maps. All public use activities would be limited to the officially designated trail system, which would include some multiple trail use and some pedestrian-only trail use. To prevent impacts to adjacent private lands, as well as to sensitive resources, no access onto Refuge lands would be permitted from any areas other than officially designated access points. Unauthorized access points would be officially closed, posted, and, if necessary, fenced with those trails leading onto the Refuge from unauthorized access points restored to native habitat.

Because the majority of lands included within the Refuge boundary are landlocked with no direct access to the public right-of-way or other public lands, the number of access points onto the Refuge is limited. Official access points onto the Refuge under Alternative B are described here (note that some of these are existing, as described under Alternative A and shown in blue on Figures 4-7 and 4-9).

- **McGinty Mountain Area** – An existing 17-space parking lot and trail staging area, maintained by the Refuge, is located off Jamul Drive approximately one-half mile west of Lyons Valley Road. This parking area provides access to a trail that extends through a portion of the Refuge, then onto other properties with trail easements, and finally back onto the Refuge (refer to Figure 4-7). Under this alternative, the Refuge would establish a designated trail through the McGinty Mountain area that could be accessed from this existing parking lot.

Public access to the McGinty Mountain area is also available south of Model A Ford Lane at Sloane Canyon Road near the northeastern portion of the Refuge. There is currently no established parking area at this location, and parking sites along the side of the roadway are extremely limited. Alternative B includes a proposal to seek funding to construct a four- to six-car parking area and trailhead on the Refuge at this location. The design and layout of this parking area would be determined as part of future step-down planning.

Access onto this portion of the Refuge from any other location is prohibited because such access would require traveling through privately owned property and/or tribal, State, or locally owned property that is not currently open to public use. The portion of this management area located to the north of Dehesa Road would remain closed to all public access.

- **Las Montañas Area** – No facilities to support parking or trail staging are currently available for the Las Montañas area. Under Alternative B, funding would be sought to create an authorized access point onto the southern portion of the Las Montañas area. The proposal includes the design and construction of a small parking lot and trail staging area, which will likely be sited along the south side of Highway 94, although a location off Vista Sage Lane onto Refuge land might also be explored. The specific details related to the location, size, site layout and design, and ingress and egress requirements as they relate to Highway 94 would be determined as part of a step-down trail plan. Public comment would be sought, and compliance under NEPA would be required as part of the step-down planning process. Additionally, any requirements for site-specific studies (e.g., County of San Diego traffic study) or necessary permits (e.g., Caltrans encroachment permit) would be complied with before construction of a parking and trail staging area could be implemented. All existing trails in the south portion of this management

area that can only be accessed via private property would be closed and revegetated.

No public access is permitted in the northern portion of the Las Montañas area; this area would remain officially closed to public access under this alternative.

- Sweetwater River Area – Under Alternative B, official access to this area would be provided via:
 - the county-maintained parking area at the old steel bridge off Highway 94;
 - Bright Valley Farms (per agreements made with the County of San Diego when the Refuge was established);
 - a trail along the north side of Highway 94, although no public parking is available at this location;
 - Par Four Drive, where only on-street parking is available; and
 - the County’s Sweetwater Loop and River Trail, which is served by a parking and trail staging area within the Sweetwater Regional Park Summit Site.

In addition, funds would be sought to design and construct visitor services facilities along the south side of Highway 94 near Millar Ranch Road to improve public access onto the Refuge. These facilities, including a parking lot with some pull-through parking spaces to accommodate equestrian trailers, a temporary visitor contact station, restrooms, shade structure, and information kiosk. It is anticipated that these facilities would be constructed on a 2.4-acre parcel to be donated to the Refuge by Caltrans in the near future. These facilities would support the interpretive and environmental education programs proposed under this alternative, as well as existing and future trail users. Specific details related to the location, size, site layout and design, and ingress and egress requirements as they relate to Highway 94 would be determined as part of a step-down trail plan. Public comment would be sought, and compliance under NEPA would be required as part of the step-down planning process. Additionally, requirements for site-specific studies (e.g., traffic study) and/or necessary permits (e.g., Caltrans encroachment permit) would be complied with before construction of a parking/trail staging area could be implemented.

The Jamacha parcel, located to the east of Jamacha Boulevard, would remain closed to public access to protect sensitive species and support ongoing restoration efforts. No access onto the Refuge from Jamacha Boulevard, Trace Road, and Doubletree Road would be permitted under this alternative.

San Miguel Mountain Area – As of 2013, the only official access point to this area is via the Sweetwater Loop and River Trail. Alternative B includes a proposal to seek funding to establish an access point and trail staging area (e.g., parking area, trailhead) on Refuge land in the Hidden Valley area off Proctor Valley Road. Specific details related to the location, size, and layout and design of the parking lot would be determined as part of a step-down trail plan. Public comment would be sought, and compliance under NEPA would be required.

Also, as part of the development of the step-down trail plan, the unofficial access points coming from the south and east of the San Miguel Mountain area would be evaluated to determine if these access points can be retained or should be closed. The decision of whether one or more of these routes should be closed or officially opened would be based on current property ownership in the area, as well as the potential effects of current and future public use on Refuge resources in the area. If these routes require access through private property, they can only be authorized if trail easements can be obtained from the underlying landowner.

- Otay Mesa and Lakes Area – The Refuge lands in this area would remain closed to all public access.

Wildlife-dependent Recreational Uses

Hunting. The Refuge would remain closed to hunting under this alternative.

Fishing. Although the Refuge includes approximately 5.7 miles of the Sweetwater River, opportunities for fishing are limited by both minimal water depths along much of the River and the lack of the presence of native fish populations within this watershed. There are some deeper pools located along the river course that support non-native fish; however, this alternative also proposes to eradicate non-native fish from the Refuge in an effort to support the reestablishment of populations of southwestern pond turtle and the federally endangered arroyo toad along suitable segments of the Sweetwater River.

The general guidelines for wildlife-dependent recreation, as presented in 605 FW 1.6 of the Service Manual, provide a range of criteria to be considered when opening a refuge to a particular recreational experience. Some of these criteria include consideration of applicable laws and regulations, minimizing conflicts with fish and wildlife population and habitat goals, promoting accessibility and availability to a broad spectrum of the American people, promoting resource stewardship and conservation, providing reliable and reasonable opportunities to experience wildlife, and using visitor satisfaction to help define and evaluate programs. We develop and evaluate quality wildlife-dependent recreation programs based on these criteria, which necessarily involves considering the existing and projected future conditions on a refuge. Such conditions include the lack of native fish within the watershed and the projected future lack of non-native fish in accordance with the Integrated Pest Management Plan that accompanies the CCP.

The guidance also addresses the need to consider applicable laws and regulation, including the ESA, and minimizing conflicts with fish and wildlife population and habitat goals. The portion of the Sweetwater River that extends through the Refuge is designated as critical habitat for the least Bell's vireo and southwestern willow flycatcher, and allowing public uses along the banks of the river could result in disturbance to nesting vireos.

The opportunities to harvest fish from the Sweetwater River at present are low and will be essentially nonexistent in the future. Based primarily on the limited fishing opportunities available along the Sweetwater River, but also considering the potential for increased disturbance within habitat designated as critical for the recovery of the least Bell's vireo and southwestern willow flycatcher, we have determined that the Refuge would remain closed to fishing under Alternative B. There are however opportunities for fishing in the immediate vicinity of the Refuge, including at Sweetwater Reservoir and Lower Otay Reservoir.

Wildlife Observation/Photography. Opportunities for wildlife observation and photography would be available from points along the designated trail system on both units of the Refuge. Within the San Miguel Mountain area, there is an opportunity to install a photo blind adjacent to the trail near one of the old cattle ponds on the site.

Interpretation. This alternative proposes to expand the interpretive program on the Otay-Sweetwater Unit and work with partners to implement interpretive programs on the Del Mar Mesa Vernal Pool Unit in an effort to increase the public's understanding of the Refuge's contribution to the conservation of the sensitive resources that occur in southwestern San Diego County. Interpreting the Refuge's resources and educating users about the need to protect these resources is an important management tool that has been shown to reduce inappropriate behavior in park and open space users. The following interpretive projects would be implemented on the Otay-Sweetwater Unit as funding sources are identified:

- Design and construct a two-paneled kiosk for the southern trailhead and parking area on McGinty Mountain that interprets McGinty Mountain's rare gabbro soil-dependent southern mixed chaparral habitat with its associated endemic plant species, and also provides trail and regulatory information;
- Design and construct a two-panel visitor contact kiosk at the Barn at the Oaks that interprets the history of the barn and surrounding lands, as well as the native habitats supported in the area;
- Design and construct a two-panel visitor contact kiosk at the Par Four Drive trailhead to inform users that they are entering Refuge land and to introduce users to the listed species in the area including San Diego ambrosia, Hermes copper butterfly, and California gnatcatcher;
- Design and construct a visitor contact kiosk with shade structure that can accommodate three to six interpretive/information panels to be installed near the convergence of the Sweetwater River and Steele Canyon Road to the south of Highway 94, with interpretive topics covering riparian, coastal sage scrub and chaparral ecology and the Refuge's role in conserving the rich diversity of native wildlife within western San Diego County;
- Develop a one- to two-mile interpretive trail near the old steel bridge within the Sweetwater River area that would incorporate the existing interpretive elements already present in this area, and include five additional interpretive elements to interpret the species and native habitats in the immediate area; and
- Design, construct, and install a two-panel visitor contact kiosk at the trailhead for the Sweetwater River and Loop Trail located in the county's Sweetwater Regional Park Summit site to introduce and interpret the habitats found on the Refuge to visitors embarking on hikes through the Refuge from this off-site public park and campground, and provide information about the existing partnership among Federal and State agencies and public utilities to manage and restore the habitats for threatened and endangered species.

Interpretation on the Del Mar Mesa Vernal Pool Unit would be provided as part of the implementation of the Carmel Mountain and Del Mar Mesa Preserves Management Plan. As currently drafted, this plan provides recommendations for interpretation but does not provide any specific proposals. Specific interpretive projects would be developed following approval of the plan, but, in general, the plan recommends that interpretive signage be installed in proximity to particularly sensitive habitat areas, such as vernal pools, at trailheads, and at other opportune locations. The plan also recommends that one trail

within the Del Mar Mesa Preserve be designated for interpretation, with signs to be placed at appropriate locations along the trail. An interpretive trail brochure is also recommended to provide more extensive interpretation of the area and the resources supported within the preserve. Finally, the plan recommends that a docent program be established to lead guided field trips, participate in presentations at the preserve, assist with public outreach, monitor trail conditions and use, and generally watch over the preserve.

Environmental Education. Under this alternative, the Refuge would expand existing partnerships with nearby schools, as well as seek additional new partners, to create formal and informal environmental education programs that utilize the Refuge, including both the Otay-Sweetwater Unit and potentially the Del Mar Mesa Vernal Pool Unit, as an outdoor classroom. The proposed locations for conducting future outdoor classroom activities on the Otay-Sweetwater Unit include the area near Par Four Drive and the area to the east of the old steel bridge. The Refuge would also assist participating schools in developing a “master teacher” program, which will reduce the administrative costs of the program. One recommendation for the Del Mar Mesa Preserve is to have the preserve adopt a local school and develop programs for that school that teaches the students about the area’s natural resources through presentations and walks, and possibly through hands-on experience in small habitat restoration projects, exotic species control, and habitat maintenance projects.

Other Public Uses

Trails. Under Alternative B, the existing network of user-created trails and pathways was evaluated to consider existing and potential future impacts to important Refuge resources, including sensitive habitat, listed and sensitive plant and animal species, cultural resources, and water quality. In addition, trail sustainability, public safety, erosion, compatibility with Refuge purposes, and potential effects to adjacent private properties were considered. Based on this analysis, general corridors for where trails should be located within a designated trail system for the Otay-Sweetwater Unit and recommended uses have been identified. Specific trail alignments for the routes included with the proposed designated trail system will be developed in a step-down trail plan to be prepared adoption of the Final CCP. This detailed trail planning would be conducted in partnership with a variety of interested parties, including trail user groups, San Diego County Parks and Recreation, adjacent property owners, and other members of the public. NEPA compliance will be required as part of the planning process and the draft trail plan would be made available for public review and comment in association with draft NEPA document.

The step-down trail plan process would include determining specific trail layouts, recommending trail tread improvements for any segments of existing trails that are retained, and identifying those trails to be closed and decommissioned. The plan would also provide descriptions of proposed trail features, identify approved uses on the various trail segments, and develop a trail sign and wayfinding program. The trail sign program would focus on providing the public with a clear understanding of which trails are part of the designated trail system. Existing trails proposed for retention in whole or in part as segments of the designated trail system would be evaluated to determine if they are sustainable, are aligned in a manner that will minimize impacts to the Refuge resources, and do not require or encourage access onto the Refuge through private property. Where realignment is necessary, the new alignment would be sited in a manner that would avoid impacts to sensitive Refuge resources, respect the existing topography, take into account surrounding drainage patterns and soil type, promote user safety, and address user

desires for viewpoints, overlooks, and linkages to other authorized trails on adjacent properties.

Under this alternative, multiple use trails designated in the step-down trail plan would generally be limited to those trail segments that serve as segments of the county's regional trail system, including the Sweetwater Loop and River Trail. Generalized trail corridors for the designated trail system within the Otay-Sweetwater Unit are presented in Figures 4-7 through 4-10.

Alternative B also includes a proposal to explore potential options for connecting the County of San Diego's Sweetwater River Trail on the south of Highway 94 to the Par Four Trail on the north of Highway 94 in a manner that would ensure safe passage from one side of Highway 94 to the other. Under this proposal, the Refuge would partner with other agencies to explore various connection options including a fair weather undercrossing along the east side of the Sweetwater River below the Highway 94 bridge or the construction of an overcrossing or at-grade crossing in an appropriate location on the east side of the Sweetwater River near the Highway 94 bridge. There is currently some trail use occurring under the bridge to gain access to the northern portion of the trail, but there is no formal trail segment. As a result, impacts to vegetation and water quality are occurring within the Sweetwater River. This segment of the trail would not be located on the Refuge; therefore, it is likely the County of San Diego would have to take the lead on such a project. Construction of a trail connection in this area would require coordination with a variety of agencies, including but not limited to the County of San Diego, Caltrans, the Service, and CDFW.

Due to the extent of listed species supported on the Refuge and the importance of protecting the habitat that supports these species, some trails could be subject to seasonal closure to protect these species during nesting or other vulnerable stages of their life cycles. For instance, if golden eagles are observed making preparation for or tending a nest, a disturbance avoidance area would be established around the nest site with a radius of approximately 4,000 feet (1,220 meters). If a trail is located within the disturbance avoidance area, the trail would be closed until the eagle chicks have fledged or the nest is no longer occupied. Trails located within habitat that could support Quino checkerspot butterfly larvae would also be subject to seasonal closure to protect the larvae while they are vulnerable to trampling.

Another component of this designated trail system proposal is the development and implementation of a trail wayfinding program. This program would include:

- Design, printing, and distribution of a Refuge trail map;
- Placement of trail signs at trailheads and major trail intersections to provide directions and to inform users of the trail's permitted uses (i.e., multiple use, pedestrian only, no dogs);
- Installation of kiosks at trailheads; and
- Installation of fencing or other barriers where necessary to better direct users down the appropriate pathway and away from sensitive resources.

Alternative B also proposes the development of a partnership with equestrian groups, including Bright Valley Farms, mountain biking groups, and hikers to form a volunteer trail maintenance group to help maintain the multiple use trails on the Refuge. Additionally, the Refuge would establish a volunteer trail patrol with similar partners to

assist the Refuge staff in monitoring trail users and updating the staff on potential hazards, maintenance issues, and inappropriate trail activities. The volunteer patrol would be developed consistent with similar programs being implemented by the San Diego County Parks Department and City of San Diego Regional Open Space Division.

Several actions are proposed under this alternative to improve accessibility within the proposed trail system. These actions include:

- Retrofit the approach ramps of the Sweetwater River Trail Bridge to comply with the draft Final Accessibility Guidelines for Outdoor Developed Areas;
- Ensure that accessibility is maximized to the extent possible when implementing trail improvements, rerouting a trail segment, and choosing which existing trail segments to include in the designated trail system; and
- Repair or eliminate degraded segments of the Sweetwater Loop and River Trail, particularly on the south side of the Sweetwater River; highly degraded sections may require a replacement route to circumvent problem areas.

The trail proposals for the Del Mar Mesa Vernal Pool Unit are illustrated in Figure 4-12. These trails would be part of the larger trail system proposed for the Del Mar Mesa Preserve, as presented in the draft Carmel Mountain and Del Mar Mesa Preserves Management Plan (City of San Diego 2011). Under the proposed plan, the northwestern Refuge parcel would include a segment of a hike/bike trail that travels through coastal sage scrub habitat and two segments of a multiple use trail that follows the alignment of existing San Diego Gas & Electric utility easements. The southwestern parcel would be bisected by a segment of a hike/bike trail that extends through coastal sage scrub habitat. No trails are proposed for eastern parcel; therefore, no public access onto this parcel would be permitted.

Geocaching. No form of geocaching would be permitted on the Refuge under Alternative B.

Groundspeak, which owns Geocaching.com, has prepared a guide for park and law enforcement agencies that assist agencies in determining if geocaches have been improperly or illegally placed on agency land. The guide also outlines the procedures for physically removing the cache and deleting its listing on Geocaching.com. This guide is available at <http://www.geocaching.com/articles/parksandpolice/GuideForParksandLawEnforcement.pdf>. Under Alternative B, any traditional geocaches encountered on the Refuge would be removed. To ensure that geocachers do not continue to seek the cache, the following procedures, developed by Groundspeak, will be implemented for any cache found on the Refuge that is listed on Geocaching.com:

- The cache owner will be informed that the cache has been removed,
- The cache name, GC code for the cache, and any additional information available to assist Groundspeak in identifying the specific cache will be provided to Groundspeak; and,
- A note will be posted on the geocaching listing indicating that the cache has been physically removed.

Research. Under Alternative B, the Refuge would continue to develop research partnerships with academic institutions and other public (e.g., USGS), private, and non-profit researchers (e.g., California Native Plant Society, Center for Natural Lands Management, San Diego Natural History Museum, Conservation Biology Institute) to conduct research on the Refuge that would benefit Refuge management and/or Refuge resources. Potential research projects include but are not limited to:

- studying the mechanisms of type conversion in coastal sage scrub habitat;
- developing appropriate methods for the successful reversal of type conversion;
- conducting studies related to the life history of the Quino checkerspot butterfly;
- identifying the factors that may be contributing to Quino population declines;
- using genetic data to determine patterns of demography and gene flow within and among populations of coastal California gnatcatcher; and
- developing a strategy to address productivity and survivorship for species populations determined to be declining.

Other potential cooperative research projects may include working with researchers at USGS to facilitate genetic, demographic, and movement studies of southwestern pond turtles; partnering with researchers to study eagle activity on the Refuge, information that will contribute to the conservation of eagles on a larger geographic scale; and encouraging research related to the restoration of cryptobiotic crust.

The Refuge would also continue to support research related to the control of invasive non-native grasses and annual forbs in an effort to identify controls methods that are both effective and avoid any adverse effects to native plant and animal species. Such research would include field studies to identify appropriate herbicides for controlling non-native grasses in areas supporting San Diego ambrosia and studies to evaluate the merits of using grazing as a tool for controlling invasive plants in some portions of the Refuge.

Research suggests that a well-regulated program of rotational grazing may have the potential to reduce cover of exotic annual grasses, thus reducing competition for native annual forbs, and improving habitat conditions for Quino checkerspot butterfly and other sensitive species found in grasslands, coastal sage scrub, and the grassland/coastal sage scrub ecotone (Weiss 1999, Hayes and Holl 2003, Vulliamy et al. 2006). Another study conducted by Kimball and Schiffman (2003) concluded that grazing harmed native species and promoted alien plant growth.

While grazing is not currently a habitat management tool used on the Refuge, an experimental grazing program that evaluates the beneficial and potentially harmful effects of grazing as a management tool may be warranted in areas of the Refuge where exotic annual grasses are problematic. If this research demonstrates that grazing is effective in controlling invasive grasses and improving habitat quality for sensitive species in coastal southern California, a carefully regulated and monitored grazing program could be implemented on portions of the Refuge in the future.

C. Refuge Operations

Staffing

Alternative B proposes to increase the number of staff supporting the San Diego NWR by five full time equivalent positions and two other positions shared with the Complex. These positions include, in order of priority:

1. Fish and Wildlife Biological Technician (GS 5/7/9);
2. Community Outreach (GS 11); this position would be shared within the Refuge Complex, with half of the time devoted to the San Diego NWR;
3. Fish and Wildlife Biologist (GS 11);
4. Park Ranger (GS 5/7/9);
5. Maintenance Worker (WG 8);
6. Environmental Education Specialist (GS 11); and
7. GIS Technician (GS 7/9/11); this position would be shared within the Refuge Complex, with a quarter of the time devoted to the San Diego NWR.

Facilities

Alternative B proposes that the Refuge office continue to be collocated with CDFW in Jamul. This alternative does however include proposals to construct several visitor-serving facilities on land currently owned by Caltrans but proposed for conveyance to the Refuge. The site is located west of Millar Ranch Road and south of Highway 94. Proposed facilities include a temporary visitor contact station where Refuge staff can be available to provide information and answer questions about the Refuge, its management, and approved public uses. This facility will also provide Refuge staff with the opportunity to monitor more closely public use activities occurring on the Refuge. Other facilities include a restroom, visitor parking, trailhead kiosk, and interpretive elements.

A site plan would be developed for the site once it is acquired by the Refuge. The parking area would accommodate several horse trailer pull-through spaces and a new access point onto the Sweetwater Loop and River Trail, including a potential new trail bridge across Steele Canyon Creek, would be constructed. The site plan would also address vehicular and pedestrian ingress and egress to the site from Highway 94. The details of the site plan would be developed with various Refuge partners and would be subject to NEPA.

Other facilities proposed for construction on the Refuge under Alternative B include:

- Construct a Native Plant Nursery – This facility, which would be constructed at the Refuge office at Rancho Jamul Ecological Reserve, would enable the Refuge to propagate native plants for use in Refuge restoration and enhancement projects. The facility would include a greenhouse, potting shed, outdoor growing areas, seed cleaning area, and seed, plant, tool and supply storage. To the maximum extent practicable, the nursery would utilize low energy use technology, such as solar panels, to minimize energy consumption. The siting and design of this facility would be coordinated with CDFW.
- Relocate an Existing Storage Building – The storage facility (Rice Barn) located on San Miguel Mountain would be relocated to the Refuge headquarters in Jamul.
- Construct Firefighter and Volunteer Staff Barracks – Temporary housing for seasonal firefighters and incidental and transient staff would be constructed at the Refuge headquarters site in Rancho Jamul. This facility would consist of a modular, four-bedroom, two-bath, "green" residence powered by photovoltaic panels.

Operational Access

Alternative B includes a proposal to assess the existing road network within the Otay-Sweetwater Unit. As part of this assessment, a road plan will be developed for maintaining those roads necessary to accommodate Refuge operations, fire management, law enforcement, Department of Homeland Security, and/or utility companies. It will also identify areas where new gates or other barricades are required to limit or prohibit access onto Refuge property; identify and post Refuge boundaries that are not adequately marked; and identify those roads and access points that are not needed to support Refuge or other authorized entities operations. Several dirt roads within the Otay-Sweetwater Unit, which have already been deemed necessary for fire and maintenance vehicle access, are highly deteriorated and require repair and rehabilitation. These access routes, which include the McGinty/Immenschuh access road, portions of existing access roads in the Las Montañas area, the Hidden Valley access road, and the access road to the old San Miguel Ranch property, are proposed for rehabilitation under Alternative B. Alternative B also proposes to seek funding to close, recontour, and restore to appropriate native habitat all existing roads and access points that are not considered necessary for Refuge management.

Maintenance

The maintenance activities described under Alternative A would also be implemented under Alternative B. Some additional maintenance activities proposed under Alternative B include:

- Repair Saddle Road Dam – The erosion and an existing seepage problem on the outside of the dam face would be repaired. Repair work, which would affect an area of approximately 6,500 square feet, would require the removal of some native vegetation.
- Remove Water Tanks – Several water tanks are present on an old dairy site near Mother Miguel Mountain. These tanks, which were present on the land when it was acquired, have become traps for small wildlife and need to be removed. The project would involve removal of the tanks, footings, and piping.
- Remove Pumphouse, Well, and Tanker Trailer – This non-operational facility, located to the south of Jamacha Road, was present on the property at the time of donation to the Refuge. The required action will involve removing the pumphouse and tanker trailer and plugging the existing well.
- Demolish Sweetwater River Pumphouse Ruins – Due to public safety issues, the ruins of this old pumphouse are proposed for demolition following a cultural resource evaluation of the structure and the implementation of any required mitigation should the facility be deemed eligible for listing on the NRHP.
- Remove Internal Fencing and Rehabilitate Boundary Fencing in Hidden Valley – The Hidden Valley property acquired in 2012 requires the removal of hundreds of feet of internal t-post and wire fencing to benefit wildlife movement, as well as the repair of boundary fencing to minimize the potential for trespass onto sensitive Refuge lands.

Alternative B also addresses the need to close known mine shafts, wells, and any previously unknown wells or mineshafts discovered on the Refuge. For example, after the wildfire in 2007, evidence of mining in the form of several scrapes and four openings were discovered in the vicinity of Mother Miguel Mountain. The openings are not protected, representing a safety hazard to the public and wildlife. In addition, the previous closure at Peg Leg Mine is in need of repair. Remedies proposed for open shafts include the installation of bat-compatible steel gates into horizontal openings and the insertion of polyurethane foam into vertical shafts and smaller openings to fill and seal these safety hazards. Three wells have been located on the Hidden Valley property and one well is known to be present in the Las Montañas area that require closing in a manner consistent with State guidelines.

Utility Easements

Refuge staff will continue to work with the various utilities that maintain utility easements and other facilities on the Refuge or on inholdings surrounded by Refuge land to ensure the protection of Refuge resources and the safety of Refuge visitors. To facilitate better coordination, the Refuge will work with the utility companies to develop maps for the Refuge that clearly delineate all recorded easements located on the Refuge.

D. Fire Management

The fire management strategies proposed under Alternative B would differ from Alternative A in that Alternative B supports the use of prescribed burning as a fire and habitat management tool. This change would only go into effect if the existing Fire Management Plan for the San Diego National Wildlife Refuge Complex (USFWS 2004a) were amended to permit this activity. Revisions to the approved Fire Management Plan for the Refuge Complex were initiated in 2011.

The use of prescribed burning to control invasive plant species would reduce the fuel load on the Refuge, which could reduce the intensity of wildland fire in some locations on the Refuge. This could in turn reduce fire suppression costs, but the reduction in costs would likely be minimal due to the size of the Refuge and the areas within the Refuge that would be appropriate for prescribed burning.

The draft Carmel Mountain and Del Mar Mesa Preserves Management Plan, which addresses fire management on the Del Mar Mesa Preserve, proposes full fire suppression in this area. This is consistent with the existing Fire Management Plan for the Refuge Complex.

E. Law Enforcement

No changes to the existing law enforcement activities occurring on the Refuge are proposed under Alternative B.

F. Land Acquisition

Future land acquisition efforts will focus on acquiring parcels that support the creation or expansion of large contiguous blocks of undisturbed habitat within MSCP-designated core areas, as well as on parcels that if acquired would provide a functional link between habitat areas to improve connectivity between core areas, minimize problems associated with habitat fragmentation, provide pathways for genetic and demographic interchange, and accommodate species movement in response to wildland fire, climate change, and other stressors.

G. Cultural Resource Management

Cultural resource management under Alternative B would include all of the actions described under Alternative A. In addition, known cultural resources would be evaluated to determine if additional measures, such as rerouting a trail to avoid or minimize the potential for adverse effects to a site, capping a site to protect its integrity, and/or installing fencing or signage intended to keep the public out of sensitive areas while not drawing attention to the presence of any cultural resources, should be implemented to ensure the long-term site protection.

Prior to implementing any project on the Refuge that would involve ground disturbance, Refuge staff would coordinate with the Service's Regional Cultural Resources team and the appropriate tribal governments when deemed necessary in accordance with Service policy and other Federal regulations and policies. The San Diego NWR Complex is also pursuing with the Kumeyaay Cultural Repatriation Committee the development of procedures, to be formalized through a Memorandum of Understanding, which would be implemented in the event of a NAGPRA-related discovery on the Refuge.

H. Environmental Contaminants Coordination

Environmental contaminants coordination would be as described under Alternative A.

I. Volunteers and Partners

As described in Alternative A, the Refuge would continue to develop partners and work with volunteers to benefit Refuge management and Refuge resources. Under Alternative B, these partnerships would be expanded to include volunteer trail maintenance activities and the formation of a volunteer trail patrol. This alternative also proposes hiring a Community Outreach Coordinator for the Refuge Complex; this position would be responsible for the development and implementation of volunteer programs and activities for the San Diego NWR, as well as the other Refuges in the San Diego NWR Complex.

ALTERNATIVE C – EXPAND OPPORTUNITIES FOR WILDLIFE-DEPENDENT RECREATIONAL USES

Alternative C (Figures 4-13 through 4-17) proposes to expand the opportunities for wildlife-dependent recreational uses on the Otay-Sweetwater Unit, while wildlife and habitat management activities would remain essentially the same as those described under Alternative B. The wildlife and habitat management actions, as well as the public use proposals, described for the Del Mar Mesa Vernal Pool Unit under Alternative B (refer to Figure 4-12) are also proposed under Alternative C.

A. Wildlife and Habitat Management

The same wildlife and habitat management actions described in Alternative B for the Otay-Sweetwater Unit and Del Mar Mesa Vernal Pool Unit, including the implementation of an IPM Plan, would be implemented under Alternative C. Also under Alternative C, annual surveys to determine relative densities and population trends for southern mule deer would be conducted on the Otay-Sweetwater Unit.

B. Public Use Program

Public Access

Similar to the discussion provided in Alternative B, various areas of the Refuge would be officially opened to public use under Alternative C, while other areas would remain closed to protect sensitive resources.

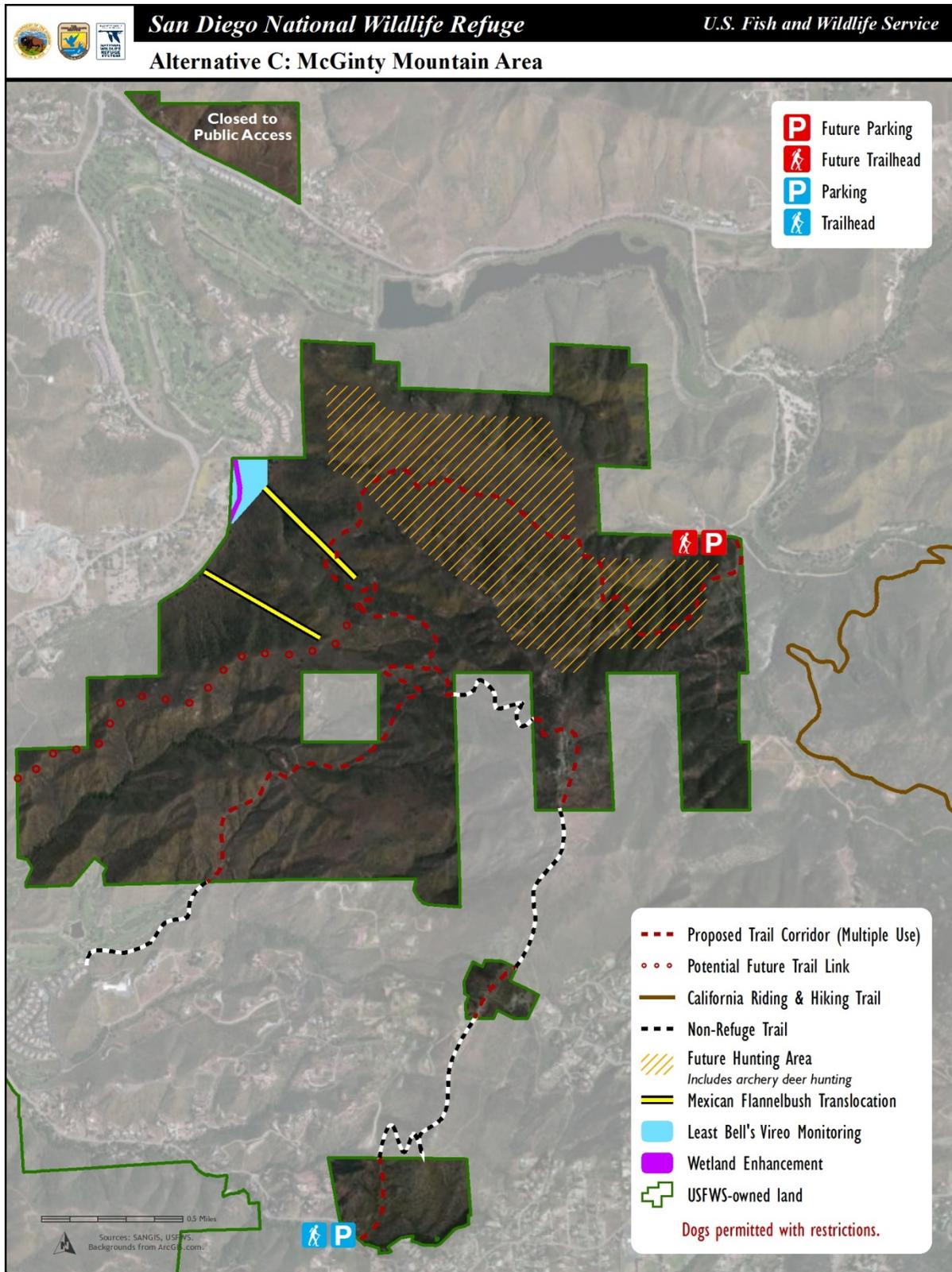


Figure 4-13. Alternative C – McGinty Mountain Area, Otay-Sweetwater Unit

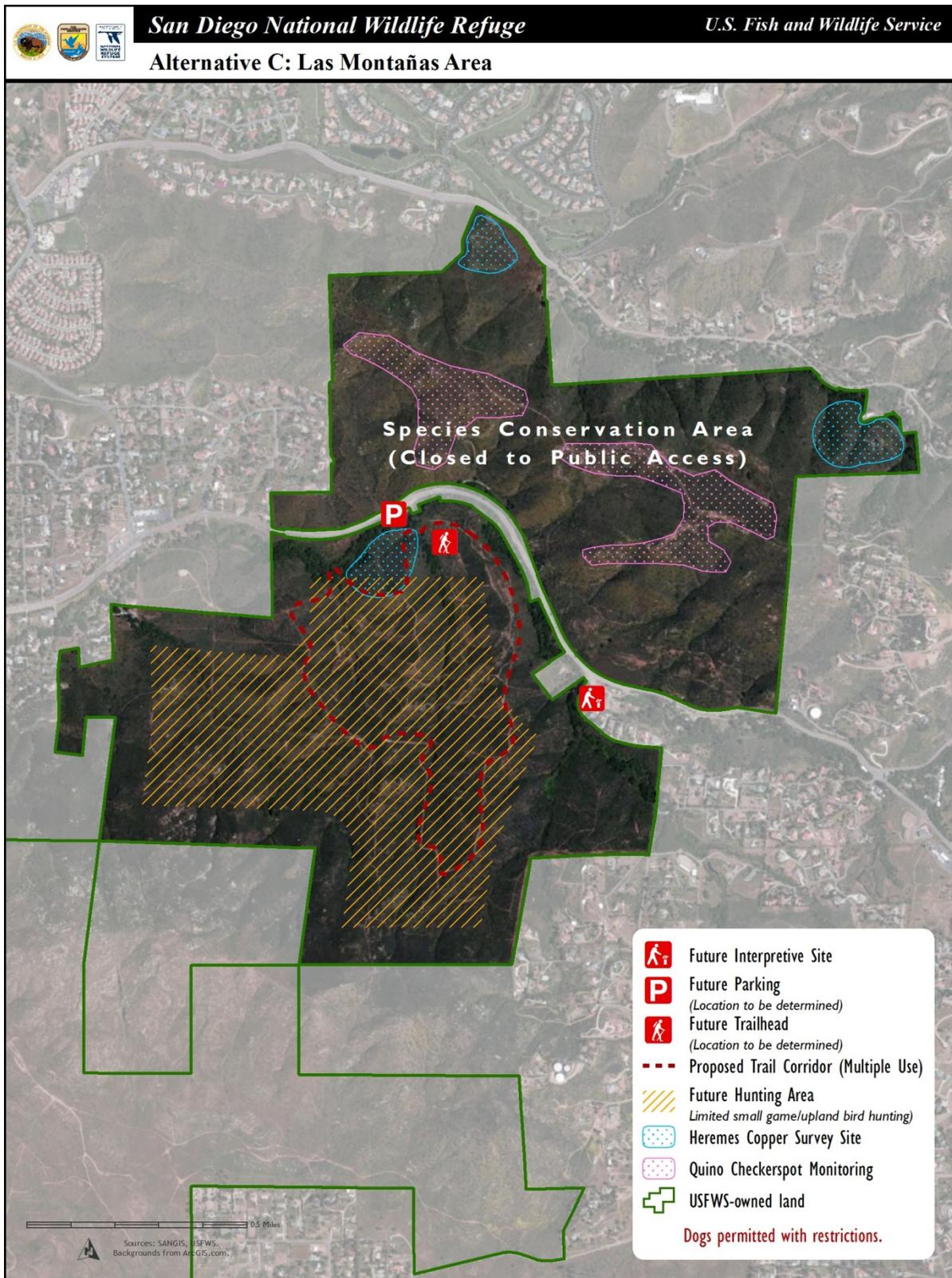
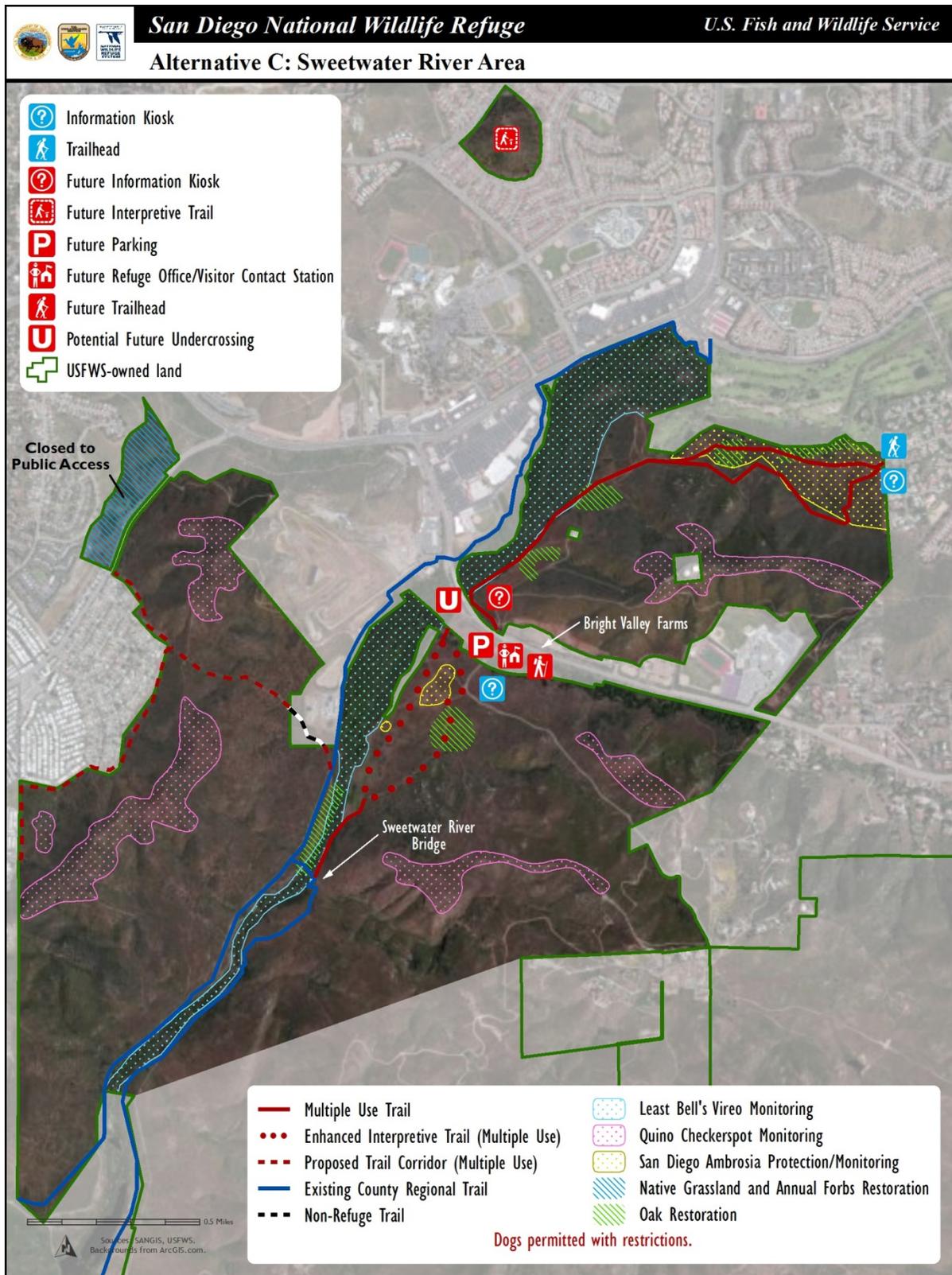


Figure 4-14. Alternative C - Las Montañas Area, Otay-Sweetwater Unit



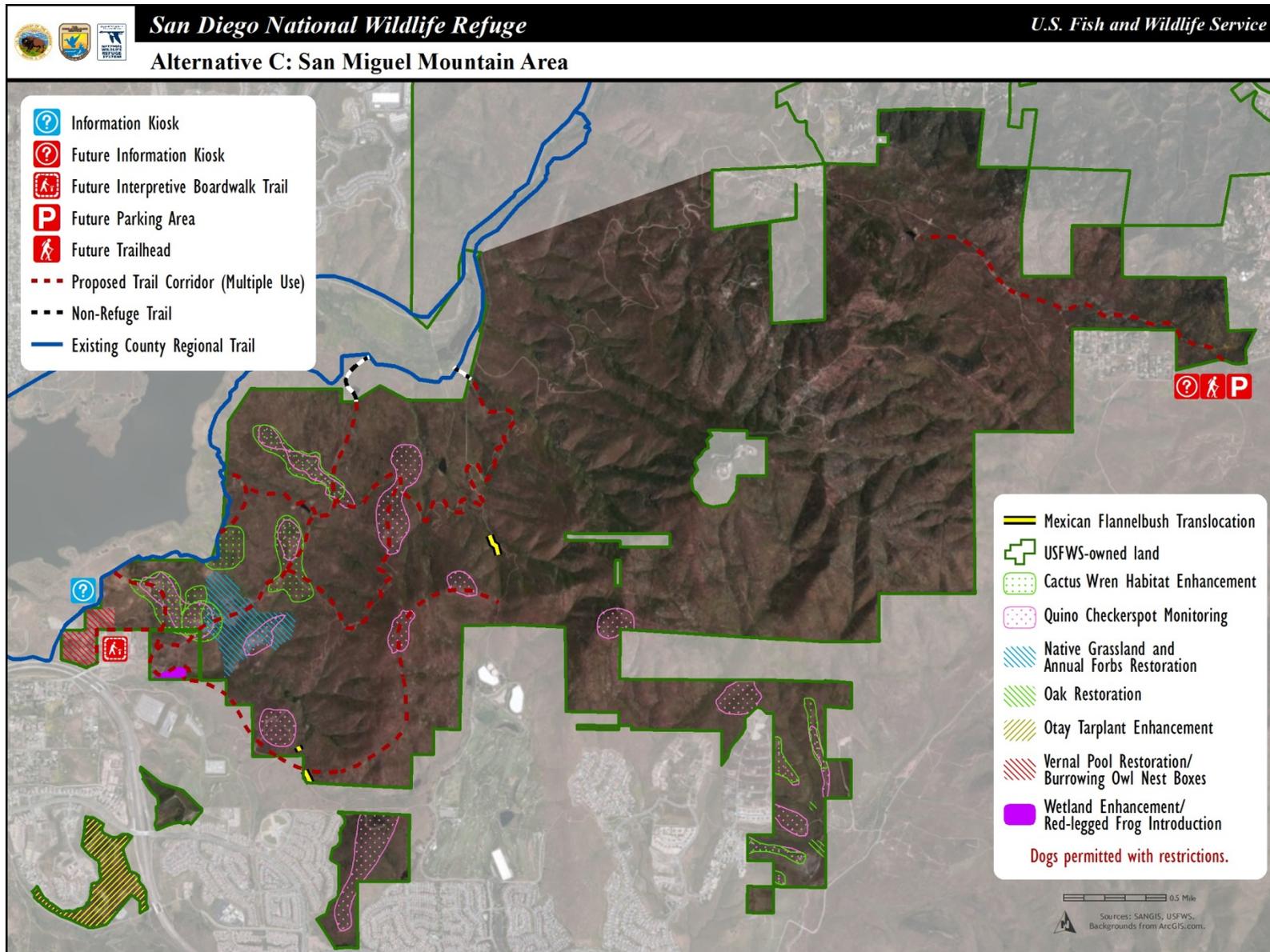


Figure 4-16. Alternative C -San Miguel Mountain Area, Otay-Sweetwater Unit

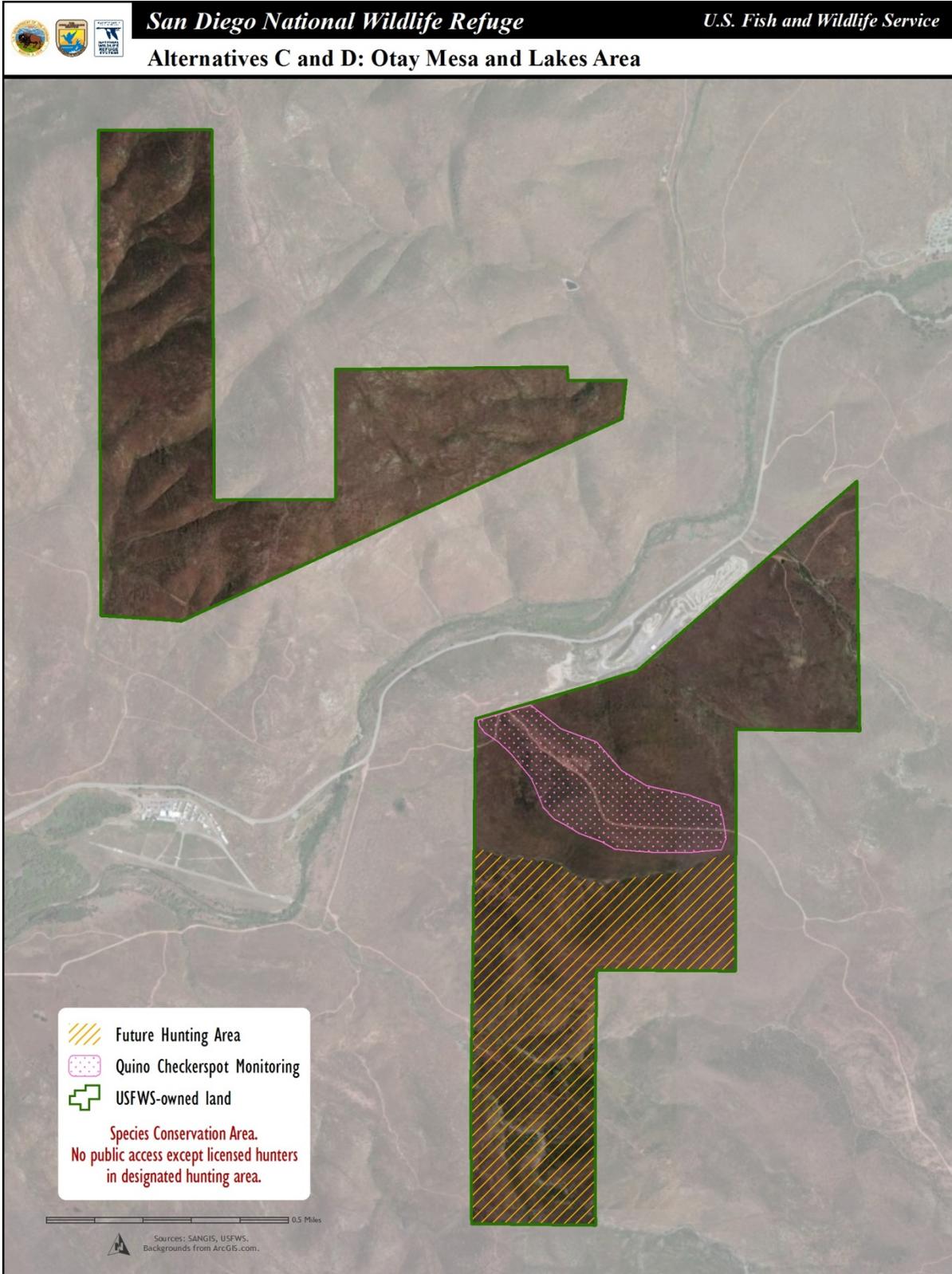


Figure 4-17. Alternatives C and D – Otay Mesa and Lakes Area, Otay-Sweetwater Unit

On the Otay-Sweetwater Unit, official access points onto the Refuge under Alternative C would include those described under Alternative B. In addition, access onto the Refuge from Jamacha Boulevard, Trace Road, and Doubletree Road would be permitted in the future when a proposed multiple use trail is constructed and officially opened on the southwest side of the Sweetwater River management area.

Wildlife-dependent Recreational Uses

Hunting. Under Alternative C, portions of the McGinty Mountain, Las Montañas, and Otay Mesa and Lakes management areas, as shown in Figures 4-13, 4-14, and 4-17, would be opened to hunting following the completion of a step-down hunt plan. Hunting would be conducted subject to refuge-specific conditions, which would vary depending upon the hunting location within the Refuge.

The areas considered for inclusion in a hunt program under Alternative C were selected after consideration of various factors, including those outlined here.

- **Size and Configuration** – Areas of the Refuge considered for hunting represent large blocks of Refuge land separated from nearby residences or other development by changes in elevation and/or dense vegetation and a minimum distance of 150 yards.
- **Ease of Access** –The majority of lands included within the Refuge boundary are landlocked, having no direct access via a public right-of-way or other public lands. Because access is not permitted onto the Refuge through adjoining private property, those areas of the Refuge that will be open for hunting under Alternative C will be accessible from a public road or through other public lands where hunting is already permitted by the land manager. Future parking areas are proposed under Alternative C to provide access onto the McGinty Mountain and Las Montañas areas, and hunting access within the Otay Lakes and Mesa area would be provided through adjacent public lands.
- **Habitat and Species Sensitivity** – Areas supporting federally listed plant and invertebrate species that could be adversely affected by trampling were excluded from designated hunting areas.
- **Visitor Experience** - In addition to our responsibilities for protecting sensitive habitats and species and our desire to promote resource stewardship and conservation, 605 FW 1.6 of the Service Manual also addresses the need to consider visitor satisfaction when developing visitor services for a Refuge. Per this guidance, the public use program under Alternative C was developed after considering how best to provide reliable and reasonable opportunities to experience wildlife and ensure a satisfying visitor experience for all users. To achieve these objectives, we looked at current and future use patterns on the Refuge, along with habitat and species sensitivity, in developing a hunting program under Alternative C. Those areas of the Refuge that currently experience lower levels of public use (e.g., wildlife observation, photography, environmental education, interpretation, non-motorized trail use) have been proposed as future hunting areas under this alternative. This proposal is intended to minimize conflicts between users and promote a satisfying experience for the range of users expected to be present on the Refuge at any one time.

The proposed hunting program in Alternative C would provide opportunities for hunting brush rabbit, desert cottontail, dove, and California quail (subject to refuge-specific conditions) in the southern portion of the Las Montañas area on about 300 acres and about 400 acres within the McGinty Mountain area (refer to Figures 4-13 and 4-14). Bow hunting of southern mule deer would also be permitted within the 400 acres on McGinty Mountain. Refuge-specific conditions, which would be developed during the preparation of a step-down hunt plan, may address a variety of topics including hunt seasons, methods of hunting, descriptions of areas open to hunting, methods of access, and other provisions as appropriate.

Approximately 160 acres in the southeastern portion of the Otay Mesa and Lakes area (refer to Figure 4-17) would also be opened to hunting per refuge-specific conditions for big game (i.e., deer, wild pig), resident small game (i.e., rabbits), and resident and migratory upland game bird (e.g., dove, quail, wild turkey) hunting. Due to the lack of frontage along Otay Lakes Road, access into this area of the Refuge would be via foot from adjacent State and BLM lands that are also open to hunting. No public access of any kind would be permitted outside of the designated hunt area.

Specific details of the proposed hunting program for the Otay-Sweetwater Unit would be further defined in a step-down hunt plan, to be developed following the approval of the CCP. The step-down plan would evaluate the need, if any, for the development and implementation of a reservation and check-in process for the McGinty Mountain and Las Montañas areas, and would address any facility needs (e.g., parking, staging, check-in and check-out station), as appropriate.

The details of the step-down hunt plan would be addressed at one or more public meetings; and once drafted the hunt plan would be made available for public review and comment. The official opening of the Refuge to hunting requires that a notice be published in the Federal Register, which would be done as part of the Service's annual final rule on Refuge-Specific Hunting and Sport Fishing Regulations.

Fishing. Alternative C includes no proposal to open the Refuge for sport fishing for the reasons described under Alternative B.

Wildlife Observation/Photography. Opportunities for wildlife observation and photography would be similar to those described under Alternative B, although the additional trail segments proposed under this alternative would provide some additional opportunities.

Interpretation. All of the proposals related to interpretation on the Otay-Sweetwater Unit that are described under Alternative B would also be implemented under Alternative C. In addition, the following proposals would be included as part of Alternative C:

- Design and construct a two-paneled kiosk for the northern trailhead and parking area on McGinty Mountain that interprets the sensitive resources and wildlife on McGinty Mountain, and also provides information regarding trail use and hunting;
- Geocaching Program – Develop a geocaching program as a component of the Refuge's interpretive program. Geocaching is a high-tech treasure hunt involving the use of a Global Positioning System (GPS) unit. The goal is to find the location of the geocache. There are different types of geocaches; the traditional geocache

includes a logbook and frequently a trinket, coin, or other object. Another form of geocache is an EarthCache, which is also listed on Geocaching.com. According to the EarthCache website (<http://www.earthcache.org>), “EarthCache sites do not use stored containers; their treasure is the lessons people learn about our planet when they visit the site.” Earthcaches would provide a unique interpretive tool for the Refuge. Traditional geocaching by individuals would not be permitted on the Refuge, as the hiding of private caches on Refuges is prohibited by Federal regulation. Such a program could, however, be implemented by the Refuge staff, which would ensure that caches are placed in locations that would avoid off-trail activity and associated impacts to the Refuge’s sensitive resources. EarthCaches could also be developed for the Refuge by the staff as part of the interpretive program.

- Vernal Pool Interpretive Trail – Develop a 500-foot-long boardwalk trail, with interpretive panels and species identification signs, around a portion of the Shinohara vernal pool site with panels that interpret the unique species and habitat requirements of this specialized wetland habitat.
- Lot 707 Interpretive Trail – Develop a children’s interpretive trail on Lot 707. This parcel is located in proximity to an elementary school, as well as Cuyamaca College, providing some interesting partnership opportunities. Interpretation along a trail on this site could be focused on introducing elementary students to the natural environment. A trail that extends to the top of the site would provide users with distant views of the Refuge; representing an opportunity to interpret the Refuge purposes and the importance of preserving natural habitat areas. Parking to access this site would be limited to on-street parking. Access to the site is also available via an existing county trail.

Environmental Education. All of the proposals related to the implementation of environmental education programs on the Refuge, as described under Alternative B, would also be implemented under Alternative C. In addition, the environmental education program would be expanded to address Quino checkerspot butterfly recovery and/or vernal pool restoration and enhancement.

Other Public Uses

Trails. As described under Alternative B, Alternative C would result in the closure of many user-created trails and old roads and accessways in an effort to protect sensitive Refuge resources and ensure public safety. The generalized trail corridors for the designated trail system proposed for the Otay-Sweetwater Unit under Alternative C are illustrated in Figures 4-13 through 4-17. Specific trail alignments would be determined based on factors such as the potential effects to sensitive Refuge resources and the ability to build a sustainable trail that respects the existing topography and takes into account surrounding drainage patterns and soil type. Access within the Refuge would generally be limited to the designated trail system. All other areas of the Refuge, with the exception of the south end of the Las Montañas area, a portion of the McGinty Mountain area, and the southwestern portion of the Otay Mesa and Lakes area where off-trail activity would be permitted in accordance with authorized hunting activity, would be closed to public access.

Under this alternative, all trail corridors are proposed to accommodate non-motorized multiple use trails. As discussed in Alternative B, specific trail alignments would be determined during the preparation of a step-down trail plan for the Otay-Sweetwater Unit.

The step-down trail process and anticipated products of the process are the same as those presented under Alternative B. During the step-down trail planning process, the potential for developing a trail to the top of Mother Miguel Mountain would also be explored.

The other proposals related to trails, as described under Alternative B, including assessment and repair or realignment of the county's Sweetwater Loop and River Trail to protect sensitive resources and improve public safety, establishment of volunteer trail maintenance groups and volunteer trail patrols, and exploring trail connection options across Highway 94 in the vicinity of the Sweetwater River, would also be implemented under Alternative C.

Unlike Alternative B, dogs would be permitted on Refuge trails, provided they are kept on a six-foot or shorter leash at all times and all waste is picked up and carried off site to an appropriate disposal can. The ability to bring dogs onto the Refuge would be conditional and subject to change without notice should leash and cleanup requirements be ignored.

The trail system described in Alternative B for the Del Mar Mesa Vernal Pool Unit would be the same under Alternative C.

Geocaching. Although geocaching would not be permitted on the Refuge, EarthCache sites, as described under Interpretation, may be established as part of an expanded interpretive program on the Otay-Sweetwater Unit. All illegal caches located on the Refuge would be removed as described under Alternative B.

Research. The proposals related to research under Alternative B would also be implemented under Alternative C.

C. Refuge Operations

Staffing

The staffing proposals described under Alternative B are also proposed for Alternative C.

Facilities

Until funding is identified to move the Refuge office onto Refuge land, it will continue to be collocated with CDFW in Jamul. Assuming such funding is identified, this alternative envisions the future establishment of a Refuge office and permanent visitor contact station on about 2.4 acres of the land currently owned by Caltrans and located to the west of Millar Ranch Road and south of Highway 94. When funding is identified, a site plan, including engineering and design plans, and required traffic studies would be prepared for the proposed facility. Site features would include an approximately 2,500-square-foot, permanent Refuge office and visitor contact station, as well as parking for Refuge staff and Refuge vehicles. This proposal would also include the facilities proposed for this site under Alternative B (i.e., parking lot with some pull-through parking spaces to accommodate equestrian trailers, restrooms, shade structure, and information kiosk).

The construction of this facility would enable Refuge staff to have a permanent presence on the Refuge; provide Refuge visitors with the opportunity to interact with Refuge staff, ask questions, and learn more about the Refuge; and allow Refuge staff to monitor more closely public use activities occurring on the Refuge. Relocation of the Refuge office onto Refuge land would also reduce miles traveled to manage wildlife, habitat, and public use on the Refuge. The implementation of this proposal would be subject to NEPA compliance,

and would be presented to the public for review and comment prior to project approval and implementation.

D. Fire Management

The fire management strategies proposed under Alternative B would also be implemented under Alternative C.

E. Law Enforcement

Under Alternative C, law enforcement activities would be expanded beyond those described under Alternative A to include the management and regulation of the proposed hunting program. Hunting on the Otay Mesa and Lakes area could be managed by CDFW, as it is located adjacent to State lands open to hunting. These details would be addressed in a step-down hunt plan.

F. Land Acquisition

Land acquisition efforts would continue as described under Alternative A.

G. Cultural Resource Management

Cultural resource management under Alternative C would include all of the actions described under Alternatives A and B.

H. Environmental Contaminants Coordination

Coordination related to environmental contaminants would be the same as that described under Alternative A.

I. Volunteers and Partners

Proposals related to volunteers and partnerships would be the same as those described under Alternatives A and B.

Alternative D (Preferred Alternative) – Optimize Species Protection while Providing Opportunities for Compatible Public Use

Alternative D includes all of the wildlife and habitat management proposals included in Alternative B, as well as a proposal to implement a feral pig monitoring and eradication plan. The public uses proposed under this alternative represent a mix of proposals from both Alternatives B and C. The actions proposed under this alternative for the Otay-Sweetwater Unit are illustrated in Figures 4-18 through 4-21 (refer to Figure 4-17 for actions proposed under Alternative D for the Otay Mesa and Lakes area). Under Alternative D, management of the Del Mar Mesa Vernal Pool Unit would be consistent with the proposals described under Alternative B (refer to Figure 4-12).

A. Wildlife and Habitat Management

The wildlife and habitat management actions described in Alternative B for the Otay-Sweetwater and Del Mar Mesa Vernal Pool Units, including the implementation of an IPM Plan, would be implemented under Alternative D. In addition, Alternative D includes a proposal to implement a Feral Pig Monitoring and Eradication Plan on the Refuge. Currently, there is no documentation of feral pig populations on the Refuge, but feral pigs have been identified on Forest Service lands to the east and are expected to continue to expand their range, making it likely that they will ultimately spread onto Refuge lands.

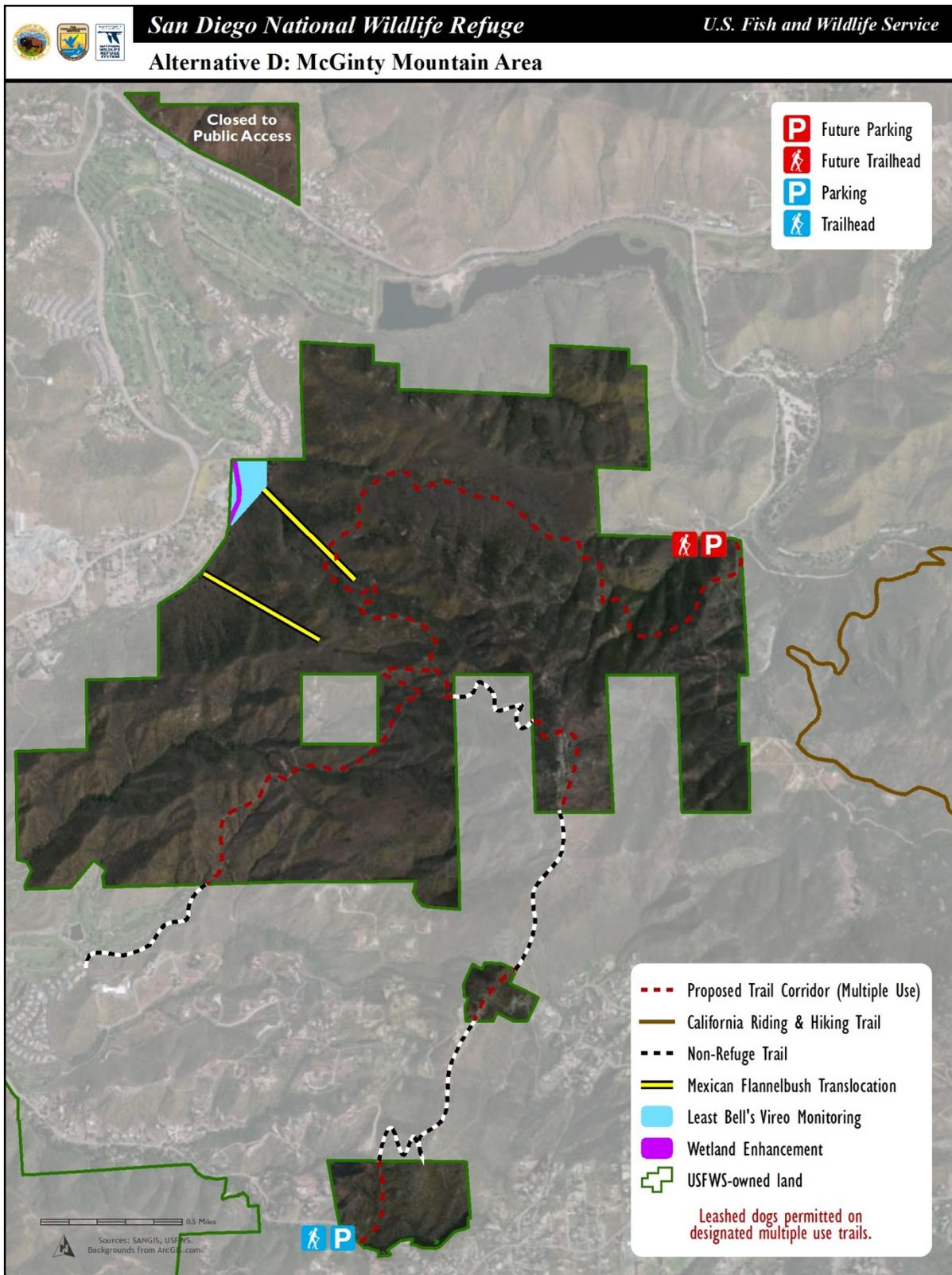


Figure 4-18. Alternative D – McGinty Mountain Area, Otay-Sweetwater Unit

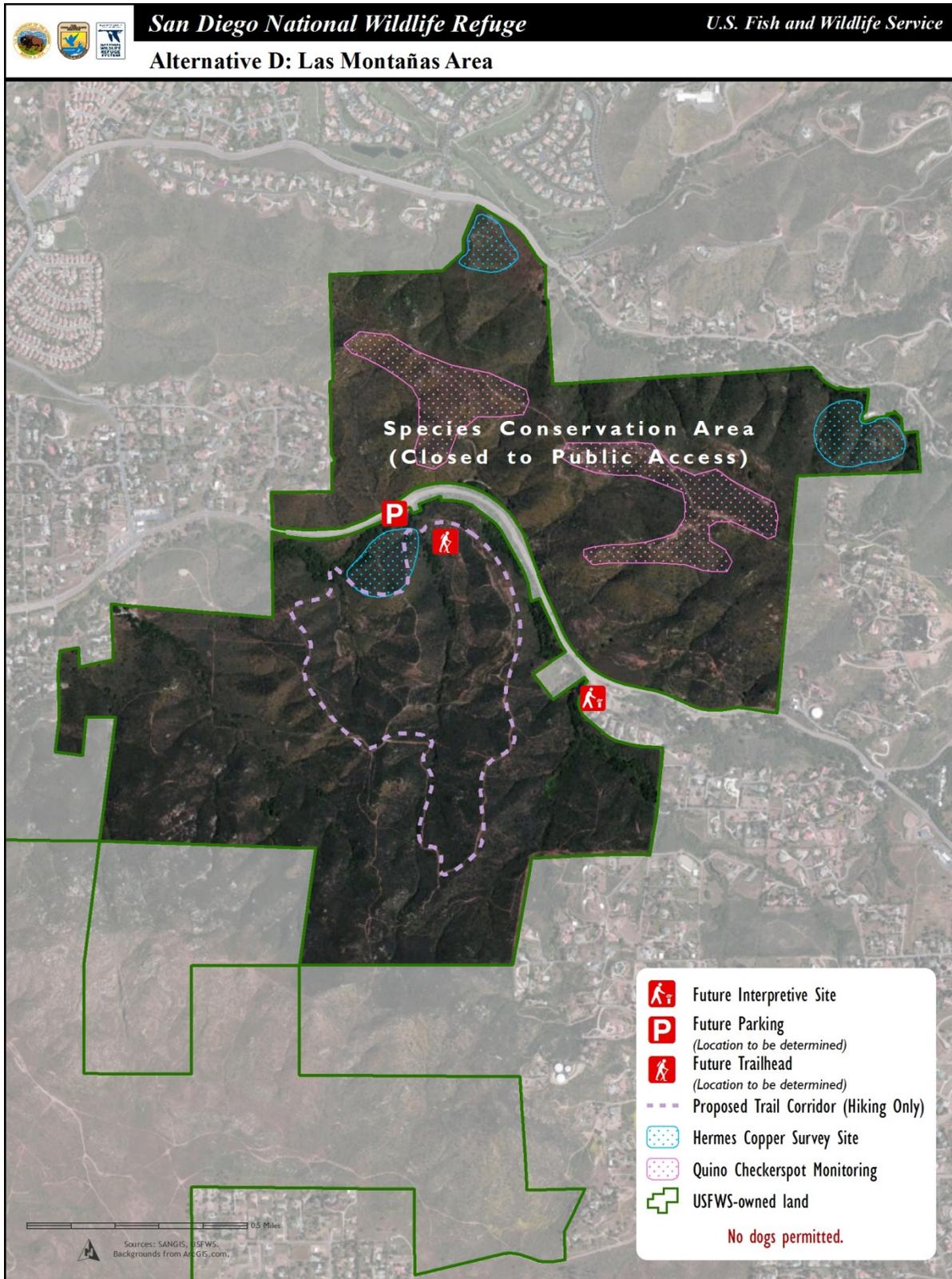


Figure 4-19. Alternative D - Las Montañas Area, Otay-Sweetwater Unit

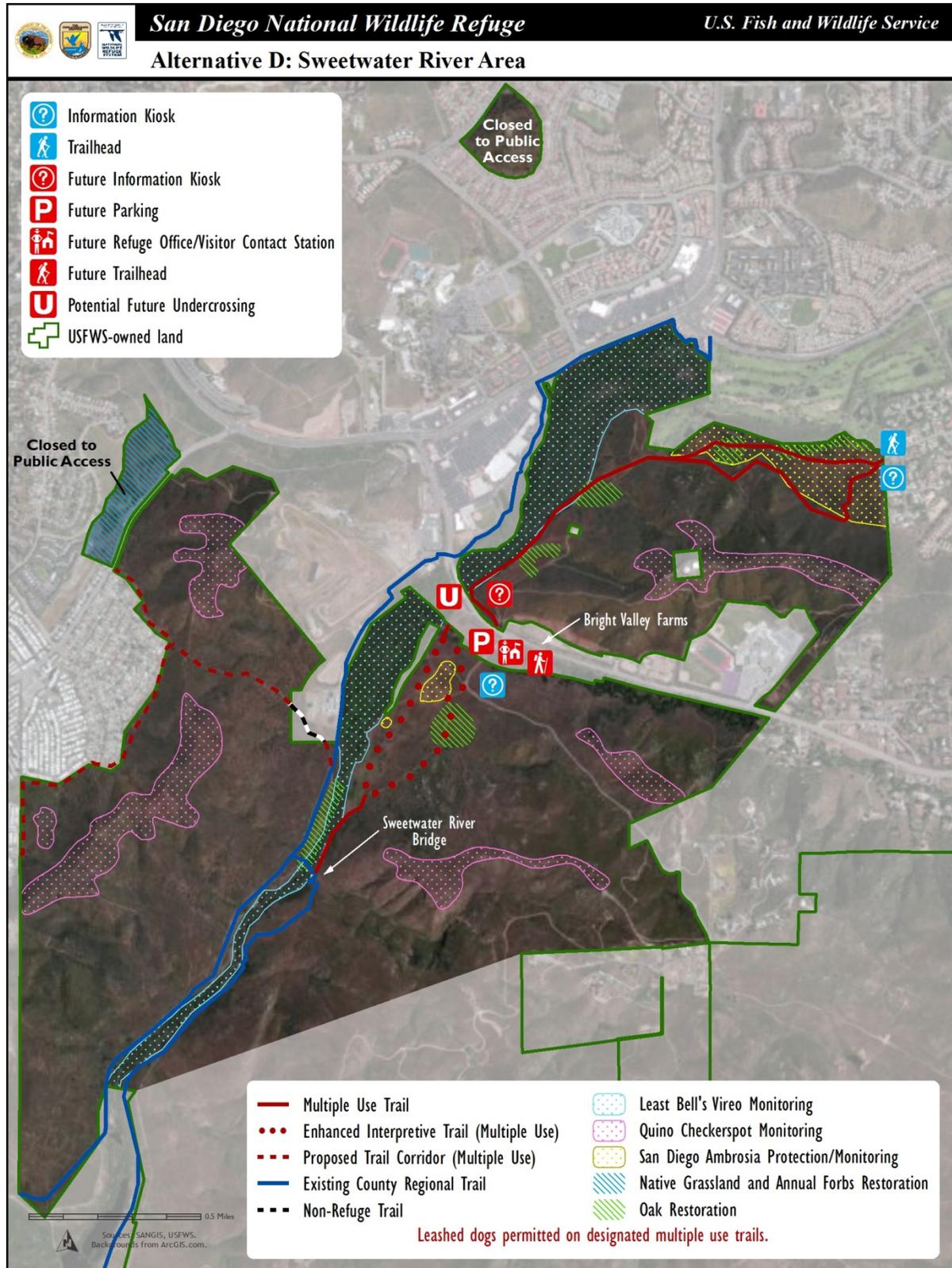


Figure 4-20. Alternative D – Sweetwater River Area, Otay-Sweetwater Unit

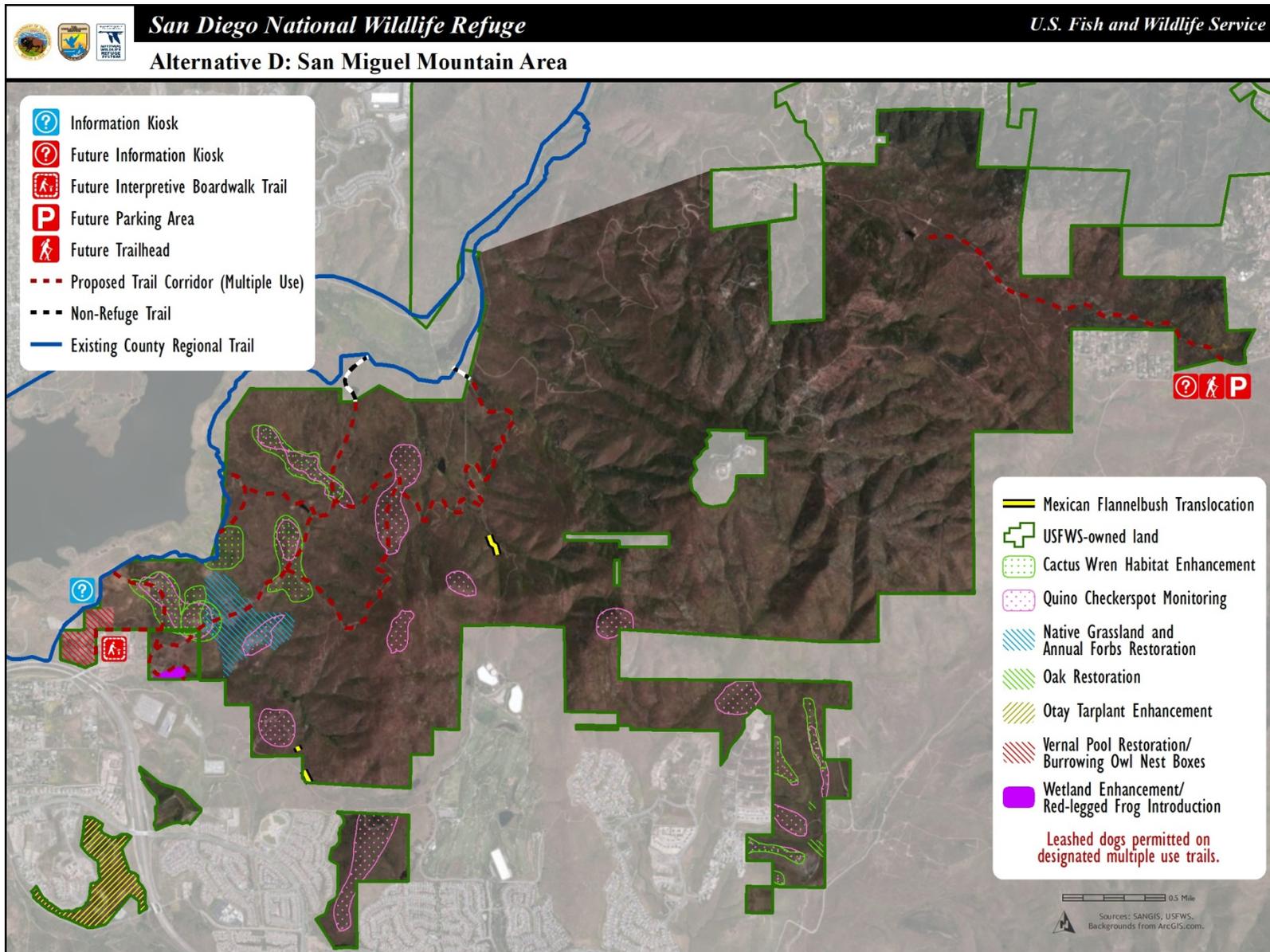


Figure 4-21. Alternative D -San Miguel Mountain Area, Otay-Sweetwater Unit

The Carlsbad Fish and Wildlife Office is already a participant in an inter-governmental group established by the Forest Service and BLM to address feral pig impacts, and the Refuge proposes to join this group. A number of State and local agencies are also participants in the Inter-Governmental Group on Feral Pig Impacts. This group has developed Principles of Understanding to work together to address feral pig impacts in San Diego County and to develop an “all-lands” approach to dealing with the feral pig population. A “Working Group” has also been established for key participants from multiple agencies in the area to come together to share knowledge and develop strategies for dealing with the feral pig population in the County across jurisdictional boundaries.

The Feral Pig Monitoring and Eradication Plan, which is provided as Appendix E, includes proposals to 1) monitor Refuge lands for evidence of feral pig activity; and 2) once pigs are confirmed to be present on the Refuge, to have the pigs lethally removed from the Refuge by contracted sharpshooters, such as USDA Animal and Plant Health Inspection Service [APHIS], before they are able to establish a permanent population on Refuge lands.

Authority to control wildlife populations for management is governed by several sections of the Code of Federal Regulations. Title 50 CFR, Part 31, Section 14 states: (a) Animal species, which are surplus or detrimental to the management program of a wildlife area, may be taken in accordance with Federal and State laws and regulations by Federal or State personnel or by permit issued to private individuals, and (b) Animal species, which damage or destroy federal property within a wildlife refuge area, may be taken or destroyed by Federal personnel. Title 50 CFR, Part 30, Section 11(a) states that feral animals, including horses, burros, cattle, swine, sheep, goats, reindeer, dogs, and cats, without ownership that have reverted to the wild from a domestic state may be taken by authorized Federal or State personnel or by private persons operating under permit in accordance with applicable provisions of Federal or State law or regulation.

To avoid or minimize impacts to Refuge resources from feral pigs, the implementation of this step-down plan would include the following steps:

- Keep apprised of current trends in feral pigs dispersal and colonization within the region;
- Establish agreements for controlling feral pigs on the Refuge well in advance of determining that their presence on the Refuge is imminent;
- Periodically inspect Refuge lands for evidence of feral pig activity, adjusting the frequency of these inspections based on current sighting information in the area and regional survey results;
- Should pigs be identified on Refuge lands, rapidly identify the location(s) and extent of infestation and document the extent of resource (e.g., biological, cultural, watershed) damage;
- Implement feral pig removal by employing the following methods: 1) removal by trapping, which is expected to result in the removal of the majority of the pigs; 2) professional (e.g., USDA APHIS) ground-based sharpshooters to pursue “trap-averse” animals after trapping efforts have been implemented; and 3) aerial dispatch (shooting), which would only be implemented in remote locations that are difficult to access on foot;

- When deemed necessary to enhance the effectiveness of control, construct short spans of temporary fencing to restrict or funnel movement of feral pig populations during trapping and hunting activities;
- Implement an adaptive management process to ensure project objectives are practical and attainable; and
- Implement short and long-term monitoring to evaluate project success.

This proposal, which is consistent with the plan developed by the participants of the Inter-Governmental Group on Feral Pig Impacts, draws upon a large body of experience from many successful feral pig elimination and control efforts across the United States (USDA Forest Service 2013). On the Refuge, the implementation of feral pig monitoring and eradication is intended to avoid or minimize damage caused by feral pigs to listed and sensitive species, as well as other biological, cultural, and watershed resources.

B. Public Use Program

Public Access

As described in Alternative C, specific areas of the Refuge would be officially opened to public use, while other areas would remain closed to protect sensitive resources. On the Otay-Sweetwater Unit, official access points onto the Refuge under Alternative D would be established consistent with the description provided under Alternative C. However, under Alternative D, hunting is only proposed on the Otay Mesa and Lakes area of the Refuge, therefore, public use activities elsewhere on the Otay-Sweetwater Unit would be limited to the officially designated trail system, except for limited environmental education and interpretive activities and approved research projects.

Wildlife-dependent Recreational Uses

Hunting. In Alternative D, hunting would be permitted on about 160 acres in the southeastern portion of the Otay Mesa and Lakes area (refer to Figure 4-17). Hunting in this area would occur per refuge-specific conditions and would allow the take of big game (i.e., deer, wild pig), resident small game (i.e., rabbits), and resident and migratory upland game birds (e.g., dove, quail, wild turkey). Due to the lack of frontage along Otay Lakes Road on which to access the Refuge, along with the potential for the presence of Quino checkerspot butterfly larvae and associated host plants on the ridge within the northern portion of the site, no access through the Refuge from Otay Lakes Road would be permitted. Access into the Refuge's hunting area would be permitted only through adjacent State and BLM lands, where hunting is also permitted. No public access of any kind would be permitted within the Otay Lakes and Mesa area outside of the designated hunt area, and only hunters with valid hunting licenses would be permitted within the designated hunt area.

As addressed under Alternative C, the details of this hunting program would be provided in a step-down hunt plan, which will be developed upon completion of the Final CCP.

Fishing. The Refuge would remain closed to fishing for the reasons described under Alternative B.

Wildlife Observation/Photography. Opportunities for wildlife observation and photography would be similar to those discussed under Alternative C.

Interpretation. All of the proposals related to interpretation on the Otay-Sweetwater Unit that are described under Alternative C would also be implemented under Alternative D.

Environmental Education. All of the proposals related to the implementation of environmental education programs on the Refuge, as described under Alternative C, would also be implemented under Alternative D.

Other Public Uses

Trails. As described under Alternative C, many user-created trails and old roads and accessways on the Refuge would be closed and rehabilitated in an effort to protect sensitive Refuge resources and ensure public safety. The generalized trail corridors for the designated trail system proposed for the Otay-Sweetwater Unit under Alternative C are also proposed under Alternative D; however, trails proposed for Lot 707 and Mother Miguel Mountain in Alternative C are not proposed under this alternative. In addition, the multiple use trail proposed for the Las Montañas area under Alternative C, would be restricted to hiking only under Alternative D; with the emphasis of this area focused on birdwatching and the interpretation of the area's natural resources.

As discussed under Alternatives B and C, the exact alignment of the trails proposed under this alternative would be determined during the preparation of a step-down trail plan for the Otay-Sweetwater Unit. The plan would identify the specific trail alignments that collectively would represent the designated trail system for this unit of the Refuge. This plan would also address parking to accommodate trail use and would include a review of current and potential future access points onto the Refuge to ensure that adjacent private lands are not being impacted.

The other proposals related to trails, as described under Alternative B, including assessment and repair or realignment of the county's Sweetwater Loop and River Trail to protect sensitive resources and improve public safety, the establishment of volunteer trail maintenance groups and volunteer trail patrols, and partnering with the county and Caltrans to identify a safe connection between the Sweetwater River Trail and the Par Four Trail would also be implemented under Alternative D.

Under Alternative D, leashed dogs would be permitted on all Refuge trails designated as multiple use, provided they are kept on a six-foot or shorter leash at all times and all waste is picked up and carried off site to an appropriate disposal site. Dogs would not be permitted on hiking-only trails. Approval to bring dogs onto multiple use trails would be conditional and subject to change without notice. Should leash and cleanup requirements be ignored, dogs would no longer be permitted within the Refuge, except as permitted under Refuge hunting regulations.

The trail system described in Alternative B for the Del Mar Mesa Vernal Pool Unit would also be proposed under Alternative D.

Geocaching. Geocaching on the Refuge would not be permitted, but EarthCache sites may be provided as described under Alternative C.

Research. The proposals related to research under Alternative B would also be implemented under Alternative D.

C. Refuge Operations

The proposals related to Refuge operations as described under Alternative C would also be implemented under Alternative D.

D. Fire Management

The fire management strategies proposed under Alternative B would also be implemented under Alternative D.

E. Law Enforcement

Under Alternative D, law enforcement activities would be expanded beyond those described under Alternative A to include the management and regulation of the proposed hunting program. Hunting on the Otay Mesa and Lakes area could be managed by CDFW, as it is located adjacent to State lands open to hunting. These details would be addressed in a step-down hunting plan.

F. Land Acquisition

Land acquisition efforts would continue as described under Alternative A.

G. Cultural Resource Management

Cultural resource management under Alternative D would include all of the actions described under Alternatives A and B.

H. Environmental Contaminants Coordination

Coordination related to environmental contaminants would be the same as that described under Alternative A.

I. Volunteers and Partners

Proposals related to volunteers and partnerships would be the same as those described under Alternatives A and B.

4.5 Alternatives Considered but Eliminated from the Detailed Analysis

The alternatives development process is designed to allow consideration of the widest possible range of issues and potential management approaches. During this process, various objectives and strategies for achieving the goals for the San Diego NWR were considered but not selected for detailed study.

Opening the Entire Otay-Sweetwater Unit for Hunting. Hunting is identified by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act), which amended the National Wildlife Refuge System Administration Act (Administration Act), as one of the six wildlife-dependent recreational uses of a refuge. The overarching goal of the Refuge System wildlife-dependent recreation policy is to enhance opportunities and access to quality visitor experiences on refuges and to manage the refuge to conserve fish, wildlife, plants, and their habitats. Hunting is an important wildlife management tool in achieving this goal and is recognized as a healthy, traditional outdoor pastime, deeply rooted in the American heritage. It is recognized as a priority general public use of the Refuge System that should receive enhanced consideration over non-priority uses. In addition, a guiding principal of the refuge hunt programs is to minimize conflicts with visitors participating in other compatible wildlife-dependent recreational activities including wildlife observation, photography, environmental education, and interpretation.

In an effort to support the goals of the Refuge System and the guiding principles for refuge hunt programs, we considered a range of public use alternatives. A proposal to open the entire Otay-Sweetwater Unit to hunting was not studied in detail for several reasons including the desire to minimize conflicts between hunting activities and visitors participating in other compatible wildlife-dependent recreational activities and the need to minimize disturbance and loss of listed wildlife and plant species within the Refuge.

The Otay-Sweetwater Unit is located within the urban interface, in general proximity to large population areas. As a result, this portion of the Refuge is visited daily by adjacent residents and visitors from throughout the immediate and greater San Diego County area who are participating in wildlife observation, photography, and general trail use. Opening all of this area to hunting under these circumstances would likely result in some level of conflict between users.

Another consideration involved the number of listed species present within the Otay-Sweetwater Unit and the need to close portions of the Refuge to all uses in an effort to achieve the Refuge purpose of conserving listed and threatened species.

Based on all of these considerations, the draft CCP/EA does not address in detail the potential for opening all of the Otay-Sweetwater Unit to hunting. Instead, specific areas within the Refuge have been analyzed as potential hunting areas. This would allow some portions of the Refuge to remain closed to all use; some portions to be open to hunting, and other areas set aside for non-consumptive wildlife-dependent recreational uses. This approach would minimize conflicts between users, as well as minimize disturbance and other impacts to listed and sensitive species.

Opening Portions of the Refuge to Fishing. The potential to provide the public with opportunities for recreational fishing along the Sweetwater River was initially evaluated because fishing is a priority public use, as identified in the National Wildlife Refuge Improvement Act. The refuge is not currently open to fishing, although evidence of fishing activity has been documented along the Sweetwater River, particularly around some year-round pools that exist along the Sweetwater River as it narrows south and west of State Highway 94.

There are several wetland areas on the Refuge: Sweetwater River, which flows through the Sweetwater River and San Miguel Mountain areas of the Otay-Sweetwater Unit; Steele Canyon Creek, an ephemeral drainage with only a few small pools holding water for all or most of the year; and three small stock ponds located along the base of Mother Miguel Mountain, only one of which holds water throughout the year. Of these areas, only the Sweetwater River is known to support game fish.

No native game fish have occurred on the Refuge since the southern steelhead was extirpated from the Sweetwater River watershed (Good et al. 2005). While no specific fish surveys have been conducted on the Refuge, casual observations confirm the presence of four non-native fish species in the Sweetwater River. These include three game fish (i.e., green sunfish, largemouth bass, carp) and western mosquitofish. The non-native species red swamp crayfish and Asian clam are also present in the Refuge.

A review of the existing conditions within and along the river provided adequate justification for not pursuing the establishment of fishing opportunities on the Refuge. These include the lack of native game fish in the Sweetwater River, proposals in the CCP to eradicate the non-native fish and other non-native aquatic species present in the river because they prey on listed and sensitive

species, the presence of listed and other sensitive breeding bird habitat present along the river banks, and the nature of the water flows within the Sweetwater River, which are managed by the Sweetwater Authority. In addition, a number of the listed species present on the Refuge, as well as several species that we propose to re-establish on the Refuge under one or more alternatives, are depend upon the aquatic habitat and associated native wetland plants supported along the Sweetwater River.

Opportunities for fishing are available upstream of the San Diego NWR at Loveland Reservoir, which is open most days throughout the year, and downstream of the San Diego NWR at Sweetwater Reservoir and Otay Lake, both of which are open several days a week throughout the year.

Based on all these factors, the proposal to permit fishing on the Refuge was not selected for detailed study with the draft CCP/EA.

Incorporating All Existing User-Created Trails into the Designated Trail System. Numerous unofficial pathways, old roads, utility easements, and user-created trails currently crisscross the Refuge, including more than 210 miles of user-created pathways and old roads within the Otay-Sweetwater Unit. The effects to refuge resources from trail use can range from soil erosion and degraded water quality to the direct loss of listed or sensitive species. Foot traffic, bicycle tires, and horse hooves can all cause physical impacts on soil surfaces, particularly when the trail surface is damp or wet or the trail grade is steep (Cessford 1995). It is anticipated that trail use within the Refuge will continue to cause soil erosion along some trails until a designated trail system is established, problem trails within the designated system are stabilized and/or rerouted, and poorly laid out pathways are closed and revegetated.

Trail use can also result in wildlife disturbance. The effects of disturbance vary with the wildlife species involved and the type, level, frequency, duration, and time of year that the disturbance occurs. A number of studies conducted to evaluate the effects of trail use on wildlife have found that wildlife observation can “negatively impact wildlife by altering wildlife behavior, reproduction, distribution, and habitat” (DeLong and Schmidt 2000). Human induced avoidance by wildlife can prevent animals from using otherwise suitable habitat (Whittaker and Knight 1998). Knight and Cole (1991) found that behavioral changes caused by disturbance from recreational use can include short-term shifts in habitat use and complete abandonment of disturbed areas in favor of undisturbed sites. Poorly designed or undefined trails can also lead to unauthorized off-trail activity, resulting in damage or loss of vegetation, trampling of invertebrates and reptiles, and/or disturbance or damage to nesting and breeding wildlife.

To minimize the potential for impacts to Refuge resources, particularly listed and sensitive species, the current proliferation of unauthorized, poorly defined trails needs to be eliminated in favor of a designated system of sustainable trails. This designated system of trails would allow large portions of the Refuge to be closed to any public use, while still providing the public with opportunities to experience, observe, and enjoy the resources protected within the Refuge. Maintaining the current configuration of crisscrossing trails would not enable us to achieve the Refuge goal of habitat protection and the Refuge purpose of listed species conservation. Therefore, the draft CCP/EA does not address in detail the potential for incorporating all existing user-created trails into the designated trail system.

Non-lethal Feral Pig Control Methods. This alternative was considered in response to public comments received by the Forest Service on their environmental assessment for Feral Pig Damage Control Project on Cleveland National Forest and Bureau of Land Management Lands (USDA Forest Service 2013). Public comments recommended non-lethal methods of feral pig population control such as pig relocation and sterilization.

Feral pig control efforts have been carried out for many years across the United States and a variety of methods have been tried. Lethal methods are the most widely used and recognized as the most effective means of feral pig control (West et al. 2009). Although in some situations non-lethal methods may be appropriate and effective, in most cases they are not a good option, either because they do not work well or are too expensive (Hamrick et al. 2011a, 2011b). Methods such as relocation of feral pigs are complex, labor intensive, and not practical given the magnitude of the problem (Sweitzer 2003). There are no known facilities in the region that are capable of lawfully handling captured feral pigs for relocation purposes. In addition, wild pigs are known carriers of at least 45 different parasites (external and internal) and diseases (bacterial and viral) that pose a threat to livestock, pets, native wildlife, and in some cases, human health (Hamrick et al. 2011a).

In addition to relocation, other non-lethal methods of control include fertility control, fencing, repellents, and diversionary feeding. Fertility control can be effective in decreasing the numbers of feral hogs in cases where they occur in isolated populations (Massei et al. 2011), however, where immigration and emigration affect the population dynamics, this approach is generally ineffective in addressing ongoing habitat destruction. This approach also requires that the pigs be trapped, injected, and then released back into the native habitat areas. This is costly and fails to address the purpose and need for control, which is to protect sensitive resources and water quality from the adverse effects of pig activity on the Refuge.

The use of enclosure fencing to protect sensitive resource areas does have some benefits, but would not be effective in meeting the overall purpose and need for control, which is to keep all pigs off the Refuge. This is because it would be impractical to fence the entire Refuge and even if it was possible, it would have an adverse effect on public access. Fencing can also result in increased damage to resources in areas adjacent to enclosure fencing.

Other methods such as the use of repellents and diversionary feeding are generally ineffective for large habitat areas. Repellents are only effective for a short time and its use is only practical at a small scale. Similar to fencing, the use of repellents in one area could concentrate damage in adjacent areas (Massei et al. 2011). Diversionary feeding, which is more often considered in agricultural settings, is labor intensive and has the potential to increase reproductive output, which would exacerbate the existing problem.

The exclusive use of non-lethal methods of control would fail to provide a permanent solution to the feral pig problem in the region and would not address the purpose and need for this action. It is for this reason that this alternative was dropped from further consideration and will not be further evaluated in this document.

Distributing Feral Pig Meat for Human Consumption. This alternative was considered in a desire on the part of the Service that feral pig meat should not be wasted. Under this alternative, feral pigs would need to be captured alive and transported to an approved USDA inspected slaughter facility. The closest such facilities for pigs are located in northern California, several hundred miles from the project area. Capturing pigs alive in remote locations with rugged topography,

dense vegetation, and limited access and transporting them to approved slaughter facilities would not be practical or financially feasible given the scale of the project. Therefore, this alternative was not given further consideration.

Use Military or Volunteers to Dispatch Feral Pigs. The alternative that volunteers or military personnel be offered the opportunity to hunt feral pigs was considered in response to public comments received by the Forest Service on their environmental assessment for Feral Pig Damage Control Project on Cleveland National Forest and Bureau of Land Management Lands (USDA Forest Service 2013). The proposal for military personnel to implement the program is not within the direct mission of the military. In addition, if military priorities shift, the program might not be completed. Effective removal of feral pigs from impacted areas requires the consistent presence of trained personnel throughout the control process.

With respect to volunteers, these programs are prone to turnover and participants vary considerably in their skills and physical abilities. In addition, the government assumes liability and is responsible for physical injuries or accidents when incurred as part of official volunteer duties. A single accident could significantly increase the cost of operations. To address issues of safety and efficiency, highly trained and experienced professional sharpshooters are required to carry out pig removal efforts on the Refuge. For these reasons, the use of military or volunteers to implement feral pig control was not considered in detail.

No Aerial Dispatch Alternative. An alternative that addresses feral pig control without an aerial dispatch component (i.e., using trained sharpshooters to remove feral pigs in remote areas using a helicopter) was considered because of public concern about human and animal welfare/humane treatment associated with implementing lethal control of pigs from helicopters. However, we eliminated this alternative from detailed analysis for a variety of reasons, including our need to have access to all available tools to ensure early and complete control of feral pigs on the Refuge.

Although the potential for using this control technique on the Refuge is limited, we believe it is a valuable tool that may be necessary to completely remove feral pigs from Refuge lands. Aerial dispatch could assist in early, effective removal of pigs in inaccessible areas. Further, early control of the pig population will reduce the population numbers and minimize the potential for reproduction, thereby reducing the total number of pigs that would need to be killed.

Concerns about public safety will be mitigated by only using highly trained professionals and by conducting aerial operations in closed or inaccessible areas of the Refuge. This technique is being used elsewhere in the U.S. without human safety incidents. Concerns about noise will be mitigated by operational buffers around developed areas.

4.6 Comparison of the Alternatives for the San Diego NWR by Issue

Summarized in Table 4-5 is an issue-by-issue comparison of the four management alternatives described in this chapter for the San Diego NWR. Additional details are provided through Chapter 4.

Table 4-5 Comparison of Alternatives for the San Diego NWR CCP				
Issue Raised During Public Scoping	Alternative A	Alternative B	Alternative C	Alternative D
<i>Wildlife and Habitat Management</i>				
Cooperatively conserve and manage conserved lands within the Refuge acquisition boundary regardless of ownership	In cooperation with a variety of partners, continue current conservation and management activities (e.g., reduce off-road vehicle activity; address illegal trespass, dumping, homeless encampments; species and habitat surveys; MSCP monitoring protocols).	Implement management activities on the Del Mar Mesa Vernal Pool Unit in accordance with the proposed Carmel Mountain and Del Mar Mesa Preserves Management Plan; on the Otay-Sweetwater Unit, continue to work with existing partners and seek additional partners as necessary to ensure seamless management of adjacent conserved lands.	Same as Alternative B	Same as Alternative B
Conduct habitat and species monitoring and surveys in accordance with accepted methods and protocols	Conduct MSCP protocol surveys for native habitat and listed species; conduct opportunistic inspections for San Diego thornmint, Hermes copper, and other species.	Same as Alternative A plus expand current species and habitat monitoring to include monitoring of population trends for least Bell's vireo, monitoring per approved protocols for Tecate cypress, Riverside fairy shrimp, and Thorne's hairstreak; expand the areas monitored for Quino checkerspot butterfly; and periodically monitor oak stands for signs of insect infestations and/or introduced plant pathogens.	Same as Alternative B	Same as Alternative B
Control invasive plant and animal species	Continue to control invasive weedy plants in recent burn areas, riparian areas, and habitat restoration or enhancement areas.	Control invasive plants and aquatic animals through an integrated approach to pest management; partner with other agencies to monitor and control of wild turkey and wild pig on the Refuge.	Same as Alternative B	Implement an IPM Plan, per Alternative B, and monitor and, if necessary, eradicate feral pigs from the Refuge.

**Table 4-5
Comparison of Alternatives for the San Diego NWR CCP**

Issue Raised During Public Scoping	Alternative A	Alternative B	Alternative C	Alternative D
Restore and enhance native habitats	On the Otay-Sweetwater Unit, continue to maintain existing restoration and enhancement projects, including vernal pool restoration, control of non-native weeds in recent burn areas, cactus revegetation sites, Otay tarplant enhancement, and others.	Same as Alternative A plus seek funding to: improve coastal sage scrub and vernal pool habitat by controlling non-native weeds and restoring key species; reestablish native grasslands; restore and enhance Quino checkerspot butterfly habitat; and enhance riparian and other wetland habitat on the Otay-Sweetwater Unit. Assist in the implementation of species and habitat management actions proposed for the Del Mar Mesa Reserve (refer to Table 4-3).	Same as Alternative B	Same as Alternative B
Expand occurrences and/or reintroduce appropriate listed and sensitive species on the Refuge	On the Otay-Sweetwater Unit, continue current management efforts to support listed species, including enhancing habitat quality to support Otay tarplant; protecting existing populations of San Diego ambrosia; and protecting and enhancing vernal pool habitat.	Same as Alternative A plus establish additional populations of Mexican flannelbush; create and install artificial bat roosting habitats; install burrowing owl boxes; and enhance various wetland habitats to support arroyo toad, red-legged frog, and southwestern pond turtle.	Same as Alternative B	Same as Alternative B
Monitor groundwater and surface water quality and quantity	No monitoring is currently occurring on the Refuge.	Seek funding to conduct periodic surface water quality monitoring and annual monitoring of groundwater levels in riparian and oak woodland habitats.	Same as Alternative B	Same as Alternative B

**Table 4-5
Comparison of Alternatives for the San Diego NWR CCP**

Issue Raised During Public Scoping	Alternative A	Alternative B	Alternative C	Alternative D
Implement fire management actions to protect sensitive habitat and listed species	Implement full suppression.	Support the use of prescribed burning as a fire and habitat management tool (An updated Fire Management Plan is required before this can be implemented.)	Same as Alternative B	Same as Alternative B
Public Use				
Open the Refuge to hunting	Hunting is not permitted on the Refuge.	Refuge would remain closed to hunting.	Open portions of the Refuge to hunting including 160 acres on the Otay Mesa and Lakes Area; as well as hunting of rabbit, dove, and quail on a portion of the Las Montañas area (about 300 acres) and a portion of the McGinty Mountain area (about 400 acres). Bowhunting of deer also proposed for a portion of the McGinty Mountain area. Specific regulations will be developed as part of a step-down hunt plan.	Open 160 acres on the Otay Mesa and Lakes Area to hunting. Specific regulations will be developed as part of a step-down hunt plan.
Provide an opportunity for fishing	Fishing is not permitted on the Refuge.	Same as Alternative A.	Same as Alternative A	Same as Alternative A
Maintain current trails for multiple use	Only the Sweetwater River and Loop Trail and the Par Four Trail are officially recognized Refuge trails; all other trails are subject to closure or rerouting.	Both multiple use and pedestrian-only trails will be provided within designated trail corridors. All existing user-created trails are subject to closure, realignment, or rehabilitation.	Same as Alternative B, although the number of trails and permitted trail uses would vary.	Same as Alternative B, although the number of trails and permitted trail uses would vary.

Table 4-5 Comparison of Alternatives for the San Diego NWR CCP				
Issue Raised During Public Scoping	Alternative A	Alternative B	Alternative C	Alternative D
Expand public use opportunities, particularly for wildlife observation, photography, environment education, and interpretation	Maintain and support the existing wildlife-dependent recreational uses on the Refuge.	Within the Otay-Sweetwater Unit, facilitate wildlife observation and photography from a designated trail system; install a photo blind adjacent to a pond in the San Miguel Mountain area; expand interpretive signage near the Sweetwater River; and expand the existing environmental education program; and provide interpretive materials in kiosks at trailheads. Assist in the implementation of interpretive signage on Del Mar Mesa in accordance with the City's approved management plan for the larger preserve.	Same as Alternative B plus create an interpretive trail on Lot 707, a vernal pool interpretive trail on the Shinohara parcel; and develop an interpretive program involving the EarthCache sites.	Same as Alternative B plus create a vernal pool interpretive trail on the Shinohara parcel; develop an interpretive program involving the EarthCache sites; and develop a birding trail and interpretive program for the Las Montañas area.
Establish a designated trail system for the Refuge and develop a trail sign plan	A designated system of trails is not currently in place for the Refuge. The county Sweetwater River and Loop Trail and the Par Four Trail used by equestrians and others are currently the only authorized trails on the Refuge. These trails are available for non-motorized multiple uses (i.e., hiking, biking, horseback riding).	For the Otay-Sweetwater Unit, general corridors within a designated trail system are proposed with specific alignments to be determined during step-down trail planning. A wayfinding and trail sign plan will also be developed during step-down planning. Trails will be a combination of multiple use regional trails and pedestrian-only trails. On the Del Mar Mesa Vernal Pool Unit, trails will be provided consistent with those shown in the City's draft management plan.	Same as Alternative B, although the number of trails and permitted trail uses would vary.	Same as Alternative B, although the number of trails and permitted trail uses would vary.

**Table 4-5
Comparison of Alternatives for the San Diego NWR CCP**

Issue Raised During Public Scoping	Alternative A	Alternative B	Alternative C	Alternative D
Permit geocaching on the Refuge	Placing traditional geocaches on the Refuge is not permitted. Caches are removed when identified.	Same as Alternative A plus implement the procedures developed by Groundspeak to inform cache owners when a cache is removed from the Refuge.	Same as Alternative B plus develop a Refuge-sponsored geocaching program, possibly "EarthCache" sites, that would be a component of the Refuge's interpretive program.	Same as Alternative C
Provide a visitor center on the Refuge	There is currently no visitor center for the San Diego NWR.	Seek funds to design and construct visitor facilities in the Sweetwater River, including a temporary visitor contact station, restrooms, parking, trailhead, and interpretive elements.	Seek funds to design and construct visitor facilities in the Sweetwater River; including a refuge office, permanent visitor contact station, restrooms, parking, trailhead, and interpretive elements.	Same as Alternative C
Provide opportunities for research that will benefit Refuge management and species and habitat conservation	Research projects that can provide benefits to the Refuge are permitted via the issuance of a Special Use Permit.	Work with academic institutions and other public, private, and non-profit researchers to expand the kinds of research projects being implemented on the Refuge to address a wider range of issues affecting Refuge management and species conservation.	Same as Alternative B	Same as Alternative B
Refuge Operations				
Identify and protect cultural resources	All applicable regulations and policies related to the protection of cultural resources are followed.	Same as Alt. A. plus pursue with the Kumeyaay Cultural Repatriation Committee a MOU to address the actions required in the event of a NAGPRA-related discovery on the Refuge.	Same as Alternative B.	See Alternative B, in addition, the control of feral pigs would reduce the threat of disturbance from pig activity to subsurface cultural resources

Table 4-5 Comparison of Alternatives for the San Diego NWR CCP				
Issue Raised During Public Scoping	Alternative A	Alternative B	Alternative C	Alternative D
Clear post Refuge boundaries and secure entry points to reduce unauthorized access	Boundary signs are installed or replaced as necessary; partnerships exist with adjacent property owners to secure entry points onto the Refuge through adjacent parcels.	Install additional signs to ensure that all boundaries are clearly posted, and install new fencing and gates as needed.	Same as Alternative B	Same as Alternative B
Expand the current volunteer program	Volunteers are currently managed in partnership with other entities.	Add one full-time equivalent (FTE) community outreach position to the Refuge Complex staff, with 0.5 FTE devoted to volunteer assistance at the San Diego NWR.	Same as Alternative B	Same as Alternative B
Continue acquisitions within acquisition boundary from willing sellers	Opportunistic acquisition of parcels from willing sellers continues per available funding.	Focus acquisition from willing sellers on parcels within MSCP-designated core areas and in areas identified by the MSCP as important linkages between core areas.	Same as Alternative B	Same as Alternative B