United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ventura Fish and Wildlife Office
2493 Portola Road, Suite B
Ventura, California 93003

IN REPLY REFER TO:
08EVEN00-2012-F-0182

February 04, 2015

Beatrice L. Kephart
Installation Management Flight (30 CES/CEI)
1028 Iceland Avenue
Vandenberg Air Force Base, California 93437

Subject: Biological Opinion on the Beach Management Plan and Water Rescue Training at Vandenberg Air Force Base (2014-2018) (8-8-12-F-11R)

Dear Ms. Kephart:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the U.S. Air Force's (Air Force) proposed beach management plan at Vandenberg Air Force Base (Vandenberg AFB) and its effects on the federally threatened Pacific Coast population of western snowy plover (*Charadrius nivosus nivosus*) and California red-legged frog (*Rana draytonii*), and the endangered El Segundo blue butterfly (*Euphilotes battoides allyni*) and California least tern (*Sterna antillarum browni*), in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). We received your February 9, 2012, request for formal consultation on February 10, 2012.

This biological opinion is based on information that accompanied your request for consultation (Air Force 2012a), including electronic mail and telephone conversations between our staff, and information in our files. We based this biological opinion on information contained in your previous requests for formal consultation and subsequent biological opinions (1-8-01-F-13, 1-8-02-F-7, and 1-8-03-F-13) for the beach management program at Vandenberg AFB. Additionally, we have reviewed previous amendments to the beach management program, in which you requested minor changes that did not rise to the level of requiring informal or formal consultation, and concurrence letters pertaining to the incorporation of additional areas to conduct beach restoration activities. We can make a complete record of this consultation available at the Ventura Fish and Wildlife Office.

You requested reinitiation of consultation regarding the biological opinion for the beach management plan (1-8-05-F-5R) to include water rescue training and coastline familiarization. You determined that the water rescue training may affect, and is likely to adversely affect, western snowy plovers and California red-legged frogs and may affect, but is not likely to adversely affect, the El Segundo blue butterfly.

You also determined that the water rescue training and coastline familiarization may affect and would likely adversely affect federally threatened southern sea otters (*Enhydra lutris nereis*). However, upon further discussions between our staffs regarding ways in which the Air Force could minimize effects to sea otters, you proposed to incorporate conservation measures into the project description that would avoid adversely affecting southern sea otters. You therefore revised your determination and concluded that water rescue training and coastline familiarization activities may affect, but are not likely to adversely affect, southern sea otters (Air Force 2013a).

Description of Water Rescue Training and Coastline Familiarization

The Air Force proposes to conduct water rescue training and coastline familiarization. For water rescue training, the Air Force would establish four areas on Base; two areas on North Base and two areas on South Base. The Vandenberg AFB Fire Department (Fire Department) would carry out these training activities, which could occur at any of four sites, but not all of them at the same time. The proposed training areas on North Base include the areas that are open to recreational use at Wall and Minuteman Beaches. The proposed training areas on South Base include the mouth of Honda Creek and the primary launch site at the Base's boat harbor south of Point Arguello.

The Fire Department would conduct training on the use of personal watercraft (PWC) and victim rescues within static water beyond the surf zone and in the surf line. Water rescue training would be restricted to within 0.5 mile (0.8 km) of the launch point; however, if the PWCs are launched from Minuteman Beach they would come back to Wall Beach due to the steep slope at Minuteman Beach. Utility vehicles would transport the PWC to the training areas or a hoist would lower the PWC into the boat harbor. Generally, one site is used per month and the training would occur year round. Training activities may occur for a maximum of two consecutive days. Up to 20 people could participate per day at each site.

Coastline familiarization would consist of personnel operating PWC up and down the coast between the Boat House and Jalama Beach to become familiar with the coastline in the event of an emergency rescue situation. The Air Force proposes to implement a suite of avoidance and minimization measures as part of the project description for this activity.

The launch site of PWC at the boat harbor is the only site out of the four training areas that is near a resident breeding colony of southern sea otters off the coast of Vandenberg AFB; however, the entire Vandenberg AFB coastline is within the range of the southern sea otter. Specifically, southern sea otters occur within and outside of the boat harbor, and a known resting/rafting area is present off the coast of the Base near Sudden Flats. Therefore, the Air Force proposes measures to avoid adversely affecting sea otters when conducting water rescue training and coastline familiarization. A qualified biologist familiar with the sea otter population off the coast of Vandenberg AFB will conduct a pre-activity briefing for project personnel that will: (a) describe the suite of measures below that the Air Force proposed to avoid adversely affecting sea otters; (b) provide a description of southern sea otters, their habitat, and where they are known to occur off the coast of Vandenberg AFB; (c) describe the temperature and metabolic

stress that sea otters are under and the impacts that result from disturbing resting sea otters; and (d) inform them that southern sea otters are not to be adversely affected by the project activities.

Additional measures to avoid adversely affecting sea otters include:

1. A qualified biologist will monitor all training activities in areas occupied by southern sea otters (e.g., Boat Harbor and Sudden Flats);

2. The biologist will survey the training areas prior to training activities to ensure southern sea otters are not present; and

3. Launching of training equipment (PWC) will not occur if southern sea otters are present within the launch site;

4. The biologist will ensure that training activities are not conducted within 328 feet (100 meters) from resting or rafting sea otters.

In addition to the pre-activity briefing that will be provided to project personnel by a qualified biologist, the Air Force will implement the following measures to avoid adversely affecting southern sea otters while conducting coastline familiarization activities:

1. Personnel operating the PWC will maintain speeds of no more than 17 miles per hour (15 knots) within depths of less than approximately 131 feet (40 meters);

2. A qualified biologist will monitor all project activities to ensure the PWC do not adversely affect sea otters;

3. The PWC will maintain a minimum 328-foot (100-meter) buffer around all kelp beds (*Macrocystis* spp.) and known sea otter rafting areas;

4. All PWC will have global positioning systems (GPS) units to ensure that project personnel are staying within the designated pathway and outside of the 328-foot (100-meter) buffer; and

5. The biological monitor will have the authority to halt all project activities if sea otters are observed within the pathway of the PWC, if personnel are not complying with the measures to avoid adversely affecting sea otters, or if the activities are affecting sea otters in a manner not discussed herein.

<u>Determination for the El Segundo Blue Butterfly, California Red-legged Frog, California Least Tern, and Western Snowy Plover</u>

For El Segundo blue butterfly, seacliff buckwheat (*Eriogonum parvifolium*)[1] plants, which are

1 Seacliff buckwheat and coast buckwheat are common names for *Eriogonum parvifolium*

host plants to the El Segundo blue butterfly, occur within and adjacent to the tertiary access road that the Fire Department would use during the water rescue training activities (specifically, accessing the launch site at the Honda Creek mouth). The Air Force has conducted multiple surveys (according to the standardized methods from El Segundo blue butterfly 10(a)(1)(A) Recovery Permits) along this road but has not observed any El Segundo blue butterflies during these surveys. Seacliff buckwheat plants at this location along the access road have not been determined to be occupied and thus would generally fall within habitat currently recognized as suitable but unknown to be occupied. However, because the Air Force conducted surveys over multiple years using the standardized methods found in the El Segundo blue butterfly recovery permit, the preponderance of evidence suggests that El Segundo blue butterflies are not present along the tertiary access road to the mouth of Honda Creek for water rescue training purposes. Therefore, we concur with your determination that the water rescue training activities are not likely to adversely affect El Segundo blue butterflies.

For California red-legged frogs and western snowy plovers, water rescue training may adversely affect these species in a manner not previously analyzed in the existing biological opinion. Therefore, we analyze the effects of the water rescue training on California red-legged frogs and western snowy plovers in this biological opinion. California least terns would not be affected by water rescue training. Additionally, coastline familiarization would not affect El Segundo blue butterfly, California red-legged frog, California least tern, or western snowy plover.

Determination for the Southern Sea Otter

Because southern sea otters occur within the area of the boat harbor and between the boat harbor and Jalama Beach, the water rescue training activities and coastline familiarization activities have the potential to adversely affect sea otters. Southern sea otters are mobile while foraging and forage in the open ocean nearby the coastline. An approaching PWC may cause an otter to flush from preferred foraging areas or cause it to forage elsewhere. However, because sea otters are mobile while foraging, the effect of a PWC causing an otter to flush while foraging is not likely to rise to the level of being adverse (L. Carswell, pers. comm. 2013). Affecting resting otters that may be rafting in kelp beds within the project area is a much greater concern due to the metabolic stress resulting from disturbing resting otters. Therefore, to avoid adversely affecting sea otters while conducting the water rescue training and coastline familiarization activities, the Air Force proposes to implement the suite of measures stated above as part of the project activities. Because the measures that the Air Force will implement would provide enough protection to avoid adversely affecting resting or rafting sea otters, we concur with your final determination that the water rescue and coastline familiarization activities, as proposed, may affect, but are not likely to adversely affect, southern sea otter.

We do not discuss coastline familiarization further because it would not affect the species on which we are formally consulting in this biological opinion (El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover).

Incorporating the Management of the California Least Tern Colony at Purisima Point into the Beach Management Plan

As part of the reinitiation of this consultation, and in agreement with the Air Force, we have added the management of the California least tern colony on Vandenberg AFB. The management program was first described in the biological opinion we issued on January 11, 1999, for the Delta II launch program at Space Launch Complex 2 (SLC-2) and Taurus launch program at 576-E (1-8-98-F-25R). Subsequently, we issued a programmatic biological opinion (8-8-09-F-10) in September 2011, which superseded the previous biological opinion (1-8-98-F-25R). Because the management of the California least tern colony at Purisima Point aligns more with the beach management program than the launch program it is currently managed under, we incorporated the management of the California least tern colony into the beach management program analyzed in this biological opinion.

The effects of launches from Vandenberg AFB on California least terns were analyzed in the previous biological opinions (1-8-98-F-25R and 8-8-09-F-10); therefore, we are not repeating that analysis herein. In this biological opinion, we only describe the activities associated with the management of the California least tern colony, which includes the maintenance of fencing around the Purisima Point colony, predator management, and nest monitoring activities. Therefore, in this biological opinion we include a description of the California least tern management program, status of the species, an environmental baseline, and an effects analysis that pertains to the management of the colony. Consolidating the management programs for the California least tern and western snowy plover should lead to managing these species and their habitat efficiently under one program and reporting the programs' effects within one document.

Beach Restoration Activities

The Air Force developed a comprehensive plan to restore western snowy plover habitat on Vandenberg AFB (Restoration Plan). The Air Force would conduct the restoration actions outside of the western snowy plover and California least tern breeding seasons. They proposed to remove approximately 62 acres (25 hectares) of European beachgrass and 2 to 3 acres (0.8 to 1.2 hectares) of iceplant from four areas (areas A-D) (Air Force 2005) to compensate for the adverse effects caused by allowing recreational access in 1.25 miles (2.0 kilometers (km)) of western snowy plover nesting habitat (see Description of the Proposed Action section below). A goal of the beach restoration plan is to increase the amount of breeding habitat available for western snowy plovers and California least.

In 2011, the Air Force requested including Wall Beach in the restoration area and proposed to use herbicide to selectively, chemically treat 4 acres (1.6 hectares) of European beachgrass and 18 acres (7.3 hectares) of iceplant. The Air Force determined that the restoration activities may affect, but were not likely to adversely affect, the western snowy plover, California least tern, California red-legged frog, El Segundo blue butterfly, and tidewater goby (Air Force 2011). We concurred with the Air Force's determination on October 13, 2011. As part of this current

request for consultation, the Air Force proposes to conduct restoration activities within any suitable habitat for California least terns and western snowy plovers on Vandenberg AFB (Air Force 2013a).

Determinations for the El Segundo Blue Butterfly, California Red-legged Frog, Tidewater Goby, Western Snowy Plover, and California Least Tern

Western Snowy Plover and California Least Tern

Restoring suitable habitat could have a beneficial effect on the western snowy plover and California least tern by enhancing the quality and availability of habitat. The U.S. Bureau of Land Management cleared 167 acres of nonnative vegetation on the North Spit of Coos Bay, Oregon, and snowy plovers used many of the cleared areas almost immediately for nesting and brood rearing (Service 2007). However, it may take many years to eliminate nonnative plants from suitable habitat areas and there is potential that western snowy plovers may never move into restored areas for nesting.

All restoration activities would occur outside of the breeding season for western snowy plovers and California least terns. Thus, the Air Force would avoid adverse effects to the breeding population that could result if these activities would occur during the breeding season. To date, restoration activities have not adversely affected western snowy plovers or California least terns. A qualified biological monitor will oversee the restoration activities to ensure that foraging behavior of wintering snowy plovers is not adversely affected. California least terns would not be present at restoration sites outside of the breeding season. Therefore, because the restoration would be conducted outside of the breeding season, and the Air Force has proposed measures to avoid adversely affecting wintering western snowy plovers, we concur with your determination that the proposed restoration activities would not adversely affect western snowy plovers or California least terns.

El Segundo Blue Butterfly

As noted previously, we concurred with your determination on October 13, 2011, that the restoration activities at Wall Beach are not likely to adversely affect El Segundo blue butterflies (Air Force 2011). We concurred because you proposed to cover and avoid seacliff buckwheat plants when chemically treating and removing invasive plants at this location . However, considering that the restoration areas analyzed under this biological opinion would include mechanical, manual, chemical, and controlled burning removal methods within all western snowy plover and California least tern habitat on Vandenberg AFB, including areas containing seacliff buckwheat, we do not concur that the beach restoration activities are not likely to adversely affect El Segundo blue butterfly. Controlled burning activities would likely remove seacliff buckwheat plants in some of the restoration sites because buckwheat plants occur scattered within stands of the invasive species targeted for removal. Therefore, we analyze the effects of beach restoration activities to El Segundo blue butterflies in the biological opinion below.

California Red-legged Frog and Tidewater Goby

The restoration activities would not occur within wetland or riparian areas, and the Air Force proposed protective measures to avoid adversely affecting these species. On October 13, 2011, we concurred with your determination that the restoration activities are not likely to adversely affect California red-legged frogs or tidewater gobies (Air Force 2011).

CONSULTATION HISTORY

The history of consultation concerning the beach management program and recreational access at Vandenberg AFB and its effect on western snowy plovers dates back to 1995. We have issued numerous biological opinions analyzing effects of the beach management program at Vandenberg AFB. During the 2001 breeding season, the Air Force proposed a beach management program that formed the basis of the plan as it currently exists. We are not providing a complete consultation history in this biological opinion, but we include a brief discussion of the beach management program since the 2001 breeding season.

Beach Management

On March 9, 2001, we issued a biological opinion (1-8-01-F-13) to the Air Force for their proposed beach management plan for the 2001 western snowy plover breeding season. The Air Force's proposed action allowed unrestricted recreational beach access to 1.25 miles (2.01 km) of western snowy plover habitat during the 2001 breeding season (the same area that was open to recreational access during the 2000 breeding season). Public access would be available to approximately 0.5 mile (0.8 km) of Surf Beach, military access would be available at the northernmost 0.25 mile (0.4 km) of Wall Beach and the northernmost 0.5 mile (0.8 km) of Minuteman Beach. Military recreational access in this context included active duty military and their dependents, retired military and their dependents, Department of Defense and Vandenberg contractor employees. The Air Force has authorized access for saltwater fishing at Minuteman Beach and for active duty military at Wall Beach through an agreement with the State of California regarding the Vandenberg State Marine Reserve. The Air Force proposed to close all other sandy beaches on Vandenberg AFB during the breeding season (March 1 to September 30) and proposed to fence and sign the closed sections of beach As part of the 2001 management plan, the Air Force proposed to close Surf Beach to all recreational access for the remainder of the breeding season if they document more than 25 violations of the closed area at Surf Beach within one breeding season. indicating the reason and timing of the closure. Fencing would run perpendicular to the ocean from the back dunes to at least the mean high tide line. The Air Force proposed to remove the fencing, in whole or in part, at the end of the breeding season. Similarly, the Air Force would close Wall and Minuteman Beaches if more than 10 and 5 violations, respectively, occur within one breeding season.

On December 21, 2001, we issued a biological opinion (1-8-02-F-7) for the beach management plan during the 2002 western snowy plover breeding season. The beach management plan was the same as proposed during the 2001 breeding season. However, in a letter dated July 26, 2002,

we concurred with the Air Force's determination that increasing the violation limit at Surf Beach from 25 to 40 would not result in additional adverse effects. In a letter dated October 2, 2002, we concurred with Air Force's determination that eliminating the wintering closure at the mouth of the Santa Ynez River would not require reinitiation of consultation. Apparently, when the closure at the Santa Ynez River mouth has been in place, western snowy plovers have not been observed roosting in the area on a regular basis or in large numbers, and the Air Force indicated that the closure was hard to maintain.

On May 12, 2003, we issued another biological opinion (1-8-03-F-13) for the beach management plan for the 2003 breeding season that was the same as the year before. Likewise, the 2004 beach management plan was the same as proposed previously.

In 2004, we had a series of meetings with the Air Force to discuss the beach management strategy going forward. Through a cooperative effort, we agreed on a proposed 5-year beach management plan that would include many of the same protective measures that have been in place during the previous three breeding seasons, yet would allow the Air Force to provide recreational access to its beaches 7 days a week.

On March 1, 2005, we issued a biological opinion (1-8-05-F-5R) for the beach management plan for the 2005 through 2009 breeding seasons. This plan included an increase of the violation limits at Surf and Minuteman Beaches during the 5-year plan. Violation limits at Surf Beach were increased from 40 to 50, and increased from 5 to 10 at Minuteman Beach. During the 5-year period this biological opinion was in effect, we have consulted with the Air Force to make minor adjustments to some management actions; these minor amendments did not reach the level of triggering additional formal or informal consultation.

In 2010, the Air Force proposed renewing the beach management plan to be effective from 2010 through the 2014 breeding season. The Air Force proposed four changes to update the project description that included to: (1) remove temporary shelters for enforcement personnel; (2) discontinue the use of satellite phones for monitors facilitating communications with enforcement personnel; (3) allow the Air Force to trap and remove corvids near western snowy plover habitat and coordinate all predator management activities instead of using U.S. Department of Agriculture's Wildlife Services to conduct these activities; and (4) use infrared-triggered still cameras only in areas with identified predation issues. On March 2, 2010, we determined that the proposed changes to the project description would not result in any additional adverse effects beyond the effects analyzed in the biological opinion. Therefore, we extended the beach management plan to be effective through the 2014 breeding season.

Beach Restoration Plan

The Air Force developed a comprehensive plan to restore western snowy plover habitat on Vandenberg AFB (Restoration Plan) to compensate for the adverse effects of allowing recreational access on 1.25 miles (2.01 km) of western snowy plover habitat. The Air Force

proposed to eradicate nonnative dune vegetation within western snowy plover habitat (Air Force 2005; see Description of the Proposed Action section below).

In 2007, you requested our concurrence that conducting beach restoration activities at areas A-D identified in the Restoration Plan was not likely to adversely affect the El Segundo blue butterfly. In a letter dated December 19, 2007, we concurred with your determination because you proposed to conduct the restoration activities outside of the flight season, avoid affecting seacliff buckwheat plants by placing a protective cover over all seacliff buckwheat plants that may be subject to herbicide, and we only considered the effects of mechanical, manual, and chemical restoration methods.

In 2011, you requested to amend the beach management plan (l-8-05-F-5R) to include beach restoration at Wall Beach, between the parking lot and the mouth of the Santa Ynez River. In a letter, dated October 13, 2011, we concurred with your determination that the restoration activities at Wall Beach would not result in adverse effects to the western snowy plover beyond what we had previously analyzed under the biological opinion. We also concurred with your determination that restoration at Wall Beach is not likely to adversely affect the El Segundo blue butterfly, California red-legged frog, tidewater goby, and California least tern. However, as discussed above, we do not concur with your determination that the additional proposed beach restoration activities in all western snowy plover habitat are not likely to adversely affect El Segundo blue butterflies.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The biological opinion consists of two main elements: (1) beach management plan, which includes access and enforcement, predator management, and beach restoration activities; and (2) water rescue training.

Beach Management

Beach Access and Enforcement

For the purposes of this biological opinion, beaches where the proposed activities would occur on Vandenberg AFB are divided into three sections: 1) North Beaches (6.2 miles) (10 km) extending from the north end of Minuteman Beach south to the rocky shore that extends north from Purisima Point; 2) Purisima Beaches (2.6 miles) (4.2 km) encompass the sandy pocket beaches, rocky beaches and dune areas adjacent to Purisima Point, including the Purisima Point least tern colony; and 3) South Beaches (5 miles) (8 km) encompass sandy coastline habitat predominately consisting of small dunes and narrow beaches backed by sheer and vegetated bluffs. North Beaches are subdivided into four sectors: 1) Minuteman, 2) Shuman North, 3) Shuman South, and 4) San Antonio. Purisima Beaches are subdivided into two sectors: 1)

Purisima North, and 2) Purisima Least Tern Colony. South Beaches are subdivided into three sectors including: 1) Wall, 2) Surf North, and 3) Surf South (Appendix A).

Western Snowy Plover

The Air Force proposes to allow recreational beach access to 1.25 miles (2.01 km) of approximately 13.8 miles (22.2 km) of suitable nesting habitat on Vandenberg AFB during the 2014-2018 breeding seasons (open areas) (the same area that was open to recreational access during the 2000-2013 breeding seasons) and for any year thereafter that the Air Force and the Service agree to extend this biological opinion. All other sandy beaches determined to be western snowy plover and California least tern habitat on Vandenberg would be closed during the breeding season (closed areas) (March 1 to September 30).

Open Areas

The open section of Surf Beach at Surf North would extend from the closure fence that the Air Force first installed in July 1999 and continue north approximately 0.5 mile (0.8 km). The Air Force established the northern boundary to protect the cluster of several nests that typically occur near this boundary. Public access is available within the open area at Surf Beach. Recreational users (e.g. walking and surfing) may access Surf Beach either through the existing access trail at the Surf Station parking lot or by a trail through the back dunes from the Ocean Beach parking lot to Surf Station. A public access road through Vandenberg (Ocean Avenue) makes Ocean Park and Surf Station accessible to the public. Access to the open area at the northernmost 0.25 mile (0.4 km) of Wall Beach is adjacent to the boundary fence. Access to the open area at the northernmost 0.5 mile (0.8 km) of Minuteman Beach is at the bluff-backed beach north of the existing access trail, where western snowy plover nesting has not been known to occur. The Air Force would close Minuteman Beach south of the access trail. Military recreational access would be available at portions of Wall and Minuteman Beaches. Military recreational access in this context includes active duty military and their dependents, retired military and their dependents, Department of Defense and Vandenberg contractor employees. The Air Force authorizes access for saltwater fishing Minuteman Beach and for active duty military at Wall Beach.

Closed Areas

The Air Force would close approximately 12.55 miles (20.2 km) of Vandenberg AFB's coastal sand beaches and adjacent dunes to recreational access during the breeding season (March 1 to September 30). The Air Force previously used drift fencing and signs to demarcate the closed section of the beaches, but currently utilizes strands of yellow rope along with signs that indicate the reasons and timing of the closure. These boundary ropes run perpendicular to the ocean from the back dunes to at least the mean high tide line. The Air Force opens the "closed areas" to public access, with restrictions (see minimization measure #7 below), at the end of the breeding season when all western snowy plovers have fledged.

California Least Tern

The Air Force delimits the California least tern colony at Purisima Point with an electric fence and does not permit public access or recreational activities in this area during the breeding season. The Air Force strictly enforces any violation of the restriction. Additionally, if California least terns recolonize historical, or establish new nesting sites on Base, the Air Force would likely afford those sites the access and recreational restrictions that would be in place to protect western snowy plovers.

Avoidance and Minimization Measures for the Western Snowy Plover and California Least Tern

The Air Force proposes to implement the following measures to minimize human disturbance and potential intrusion into areas closed during the western snowy plover and California least tern breeding seasons:

1. The Air Force will place fencing and bilingual (English and Spanish) signs to delineate closed beach and dune areas. Fencing (strands of yellow rope) in beach areas will be erected perpendicular to the shoreline and will extend from as close to the water as practicable to the upper dunes.

2. The Air Force will inspect fences throughout the breeding season to assess the need for maintenance. Individuals responsible for repairing damaged fences will coordinate with the biological monitors to avoid adversely affecting western snowy plovers and least terns during fence maintenance activities.

3. The Air Force will provide animal-proof trash containers in convenient locations near entrances to all open beach areas and will empty and clean the containers as needed to minimize attracting predators.

4. The Air Force will make routine beach inspections to remove any trash from open beach areas.

5. The Air Force will present the established educational program to all base personnel and contractors who may use beaches for recreation. This program will:

    a. describe and illustrate the behavior of the western snowy plover and its distribution and habitat on Base;
    b. describe threats to the western snowy plover;
    c. describe the adverse effects of feeding wildlife;
    d. explain seasonal access restrictions of certain areas;
    e. show examples of signs describing beach restrictions;
    f. explain the penalties for not obeying restrictions;
    g. provide maps showing restrictions; and

h. identify the proper contact if an injured or dead western snowy plover or California least tern is found.

6. The Air Force will distribute an educational brochure to the public, as needed.

7. The following prohibitions will be in effect for all of Vandenberg AFB beaches during the nonbreeding season (from approximately October 1 to February 28):

   a. overnight camping is prohibited;
   b. pets must be on a leash at all times;
   c. littering is prohibited;
   d. fireworks are prohibited; and
   e. recreational off-road vehicles (ATVs and utility vehicles) are prohibited, unless used for the sole purpose of the Fire Department to transport personal watercraft (PWC) to specific launch sites (see Water Rescue Training)

8. The following prohibitions will be in effect for all of Vandenberg AFB's western snowy plover and California least tern beaches during the breeding season from March 1 to September 30:

   a. beach fires are prohibited;
   b. pets are prohibited;
   c. overnight camping is prohibited;
   d. littering is prohibited;
   e. recreational off-road vehicles are prohibited, unless used for the sole purpose of the Fire Department to transport PWC to specific launch sites (see Water Rescue Training);
   f. fireworks are prohibited;
   g. horses are prohibited
   h. windsurfing and/or parasailing is prohibited; and
   i. kite flying is prohibited.

9. Overflight restrictions will include a minimum 500-foot (152-meter) altitude above western snowy plover nesting areas and 1,900-foot (579-meter) altitude over the least tern nesting area at Purisima Point. Flight patterns are established to minimize aircraft presence over these areas

10. The Air Force's enforcement officers will issue citations, at their discretion, to all persons found violating the beach access restrictions.

11. Enforcement of beach access will be conducted as follows: (a) enforcement personnel will patrol beaches during both open and closed periods; and (b) enforcement efforts will emphasize personnel presence when and where it is most needed (i.e., where violations are occurring or are deemed most likely to occur), and will be adjusted to times and locations

12. where violations are occurring. The Air Force will conduct patrols on foot and only on wet sand in closed areas to the maximum extent practicable.

13. If the Air Force documents 50 violations of the closed area of Surf Beach (including Ocean Park) in any one breeding season, Surf Beach will be closed to all recreational access for the remainder of the western snowy plover breeding season. If the Air Force documents 10 violations of the closed area at Wall Beach in any one breeding season, Wall Beach will be closed to all recreational access for the remainder of the breeding season. If the Air Force documents 10 violations of the closed area at Minuteman Beach in any one breeding season, Minuteman Beach will be closed to all recreational access for the remainder of the breeding season.

Violations of Beach Closure Rules

The Air Force will determine violations based on individuals found in closed areas or by evidence of such intrusion based on footprints in closed areas. Violations of beach closures will be determined in the following manner:

1. Each individual found in a closed beach area will count as a single and separate violation. Multiple persons in a closed area will count as multiple violations. However, if multiple persons are found in a closed area, or there is evidence (e.g., footprints) of multiple persons violating the closed area restrictions that appear to be part of a discrete group (2 or more individuals), the Air Force will contact the Service to determine whether the individuals in the discrete group would be counted as individual violations (e.g., whether a group of 10 individuals would count as 10 violations) or if the discrete group as a whole would count as 1 violation. Because this situation is not typical, the Air Force and Service will make this determination on a case-by-case basis.

2. The Air Force will consider documentation of entry into closed beach areas based on footprints a violation for each set of footprints.

3. The Air Force will investigate evidence of persistent activity (lasting more than a few minutes) in a closed area, such as a fire, camping, resting or other similar activity as a violation. The Air Force will conduct an investigation to attempt to determine the following: the number of people who entered the closure, the type of activity and duration, and the potential effects to western snowy plovers.

4. The Air Force will conduct investigations of potential violations in a manner such that western snowy plovers will not be adversely affected as a result of the investigation. Air Force enforcement personnel will coordinate with and be escorted by monitors to avoid adverse effects to western snowy plovers. Monitors will assist the investigating official to help determine adverse effects of the incident on western snowy plovers.

In addition, the Air Force will implement the following actions to allow consistent follow-up and documentation of violations, and to support the Conservation Law Enforcement Officers in their enforcement efforts:

1. The Air Force will provide official forms (AF Form 1168, Statement of Suspect/Witness Complaint) to monitors for recording their observations of violations. This form will help standardize reporting by monitors to better document the time, date, nature of observed violations, and evaluate potential impacts to western snowy plovers.

2. Law enforcement personnel must witness monitors filling out AF Form 1168 for them to be legally valid. Therefore, the monitor must contact Conservation Law Enforcement Officers the same day that they observe the evidence of violation(s). Many cases (e.g., footprints-only evidence) require subsequent onsite investigation by the officers to determine if a violation or violations occurred. In some cases this may not be feasible. Therefore, this measure is expected to reduce, but not entirely eliminate, the number of incidents where the monitor's observations of trespass do not receive follow-up investigation by law enforcement.

3. The Air Force will establish clear protocols for communication between monitors, Conservation Law Enforcement Officers, and the Air Force biologist(s).

4. The Air Force will ensure monitors are kept informed of all beach openings and closings and criteria for counting violations toward the violation limit for each beach.

Beach Restoration

An important aspect of the beach management program at Vandenberg AFB is restoration of suitable western snowy plover and California least tern habitat. The Air Force developed the restoration plan with the primary aim of providing a long-term benefit to western snowy plovers and California least terns by enhancing suitable habitat. They proposed to conduct restoration activities within any suitable habitat for California least terns and western snowy plovers on Vandenberg AFB; the total area encompasses approximately 1,628 acres (659 hectares) (Air Force 2013a; Kaisersatt, in litt. 2014). They proposed to conduct the restoration actions between October 1 and February 28, which is outside of the El Segundo blue butterfly, western snowy plover and California least tern breeding seasons. The Air Force would utilize a combination of restoration methods such as manual removal, chemical treatment, mechanical removal, and controlled burning to eradicate invasive nonnative dune vegetation (e.g., European beachgrass and iceplant.

Predator Management

The Air Force developed a predator management plan for western snowy plovers during the 2001 breeding season. The Air Force updated the plan in response to changing conditions, primarily due to the incursion of common ravens (*Corvus corax*). The goal of the plan is to control predation on western snowy plovers and California least terns sufficiently to allow a

reasonable level of recruitment into the population. Qualified biologists conduct predation control, which focuses on those species that have a substantial effect on western snowy plover and California least tern breeding and fledging success [e.g., coyotes (*Canis latrans*) and corvids (western scrub-jays (*Aphelocoma californica*), crows (*Corvus brachyrhynchos*), ravens)]. The Air Force targets individual problem coyotes and corvids for lethal removal. Predatory birds, such as American kestrels (*Falco sparverius*), loggerhead shrikes (*Lanius ludovicianus*), and merlins (*Falco columbarius*), found to be preying on western snowy plover and California least tern would be captured and relocated when possible. The predator management plan is subject to change based on information gained during implementation.

The Air Force will implement the following measures to manage avian and mammalian predators during the western snowy plover and California least tern breeding season:

Avian Predators

1. The Air Force will trap and remove avian predators identified as an imminent threat near western snowy plover and California least tern habitat, and coordinate all predator management activities between the biological monitors and appropriately permitted individuals. Predator management personnel would observe predator movements to and from beaches in an attempt to identify roosting and nesting locations of birds that frequent western snowy plover and California least tern habitat. Additionally, the Air Force will lethally remove individual coyotes that are keying-in on western snowy plover nests. In some instances, the lethal removal of corvids may be warranted. Authorized personal under the direction of a Vandenberg AFB biologist would maintain the trap(s), humanely euthanize corvids, and dispose of the carcasses.

2. Nixalite® or similar materials will be installed on all posts and fencing where practicable to minimize the attractiveness of these structures to avian predators.

3. The Air Force will place small shelters within California least tern nesting habitat at Purisima Point to provide cover for least tern chicks from avian predators. The Air Force will evaluate the design, number and specific placement of shelters each season to achieve optimum effectiveness.

Mammalian Predators

1. The Air Force will install and maintain electric fencing around the California least tern managed area at Purisima Point (Purisima Point Colony). The Air Force will electrify the fences prior to the arrival of any California least terns and will repair fences as needed.

2. The Air Force will utilize infrared-triggered still cameras to assist with unidentified predation issues.

3. The Air Force will place traps for mammalian predators based on information derived from

biological monitors.

4. Trapping and lethal removal of mammalian predators within nesting habitat will be done by trained and authorized personnel under the supervision of individuals permitted to work in western snowy plover and California least tern nesting habitat.

Water Rescue Training

As discussed above, the Air Force proposes to establish four water rescue training areas on Base; two areas on North Base and two areas on South Base. The Fire Department would carry out these training activities, which could occur at any of four sites, but not all of them at the same time. The proposed training areas on North Base include the areas that are open to recreational use at Wall and Minuteman Beaches. The proposed training areas on South Base include the mouth of Honda Creek and the primary launch site at the Base's boat harbor south of Point Arguello.

The Fire Department would conduct training on the use of PWC and victim rescues within static water beyond the surf zone and in the surf line. Water rescue training would be restricted to within 0.5 mile (0.8 km) of the launch point; however, if the PWCs are launched from Minuteman Beach they would come back to Wall Beach due to the steep slope at Minuteman Beach. Utility vehicles would transport the PWC to the training areas or a hoist would lower the PWC into the boat harbor. Generally, one site is used per month and the training would occur year round. Training activities may occur for a maximum of two consecutive days. Up to 20 people could participate per day at each site. In addition to those measures described above to avoid adverse effects from water rescue training and coastline familiarization to the southern sea otter, the Air Force also proposes the following measures to avoid and minimize adverse effects from water rescue training to the California red-legged frog and western snowy plover:

<u>California Red-legged Frog</u>

1. Prior to any training activities, a qualified biologist who is familiar with California red-legged frogs will conduct a brief training session for personnel that will include a description of the species and the avoidance and minimization measures afforded to it.

2. The Air Force will conduct all equipment maintenance and refueling at least 250 feet (76 meters) away from riparian and wetland areas. Project personnel will conduct daily inspections of vehicles for leaks of hazardous substances.

3. The Air Force will limit the number of access routes, number and size of staging areas, and the total area of the activity to the minimum necessary to achieve training needs. The Air Force will clearly demarcate routes and boundaries and will locate them as far as possible outside of riparian and wetland areas.

4. A Service-approved biologist will conduct pre-activity surveys at the mouth of Honda Creek, and relocate California red-legged frogs found within the project area to the nearest suitable habitat outside of the project area but within the same watershed.

Western Snowy Plover

1. Prior to any training activities, a qualified biologist who is familiar with the western snowy plover will provide a brief training session for water rescue personnel that will include a description of the species and the avoidance and minimization measures afforded to it during the breeding and wintering seasons.

2. A Service-approved biologist will monitor all training activities at Wall and Minuteman beaches to minimize effects to western snowy plovers.

3. Training activities at Wall and Minuteman beaches will only occur within the open areas during the western snowy plover breeding season.

4. All-terrain vehicles/utility vehicles will be restricted to 15 miles per hour within western snowy plover habitat to avoid impacts to breeding and wintering birds.

5. The Air Force will choose access routes that avoid nests and wintering western snowy plovers in the open areas at Wall and Minuteman Beaches.

6. During the breeding season, access in the open areas will be as far away as possible from the boundary fences demarcating the closed areas at Wall and Minuteman Beaches while still allowing the Fire Department to accomplish its training.

ANALYTICAL FRAMEWORK FOR THE JEOPARDY DETERMINATIONS

Section 7(a)(2) of the Endangered Species Act requires that Federal agencies ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of listed species. "Jeopardize the continued existence of" means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR 402.02).

The jeopardy analysis in this biological opinion relies on four components: (1) the *Status of the Species*, which describes the range-wide condition of El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover, the factors responsible for that condition, and its survival and recovery needs; (2) the *Environmental Baseline*, which analyzes the condition of El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover; (3) the *Effects of the*

Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover; and (4) the *Cumulative Effects*, which evaluates the effects of future, non-Federal activities in the action area on El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover.

In accordance with policy and regulation, the jeopardy determinations are made by evaluating the effects of the proposed Federal action in the context of the current status of El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to reduce appreciably the likelihood of both the survival and recovery of El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover in the wild by reducing the reproduction, numbers, and distribution of that species.

STATUS OF THE SPECIES

El Segundo Blue Butterfly

The El Segundo blue butterfly was federally listed as endangered on June 1, 1976 (41 Federal Register (FR) 22041). We have not designated critical habitat for the El Segundo blue butterfly. We issued a recovery plan for the El Segundo blue butterfly on September 28, 1998 (Service 1998). We completed a 5-year status review for the subspecies in 2008 (Service 2008).

Oakley Shields (1975) formally described the El Segundo blue butterfly based on specimens that had been collected in the city of El Segundo, California. The El Segundo blue butterfly is in the family Lycaenidae. It is one of five subspecies comprising the polytypic species, the square-spotted blue butterfly *(Euphilotes battoides)*. Like all species in the genus *Euphilotes*, the El Segundo blue butterfly spends its entire life cycle in intimate association with a species of buckwheat, in this case seacliff buckwheat. However, the nearly complete association of all life stages with a single plant is unique among North American butterflies. El Segundo blue butterfly adults mate, nectar, lay eggs, perch, and in most cases probably die on buckwheat flowerheads (Mattoni 1990).

The adult stage of the El Segundo blue butterfly generally begins in early June and concludes in early to mid-September. The onset of this stage is closely synchronized with the beginning of the flowering season for seacliff buckwheat (Mattoni 1990; Pratt and Ballmer 1993). Typically, adult females may survive up to 2 weeks whereas a male may survive up to 7 days (G. Pratt, pers. comm. 2006a). Upon emergence as adults, females fly to seacliff buckwheat flowerheads where they mate with males that are constantly moving among flowerheads (Service 1998).

The El Segundo blue butterfly lays eggs in seacliff buckwheat flowerheads, and the eggs hatch within 3 to 5 days. The larvae then undergo four instars to complete growth, a process that takes 18 to 25 days (Service 1998). By the third instar, the larvae develop honey glands and are thereafter usually tended by ants (e.g., *Iridiomyrmex humilis*, *Conomyrmex* spp.), which may

protect them from parasitoids (e.g., Branchoid wasp (*Cortesia* spp.)) and small predators (Mattoni 1990). Ant species that are associated with and tend El Segundo blue butterfly larvae include carpenter ants (*Camponotus maritimus*), pyramid ants or insane ants (*Dorymyrmex insanus*), formica or California red-and-black field ant (*Formica moki*), acrobat ants (*Crematogaster hesperus*), and odorous house ant, stink ant, or coconut ant (*Tapinoma sessile*) (Tetra Tech, Inc. and Pratt 2012). Larvae remain concealed within flowerheads and initially feed on pollen, then switch to feeding on seeds sometime during the first and second instar (G. Pratt, pers. comm. 2006a). Larvae are highly polymorphic, varying from almost pure white or yellow to strikingly marked individuals with a dull red-to-maroon background broken by a series of yellow or white dashes (Mattoni 1990).

At the end of the fourth instar, larvae disperse from the flowerheads, fall or crawl to the ground, and pupate in the soil. Larvae may find a suitable site directly underneath seacliff buckwheat plants or migrate (wander) away from the plant to a more suitable site. This wandering stage is short (likely 1 day or less). Larvae may travel up to approximately 25 feet (7.6 meters) from the nearest seacliff buckwheat plant, but we expect that most larvae remain within the immediate vicinity of a seacliff buckwheat plant (Arnold pers comm. 2013; Arnold, in litt. 2013). We do not know the factors that make a site suitable, but it is known that the larvae pupate in sandy soils, clay soils, shale, sandstone, and even cracks and softer portions of road, and seem to prefer softer soils compared to harder substrates (Arnold pers comm. 2013; Arnold, in litt. 2013). Upon finding a suitable site, larvae burrow into the ground and remain there until the appropriate conditions are met. El Segundo blue butterfly are true pupae in that they are bags of fluid that contain a thick cuticle to protect it from moisture loss and other factors. At least 0.5 inch (1.3 centimeters (cm)) of rain must penetrate the soil to accumulate enough moisture for the pupae to undergo a life stage change (i.e., develop into an adult) (G. Pratt, pers. comm. 2006a). The adult butterfly emerges the following June; however, some pupae may remain in diapause for 2 or more years (Service 1998), and may remain in diapause for up to 6 years (Pratt, in litt. 2013). Some pupae at every site likely remain in diapause every year (some pupae stay in diapause each year even in good years) (Arnold pers comm. 2013; Arnold, in litt. 2013).

Population dynamics of El Segundo blue butterflies are closely allied with the seacliff buckwheat. Although individual plants may live 20 years or more, young plants generally do not flower until their second year of growth (Arnold and Goins 1987). Juveniles and older plants do not produce as many flowers as middle-aged buckwheat plants, which support the most butterflies (Arnold and Goins 1987). Field observations suggest that solitary buckwheat plants less than about 5 years of age do not produce enough flowers for larvae to effectively utilize them (Arnold 1983). Thus, survival of the El Segundo blue butterfly is dependent upon maintenance of middle-aged buckwheat plants and recruitment of younger plants to replace older individual plants that senesce.

For several decades following the subspecies' description, researchers presumed the El Segundo blue butterfly was endemic to southwestern Los Angeles County in coastal southern California. Museum records reveal that the El Segundo blue butterfly was once widespread on the El Segundo sand dunes and specimens were collected at El Segundo, Redondo Beach, Manhattan

Beach, and at several locations on the Palos Verdes peninsula (Donahue 1975). Currently, El Segundo blue butterfly occurs at four locations in Los Angeles County: the Ballona Wetlands, the Airport Dunes, the Chevron Preserve, and Malaga Cove. Four recovery units, based on geographic proximity, habitat similarity, and possible genetic exchange, encompass these areas with the known populations and (or) areas with restorable habitat (Service 1998). The El Segundo blue butterfly appears further limited to areas with high sand content (Service 1998).

Seacliff buckwheat occurs over a larger range than the known range of El Segundo blue butterfly; seacliff buckwheat occurs from San Diego County to the northern end of Monterey County (Pratt, in litt. 2006b; Jepson 2012; CalFlora 2013)). The southern extent of El Segundo blue butterfly's known distribution is Malaga Cove in Los Angeles County and before it was discovered in Santa Barbara County in 2005, the northern extent of its known distribution was the Ballona Wetlands in Los Angeles County.

Population in Santa Barbara County

The El Segundo blue butterfly was reported to occur at Vandenberg AFB in 2005 by Dr. Gordon Pratt and by Dr. Pratt and Dr. Richard Arnold in 2007 (G. Pratt, pers. comm. 2006a; Bell, in litt. 2007). Questions arose whether the butterflies observed at Vandenberg AFB are actually the El Segundo blue butterfly or a morphologically similar species. The genus *Euphilotes* is complex and diverse. There are known cases of cryptic speciation in the genus (i.e., some distantly related species are very similar morphologically) (Mattoni 1988). Entomologists typically use wing characters to identify butterflies; however, they are not as useful in *Euphilotes* (as a genus) because these characters can vary between individuals within the same taxon (and particularly in the *E. battoides* complex). In these instances, additional information and other characters are necessary for a definitive identification such as larval host plant, genitalia morphology, flight season, location, and genetics (Ballmer, in litt. 2006).

Because butterflies in the genus *Euphilotes* can be very similar morphologically yet substantially different genetically (Mattoni 1990; Pratt 1994), individual male butterflies were collected to compare the genetic signatures among the butterflies from Vandenberg AFB with known El Segundo blue butterflies from Los Angeles County (Pratt and Stouthamer 2008). We have reviewed the results of the genetic study and determined that the resulting information was not conclusive enough to make a determination that the butterfly in question is not the El Segundo blue butterfly.

Given that the geographic separation between the known occurrences of El Segundo blue butterfly in Santa Barbara County and Los Angeles County is approximately 120 miles and the relatively limited dispersal capability of El Segundo blue butterfly, it is possible that the butterflies observed at Vandenberg AFB are not El Segundo blue butterflies but rather an undescribed, cryptic species with the same morphology, larval food plant, flight season, and genitalia. On the contrary, it is possible that there was a continuous distribution between Santa Barbara and Los Angeles Counties but separated over time either naturally or by anthropogenic causes. The distribution of seacliff buckwheat, the butterfly's limited dispersal capabilities, and

the increasing fragmentation of native habitat in this region support this concept. A third possibility is that the butterflies currently have a continuous distribution between Santa Barbara and Los Angeles Counties, but have not yet been documented in the intervening areas. However, there are no areas known with El Segundo blue butterfly occurrences between the populations in Santa Barbara and Los Angeles Counties. A few species experts have opportunistically surveyed some of the intermediate sites that contain seacliff buckwheat, but these survey efforts have been infrequent and less rigorous. Moreover, another possibility is that El Segundo blue butterflies does not occupy the areas between Santa Barbara and Los Angeles Counties, but have dispersed from one area to another. A long-distance dispersal event is more likely to occur during one dispersal event rather than multiple events in a stepping-stone fashion because the probability of a single longer dispersal event is greater than the combined probability of two (or more) consecutive shorter dispersal events (Gillespie et al. 2012, Crisp et al. 2011). Strong wind events (e.g., Santa Ana winds, hurricanes) are a widely recognized mechanism for successful long-distance dispersal events and have been determined to be the vector for the successful colonization of remote islands by plants, animals (e.g., butterflies), and arthropods, which are generally less dispersive (Gillespie et al. 2012, Zimmerman 1948).

Based on wing morphology, flight period, genitalia, and host plant association; these individuals were determined to be more similar to El Segundo blue butterfly than to any other known *Euphilotes* species or *E. battoides* subtaxon (Ballmer, in litt. 2006; Pratt, in litt. 2006c). Therefore, we consider this species to be El Segundo blue butterfly until we receive definitive information demonstrating otherwise.

Surveys conducted in Santa Barbara County (including at Vandenberg AFB) reported 127 adult El Segundo blue butterflies in 2012; 247 individuals in 2011, 403 individuals in 2010, and 379 individuals in 2009. Lower numbers of adult El Segundo blue butterflies observed can be partially attributed to variation in precipitation, which can result in dead or poor quality seacliff buckwheat plants. The Air Force, along with biological consultants first documented the El Segundo blue butterfly at two general locations on Vandenberg AFB in Santa Barbara County (Tranquillon Mountain and San Antonio Terrace). In subsequent years the El Segundo blue butterfly has also been reported to the northeast of San Antonio Terrace near Lompoc-Casmalia Road and northeast of the Vandenberg tracking station; East of the Base boundary near the northwestern portion of Burton Mesa Ecological Reserve along the Freeport-McMoran pipeline; East of Tranquillon Peak along Miguelito Canyon Road, East of Lompoc along Sweeney and Santa Rosa Roads; and even further east near Drum Canyon Road. Biologists have found El Segundo blue butterflies in additional areas as surveys have been conducted over the last 6 years.

Arnold (1986) conducted capture-recapture studies in Los Angeles County and reported that the majority of El Segundo blue butterflies moved 100 feet (31 meters) or less between captures; 79 percent and 87 percent for females and males, respectively. Approximately 93 percent of females and males moved 200 feet (61 meters) or less between captures. Approximately 3 percent of females and 4 percent of males moved more than 500 feet (152 meters) between captures. The farthest distance moved by any individual butterfly was approximately 7,200 feet (1.36 miles; 2.18 km). However, we note that Arnold derived the 200-foot (61-meter) buffer

from studies at the Chevron Refinery (Chevron) in El Segundo. The Chevron site is approximately 1.5 acres (0.61 hectares) and is surrounded by urban areas. The area contains high concentrations of seacliff buckwheat plants that grow in close proximity to one another. Therefore, the adult El Segundo blue butterfly would not have to disperse very far to locate suitable seacliff buckwheat flowerheads. In contrast, the preserve at the Los Angeles International Airport (LAX) is 200 acres (81 hectares) and contains widely scattered seacliff buckwheat plants. At the LAX site, El Segundo blue butterflies were detected dispersing up to 1.36 miles (2.18 km), and the average movement of individuals at LAX was more than twice that of individuals at the Chevron location (Arnold 1986). Additionally, adult El Segundo blue butterflies routinely dispersed up to 0.5 mile (0.8 km) from occupied locations to colonize restoration sites in Los Angeles and Redondo Beach.

Because biologists have documented the El Segundo blue butterfly dispersing farther distances in larger areas that contain more widely scattered plants, the 200-foot (61-meter) buffer may represent the lower end of the dispersal distance capability of El Segundo blue butterfly. Therefore, based on the habitat and area at Vandenberg AFB, it could be expected that dispersal distance would be greater in Santa Barbara County where the seacliff buckwheat plants are much less dense than at Chevron, as it was at the LAX site compared to the Chevron site. However, we do not know the minimum, average, or maximum dispersal distances of the El Segundo blue butterfly in Santa Barbara County.

To quantify the amount of occupied habitat on Vandenberg AFB, we took into account that the majority of individual El Segundo blue butterflies move 200 feet (61 meters) or less (Arnold 1986), and calculated a 200-foot (61-meter) buffer around each observed butterfly. We assume, however, the 200-foot (61-meter) buffer is at the lower end of observed dispersal distances for El Segundo blue butterflies when seacliff buckwheat plants are more scattered, such as at Vandenberg AFB (see discussion above regarding dispersal distances (Arnold 1986)). Nevertheless, the estimate in 2012 is approximately 1,009 acres (408 hectares) of known occupied habitat at Vandenberg AFB (Air Force 2012b). The Air Force estimated that approximately 17,500 acres (7,082 hectares) of suitable habitat is within 1 mile (1.6 km) of the known occupied habitat, and the seacliff buckwheat occurs over at least 60,000 acres (24,281 hectares) of the Base. Many of these areas contain seacliff buckwheat plants at low densities. The acreage estimates for suitable habitat do not include a 200-foot (61-meter) buffer; thus, calculations for known occupied and suitable habitats are not determined the same way.

Threats to the El Segundo Blue Butterfly

In general, competition, predation, and parasitism by other insects utilizing seacliff buckwheat; loss of habitat and habitat fragmentation due to development; and loss of habitat due to competition of nonnative vegetation with seacliff buckwheat negatively impact the El Segundo blue butterfly. Urbanization and land conversion have fragmented the historic range of the El Segundo blue butterfly such that extant populations now operate as independent units rather than parts of a metapopulation or a single, cohesive, wide-ranging population (Service 2008). Small populations have higher probabilities of extinction than larger populations because their low

abundance renders them susceptible to inbreeding, loss of genetic variation, high variability in age and sex ratios, demographic stochasticity, and other random, naturally occurring events such as droughts or disease epidemics (Soulé 1987). Additionally, isolated populations are more susceptible to elimination by stochastic events because the likelihood of recolonization following such events is negatively correlated with the extent of isolation (Wilcox and Murphy 1985). Given the low dispersal potential of El Segundo blue butterflies, the likelihood that this subspecies would naturally recolonize a site decreases as the distance between the occupied sites increases. Therefore, if El Segundo blue butterflies are extirpated from a site that is a greater distance from an occupied site than the subspecies' dispersal distance, the site may not be recolonized. Habitat fragmentation is detrimental to small, isolated populations and produces edge effects that facilitate the introduction of invasive nonnative plant species that may out-compete and displace seacliff buckwheat. Relatively fast-growing invasive nonnative plants such as acacia (*Acacia* spp.), iceplant, other buckwheat species (*Eriogonum* spp.), and nonnative grasses compete with seacliff buckwheat and decrease the likelihood that seacliff buckwheat would sprout and mature (Mattoni 1990). Furthermore, Pratt (1987) observed numerous insects living in seacliff buckwheat inflorescences along with El Segundo blue butterfly larvae, including lepidopterous larvae in the families of Cochylidae, Gelechiidae, Geometridae, Riodinidae, and even other Lycaenidae. Parasitoids (e.g., Branchoid wasp (Cortesia spp.) and small predators may also affect El Segundo blue butterflies (Mattoni 1990).

Recovery of El Segundo Blue Butterfly

The recovery plan for El Segundo blue butterfly identifies four recovery units (Ballona, Airport, El Segundo, and Torrance) to conserve and maintain the species' distribution and its genetic diversity throughout its present range (Service 1998). At least one population is needed in each of the four units to reduce the risk of extinction from random events that may affect any one local area. We wrote the recovery plan for El Segundo blue butterfly prior to the discovery of the species on Vandenberg AFB, so the plan does not consider the Base.

The recovery of El Segundo blue butterfly is dependent on protection of occupied and potential habitat. Occupied habitat contains individuals of the subspecies and associated habitat used for breeding, feeding, shelter, and/or as a dispersal corridor. Areas that contain El Segundo sand dune and are not currently occupied by El Segundo blue butterflies, but could be managed and restored, constitute potential habitat for the subspecies. Colonization of potential areas by El Segundo blue butterfly would result in increased numbers of individuals, ultimately expanding the number and size of populations until the subspecies reaches the point where it can be downlisted to threatened. According to the recovery plan (Service 1998), El Segundo blue butterfly can be considered for downlisting to threatened status when:

1. At least one secure population in each of the four RUs is permanently protected. The Airport Dunes located in the Airport recovery unit contains the largest population of the butterfly and is the most likely one that can survive disease, predators, parasites, and other perturbations. The Airport Dunes must be one of the protected populations.

2. Each of the four populations are managed to maintain coastal dune habitat dominated by local native species including coast [seacliff] buckwheat.

3. As determined by a scientifically credible monitoring plan, each of the four populations must exhibit a statistically significant upward trend (based on transect counts) for at least 10 years (approximately 10 butterfly generations). Population management in each RU must ensure that discrete population growth rates are maintained at or above 1.0, indicating a stable or increasing population.

4. A program is initiated to inform the public about the El Segundo blue butterfly and its habitat.

5-Year Review for the El Segundo Blue Butterfly

Biologists discovered the El Segundo blue butterfly on the Palos Verdes Peninsula near Point Vicente in Los Angeles County (RBF Consulting 2001; Pratt 2006 in Service 2008) and at Vandenberg AFB in Santa Barbara County subsequent to the subspecies' listing and prior to the 2008 5-year status review. Thus, the original listing document and the recovery plan did not consider these areas. The 5-year review for the El Segundo blue butterfly states that the subspecies continues to be threatened by habitat degradation; habitat fragmentation; introduction of parasitic, competing and predatory insect species; and stochastic extinction. In consideration of its limited and fragmented distribution, overall small population size, and continued threats as discussed, we determined that the El Segundo blue butterfly remains in danger of extinction throughout all or a significant portion of its range (Service 2008). However, because of the recent success of habitat restoration efforts along Torrance, Redondo, and Dockweiler Beaches (Los Angeles County) in 2007, we conclude that this subspecies can respond positively to management of its habitat and the recovery potential has improved.

California Red-Legged Frog

The California red-legged frog was federally listed as threatened on May 23, 1996 (61 FR 25813), and critical habitat was designated on March 17, 2010 (71 FR 19244). The Service completed a recovery plan for the species in 2002 (Service 2002). Storer (1925), Stebbins (2003), and Jennings et al. (1992) contain detailed information on the biology of California red-legged frogs.

This species is the largest native frog in the western U.S., ranging from 1.5 to 5.1 inches (3.8 to 13 cm) long. The abdomen and hind legs of adults are largely red; the back is characterized by small black flecks and larger irregular dark blotches with indistinct outlines on a brown, gray, olive, or reddish background color. Dorsal spots usually have light centers, and dorsolateral folds are prominent on the back.

The diet of California red-legged frogs is highly variable. Hayes and Tennant (1985) found invertebrates to be the most common food item of adults. Vertebrates, such as Pacific treefrogs

(*Pseudacris regilla*) and California mice (*Peromyscus californicus*), represented over half of the prey mass eaten by larger California red-legged frogs (Hayes and Tennant 1985). Feeding activity occurs along the shoreline and on the surface of the water. Hayes and Tennant (1985) found juveniles to be active diurnally and nocturnally, whereas adults were largely nocturnal.

California red-legged frogs use a variety of habitat types, including various aquatic systems, riparian, and upland habitats. Suitable habitat includes all aquatic and riparian areas within the range of the species and includes any landscape features that provide cover and moisture (61 FR 25813).

California red-legged frogs spend most of their lives in and near sheltered backwaters of ponds, marshes, springs, streams, and reservoirs. Deep pools with dense stands of overhanging willows (*Salix* spp.) and an intermixed fringe of cattails (*Typha* spp.) provide optimal habitat. Eggs, larvae, transformed juveniles, and adults also have been found in ephemeral creeks and drainages and in ponds that do not have riparian vegetation. When riparian vegetation is present, California red-legged frog spend considerable time resting and feeding in it; the moisture and camouflage provided by the riparian plant community likely provide good foraging habitat and may facilitate dispersal in addition to providing pools and backwater aquatic areas for breeding. Accessibility to sheltering habitat is essential for the survival of California red-legged frogs within a watershed, and can be a factor limiting population numbers and distribution.

California red-legged frogs breed in aquatic habitats from November through March, including in artificial impoundments such as stock ponds if conditions are appropriate. Storer (1925) recorded earlier breeding in southern localities. This species successfully breeds in streams and riparian systems, although high seasonal flows and cold temperatures in streams often make these sites risky environments for eggs and tadpoles. Males appear at breeding sites from 2 to 4 weeks before females (Storer 1925). California red-legged frogs are often prolific breeders, typically laying their eggs during or shortly after large rainfall events in late winter and early spring. Females deposit egg masses on emergent vegetation so that the masses float on the surface of the water (Hayes and Miyamoto 1984). Egg masses contain about 2,000 to 5,000 moderately-sized (0.08 to 0.11 inch (0.2 to 0.28 cm)) in diameter, dark reddish brown eggs (Storer 1925, Jennings and Hayes 1985). Eggs hatch in 6 to 14 days (Storer 1925). Larvae undergo metamorphosis between 3.5 to 7 months after hatching (Storer 1925, Wright and Wright 1949). Sexual maturity can be attained at 2 years of age by males and 3 years of age by females and is usually reached at 3 to 4 years of age (Jennings and Hayes 1985). Adults may live 8 to 10 years (Jennings *et al.* 1992) but the average life span is considered much less.

Juvenile and adult California red-legged frogs may disperse long distances from breeding sites throughout the year. They can be encountered living within streams at distances exceeding 1.8 miles (2.9 km) from the nearest breeding site, and have been found up to 400 feet (122 meters) from water in adjacent dense riparian vegetation (Bulger et al. 2003). Some California red-legged frogs have moved long distances over land between water sources during winter rains. Adult California red-legged frogs moved more than 2 miles (3.22 km) in northern Santa Cruz County "without apparent regard to topography, vegetation type, or riparian corridors" (Bulger et

al. 2003). Individual California red-legged frogs make long-distance movements that were straight-line, point-to-point migrations over variable upland terrain rather than using riparian corridors for movement between habitats. Most of the overland movements occur at night.

The historical range of the California red-legged frog extended coastally from southern Mendocino County and inland from the vicinity of Redding, California, southward to northwestern Baja California, Mexico (Jennings and Hayes 1985, Storer 1925). This species occurred throughout the Central Valley and Sierra Nevada foothills. The California red-legged frog has been extirpated or nearly extirpated from 70 percent of its former range. At present, California red-legged frogs occur in 243 streams or drainages in 22 counties, primarily in central coastal California. Surveyors have recorded four additional occurrences in the Sierra Nevada foothills since listing, bringing the total to five extant populations, compared to approximately 26 historical records. Currently, California red-legged frogs occur in three disjunct regions in 26 California counties and one region in Baja California, Mexico (Grismer 2002, Fidenci 2004, Smith and Krofta 2005). The most secure aggregations of California red-legged frogs are in aquatic sites that support substantial riparian and aquatic vegetation and lack non-native predators.

Threats to California Red-legged Frog

Over-harvesting, habitat loss, nonnative species introduction, and urban encroachment are the primary factors that have negatively affected the California red-legged frog throughout its range (Jennings and Hayes 1985, Hayes and Jennings 1988; Service 2002). Habitat loss and degradation, combined with over-exploitation and introduction of exotic predators, were important factors in the decline of the California red-legged frog in the early to mid-1900s. Continuing threats to California red-legged frogs include direct habitat loss due to stream alteration and loss of aquatic habitat, indirect effects of expanding urbanization, and competition from or predation by nonnative species including bullfrog (*Lithobates catesbeiana*), catfish (*Ictalurus* spp.), bass (*Micropterus* spp.), mosquitofish (*Gambusia affinis*), red swamp crayfish (*Procambarus clarkii*), and signal crayfish (*Pasifasticus leniusculus*). The cause of local extirpations does not appear to be restricted solely to loss of aquatic habitat. We consider the most likely causes of local extirpation to be changes in faunal composition of aquatic ecosystems (i.e., the introduction of nonnative predators and competitors) and landscape-scale disturbances that disrupt California red-legged frog population processes, such as dispersal and colonization. The introduction of contaminants or changes in water temperature may also play a role in local extirpations. Furthermore, we consider chytrid fungus (*Batrachochytrium dendrobatidis*), a waterborne fungus that can decimate amphibian populations, a threat to California red-legged frog populations.

Recovery of California Red-legged Frog

According to the recovery plan for the California red-legged frog, the strategy for the species' recovery involves: 1) protecting existing populations by reducing threats; 2) restoring and creating habitat that will be protected and managed in perpetuity; 3) surveying and monitoring

populations and conducting research on the biology and threats to the species; and 4) reestablishing populations of the species within its historical range (Service 2002).

The recovery plan for the California red-legged frog identifies eight recovery units. The Recovery Team's determination that various regional areas of the species' range are essential to its survival and recovery formed the basis for the recovery units. The recovery status of the California red-legged frog is considered within the scale of recovery units as opposed to the overall range. Because of the varied status of this species and differing levels of threats throughout its range, recovery strategies differ per recovery unit to best meet the goal of delisting the species. For example, in areas where California red-legged frog populations appear to be stable, recovery strategies are intended to protect existing population numbers, whereas in areas where frogs have been extirpated or are declining, strategies are to stabilize, increase, augment, or reestablish populations.

Major watershed boundaries, as defined by U.S. Geological Survey hydrologic units, and the limits of the range of the California red-legged frog delineate the recovery units. The goal of the recovery plan is to protect the long-term viability of all extant populations within each recovery unit. Core areas were delineated within each recovery unit, and represent contiguous areas of moderate to high California red-legged frog densities that are relatively free of nonnative species such as bullfrogs. The goal of designating core areas is to protect metapopulations that, combined with suitable dispersal habitat, will allow for the long-term viability within existing populations. This management strategy allows for the recolonization of habitat within and adjacent to core areas that naturally experience periodic localized extinctions, thus assuring the long-term survival and recovery of the California red-legged frog.

California Least Tern

The California least tern, which is one of three subspecies of least tern in the United States, was listed as endangered in 1970 (35 FR 16047). We have not designated critical habitat for the California least tern. We issued a revised recovery plan in 1985 (Service 1985). We completed a 5-year status review for the California least tern in September 2006 (Service 2006). The State of California listed the California least tern as endangered in 1971. The California least tern is a fully-protected species under California law.

The California least tern was historically concentrated in three southern California counties: Los Angeles, Orange, and San Diego. Between Ventura County and the San Francisco Bay area, only Guadalupe Dunes-Mussel Rock Dunes and Purisima Point (Vandenberg AFB) have been used regularly by California least terns (Marschalek 2006). At the time of listing, a census revealed only 600 pairs of breeding California least terns in California, but recovery efforts instituted since the time of listing have helped raise numbers of breeding birds. Statewide surveys conducted in 1995 counted 2,598 pairs (Caffrey 1995) and the population increased to approximately 7,100 pairs by 2005. In addition, the number of California least tern sites has nearly doubled since the time of listing, with most of the California least tern colonies occurring in southern California.

Since 1970, nesting sites have been documented in California from the San Francisco Bay area to the Tijuana River at the Mexican border (Marschalek 2006), and in Mexico within the Gulf of California and on the west coast of Baja California from Ensenada to San José del Cabo at the tip of the peninsula (Lamb 1927, Grinnell 1928, Patten and Erikson 1996). In 1991 and 1992, a survey of the west coast of the Baja peninsula documented 13 breeding colonies at five different locations, from Ensenada through Bahía Magdalena with one to six sites at each location. Large nesting colonies along the California coast have been discontinuous and are spread out along beaches at the mouths of larger estuaries. The Santa Margarita River mouth in San Diego County generally hosts the largest number of California least terns among all locations.

The breeding season typically begins in April. California least terns nest in colonies on relatively open beaches kept free of vegetation by natural scouring from tidal action. Nesting areas are relatively flat sandy beaches in close proximity to foraging habitat, and are relatively secluded from disturbance and predation. California least tern are gregarious. They forage, roost, nest, and migrate in colonies, although there are many records of solitary pairs nesting at certain sites, or low densities of nesting pairs over several miles of beach habitat (Service 1985). A typical colony size is 25 pairs; a typical clutch is 2 eggs. California least terns lay eggs in the first part of May, and eggs hatch in early June. Sometimes they line the nest with shell fragments and small pebbles after laying the eggs. Eggs are incubated primarily by the female for 20 to 25 days. Chicks usually fledge by late June. California least terns can re-nest up to two times in one breeding season if eggs or chicks are lost early. The wintering range is not clearly defined because fragments of distributional information have not created a comprehensive picture of the migratory route and winter range of California least tern.

California least terns forage primarily in near-shore ocean waters and in shallow estuaries and lagoons (Massey 1987). At colonies where feeding activities have been studied, California least tern foraged mostly within 2 miles (3.2 km) of the breeding area and primarily in near-shore ocean waters less than 60 feet (18 meters) deep (Collins et al. 1979, Atwood and Minsky 1983). Prey items include northern anchovy (*Engraulis mordax*), topsmelt (*Atherinops affinis*), California grunion (*Leuresthes tenuis*), and killifish (*Fundulus parvipinnis*). Severe El Niño Southern Oscillations can affect the California least tern's food supply.

Threats to the California Least Tern

The decline of the California least tern is attributed primarily to the loss and fragmentation of breeding and foraging habitat, although the rate of habitat loss in recent years is reduced because almost all coastal habitats have already been fragmented and degraded. Most colonies are small patches of degraded nesting habitat surrounded on all sides by human activity. Additionally, there is a lack of undisturbed or moderately-disturbed suitable breeding habitat available for population expansion. The level of human coastal use is expected to continue the conflict between resurging California least tern populations and limited habitat availability. Although most of the important nesting sites are in public ownership, competing land uses continue to be a major threat for disturbance to, or elimination of, nesting habitat. These remaining nest sites must be intensively managed to conserve suitable nesting habitat.

Repeated disturbance in California least tern breeding sites can also have significant effects on California least tern reproductive success and cause nest failure, re-nesting, and site abandonment (Massey and Fancher 1989). For example, the California least tern colony at Ormond Beach, Ventura County California, was repeatedly disturbed by paragliders and ultralight aircraft; within 4 years, all nesting attempts had failed and the site was abandoned (Smith 2006).

Recovery of the California Least Tern

The recovery plan for the California least tern focuses on: 1) developing and implementing site specific management plans; 2) preserving and properly managing nesting habitat; 3) protecting colonies against certain predation pressures and other disturbances; 4) refining management techniques through additional research; 5) developing a conservation education program; 6) enforcing laws and regulations that protect the California least tern and its habitat; and 7) determining the status of the California least tern in Baja California, Mexico. The goal of recovery efforts is the reclassification of the species from endangered to threatened and, ultimately, delisting of the species.

The 1985 final recovery plan for the California least tern states that the goal of recovery efforts is the reclassification of the species from endangered to threatened and, ultimately, delisting of the species. Reclassification to threatened status may be considered when: 1) there are at least 1,200 breeding pairs distributed in at least 15 of 23 coastal management areas; 2) each of the 15 "secure" coastal management areas must have at least 20 breeding pairs; and 3) each of the 15 "secure" coastal management areas must have a 3-year mean reproductive rate of at least 1.0 young fledged per breeding pair. Delisting of the California least tern may be considered when: 1) at least 1,200 breeding pairs are distributed in at least 20 of 23 coastal management areas; 2) each of the 20 "secure" coastal management areas must have a 5-year mean reproductive rate of at least 1.0 young fledged per breeding pair; and 3) the San Francisco Bay, Mission Bay, and San Diego Bay are included within the 20 secure management areas with 4, 6, and 6 secure colonies respectively.

5-Year Review for the California Least Tern

Researchers have discovered new information about the species' population dynamics and its threats since the completion of the recovery plan. Thus, the recovery criteria in the recovery plan do not reflect the best available and most up-to-date information on the biology of the species and its habitat (Service 2006). The California least tern population in California increased from 600 pairs in 1973 to approximately 7,100 pairs in 2005. The number of occupied sites had nearly doubled since the time of listing, with most of the colonies occurring in Southern California. The level of production (fledged young per year) had declined and continues on a downward trend (Marschaleck 2006); however, new information suggests that even at these production levels, California least tern populations are continuing to increase. Monitoring data from 2012 indicates there is an estimated 4,300-6,400 breeding pairs rangewide (Frost 2013). The 5-year review for the California least tern recommends: 1) revising the recovery plan; 2)

continued management of existing nest sites; and 3) the creation of new nest sites and site expansion at existing sites.

Western Snowy Plover

We listed the Pacific Coast population of the western snowy plover as threatened on March 5, 1993 (58 FR 12864). We first designated critical habitat on September 29, 2005; however, we designated revised critical habitat on June 19, 2012. We issued a recovery plan for the western snowy plover in September 2007 (Service 2007), and completed a 5-year status review on May 31, 2006.

Historical records indicate that nesting western snowy plover (Pacific Coast population) were once more widely distributed and abundant in coastal Washington, Oregon, and California. Prior to 1970, western snowy plovers bred at 53 coastal locations in California. Between 1970 and 1981, western snowy plovers stopped breeding in parts of San Diego, Ventura, and Santa Barbara Counties, most of Orange County, and all of Los Angeles County (Page and Stenzel 1981).

Western snowy plovers in California comprise at least 90 percent of the Pacific Coast population. Eight geographic areas support over three-quarters of the California coastal breeding population: San Francisco Bay, Monterey Bay, Morro Bay, the Callendar-Mussel Rock Dunes area, the Point Sal to Point Conception area (Vandenberg AFB), the Oxnard lowland, Santa Rosa Island, and San Nicolas Island (Page et al.et al. 1991). The population is sparse in Washington, Oregon, and northern California. In 2006, estimated populations were 70 adults along the Washington coast (Pearson et al. 2006), 177 to 179 adults along coastal Oregon (Lauten et al. 2006), and 2,231 adults in coastal California and San Francisco Bay (window survey including correction factor) (Service 2007). A recent population estimate suggests the Baja California, Mexico population is approximately 1,000 breeding adults (E. Palacios, pers. comm. 2008).

The Pacific Coast population of the western snowy plover nests near tidal waters along the mainland coast and offshore islands from Damon Point, Washington, to Bahía Magdelena, Baja California, Mexico. Most nesting occurs on unvegetated to moderately vegetated, dune-backed beaches and sand spits. Other less common nesting habitats include salt pans, dredge spoils, and salt pond levees. Nests consist of a shallow scrape or depression, sometimes lined with beach debris (e.g., small pebbles, shell fragments, plant debris, and mud chips); nest lining increases as incubation progresses. Nests are usually located within 328 feet (100 meters) of water, but can be farther away when there is no formative vegetative barrier between the nest and water (Page and Stenzel 1981). The majority of western snowy plovers are site-faithful (returning to the same breeding area in subsequent breeding seasons); some also disperse within and between years (Warriner et al. 1986, Stenzel et al. 1994).

The breeding season is from early March through late September. The earliest nests on the California coast occur during the first week of March in some years and by the third week of March in most years (Page et al. 1995). Peak initiation of nesting is from mid-April to mid-June

(Warriner et al. 1986; Powell et al. 1997). Generally, the breeding season may be 2 to 4 weeks earlier in southern California than in Oregon and Washington. Individual birds 1 year or older are considered to be breeding adults. The mean annual life span of western snowy plovers is estimated at about 3 years, but at least one individual was at least 15 years old when last seen (Page et al. 1995).

The typical egg clutch size of western snowy plover is three with a range from two to six (Warriner et al. 1986, Page et al. 1995). Both sexes incubate the eggs, which take about 27 days (4 weeks) to hatch, with the female tending to incubate during the day and the male at night (Warriner et al. 1986). After losing a clutch or brood or successfully hatching a nest, western snowy plovers may re-nest at the same site or move up to several hundred miles to nest at other sites (Stenzel et al. 1994, Powell et al. 1997). Re-nesting occurs 2 to 14 days after failure of a clutch, and observers documented up to five re-nesting attempts for a pair (Warriner et al. 1986).

Western snowy plover chicks are precocial (capable of a high degree of independence from birth) and able to feed on their own within hours of hatching; however, chicks are unable to fly until 1 month after hatching. Females generally desert males and broods by the sixth day and thereafter the chicks are typically accompanied by only males. Females obtain new mates and initiate new nests while males rear the broods (Page et al. 1995).

Western snowy plover are primarily visual foragers, using the run-stop-peck method of feeding typical of *Charadrius* species. They forage on invertebrates in the wet sand and amongst surf-cast kelp within the intertidal zone, in dry sand areas above the high tide, on salt pans, on spoil sites, and along the edges of salt marshes, salt ponds, and lagoons. Western snowy plover sometimes probe for prey in the sand and pick insects from low-growing plants. Their food sources consist of immature and adult forms of aquatic and terrestrial invertebrates. Little quantitative information is available on food habits. The recovery plan (Service 2007) identifies prey items for western snowy plover that include but are not limited to: beach hoppers (*Orchestoidea* spp.) rove beetles (Staphylinidae), long-legged flies (Dolichopodidae), shore flies (Ephydridae), water bugs (Saldidae), and hymenopterans (Braconidae).

In western North America, western snowy plovers winter mainly in coastal areas from southern Washington to Central America (Page et al. 1995), although the majority of birds winter south of Bodega Bay, California (Page et al. 1986). In winter, western snowy plovers occur on many of the beaches used for nesting, as well as some beaches where they do not nest. They also occur in man-made salt ponds and on estuarine sand and mud flats. In California, the majority of wintering western snowy plovers assemble on sand spits and dune-backed beaches. Some also occur on urban and bluff-backed beaches, which western snowy plovers rarely use for nesting (Page *et al.* 1986). Western snowy plovers that breed on the coast and inland are very site-faithful in winter.

Threats to Western Snowy Plover

Much of the analysis presented below is based on the western snowy plover recovery plan (Service 2007), Lafferty (2001), Burger (1993, 1994), and the Guidelines for Managing Recreational Activities in Piping Plover (*Charadrius melodus*) Breeding Habitat (Service 1994). The piping plover is closely related to the western snowy plover, its biology and behaviors are similar to the western snowy plover and it faces similar threats; therefore, we use piping plover as a surrogate to analyze some of the impacts to western snowy plover in this biological opinion.

The Pacific Coast population of western snowy plovers has experienced widespread loss of nesting habitat and reduced reproductive success at many nesting locations. The degree of threats varies by geographic location. Human activity is a key factor in the decline of the western snowy plover coastal breeding populations range wide. Human activities disturb western snowy plovers twice as often as all other natural causes combined (Page et al. 1977). We cited increasing level of human recreation as a major threat to the breeding success of the Pacific Coast population of the western snowy plover at the time of listing (Service 1993). Human disturbance is the primary cause of habitat loss, along with urban development, invasive nonnative plants, and expanding predator populations. Breeding and wintering habitat is subject to erosion and accretion, and is highly susceptible to degradation by mechanized beach cleaning; and construction of seawalls, breakwaters, jetties, piers, homes, hotels, parking lots, access roads, trails, bike paths, day-use parks, marinas, ferry terminals, and recreational facilities. Urban development has permanently eliminated valuable nesting habitat on beaches in southern Washington (Brittell et al. 1976), Oregon (Oregon Department of Fish and Wildlife 1994), and California (Page and Stenzel 1981).

Urban development can result in increased human use of snowy plover habitat in addition to causing direct loss of habitat,. Human activities such as walking, jogging, fishing, fireworks, unleashed pets, horseback riding, and off-road vehicles can destroy the western snowy plover's cryptic nests and chicks. Thus, humans can cause direct mortality of western snowy plovers because people may step on and crush eggs or chicks on purpose or inadvertently, deliberately take eggs from nests, and remove chicks from beaches erroneously thinking they have been abandoned. Humans may flush adult western snowy plovers off their nests, which may cause mortality of eggs and chicks due to exposure to temperature changes, blowing sand, and increased vulnerability to predators (Service 2007). Beach-related recreational activities that are concentrated in one location can negatively affect incubating western snowy plover adults when these activities occur too close to their nests and repeated intrusions by people into nesting areas may cause birds to move into marginal habitats where reproductive success is then reduced (Service 2007). Studies of the piping plover indicate that early season nesting attempts are abandoned and moved elsewhere when human use becomes too intense (Cairns and McLaren 1980). Disturbances such as stationary visitors and surf fishermen kept incubating western snowy plovers off their nests for the longest period of time probably because of the duration of stationary disturbances that occur close to nests (Fahy and Woodhouse 1995). Additionally, the improper disposal of offal (waste parts of fish), bait, and other litter attracts predators of western

snowy plover. Western snowy plovers may also become entangled in discarded fishing lines (G. Page, pers. comm. 1998).

Page et al. (1977) observed humans disrupt incubating adult western snowy plovers at Point Reyes, California; when humans approached western snowy plover, adults left their nests most of the time when people were within 164 feet (50 meters) and about one-third of the time when people were over 328 feet (100 meters). Hoopes et al. (1992) found that humans caused piping plovers to flush or move at an average distance of 75 feet (23 meters). Burger (1994) observed that piping plovers in response to human disturbance spent more energy on vigilance and avoidance behavior at the expense of foraging activity; the time devoted to foraging was negatively correlated with the number of people within 328 feet (100 meters) of piping plovers. The disruption of foraging and roosting behavior may result in decreased accumulation of energy reserves necessary to complete the migration cycle and successfully breed (Burger 1986, Pfister et al. 1992). Shorebirds, such as western snowy plover and piping plover that are unsuccessful in gaining necessary fat reserves have very low survival rates (Brown et al. 2000b in Lafferty 2001).
Plovers (*Charadrius* spp.), however, may have differing reactions to human disturbances. Page et al. (1977) observed that western snowy plovers' reaction to disturbance by humans varied, ranging from one bird remaining off the nest for less than 1 minute when a person walked within 3 feet (1 meter) of the nest on a heavily-used beach to another western snowy plover leaving the nest when three people were 656 feet (200 meters) away on a less-used beach. Lafferty (2001) observed that western snowy plover were most frequently disturbed when approached closely by people and dogs. However, researchers have suggested that western snowy plover exposed to prolonged human activity near their nests may become accustomed to it and may adapt by diversifying habitat use (e.g., beaches and dunes) when available (Page et al. 1977; Burger 1994).

People using beaches for recreation occasionally drag driftwood around the beach and build structures with it (Applegate and Schultz 2000). Western snowy plovers often build nests beside driftwood, so its removal may reduce the number of suitable nesting sites (Service 2007). Additionally, driftwood provides western snowy plover with year-round protection from wind, blowing sand, predators, and humans. Removal of driftwood has destroyed nests at Vandenberg AFB, where driftwood being dragged to beach fire sites crushed two nests (Persons 1994). Driftwood also provides habitat for invertebrate prey species, especially near the wrack line. Therefore, driftwood removed for firewood or decorative items can result in destruction of nests and newly hatched chicks that frequently crouch by driftwood to hide from predators and people, and is likely to reduce the concentration of invertebrate prey, which may cause western snowy plovers to spend more time and energy foraging elsewhere. Moreover, structures built of driftwood can serve as hunting perches for avian predators (Service 2007).

Dogs on beaches can pose a substantial threat to western snowy plover during both the breeding and nonbreeding seasons. Unleashed dogs may chase western snowy plover and destroy nests. Similar to disturbance by humans, repeated disturbances by dogs can interrupt brooding, incubating, and foraging behavior of adult western snowy plover and cause chicks to become

separated from their parents (Service 2007). Even when not deliberately chasing birds, dogs on a beach may disturb western snowy plover and other shorebirds that are roosting or foraging. Page et al. (1977) found that western snowy plovers flushed more frequently and remained off their nests longer when a person was accompanied by a dog than when alone. Lafferty (2001) observed that the minimum distance between human activity and wintering and roosting western snowy plovers was approximately 100 feet (30 meters). Relatively few people or dogs beyond this distance disturbed wintering plovers. The number of individual people or pets in a group did not seem to alter the probability of disturbance. However, breeding western snowy plovers are more sensitive to disturbance by humans and react at a greater distance (at least 262 feet (80 meters)) than wintering western snowy plovers (Fahy and Woodhouse 1995; Lafferty 2001).

Western snowy plovers may perceive kites flown by people as potential predators, as was shown with piping plovers. Hoopes et al. (1992) found that piping plovers responded to kites at an average distance of 279 feet (85 meters), moved an average distance of over 328 feet (100 meters), and responded for an average duration of 70 seconds. Stunt kites may cause a greater response from western snowy plovers than traditional, stationary kites. At Ocean Beach in San Francisco, California, western snowy plovers' reaction to kites ranged from increased vigilance while roosting in close proximity to the kite flying to walking or running up to 82 feet (25 meters) away and resting again while remaining alert (Hatch 1997). Other kite-like instruments or sails, such as parachutes used to wind-surf or para-surf, can have the same effect as kites, especially if parachutes are raised over the beach or in the surf near the shoreline.

Driving vehicles in breeding habitat may cause destruction of eggs, chicks, and adults, abandonment of nests, and considerable stress to western snowy plover family groups (G. Page, pers. comm. 1997; Myers, in litt. 1988; Price, in litt. 1992; Stern et al. 1990; Casler et al. 1993; S. Richardson, pers. comm. 1998; Widrig 1980, in Service 2007). Vehicles may crush wrack into the sand making it unavailable as cover or a foraging substrate (MacIvor 1990, Strauss 1990, Hoopes *et al.* 1992, Goldin 1993, in Service 1994). Furthermore, beaches used by vehicles during nesting and brood-rearing periods generally have fewer breeding piping plovers than available nesting and feeding habitat can support. In contrast, piping plover abundance and productivity has increased on beaches with vehicle restrictions during chick-rearing periods and protection of nests from predators (Goldin 1993; S. Melvin, pers. comm. 1993, in Service 1994). However, the magnitude of this threat is variable, depending on the frequency of use and type of terrain covered.

Studies on the piping plover found off-road vehicles caused piping plover to flush or move at an average distance of 131 feet (40 meters) (Hoopes et al. 1992). Off-road vehicles within 164 feet (50 meters) of piping plovers caused them to stop feeding most of the time. While most responses by piping plovers to off-road vehicles resulted in movement by the birds, sometimes piping plovers freeze in response to the off-road vehicles. Both of these responses (flushing and freezing in place) have a negative impact on plovers through either disturbance, interruption of foraging behavior, or increasing the risk that vehicles will hit or crush them. Western snowy plover adults and chicks have used tire tracks and human footprints for loafing at Camp Pendleton and Naval Amphibious Base Coronado (Powell and Collier 1994), which would

increase their chances of being run over and killed. Plover chicks stand in, walk, and run along tire ruts, and sometimes have difficulty crossing deep ruts or climbing out of them (Eddings et al. 1990, Strauss 1990, Howard et al. 1993, in Service 1994). According to Fahy and Woodhouse (1995, in Service 2007), all-terrain vehicles operating at Vandenberg AFB caused the most significant alert and flight behaviors by western snowy plovers, even though they were in compliance with the then linear restriction.

Additional Threats to the Western Snowy Plover

West Nile Virus

West Nile virus, a mosquito-borne disease that can infect birds, reptiles, and mammals, has spread rapidly across the U.S. from the initial introduction in New England (National Audubon Society 2006). In 2004 to 2006, the disease was reported from two coastal counties (Lane and Lincoln) in Oregon but has not been reported from any coastal counties in Washington (U.S. Geological Survey 2006). The West Nile virus has been identified in dead piping plovers and killdeer (*Charadrius vociferus*), both of which are closely related to the western snowy plover (Center for Disease Control 2004).

Predation

Predator density is a significant factor affecting the quality of western snowy plover nesting habitat (Stenzel et al. 1994). Predation can result in the loss of adults, chicks, or eggs and separation of chicks from adults (Service 2007). Western snowy plovers generally cannot defend themselves or their nests against predation but must rely on anti-predator adaptation, including 1) pale coloration of adults, eggs, and young, which acts as camouflage against detection by predators; 2) a skulking retreat from the nest at a predator's approach; 3) extreme mobility and elusiveness of precocial young; and 4) maintenance of low nesting density (Page et al. 1983). In natural ecosystems, the predator-prey relationship tends to maintain a natural balance, where prey species slowly evolve strategies to evade predators, while predator species slowly evolve effective prey-capturing behavior. However, when nonnative predators are introduced into the ecosystem and thrive, they frequently occur in much higher densities and possess more effective strategies than native predators and, hence, usually have a more severe effect on native wildlife populations (Service 2007).

Nonnative predators of western snowy plovers include eastern red foxes (*Vulpes vulpes regalis*), domestic and feral dogs and cats, and North American opossums (*Didelphis virginiana*). Domestic and feral cats are widespread predators. The threat of predation by domestic cats intensifies when housing is constructed near western snowy plover breeding habitat. Furthermore, unnatural habitat features such as landscaped vegetation (e.g., palm trees), telephone poles, transmission towers, fences, buildings, and landfills near western snowy plover nesting areas attract predators (Service 2007). Trash left on the beach by humans may also attract predators. Native predators of western snowy plovers include coyotes, crows, ravens, American kestrels, loggerhead shrikes, and several gull species (*Larus* spp.). Human presence,

fragmentation of plover colonies into smaller, isolated units, and the loss of larger predators to control these meso-predators all exacerbate the effects of even native predators.

Invasive Nonnative Vegetation (from Service 2007)

A significant cause of habitat loss for coastal breeding western snowy plovers has been the encroachment of European beachgrass and American beachgrass (*Ammophila breviligulata*) into suitable habitat. Foredunes dominated by introduced beachgrass have replaced the original low, rounded, open mounds formed by the native dunegrass (*Leymus mollis*) and other native beach plants. European beachgrass was introduced to the west coast around 1898 to stabilize dunes (Wiedemann 1987); it has spread up and down the coast and now occurs from British Columbia, Canada, to Ventura County in southern California. American beachgrass is native to the East Coast and the Great Lakes region. Currently, American beachgrass is the dominant introduced beachgrass species in much of the western snowy plover's range in the state of Washington (Seabloom and Wiedemann 1994). In addition to the loss of nesting habitat, European beachgrass may affect western snowy plover food resources. Slobodchikoff and Doyen (1977) found that beachgrass markedly depressed the diversity and abundance of sand-burrowing arthropods at coastal dune sites in central California. Beachgrass communities may also provide habitat for western snowy plover predators that historically would have been largely precluded by the lack of cover in the dune community (Stern et al. 1991).

Other nonnative plant species that have invaded coastal dunes include Scotch broom (*Cytisus scoparius*), gorse (*Ulex europaeus*), South African iceplant (*Carpobrotus edulis*), pampas grass (*Cortaderia selloana*), jubata grass (*Cortaderia jubata*), and iceplant (*Mesembryanthemum* sp.). Shore pine (*Pinus contorta*) is a native plant species that has invaded coastal dunes and resulted in similar impacts to western snowy plovers (Schwendiman 1975, California Native Plant Society 1996, Powell 1996). Many nonnative weed species also occur on and along San Francisco Bay salt pond levees, resulting in unsuitable nesting habitat for western snowy plovers (Service 2007).

Recovery of the Western Snowy Plover

The 2007 final recovery plan for the western snowy plover states that the goal of recovery efforts is to delist the western snowy plover. The recovery plan for western snowy plover focuses on: (1) increasing population numbers distributed across the range of the western snowy plover; (2) conducting intensive ongoing management for the species and its habitat and developing mechanisms to ensure management in perpetuity; and (3) monitoring western snowy plover populations and threats to determine success of recovery actions and refine management actions. The species would be considered for delisting when:

1. An average of 3,000 breeding adults has been maintained for 10 years, distributed among 6 recovery units as follows: Washington and Oregon, 250 breeding adults; Del Norte to Mendocino Counties, California, 150 breeding adults; San Francisco Bay, California, 500 breeding adults; Sonoma to Monterey Counties, California, 400 breeding adults; San Luis

Obispo to Ventura Counties, California, 1,200 breeding adults; and Los Angeles to San Diego counties, California, 500 breeding adults. This criterion also includes monitoring of site-specific threats, incorporation of management activities into management plans to ameliorate or eliminate those threats, completion of research necessary to modify management and monitoring actions, and development of a post-delisting monitoring;

2. A yearly average productivity of at least one (1.0) fledged chick per male has been maintained in each recovery unit in the last 5 years prior to delisting; and

3. Mechanisms have been developed and implemented to assure long-term protection and management of breeding, wintering, and migration areas to maintain the subpopulation sizes and average productivity specified in Criteria 1 and 2. These mechanisms include establishment of recovery unit working groups, development and implementation of participation plans, development and implementation of management plans for Federal and State lands, protection and management of private lands, and public outreach and education.

5-Year Review for the Western Snowy Plover

Threats to western snowy plover remain essentially the same as at the time of its listing in 1993, although the magnitude of the threats has been reduced and the overall population has increased through active management afforded by protections under the Act. Despite the reduction in the magnitude of threats and increased population, western snowy plover is still at risk. The most important threats are ongoing habitat loss and fragmentation; mortalities, injuries, and disturbance resulting from human activities; and lack of comprehensive State and local regulatory mechanisms throughout this species' range. Despite the overall population increase, population sizes are low or the species is absent throughout parts of its historical range in Washington, Oregon, and California. Therefore, we concluded in the 5-year review that the western snowy plover remains a threatened species under the Act.

The actions most needed to further promote recovery include re-establishing breeding populations to beach habitats in southern California; continuing to prevent habitat loss and degradation; restoring degraded habitats; balancing habitat restoration with the needs for other species and their habitats around San Francisco Bay; managing nest and chick predators; and continuing managing human activities at breeding and wintering locations. Because threats differ range-wide, the degree of management needed for recovery and conservation would vary site to site and should be conducted in a regional context.

ENVIRONMENTAL BASELINE

The implementing regulations for section 7(a)(2) of the Act define the "action area" as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). For the purposes of this biological opinion and based on the information provided by the Air Force, we consider the action area to include Vandenberg AFB's sandy beaches (South, North, and Purisima Beaches) where the California least tern and

western snowy plover nest during the breeding season and western snowy plover uses for wintering habitat. The nesting habitat for western snowy plover comprises 13.8 miles (22.2 km); the Air Force closes 12.55 miles (20.1 km) to recreational activities during the breeding season and opens 1.25 miles (2.02 km) to certain recreational activities. The California least tern colony at Purisima Point accounts for approximately 1.3 miles (2.1 km) of the total nesting habitat for the western snowy plover and California least tern. Additionally, the action area includes the boat house, and the access route(s) to the mouth of Honda Creek, where large vehicles would transport PWC to launch sites to conduct water rescue training activities.

Beach Restoration

To date, the Air Force has treated approximately 372 acres (151 hectares) of invasive nonnative vegetation within areas A-D of the Restoration Plan to enhance western snowy plover and California least tern habitat (Kaisersatt, in litt. 2014).

El Segundo Blue Butterfly

Seacliff buckwheat plants are within some but not all areas that the Air Force would target for restoration, and occur in low densities scattered within stands of invasive nonnative vegetation (i.e., European beachgrass and iceplant). . The Air Force conducted surveys for seacliff buckwheat plants within restoration areas on north base at Purisima, Wall, and Minuteman Beaches. They observed 1,591 seacliff buckwheat plants in 154 acres (62 ha) within Purisima, Wall, and Minuteman Beaches; these three beach segments encompass a total restoration area of 959 acres (388 ha) (Kaisersatt, in litt. 2015). Based on the surveys at these three beach segments, and other visual inspections throughout the entire restoration area (1,628 ac (659 ha)), the Air Force estimated that seacliff buckwheat occurs within 16 percent of the entire restoration area. However, the density of seacliff buckwheat in restoration areas targeted on south base is typically less than north base restoration areas (Kaisersatt, in litt. 2015). Furthermore, the Air Force extrapolated (based on the surveys at north base) that there are approximately two buckwheat plants per acre within the entire restoration area. We consider these seacliff buckwheat plants to comprise suitable but unknown to be occupied habitat.

For the purposes of this consultation, we define areas that contain seacliff buckwheat but have not been determined to be occupied or unoccupied by the El Segundo blue butterfly as suitable but unknown to be occupied habitat. The Air Force has referred to these areas as "suitable but not known to be occupied." Therefore, relative to this habitat category, "suitable but not known to be occupied" is equivalent to "suitable but unknown to be occupied" as defined.

Recovery of the El Segundo Blue Butterfly

The recovery plan for the El Segundo blue butterfly did not contemplate the role of Vandenberg AFB in the species' recovery because we finalized the plan prior to the observations of this species in Santa Barbara County. Similarly, the 2008 5-year review does not specify the recovery function of Vandenberg AFB for the El Segundo blue butterfly.

The Integrated Natural Resources Management Plan (INRMP) for the Base considers the species and includes measures to conserve the El Segundo blue butterfly and its host plants. The positive conservation measures for El Segundo blue butterfly the Air Force has implemented at the Base so far include: 1) surveys to further delineate the species' occurrence on, and off, the Base; 2) removal of invasive plants from potentially suitable habitat; 3) cooperation with research through U.C. Riverside and U.C. Santa Barbara; 4) public outreach; and 5) funding research such as commensal relationships between El Segundo blue butterfly and harvester ants (*Messor* spp., *Pogonomyrmex* spp.). Therefore, although the recovery plan for El Segundo blue butterfly did not consider the potential presence of the species at Vandenberg AFB, nor does the 2008 5-year review specify a recovery function of the Base, the Air Force has made a positive effort to conserve the species on Vandenberg AFB, which would be consistent with other recovery efforts.

California Red-legged Frog

The California red-legged frog occurs in Honda Creek and has the potential to occur on the beach adjacent to the creek mouth. Additionally, the California red-legged frog has the potential to occur in a dune swale wetland adjacent to the Wall Beach restoration area, and occurs in the nearby Santa Ynez River. California red-legged frogs occur in nearly all permanent streams and ponds on Vandenberg AFB. Of the 109 ephemeral, wetland, and riparian sites on Base, only 11 sites did not have any life stage of the California red-legged frog (Christopher 2002).

Recovery of the California Red-Legged Frog

The action area, and Vandenberg AFB in general, are within the Northern Transverse Ranges and Tehachapi Mountains Recovery Unit for the California red-legged frog. The action area is also within the Santa Maria River-Santa Ynez River Core Area defined in the recovery plan (Service 2002). The recovery unit was described in the recovery plan as having a "high recovery status,' meaning that the unit supports many populations of the species, has many areas of high habitat quality, and threat levels that range from low to high.

Implementation of the Air Force's INRMP affords the California red-legged frog many protections on Vandenberg AFB. So far, the Air Force has implemented several actions that provide a positive conservation benefit: 1) public outreach and education; 2) working with researchers from U.C. Santa Barbara, the U.S. Geological Survey, and Department of the Navy, including chytridiomycosis studies; 3) surveys for new populations; and 4) monitoring of known populations. These efforts are consistent with the goals from the recovery plan of protecting known populations; protecting suitable habitat, corridors, and core areas; developing and implementing management plans for preserved habitat, occupied watersheds, and core areas; developing land use guidelines; gathering biological and ecological data necessary for conservation of the species; and monitoring existing populations and conducting surveys for new populations.

California Least Tern

Since 1978, California least terns have used the Purisima Point site on a regular basis. The site is approximately 1.3 miles (2.1 km) and bounded by electrified fences on the northern and southern boundary, a chain link fence along the eastern boundary, and the ocean to the west. The Purisima Point colony is characterized by a small population, especially when considering the amount of available breeding habitat and variable annual productivity (Robinette and Howar 2009). In addition to the Purisima Point colony, California least terns historically nested at the Beach 2 colony during 6 breeding seasons between 1990 and 2003, with populations ranging from 1 to 15 pairs. No nesting has occurred at this site since 2003.

The Purisima Point colony has a history of variable productivity, fluctuating at or above the mean from 1998 through 2003, and below the mean prior to 1998 and after 2003. Productivity in 2011 was well below average, marking the first time productivity has been below average since 2006. Since Point Reyes Bird Observatory began monitoring the Purisima Point colony in 2001, there have been six productive years (2001 through 2003 and 2007 through 2010) and three non-productive years during which only one fledgling in total was produced (2004 through 2006). In productive years, California least terns arrive early in the season and adult colony attendance increases rapidly. Colony attendance remains relatively high and stable throughout the egg laying and chick rearing periods and then both adults and fledglings gradually disperse from the colony. The 2011 breeding season initially showed characteristics of a productive year, but resulted in a non-productive year. The breeding population in 2011, estimated at 32 breeding pairs, represented a 3 percent decrease compared to the 2010 breeding season and the 16-year mean (Robinette and Howar 2011).

The mammalian predator that causes the most concern on Base is the coyote (*Canis latrans*), which preys on eggs, chicks, and adults. Avian predators that cause the most concern are ravens and crows; other avian species that are less of a concern include northern harriers (*Circus cyaneus*), American kestrels, loggerhead shrikes, and great-horned owls (*Bubo virginianus*) that may nest close to the California least tern colony. The first raven was sighted at the colony in 2010 (Robinette and Howar 2011).

Recovery of the California Least Tern

The revised recovery plan for the California least tern divides the geographic distribution of the California least tern into 23 Management Areas. The area covered by the 23 Management Areas encompasses all known breeding sites. The recovery plan identifies the beaches at Vandenberg AFB in Coastal Management Area D (Service 1985). Recovery objectives for this area include the development and implementation of a California least tern management plan. The 5-year review does not specify the recovery function of Vandenberg AFB for the California least tern (Service 2006).

The INRMP identifies key threats to the California least tern on Vandenberg AFB, and conservation measures to help alleviate threats. Management activities for the California least

tern on Vandenberg AFB include the avoidance and minimization measures that the Air Force included as part of the proposed project; we therefore will not repeat them herein. Additionally, the Air Force monitors impacts of launches on California least terns in accordance with the Service's biological opinions for applicable launch programs (Delta, Atlas, Taurus, and Falcon). Because year-round launch capability is essential to the Air Force's mission at Vandenberg AFB, the objective of launch monitoring is to identify launch-related impacts and develop additional management and/or mitigation measures if necessary to ensure conservation of California least terns on Base with no net impact to mission capability.

Western Snowy Plover

The following baseline information was compiled from western snowy plover breeding season annual monitoring reports (2006 through 2012) (SRS Technologies 2004, 2005, 2006; Mantech SRS Technologies 2007, 2008, 2009, 2010; Ball and Robinette 2011, 2012; Robinette et al. 2013). In particular, we relied on the 2012 breeding season annual report for much of the discussion of historical nesting and reproduction (Ball and Robinette 2012).

Vandenberg AFB provides one of the best opportunities for recovery of the western snowy plover because it supports one of the largest concentrations of breeding individuals throughout the species' range, and the recovery plan estimates it may be able to support 400 adult birds during the breeding season. Additionally, Vandenberg AFB represents the largest area of continuous mainland coastal habitat under Federal ownership. Since the first comprehensive surveys in the late 1970s for western snowy plover in western North America, Vandenberg AFB has consistently had one of the largest breeding aggregations of western snowy plovers along the west coast of the U.S. (Page and Stenzel 1981, Page et al. 1991).

Western snowy plovers nest from March through September on up to approximately 13.8 miles (22.2 km) of Vandenberg's coastal sand beaches and adjacent dunes that is divided into three sections: North Beaches (6.2 miles) (10 km), Purisima Beaches (2.6 miles (4.2 km), which includes the Purisima Point least tern colony that is 1.3 miles (2.1 km)), and South Beaches (5 miles) (8 km) (see the Description of the Proposed Action for a description of the beach sections that characterize North, South, and Purisima Beaches). Approximately 1.25 miles (2.01 km) of breeding habitat is open to recreational use during the breeding season.

Since 1994, the size of the western snowy plover breeding population on Base has been variable (Ball and Robinette 2011). The smallest population occurred in 1999 (78 adults) and the largest in 2004 (420 adults). The population showed decreasing trends between 1997 and 1999 and more recently between 2004 and 2007. It is important to note that after 1999, the Air Force instituted a beach management plan that provided greater protection for nesting and breeding birds, which resulted in higher numbers of breeding western snowy plovers on Base. As a result, the population showed an increasing trend between 1999 and 2004. The population is variable, but relatively stable since 2007 with a mean of 240 adults from 2000 to 2012 and a mean of 340 nests initiated (Ball and Robinette 2012). Within this time period, approximately 10 percent of

the total nests were initiated in the areas open to recreational access; the sum of the averages for the open areas at Surf, and Wall, and Minuteman Beaches is approximately 35 nests.

Both hatching and fledging success has been highly variable from 1997 through 2012; the long-term mean for hatching success is approximately 46 percent and fledging success is 34 percent. Annual variability is higher for fledging success than hatching success, with no real long-term pattern. Annual hatching success on North and South beaches show similar patterns, though there is divergence in some years (1999, 2003, 2006, and 2011). Purisima Beaches maintain a higher hatching success compared to North and South beaches; however, we note that these results are not statistically significant. Additionally, hatching success has been less variable at Purisima Beaches. The long-term mean for fledging success on North and South beaches is similar, approximately 35 percent and 40 percent respectively, but these annual values are not correlated. Western snowy plover that nest on Purisima Beaches appear to show slightly higher long-term fledging success.

The mean number of nests initiated over the time series is similar between North and South beaches. The highest number of nests occurred on South Beaches and the lowest on Purisima Beaches. There was also little variability in nest densities among beach sections. Nests initiated at Purisima Beaches have been declining since 1994, with the lowest number of nests initiated at Purisima Beaches in the time series occurring in 2011. There was no significant correlation between wrack index values and nest density or fledgling density. Overall, South Beaches had more wrack and a higher mean nest density while North Beaches had a higher mean fledgling density.

Predation is one of the primary causes of loss of western snowy plover nests at Vandenberg AFB. Over the 19 years of monitoring on Base, 17 to 52 percent of nests have been lost in a given year to predators (Ball and Robinette 2012). The two main predators observed preying upon nests are coyotes and corvids (i.e., crows and ravens). In 2012, 37 percent of nests were lost to predators. Coyotes and ravens were responsible for approximately 80 percent of these losses.

From 1994 to 2000, crows were the main corvids observed on Vandenberg AFB beaches, but northern ravens have become the dominant corvid in recent years. Coyote predation has mainly occurred on South Beaches. From 1994 through 2012, approximately 32 percent of all nests where the fate was known were lost to predators.

The long-term mean for hatching success was higher in the closed areas at Surf, Wall, and Minuteman Beaches (Minuteman: approximately 19 percent in the open area and 47 percent in the closed area; Wall: approximately 42 percent in the open area and 45 percent in the closed area; and Surf: approximately 42 percent in the open area and 50 percent in the closed area). The hatching success at Minuteman and Wall Beaches is highly variable with many years where no plovers initiated nests in the respective open area. However, hatching success appears to be increasing within the closed area at Minuteman Beach. At Wall Beach, hatch success within the closed area appears relatively stable, fluctuating near the long-term mean. At Surf Beach, hatch

success within the open area and closed area appear to follow a similar pattern, but are not significantly correlated (Ball and Robinette 2012).

Fledging success at Minuteman is highly variable in the closed area with no banding data available for nests initiated in the open area. The long-term mean for the closed area is approximately 35 percent. At Wall Beach, the long-term mean was higher in the closed area (29 percent) compared to the open area (11 percent), although the mean for the open area was based on a small sample size (only 3 years of banding data). At Surf Beach, the mean fledging success is similar between open and closed areas (open area is approximately 27 percent and closed area is 32 percent), but inter-annual patterns were not significantly correlated (Ball and Robinette 2012).

Winter censuses have documented up to 450 western snowy plovers on Vandenberg AFB (1994 through 2013 survey data) (Air Force 2013b). The average number of wintering snowy plovers on Base is approximately 250. The Air Force conducts wintering counts in December and January. Many of the fledglings overwinter on Vandenberg AFB and are detectable in large wintering flocks (Mantech 2008). Additionally, observations of banded individuals indicate that western snowy plovers that breed elsewhere use Vandenberg AFB in the winter.

Recovery of the Western Snowy Plover

The recovery plan divided the Pacific Coast population of the western snowy plover into six recovery units. The area covered by the six recovery units encompasses all known breeding and wintering sites for the Pacific coast population of the western snowy plover. Vandenberg AFB is within Recovery Unit 5 for the Pacific Coast population of the western snowy plover. Recovery Unit 5 supports the greatest number of western snowy plovers (approximately half of the U.S. Pacific Coast population) and has the greatest amount of available suitable habitat (Service 2007). The beach management plan encompasses Locations CA-84 and CA-85 (as described in the recovery plan, (Service 2007)), which have been identified as breeding and wintering sites for this species. The 5-year review does not specify the recovery function of Vandenberg AFB for western snowy plover.

The INRMP identifies key threats to western snowy plovers on Vandenberg AFB, and conservation measures to help alleviate threats. Management activities for western snowy plovers on Vandenberg AFB include the avoidance and minimization measures that the Air Force included as part of the proposed project; we therefore will not repeat them herein. Additionally, a completed habitat restoration plan includes eradication of nonnative beachgrass and iceplant and enhancement of native vegetation within suitable habitat for the western snowy plover. Furthermore, the Air Force monitors impacts of launches on western snowy plovers in accordance with the Service's biological opinions for applicable launch programs (Delta, Atlas, Taurus, and Falcon). Because year-round launch capability is essential to the Air Force's mission at Vandenberg AFB, the objective of launch monitoring is to identify launch-related impacts and develop additional management and/or mitigation measures if necessary to ensure conservation of western snowy plovers on Base with no net loss to mission capability.

EFFECTS OF THE ACTION

El Segundo Blue Butterfly

Beach Management

Removal or destruction of occupied seacliff buckwheat plants could kill or injure individual adults, larvae, or eggs of El Segundo blue butterfly present on the plants. Beach Restoration as proposed would remove seacliff buckwheat within some but not all the areas where these activities occur. Currently, we consider seacliff buckwheat plants in the restoration area(s) to comprise habitat that is suitable but unknown to be occupied by El Segundo blue butterflies, and therefore we assume that butterflies may be present. As part of the restoration plan, the Air Force may employ manual or mechanical removal, chemical treatment methods, or controlled burning to remove targeted invasive nonnative vegetation such as European beachgrass and iceplant. Mechanical and controlled burning removal methods may also remove seacliff buckwheat plants, whereas manual removal methods should not affect seacliff buckwheat plants because manual removal would specifically target invasive nonnative plants. Because we do not have enough information to analyze the effects of chemical removal methods to El Segundo blue butterflies, any adverse effects to El Segundo blue butterflies from chemical removal methods are not covered by this biological opinion.

Seacliff buckwheat plants occur in low densities and scattered within invasive nonnative vegetation that the Air Force would remove. Based on Air Force surveys of north base restoration areas, approximately 3,256 seacliff buckwheat plants[2] may be removed by restoration activities within the entire restoration area (1,628 ac (659 ha)). Because the Air Force proposed to conduct restoration actions outside of the El Segundo blue butterfly flight season, El Segundo blue butterflies would not be present on seacliff buckwheat plants during restoration actions. The proposed ground disturbance from restoration activities would be short-term for the duration of the restoration activities. While removing seacliff buckwheat plants outside of the flight season would avoid effects to adults, larvae, and eggs that could be present on flowerheads, removing or otherwise destroying these plants after the flight season could directly affect El Segundo blue butterflies that have diapaused beneath seacliff buckwheat plants. We assume that when seacliff buckwheat plants are lost, any individual El Segundo blue butterfly larvae that may be beneath the plants could be killed or injured as the plant is damaged or removed by project equipment or from ground-disturbing activities such as invasive nonnative vegetation removal actions (i.e., mechanical removal and controlled burning).

Removing seacliff buckwheat plants may indirectly affect the next generation of butterflies by removing or rendering the host plants unusable for the subsequent flight season(s). If seacliff buckwheat reestablishes post-removal but prior to the flight season, there likely would not be adequate flowerheads on these plants for El Segundo blue butterflies to utilize for at least one to several breeding seasons until the plants mature.

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2 (Two seacliff buckwheat plants per acre * 1,628 acres (659 ha)) = 3,256 plants

Summary

Overall, beach restoration activities would have a minor adverse effect to the El Segundo blue butterfly population on Vandenberg AFB. The total number of seacliff buckwheat plants (approximately 3,256) and associated El Segundo blue butterflies that may be adversely affected is a small portion of the population on Base. In addition, we consider the seacliff buckwheat plants that would be adversely affected by restoration activities suitable but unknown to be occupied habitat. Therefore, the proposed activities are not likely to noticeably reduce the El Segundo blue butterfly population on Vandenberg AFB and would have even less of an impact rangewide, and would not translate into a substantial diminishment of the numbers, reproduction, or distribution of the species throughout its range.

Recovery of the El Segundo Blue Butterfly

As noted earlier, we published the recovery plan before biologists discovered the El Segundo blue butterfly population at Vandenberg AFB and in Santa Barbara County. We expect minor adverse effects to the El Segundo blue butterfly because of the proposed project; therefore, the level of effects to the El Segundo blue butterfly that we anticipate to occur within the action area would not interfere with recovery efforts for the subspecies. The population of El Segundo blue butterfly on Base would be able to continue to contribute to the overall conservation of the species.

California Red-legged Frog

Beach Management

Beach management, as proposed, is not likely to adversely affect California red-legged frogs because these activities would not occur in California red-legged frog habitat and we do not expect California red-legged frogs to be present where these activities would occur.

Water Rescue Training

The access to and launching of PWC at Honda Creek may adversely affect California red-legged frogs. Training activities would not occur within wetland or riparian habitats, but dispersing California red-legged frogs have the potential to occur in adjacent areas where the water rescue training activities would occur. Juvenile and adult California red-legged frogs may disperse long distances from breeding sites throughout the year. Therefore, the Air Force proposes to conduct pre-activity surveys at the mouth of Honda Creek, using Service-approved biologists to capture and relocate any California red-legged frogs found within the action area. California red-legged frogs would be relocated to the nearest suitable habitat outside of the action area, but within Honda Creek. While capturing and relocating California red-legged frogs reduces the potential for adverse effects form the proposed project, a small proportion of captured California red-legged frogs could be injured or die as a result of the capture and relocation efforts due to improper handling, containment, transport of individuals, or from releasing them into unsuitable

habitat (e.g., where nonnative predators are present). Observations of diseased and parasite-infected amphibians are not uncommon. This has given rise to concerns that releasing amphibians following a period of captivity, during which time they can pick up infections of disease agents, may cause an increased risk of mortality in wild populations. The hands, footwear, or equipment of fieldworkers can carry amphibian pathogens and parasites between habitats, in the process spreading them to localities containing species that have had little or no prior contact with such pathogens or parasites. The Air Force's use of a Service-approved biologist would reduce improper handling, containment, or transport of California red-legged frog.

The effects of noise generated by personnel and vehicles during the nonbreeding season would likely be minor because California red-legged frogs spend most of their lives in and near sheltered backwaters of ponds, marshes, springs, streams, and reservoirs. The noise generated would likely not penetrate the air-water interface unless directly above it, and therefore, we anticipate California red-legged frog would experience limited exposure to noise while in their aquatic habitats.

The adverse effects to California red-legged frogs during the breeding season could be more substantial because noise generated from the vehicles, PWC, and up to 20 personnel participating in the water rescue training activities could interfere with California red-legged frog breeding activities. Male California red-legged frogs produce mating calls to attract females. These mating calls are audible during the evening and at night, and sometimes during the daytime during peak breeding season (CaliforniaHerps.com 2013). In general, noise effect thresholds for most species are unknown, evidence for habituation is limited, long-term effects are generally unknown, and how observed behavioral and physiological response might be manifested ecologically and demographically are poorly understood (Brown 2001).

An animal's response to noise can depend on a variety of factors, including noise level, frequency distribution, duration, number of events, variation over time, rate of onset, level of background noise, time of year, and time of day. A review of the literature reveals that it is generally accepted reptiles, amphibians, and invertebrates do not hear as well as and react less than birds and mammals, although research is limited (U.S. Department of Transportation 2004). Spadefoot toads (*Scaphiopus couchi*) undergoing estivation reacted to motorcycle sounds (up to 95 decibels at 0.4-4.4 kilohertz) by leaving their burrows, which could have a detrimental effect if it occurred at the wrong time of year (Brattstrom and Bondello 1983). Other than this one study; however, there is little information on the response of amphibians to noise disturbance.

Assuming a worst-case scenario that noise from the vehicle towing the PWC and presence of personnel at the project site adjacent to Honda Creek could cause disruption of breeding activities similar to spadefoot toads leaving burrows, the water rescue training activities could interrupt breeding activities in Honda Creek. However, we anticipate the effect would be less substantial because the noise generated by the project activities is temporary (up to 2 consecutive days per month, but likely less often); the project activities would only occur during daylight hours, whereas the California red-legged frog produces mating calls during the day but primarily

at night; and the Air Force would use a route that is as far from the riparian corridor of Honda Creek as possible.

Summary

The beach management activities would not adversely affect California red-legged frogs. Water rescue training activities are likely to adversely affect California red-legged frogs. Because the Air Force will implement measures to minimize adverse effects, and the Fire Department would only conduct activities during daytime hours and not within wetland habitats, we anticipate that the overall effect to California red-legged frogs at Honda Creek, and thus to the population on Vandenberg AFB as a whole, to be minor. We do not expect the proposed activities to reduce the reproduction, numbers, or distribution of the California red-legged frog.

Recovery of the California Red-legged Frog

The action area is within the Santa Maria to Santa Ynez Core Area of the Central Coast recovery unit. Because the action area is within a recovery unit with high recovery status, the proposed project is not likely to reduce the potential contribution to the conservation of California red-legged frog. In other words, we consider the populations of California red-legged frog in the recovery unit plentiful and many of those are of high quality. Because the impacts of the water rescue training activities would be temporary and minor, and the Air Force will implement measures to minimize adverse effects to the California red-legged frog and its habitat, we anticipate that the proposed project will not diminish the likelihood of the California red-legged frog's recovery.

California Least Tern

Beach Management

The Air Force proposes to close 12.55 miles (20.2 km) of beaches to human recreational use during the western snowy plover and California least tern breeding season. Approximately 1.3 miles (2.1 km) of breeding habitat for California least tern at Purisima Point will be closed. Because there is no public access to the Purisima Point colony during the breeding season, and the access restrictions are strictly enforced, human recreation should not directly impact California least terns. No disturbance due to human activity on the beach has been observed since at least 2005 (Robinette and Rogan 2006; Robinette 2007; Robinette and Howar 2008, 2009, 2010, 2011; Robinette et al. 2012; Robinette et al. 2013).

Predation is one cause of low productivity of California least terns. The Air Force has developed a predator management plan, the implementation of which should reduce the rate of predation on breeding California least tern eggs and chicks. Although we recognize that some level of predation by native predators is part of a healthy, dynamic environment, the goal of predator management is to reduce predation to a level that would allow California least terns on Vandenberg AFB to contribute to the recovery of the species.

The Air Force installs fencing around the perimeter of the breeding area. The Air Force repairs the fencing (if necessary) and electrifies it before California least terns arrive at the site. If repairs are needed during the breeding season, maintenance activities could adversely affect nesting California least terns because the human presence needed to repair the fence may cause adult birds to temporarily or permanently flush from nesting sites, exposing eggs and chicks to predators and/or unfavorable conditions where eggs and chicks may not hatch or survive. We assume that the closer the nest is to the location of the fencing repair, the more likely the human presence would negatively impact nesting birds. However, there is no indication that fencing repairs or maintenance has adversely affected California least terns during 8 years of monitoring. The Air Force coordinates all fence maintenance activities with biological monitors to reduce the effects of this activity on California least terns, and the benefit of having a functioning fence to protect nesting California least terns outweighs the potential for negative effects. Because the Air Force will coordinate all maintenance activities with biological monitors, they may reduce the potential to adversely affect nesting California least terns. However, because we cannot predict where the adults will nest within the fence, we anticipate that fence maintenance could adversely affect California least terns.

If the Air Force needs to trap and remove a coyote out of the colony as part of predator management, this action could result in temporary or permanent flushing of an unknown number of California least terns from their nests. We assume that the closer nests are to the area where this human activity would occur to remove a coyote, the more likely this action would affect nesting birds. Because the Air Force will coordinate all predator management with biological monitors, they would reduce the potential to adversely affect nesting California least terns. However, because we cannot predict where the adults will nest, we anticipate that predator management could adversely affect California least terns. The overall purpose of predator management, however, is to provide a benefit to California least terns.

Water Rescue Training

Water rescue training activities would not adversely affect California least tern because these activities would not occur within California least tern habitat.

Summary

Overall, the implementation of the beach management plan would provide a benefit to California least terns because it protects California least terns from adverse effects of human recreation and includes a predator management plan. Impacts associated with biological monitoring and conducting predator management and fence maintenance activities are likely to have only a minor adverse effect on the California least tern population on Base and would not reduce the numbers, reproduction, or distribution of the species.

Recovery of the California Least Tern

The recovery plan states that the most effective means of California least tern conservation is

through development and implementation of a California least tern management plan (Service 1985). The beach management program at Vandenberg AFB positively reflects the goals of the recovery plan and the recommendations of the 5-year review because it includes management of the California least tern colony and its habitat at Purisima Point on Vandenberg AFB. Therefore, we conclude that the proposed activities would not diminish the likelihood of the California least tern's recovery.

Western Snowy Plover

Beach Management

The Air Force proposes to close 12.55 miles (20.2 km) of beaches to recreational use during the western snowy plover and California least tern breeding season. Recreational access would occur within 1.25 miles (2.01 km) of suitable habitat. The closure of the suitable habitat area during the breeding season has been in effect since the 2001 breeding season. The closure of this area to public access during the breeding season has increased the rates of survival and breeding success, and decreased the impacts of humans (SRS Technologies 2004, 2005, 2006; Mantech SRS Technologies 2007, 2008, 2009, 2010; Ball and Robinette 2011, 2012; Robinette et al. 2013). These results are consistent with other findings of increased reproductive success on fully-closed beaches compared with those with just linear restrictions (Persons 1998).

The Air Force installs boundary fencing (yellow rope) and signs prior to the start of the breeding season to demarcate the closed areas. Maintenance activities could affect nesting western snowy plovers; however, the Air Force coordinates all maintenance activities with biological monitors to reduce the effects on western snowy plovers. Therefore, we anticipate fencing maintenance would have a minor effect. Additionally, the boundary fencing and signs may provide perches for birds that prey on western snowy plovers. The Air Force would apply Nixalite® or other appropriate material to deter perching and reduce avian predation opportunities.

The Air Force prohibits certain recreational activities in western snowy plover habitat during the breeding and nonbreeding seasons to minimize the effects to breeding and wintering western snowy plovers (see minimization measures 7 and 8 under Avoidance and Minimization Measures for the Western Snowy Plover and California Least Tern in the Description of the Proposed Action section of this biological opinion). Additionally, the Air Force has initiated actions to increase public awareness to reduce potential effects to the western snowy plover and its habitat while trying to keep the open areas accessible to the public and Vandenberg AFB personnel during the breeding season. The distribution of educational brochures to the public and installation of bilingual signs should reduce human intrusion into the areas closed during the breeding season. Additionally, the recent use of volunteer docents during the 2013 breeding season to increase public awareness should help reduce human intrusion into the closed areas. Furthermore, the proposed cap on the number of violations would further reduce the amount of adverse effects to western snowy plovers because once the limit is reached at Surf (50), Wall (10), or Minuteman (10) Beaches, respectively, the Air Force closes the open beach area where the violations limit is exceeded for the remainder of the breeding season. The issuance of

citations, at the discretion of Vandenberg AFB law enforcement, to violators of the beach access rules (i.e., closed areas) acts as a deterrent to potential violators.

From 2001 to 2012, the number of violations in the closed areas at Surf Beach have ranged from 17 to well over 50. The violations at Wall Beach ranged from 1 to 8; Minuteman Beach ranged from 1 to 11 (Ball and Robinette 2012). In most years, the open areas of the beaches remain accessible for the entire breeding season. However, the limits were exceeded three times at Surf Beach including the last two breeding seasons, and once at Wall Beach, but Minuteman Beach has never been closed due to exceeding the violation limit. Unauthorized human recreation occurs within the closed areas as people ignore the signs to stay out of the closed areas during the breeding season. Even after reaching the violation limit and the open area at Surf Beach is closed for the remainder of the breeding season, people continue to enter the area closed to recreation. The open area at Surf Beach was closed relatively early during the 2013 breeding season and violations post-closure of the open area of Surf Beach during 2013 were high. Because the Air Force implemented an increased monitoring effort and docent program during the 2013 breeding season, the number of violations seemed high because there was more monitoring of the closed areas in 2013; however, it is also possible the number of violations each year was higher than was documented because it was not being monitored as closely. Nevertheless, we discuss the adverse effects that humans have on western snowy plovers above (see Status of the Species section–Western Snowy Plover).

As stated earlier, the Air Force proposes to allow access to 1.25 miles (2.01 km) of western snowy plover habitat during the breeding season (0.5 mile (0.8 km) at Surf Beach, 0.25 mile (0.4 km) at Wall Beach, and 0.5 mile (0.8 km) at Minuteman Beach), but with limitations on recreational activities (see minimization measures 7 and 8 under Avoidance and Minimization Measures for the Western Snowy Plover and California Least Tern in the Description of the Proposed Action section of this biological opinion). In total, the three areas open to beach recreation have historically supported between 0 and approximately 10 percent of all western snowy plover nests on Base. Eleven nests were located in the open areas in 2012; nine at Surf, one at Wall, and one at Minuteman Beach (Ball and Robinette 2012). During the 2013 breeding season, and after the violation limit was reached at Surf Beach and the open area subsequently closed, western snowy plovers established more nests than usual in the (previously) open area that was closed. The increase in nests is likely due to the decrease in human disturbance effects after closure of the previously open area.

Biological monitors erect symbolic fencing around nests in high-visitor traffic areas within the open areas to protect the nests and birds from people inadvertently crushing the nests, eggs, or chicks. Installing symbolic fencing may cause western snowy plovers to flush from nests, but the installation of symbolic fencing has been successful in protecting nests from trampling. However, symbolic fencing may increase curiosity and vandalism by humans (Service 2007). In 2011, a human deliberately trampled one nest (Ball and Robinette 2011); two nests were deliberately destroyed in 2013 (Robinette *et al* 2013). Overall, humans deliberately destroy very few nests in the open areas on Base because of the protection given by the symbolic fencing and the monitoring and enforcement efforts provided by the Air Force.

Symbolic fencing placed around nests may be ineffective in protecting chicks from people or vehicles because chicks typically leave the nest within a day after hatching and move extensively along the beach to feed (Service 1994). Additionally, symbolic fencing would not protect the nests and western snowy plovers from predators. The Air Force may install predator exclosures, which have consistently increased nest success (White and Hickey 1997, Stern et al. 1991, Craig et al. 1992, Mabee and Estelle 2000, Service 2002, Lauten et al. 2006, in Service 2007). Over time, however, these exclosures may provide a visual cue to predators, making it easier for them to target adults, chicks, and eggs of western snowy plover (Service 2007).

Over 19 years of monitoring on Base, approximately 32 percent of western snowy plover nests were lost due to predation (1994 through 2012), ranging between 17 to 52 percent of nests being lost to predators (Ball and Robinette 2012). In 2012, 37 percent of western snowy plover nests were lost due to predators, with coyotes, ravens, and crows the three main predators of nests (Ball and Robinette 2012).

The Air Force implements a predator management plan that aims to reduce the high rate of predation of western snowy plover on Base. An effective predator management plan would increase nesting and fledging success, as has been evident elsewhere (Service 2007). Nevertheless, predators continue to have an effect on western snowy plover at Vandenberg AFB, but not unlike other breeding areas that host the western snowy plover throughout its range. The Air Force uses qualified biologists to conduct the predator management activities. Personnel may enter closed areas to conduct these activities and have the potential to step on and crush eggs and/or cause adults to flush from their nests, but because they would be accompanied by a Service-approved biological monitor, the effects to western snowy plovers from conducting predator management activities is expected to be minimal.

The Air Force has used electric fencing around the California least tern colony at Purisima Point on Base, where western snowy plovers also have historically nested. This fence is generally effective at excluding mammalian predators of the California least tern, and western snowy plovers that may nest within the California least tern colony have also benefited (Service 2007).

We expect that dogs will have a minimal effect on breeding western snowy plovers because the Air Force proposes to prohibit dogs within western snowy plover habitat (closed and open areas) during the breeding season. Unfortunately, small percentages of the public do not always follow these restrictions and bring dogs into the open areas regardless, or unaware, of the rules prohibiting dogs. These individuals are cited, as necessary, by Conservation Law Enforcement to deter future incidents of ignoring the prohibitions of dogs on the beach during the breeding season. Similar to disturbance by humans, repeated disturbances by dogs can interrupt brooding, incubating, and foraging behavior of adult western snowy plovers and cause chicks to become separated from their parents (Service 2007) (see discussion above in the Status of the Species–Western Snowy Plover). Fahy and Woodhouse (1995; in Lafferty 2001) observed that leashed pets were about half as likely to disturb western snowy plovers as unleashed pets. Additionally, Lafferty (2001) observed that few dogs (and people) beyond 100 feet (30 meters) impacted wintering roosting western snowy plovers. However, because breeding western snowy plovers

are more sensitive to disturbance and react at a greater distance than wintering western snowy plovers (see Page et al. (1977); Hoopes et al. (1992); Burger (1994)), bringing dogs into the open areas may affect breeding adults within the open areas, and possibly within closed areas. If western snowy plovers are affected in the closed area, it would depend upon where the dog is relative to the boundary demarcating the closed area and if nests are present near the boundary. Outside of the breeding season, the Air Force allows dogs but they must be on a leash at all times. Thus, based on Lafferty (2001), we anticipate that few leashed dogs would affect wintering western snowy plovers unless the dog gets within 100 feet (30 meters).

Law enforcement patrols could crush western snowy plovers, destroy nests, and disturb nesting activity, chick rearing, and foraging western snowy plovers. Enforcement personnel patrol within wet sand to the maximum extent possible in order to reduce the potential for these effects to western snowy plovers. Enforcement personnel may enter closed areas to remove and cite trespassers as necessary. Biological monitors will escort enforcement personnel to help minimize effects to western snowy plovers when investigations are needed. Overall, enforcement is a beneficial part of the beach management program by discouraging encroachment into closed areas and thus increasing breeding success.

Anglers using specific areas of Vandenberg AFB have previously violated closures and other beach restrictions, most notably leaving litter in these areas (Applegate and Shultz 2000). Anglers' have occasionally used suitable habitat as a toilet area and left bait and fish remains on the beach. These activities may attract predators to the beach that in turn may prey upon western snowy plovers.

As described above, the Air Force developed a beach restoration plan as part of their beach management program, which would improve western snowy plover and California least tern habitat by removing invasive nonnative plants, particularly European beachgrass and iceplant. The Air Force has successfully removed approximately 87 acres (35 hectares) of European beachgrass and iceplant. We concluded that the restoration plan would not adversely affect western snowy plover because it occurs during the nonbreeding season and monitors will be present during restoration activities (see discussion above). Overall, the Air Force provides a benefit to western snowy plovers by working to increase the amount and quality of nesting and foraging habitat on Base.

Water Rescue Training

The Fire Department would conduct water rescue training activities within the open areas at Wall and Minuteman Beaches. This activity would not occur in the open area at Surf Beach. The percentage of western snowy plover nests in the open areas is historically a very small proportion of the total nesting that occurs on Base. The amount of habitat available within areas open and closed to recreational activities is similar at Minuteman Beach (0.5 mile (0.8 km) open and 0.6 mile (0.97 km) closed). On average from 2008 through 2012 breeding seasons, western snowy plovers initiated less than one nest annually in the open area and nine nests in the closed area. At Wall Beach, there is more habitat available in the closed area ((0.85 mile) (1.37 km)) than the

open area ((0.25 mile) (0.4 km)). On average from 2008 through 2012 breeding seasons, western snowy plovers initiated two nests annually in the open area and approximately 47 nests in the closed area (Mantech 2008-2010; Ball and Robinette 2011-2012).

We assume that the presence of humans associated with conducting these activities would be similar to the effects that currently occur to western snowy plovers due to the existing presence of people in the open areas. However, the effects of the water rescue training activities to western snowy plover may be more substantial. Up to 20 Fire Department personnel would participate in these training activities at the same time, which could last up to 8 hours per day at the same location (Wall or Minuteman Beaches). Stationary people may affect incubating western snowy plover for a longer period of time because of the duration of these stationary disturbances that may occur close to nests. Similarly, the Fire Department would transport the PWC to the launch site with utility vehicles, which are similar to but larger than an all-terrain vehicle. The presence of vehicles in the open areas would be a new effect to western snowy plovers at Vandenberg AFB because aside from the rare occurrence where law enforcement would use an ATV to conduct an enforcement action, the Air Force has not allowed vehicles within suitable habitat. As discussed above in the Status of the Species–Western Snowy Plover, utility vehicles could affect western snowy plovers by causing adults to flush from their nests, reduce foraging efforts, and increase the potential for eggs and chicks to succumb to temperature changes, blowing sand, and predators. Moreover, these vehicles may also crush western snowy plover chicks within the open areas.

At Minuteman Beach, the access route of the vehicles from the parking lot to the training area is approximately 492 feet (150 meters) from the boundary fence that demarcates the closed area. This distance is likely to be far enough distance away for the water rescue training activities not to affect breeding western snowy plover within the closed area at Minuteman Beach. A biological monitor will ensure that any nests in the open area will be avoided by the access route and all training personnel will avoid directly affecting nest(s). However, because western snowy plovers may nest anywhere within the open area at Minuteman Beach, there is potential for these activities to indirectly affect western snowy plovers by causing adults to flush from their nests, thereby impacting adults, chicks, or eggs as discussed above.

At Wall Beach, the access route from the parking lot to the training area is adjacent to the boundary fence that demarcates the closed area. A biological monitor will ensure that any nests in the open area would be avoided by the access route and all training personnel would avoid directly affecting nest(s). The effects in the open area would be similar to Minuteman Beach, however, there is potential for these activities to indirectly affect adults, chicks, and eggs in the closed area at Wall Beach. The access route will be as far away from the boundary fence as possible, but the presence and noise of the vehicle and people may affect western snowy plovers within the closed area of Wall Beach. Disruption of normal behaviors because of the water rescue training activities could lead to reduced breeding and reproductive success of western snowy plovers in the closed area at Wall Beach.

The number of nesting western snowy plovers that would be affected would depend on how close nests are to the boundary fence. We anticipate that these activities would cause all western snowy plovers to flush from their nests that are within at least 131 feet (50 meters) of the boundary fence. Additionally, the distance from the fence in which western snowy plovers flush is likely to be greater because breeding western snowy plovers are more sensitive to disturbance than wintering western snowy plovers, and the use of vehicles is a new impact to western snowy plovers at Vandenberg AFB. Therefore, for our effects analysis we assume that nests within 328 feet (100 meters) of the boundary fence could be affected due to vehicle access to Wall Beach for water rescue training operations during the western snowy plover breeding season.

Since 2005, most of the nesting at Wall Beach occurs within the closed area (greater than 90 percent of nests at Wall Beach are in the closed area). Based on annual reports from western snowy plover monitoring, we assume that the nests are uniformly distributed in the closed area of Wall Beach. Therefore, if the closed area is approximately 0.85 mile (1.37 km), and we use an average of 47 nests (average number of nests in the closed area from 2005 to 2012) initiated in the closed area, we assume approximately four nests (including all life stages of western snowy plovers in these nests) would be adversely affected. The effect could range from temporary flushing from a nest to total loss of a nest in response to the water rescue training activities, in particular because of the use of a vehicle in the open area. The water rescue training activities may, in effect, result in slightly less available habitat for breeding western snowy plovers in the closed area at Wall Beach. Moreover, water rescue training activities may affect wintering western snowy plovers at both Minuteman and Wall Beaches by causing western snowy plovers to abandon preferred foraging areas and expend energy in order to move out of the way of these activities. The Air Force will also monitor these activities during the nonbreeding season, which would minimize potential adverse effects to wintering western snowy plovers from this activity.

Summary

The Air Force's proposed beach management program would provide an overall benefit to the western snowy plover. The beach management program includes beach restoration and predator management programs to enhance suitable habitat for western snowy plover. Closing 12.55 miles (20.2 km) of suitable habitat to human use allows western snowy plover to complete its life cycle more successfully than if the breeding season closure was not in effect on Base. People directly and indirectly affect breeding western snowy plovers because they continue to violate the beach access restrictions and enter the closed areas, and can recreate on 1.25 miles (2.01 km) of habitat. Additionally, recreational access within the open areas could adversely affect not only breeding western snowy plovers in the open area but also within the closed area because people can be adjacent to the boundary fence (yellow rope) that demarcates the closed area. However, because Vandenberg AFB allows human recreation within the open areas, western snowy plovers on Base may be somewhat accustomed to humans within and adjacent to its breeding habitat. Mortality caused by people is not typical although it happens, and humans may cause adults to flush from their nests, spend more time and energy on vigilance and avoidance behavior, and disrupt breeding and roosting behavior. The effect of flushing western snowy plovers is difficult to analyze.

Overall, we anticipate the nesting and breeding success in the open areas to be less than the closed areas because of the human presence in the open areas. The nests within the closed areas at Surf, Wall, and Minuteman Beaches have a higher long-term hatching success rate; fledging success is more variable. There is no data to compare the open and closed areas at Minuteman Beach, the nests within the closed area at Wall Beach have a higher fledging success than the nests in the open area, and the fledging success at the open and closed areas at Surf Beach is comparable (Ball and Robinette 2012). Additionally, the density of nests is lower near the boundary demarcating the closed areas of Minuteman, Wall, and Surf Beaches than it is farther away from these boundary lines. Thus, we could assume, and much of the literature indicates that humans adversely affect nesting and breeding success of the western snowy plover. The initiation of water rescue training activities in the open areas at Minuteman and Wall Beaches would affect breeding western snowy plover and their offspring. Furthermore, we anticipate that the water rescue training activities would adversely affect a small percentage of the western snowy plovers in the closed area at Wall Beach as well because the access route at Wall Beach is adjacent to the closed area boundary.

Human presence, leashed dogs, and water rescue training activities on the beaches occurring outside of the breeding season may affect wintering western snowy plovers by causing western snowy plovers to abandon preferred foraging areas and expend energy in order to move out of the way of these activities.

We do not expect that the impacts associated with actions of the beach management plan (e.g., personnel monitoring, predator management, and fence maintenance), and water rescue training activities to substantially reduce the numbers, reproduction, or distribution of the species.

Recovery of Western Snowy Plover

The beach management plan encompasses Locations CA-84 and CA-85 (as described in the recovery plan, (Service 2007)), which have been identified as breeding and wintering sites for this species. The beach management plan beneficially affects the recovery of the western snowy plover because it incorporates management of the breeding and wintering population and suitable habitat on Base, including the locations identified in the recovery plan. Therefore, the beach management plan would provide a benefit to western snowy plovers and would not diminish the likelihood of recovery. Similarly, the initiation of water rescue training activities is not likely to diminish the likelihood of the western snowy plover's recovery.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. We do not consider future Federal actions that are unrelated to the proposed action in this section because they require separate consultation pursuant to section 7 of the Act. Because the action area is entirely within Vandenberg AFB, which is a Federal installation, all activities within this action

area would be Federal actions subject to section 7; therefore, we do not anticipate any cumulative effects.

CONCLUSION

After reviewing the current status of the El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover; the environmental baseline for the action area; the effects of the proposed beach management plan and water rescue training on these species; and the cumulative effects, it is the Service's biological opinion that the activities described in the Description of the Proposed Action section of this biological opinion, as proposed, are not likely to jeopardize the continued existence of the El Segundo blue butterfly, California red-legged frog, California least tern, or western snowy plover.

El Segundo Blue Butterfly

The project activities would adversely affect only a small portion of the available habitat on Base. Beach restoration activities would have a minor effect on the El Segundo blue butterfly because of the removal of approximately 3,256 seacliff buckwheat plants currently categorized as suitable but unknown to be occupied from restoration areas by equipment and personnel. Therefore, with the amount of occupied habitat on Vandenberg AFB and throughout this species' range outside of the Base, the proposed activities analyzed under this biological opinion would have a relatively minor effect on the El Segundo blue butterfly rangewide. Additionally, the project activities would not diminish the likelihood of the recovery of the El Segundo blue butterfly because the activities that would occur within the action area would not translate into a substantial diminishment of the numbers, reproduction, or distribution of the species.

California Red-legged Frog

The project activities would adversely affect only a small portion of the available habitat and known population of California red-legged frogs on Base. The beach management activities would not affect California red-legged frogs; only the water rescue training activities would likely adversely affect individuals. Because the Air Force will implement measures to minimize adverse effects, and would not reduce habitat for the California red-legged frog at Honda Creek on Vandenberg AFB, the proposed activities analyzed under this biological opinion would represent a minor adverse effect to the California red-legged frog throughout its range. Additionally, the project activities would not affect the recovery of California red-legged frog because the activities that would occur within the action area would not translate into a substantial diminishment of the numbers, reproduction, or distribution of the species.

California Least Tern

Overall, the implementation of the beach management plan would provide a benefit to the California least tern because it protects California least terns from adverse effects of human recreation and reduces predation. Activities such as monitoring, predator management, and

fence maintenance would only have a minor adverse effect on the California least tern population on Base. Water rescue training activities would not adversely affect California least terns because water rescue training would not occur in or near California least tern habitat. The proposed project activities would not affect the recovery of California least tern because the beach management program reflects the goals of the recovery plan and recommendations of the 5-year review, and includes management of the California least tern colony and its habitat at Purisima Point on Vandenberg AFB. Thus, the activities that would occur within the action area would not translate into a substantial diminishment of the numbers, reproduction, or distribution of the species.

Western Snowy Plover

The human activities associated with the beach management plan, and the addition of water rescue training activities, would adversely affect snowy plover. Because Vandenberg AFB allows human recreation on their beaches within open areas and outside of the breeding season, and people continue to violate the beach closure restrictions during the breeding season, humans continue to cause direct mortality of western snowy plovers, but more typically, cause western snowy plovers to flush from their nests and preferred nesting, foraging, and roosting areas. However, the Air Force's proposed beach management program would provide an overall benefit to western snowy plovers on Vandenberg AFB as compared to the Air Force not implementing this plan. Water rescue training activities are likely to adversely affect western snowy plovers. Because these activities are temporary and would only occur in two locations where the Air Force currently allows human recreation, we do not expect the adverse effects to western snowy plovers to increase substantially, in addition to the effects of the beach management plan and human recreational impacts. In total, these effects would not reduce the reproduction, numbers, or distribution of the western snowy plover. The beach management program would contribute to the recovery of the species because the number of breeding birds and the breeding success on Base should at least remain consistent, if not increase because of this plan.

INCIDENTAL TAKE STATEMENT

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

Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be undertaken by the Air Force or made binding conditions for the Fire Department, as appropriate, for the exemption in section 7(o)(2) to apply. The Air Force has a continuing duty to regulate the activity covered by this incidental take statement. If the Air Force 1) fails to assume and implement the terms and conditions, or 2) fails to require the Fire Department to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the Air Force must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR 402.14(i)(3)]

El Segundo Blue Butterfly

Beach Management

The Air Force estimated that they would remove or otherwise adversely affect approximately 3,256 seacliff buckwheat because of restoration actions. We assume that a typical seacliff buckwheat plant contains about 300 flower heads and may yield 30 El Segundo blue butterfly larvae, although through parasitization and predation many of the larvae would not survive (Pratt, in litt. 2007). The seacliff buckwheat plants at Vandenberg AFB are more scattered and less dense than habitat in other known locations in Los Angeles County (Pratt, in litt. 2007). In addition, the population of El Segundo blue butterflies at Vandenberg AFB occurs in much less dense numbers than other known populations. Generally, El Segundo blue butterflies are not common anywhere they are observed. Therefore, we anticipate a low level of take of El Segundo blue butterflies would result from beach restoration activities.

Specifically, we anticipate that all El Segundo blue butterflies within restoration areas will be taken in the form of harm, harassment, injury, or mortality. The restoration areas are comprised of suitable but unknown to be occupied habitat and we assume that El Segundo blue butterflies may be present where these activities would occur. However, because these activities would occur outside the flight season detecting an individual would be difficult as larvae are in diapause in the soil. Removing seacliff buckwheat plants, or otherwise damaging it to a point that the plant would not provide the adequate life-supporting attributes, could harm individual El Segundo blue butterflies by altering the habitat resulting in death or injury by impairing essential behavioral patterns, including breeding, feeding, or sheltering. Rendering host plants unusable may harass individual El Segundo blue butterflies, creating a likelihood of injury by annoying it to such an extent as to significantly disrupt its normal behavioral patterns, which include, but are not limited to, breeding, feeding, or sheltering. Removing secliff buckwheat plants may outright injure or kill individual El Segundo blue butterflies. We recognize that the effect of removing seacliff buckwheat plants breeding and feeding behaviors of adult butterflies may not be observable until the subsequent breeding season(s).

Summary

Because of their cryptic nature, small size, low mobility, fluctuations in abundance from one generation to the next and from one flowerhead to another, and we consider the seacliff buckwheat plants suitable but unknown to be occupied, detecting dead, injured, harmed, or harassed El Segundo blue butterflies resulting from the proposed actions would be difficult. Consequently, we are unable to reasonably anticipate the actual number of El Segundo blue butterflies that would be taken by the proposed project activities; however, we must provide a number at which formal consultation would have to be reinitiated.

The Environmental Baseline, Effects Analysis, and Conclusion sections of this biological opinion indicate that adverse effects to El Segundo blue butterflies would likely be minor given the nature of the proposed activities and the habitat currently recognized as suitable but unknown to be occupied. Thus, we anticipate that take of El Segundo blue butterflies would also be low. If the Air Force removes more than 3,256 seacliff buckwheat plants in the entire restoration area, they must contact our office immediately to reinitiate formal consultation. Additionally, because we recognize that for every El Segundo blue butterfly found dead or injured, other individuals would likely killed or injured that are not detected, we determine an appropriate take limit anticipating that the actual take would be higher and thus set the number at a lower limit. Therefore, because the seacliff buckwheat plants are currently unknown to be occupied and El Segundo blue butterflies generally occur in low densities, if 1 (one) El Segundo blue butterfly is found dead or injured due to the proposed activities, the Air Force must contact our office immediately. If a second adult or larval El Segundo blue butterfly is found killed or injured by project activities, the Air Force must reinitiate formal consultation with the Service. El Segundo blue butterflies may be taken only within the boundaries of the action area. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions. We do not anticipate, nor do we exempt take for any other activities not analyzed in this consultation.

California Red-legged Frog

Beach Management

We anticipate that no take of California red-legged frogs would result from beach management actions such as monitoring, fence maintenance, and predator management because these activities do not occur in California red-legged frog habitat and we do not expect California red-legged frogs to be present where these activities would occur. Additionally, because the Air Force uses qualified biologists to monitor these activities, we do not anticipate beach management actions to result in take of California red-legged frog.

Water Rescue Training

We anticipate that California red-legged frogs would be taken in the form of capture, injury, and

mortality due to the water rescue training activities. All California red-legged frogs found at the mouth of Honda Creek would be subject to capture because the Air Force will attempt to capture and relocate all life stages of California red-legged frogs out of affected areas prior to the onset of water rescue training activities. The protective measures proposed by the Air Force are likely to prevent mortality or injury of most individuals. However, we assume that a small percentage of the captured California red-legged frogs may succumb to injury or mortality due to mishandling, improper containment, or physiological stress. Additionally, these captured individuals may be killed or injured if they attempt to return to the project area after they have been relocated. Individual California red-legged frogs that the Air Force does not detect through pre-construction surveys may be killed or injured anywhere within the action area, but because Service-approved biologists would conduct the capture and relocation efforts we anticipate they will detect most California red-legged frogs and properly move them out of harm's way. The purpose is to reduce the overall risk to California red-legged frog that could result from implementing project actions.

Summary

Incidental take of the California red-legged frog will be difficult to detect because of its small body size and its cryptic coloration, and therefore finding a dead or injured specimen is unlikely. Finding carcasses and assigning a cause of death are problematic, especially in the presence of numerous scavengers that are likely to find dead animals soon after they die. Consequently, we are unable to reasonably anticipate the actual number of California red-legged frogs that would be taken by the proposed project; however, we must provide a number at which formal consultation would have to be reinitiated. The Environmental Baseline and Effects Analysis sections of this biological opinion indicate that adverse effects to California red-legged frogs would likely be low given the nature of the proposed activities, therefore, we anticipate that take of California red-legged frogs would also be low. Because we recognize that for every California red-legged frog found dead or injured, other individuals may be killed or injured that are not detected, we determine an appropriate take limit anticipating that the actual take would be higher and we set the number at a lower limit. .

If 2 adults, subadults, or juveniles are found dead or injured the Air Force must contact our office immediately to reinitiate formal consultation. If more than 100 California red-legged frogs (adults, subadults, and juveniles) are captured and relocated, the Air Force must contact our office immediately to reinitiate formal consultation. Furthermore, if more than 5 captured California red-legged frogs die or are injured in captivity, the Air Force must contact our office immediately to reinitiate formal consultation. These limits on take apply annually.

California red-legged frogs may be taken only within the boundaries of the action area. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions. We do not anticipate, nor do we exempt take for any other activities not analyzed in this consultation.

California Least Tern

Beach Management

We anticipate that few California least terns would be taken as a result of harassment during beach management, including predator management actions. The California least tern colony at Purisima Point is not accessible to recreational use during the nesting season. Because Service-approved biologists would conduct monitoring actions during the breeding season and would accompany any personnel conducting maintenance or law enforcement actions into the California least tern colony, we do not anticipate these actions to result in take. Maintenance of the electrified fence that surrounds the colony is conducted prior to the beginning of the breeding season when California least tern would not be present, although maintenance of the fence (e.g. washing salt off wires) may be required throughout the breeding season. The Air Force may need to remove a coyote from within the fenced colony, and therefore we anticipate that maintenance repairs and predator removal could result in take of California least terns as it may cause California least terns to flush from their nests. The majority of the time, capture and removal or lethal removal of individual problem predators is not likely to result in a loss of California least tern nests, chicks, or eggs because predator management activities occur outside of the colony, and qualified biologists accompany any individuals entering the Purisima Point colony. Beach restoration activities would occur outside of the breeding season when California least terns would not be present, so there would be no take of California least terns from these activities.

Water Rescue Training

We do not anticipate any California least terns would be taken due to the water rescue training activities because these activities would not occur in California least tern habitat (Purisima Point Colony). We do not anticipate, nor do we exempt take for any other activities not analyzed in this consultation.

Summary

We anticipate minimal take of California least terns from the Air Force implementing the beach management plan. Therefore, if California least terns associated with two nests (i.e., adult pair and offspring) annually are flushed as a result of fencing maintenance and predator management actions, the Air Force must contact our office immediately to reinitiate formal consultation.

California least terns may be taken only within the boundaries of the action area. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions. We do not anticipate, nor do we exempt take for any other activities not analyzed in this consultation.

Western Snowy Plover

Western snowy plovers are small, cryptically-colored birds that are difficult to detect, except perhaps when they move, and finding dead or injured individuals would be difficult. Breeding western snowy plovers and their young are present in spring and summer; migratory or wintering individuals augment the resident population in fall and winter. Changes in the number of western snowy plovers at Vandenberg AFB can be attributed to several factors, including habitat management, the presence of people, weather, and predation. Therefore, determining a reason for the failure of a nest when it does occur may be difficult. Anticipating the precise number of western snowy plovers that may be taken as a result of the beach management plan in any given year is also difficult. Additionally, we are unable to anticipate the precise number of western snowy plovers that may be taken over the course of several years under the beach management plan.

Beach Management

Closed Areas

We anticipate take in the form of harassment of western snowy plovers in the closed areas due to Air Force activities such as fence and sign maintenance during the breeding season. Conducting these activities may cause western snowy plovers to flush from their nests and thus cause injury by significantly disrupting normal behavioral patterns including breeding, feeding, or sheltering. Adult western snowy plovers flushed off their nests may not be able to successfully incubate, which can lead to mortality of eggs and chicks due to exposure to temperature changes, blowing sand, and increased vulnerability to predators. Additionally, humans may cause western snowy plovers to abandon preferred foraging areas and expend more energy on vigilance and avoidance behavior than foraging. However, western snowy plovers may differ in their responses to people because western snowy plovers do not always flush when humans approach their nests and therefore may not be taken. Overall, the take resulting from flushing western snowy plover is difficult to anticipate. Consequently, we are unable to estimate the number of individual western snowy plovers that may be harassed because we cannot predict the number of western snowy plovers that may nest or attempt to raise broods in the vicinity of the boundary fencing, or the number of adults that may flush from their nests that result in disruption of normal behavioral patterns. Given the limited area where signs and fencing are located, the Air Force conducts this maintenance prior to the start of the breeding season, unless otherwise needed, and the Air Force uses qualified biological monitors, we anticipate that few western snowy plovers would be taken in the form of harassment.

We anticipate that implementation of the predator management plan would result in minimal take of western snowy plovers. Capture and removal or lethal removal of individual problem predators is not likely to result in a loss of western snowy plover nests, chicks, or eggs. We also do not anticipate that predator management activities would cause western snowy plovers to flush from their nests because predator control actions would occur away from nests. Similarly, because beach restoration activities would occur outside of the breeding season, there would be

no take of breeding western snowy plovers.

The take of any western snowy plover by recreational beach users in the closed areas as a result of noncompliance with beach access restrictions is not exempted from the prohibitions against take contained in section 9 of the Act because these actions are in violation of posted prohibitions on Vandenberg AFB and not incidental to implementing the beach management plan. Additionally, take in the open area that results from people not following the prohibitions on recreational activities in the open areas (e.g., walking dogs on the beach during the breeding season) is not exempted from the prohibitions against take contained in section 9 of the Act because these actions are in violation of posted prohibitions on Vandenberg AFB.

Open Areas

During the 2002 breeding season, the Air Force began demarcating nests found in high traffic areas within the open area using symbolic fencing. Four nests have been lost in the last 2 years directly attributed to humans (S. Kaisersatt pers. comm. 2013a; S. Kaisersatt pers. comm. 2013b; Ball and Robinette 2011). Although the Air Force attempts to protect all nests in the open area before a trampling incident, we cannot anticipate that they will be able to find and protect all future nests in the open areas prior to human effects. Therefore, we anticipate that all western snowy plover nests, which includes the associated adults, chicks, and eggs, in the open area may be taken through harassment, injury, or mortality resulting from people crushing chicks, nests, and eggs; causing individuals to flush; causing adults to abandon nests; disrupting foraging behavior; increasing the likelihood of predation and exposure to adverse weather conditions; and altering habitat features necessary for successful breeding and foraging. However, we note that not all nests are lost that are initiated in the open areas and these nests have successfully fledged western snowy plovers. The percentage of nests initiated in the open areas at Surf, Wall, and Minuteman Beaches combined is historically low (approximately 10 percent) compared to the number of nests initiated in the closed areas. Thus, we assume the loss of all nests in the open areas would not substantially reduce the annual productivity of western snowy plover on Vandenberg AFB.

Water Rescue Training

Closed Areas

Water rescue training activities may result in take of western snowy plovers that are nesting in the closed area at Wall Beach in the form of harassment due to the presence of Fire Department personnel and the noise generated while accessing Wall Beach and conducting the training activities. The closed area at Wall Beach is approximately 0.85 mile (1.37 km), and based on annual western snowy plover monitoring reports we use an average of 47 nests (average number of nests in the closed area 2005 to 2012) initiated within the closed area. Assuming a uniform distribution of nests in the closed area at Wall Beach, and the distance of 328 feet (100 meters) at which western snowy plover are likely to flush off their nests due to the water rescue training activities, we anticipate that no more than 4 nests (including all life stages of the associated

western snowy plover, which may be up to 2 adults and 3 eggs/chicks per nest) would be lost as a result of these activities due to impairing essential behavioral patterns, including breeding feeding, and sheltering.

Open Areas

The water rescue training activities would occur in the areas open to recreational use at Wall and Minuteman Beaches, but not at Surf Beach. Because the Air Force may not be able to locate and protect all the nests in the open areas prior to human effects, we anticipate that these activities may result in take of western snowy plovers in the open areas in the form of harassment, injury, or mortality. However, the Air Force will use Service-approved biological monitors to oversee these activities to reduce effects to breeding and wintering snowy plovers in the open areas, and thus reduce take of western snowy plovers.

Summary

Combining the anticipated take of western snowy plovers in the open and closed area resulting from beach management and the water rescue training activities, and based on the historical numbers of nests observed, we anticipate no more than 40 nests (including all life stages of associated western snowy plovers, which may be up to 2 adults and 3 eggs or chicks per nest) would be taken annually. The anticipated take includes take of all nests in the open area (average of 35 nests or up to 10 percent of the total nests), take of up to 4 nests in the closed area at Wall Beach, and take of 1 nest in the closed areas combined due to beach management activities such as fencing maintenance or predator management.

Western snowy plovers may be taken only within the boundaries of the action area. Project activities that are likely to cause additional take should cease during this review period because the exemption provided under section 7(o)(2) would lapse and any additional take would not be exempt from the section 9 prohibitions. We do not anticipate, nor do we exempt take for any other activities not analyzed in this consultation.

REASONABLE AND PRUDENT MEASURES

For the El Segundo blue butterfly, the avoidance and minimization measures listed in the Project Description will effectively minimize the impacts of any potential take of El Segundo blue butterfly. Consequently, we are not including additional reasonable and prudent measures or implementing terms and conditions for El Segundo blue butterfly in this incidental take statement.

For the California red-legged frog, California least tern, and western snowy plover, we believe the following reasonable and prudent measures are necessary and appropriate to minimize the impacts of the incidental take of these species:

1. The Air Force must monitor breeding western snowy plovers and California least terns to determine effectiveness of the beach management plan.

2. The Air Force must ensure that implementation of the predator management plan is conducted by biologists qualified to conduct these activities.

3. The Air Force must minimize the effects to western snowy plovers from water rescue training activities in the open areas at Wall and Minuteman Beaches.

4. The Air Force must use qualified personnel to minimize incidental take of California red-legged frogs, California least terns, and western snowy plovers during project implementation.

The Service's evaluation of the effects of the proposed action includes consideration of the measures developed by the Air Force, stated in the Description of the Proposed Action portion of this biological opinion, to minimize the adverse effects of ongoing actions to the El Segundo blue butterfly, California red-legged frog, California least tern, and western snowy plover. Any subsequent changes in the minimization measures proposed by the Air Force may constitute a modification of the proposed action and may warrant re-initiation of formal consultation, as specified at 50 CFR 402.16. These reasonable and prudent measures are intended to clarify or supplement the protective measures that are proposed by the Air Force as part of the proposed action.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, the Air Force must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline reporting and monitoring requirements. These terms and conditions are non-discretionary.

1. The following terms and conditions implement reasonable and prudent measure 1:

    a. The Air Force must monitor all nesting activity of western snowy plovers on Vandenberg AFB throughout the breeding season (March 1 to September 30). This monitoring must be conducted in a manner consistent with the monitoring effort conducted during the 2004 to 2012 breeding seasons. Banding under the monitoring plan must be consistent with the 2004 to 2012 breeding seasons; therefore; broods would be banded with a different color. Any proposal to alter the monitoring methodology or data collection must be reviewed and approved by the Service.

    b. "The Air Force must ensure that all western snowy plover chicks have fledged prior to opening the closed areas on Vandenberg AFB to recreational use. We estimate the end of the breeding season to occur on September 30; however, if all western snowy plover chicks have fledged before September 30, the closed areas may be opened to recreational

access. In contrast, if western snowy plover chicks have not fledged and are present after September 30, the closed areas must remain closed until all chicks have fledged.

c. The Air Force must monitor all nesting activity of California least terns on Vandenberg AFB throughout the breeding season (March 1 to September 30). The Air Force must conduct this monitoring in a manner consistent with the monitoring effort conducted during the 2004 to 2012 breeding seasons.

2. The following terms and conditions implement reasonable and prudent measure 2:

   a. Any change to the Air Force's predator management plan must be approved by the Service prior to its implementation.

   b. Biologists implementing predator management actions must be approved in the same manner as Service-approved biologists in Term and Condition 4(a) below.

3. The following terms and conditions implement reasonable and prudent measure 3:

   a. The Air Force must monitor the water rescue training activities during the nonbreeding season to minimize the effects to wintering western snowy plovers.

   b. The personnel conducting water rescue training activities must not congregate near the boundary fence that demarcates the closed area at Wall and Minuteman Beaches.

   c. The vehicles that are transporting PWC to launch sites at Wall and Minuteman Beaches must go no faster than 10 mph when on the sandy beaches.

   d. The pathway vehicles take to access the launch point at Wall Beach must be as far as possible from the boundary fence that demarcates the closed area at Wall Beach.

   e. The Air Force must avoid creating tire ruts in the sand, to the maximum extent possible, when driving vehicles to the launch sites at Minuteman and Wall Beaches.

4. The following terms and conditions implement reasonable and prudent measure 4:

   a. The Air Force must request our approval of any biologist it wishes to employ as a Service-approved biologist at least 30 days prior to conducting any such activities. In the request, the Air Force must include the names of the biologist(s), qualifications, references, which species the biologist(s) is requesting to monitor for, and what monitoring activities the biologist(s) would complete. Please be advised that possession of a 10(a)(1)(A) permit for the covered species does not substitute for the implementation of this measure. Authorization of Service-approved biologists is valid for this consultation only.

b. California red-legged frogs must be relocated from all areas where project activities would occur near aquatic habitat and that may result in injury or mortality of these individuals. California red-legged frogs may only be captured by hand or dip net and transported in buckets separate from other species. When capturing and removing California red-legged frogs, the Service-approved biologist(s) must minimize the amount of time that animals are held in captivity. California red-legged frogs must be maintained in a manner that does not expose them to extreme temperatures or any other environmental conditions that could cause mortality, injury, or undue stress.

c. Term and Condition 4.b. has the potential to cause the transfer of chytrid fungus between drainages. Therefore, to avoid transferring disease or pathogens between aquatic habitats during the course of surveys and handling of California red-legged frogs, the Service-approved biologist(s) must follow the Declining Amphibian Population Task Force's Code of Practice (see enclosure). A copy of this Code of Practice is enclosed. You may substitute a bleach solution (0.5 to 1.0 cup of bleach to 1.0 gallon of water) for the ethanol solution. Care must be taken so that all traces of the disinfectant are removed before entering the next aquatic habitat.

REPORTING REQUIREMENTS

Pursuant to 50 CFR 402.14(i)(3), the Air Force must report the progress of the beach management program and water rescue training and their impact on the species to the Service as specified in this incidental take statement. This reporting will assist the Service and the Air Force in evaluating current and future measures for the conservation of El Segundo blue butterfly, California red-legged frog, California least tern , and western snowy plover at Vandenberg AFB. The Air Force must provide the following information to the Service:

1. An annual report for the western snowy plover and California least tern breeding season: The report must contain (a) the results of monitoring, biological surveys, and sighting records; (b) documentation of any effects to western snowy plover and California least tern by the activities evaluated in this biological opinion; (c) a discussion of the effects that result in take of western snowy plover and California least tern; and (d) any other pertinent information as required by this biological opinion. The report should follow the format and include, at a minimum, the same type of data as breeding season reports submitted since 2001. In addition, the report must document compliance with all of the protective measures being implemented to conserve western snowy plovers and California least terns and provide recommendations to better protect these species on Vandenberg AFB. The annual reports are due December 31 of each year this biological opinion is in effect.

2. An annual report on wintering western snowy plovers: The report must include, at a minimum, results of winter surveys, any effects to wintering western snowy plovers and a discussion of the effects that result in take of western snowy plovers, recommendations to better protect wintering western snowy plovers, and any other pertinent information that may

be useful in protecting wintering western snowy plover. The annual reports are due on May 31 of each year this biological opinion is in effect.

3. An annual report discussing the trespassing violations into the closed areas during the western snowy plover breeding season and must include the following information for each violation (or collect as much of the information as is possible): Evidence of the violation (e.g., monitors observe a violation or observe footprints); date, time, and location of the violation; description of the violation and the effects to western snowy plovers, including a discussion of the effects that result in take of western snowy plover, how the violator(s) accessed a closed area, the violator(s) approximate distance from western snowy plover nest(s), and the response of western snowy plovers to the violation (e.g., flushing from nest, hunkering down in nest, alarm calls, or injury or mortality); action the Air Force takes against the violator(s) (e.g., warning, citation, removal from base); whether the violator(s) is affiliated with the Air Force (military personnel, contractor, or not affiliated); and the city where the violator(s) resides (if possible). This report must also document the hours spent in the field monitoring beach access/closure restrictions.

4. The Air Force must keep the Service informed if the number of violations is approaching the maximum allowed for each closed beach segment (i.e., Surf, Wall, and Minuteman) and must notify the Service within one business day if the maximum number of violations is reached.

5. An annual report discussing the effectiveness of predator management activities: The report must include a description of the effects of predation on California least terns and western snowy plovers; actions initiated by the Air Force to reduce the effect of predation; a discussion of the level of take resulting from predator management activities; and the number, if applicable, of predators removed from California least tern and western snowy plover breeding habitat, including the removal method.

6. An annual report discussing when and where restoration activities occurred (i.e., beach segment), including which methods the Air Force used to remove vegetation; the number of seacliff buckwheat plants removed in restoration areas; a discussion of adverse effects to El Segundo blue butterflies and western snowy plovers; and the total acreage of habitat that has been restored.

7. An annual report that includes the dates and locations where water rescue training activities occur: The report must include a discussion of the effects to California red-legged frogs and western snowy plovers, and a discussion of the effects that result in take of California red-legged frogs and western snowy plovers.

8. A report summarizing the effects to California red-legged frogs: The report must include how many California red-legged frogs were captured and relocated from Honda Creek during water rescue training activities, the effects to California red-legged frogs from capture and relocation efforts, and any injury or mortality of California red-legged frog resulting from capture and relocation.

DISPOSITION OF DEAD OR INJURED SPECIMENS

As part of this incidental take statement and pursuant to 50 CFR 402.14(i)(1)(v), upon locating a dead or injured El Segundo blue butterfly, California red-legged frog, California least tern, or western snowy plover, initial notification within 3 working days of its finding must be made by telephone and in writing to the Ventura Fish and Wildlife Office ((805) 644-1766). The report must include the date, time, location of the carcass, a photograph, cause of death or injury, if known, and any other pertinent information.

Care must be taken in handling injured animals to ensure effective treatment and care and in handling dead specimens to preserve biological material in the best possible state. Injured animals must be transported to a qualified veterinarian. Should any treated El Segundo blue butterfly, California red-legged frog, California least tern, or western snowy plover survive, the Air Force must contact the Service regarding the final disposition of the animals.

Dead specimens must be preserved in accordance with standard specimen preservation methods. The remains must then be deposited with an educational or research institution that holds the appropriate State and Federal permits in accordance with relevant permit conditions. For the University of California at Santa Barbara, contact the Cheadle Center for Biodiversity and Ecological Restoration, Santa Barbara, California 93106, telephone (805) 893-2401. For the Santa Barbara Museum of Natural History, Santa Barbara, California 93105, contact Paul Collins, telephone (805) 682-4711.

In the case of take or suspected take of El Segundo blue butterfly, California red-legged frog, California least tern, or western snowy plover not exempted in this biological opinion, the Air Force must notify Vandenberg AFB Conservation Law Enforcement and the Ventura Fish and Wildlife Field Office within 24 hours.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to avoid or minimize adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The Service requests notification of the implementation of any conservation recommendations so we may be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats.

1. The Air Force should work with the Santa Barbara County Department of Parks and Recreation to see that management of Ocean Beach County Park is consistent with conservation of the western snowy plover.

2. The Air Force, in tandem with the Service, should work with the Mayor of Lompoc and/or other local officials to help educate local residents about the beach access restrictions at Surf

Beach during the western snowy plover breeding season and the consequences (i.e., beach closure) of not abiding by these restrictions.

REINITIATION NOTICE

This concludes formal consultation on the Air Force's Beach Management Plan at Vandenberg AFB outlined in your request for reinitiation dated February 9, 2012. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the exemption issued pursuant to section 7(o)(2) will have lapsed and any further take would be a violation of section 4(d) or 9. Consequently, we recommend that any operations causing such take cease pending reinitiation.

If you have any questions regarding this biological opinion, please contact Bill Standley of my staff at (805) 644-1766, extension 315.

Sincerely,



Stephen P. Henry
Field Supervisor

Enclosure

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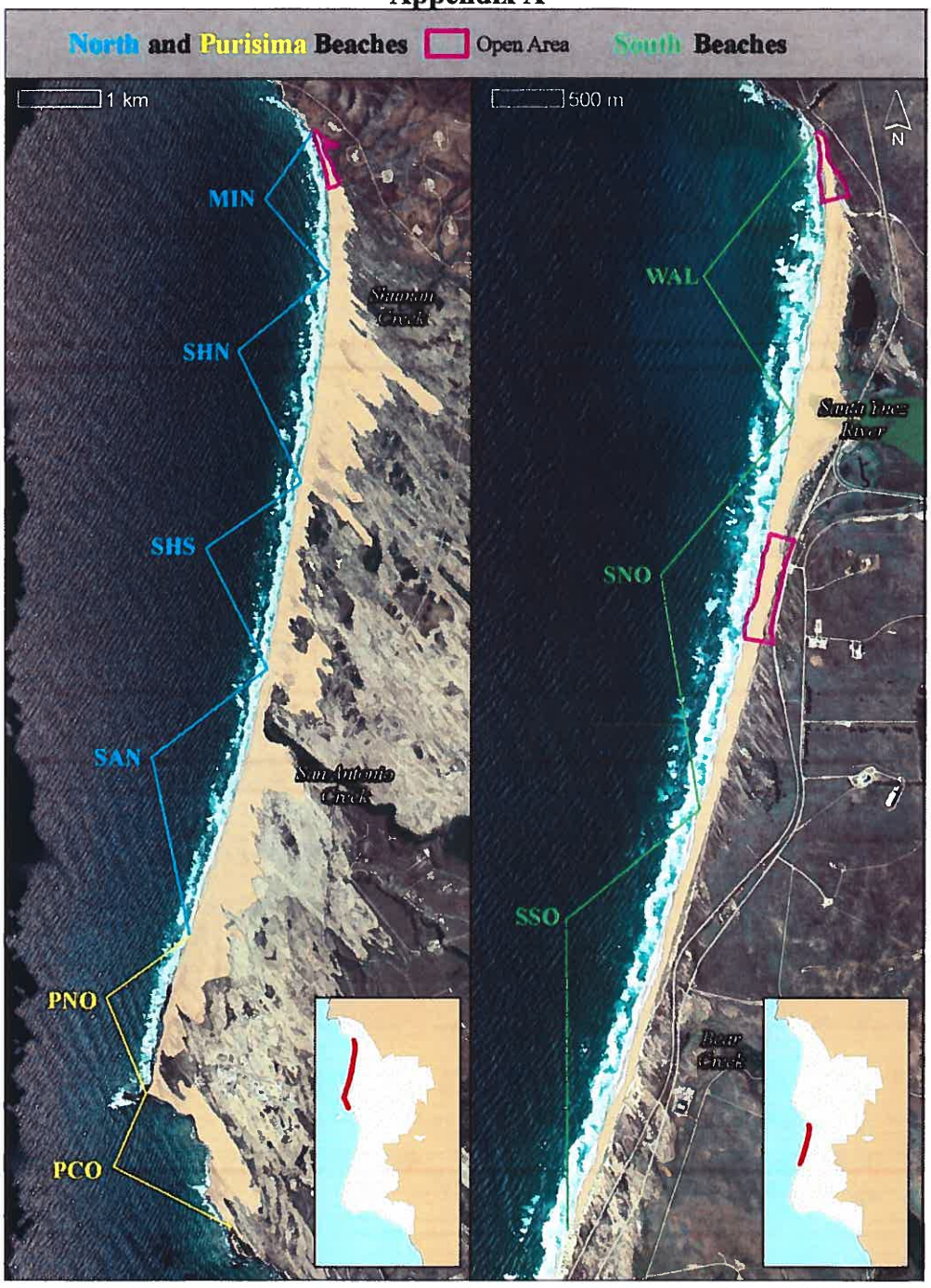
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Appendix A



Map of beach sections for North, Purisima, and South Beaches on Vandenberg AFB: MIN = Minuteman, SHN = Shuman North, SHS = Shuman South, SAN = San Antonio, PNO = Purisima North, PCO = Purisima Colony, WAL = Wall Beach, SNO = Surf North, SSO = Surf South (from Ball and Robinette 2012).

The Declining Amphibian Populations Task Force Fieldwork Code of Practice

1. Remove mud, snails, algae, and other debris from nets, traps, boots, vehicle tires, and all other surfaces. Rinse cleaned items with sterilized (e.g., boiled or treated) water before leaving each work site.

2. Boots, nets, traps, and other types of equipment used in the aquatic environment should then be scrubbed with 70 percent ethanol solution and rinsed clean with sterilized water between study sites. Avoid cleaning equipment in the immediate vicinity of a pond. wetland, or riparian area.

3. In remote locations, clean all equipment with 70 percent ethanol or a bleach solution, and rinse with sterile water upon return to the lab or "base camp." Elsewhere, when washing machine facilities are available, remove nets from poles and wash in a protective mesh laundry bag with bleach on the "delicates" cycle.

4. When working at sites with known or suspected disease problems, or when sampling populations of rare or isolated species, wear disposable gloves and change them between handling each animal. Dedicate sets of nets, boots, traps, and other equipment to each site being visited. Clean them as directed above and store separately at the end of each field day.

5. When amphibians are collected, ensure that animals from different sites are kept separately and take great care to avoid indirect contact (e.g., via handling, reuse of containers) between them or with other captive animals. Isolation from unsterilized plants or soils which have been taken from other sites is also essential. Always use disinfected and disposable husbandry equipment.

6. Examine collected amphibians for the presence of diseases and parasites soon after capture. Prior to their release or the release of any progeny, amphibians should be quarantined for a period and thoroughly screened for the presence of any potential disease agents.

7. Used cleaning materials and fluids should be disposed of safely and, if necessary, taken back to the lab for proper disposal. Used disposable gloves should be retained for safe disposal in sealed bags.

The Fieldwork Code of Practice has been produced by the Declining Amphibian Populations Task Force with valuable assistance from Begona Arano, Andrew Cunningham, Tom Langton, Jamie Reaser, and Stan Sessions.

For further information on this Code, or on the Declining Amphibian Populations Task Force, contact John Wilkinson, Biology Department, The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK.
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