



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011



In Reply Refer To:
FWS-SDG-08B0503-09F0517

JUL 07 2010

Captain Yancy Lindsey
Commanding Officer
Naval Base Coronado
P.O. Box 7033
San Diego, California 92132

Subject: Biological Opinion on the U.S. Navy's Silver Strand Training Complex Operations,
Naval Base, Coronado, San Diego, California

Dear Captain Lindsey:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion regarding effects to federally listed species from the proposed U.S. Department of Navy (Navy, DoN) military training program and associated resource management program on the Silver Strand in San Diego, California, in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*). This biological opinion is the result of a programmatic level consultation on Navy training activities and associated resource management proposed for the Silver Strand Training Complex (SSTC), which includes Naval Amphibious Base Coronado (NAB) and Naval Radio Receiving Facility (NRRF). Although technically not part of the SSTC, the beaches of Naval Air Station North Island (NASNI) are also included in this consultation as part of the SSTC action area. The Navy intends to use the programmatic nature of this document to establish a long-term management program for federally listed species on the SSTC.

Programmatic consultations evaluate planning documents or broad programs and may include actions where the best available scientific data may not support the determination of any anticipated incidental take (U.S. Fish and Wildlife Service and National Marine Fisheries Service Endangered Species Consultation Handbook, p.4-48). In such instances, actions are reexamined under the umbrella of the larger planning document during subsequent consultations on site-specific actions.

During consultation, we determined that adequate details were available to estimate levels of incidental take likely to occur as a result of the proposed actions included in the Navy's military training and resource management programs. For these actions an incidental take statement is included in this biological opinion. Nonetheless, project-level consultation may be necessary in the future for some actions (e.g., introduction of new equipment, changes in proposed training

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locations, expansion of tern or plover nesting deterrence through habitat modification, construction of a dog kennel, dune restoration and habitat enhancement). Additional analysis and amendment of this biological opinion may also be necessary as new information becomes available regarding the effects of military working dogs on terns and plovers. We will continue to coordinate with the Navy to determine if future activities require consultation, and to reassess the effects of the action described herein in the context of changing abundance and distribution of listed species, as necessary. This programmatic consultation facilitates a streamlined process for any future site-specific military training or resource management activities within the action area. Any future incidental take statement to address the impacts of changes in training or management may be appended to this biological opinion.

The effects to three federally listed species that occur on the SSTC are evaluated within this biological opinion including one federally threatened species, the western snowy plover (*Charadrius alexandrinus nivosus*, “snowy plover” or “plover”), and two federally endangered species, the California least tern (*Sternula antillarum browni*, “least tern”) and the San Diego fairy shrimp (*Branchinecta sandiegonensis*, “fairy shrimp”). The effects to the California brown pelican (*Pelecanus occidentalis californicus*, “pelican”) were evaluated within our September 21, 2009, draft biological opinion. The California brown pelican was removed from the Endangered Species List, effective December 17, 2009, and has therefore been removed from consideration in this biological opinion.

Other listed species within the vicinity of the action area include the California clapper rail (*Rallus longirostris levipes*, “clapper rail”), Salt marsh bird’s beak (*Cordylanthus maritimus* ssp. *maritimus*), and the East Pacific green sea turtle (*Chelonia mydas*, “green sea turtle”). However, the Navy has concluded that the proposed training and resource management activities would have no effect on the clapper rail and the Salt marsh bird’s beak, and they are not addressed in this biological opinion. Any potential in-water effects to green sea turtle within San Diego Bay and the nearshore ocean waters is not addressed in this biological opinion, but would be addressed in separate consultation with National Marine Fisheries Service (NMFS), as required.

While written confirmation was not provided to your agency, formal consultation was initiated on September 22, 2008, the date we received your request for consultation. We initiated review of the Programmatic Biological Assessment for the Silver Strand Training Complex (BA; DoN 2008) in November 2009. This biological opinion is based on: information provided in the BA; modifications and clarifications to the project description outlined in the BA made during the consultation process; previous biological opinions developed addressing operations and activities on the SSTC and NASNI Beach (listed in Appendix B); Memorandums of Understanding (MOUs) developed to address management of federally listed species within the boundaries of the SSTC (listed in Appendix B); the *NBC Integrated Natural Resource Management Plan* (INRMP); the *Recovery Plan for the Pacific Coast Population of the Western Snowy Plover* (Service 2007a); the *Recovery Plan for the California Least Tern* (Service 1985); the *Vernal Pool Recovery Plan for Southern California* (Service 1998); the *California Least Tern 5-Year Review* (Service 2006a); the *San Diego Fairy Shrimp 5-Year Review* (Service 2008a); annual least tern and western snowy plover monitoring reports submitted to the Service; literature

relevant to species and effects of the activities addressed; supplementary materials provided during the consultation process; site visits conducted before and during the consultation process; and on other available information.

This consultation supersedes biological opinion FWS-SDG-3452.3 (2005), which is the current comprehensive biological opinion regarding Navy training and management activities within the action area.

Consultation History

We received your request for consultation on training activities at the SSTC on September 22, 2008. When we received your request, our staff was working to complete a biological opinion for training activities and associated fire management at San Clemente Island (FWS- LA-09B0027-09F0040). Upon completion of the San Clemente Island biological opinion, on November 18, 2008, we initiated review of your consultation request and the BA.

Between November 18, 2008, and April 27, 2009, the Navy and Service met regularly to discuss the proposed action, effects to species and associated incidental take, and conservation measures to avoid, minimize, and monitor impacts.

The Service provided a draft biological opinion to the Navy for review and comment on August 28, 2009. The Navy provided preliminary comments on the draft biological opinion on September 28, 2009. The Navy and the Service discussed the Navy's comments at meetings held on September 21 and September 29, 2009. The Service addressed these comments and provided a revised draft biological opinion to the Navy on January 15, 2010. The Navy provided additional comments on the revised draft biological opinion to the Service, via electronic mail, on March 3, 2010. The Navy and the Service discussed the Navy's additional comments at meetings held on March 4 and May 26, 2010. The Service has addressed the Navy's comments in this final biological opinion as discussed in these meetings.

The complete project file for this consultation is maintained at the Carlsbad Fish and Wildlife Service Office (CFWO).

BIOLOGICAL OPINION

PROJECT DESCRIPTION

The Navy has a history of consultation and coordination with the Service regarding the effects of various activities located at NBC, including the SSTC, on federally listed species. The Navy has also coordinated with the Service in the development of their resource conservation and monitoring programs on the SSTC under the NBC INRMP. The proposed action represents a comprehensive description of future training activities and includes proposed continuation of a variety of natural resource management programs that monitor species status and may reduce adverse effects of proposed training.

The mission of the SSTC is to support Navy and U.S. Marine Corps (Marine Corps) individual and Fleet training by providing local land, sea, and airspace, support services, material, and training facilities that will help these forces achieve and maintain the highest level of operational readiness. The importance of the SSTC in supporting the Navy and Marine Corps' need for training and operational readiness is underscored by the wide range of commands and units and their proximity to SSTC facilities. The ability of local commands to engage in amphibious, inshore, clandestine, unconventional, and special warfare operations by providing local land, water, and airspace, support services, materials, and facilities for training on the SSTC is critical towards achieving and maintaining operational readiness.

The action area includes the area that will be directly or indirectly affected by the Navy's proposed military training and associated resource management program for the SSTC (Figure 1). The action area, located in and around the Silver Strand peninsula, has had a long history of training use and resource management. The Silver Strand peninsula is an 11.3 km (7 mi) coastal strand that extends from NASNI to the City of Imperial Beach in southern San Diego County. It is characterized by broad dune-backed beaches in the areas that have not been developed, and hosts many summer recreational visitors. Official military training areas, administered by NBC, are separated by the City of Coronado and Silver Strand State Beaches that are open to public use. These public beaches are included within the action area because some military training activities (primarily involving foot-traffic transit) occur on these beaches (Figure 1).

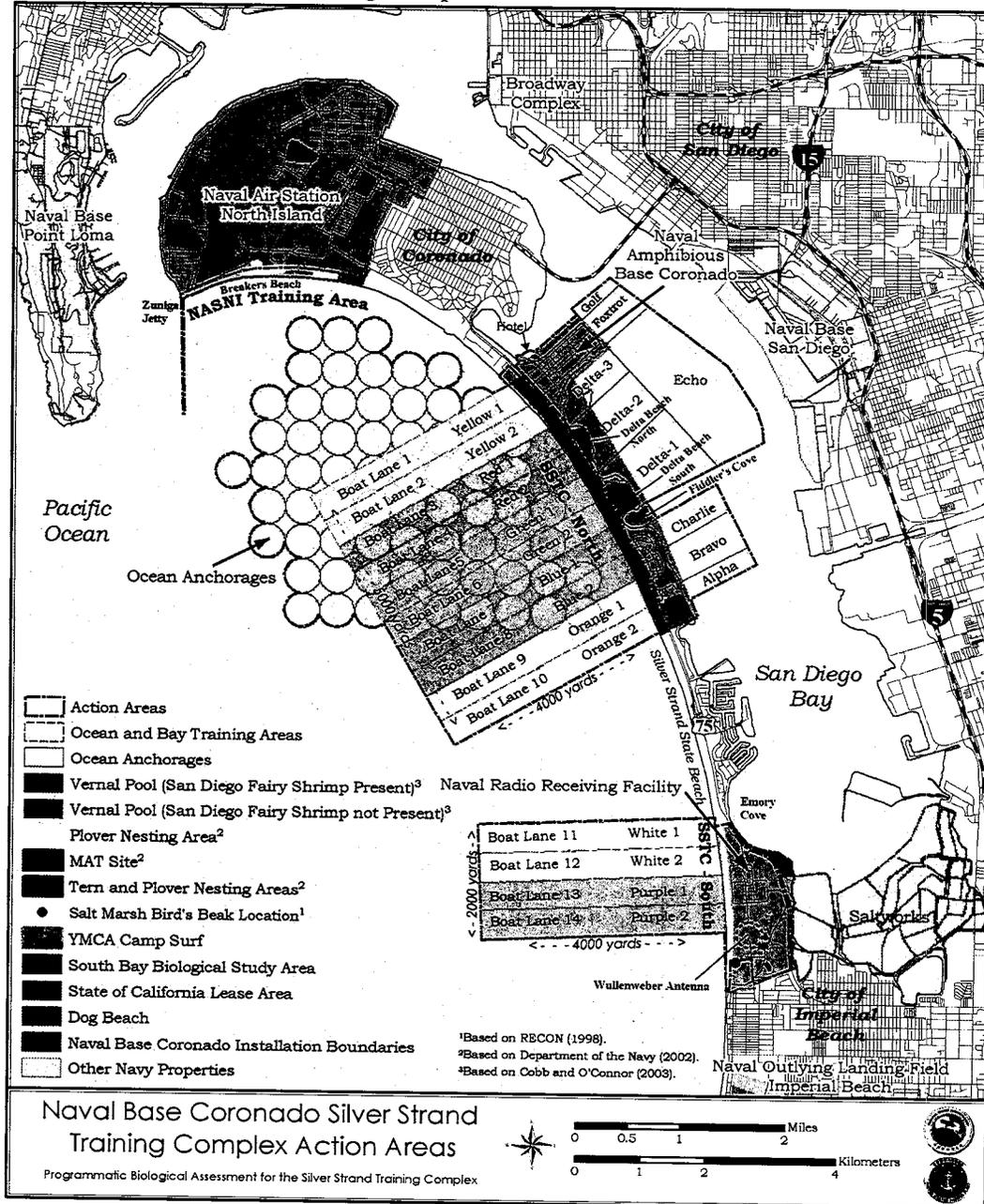
Military units conducting training within the SSTC action area report to one of four major commands: Commander Navy Surface Pacific (COMNAVSURFPAC); Commander Naval Special Warfare (COMNAVSPECWAR); Commander, Navy Expeditionary Combat Command (NECC), and the First Marine Expeditionary Force (I MEF). The COMNAVSURFPAC and COMNAVSPECWAR are headquartered on NBC. NECC is headquartered at NAB Little Creek, Virginia, with subordinate units stationed in the San Diego area. I MEF is headquartered at Marine Corps Base Camp Pendleton.

The Navy proposes to conduct training activities within the SSTC action area (Figure 1). The area is currently used for numerous training activities, which will continue under the proposed action. Training activities will occur at SSTC-North (SSTC-N) and SSTC-South (SSTC-S) and the adjacent ocean and bay waters, as well as the NASNI Beach. In addition, some physical fitness training and vehicle transit will occur on the City of Coronado Beach and Silver Strand State Beach. For scheduling purposes, the Navy uses Boat Lanes and Beach Lanes to identify the scheduled location(s) of training activities. Training is also proposed on the non-beach portion of SSTC-S, referred to as the "SSTC-S Inland" on the NRRF. Proposed military training activities include those conducted on land, in the air, in San Diego Bay, and in the Pacific Ocean. The proposed action includes the following components, which are discussed in more detail below:

- (1) Continue Current Training;
- (2) Increase Training Tempo;
- (3) Conduct New Training;

- (4) Conduct Current Training at Additional Established Training Areas;
- (5) Increase Training Access to SSTC Beach and Inland Training Areas;
- (6) Implement Avoidance Measures for Specific Activities, and
- (7) Implement a Modified Conservation Program for Listed Species.

Figure 1: Silver Strand Training Complex Action Area



A complete description of the Navy's proposed action is provided in the BA.

1. Continue Current Training

Training exercises that are currently conducted at the SSTC are proposed to continue at frequencies required to maintain military readiness. Many personnel who would normally be going through training rotations at the SSTC are currently deployed overseas, and training exercises have also temporarily shifted from the SSTC to desert training areas to prepare military personnel for conditions they will encounter overseas. Data regarding the location, timing, and number of training exercises that have recently taken place each year at the SSTC are not available. To establish the “baseline” level of training at SSTC, training personnel were interviewed to determine the training frequency from a “representative year” for each training activity over a 7-year period (i.e., 2001 to 2008). The data collected does not represent the total or average number of training exercises conducted during a single year, rather a composite of the most representative year for each type of activity over a 7-year period. Therefore, training data termed the “baseline” level of training does not reflect the actual level of training conducted at SSTC in any given year from 2001 to 2008 or currently.

Under the “baseline” level of training established by the Navy, 3,926 training exercises per year would be conducted at the SSTC to maintain military readiness (DoN 2009). Data is not available to determine how this estimate of the “baseline” level of training compares to the actual level of training conducted at SSTC in any given year; however, due to the number of deployed troops and the shift to desert training areas, this baseline number is likely higher than the actual level of training conducted at SSTC from 2001 to present.

Current training exercises are listed in Table 1 and described in more detail in Appendix A. Table 1 provides the name of each training exercise (e.g., anchoring, towing, etc.) and the terrestrial activities associated with each type of training exercise [e.g., Beach Party Teams, Mine Counter Measures (MCM), Beaching, Beach Camps, etc.]. The estimated “baseline” and “proposed” annual frequency of each training exercise is also provided but does not necessarily reflect the actual level of current or future training, since less training has and will occur if troops are deployed overseas and/or are training in the desert. The terrestrial activities associated with each type of training exercise are provided to facilitate the assessment of impacts of various training exercises on the natural resources in the vicinity.

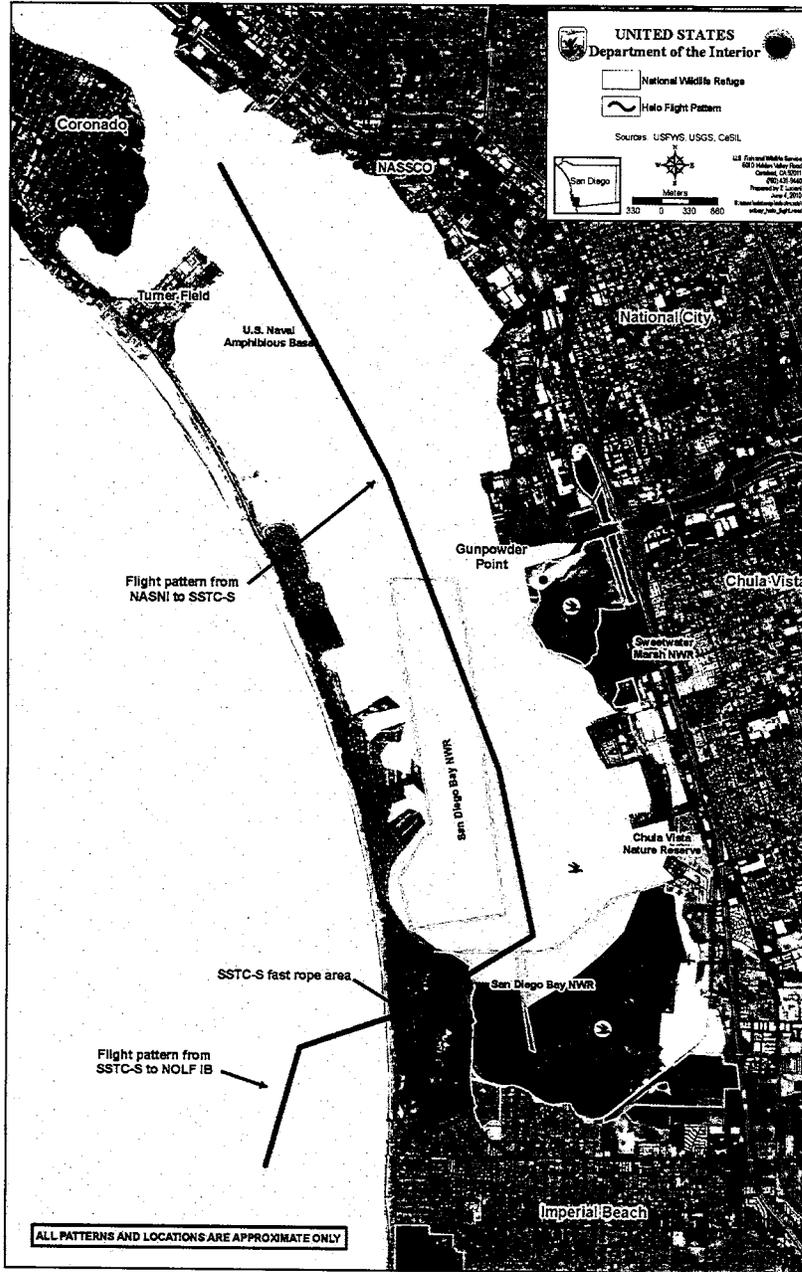
Training exercises include activities within and over the waters included in the action area. Boat travel occurs throughout San Diego Bay and the nearby ocean waters as vessels travel to and from training areas. Helicopter air traffic occurs from NASNI to over water areas, or designated landing areas at NAB and SSTC-S inland.

2. Increase Training Tempo

Training at SSTC is expected to return to levels identified as “baseline” in Tables 1, 16, and 17 after the end of current combat overseas and is also expected to increase to support future organizational realignments. Overall, the Navy proposes to increase the potential number of training exercises at the SSTC from the “baseline” level of 3,926 exercises per year to 5,343

*"Baseline" training levels identified in the table may exceed the actual baseline of training activity in any given year. The training identified as baseline represents, in most instances the maximum frequency for each activity that has occurred between 2001 and 2007.
**For analysis purposes, the Navy categorized activities into 4 groups and assigned each a number, as discussed in the "Effects of the Action" section.

Figure 1.a. Route of helicopter travel over San Diego Bay Compared to the Boundary of the South San Diego Bay Unit of San Diego Bay NWR.



*Figure based on Latas 2010, and Service 2006e

3. Conduct New Training

The Navy will conduct new training exercises at the SSTC, including eight new types of MCM exercises, one new type of amphibious exercise, and four new Naval Special Warfare exercises (Table 2). The new training exercises will be conducted primarily in training areas that already host similar operations. Based on future training requirements, the Navy has identified a need to replace Amphibious Assault Vehicles (AAVs) with Expeditionary Fighting Vehicles (EFVs), update the current Offshore Petroleum Discharge System (OPDS), and introduce the MH-60S helicopter. In addition, the Navy has identified a need to include military working dogs in breacher training exercises conducted at SSTC-S, and infrequently during Platoon Over the Beach (OTB) exercises. The Navy will use the EFV in lieu of the AAVs as part of the Mechanized Amphibious Raid in existing training locations. As part of this exercise, up to 14 of the EFVs will be beached, but the vehicles will not travel into the inland areas. The Navy will use a new type of OPDS equipment in the same areas currently used for OPDS. The training activity that uses this equipment will not change; however, the new equipment has a self-sinking mechanism that will reduce the need for external anchoring systems. The Navy will use the MH-60S helicopter in new exercises identified in Table 2.

The Navy will station up to 10 military working dogs at NBC; however, due to deployment, an average of 4 to 6 dogs will be present on the installation. The Navy will extensively train dogs at Lackland Airforce Base prior to their arrival at SSTC and will only station military working dogs at SSTC that are in the advanced stages of training, including training to avoid wild animals. Since there is currently no permanent kennel facility located on NBC, the Navy will temporarily house up to 10 (but on average 4-6) military working dogs at NAB Coronado. No location for a permanent kennel is yet proposed, and it will take an unknown amount of time to site, design, and construct a kennel. Future kennel construction may require additional consultation with the Service, depending on the location of the facility.

Military working dogs require daily exercise, and they will remain on a maximum 3 m (10 ft) leash under supervision of a handler when on the beach for exercise or training activities. The Navy will use SSTC-N Beach and SSTC-S Beach for exercising military working dogs. When on the beach, they will run primarily on the hard pack sand (i.e., below the mean high tide line). Occasional exercise may also be necessary on the soft sand on the sand road at SSTC-N, and/or above the mean high tide line at both locations, to avoid damage to dogs' paws and knees. Dogs and handlers will avoid any marked and buffered plover nests.

The Navy estimates that in total, there will be approximately 10 instances of dog exercise on the SSTC-N Beach each week. No dog exercise will occur in the southern 3 lanes at SSTC-N (i.e., Blue 2, Orange 1, and Orange 2) during the plover and tern breeding season until: 1) completion of a study to assess the effects of dogs on tern and plover behavior and productivity and 2) coordination with the Service regarding additional effects and necessary conservation measures identified as a result of the study. The study design will include the southern 3 beach lanes at SSTC-N as a "control" area. When using SSTC-N for dog exercise, handlers and dogs will enter/exit the beach at beach lane Yellow 1 to conduct runs. If it is necessary to cross the beach

from the intertidal area to the sand road, handlers and dogs will cross at the existing route that lies immediately to the north of the demo pit until completion of the study and coordination with the Service. According to Navy staff, the dogs cannot pass other dogs on their route, due to the potential for biting incidents or behavioral issues. Since multiple dogs will be exercised at one time, they will run with the handler to and from a destination point without running “laps” to avoid instances where dogs pass other dogs during training.

If training is conducted at SSTC-S, handlers and dogs will enter/exit the beach at Camp Surf or the middle gate at SSTC-S. Since dogs cannot pass other dogs on their route and no sand road is present at SSTC-S, only one military working dog will be exercised at a time primarily below the beach crest on the hard pack sand, but occasionally exercise will be necessary on soft sand. Dog handlers at SSTC-S will avoid any marked and buffered plover nests.

Military working dogs will be transported by vehicle to participate in breacher training activities at the SSTC-S Inland buildings. Infrequently, military working dogs may also participate in platoon OTB activities, which could occur across beach lanes at SSTC-N or SSTC-S. Platoon OTB training involves landing on the beach and crossing over the beach in a patrol (line) fashion. The crossing will occur with a platoon of personnel and one dog accompanying that platoon. A total of 10-15 beach crossings may occur during each event, which is conducted over a 1-2 day period. The exercise does not entail lateral movement up and down the beach. Platoon OTB activities involving dogs are proposed to occur 2-6 times per year. Platoon OTB training activities will not occur at SSTC-N Beach until completion of the study to evaluate the effects of dogs on terns and plovers and will never occur in the southern 3 beach lanes at SSTC-N during the nesting season.

A list of new proposed training exercises is provided in Table 2, and a description of what each exercise entails is included in Appendix A. Table 2 provides the name and proposed frequency of various training exercises (e.g., shock wave generator, surf zone test detachment equipment T/E, etc.) and the terrestrial activities associated with each exercise (e.g., Beach Party Teams, MCM Beaching, Beach Camps, etc.). Proposed new training exercises are primarily in the water or in the more developed portion of SSTC-S, so few terrestrial activities are denoted in the table.

If introduction of additional types of new equipment or changes in the use areas for equipment are proposed in the future, and if these changes would result in additional effects to listed species, the Navy will request a project-level consultation with the Service under the umbrella of this programmatic consultation.

4. Conduct Current Training at Additional Established Training Areas

The Navy proposes to conduct eleven current training activities at additional established training areas (Table 3).

Table 3: Current Training Exercises Proposed at Additional Established Training Areas

Training Exercise Number from Table 1	Training Exercise	Baseline Training Areas	Proposed Additional Training Areas
1	Anchoring	SSTC-N Anchorages	Offshore NASNI Beach
19	SUROBS	SSTC-N Beach Lanes Yellow 1-Orange 2	SSTC-S Beach Lanes White 1-Purple 2
31	Breacher Training	SSTC-S Inland (Bunker 98, Bunker 99, Interior)	(Northwest of Bunker 99, CQC/CQD Facility)
48	Field Training with a Beach Camp	SSTC-N Beach Yellow 1-Orange 2 ,	SSTC Beach Lanes 1-14 SSTC-S Inland
49	MPS Offload	SSTC-N Boat and Beach Lanes Yellow 1-Orange 2	SSTC-S Boat and Beach Lanes White 1-Purple 2 SSTC-S Inland
50	ROWPU	SSTC-N Beach Yellow 1-Orange 2	SSTC-S Beach Lanes White 1-Purple 2 SSTC-S Inland
55	Open Circuit Breathing Diving	All SSTC-N Boat and Beach Lanes Yellow 1-Orange Breakers Beach, Alpha-Hotel	SSTC-S Boat and Beach Lanes White 1-Purple 2
57	Rock Portage	SSTC-N Boat and Beach Breakers Beach, Yellow 1-Orange 2, Zuniga Jetty Coronado Rock Jetty	SSTC-S Boat and Beach Lanes White 1-Purple 2
64	Close Quarters Combat / Close Quarters Defeat CQC/CQD	SSTC-S Inland Bunkers 98 & 99	CQC/CQD Facility
75	Conventional Ordnance/IED Response	SSTC-N Beach Lanes Yellow 1-Orange 2	SSTC-S Beach Lanes White 1-Purple 2
76	Land Mine Detection/ Neutralization	SSTC-N Beach Lanes Yellow 1-Orange 2	SSTC-S Beach Lanes White 1-Purple 2

5. Increase Training Access to Portions of SSTC Beach and Inland Training Area

The Navy proposes to allow training in areas that are seasonally restricted under baseline conditions, including portions of SSTC-N Beach and the SSTC Inland area. In addition, the Navy proposes to prevent future encumbrance on SSTC beaches by limiting the number of

plover nests that will be marked for avoidance on SSTC-N Beach and SSTC-S Beach and deterring least terns from nesting at SSTC-S Beach.

5.1 Increase Training Access to SSTC-N Beach by Modifying Management Strategies

Under the current resource management strategy, the Navy preferentially schedules training activities in beach lanes that support fewer tern and plover nests to the extent consistent with training need. Such scheduling will continue under the proposed action. If training activities are planned for the same time period, they will be compared and those that require use of larger beach areas will be preferentially scheduled on lanes that contain fewer nests, where it doesn't adversely impact training needs or realism. If training activities are scheduled during time periods when they are not competing with other activities, each activity will be scheduled in the suitable beach lane that supports the fewest least tern nests as long as long such scheduling doesn't adversely impact training needs.

Under the current resource management strategy, the Navy protects the southern 3 beach lanes (i.e., Blue 2, Orange 1, and Orange 2) (Figure 1) from human disturbance and does not conduct training activities within these lanes during the tern and plover breeding seasons (FWS-SDG-3452.5). The Navy proposes to continue to avoid the southern 3 beach lanes to the extent consistent with training need but anticipates that additional beach training area will be necessary to accommodate future training. To accommodate future training and to increase flexibility, the Navy now proposes to schedule and conduct training exercises during the tern and plover breeding season in beach lanes Blue 2, Orange 1, or Orange 2 if other suitable lanes are already being used. In recognition of the increasing likelihood that training activities may be necessary in beach lanes Blue 2, Orange 1, and Orange 2, the Navy will use the following criteria to guide beach scheduling during the tern and plover breeding season:

Beach lanes Blue 2, Orange 1, and/or Orange 2 will be used for training during the tern and plover breeding season only if beach lanes White 1 and White 2 and Purple 1 and Purple 2 are unavailable or less suitable for the training activity in question, and beach lanes Red 1 and Red 2, Green 1 and Green 2, and Blue 1 are unavailable when additional training lanes are needed. The southern 3 beach lanes will be opened one at a time, based on need, with Blue 2 being opened first, Orange 1 being opened second, and Orange 2 being opened last. If one of the southern 3 beach lanes is opened to accommodate a training event, it will be closed again after the training event. After each training event, any incidental take that may have occurred will be documented during routine monitoring. The lanes may be re-opened, as necessary, to accommodate other training events that meet the criteria above.

Beach lanes Blue 2, Orange 1, and/or Orange 2 may also be used in lieu of other available lanes in instances where characteristics of these lanes, when compared to all other available lanes, make the lanes more appropriate for meeting training needs. Examples of lane characteristics that may result in training need include: presence of sand bars or holes, slope or depth of beach, and proximity to other training activity.

The Navy will continue to implement all other baseline conservation measures at SSTC-N Beach, including those identified below under “Proposed Conservation Measures.”

5.2 Prevent Expansion of Plover and Tern Nesting on SSTC Beaches

Under the current resource management strategy, the Navy buffers, marks, and avoids all plover nests that are established on the beach lanes of SSTC-N and SSTC-S, with the exception of those within the most heavily utilized training lanes (Green 2 and Blue 1) (FWS-SDG-3452.3). In addition, the Navy installs a mini-exclosure (i.e., small cage) over plover nests to protect them from mammalian and avian predators in instances where this technique appears beneficial. Within beach lanes Green 2 and Blue 1, the Navy installs a mini-exclosure over any nests established but does not buffer the site and mark with blue flexi stakes. Navy personnel routinely avoid area beyond the marked buffer to facilitate training and avoid impacting plovers. The avoidance of beach area in excess of the marked buffer reduces the width of the beach lane that is then used for the training activity (Delphine Lee, pers. comm. 2009d). The Navy now proposes to limit the number of active plover nests that will be marked for avoidance at any given time on the SSTC-N and SSTC-S Beaches to 22. This proposed change is intended to limit the future impacts of the markers on training exercises by limiting the number of nests that are marked and buffered. Each nest will be surrounded by a square buffer that is approximately 30-meter (m) [98.4-foot (ft)] on each side, and is marked by blue flexi stakes. The number of nests that will be marked and protected on the SSTC-N and SSTC-S Beaches will not exceed 22 at any given point in time. The total number of nests that will be marked and protected over the course of the 6 month breeding season is likely to be more than 22. Once chicks hatch, markers will be removed when biologically appropriate to minimize impacts to plovers, as determined by biological monitors in conjunction with Navy Natural Resources personnel.

The Navy recognizes the potential for terns to expand their distribution to include nesting on the SSTC-S Beach and is concerned that this could encumber training. The Navy proposes to deter least tern nesting at SSTC-S Beach by actively removing any nests/eggs that become established on SSTC-S Beach. Tern scrapes will be smoothed over to deter nesting. Tern eggs will be collected if laid. If any tern eggs are collected, they will be taken to Project Wildlife, or other qualified and permitted wildlife rehab facility, if feasible.

5.3 Increase Training Access to SSTC-S Inland Area

Under current conditions, the Navy avoids training activities in the vicinity of vernal pools at SSTC-S Inland year-round. The Navy now proposes to allow off-road foot traffic training activities in the portion of SSTC-S inland that supports vernal pools that are occupied by San Diego fairy shrimp when the vernal pools are dry (Figure 2). Whether or not pools are dry will be determined by personnel under the guidance of the Navy’s botanist or wildlife biologist. To assure that activities do not extend into occupied vernal pools when they are wet, the Navy will map vernal pools at SSTC-S Inland and subdivide the area into training areas that support groups of vernal pools. Training area boundaries will be based on the characteristics of vernal pools within the area and discernable geographic features, such as roads. If one pool in a particular

training area is wet, training activities will remain outside that training area until all pools in the training area are dry.

Figure 2. SSTC-S Inland and Vernal Pool Distribution



6. Implement Avoidance Measures for Specific Activities

The Navy proposes to implement specific measures to minimize the potential for incidental take associated with the following activities:

6.1 Underwater Detonation Measures

If a training exercise entails the use of multiple detonations, the second (or third, etc.) detonation will occur either immediately after the preceding detonation (i.e., within 10 seconds of the preceding detonation), or after 30 minutes have passed. This measure is intended to reduce the potential impacts to any piscivorous (fish-eating) birds, including least terns and pelicans, that forage in ocean waters and/or are attracted by stunned fish within the sphere of influence of the detonation.

A safety buffer zone [396.2 m (1,300 ft) radius for detonations occurring in 0 to 4 fathoms of water and 670.6 m (2,220 ft) radius for detonations in 4 to 12 fathoms of water] will be established around each detonation point. Assigned personnel will be trained to survey the safety buffer zone for birds prior to the detonation event. One trained lookout on shore will use binoculars to survey the detonation area and safety buffer zone for seabirds prior to and after detonations in 0 to 4 fathoms of water. Trained lookout(s) in small boats (one for 0 to 4 fathoms and two for 4 to 12 fathoms) will also use binoculars to survey the detonation area and safety buffer zone to detect any seabirds prior to the detonation event and until at least 30 minutes after each detonation. The lookouts will be allowed adequate time to effectively survey the safety buffer zone. Safety buffer zones encompass a large area [49-hectare (ha) [122-acre (ac)] area for detonations occurring in 0 to 4 fathoms of water, 141-ha (349-ac) area for detonations in 4 to 12 fathoms of water], and the Navy will determine the length of time necessary to adequately survey this area for seabirds prior to detonation. If flocks of birds or individual foraging birds are sighted within the buffer zone or moving towards it, activities will be suspended until the birds voluntarily leave the area. Immediately following the detonation, visual monitoring for birds within the buffer zone will take place for 30 minutes. Observations will be made for animals that have been injured or killed. If animals are detected that have been injured or killed, report will be made to the Commander Navy Region Southwest Environmental Director and the Navy Pacific Fleet Environmental Office. The NASNI Wildlife Biologist will also be notified.

6.2 Vehicle Patrolling and Lighter Amphibious Re-supply Cargo 5-Ton (LARC V) Operator Training

Vehicle patrolling and LARC V Operator training will not occur in Red, Blue, or Orange beach lanes during the tern or plover nesting season to avoid incidental take from these intensive activities.

6.3 Working Dog Management

Disturbance to plovers and terns posed by military working dogs exercising or training on the beach will be reduced by controlling all dogs that exercise or train on the beach with a maximum 3-m (10-ft) leash. As stated above, the Navy will conduct a study to assess the effects of military working dogs on tern and plover behavior and productivity prior to conducting exercising of the dogs in the southern 3 beach lanes at SSTC-N, or using military working dogs in OTB training activities at SSTC-N Beach. Results from this study will be used to determine whether use of

dogs is likely to cause additional effects to terns and plovers and to develop additional conservation measures, if necessary.

6.4 NASNI Beach/Airfield Mowing Protocols

The Navy will mow vegetated areas surrounding the NASNI airfield when 25 percent of the vegetation reaches 20-centimeters (cm) [8-inch (in)] or higher, as measured from the soil, to deter avian species that pose a bird airstrike hazard from using the areas. The mowing schedule will be coordinated with the NBC Botanist and Wildlife Biologist to minimize the potential for harm to plovers associated with this activity. The area to be mowed will be surveyed prior to mowing if habitat conditions suitable for nesting plovers are present.

6.5 Beach Clean Up Activities

The Navy will conduct beach clean-up on beach segments that support terns and plovers only between August 30 and March 1 to avoid disturbance to these species during the breeding season.

7. Implement a Modified Conservation Program for Listed Species

The Navy has implemented successful programs directed at the conservation and management of federally listed species within the area now identified as the SSTC for over 20 years and proposes to continue to implement modified conservation measures, as part of the proposed action. Natural resources management within the SSTC has been adaptive in nature, adjusting to changes in natural resource conditions and training needs and adding to and modifying avoidance and minimization measures based on experience and past effectiveness of the measures. Several changes to the baseline conservation program are proposed to increase training flexibility as described under Section 5: *"Increase Training Access to Portions of SSTC Beach and Inland Training Area."* In addition to these changes, the Navy will implement the following modified conservation actions:

7.1 Seasonal Marking/Avoidance Measures

Mini-exlosures will be used to protect plover nests from mammalian and avian predators in instances where this technique appears beneficial. Once chicks hatch, the exlosures will be removed within seven days, or when biologically practical, to minimize impacts to plovers as determined by biological monitors in conjunction with Navy Natural Resources personnel.

The Navy will continue to maintain conditions at NASNI that are believed to support 12 to 13 pairs of plovers by marking and protecting from human disturbances, a minimum of 6 ha (14.9 ac) of NASNI Beach as a Western Snowy Plover Management Area, as committed to during a previous consultation (i.e., FWS-SDG-3908.5).

SSTC-S Inland

The Navy will continue to prohibit: 1) training activities in and around all of the vernal pools when they are wet; and 2) driving of vehicles off of established roads at SSTC-S Inland, year round. Only emergency or security vehicles will infrequently be driven on unpaved roads. The NBC Botanist or Wildlife Biologist, or a qualified person overseen by the NBC Botanist or Wildlife Biologist will determine when the pools have dried enough to allow training.

7.2 Communication of Training Area Protocols

The Navy will continue to ensure effective communication and coordination among the biological monitors, the Natural Resources Office, and the scheduling commands for NASNI, SSTC-N and SSTC-S.

The Navy Natural Resources Office will continue to host an annual kickoff meeting(s) each year to outline natural resource needs and training/scheduling protocols designed to minimize the impacts of training to terns and plovers. Each command/tenant will participate in this kickoff meeting(s). During the breeding season kickoff meeting, the Navy Natural Resources Office will present information regarding the tern, plover, and management strategy to conserve these resources for that season.

The Navy Natural Resources Office will continue to submit to the SSTC scheduling office, on a weekly basis during the breeding season, an updated map that depicts the location of all active tern and plover nests. Likewise, the Navy Natural Resources Office will submit to the SSTC-S scheduling office each year, a map that depicts the most recent information regarding the location of vernal pools at SSTC-S.

7.3 Nest Relocation

The Navy will instruct Service-approved nest monitors to move least tern or snowy plover nests small distances, as necessary and appropriate, to reduce the potential for nest failure. For example, plover and tern nests located in existing Beach Crossing Lanes will typically be relocated to safer areas at the periphery of the Beach Crossing Lanes. The Navy will contact the Service to report the circumstance that necessitated movement of any tern or plover nest. This will be done via submittal of the Navy's weekly report to the Service. If relocation is necessary to reduce potential impacts, nests will be moved the shortest distance possible into suitable habitat to increase the chances for nest success.

The Navy will also instruct Service-approved monitors to salvage plover eggs from nests that have been abandoned, to allow incubation, rearing, and release onto beaches within the action area. Eggs may likewise be collected and removed to captivity in instances where high tide events will submerge eggs, and no safe adjacent beach is present in which to relocate eggs out of the intertidal zone.

7.4 Predator Management and Control

The Navy will continue to conduct predator management of mammalian and avian predators of the tern and plover at all nesting sites. This is currently accomplished via cooperative agreement with the U.S. Department of Agriculture. Predator management will include non-native species, as well as native predators. In instances involving native predators, every effort will be made to use non-lethal means of predator management. The Navy will continue to use pole traps as part of the predator management program, subject to the limitations placed upon the use of this tool as part of the USDA's depredation permit from the Service's Migratory Birds Office. The Navy will also continue to work cooperatively with the Service regarding the relocation of American peregrine falcons (*Falco peregrinus anatum*) if they are detected.

The Navy will continue to submit Migratory Bird Depredation Permit requests to address management of the gull-billed tern (*Gelochelidon nilotica vanrossemi*), a significant predator on least tern and snowy plover chicks within the action area. To date, the Navy has not received authorization to capture, relocate, or take this species although documented predation on least tern chicks has been significant, and permit applications have been submitted since 2005. The Navy will continue the use of wire wickets or domes, as appropriate, to attempt to reduce the level of nest predation by gull-billed terns. Wickets are made of two pieces of small gauge wire and formed into a 30-cm (1-ft) dome, which is placed over some active tern nests. The Navy is currently studying the wickets to determine their effectiveness.

... The Navy will continue to manage southern fire ants (*Solenopsis xyloni*), field ants (*Lasius spp.*), Argentine ants (*Linepithema humile*), and pyramid ants (*Dorymyrmex spp.*) on the Delta Beaches and at NASNI prior to and during the plover and tern nesting seasons.

The Navy will also continue to periodically use cameras to document predator activity and collect status information.

7.5 Nesting Deterrence through Habitat Modification

The Navy will continue to modify beach topography within SSTC-N Beach Lanes Green 1 and Green 2 prior to the breeding season to discourage establishment of tern and plover nests in these intensively used areas. The Navy may also expand use of this management technique into other beach lanes, which will require future project-level consultation.

7.6 Annual Nesting Site Preparation

The Navy will continue to inspect and remove plant growth from North and South Delta Beach prior to the breeding season. In addition, the Navy will continue to replace or reinstall site grid poles and chick barriers around the site perimeter, use tern decoys, apply clean sand to, and place chick shelters throughout the nesting colony as necessary to prepare the site(s). The Navy will enhance substrate at the Delta Beaches and the NASNI Least Tern nesting site (MAT site) as opportunities arise with available sand or dredge spoil. If a sand source is identified for

application to the Delta Beaches or the MAT site, the Navy will first test the material to assure that it is: 1) appropriate size and quality for tern and plover nesting and 2) free from contaminants that may pose a risk to terns, plovers or other avian species that use the site. All work conducted to enhance the substrate by adding sand or dredge materials will occur between September 15 and February 15 each year.

The Navy will continue efforts to control invasive exotic plants on all SSTC ocean and bay-side beaches to improve habitat quality for terns and plovers. Due to the function that iceplant can provide for dune stabilization and the financial expense of removal, some non-native iceplant will be left in place until funds become available for native plant restoration activities. Invasive plant control may include weeding, using heavy equipment, or moving sand. During invasive plant control, the Navy will mark and avoid the locations of select native plants, including coastal woolly-heads (*Nemacaulis denudata*), Brand's phacelia (*Phacelia stellaris*), and Nuttall's lotus (*Lotus nuttallianus*), to protect these rare plants and provide a mosaic of vegetation for chick shelter and escape cover.

To maintain plover foraging habitat within the SSTC action area, the Navy will not rake or otherwise remove kelp or natural marine vegetation from beaches within the action area, with the exception of:

- (A) The beach at YMCA Camp Surf will be periodically cleared of kelp to increase the safety of children participating in surf camps at this facility. Kelp removal will be limited to the area most intensively used during summer camping programs. Kelp will not be buried and will remain within the boundaries of SSTC to provide forage material for plovers.
- (B) The beach immediately in front of the Navy Lodge will be periodically raked in accordance with a previous consultation (FWS-SDG-3908.5). During the plover breeding season, the beach raker will continue to coordinate with plover monitors to assure that raking does not result in nest/active scrape loss. The Navy will minimize beach raking at NASNI to the extent consistent with ongoing recreational use.

7.7 Long Term Habitat Enhancement Plan for Action Area Beaches

The Navy currently conducts site enhancement activities at the Delta Beaches as outlined under "Annual Nesting Site Preparation" above and has also implemented weed control activities on the eastern edge of training lanes to improve conditions for nesting terns and plovers. Site enhancement is currently conducted on an opportunistic basis, using resources for site enhancement (sand) if it becomes available during other projects. The Navy proposes to develop and implement a comprehensive site enhancement plan for SSTC, including the Delta Beaches, portions of SSTC-N Beach, and portions of SSTC-S Beach. One goal of the Long Term Habitat Enhancement Plan will be to improve conditions for terns and plovers at the Delta Beaches and portions of the training lanes, in hopes that the nesting distribution will shift into these areas and reduce potential conflicts with training activities. The site enhancement plan will include dune

restoration and establishment on the windward (western) edges of the Delta Beaches and some areas of SSTC-N Beach. The plan will include measures to ensure that terns or plovers that nest in restoration areas are not disturbed or harmed during restoration or site maintenance activities. These measures may include: coordination with tern/plover monitors; passive irrigation systems, and timing the planting and maintenance activities to reduce the level of human presence necessary during the breeding season. Dune establishment will enhance this area for plovers, create a source of sand for the least tern nesting area, and establish a better visual barrier between Highway 75 and the nesting colony.

7.8 Recreational Use Restriction

The Navy will continue efforts to eliminate recreational or casual use of the SSTC Beaches by the general public and by military personnel and their dependents from the Naval housing that is across the highway from beach lanes Blue 2, Orange 1, and Orange 2.

The Navy will send a letter to military housing residents each year prior to the plover and tern breeding seasons to increase awareness about recreational use restrictions. The Navy will use security patrols and guards to reduce recreational and casual use of the SSTC-N and SSTC-S Beaches. The Navy will also install a guard shack with a camera and improved signage/markers at the southern end of SSTC-N Beach to discourage unauthorized access by people from Silver Strand State Beach. Improved signage and markers will include: "K-rail" or other suitable barrier that will be installed from the existing fence, which lies above the high tide line, to the mean high tide line, and large visible signs that clearly delineate "No Trespassing". The Navy will also continue to support the "Plover Patrol," a volunteer effort coordinated by the Silver Strand State Beach personnel.

7.9 Rearing of Collected Eggs, Injured and Sick Individuals

All injured or sick least terns or snowy plovers will be taken to a wildlife rehabilitation center, preferably Project Wildlife, for rehabilitation.

Plover eggs that have been collected due to abandonment will be taken to Project Wildlife, Sea World, or other permitted and qualified rehabber, as appropriate, for hatching and rearing. The Navy will continue to supply Project Wildlife, Seaworld, or other permitted rehabber, with fiscal resources to support this activity to the extent consistent with Navy funding abilities. All chicks will be released in areas approved by the Navy with guaranteed predator management. The success of any released plovers or terns will be tracked and evaluated to develop more effective rearing methods.

7.10 Plover Health Study

The Navy will continue to support studies and efforts by the Service to determine the cause(s) of plover mortality if dead/sick plovers are observed within the action area.

7.11 Monitoring Species Status and Incidental Take

The Navy will continue the current intensive monitoring protocols for terns and plovers at all San Diego Bay NBC training locations. The Navy will continue to submit to the CFWO: 1) weekly reports during the least tern and snowy plover breeding seasons on the status of these species in the training areas; and 2) yearly reports that document, at a minimum, the location of all nests observed, nest outcomes, the location and cause (if known) of all nests or individuals injured or killed, the locations of nests/eggs collected, number of nests/eggs collected, the hatch date of each egg collected, the unique band combination given each captive-reared chick, the approximate fledgling date and the release date/location of each captive-reared fledgling, and suggestions to improve the efficacy of this process if used in future years. This information is necessary to assess the amount of incidental take, and the effectiveness of using this approach to minimize impacts.

Biological monitoring of the tern and plover during the breeding season will be conducted by Service-approved monitors at all nesting sites. The general schedule for monitoring is provided below but may be modified based on findings in the field and/or operational requirements. The Navy will ensure that, as part of routine monitoring, biological monitors look for and document the location of least tern or snowy plover nests, eggs and chicks prior to and after all military training exercises, to allow assessment of take associated with training activities. The frequency of monitoring described below will be used to accomplish this objective:

- NBC Ocean Beach: Monitoring for least terns and snowy plovers will be conducted 3 to 4 days each week from March 1 to April 15, 5 to 6 days per week from April 15 to August 1, and 3 to 4 days per week from August 1-August 31.
- Delta Beaches: Monitoring for terns and plovers will be conducted 3 days a week from April 15 to April 30, 4 to 5 days a week from April 30 to July 31, and 3 days a week from July 31 to August 31.
- Monitoring at SSTC-S Beach for plovers will be conducted 1 to 3 days a week from March 1 to mid-September.
- Monitoring for plovers will be conducted at all sites 1 day per week from September through February.

The Navy will band tern and plover adults and chicks in conjunction with monitoring of nests at the NASNI, SSTC-N and SSTC-S. Due to the large number of nests that must be monitored and the number of quality bands received from the Service, not all adults or chicks are banded, and color band combinations do not mark birds to the level of the individual.

STATUS OF THE SPECIES

California least tern (*Sterna antillarum browni*)

Listing Status

The California least tern was listed as endangered under the Act on June 2, 1970 (35 FR 8491), due to loss of nesting habitat in conjunction with increased loss of foraging areas, human disturbance, and predation at remaining breeding colonies. No critical habitat has been designated for the least tern. A recovery plan was adopted in 1980, and revised on September 27, 1985 (Service 1985).

The Service completed a 5-Year Review of the California least tern in September 2006 (Service 2006a) and published a notice announcing the completion of the review in the *Federal Register* on February 14, 2007 (72 FR 7064). The 5-Year Review recommended downlisting the species to threatened status in recognition of the reduction of threats by ongoing management efforts.

Species Description

The least tern is the smallest of the North American terns, measuring about 22 cm (9 in) long with a wingspan of about 51 cm (20 in). Males and females look alike with a black cap, gray wings with black tips, orange legs, and black-tipped yellow bill. Immature birds have darker plumage and a dark bill with distinctive white heads and dark eye stripe.

Distribution and Abundance, and Habitat Affinity

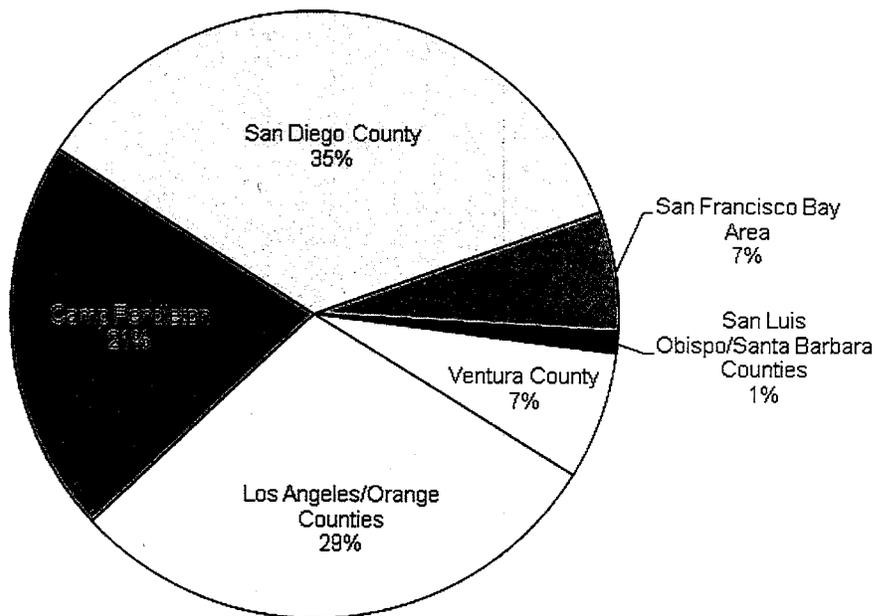
The breeding range of this subspecies has historically been described as extending along the Pacific Coast from Moss Landing, Monterey County, California, to San Jose del Cabo, southern Baja California, Mexico (American Ornithologists' Union 1957, Grinnell and Miller 1944). However, since 1970, nesting sites have been recorded from San Francisco Bay to Bahia de San Quintin, Baja California (Service 1985). The nesting range in California is thought to have been widely discontinuous, with the majority of birds nesting in southern California from Santa Barbara County south through San Diego County (Service 1985). Least terns typically arrive in California from Central and South America beginning in mid-April and complete their breeding cycle by the end of August. Their migration route in California is along the coast in both spring and fall. South of the Mexican border, the migratory route is not known, but it is assumed to be coastal (Service 1985).

The majority of the least tern population is concentrated in southern California within Los Angeles, Orange, and San Diego counties. Over half (56 percent in 2007) of the U.S. least tern population is found in San Diego County, including Camp Pendleton (Marschalek 2008; Figure 3). In 2007, approximately 35 percent of the population was distributed in San Diego County outside of Camp Pendleton. In northern San Diego County, least terns currently breed at the mouth of the Santa Margarita River on U.S. Marine Corps Base Camp Pendleton (USMCBCP),

and at Batiquitos Lagoon (Fancher 1992, Powell and Collier 2000, Marschalek 2005). In southern San Diego County, nesting sites are known from Mission Bay (including FAA Island, north Fiesta Island, Mariner’s Point, Stony Point, and San Diego River Mouth), San Diego Bay [including South San Diego Bay NWR, Sweetwater Marsh NWR, Lindbergh Field, NASNI, NBC (Delta Beaches and SSTC-N Beach), and the Chula Vista Wildlife Reserve], and the beach areas north and south of the Tijuana River mouth. All of these sites are in proximity or adjacent to estuaries, lagoons, and/or river mouths.

Figure 3. California Least Tern 2007 Distribution*

California Least Tern
2007 Distribution of Breeding Pairs by Geographic Cluster



* Data obtained from Marschalek 2008

Statewide efforts to implement protection and management for least tern nesting and foraging areas have contributed to a breeding population increase from 1,706 pairs in 1990 to an estimated 7,023 pairs in 2008, and 7,124 pairs in 2009 (Table 4). The annual population growth rates were variable between 1992 and 2003, and have stabilized since then. However, the fledgling per pair ratios were generally greater (i.e., approximately 2 times greater) from 1990 to 2000 (except 1995) than from 2001 to 2009 (Table 4).

Unfrequented sandy beaches close to estuaries and coastal embayments have traditionally served as nesting sites for the California least tern (Grinnell and Miller 1944, Garrett and Dunn 1981). Conflicting uses of southern California beaches during the least tern nesting season have

precluded the use of most natural nesting sites, although least terns nest adjacent to intensively used beaches if protected from the adjacent disturbance (e.g., Huntington Beach, Venice Beach). In recent years, some non-beach sandy surfaces in coastal areas (e.g., salt pond dikes, sand flats, sandfills, airports, and landfills around bays and estuaries) have been successfully used by least terns for nesting because potential nesting habitat has been greatly reduced by human disturbance associated with recreation and development (Massey and Atwood 1979 – 1985, Thompson et al. 1997).

Table 4. California Least Tern U.S. Rangewide Abundance *

Year	CLT pairs (minimum)	CLT fledglings (minimum)	Fledgling/Pair Ratio (minimum)	CLT Nests (minimum)	Change in Estimated Number of Pairs	Percentage Change in Estimated Population Size
1990	1706	759	.61	--		
1991	1827	1745	.96	--	+121	+7
1992	2100	1376	.66	--	+273	+15
1993	2324	2043	.88	--	+224	+11
1994	2792	1784	.64	--	+468	+20
1995	2599	1021	.39	--	-193	-7
1996	3362	1916	.57	--	+763	+29
1997	4017	3231	.80	--	+655	+19
1998	4141	2686	.65	--	+124	+3
1999	3493	671	.19	--	-648	-16
2000	4521	3710	.82	5301	+1099	+31
2001	4712	1773	.38	5319	191	+4
2002	3569	692	.19	4093	-1143	-24
2003	6780	2627	.39	7677	+3211	+90
2004	6351	1547	.23	7937	-429	-6
2005	6865	1721	.23	8124	+514	+8
2006	7006	2571	.35	8173	+141	+2
2007	6709	2188	.32	7627	-297	-4
2008	7023	2254	.30	8223	+314	+5
2009	7124	1694	.24	8026	+101	+1

*Data obtained from California Department of Fish and Game annual status reports.

In addition to nesting areas, secure roosting and foraging areas are essential to the recovery of the species. Roosting areas are of two kinds: pre-breeding season nocturnal roosts and post-breeding season dispersal sites where adults and fledglings congregate. The best documented night roost is in Belmont Shore, Long Beach (Atwood 1986). However no recent surveys have been conducted to verify continued use of this night roost site. A night roost has also been identified at SSTC-N in beach lane Blue 2 and Orange 1 and 2, and in an area near the mudflats at Delta Beach North and South (DoN 2009a).

Least terns typically forage close to their nesting colony during the breeding season (Atwood and Minsky 1983, Minsky 1984, Copper 1986, Massey 1987, Ehrler et al. 2006). One study observed that although more abundant prey is available at a more distant location, least terns most intensely forage (i.e., number of least terns per hour per hectare) within approximately 1 km (0.6 mi) of their nesting colony (Ehrler et al. 2006). In San Diego Bay, a 2-year foraging study found that least terns nesting at Delta Beach North foraged the most intensely and frequently in sampling stations immediately adjacent to Delta Beach North, which extended up to 0.5 to 0.8 km (0.3 to 0.5 mi) away from the nesting colony, and that least terns forage more in the bay than in the ocean (Copper 1986). Another study observed that the majority of least terns forage less than 1.6 to 3.2 km (1 to 2 mi) from their nesting colony while a small proportion of least terns will sometimes forage up to 8 km (5 mi) from a colony site (Atwood and Minsky 1983). Adult terns exhibit two patterns of foraging activity, one of which is observed before the hatching of eggs and another observed subsequent to hatching. Adults feeding only themselves tend to go farther and feed on larger fish than when they are feeding chicks. After the eggs hatch, adults make shorter and more frequent trips to find the smaller fish needed by the chicks (Massey 1987).

Life History

The least tern is migratory, typically arriving in California from Central and South America in mid-April and departing by the end of August (Massey 1974). However, terns have been recorded in the breeding range as early as March 13 and as late as November 24 (San Diego Natural History Museum specimen records).

Least terns are gregarious year-round, feeding and migrating in flocks of 5 to 20 or more. Least terns flock together before the nesting season, at night roosts during the nesting season, and at shallow-water, freshwater, and estuarine marshes after the nesting season (Atwood and Minsky 1983, Service 1985). Nesting colonies of least terns range widely in size from less than 10 to over 100 pairs of terns (Marschalek 2007), and occur in 5 clusters along the western coast of the United States (Massey and Fancher 1989). Least terns are more loosely colonial than other tern species; nests are sometimes so widely spaced as to be out of sight of conspecific species (Thompson et al. 1997). In Connecticut, Brunton (1999) found that an intermediate colony size (approximately 150 nests) was optimal for least tern nesting success. She found that predation by small mammals, gulls, and crows was dependent on colony size and that these predators were deterred from colonies with more than 100 nests, but black-crowned night herons were attracted to large colonies.

Least tern nesting has been characterized by two waves of nesting from approximately May through August (Massey and Atwood 1981). In years where two waves of nesting do occur, most of the initial nesting attempts are made by experienced breeders and are completed by mid-June. A second wave of nesting, from mid-June to early August, is comprised of re-nests after initial failures and second year birds nesting for the first time (Massey and Atwood 1981). A second wave of nesting, however, is not observed in all years.

The nest of the least tern is a simple scrape or depression in the sand that the birds sometime adorn with small fragments of shell or pebbles. One to three eggs are laid, usually two. Both parents share duties throughout nesting and chick-rearing, but the female incubates and broods chicks more than the male (Keane 1987). Nests are incubated for 20-25 days with a mean time of about 21 days. After their eggs hatch, breeding adults catch and deliver small fish [i.e., approximately 2.5 cm (1 in) long (Atwood and Kelley 1994, Ehrler et al. 2006)] to the flightless young. Newly hatched downy chicks are capable of walking in the vicinity of the nest (e.g., to seek shade) (Cornwell 1986). Young are capable of flight at approximately 20 days but continue to be fed and are taught how to feed by their parents for some time after fledging (Thompson et al. 1997). Recently fledged chicks intermingle with adults and chicks from other colonies, feed inexpertly for several weeks, and ultimately depart colony areas in preparation for migration within 4-8 weeks of fledging. Minimum breeding age is 2 years (Massey and Atwood 1981), and the average breeding life-span of least terns is 9.6 years (Massey et al. 1992).

Least terns exhibit a high degree of nest site fidelity from year to year (Atwood and Massey 1988), but inter-colony movement can occur in response to failure at a particular site. Factors which can affect colony site fidelity include reproductive failure and the physical attributes of the nest site such as the amount of vegetative encroachment. Declines at one nesting site sometimes are balanced by increases at another nearby site, assuming access and availability of a nearby appropriate food source. These shifts appear to be related to heavy predation or human disturbance event(s) which often times result in poor reproductive success. For example, least terns relocated from the colony sites in western Mission Bay (i.e., San Diego River Mouth and Mariner's Point) to colony sites in eastern Mission Bay (i.e., Stony Point and North Fiesta Island) during the 2006 breeding season and re-nested after predation decimated the offspring at the western sites (Marshalek 2006). Least terns have also shifted in distribution at SSTC-N beach in response to disturbance and modified topography (DoN 2009a).

Least terns feed exclusively on small fishes captured in estuaries, embayments, and shallow near-shore waters, particularly at or near estuaries and river mouths (Massey 1974, Collins et al. 1979, Atwood and Minsky 1983, Atwood and Kelly 1984, Minsky 1984, Bailey 1984). They characteristically forage by hovering 1 to 10 m [1.1 to 11 yards (yd)] above the water, then plunging headfirst into the water to seize small fish. Least terns primarily forage on juvenile or larval anchovies [Engraulidae: deep-bodied anchovies (*Anchoa compressa*), slough anchovies (*A. delicatissima*), northern anchovies (*Engraulis mordax*)] and silverside smelt [Atherinidae: topsmelt (*Atherinops affinis*) and jacksmelt (*Atherinopsis californiensis*)] that are less than 5 cm (2 in) long and occur in the upper 0.5 m (0.5 yd) of the water column, which is probably the deepest least terns can plunge-dive (Atwood and Kelly 1984, Baird 1997). Chicks receive smaller food items than adults or juveniles and newly hatched chicks consume fish that are approximately 2.5 cm (1 in) long (Atwood and Kelly 1984, Ehrler et al. 2006). Adults do not dismember prey fish before delivering to chicks, so chicks must be given fish that are small enough for them to swallow whole.

Threats

Threats to the nesting habitat of California least terns have been ameliorated but not eliminated. Habitat for the species is degraded throughout its range and competing human activities continue to threaten this species. The remaining nesting colonies are located within small sites requiring intensive management. Within these managed sites, the species remains vulnerable to predation, invasive non-native plants, and human-related disturbance (Service 2006). Without continued management of these sites, we anticipate that the threats of habitat loss and predation would reverse the population increase that has occurred since the species was listed (Service 2006). The site-specific threats to least terns habitat associated with climate change and rising sea level have not been evaluated, but the coastal location of least tern habitat places it at risk should sea levels rise over the next several decades.

The sensitive status of some predatory species requires special consideration and has reduced the predator management options available to protect least tern colonies in some instances. For example, the gull-billed tern, a species protected by the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 *et seq.*), has recently posed a localized problem for least terns nesting on beaches around San Diego Bay (Service 2009a), which supports over 20 percent of the rangewide population of the least tern (Appendix D). Gull-billed terns are terrestrial foragers and pluck prey while on the wing (Service 2009a). Their diet includes fish, marine invertebrates, and small terrestrial vertebrates such as least tern chicks. Historically, this species was not recorded as a breeding resident along the west coast of the U.S. There are no records of western gull-billed terns in San Diego County until 1985 (Unitt 2004), and currently the only area in which gull-billed terns have been found nesting in San Diego County is on the salt pond levees within the San Diego Bay NWR, southeast of the action area. The first gull-billed tern nest at the salt pond levees was observed in 1987 (Terp and Pavelka 1999), and between 1993 and 1998, eight to ten nesting pairs were recorded. Since then, the gull-billed tern colony at the salt pond levees has increased so that in 2009, over 78 nests and a minimum of 58 pairs were recorded (Service 2009b). Gull-billed terns have also been observed foraging further north, within and around least tern colonies at MCBCP and Bolsa Chica (Service 2009a), but gull-billed tern nesting on the west coast has not yet been documented north of San Diego Bay (Service 2009a).

During the 2002 nesting season, nest monitors documented a significant increase in least tern chick predation by gull-billed terns (Patton 2002). At least 37 incidents of least tern and snowy plover chick predation by gull-billed terns were documented in 2003 (Patton 2004b). In 2004, at least 44 least tern and snowy plover chicks were documented as lost to gull-billed tern depredation (Patton 2006), but the number of least tern vs. snowy plover chicks was not determined. In 2008, a total of 137 least tern chicks were documented as lost to gull-billed tern predation in the San Diego Bay area. Since biologists monitoring the nesting populations around the bay and at the Tijuana Estuary are only present intermittently on a weekly basis, it is likely that only a fraction of the actual predation occurring is observed. Despite the visible predation on least tern chicks within the action area and the low productivity observed here in recent years, the estimated number of least tern pairs in the action area has remained stable. A study is underway to assess the age class distribution of the least terns nesting within the action area,

since the age structure of the birds nesting in this area may have changed due to low productivity and recruitment. Tern monitors are also re-evaluating the methods used to estimate least tern pair numbers to determine if re-nesting efforts by least tern pairs that have failed due to predation, may be resulting in overestimates of the pairs currently using the site.

Although gull-billed terns have expanded their distribution to include San Diego Bay and have increased in number in San Diego, the recorded numbers of this species remain low rangewide. The gull-billed tern is included in the Service's Birds of Conservation Concern list (Service 2008b), and the Service recently received a petition to list the gull-billed tern as a threatened or endangered species (Center for Biological Diversity 2009). Concern over the status of the gull-billed tern has prompted the Service's Division of Migratory Bird Management to deny U.S. Navy requests for permits to lethally remove gull-billed terns observed foraging upon least tern chicks at SSTC.

The current situation, including unmanaged predation, the increasing size of the gull-billed tern colony in San Diego Bay, and likelihood of further northward expansion in gull-billed tern nesting distribution, has raised concerns that gull-billed tern predation may have rangewide recovery implications for the least tern. The ongoing impact of gull-billed tern predation on least tern colonies surrounding San Diego Bay, including NBC, is of particular concern because of the contribution of these colonies to the overall least tern status, the level of predation recorded at these colonies in recent years (Service 2009a), and the likelihood that ongoing lack of productivity could eventually depress the numbers of least terns in this area, if left unchecked. Various programs within the Service, including the Divisions of Migratory Bird Management, Wildlife Refuges, and Ecological Services, are currently working together to identify and implement actions that will provide a better understanding of the impacts of gull-billed tern predation on the least tern and snowy plover. Management options to address the conservation needs of the least tern, snowy plover, and gull-billed tern are under Service consideration (Structural Decision Making Workshop, September 2009) and a draft Environmental Assessment regarding gull-billed tern management options was released by the Service for public review in 2009 (Service 2009a).

Reduction in food supplies for least terns can decrease recruitment to the breeding population. Low reproductive success and high chick mortality in recent years has been attributed to shortages of fish prey (Marschalek 2005 and 2006). Reduced food availability negatively affects the reproductive success of the tern by reducing clutch sizes, significantly lowering weights of chicks, and increasing levels of egg abandonment and non-predator chick mortality (Atwood and Kelly 1984). More specifically, scarcity of small fish can result in chick mortality. The "El Niño" warm sea current phenomenon can have deleterious long-term effects on the entire least tern population. During the El Niño event of 1982-1983, diminished fish populations throughout the southern California bight caused a drastic reduction in least tern breeding success resulting in the lowest annual production of fledged young on record (Massey 1988, Massey et al. 1992). Subsequently, it took 5 years for the population to recover from this event. El Niño conditions were also evident during the 1992 breeding season, which also resulted in reduced statewide production of fledglings (Caffrey 1993).

Loss and/or degradation of foraging habitat through filling habitat, covering it with structures, or by reducing visibility in the upper water's surface can reduce the ability of least terns to capture their prey. To avoid temporary degradation of foraging habitat during the nesting season, Copper (1986) recommended that dredging and water-related construction in important foraging habitats, such as foraging habitat immediately adjacent to least tern colonies, occur outside the nesting season.

California least terns may also be somewhat susceptible to the expressed effects of pesticide contamination and bioaccumulation (Boardman 1988).

Rangewide Conservation Needs

The Least Tern 5-Year Review (Service 2006a) included the following recommendations for the future conservation needs of the California least tern:

1. Revisit and revise the current California least tern recovery plan;
2. Continue management of existing nest sites;
3. Develop binding, site-specific management plans in concert with State and Federal wildlife agencies to provide long-term protection of nest sites;
4. Continue monitoring nest sites; and
5. Create new nesting sites and expand existing nesting sites.

Western Snowy Plover (*Charadrius alexandrinus nivosus*)

Listing Status

The Pacific coast population of the western snowy plover (*Charadrius alexandrinus nivosus*) was listed as threatened under the Act on March 5, 1993 (58 FR 12864). Threats to the species identified at the time of listing included loss and modification of nesting habitat resulting from encroachment of European beachgrass, extensive human recreational use of nesting areas, and human development of the coast, with predation also cited as a significant threat to a number of nesting colonies (58 FR 12872).

Critical habitat was first designated for this population of western snowy plover on December 7, 1999 (64 FR 68508). Following a lawsuit filed against the Service by the Coos County Board of County Commissioners and others, the 1999 critical habitat designation was remanded and partially vacated (Coos County Board of County Commissioners *et al.* v. Department of the Interior *et al.* CV 02-6128). A revised final critical habitat designation was published in the *Federal Register* on September 29, 2005 (70 FR 56969). The 2005 revised final critical habitat designation does not include lands owned or managed by the Department of Defense at NBC.

On July 29, 2002, we received a petition from the Surf-Ocean Beach Commission of Lompoc, California to delist the Pacific coast population of the western snowy plover. A similar petition dated May 30, 2003, was received by us from the City of Morro Bay, California. In accordance with our 1996 Petition Management Guidance (61 FR 36075), we treated the two petitions as a single petition because the second petition was neither greater in scope nor did it broaden the area of review of the first petition. We published a 90-Day Finding on the 2002 petition on March 22, 2004 (69 FR 13326), indicating the petition presented substantial information that the petitioned action may be warranted.

We completed our 12-Month Finding on the petition to delist the Pacific coast population of the western snowy plover on April 21, 2006 (71 FR 20607). In our 12-Month Finding, we determined the Pacific coast population of the western snowy plover met the criteria for discreteness and significance as outlined in the Service's and National Marine Fisheries Service's 1996 Joint Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act (61 FR 4722). At the time the 12-Month Finding was published in the *Federal Register*, the United States' portion of the Pacific Coast Distinct Population Segment (DPS) of the western snowy plover was estimated to be 2,334 adult birds (71 FR 20625). Furthermore, while we determined the DPS of the western snowy plover should remain classified as threatened under the Act, we also concluded that significant progress has been made toward recovery; therefore, concurrent with the publication of the 12-month finding, we also published a proposed Special Rule Pursuant to Section 4(d) of the Act for the Pacific Coast DPS of the western snowy plover (71 FR 20625). The proposed 4(d) rule would remove the section 9 prohibitions of the Act for activities that occur in counties where a particular county has met its Breeding Bird Management Goal, as specified in Table 1 of the April 2006 proposed rule (71 FR 20631). A Notice extending the comment period on the proposed 4(d) rule was published in the *Federal Register* on August 21, 2006 (71 FR 35406). A final rule is still in development.

The Service completed a 5-Year Review of the Pacific coast DPS of the western snowy plover in May 2006 (Service 2006b) and published a notice announcing the completion of the review in the *Federal Register* on February 14, 2007 (72 FR 7064). The 5-Year Review, which used the 2006 12-Month Finding as the basis for the review, recommended no change in the status of the Pacific coast DPS of the western snowy plover.

A Notice Announcing the Availability of a *Final Recovery Plan for the Pacific Coast Population of the Western Snowy Plover* (WSP recovery plan) was published in the *Federal Register* on September 24, 2007 (72 FR 54279).

Species Description

The western snowy plover is a small shorebird in the family Charadriidae. Adults weigh from 34 to 58 g (1.2 to 2 oz) and range in length from 15 to 17 cm (6 to 7 in) (Page et al. 1995). Western snowy plovers are pale gray-brown above and white below, with a white hind neck collar and dark lateral breast patches, forehead bar, and eye patches. The bill and legs are black.

Distribution, Abundance and Habitat Affinity

The breeding range of the Pacific coast western snowy plover population extends along coastal beaches from the southern portion of Washington State to southern Baja California, Mexico. The WSP recovery plan (Service 2007a) identified 159 current or historical western snowy plover breeding or wintering locations on the U.S. Pacific coast. These localities include 6 in Washington, 19 in Oregon, and 134 in California. In Baja California, breeding western snowy plovers concentrate at coastal wetland complexes as far south as Bahia Magdalena, Mexico (Palacios et al. 1994). The largest number of breeding birds occurs from south San Francisco Bay to southern Baja California suggesting that the center of the plovers' coastal distribution lies closer to the southern boundary of California (Page and Stenzel 1981, Palacios et al. 1994).

The 2009 western snowy plover population estimate for the U.S. is higher than the estimate at the time of listing of this species in 1993. Within the U.S., breeding season window surveys are used as an index to assess population trends and also as a basis for roughly estimating population size. At the time of listing, 1,386 birds were detected in California based on a 1989 survey, with 30 adults reported in Oregon in 1992, and fewer than 30 nesting birds in Washington (58 FR 12870). In 2005, the breeding season window surveys detected 1,817 plovers along the Pacific coast of the U.S. Numbers detected during the breeding season window survey increased in 2006 to 1,877 plovers, then decreased to 1,537 plovers in 2007, and increased slightly in 2008 and 2009 at 1,541 plovers, and 1,587 plovers, respectively. (Appendix C). Within the U.S., the Service has used a correction factor of 1.3 applied to the window survey results to develop a population estimate (Service 2007a). The correction factor was derived from studies using marked birds at one of the breeding locales, rather than rangewide, and evaluation of the accuracy of this correction factor in other areas is in progress (Watkins 2010). Using this correction factor, the estimated 2009 population on the U.S. Pacific coast was 2,063 plovers (Appendix C).

The most recent surveys conducted in Mexico detected fewer plovers on the coast of Baja California than detected in 1991-1992 (Eduardo Palacios 2009). Surveys in Baja California use methodology similar to the U.S. breeding season window surveys. Surveys were conducted in 1991-1992 and again in 2007 and 2008. The 1991-1992 surveys detected 1,344 plovers in Baja California (Palacios et al 1994), and recent surveys used the same methodology and detected only 555 plovers in 2007 and 879 plovers in 2008 (Eduardo Palacios 2009). Using the 1.3 correction factor, the estimated 2008 population in Baja California was 1,143 plovers.

Sand spits, dune-backed beaches, sparsely to unvegetated beach strands, open areas around estuaries, and beaches at river mouths are the preferred coastal nesting areas of the snowy plover (Page and Stenzel 1981, Wilson 1980, Powell et al. 1997). Other areas used by nesting snowy plovers include dredge spoil fill, dry salt evaporation ponds, airfield ovals, and salt pond levees (Widrig 1980,; Wilson 1980, U.S. DoN 2004, Page and Stenzel 1981). Nest sites typically occur in flat, open areas with sandy or saline substrates with little or no vegetation (Widrig 198, Wilson 1980, Page and Stenzel 1981, Welchell and Keane 1998, Fancher 1998). Snowy plovers are sometimes found nesting in similar habitats as the least tern, such as occurs at Batiquitos Lagoon

(Welchell and Keane 1998), NBC (DoN 2004), and Camp Pendleton (Powell 1996) in San Diego County, California. Like the least tern, the western snowy plover requires suitable habitat that is subject to little disturbance from people, vehicles, and dogs.

Life History

The breeding season of the western snowy plover typically extends from March 1 through September 15. During the breeding season, plovers congregate in loose concentrations with the number of adults at coastal breeding areas ranging from 2 to 318 (Page and Stenzel 1981). Both unpaired males and pairs defend territories against other plover species by posturing, chasing, or fighting. Unpaired males defend territories for up to 45 days before procuring a mate (Page et al. 1995). Paired birds use the territories for courtship, nest sites, and sometimes feeding (Page et al. 1995).

Egg laying in southern California has been documented as early as February 13 (Copper 2008), but most often begins in mid-March and continues through late-July (Page et al. 1995). Generally, three (3) eggs are laid in a nest that consists of a shallow depression scraped in sandy or saline substrates. After the full clutch is laid, both males and females incubate the eggs for 27-33 days (Warriner et al. 1986). Chicks are mobile soon after hatching, and broods rarely remain within the nesting territory (Warriner et al. 1986). The male may lead the brood to a brood territory, which can range from 0.8 to 1.2 ha (2 to 3 ac) (Fancher 2003). Birds are able to fly within approximately 31 days of hatching (Stenzel et al. 1994).

Snowy plovers clutches are frequently destroyed by predators, people, tides, or weather, but they re-nest readily after these losses up to six times in some locations (Wilson 1980, Warriner et al. 1986, Page et al. 1995). Snowy plovers may also double or triple brood during favorable years. Re-nesting may occur in the same scrape (rarely), in proximity to the initial nest, or in a new location distant from the first attempt (Warriner et al. 1986, Powell and Collier 1994, Powell et al. 1997). Nests are rarely reused because weather typically destroys scrapes within days of hatching (Page et al. 1995).

Polygamy has been observed in snowy plovers along coastal California (Warriner et al. 1986). Snowy plover females may abandon chicks as young as 6 days old to find another mate leaving the male to care for the brood (Warriner et al. 1986). Males attend the young for 29-47 days (Warriner et al. 1986) and then may re-nest with a new partner if sufficient time remains in the season (Stenzel et al. 1994). This results in a serial polygamous breeding system in which males may double clutch and females may triple clutch.

Snowy plover adults and young forage on invertebrates along intertidal areas, along beaches in wet sand and surf cast kelp, in foredune areas of dry sand above the high tide, on salt pans, and along the edges of salt marshes and salt ponds. Page et al. (1981) observed snowy plovers moving between salt pans, tidal flats, and beaches indicating these areas function together in providing habitat for the species.

While some western snowy plovers remain in their coastal breeding areas year-round, others migrate south or north for winter (Warriner et al. 1986, Page et al. 1995a, Powell et al. 1997). In Monterey Bay, California, 41 percent of nesting males and 24 percent of the females were consistent year-round residents (Warriner et al. 1986). At Marine Corps Base Camp Pendleton (MCBCP) in San Diego County, California, about 30 percent of nesting birds stayed during winter (Powell et al. 1995, 1996, 1997). The migrants vacate California coastal nesting areas primarily from late June to late October (Page et al. 1995a). There is evidence of a late-summer (August/September) influx of western snowy plovers into Washington; it is suspected that these wandering birds are migrants. Most western snowy plovers that nest inland migrate to the coast for the winter (Page et al. 1986, 1995). Thus, the flocks of non-breeding birds that begin forming along the U.S. Pacific coast in early July are a mixture of adult and hatching-year birds from both coastal and interior nesting areas. During migration and winter, these flocks range in size from a few individuals to up to 300 birds (Service 2007a).

Threats

Threats to the Pacific Coast population of the western snowy plover remain essentially the same as at the time of its listing in 1993. The magnitude of these threats in the U.S. has been reduced through active management afforded by protections under the Act and undertaken primarily by certain Federal, State, and County agencies (71 FR 20625). The most important threats are ongoing habitat loss and fragmentation; mortalities, injuries, and disturbance resulting from human activities; predation; and lack of comprehensive State and local regulatory mechanisms throughout the range of the Western snowy plover (71 FR 20607). Natural factors, such as inclement weather, have also affected the quality and quantity of western snowy plover habitat (Service 2007a). The threats associated with climate change and rising sea level have not been evaluated, but the coastal location of plover habitat places it at risk should sea levels rise over the next several decades.

The gull-billed tern represents a threat to the snowy plover as discussed above for the least tern. At least 37 incidents of least tern and snowy plover chick predation by gull-billed terns were documented in 2003 (Patton 2004b), although the number of terns vs. plovers was not identified. In 2004, at least 44 least tern and snowy plover chicks were documented as lost to gull-billed tern depredation (Patton 2006). In 2008, a total of six incidents of snowy plover predation were documented by gull-billed terns in the San Diego Bay area. Gull-billed tern predation on the snowy plover is being address as discussed above for the least tern.

Rangewide Conservation Needs

The goal to achieve the long-term survival and recovery of the Pacific coast snowy plover population, as identified in the WSP recovery plan includes three criteria:

- (1) maintain for 10 years an average of 3,000 breeding adults distributed among six recovery units, including 500 breeding adults in Recovery Unit 6;

- (2) maintain a 5-year productivity of at least one fledged chick per male in each recovery unit in the last 5 years prior to delisting; and
- (3) establish participation plans among cooperating agencies, landowners, and conservation organizations to assure protection and management of breeding, wintering, and migration areas.

While some positive contributions have been made to achieving each of these criteria, recovery actions are still needed (71 FR 20625). Conservation needs identified in the WSP recovery plan include: monitoring; management of breeding and wintering habitat to reduce threats (e.g. disturbance, loss of natural coastal processes, predation, invasive vegetation); enhancement and creation of habitat; reduction of disturbances on nesting and wintering beaches; and public education.

San Diego Fairy Shrimp (*Branchinecta sandiegonensis*)

Listing Status

The San Diego fairy shrimp was federally listed as endangered on February 3, 1997, (62 FR 4925). In September 1998, the Service published the *Recovery Plan for Vernal Pools of Southern California* (VP recovery plan) (Service 1998). The San Diego fairy shrimp is included in this recovery plan. Critical habitat for the San Diego fairy shrimp was designated on October 23, 2000, (65 FR 63438). Critical habitat was remanded, but not vacated, by the Central District Court of California on June 12, 2002. Critical habitat was re-proposed on April 22, 2003, (68 FR 19887). Revised critical habitat for the San Diego fairy shrimp was designated on December 12, 2007 (72 FR 70648). The 2007 revised final critical habitat designation excluded lands owned or managed by the Department of Defense at NBC because of the conservation efforts for the San Diego fairy shrimp identified in the INRMP for this area. Lands at the area now referred to as SSTC-S were considered biologically essential to the San Diego fairy shrimp, but did not meet the second provision of the definition of critical habitat pursuant to section 3(5)(A)(i)(II) because of the special management and protection identified in the INRMP.

The Service completed a 5-Year Review of San Diego fairy shrimp in September 2008 (Service 2008a) and published a notice announcing the completion of the review in the *Federal Register* on March 25, 2009 (74 FR 12878). The 5-Year Review recommended no change in the status of the San Diego fairy shrimp.

Species Description

The San Diego fairy shrimp is a small freshwater crustacean in the family Branchinectidae of the Order Anostraca. The species was originally described by Fugate (1993) from samples collected on Del Mar Mesa, San Diego County. Male San Diego fairy shrimp are distinguished from males of other species of Branchinecta by differences found at the distal (located far from the point of attachment) tip of the second antennae. Females are distinguishable from females of other species of Branchinecta by the shape and length of the brood sac, the length of the ovary,

and by the presence of paired dorsolateral (located on the sides, toward the back) spines on five of the abdominal segments (Fugate 1993). Adult male San Diego fairy shrimp range in size from 9 to 16 mm (0.35 to 0.63 in) and adult females are 8 to 14 mm (0.31 to 0.55 in) long.

Distribution, Abundance and Habitat Affinity

The range of the San Diego fairy shrimp includes Orange and San Diego counties in southern California, and northwestern Baja California, Mexico (Service 1998, Brown et al. 1993). In Baja California, San Diego fairy shrimp have been recorded at two localities: Valle de Palmas, south of Tecate and Baja Mar, north of Ensenada. A single isolated female was previously reported from vernal pools in Isla Vista, Santa Barbara County, California; however, directed surveys have not located any additional individuals (62 FR 4925).

In Orange County, the San Diego fairy shrimp has been documented at Fairview Park (CNDDDB occurrence #11, 1996), Newport Banning Ranch, Irvine Ranch Land Reserve, and within the San Juan Creek watershed at Chiquita Ridge and Radio Tower Road.

In San Diego County, the species occurs in vernal pools from MCBCP, inland to Ramona and south through Del Mar Mesa, Proctor Valley, and Otay Mesa. A minimum of 246 pools on MCBCP are known to be occupied by San Diego fairy shrimp. Based on surveys of the 2,856 vernal pool basins currently mapped on Marine Corps Air Station Miramar, 1,303 are occupied by San Diego fairy shrimp (Miramar 2006). Of the 62 vernal pool complexes¹ mapped by the City of San Diego², 29 were found to be occupied by San Diego fairy shrimp and occur at the following localities: Del Mar Mesa (1), Carmel Mountain (1), Mira Mesa (6), Nobel Drive (3), Kearny Mesa (3), Mission Trails Regional Park (1), and Otay Mesa (14) (City of San Diego 2004b).

Additional vernal pool complexes with occurrences of San Diego fairy shrimp located in San Diego County but not included in the City of San Diego's Inventory include: Carlsbad, San Marcos, Ramona, Poway, Santee, Rancho Santa Fe, Murphy Canyon, Otay Lakes, Imperial Beach, East Otay Mesa, Marron Valley, NRRF, and Proctor Valley (CNDDDB Occurrence # 27, 2001).

The loss of vernal pools that have the potential to support San Diego fairy shrimp has resulted in a rangewide reduction in diversity and abundance of San Diego fairy shrimp. Urban and water development, flood control, and highway and utility projects, as well as conversion of wild lands to agricultural use, have eliminated or degraded vernal pools and/or their watersheds in southern California (Jones and Stokes Associates 1987). Historically, vernal pools covered approximately 518 sq km (200 sq mi) of San Diego County (Bauder and McMillan 1998). Approximately 95 to

¹ Vernal pool complexes are defined as a series of vernal pool groups that are hydrologically connected with similar soil types and species compositions. They were first described and surveyed by Beauchamp and Cass 1979 and subsequently updated in 1986 (Bauder) and 1998 (recovery plan).

² The City of San Diego conducted non-protocol surveys for San Diego fairy shrimp. Therefore, this inventory may under-represent the true number of vernal pools with occurrences of San Diego fairy shrimp.

97 percent of vernal pools within San Diego County have been destroyed (Bauder 1986, Bauder and McMillan 1998, Oberbauer 1990). Most of the remaining vernal pools in San Diego County occur on Redding soils, primarily on MCAS-Miramar (Service 1998).

At the time of listing, San Diego fairy shrimp were known to inhabit a minimum of 25 vernal pool complexes in coastal areas of San Diego, Orange, and Santa Barbara counties, and northwestern Baja California, Mexico (62 FR 4925). However, the names and locations of all complexes were not specified in the listing rule, and therefore, it is difficult to ascertain the status of these complexes. Currently, 137 complexes occupied by San Diego fairy shrimp have been identified in the U.S.; an additional 3 complexes that were identified as occupied at listing have since been extirpated (Service 2008a). Most of these additional complexes fall within the extant range of the San Diego fairy shrimp known at the time of listing. We expect that these additional complexes and occurrences were occupied at the time of listing, but they had not been identified due to lack of survey effort and do not represent an actual expansion of San Diego fairy shrimp distribution and range into previously unoccupied areas. Rather, they provide a better understanding of the historical distribution and range of the San Diego fairy shrimp that was unknown at the time of listing. Therefore, we estimate that the overall San Diego fairy shrimp distribution has not decreased or increased appreciably since listing. A summary of occupied vernal pool complexes is provided in Appendix 1 of the *San Diego Fairy Shrimp (Branchinecta sandiegonensis) 5-Year Review: Summary and Evaluation* (Service 2008a).

Impacts to vernal pools from development have been offset through the restoration, enhancement, and management of habitat. In some cases, due to security of the site and the active management of the vernal pools, the species status has improved. In addition, grants have been awarded to restore habitat in several areas including Otay Mesa, the San Diego NWR, and Sweetwater Authority lands. Sites that have been restored benefit from fencing and management, which further removes threats from the site that were occurring prior to the restoration efforts.

San Diego fairy shrimp are restricted to vernal pools and vernal pool-like depressions (e.g., ruts in dirt roads). Vernal pools are ephemeral wetlands that occur from southern Oregon through California into northern Baja California, Mexico (Service 1998). They require a unique combination of climatic, topographic, geologic, and evolutionary factors for their formation and persistence. They form in regions with Mediterranean climates where shallow depressions fill with water during fall and winter rains and then dry up when the water evaporates in the spring (Collie and Lathrop 1976; Holland 1976; Holland and Jain 1977, 1988; Thorne 1984).

Downward percolation of water within the pools is prevented by an impervious subsurface layer consisting of claypan, hardpan, or volcanic stratum (Holland 1976, 1988). Seasonal inundation makes vernal pools too wet for adjacent upland plant species adapted to drier soil conditions, while rapid drying during late spring makes pool basins unsuitable for typical marsh or aquatic species that require a more persistent source of water. Local upland vegetation communities associated with vernal pools include needlegrass grassland, annual grassland, coastal sage scrub, maritime succulent scrub, and chaparral (Service 1998).

San Diego fairy shrimp tend to inhabit shallow, small vernal pools and vernal pool-like depressions that range in temperature from 10° to 26° celsius (C) [50° to 79° fahrenheit (F)] They are ecologically dependent on seasonal fluctuations in their habitat, such as absence or presence of water during specific times of the year, duration of inundation, and other environmental factors that likely include specific salinity, conductivity, dissolved solids, and pH levels (Gonzalez et al. 1996, Hathaway and Simovich 1996, Holtz 2003)

Life History

San Diego fairy shrimp are non-selective particle feeding filter-feeders, or omnivores. Detritus, bacteria, algal cells, and other items between 0.3 to 100 microns (0.00001 to 0.004 in) may be filtered and ingested (Eriksen and Belk 1999). Adult fairy shrimp are usually observed from January to March; however, in years with early or late rainfall, the hatching period may be extended (65 FR 63438). Like most vernal pool fairy shrimp, San Diego fairy shrimp have a two-stage life cycle and spend the majority of their life cycle in the cyst stage (Templeton and Levin 1979, Schaal and Leverich 1981, Herzig 1985, Hairston and De Stasio 1988, Venable 1989). After hatching, San Diego fairy shrimp reach sexual maturity in about 7 to 17 days, depending on water temperature and persist for about 4 to 6 weeks (Hathaway and Simovich 1996). Fairy shrimp mate upon reaching maturity, and female San Diego fairy shrimp produce between 164 and 479 cysts (eggs) over their lifetime (Simovich and Hathaway 1997). The cysts are either dropped by the females to settle into the mud at the bottom of the pool, or they remain in the brood sac until the female dies and sinks to the bottom (Eriksen and Belk 1999). Fairy shrimp cysts may persist in the soil for several years until conditions are favorable for successful reproduction (Simovich and Hathaway 1997). The cysts will hatch in 3 to 5 days when water temperatures are between 10° and 20° C (50° and 68° F) (Hathaway and Simovich 1996). Not all cysts are likely to hatch in a season, thus providing a mechanism for survival if water quality and ponding conditions are not favorable in a given year (Simovich and Hathaway 1997, Ripley et al. 2004).

Threats

The San Diego fairy shrimp still faces the same threats that were identified in the final listing rule throughout its range. These threats can be divided into three major categories: 1) direct destruction of vernal pools and vernal pool habitat as a result of construction, vehicle traffic, domestic animal grazing, dumping, and deep plowing; 2) indirect threats which degrade or destroy vernal pools and vernal pool habitat over time including altered hydrology (e.g., damming or draining), invasion of non-native species, habitat fragmentation, and associated deleterious effects resulting from adjoining urban land uses; and 3) long-term threats including the effect of isolation on genetic diversity and locally adapted genotypes, air and water pollution, climatic variations, and changes in nutrient availability (Bauder 1986, Service 1998, Bohonak 2005).

Rangewide Conservation Needs

Based on current population trends, threats analysis, and new genetic information, the San Diego fairy shrimp has the following needs to survive and recover:

1. Vernal pool habitat should be restored and enhanced; this includes expansion of existing populations and re-establishment of populations where habitat and historical conditions are appropriate;
2. Vernal pool management plans should be developed and implemented to maintain hydrologic regimes; watershed and habitat functions; and species viability;
3. Land protection strategies should be developed to prevent further loss and fragmentation of existing habitat; and
4. Vernal pool complexes not identified in the VP recovery plan as necessary to stabilize or reclassify the population should be re-evaluated based on their genetic structure to ensure the genetic variation within the San Diego fairy shrimp population is maintained.

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 *CFR* §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions which are contemporaneous with the consultation in progress.

Since 1943, the Navy has conducted a variety of training activities in several locations on the Silver Strand and more recently has implemented natural resources programs to support these resources in a manner consistent with training requirements. Baseline training activities include: physical conditioning, force protection, mine counter measure training, amphibious operations, over the shore logistics, mission area training, and Naval special warfare. The action area for military training at the SSTC includes the following areas:

- (1) Ocean-front beaches and ocean waters adjacent to three Naval installations that are part of NBC:
 - a) NASNI,
 - b) NAB; SSTC-N, and
 - c) NRRF; SSTC-S;
- (2) Bay-front beaches identified as the California Least Tern Preserve (Delta North and Delta South, Delta Beaches);

- (3) SSTC-S Inland;
- (4) Bay-front beaches at SSTC-N, SSTC-S, and Emory Cove, bay waters from SSTC-N to SSTC-S, and the South San Diego Bay Unit of the San Diego Bay NWR;
- (5) City of Coronado Beach; and
- (6) Silver Strand State Beach.

During development of the Navy's biological assessment for training activities at SSTC, the Navy collected data on the baseline number of activities within the action area as a whole but did not provide a breakdown on the number of activities conducted in each training area (DoN 2008, Delphine Lee 2009a, Table 1). We used the information in the BA and provided during consultation to estimate the baseline number of training activities, and anticipated increases for each training area.

1.a. NASNI Ocean-front Beach and Ocean Waters

NASNI is located adjacent to the City of Coronado and was once an island north of Coronado ("North Island"). A strip of shallow water approximately 1.6 km (1 mi) long and 177 m (581 ft) wide ("Spanish Bight") once separated the two land masses, but it was filled in 1945. North Island was commissioned as Naval Air Station San Diego in 1917 and re-named Naval Air Station North Island in 1955.

NASNI Beach is approximately 27.07 h (66.9 ac) in size and lies south of the NASNI airfield. The beach extends approximately 4.43 km (2.75 mi) from Zuniga jetty to the base boundary (Figure 1). The Navy retains exclusive jurisdiction over this beach. The beach is used primarily as a recreational beach serving off-duty military personnel and their families, although it also supports a limited number of training activities included within the proposed action. Baseline training activities are identified in Table 1. The number of training activities conducted on the NASNI Beach under baseline conditions is not available.

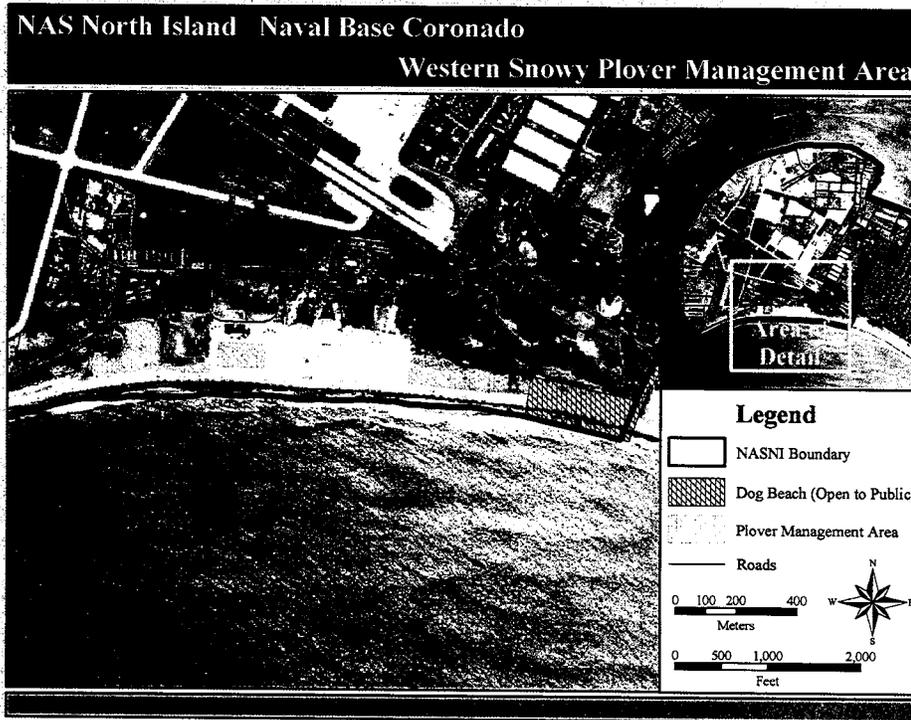
An approximately 366-m (1200-ft) long segment of beach front property of NBC is under license to the City of Coronado for public recreation. This area is approximately 4 ha (10 ac) in size and is separated from the remainder of NBC by a fence that extends from the back dunes to below the mean high tide line. Lights on the fence in between this strip of beach front and NBC illuminate this beach area at night. This beach front area supports beach habitat that would be suitable for western snowy plover or California least tern use in the absence of human and pet disturbances. The beach is currently under exclusive jurisdiction to the Navy and currently the City of Coronado cannot enforce City or State laws due to the jurisdictional status. However, the NBC and the City of Coronado are working collaboratively to give the City concurrent jurisdiction over this area. This will allow both agencies to patrol the area as security forces are available to enforce applicable federal, state and local laws or ordinances.

Under baseline conditions, the Navy discourages western snowy plover nesting and use of the NASNI airfield adjacent to the NASNI Beach due to their concern that nesting plovers could pose a Bird Airstrike Hazard (BASH) risk (FWS-SDG-3908.3). To deter nesting, the Navy destroys any nest scrapes that are initiated, actively harasses plovers from the area, and removes eggs that are laid within defined airfield boundaries. As part of this program, approximately 112 western snowy plover eggs (approximately 33 nests) have been removed from the NASNI airfield since 2004 (DoN 2009b). The harassment and deterrence of western snowy plovers from the airfield, and lack of other nearby suitable habitat, increases the importance of the NASNI Beach to plovers. Plovers that might otherwise nest within the NASNI airfield boundaries are more likely to nest on the NASNI Beach as a result of deterrence from the airfield. The Navy marks three areas of the NASNI Beach (described below) that total approximately 6 ha (14.9 ac) with blue flexi-stakes during the breeding season. The marked areas are mapped as the Western Snowy Plover Management Area (Figure 4). Each of the three small areas is in proximity to recreational activity, dogs, beach raking, and military training activities. The NASNI Beach, from Zuniga jetty to the boundary with Dog Beach, is regularly monitored to determine the status of the plovers. Plovers generally nest in the immediate vicinity of the nests from previous years, within the marked boundaries (Figure 4). In addition, foot and vehicle traffic are directed outside of the Western Snowy Plover Management Area during the plover breeding season to minimize impacts to breeding plovers from airfield activities and to improve habitat conditions.

The eastern end of the NASNI Beach (i.e., "East Breakers Beach") is adjacent to the lighted fence at Coronado Dog Beach. Intact foredunes that support approximately 4.3 ha (10.5 ac) of sand verbena/beach bursage are present between the East Breakers Beach and the adjacent Navy golf course. An area above the mean high tide line at East Breakers Beach (2.2 ha; 5.5 ac) is included as part of the Western Snowy Plover Management Area. However, dog and human footprints are routinely observed within the boundaries of this segment of the Western Snowy Plover Management Area (DoN 2009c).

The broadest portion of the NASNI Beach is midway between the eastern and western ends. This middle beach segment supports several buildings, including a hotel for Navy personnel (i.e., the Navy Lodge). The area in front of the Navy Lodge and adjacent parking lot is the primary recreational use area at the NASNI Beach. Hundreds of people stay at the Navy Lodge each year and frequent the NASNI Beach. A 1.1-ha (2.8-ac) area near the Navy Lodge is included as part of the Western Snowy Plover Management Area and despite its proximity to heavily used recreational areas, it typically supports several pairs of plovers each year. The Navy consulted with the Service in 2004 to address proposed expansion of this hotel (FWS-SDG-3908.5). When the Navy Lodge expansion is completed, the capacity of the hotel will increase from 100 rooms to 360 rooms, so the number of people using the beach is likely to increase.

Figure 4: NASNI Beach and the Western Snowy Plover Management Area



The western end of the NASNI Beach (i.e., near Zuniga Jetty, Figure 1) is characterized by a narrow beach strip that is backed by a steep slope [approximately 2-m (6-ft) high] and is fully inundated at the highest tides and during storm events. Upland fill/ruderal habitat lies adjacent to the sandy beach atop the 2-m (6-ft) slope. The western end of the NASNI Beach is signed as off-limits to foot traffic due to the potential dangers associated with its proximity to a Small Arms Range (SAR). The western end of the beach has limited habitat suitability to nesting plovers because of the narrowness of the beach and because nests can be inundated during the highest tides, especially early in the spring. Plovers do, however, attempt to nest in this area despite the narrow width of the beach. Since nests could be inundated, this area was not included as part of the Western Snowy Plover Management Area. Although this beach segment has limited value as a nesting beach in its current condition, it provides valuable foraging and roosting habitat for plovers because the area is not raked and is less frequently used for training and recreation than the adjacent beach segments. Birds that use this beach segment for foraging or roosting are subjected to less disturbance than on adjoining stretches of the NASNI Beach. People do, however, routinely disregard signs and walk on this narrow beach strip (DoN 2009a)

Under baseline conditions, NASNI Beach is subject to raking throughout the year except in the Western Snowy Plover Management Area and the western end. During the breeding season, the beach rake operators coordinate with western snowy plover monitors who check the raked area each morning prior to raking to determine if western snowy plover scrapes/nests are present in the area scheduled for raking. If plover nests are located, they are marked and avoided.

Dogs had been allowed on a segment of the NASNI Beach since 2003, and dog tracks have been routinely observed within the Western Snowy Plover Management Area boundaries (DoN 2009c). However, in recognition of its commitment to manage portions of the NASNI Beach as the Snowy Plover Management Area, the Navy has recently prohibited dogs from NASNI Beach (Tiffany Shepherd 2010).

Baseline conservation activities at NASNI Beach include ongoing intensive plover monitoring during the breeding season, extensive coordination between the plover monitors and other beach personnel (lifeguards and beach rakers), a twice monthly educational “beach bird walk” conducted by Navy Natural Resources personnel or plover monitors, predator management, and dune restoration [0.5 ha (1.2 ac)] at the eastern end/central portion of the beach). Maintenance of suitable nesting conditions for plover use of the NASNI Beach requires constant active management, since recreational use, dogs, and training activities routinely enter the areas that are designated as the Western Snowy Plover Management Area and limited habitat is available.

1.b. SSTC-N Ocean-front Beach and Ocean Waters

SSTC-N encompasses the Navy installation also known as NAB, where military training has been conducted since 1943. San Diego Bay lies on one side of the narrow beach strand, and the Pacific Ocean is on the other side. SSTC-N Beach is not fenced at the City of Coronado or the Silver Strand State Beach boundary.

The portion of the beach strand that supports SSTC-N is narrow [approximately 0.4 to 0.8-km (0.25 to 0.5-mi) wide]; however the beaches are relatively wide, extending approximately 150 to 200 m (492 to 656 feet) above the mean high tide line (Figure 1). The SSTC-N Beach is approximately 112.5 ha (277.8 ac) and extends approximately 4.5 km (2.8 mi) from Coronado Beach to Silver Strand State Beach (Figure 1). The Navy leases this beach from the State of California for training use and retains jurisdiction to the mean high tide line as surveyed in 1948 (now inundated). The beach is used as a military training beach. Baseline training activities include: physical conditioning, force protection, mine counter measure training, amphibious operations, over the shore logistics, mission area training, and Naval special warfare. Estimates of baseline activities at STTC-N Ocean-front Beach and Ocean Waters are shown in Table 5. Activities listed in Table 5 are the components of the various numbered training exercises included in Table 1.

Table 5: Estimated Baseline Annual Activities at the SSTC-N Oceanside Beach and Boatlanes

Activity	Baseline Total Annual Events including SSTC-N Beach and Ocean and SSTC-S	Baseline SSTC-N Beach and Ocean Annual Events*	Baseline SSTC-N Beach and Ocean Events Between from April through July
Beach Party Teams	204	204	68
MCM Beaching	32	3	1
Beach Camps	1	1	0-1
Equipment Offload/Stage	2	2	0-1
Causeway/ ELCAS	12	10	3
LCAC Landing	4	4	1
Beach Crossing and OTB	432	216	72
Raids	60	30	10
Foot Patrol and Ambush	60	70	23
Vehicle Patrol	139	1	0-1
Observation Post	50	50	17
Reconnaissance	152	152	51
Logistic and Safety Vehicles	2275	1706	568
Running	948	853	284
Manual Excavation	68	61	20
Visual Observations	156	78	26
SSTC-S Off road Foot	422	0	0
Total	5017	3441	1147

* Based on percent of activities in SSTC-N included in Navy model

** The percentage of activities anticipated at SSTC-N represents a “worst-case scenario” percentage breakdown with training activities biased towards SSTC-N Beach lanes.

SSTC-N supports approximately 112.5 ha (277.8 ac) of southern foredune/beach, including 94 ha (232.5 ac) of beach, and 18.3 ha (45.3 ac) of coastal dunes. Foredunes arise along the coast where sandy beaches occur and where coastal headlands are absent. Dune size and shape typically vary and are mostly dependent on wind speed and direction. Plants found here are generally prostrate and have long taproots, with many succulents. A band of mostly non-native vegetation, predominantly iceplant (*Carpobrotus sp.*) is found on the eastern edge of the foredunes at SSTC-N. A 5-7 m (15-21ft)-wide unvegetated “sand road” lies beyond this band of non-native vegetation. This sand road facilitates linear off-highway movement of traffic and personnel. State Highway 75, which is the main road that runs along the Silver Strand, defines the northeastern boundary of the action area at SSTC-N (Figure 1).

The SSTC-N action area is divided into 10 ocean training boat lanes, which are each 457-m (500-yd) wide and 3,657-m (4,000-yd) long, overlapping some of the NOAA-established anchorages (numbered 101-178) (Figure 1). These boat lanes are numbered (1-10). As the boat lanes meet the shore, they are referred to as beach lanes and are identified by color, with each colored beach lane measuring 914-m (1,000-yd) wide and divided into two 457-m (500-yd) subsections (Yellow 1, Yellow 2, Red 1, Red 2, etc.). Together, the 10 SSTC-N boat lanes and beach lanes extend 4,570 m (5,000 yd) along the beachfront and extend offshore 3,657 m (4,000 yd). The name and approximate area of each of the SSTC N Beach Lanes is provided in Table 6.

Table 6: Area of SSTC N Beach Lanes Above the Beach Crest

Lane	Yellow1	Yellow2	Red 1	Red 2	Green 1	Green 2	Blue 1	Blue 2	Orange 1	Orange 2	Total
Area ha	1.1	4.79	6.55	5.90	5.88	6.27	4.97	5.96	5.66	4.82	51.92
(ac)	(2.74)	(11.83)	(16.19)	(14.59)	(14.52)	(15.50)	(12.29)	(14.73)	(13.99)	(11.91)	(128.29)

*data obtained from DoN 2005.

The State of California (State) owns the land that supports SSTC-N and leases it to the Navy for military training under lease number PRC 6110. The current lease expires on August 31, 2021. Based on the language of the lease, Navy jurisdiction extends from Highway 75 to the 1948 mean high tide line, which is now completely submerged. Thus, Navy jurisdiction now includes the entire beach, including submerged lands. The ocean waters that support the boat lanes of SSTC-N are under State jurisdiction but, with the exception of any submerged land above the 1948 mean high tide line, are not subject to a lease.

The frequency of military use of the SSTC- N has varied considerably through time. Upon request, military training units are assigned to one or more boat lanes and/or beach lanes to conduct various training activities. Many of the training activities take place primarily on the hard packed sand portion of the beach lanes below the mean high tide line, or even mostly within the water. However, some activities involve foot traffic, vehicle traffic, or operation of heavy equipment above the mean high tide line in the beach lanes, and some activities require foot traffic or vehicle movement from the wave washed section of the beach to the sand road adjacent to Highway 75. A beach lane that is suitable for a particular training activity may not be suitable for a different activity, depending on the water depth and bathymetry of the adjacent boat lane, distance from berthing and other facilities, and accessibility for equipment. A permanent demolition pit primarily used by Naval Special Warfare is located in the northern end of Blue 1 Beach Lane. Since 1994, a pattern of lane use has evolved, due to the preference of training units for particular areas, the distribution of California least terns and western snowy plovers, and Navy efforts to minimize impacts to these species.

The beach lanes Green 1, Green 2, and Blue 1 sustain the highest level of training use under baseline conditions. These lanes are closest to an access point off of Highway 75, support a demolition pit, and sustain in-water conditions conducive to large-scale amphibious operations (i.e., those that involve offloading, heavy vessels coming ashore, etc.). The Navy has modified topography within beach lanes Green 1 and Green 2 (Figure 5) in an effort to discourage nesting

in these lanes (FWS-SDG-3452.3). The strategy appears to discourage tern and plover use of these areas.

Figure 5: Modified Topography in SSTC-N Beach Lanes Green 1 and Green 2



Due to changes in training needs and changing numbers and distribution of the least tern and snowy plover on the SSTC-N beaches, the Navy has re-initiated consultation on proposed training and associated conservation strategies every 1 to 3 years at SSTC North since 1994. (Appendix B). Strategies that have been used at SSTC-N to reduce the effects of military training activities on the least tern and snowy plover have included:

- (1) Marking and avoidance of California least tern nests and snowy plover nests.
 - Between 1994 and 2000, the Navy coned off the area where least terns had begun nesting (primarily in Beach Lane Green 2). They also marked all least tern nests detected on the beach at SSTC-N with stakes and avoided the nests during training activities or moved nests out of harm's way. This measure provided maximum protection for the least tern, but it became an encumbrance to training activities as the number of tern nests on the beach increased. The Navy marks plover nests with a 9.1-m (30-ft) buffer and avoids these areas.

- (2) Marking of "beach crossing lanes" to facilitate movement of people and equipment from hard packed sand areas to the sand road.
 - Between 2001 and 2003, the Navy avoided least tern nests by avoiding large areas of beach where the birds were nesting and conducted training activities on the hard packed sand or below the beach crest. To allow movement of people and equipment over the beach without crushing nests or eggs, the Navy marked "beach crossing lanes" with white stakes and green flagging for the length of the lane and allowed travel from below the beach crest to the sand road on the beach crossing lanes only. If tern or plover nests were detected within the beach crossing lanes, they were moved from the lane to adjacent habitat to reduce the potential for people and equipment to crush the nests. The use of beach crossing lanes has continued into the present to allow for troop movement across the portion of the beach where tern nests are marked and avoided.

- (3) Detering adult terns and taking eggs into captivity.
 - In 2002, the Navy conducted daily beach raking on beach lanes Green 2 and Blue 1 to discourage birds from nesting in these beach lanes. Despite regular raking, birds continued to construct nest scrapes and lay eggs in these beach lanes. The Service authorized the Navy to remove tern and plover eggs that were laid in beach lanes Green 2 and Blue 1 in conjunction with the Navy proposal to protect tern and plover nests in other beach lanes. Approximately 100 California least tern eggs were removed from these beach lanes over the course of 2 years and taken to a local wildlife rehab center for captive rearing, banding, and release. No birds that were released into the wild as part of this management strategy have been subsequently observed. Based on Navy staff observations, terns continued to attempt to nest within the beach lanes, despite repeated raking (Conkle 2007).
- (4) Removal of predators from all nest sites within the action area.
 - In 1988, the Navy initiated predator management activities to protect the Delta Beaches. This management activity was extended to the SSTC-N oceanfront beaches in 1996.
- (5) Education of the general public and providing security measures to reduce unauthorized uses of the action area.
- (6) Protection of beach lanes on the SSTC-N beach for nesting birds and training without avoidance measures elsewhere on the SSTC-N beach.
 - From 2003-2005, the Navy marked and avoided four beach lanes at SSTC-N (i.e., Green 1, Blue 2, Orange 1, and Orange 2) to provide a protected area for California least terns and western snowy plovers. Protected lanes were intended to minimize the impact of the potential incidental take associated with training activities elsewhere on the SSTC beaches. Green 1 was protected because it supported a large number of tern nests, and Blue 2 and Orange 2 were protected because these lanes were farther from facilities and received less use requests. The Navy tried discontinuation of predator management as a means of deterrence for terns and plovers nesting on the beach in 2004, but lack of predator management increased nest loss without changing relative distributions, and management was therefore re-initiated in 2005.

The most recent comprehensive biological opinion (FWS-SDG-3452.3) on training and natural resource management strategies that defines the environmental baseline at SSTC-N was finalized in 2005. In accordance with this opinion, the Navy reduced the size of the area protected for least terns and snowy plovers to accommodate the projected training need, and currently conducts training activities during the breeding season within seven of the ten beach lanes at SSTC-N and protects three of the beach lanes (i.e., Blue 2, Orange 1, and Orange 2) for terns and plovers. These three beach lanes are marked with blue stakes and are not scheduled for training activities during the breeding season. These lanes are less desirable for most types of training due to the distance from infrastructure and facilities, as well as the marine conditions directly off

shore from the lanes. The Navy identifies beach crossing lanes to facilitate movement of equipment and personnel across protected beach lanes. In addition, the Navy conducts conservation measures within the boundaries of SSTC- N, including: (1) predator management at all nest sites; (2) annual nest site preparation; (3) modification of the beach to create hummocks (Figure 5) to deter terns and plovers from nesting in intensively used lanes Green 1 and Green 2; (4) scheduling efforts to avoid beach lanes with higher nest numbers; (5) marking and avoidance of established western snowy plover nests; (6) public outreach to military residents of adjacent housing; and (7) limited enforcement of range boundaries.

Protection of a beach segment that supports a significant percentage of the least tern population on the SSTC-N beaches has justified the absence of avoidance measures for the least tern elsewhere on the training beach and provided increased realism in training to the troops. The Service recommended that the Navy continue this management strategy to support future training needs and provide conservation for the least tern and snowy plover at SSTC (FWS-SDG-3452.3).

Like the other beaches included within the action area, SSTC-N experiences unauthorized recreational use under baseline conditions. SSTC-N is across Highway 75 from military housing and is also close to Coronado Cays residential development. People cross Highway 75 to use the beach area at SSTC-N, or walk along the beach from Silver Strand State Beach (to the south) or Coronado and NAB (to the north), and have entered into least tern nesting areas. During July 4th weekends, people routinely ignore signage and walk onto the beach to watch the City of Coronado fireworks display. Although some marking is present at both ends of the beach and a guard is periodically stationed at the north end to keep non-military civilians out, under baseline conditions, enforcement of base boundaries is irregular and is not effectively controlling public uses. Under baseline conditions, the Navy does not have jurisdiction to enforce leash laws or regulations pertaining to trespass, which reduces the effectiveness of security personnel. In addition, too few security staff are on duty to allow them to respond to calls pertaining to dog issues or trespass (Shepherd 2010). Maintenance of suitable nesting conditions for least terns and snowy plovers may require improvements in enforcement to minimize disturbances at SSTC-N in areas where nesting, roosting, and foraging occur.

1.c. SSTC-S Ocean-front Beach and Ocean Waters

SSTC- S is located at the southern end of the Silver Strand and includes the beach as well as an inland area. SSTC-S lies to the south east of Silver Strand State Beach and northwest from the City of Imperial Beach (Figure 1). SSTC-S Beach is not fenced at the Imperial Beach or the Silver Strand State Beach boundary.

SSTC-S Beach is approximately 31.5 ha (77.9 ac) in size and extends approximately 2.7 km (1.7 mi) from Silver Strand State Beach to Imperial Beach. The Navy retains exclusive jurisdiction over this beach down to the mean high tide line. The beach below mean high tide line is administered by the State Lands Commission, as are most beaches in California. No signage or markers delineate the boundary between the beach administered by the State Lands Commission

and the beach administered by the Navy. SSTC-S Beach is used primarily as a military training beach, while the area below mean high tide line receives frequent use by recreational hikers and dog walkers. Baseline training activities include physical conditioning, force protection, mine counter measure training, amphibious operations, mission area training, and Naval special warfare. Estimates of baseline activities at SSTC-S Beach are shown in Table 7. Activities listed in Table 7 are the terrestrial components of the numbered training exercises included in Table 1.

Habitat at SSTC-S Beach includes approximately 17.6 ha (43.5 ac) of beach and 13.9 ha (34.4 ac) of sand verbena-beach bursage series plant community. Since Highway 75 is not visible from most of the SSTC-S Beach, this beach is relatively secluded from the surrounding urban environment. The beach is, however, subject to frequent unauthorized recreational use. People enter the beach from Imperial Beach, to the southeast, and from Silver Strand State Beach, to the northwest. Based on accounts presented at breeding season meetings and weekly reports prepared for the Navy, recreational trespass onto the Navy lands and use of the adjacent intertidal beach (State Lands) creates a significant disturbance that may affect the potential for plover nesting or nest success. Under baseline conditions, enforcement of base boundaries is irregular and is not effectively controlling public uses. Under baseline conditions limitations in the number of on duty security personnel reduces their ability to respond to calls pertaining to dog issues or trespass (Shepherd 2010). Maintenance of suitable nesting conditions for terns and plovers may require improvements in enforcement to minimize disturbances at SSTC-N in areas where nesting, roosting, and foraging occur.

SSTC-S Beach includes 18.2 ha (45 ac) leased by the Navy to the Young Men's Christian Association (YMCA) for use as a recreational camping facility for youth. The leased area includes the southern portion of the SSTC-S Beach, as well as a fenced inland area. The facility, known as Camp Surf, serves many day and overnight campers each year. Recreational use of the Camp Surf Beach occurs under baseline conditions and is expected to continue at levels that are likely to preclude least tern or western snowy plover nesting.

The SSTC-S Beach north of Camp Surf (Figure 1) is divided into four ocean training boat lanes, which are each 457-m (500-yd) wide and 3,657-m (4,000-yd) long. These boat lanes are numbered (11-14). As the boat lanes meet the shore, they are referred to as beach lanes and are identified by color, with each colored beach lane measuring 914-m (1000-yd) wide and divided into two 457-m (500-yd) subsections (White 1, White 2, Purple 1, Purple 2). Together, the four SSTC-S boat lanes and beach lanes extend 1,828 m (2,000 yd) along the beachfront and extend offshore 3,657 m (4,000 yd). The approximate area of each of the SSTC-S beach lanes is provided in Table 8. The beach at SSTC-S has been described as a narrower beach with a shallow entry from the water, when compared to the SSTC-N beaches, with numerous sand bars located offshore (DoN 2008, Delphine Lee, 2009b).

Table 7: Estimated Baseline Annual Activities at SSTC-S Beach**

Activity	Baseline Total Annual Activities, including SSTC-N, SSTC-S, NASNI, and Bayside*	Baseline SSTC-S **Annual Activities	Baseline SSTC-S Activities from April through July***
Beach Party Teams	204	0	0
MCM Beaching	32	29	10
Beach Camps	1	0	0
Equipment Offload/Stage	2	0	0
Causeway/ ELCAS	12	0	0
LCAC Landing	4	0	0
Beach Crossing and OTB	432	216	72
Raids	60	30	10
Foot Patrol and Ambush	60	69	23
Vehicle Patrol	139	0	0
Observation Post	50	0	0
Reconnaissance	152	0	0
Logistic and Safety Vehicles	2275	569	187
Running	948	95	32
Manual Excavation	68	7	2
Visual Observations	156	78	26
SSTC-S Off-road Foot	422	422	141
Total	5017	1002	334

* Information from Table 1

** Explicit data regarding the baseline or proposed number of activities for SSTC-S was not provided to the Service for analysis, thus, the data in this table is based on an assumption that SSTC-S would host all activities that did not occur at SSTC-N. Data was provided regarding the percentage of each type of terrestrial activity that was conducted at SSTC-N vs. all other areas. The numbers presented in this table are based on the assumption that the training activities that did not occur at SSTC-N would occur at SSTC-S. Accordingly, the table provides only rough estimates of baseline and proposed levels of activity. *The percentage of activities anticipated at SSTC-N represents a "worst-case scenario" percentage breakdown with training activities biased towards SSTC-N Beach lanes.*

*** This number is based on the assumption that training events will be conducted at a constant rate throughout the year.

The Navy implements conservation measures on the SSTC-S Beach, including: (1) marking and avoiding western snowy plover nests at SSTC-S; and (2) predator management.

Table 8: Area of SSTC-S Beach Lanes Above the Beach Crest.*

Lane	White 1	White 2	Purple 1	Purple 2	Total
Hectares	5.8	5.3	4.8	4.1	20.0
(ac)	(14.53)	(13.18)	(11.88)	(10.08)	(49.67)

*data obtained from DoN 2005.

2. Delta Beaches

Delta Beach lies across Highway 75 from the SSTC-N beaches, on the shore of San Diego Bay (Figure 1), and is flanked by Fiddler’s Cove Marina to the south and NAB to the north. The area was created from dredge fill and extends approximately 1,829 m (2,000 yd) along the bayside of the Silver Strand. Delta Beach is divided into North Delta Beach (Delta Beach-N) and South Delta Beach (Delta Beach-S), which are separated by an expansive intertidal mudflat with saltmarsh vegetation. A chain-link fence separates Delta Beach from Highway 75.

The 30.4-ha (75-ac) Delta Beaches were officially designated as the California Least Tern Preserve upon completion of a Memorandum Of Understanding (MOU) in 1984 (March 12, 1984, *Memorandum of Understanding between the U.S. Fish and Wildlife Service and the U.S. Navy relating to the Description and Management of a Preserve for the California Least Tern on Naval Amphibious Base Coronado*), to partially offset the loss of 25.7 ha (63.5 ac) of nesting area associated with the construction of the LAMPS MK III project at NASNI (Biological Opinion 1-1-82-F-123). Delta Beaches received additional management commitment from the Navy in 1987 when the Service and the Navy signed another MOU to establish standards and conditions for Navy in-water construction activities conducted in San Diego Bay. Under specifications of the MOU, the Navy intensified management of least tern colonies on Naval facilities to offset the impacts to the tern from Navy in-water construction projects. Active management of the Delta Beaches for least tern nesting has included extensive biological monitoring, beach sand deposition, grading and invasive plant species control, protection of sensitive plant species, installation of chick shelters and gull-billed tern deterrent wickets, and predator control. The MOU is currently under revision, and the Navy and Service are operating under the tenets of the existing MOU until the revision is complete.

The habitat included within the California Least Tern Preserve includes areas that have been enhanced for tern and plover use, primarily via active sand deposition and vegetation/weed removal. The 1984 MOU indicated that the Navy was going to develop a management plan for this site, but a specific written plan has not been developed. The Navy has, however, continued to implement management actions at the site, including site preparation, predator management, and monitoring, and has included these measures within the NBC INRMP. While least tern use of the site has increased as the species’ status has improved, snowy plovers have rarely used the site.

Delta Beach-N was created in the late 1970s/early 1980s from dredge spoils from an unidentified location, and Delta Beach-S was created from dredge spoils removed from beneath Navy ships at

Naval Base San Diego in 1966 (DoN 2009d). Delta Beach-S is included on the Navy's list of Munitions Response Program (MRP) sites as NAB Coronado MRP Site 5. The area has potential contamination associated with the dredge spoils used to create the site, as well as known presence of munitions and possibly unexploded ordnance. The status of this site as an MRP site had not been mentioned in previous biological opinions or in the MOU that established the California Least Tern Preserve. Under the MRP, the Navy recently conducted a Site Inspection that found exposed munitions on the site, including a 20-mm cartridge case found in the corridor used by Navy SEALs (DoN 2009). Evaluation of the site and the need for remedial measures is underway as part of the MRP. The site had originally been capped with approximately 1.5 m (1.8 yd) of sand from an unknown source (DoN 2009d). Sand loss has apparently occurred along the shoreline, resulting in some of the exposed ordnance detected in the 2009 surveys. Potential impacts of contaminants to birds nesting on this site are unknown. However, no organic explosive contaminants were detected in the site soils and an ecological risk assessment is currently being conducted. Although the Navy would conduct any remediation activities outside the breeding season, some uncertainty is introduced regarding the suitability of the site as a preserve for the least tern because of the future remediation activities that may be necessary.

3. SSTC-S Inland

SSTC-S Inland is immediately adjacent to the SSTC-S Beach, where the coastal strand joins the mainland (Figure 1). This facility includes the large "Wullenweber" circular antenna, which was used until 1999 to provide primary communication links for the Navy's submarine community. The northern part of the 182 ha (450-ac) facility provides a city-like layout of the base that provides a realistic site for urban warfare training. SSTC-S Inland is completely fenced, and a manned guard gate provides security for this installation.

The non-native iceplant is the predominant vegetation in the northern part of the installation. The southern part of the site is less developed and supports California annual grassland plant communities, maritime succulent scrub, vernal pools, and marsh communities. Baseline training activities at SSTC-S inland include: helicopter rope suspension, parachuting, mine neutralization, amphibious raids, pyrotechnics use, and breacher training (Table 1).

A current conservation objective for the SSTC-S Inland area, as stated in the NBC INRMP, is to "conserve the San Diego fairy shrimp through proper management of vernal pool habitat" (U.S. Navy 2002). The INRMP indicates that the Navy posts the vernal pool area with signs on the high ground around the perimeter to inform personnel of the presence of the vernal pool complex in the low area inside the perimeter and seeks opportunities to restore vernal pool habitats that have been disturbed (U.S. Navy 2002, p.4 - 48). The Navy has not implemented the signage described in the INRMP (Vissman, pers. Obs 2010), however current conservation activities at SSTC-S Inland include avoidance of all offroad travel (foot traffic or vehicle) within the southern portion of the fenced facility to avoid impacts to vernal pools, monitoring and control of invasive plant species, and periodic surveys to detect San Diego fairy shrimp. Portions of the installation are also identified in an MOU with the Service as a prospective mitigation bank for Navy projects elsewhere; however, the Navy intends to terminate this MOU (Tiffany Shepherd,

2009a). Under current conditions, emergency and security vehicles infrequently use the unpaved roads at SSTC-S Inland.

4.a. SSTC-N Bay-front Beach and Bay Waters

SSTC-N includes five bayside beach training lanes and eight boat lanes within San Diego Bay (Figure 1). The types of training conducted in San Diego Bay under baseline conditions include: small boat handling, navigation, swimmer conditioning, amphibious warfare activities, hydrographic reconnaissance, parachuting, helicopter flights, and transit of larger craft to the ocean training lanes. Estimates of baseline activities at SSTC-N Bay-front Beach and Bay Waters are shown in Table 1. Under baseline conditions, approximately 100 to 150 helicopter sorties per year are flown over the SSTC-N bay side boat lanes as helicopters transit from NASNI/NAB to SSTC-S (Latta 2010). In addition, an unidentified number of helicopter sorties are flown from NASNI to NOLF IB, which lies south of the action area.

The bayside shoreline in this area is not currently managed for botanical or other biological resources, although recent discovery of a federal candidate plant species, Brand's phacelia (*Phacelia stellularis*), in this area has resulted in initiation of evaluation of the resources within this area. Plant communities present include upland fill ruderal habitat and upland transition habitat. The Navy Natural Resources Office plans to include management of this area in subsequent revisions of the NBC INRMP.

Conservation actions within San Diego Bay include Navy support of a foraging study to identify important California least tern foraging locations.

4.b. SSTC-S Bay-front Beach and Bay Waters

The action area includes the bay-front beach and bay waters that extend from SSTC-N, over the South San Diego Bay Unit of the San Diego Bay National Wildlife Refuge (NWR), to SSTC at Emory Cove (Figure 1, 1.a). Emory Cove is adjacent to the South Bay Biological Study Area and the South San Diego Bay Unit of the San Diego Bay NWR. A small segment of SSTC-S extends into Pond 11 of the NWR.

The routes of helicopter travel from NASNI/NAB to SSTC-S Inland lie within the boundary of the South San Diego Bay Unit of the San Diego Bay NWR and the Chula Vista Nature Preserve. The NWR was established to protect, manage, and restore habitats for federally listed endangered and threatened species and migratory birds and to maintain and enhance the biological diversity of native plants and animals. The South San Diego Bay Unit includes approximately 405 ha (1,000 ac) of open bay that are within the action area along the west side of the Bay from Sweetwater Marsh south to Emory Cove and along the northern edge of the existing salt pond complex (Service 2006e). The NWR also includes dikes and solar salt evaporation ponds at the south end of the bay, some of which lie outside the action area, and the western end of the Otay River floodplain.

The American Bird Conservancy has designated the South San Diego Bay Unit as a Globally Important Bird Area due to the presence of globally significant numbers of nesting gull-billed terns and continentally significant numbers of surf scoters, Caspian terns, and western snowy plovers. The entire southern end of San Diego Bay, including the Sweetwater Marsh and South San Diego Bay Units, has also been recognized as a Western Hemisphere Shorebird Reserve Network Site. Through a partnership of Federal, State, and local agencies and several non-governmental organizations, approximately 121 ha (300 ac) of coastal habitat will be restored and/or enhanced in south San Diego Bay in 2010/2011. One component of the coastal restoration project is planned for 2010/2011 adjacent to the action area, where 94 ha (233 ac) of existing salt ponds, located along the eastern edge of SR-75, will be restored to tidally influenced coastal wetlands. Habitat proposals in the restored ponds include cordgrass-dominated salt marsh habitat to support the federally listed endangered light-footed clapper rail and subtidal habitat to expand foraging opportunities for the least tern (Service 2006e).

The portion of the NWR that lies within the action area provides foraging and roosting habitat for a variety of migratory birds. Least tern foraging within this portion of the action area is likely. Nesting habitat for a variety of ground nesting birds, including the least tern, snowy plover, and six other tern species, some of which only nest in a few locations in the United States, lies within the boundaries of the NWR, but outside the action area.

The waters in the southern portion of San Diego Bay are very shallow and a channel within Emory Cove extends to the bayside shoreline, adjacent to SSTC-S. The southern shore of Emory Cove supports pickleweed (*Salicornia sp.*) marsh within the boundaries of SSTC-S. Training activities within and adjacent to Emory Cove include helicopter travel over the cove (Figure 1a), small boat travel up the channel to the beach, and maneuvers from the beach across Highway 75. Estimates of baseline activities at SSTC-S Bay-front Beach and Bay Waters are shown in Table 1.

5. City of Coronado Beach

The City of Coronado Beach, like the other beaches along the Silver Strand, has physical characteristics suitable for western snowy plover use (Figure 1). The beach supports a back dune system that has been groomed in some areas and cultivated with non-native plant species (i.e., ice plant). Like Coronado Dog Beach, this beach is regularly groomed, and no management to benefit snowy plovers has been implemented. The beach is approximately 1.6-km (1-mi) long, 120 ha (296 ac) in area, and supports millions of beach visitors each summer. A single roosting plover has been reported during winter window surveys (Service 2007b); however, there are no recent records of nesting plovers on the City of Coronado Beach. It is likely that the level of disturbance and reduction in prey availability from beach grooming have affected the potential for this beach to support plover nesting or substantial roosting without active management directed at disturbance minimization and retention of beach wrack in some areas. A nest scrape was detected on the City of Coronado Beach in April 2009 (Elizabeth Copper 2009a).

The Coronado Municipal Beach is affected by Navy training to the extent that some training activities (i.e., running along the beach, swimming) occur in a linear fashion along the beach, primarily for training activities to go from NASNI Beach to SSTC-N. The number of training activities conducted on the NASNI Beach under baseline conditions is not available. However, Navy activity on this beach is expected to be a minor component of the already intensive use by recreational visitors.

6. Silver Strand State Beach

Silver Strand State Beach, located between SSTC-N and SSTC-S, extends 4 km (2.5 mi) along the shore and encompasses 34.4 ha (85 ac) of beach and dune habitat (Figure 1). Silver Strand State Beach is administered by California State Parks and broadly divided into: the northern portion, which supports RV camping and parking lots for day visitors and holds several facilities; the southern portion, which is designated as the Silver Strand Natural Preserve; and the eastern portion on the San Diego Bay, separated from the ocean by Highway 75 but connected through a series of tunnels. California State Parks also manages an Underwater Park, constituting approximately 29,137 ha (7,200 ac) of off-shore aquatic area directly contiguous with the beach and dune area.

In the northern end of the State Beach, there are four large paved parking lots that provide access to RV campers and day campers. The parking lots are close to the high tide line. Approximately 130 RV camping spots are located at the northernmost parking lot, adjacent to the southern end of SSTC-N. Approximately 15,000 vehicles per month entered Silver Strand State Beach during summer 2008 (Chris Peregrine, 2009). Other facilities in this portion include a four-storied lifeguard headquarters building, a small concessions stand, and several restrooms.

The eastern portion of Silver Strand State Beach on San Diego Bay is largely undeveloped but also holds an aquatic complex facility managed by Southwestern Community College and California State Park maintenance facilities. The aquatic complex is set on Crown Cove and runs a series of classes and recreational activities associated with non-motorized boating. The State Park maintenance facility lies to the south and serves as the primary maintenance headquarters for the State Beach. Portions of the undeveloped region are used for over-night camping with special-use permits. This eastern portion supports a unique bay-side vegetation association including rare plants such as: Nuttall's lotus, Brand's phacelia, coastal wooly-heads, Lewis's evening primrose (*Camissonia lewisi*), and off-shore eel-grass beds. The area supports a diverse bird assemblage including nesting killdeer (*Chardrius vociferous*) and horned larks (*Eremophila alpestris*). State Parks manages approximately 29.5 ha (73 ac) in this region.

The southern portion of the State Park-managed area is designated as a State Natural Preserve and supports southern foredune vegetation and lies adjacent to SSTC-S. Since this area is farther from the large parking areas and RV park, it receives significantly less recreational use. This southern portion, or Natural Preserve, holds approximately 16.6 ha (41 ac) of the beach above the mean high tide and foredune. This area is marked with symbolic fencing and signage year-

round to discourage foot traffic in the sand dunes. Predator management activities are also supported by State Parks to protect the western snowy plover at this location.

Silver Strand State Beach lies outside of Navy jurisdiction; however, it is used for military training activities that require linear travel along the beach from SSTC-N to SSTC-S as well as activities that occur on the bay and traverse through the tunnels to the ocean. The specific number of training activities conducted on the Silver Strand State Beach under baseline conditions is not available; however, they are typically periodic in nature and mostly associated with Navy BUDS training events. Navy activity on this beach is expected to be a minor component of the already intensive use by recreational visitors.

Several small signs mark the boundary between Silver Strand State Beach and the southern end of SSTC-N. The signs are located well above high tide, and most of the foot traffic occurs closer to the water where the signs are not evident. Consequently, a significant amount of unauthorized foot traffic enters SSTC-N from Silver Strand State Beach. The Silver Strand State Beach web site (www.parks.ca.gov) has listed the SSTC-N Beach as a hiking trail, which likely contributed to the number of civilian beachgoers who strayed onto SSTC-N and inadvertently disturbed nesting terns and plovers. During consultation, the SSTC-N Beach was removed from the State Park web site, but reference to this area as a hiking trail remains available to the public on a variety of internet web sites. Additionally, a significant portion of the dogs that are noted on Silver Strand State Beach during avian monitoring arrive from SSTC-S as a result of beach users and their dogs walking north from the City of Imperial Beach (DoN 2009a). Dogs are not allowed on Silver Strand State Beach and the Natural Preserve.

The California State Parks and California State Parks Foundation have entered into a partnership with the Loews Coronado Bay Resort, which is located across Highway 75 from the State Beach. As part of the partnership, State Parks rakes a segment of the Silver Strand State Beach to make the beach more appealing to the clients of the Loews Coronado Bay Resort. Loews also contributes funds collected by assignment of a 1-percent room fee to the Silver Strand State Parks Foundation for conservation of beach resources.

Terrestrial Plant Communities and Cover Types

The action area lies within the south coast subdivision of the California Floristic Province. The terrestrial plant communities within the action area are provided in Table 9 (DoN 2008).

Table 9: Terrestrial Plant Communities and Cover Types in the Action Area.*

Plant Community	NASNI		SSTC North (NAB Coronado)		SSTC South (NRRF)		TOTALS	
	Acres	Ha	Acres	Ha	Acres	Ha	Acres	Ha
Diegan coastal sage scrub^H					15.1	6.1	15.1	6.1
California buckwheat series ^S					2.7	1.1	2.7	1.1
California sagebrush series ^S					7.7	3.1	7.7	3.1
Coyote brush series ^S					4.7	1.9	4.7	1.9
Maritime succulent scrub^H					7.3	3.0	7.3	3.0
California Annual Grasslands^S					125.5	50.8	125.5	50.8
Upland transition			90.0	36.4			90.0	36.4
Southern foredune/beach^O	95.3	38.6	277.8	112.5	77.8	31.5	450.7	182.4
Beach ^O	83.6	33.8	232.5	94.1	43.5	17.6	359.6	145.6
Sand verbena-Beach bursage series ^S	10.5	4.3			34.4	13.9	44.9	18.2
Disturbed coastal dune ^O			45.0	18.2			45.0	18.2
Dune restoration ^O	1.2	0.5					1.2	0.5
Vernal pools^O					3.2	1.3	3.2	1.3
San Diego Mesa vernal pools ^H					3.2	1.3	3.2	1.3
Water^O	1.1	0.4	20.8	8.4	9.0	3.6	30.8	12.4
Unvegetated channel ^O	1.1	0.4					1.1	0.4
Freshwater pond ^O					0.8	0.3	0.8	0.3
Open water			20.8	8.4	8.2	3.3	29.0	11.7
Freshwater marsh^H	0.1	0.1			3.3	1.3	3.4	1.4
Cattail series ^S	0.1	0.1					0.1	0.1
Bulrush-Cattail series ^S					0.9	0.3	0.9	0.3
Spikerush series ^S					2.4	1.0	2.4	1.0
Coastal salt marsh^H	0.2	0.1	13.8	5.6	56.7	22.9	70.7	28.6
Pickleweed series ^S					55.4	22.4	55.4	22.4
Salt grass series ^S	0.2	0.1					0.2	0.1
Pickleweed-saltgrass series ^S					1.3	0.5	1.3	0.5
Landscaped^O	140.7	57.0					140.7	57.0
Eucalyptus woodland ^S	16.6	6.7					16.6	6.7
Ornamental vegetation ^O	28.7	11.6					28.7	11.6
Golf course ^O	95.5	38.7					95.5	38.7
Developed, Ruderal, or Other^O	2273.9	920.6	404.8	163.9	283.3	114.7	2962.0	1199.2
Ruderal habitat ^O	365.4	147.9	34.8	14.1	42.7	17.3	442.9	179.3
Iceplant ^S					165.1	66.8	165.1	66.8
Urban/developed lands ^O	1881.4	761.7	370.0	149.8	75.5	30.6	2326.9	942.1
Riprap ^O	6.8	2.7					6.8	2.7
Least tern nesting (MAT) site ^O	20.3	8.2					20.3	8.2
Totals	2532.1	1025.1	786.1	318.3	572.9	231.9	3891.1	1575.3

* Sources For This Data Include RECON 2004 and 2005 and DoN 1982 and 1998. (Two Different vegetation classification systems have been used in the action area, Holland [1986] and Sawyer and Keeler-Wolf [1995])

Vegetation Classification Systems: ^H Holland, ^S Sawyer & Keeler-Wolf, ^O Other types not classified by either system.

Integrated Natural Resources Management Plans

The Sikes Act (16 U.S.C. 670) authorizes the Secretary of Defense to develop cooperative plans for conservation and rehabilitation programs on military reservations and to establish outdoor recreation facilities. While the Sikes Act of 1960 was in effect at the time that the tern was listed, it was not until the amendment of 1997 (Sikes Improvement Act) that Department of Defense Installations were required to prepare Integrated Natural Resources Management Plans (INRMPs). Consistent with the use of military installations to ensure the readiness of the Armed Forces, INRMPs provide for the conservation and rehabilitation of natural resources on military lands. They incorporate, to the maximum extent practicable, ecosystem management principles and provide the landscape necessary to sustain military uses.

The Navy completed an INRMP for NBC in 2002. The Service was a member of the NBC INRMP Working Group that identified issues and strategies for managing the natural resources found on NBC, including measures to avoid and minimize the take of federally listed species, such the least tern and snowy plover, in their management of Navy installations. The NBC INRMP addresses resource management at NASNI, NRRF, NAB, La Posta Mountain Warfare Training Facility, Camp Morena, and Remote Training Site Warner Springs. Like other INRMPs, it is largely ecosystem-based except where biological opinions direct species-specific actions. The NBC INRMP includes a conservation strategy for the least tern and snowy plover.

The Navy and the San Diego Unified Port District (Port) completed an INRMP for San Diego Bay in September 2000. The Service was also a member of the San Diego Bay INRMP Working Group that identified issues and strategies for managing the natural resources found in San Diego Bay, including measures to avoid and minimize the take of federally listed species, such the least tern and snowy plover. The San Diego Bay INRMP provides information on the biological resources of San Diego Bay and future management strategies that could be implemented by the Navy and the Port, the two major managers and users of the bay. The San Diego Bay INRMP includes a conservation strategy for least tern foraging habitat.

Previous Consultations-Biological Opinions and Memoranda of Understanding Pertaining to Training and Resource Management

The Navy has coordinated extensively and previously consulted on activities within the action area, including maintenance and construction of facilities at NASNI, military training on bayside and oceanside beaches, and in-water construction activities.

1. NASNI helicopter maintenance and training facilities.

The construction of a helicopter MAT facility, including a LAMPS MK III, resulted in the loss of an occupied least tern nesting area (Service BO 1-1-80-F-18 5 March 1980). A total of 25.7 ha (63.45 ac) were affected by the project. As a result of section 7 consultation, a 10.6-ha (21.6-ac) area of the existing nesting area called the MAT site was preserved, indefinitely, for terns nesting at NASNI. An additional 11.8 ha (29.2 ac) of NASNI were prepared on an annual basis

as alternate nest sites, including predator and vegetation control, in the event the MAT site was not successful.

Consultation on development of the NASNI airfield culminated with a 1983 biological opinion (Service BO 1-1-82-F-123, March 2, 1983) under which the Navy excluded 30.4 ha (75 ac) of land at Delta Beach from public access by fencing for least terns under the terms of a MOU between the Service and NAB Coronado. The biological opinion required that the 30.4 ha (75 ac) of land at Delta Beach be “fenced and officially established as a nesting site.” The designation of the Delta beaches as a “least tern preserve” was formalized in a 1984 MOU between the Navy and Service (DoN and Service 1984) that was developed to provide long-term management of the 30.4 ha (75-ac) Delta Beach site. The MOU did not inhibit the use of Delta beaches for military maneuvers, but directed maneuvers to the northern and eastern perimeters of the site. Prior to designation as the California Least Tern Preserve, Delta Beach North had been used both for Navy training and as a public boat launching facility. Public access was closed as a result of the fencing and a requirement of the California Coastal Commission Consistency Determination (CD-4-84 22, February 1984) to address this loss. California least terns returned to nest regularly at Delta Beach North starting in 1985.

2. Military training activities

The Navy has coordinated and consulted with the Service on training activities since 1994 to facilitate continued training while minimizing incidental take to least terns and western snowy plovers. The strategy used to minimize incidental take and facilitate training have varied as the tern (and plover) populations have grown and training needs have increased. The Service has issued 11 biological opinions or extensions of opinions regarding training activities and associated management activities (Appendix B). Each of the opinions/extensions addressed activities over a period of 1-2 years to allow for changes in management strategies and address changes in the status/distribution of least terns and snowy plovers in training areas.

The most recent comprehensive biological opinion (FWS-SDG-3452.3) addressing training and natural resource management strategy that defines the environmental baseline at SSTC-N was finalized in 2005. In accordance with this opinion, the Navy currently conducts training activities during the breeding season within seven of the ten beach lanes at SSTC-N and minimizes the impacts of training by providing a disturbance-free nesting area for western snowy plovers and California least terns in three of the beach lanes. Beach lanes Blue 2, Orange 1, and Orange 2 are marked with blue stakes and are not scheduled for training activities during the breeding season. These lanes are less desirable for training due to the distance from infrastructure and facilities, as well as the marine conditions directly off shore from the lanes. The Navy identifies beach crossing lanes to facilitate movement of equipment and personnel across the beach in beach lanes that are protected. In addition, the Navy conducts conservation measures within the boundaries of SSTC- N, including: (1) predator management at all nest sites; (2) annual nest site preparation; (3) modification of the beach to create hummocks to deter terns and plovers from nesting in intensively used beach lanes Green 1 and Green 2; (4) scheduling efforts to avoid beach lanes with higher nest numbers; (5) marking and avoidance of

established western snowy plover nests; (6) public outreach to military residents of adjacent housing; and (7) limited enforcement of range boundaries.

3. In-water construction noise and turbidity

The 1987 MOU between the Service and the Navy established standards and conditions for in-water construction activities in San Diego Bay to prevent adverse effects to the endangered California least tern (DoN and Service 1987, 1993, 1999, 2000, 2004). Originally a 5-year MOU, it has been formally renewed several times, most recently in 2004 for 2 years. A letter from the Service allows for recognition of the MOU until a new one is signed (FWS-SDG-08B0211-08I0203, December 18, 2007). In the 2004 MOU, the Navy committed to enhance 4 ha (10 ac) at South Delta Beach for tern nesting, as well as an additional 1.2 to 2 ha (3 to 5 ac) of California least tern foraging habitat. In addition, the Navy committed to the removal of overhead power lines at Delta Beach, predator control efforts for tern colonies, studies to determine effects of various in-water construction activities, end-of-year reports on tern population monitoring, and a list of proposed Navy projects to be conducted in San Diego Bay.

With implementation of these conservation measures, ongoing maintenance and new construction activities could be conducted by the Navy in San Diego Bay without the need for formal consultation with the Service on each action as long as California least tern foraging areas were not affected. The U.S. Navy agreed to provide an annual funding source of \$250,000 for management and monitoring of the least tern in the San Diego Bay region, as well as a one-time funding source of \$500,000 to be used to create additional tern foraging or nesting habitat. In addition, the Navy agreed to staff a permanent position to oversee the implementation of the MOU. The 1987 MOU was updated in 1993 and provided for annual funding of \$250,000 by the Navy to continue California least tern management and predator control efforts. The MOU between the Navy and Service has provided funding consistency up front, rather than depending on project-by-project funding. It has also provided personnel consistency by establishing a permanent, full-time Navy natural resource position since 1988 to manage the tern conservation program and coordinate with the Service on Navy projects that may affect the tern.

4. The NASNI Operations (airfield and recreational as well as military training use of the beaches)

The NASNI operations include 112,570 annual airfield operations (based on take-offs and landings in 2004) and training and recreational activities on the beach. They include a Bird/Animal Aircraft Strike Hazard (BASH) program designed to reduce wildlife hazards in the airfield area. As part of the BASH program, the Navy harasses avian species to keep them away from the runway. Plovers have historically nested within the airfield boundaries. The flat topography of the airfield, lack of foot traffic, consolidated substrate with loose windblown sand, and proximity to the ocean and the bay have proven attractive to plovers, especially since undisturbed habitat closer to the shoreline is limited. The Navy consulted with the Service on the proposal to include snowy plovers among the birds harassed during BASH activities and to

remove any plover nests from the airfield (FWS-SDG-3908.3 2005). The resulting consultation secured commitment to protect an area big enough to support 12 to 13 pairs of plovers.

5. Navy Lodge Expansion

The Navy proposed to increase the size of the Navy Lodge and consulted with the Service to address the effect of this proposal on western snowy plovers that nest on adjacent beaches (FWS-SDG-3908.5). To minimize the effects of Navy Lodge expansion, the Navy conducts the following management at NASNI: (1) continued plover nest marking for 30-m (98.4-ft) diameter buffers and monitoring; (2) avoidance of plover management areas when beach raking; (3) setting aside of 6 ha (14.9 ac) of suitable (and historically used) plover habitat as off-limits to foot traffic, vehicle traffic, beach raking, and pets during the snowy plover breeding season; (4) implementation of predator controls including anti-perch materials on buildings; (5) placement of signage and distribution of educational materials to patrons, employees, life guards; (6) training for construction workers; and (7) shielding of lighting away from the beach during nesting season.

California Least Tern

The California least tern is a breeding resident that is present from approximately April 1 to September 15 within the action area. The action area has historically been used for nesting by California least terns. Records of least tern use of Coronado and Silver Strand beaches include specimens currently housed at San Diego Natural History Museum and the Los Angeles County Museum. Least tern specimens include five specimens taken from the Silver Strand during the breeding season between 1921 and 1926, and one specimen taken from the "Coronado Strand" in 1918. While the collection location of these specimens is not precise, it is likely, given these records and the habitat affinities of least terns that this species historically nested throughout the action area.

Within the action area, least terns currently nest exclusively on the oceanfront SSTC-N beaches and across Highway 75 in the bayside Delta Beaches (Figures 6a, 6b). Least terns also nest outside, but close to, the action area on lands administered by NBC, within the "MAT Site" and occasionally on an additional site at NASNI (i.e., the Runway 11 site). Least terns are known to roost on the jetty and beach at Zuniga Point NASNI (DoN 2009a.) and a least tern night roost has also been identified in the southern 3 beach lanes at SSTC-N Beach (i.e., Blue 2 and Orange 1 and 2) and in an area near the mudflats at Delta Beach North and South (DoN 2009a). Least terns nest on dikes located within the South San Diego Bay Unit of the San Diego Bay NWR; however, these dikes lie beyond the influence of helicopter disturbance and thus are outside the action area. Least terns forage in the bay and ocean waters throughout the action area.

The least tern colony at SSTC-N has successfully established and coexisted with baseline levels of training disturbance. Least terns currently nest within and adjacent to SSTC-N beach lanes used during the breeding season for training exercises and forage in waters that support baseline training exercises. The need for consistency in training, combined with the Navy's successful

avoidance and minimization measures, has resulted in reduced human and vehicle traffic in some areas of the training beach lanes. The status of the SSTC-N Beach as a military training area has also resulted in reduced recreational use of the area, improving conditions for least tern nesting compared to recreational beach areas.

Figure 6a. California Least Tern and Western Snowy Plover 2008 Nest Distribution at SSTC-N Beach Lanes Red 1 to Green 2.

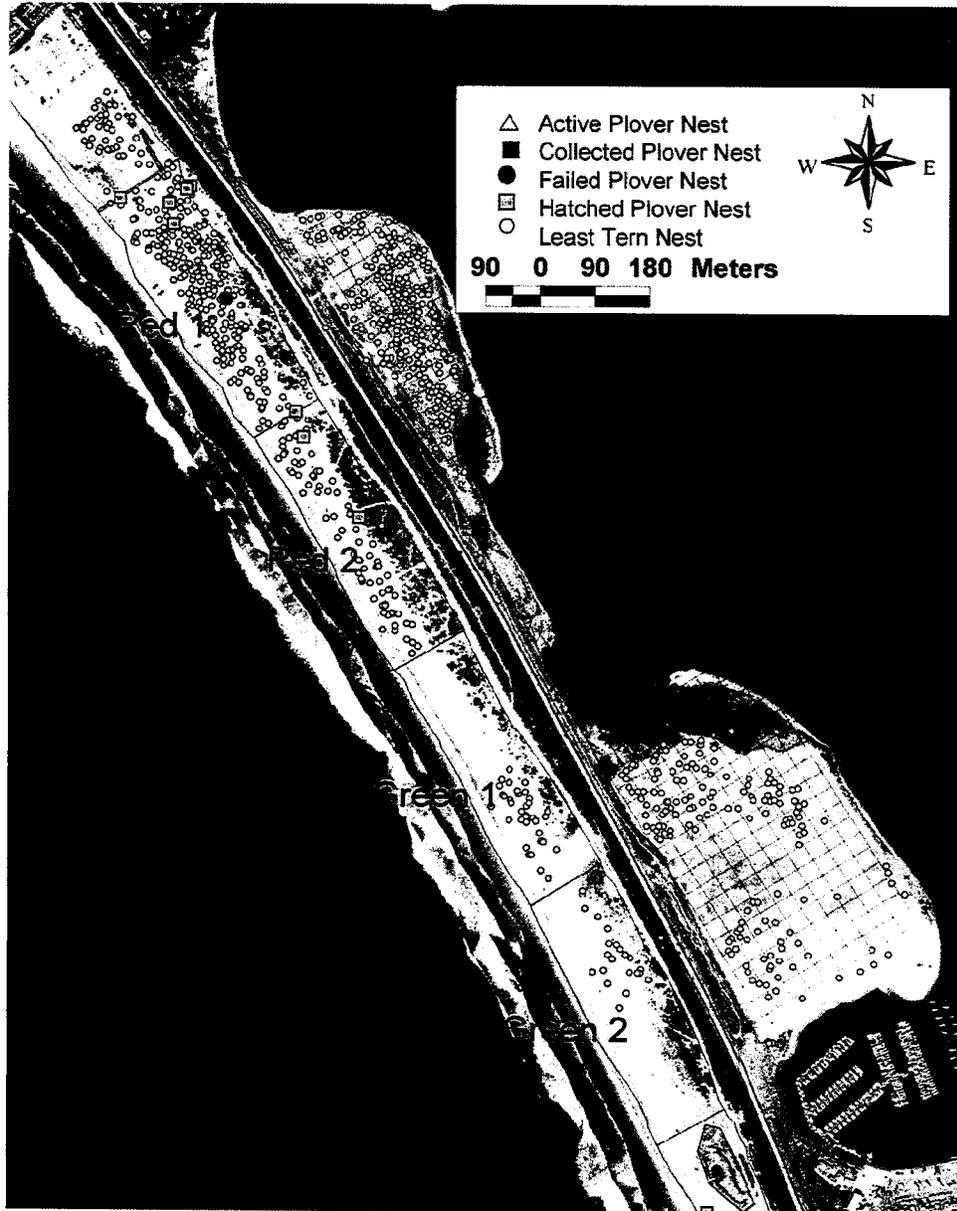
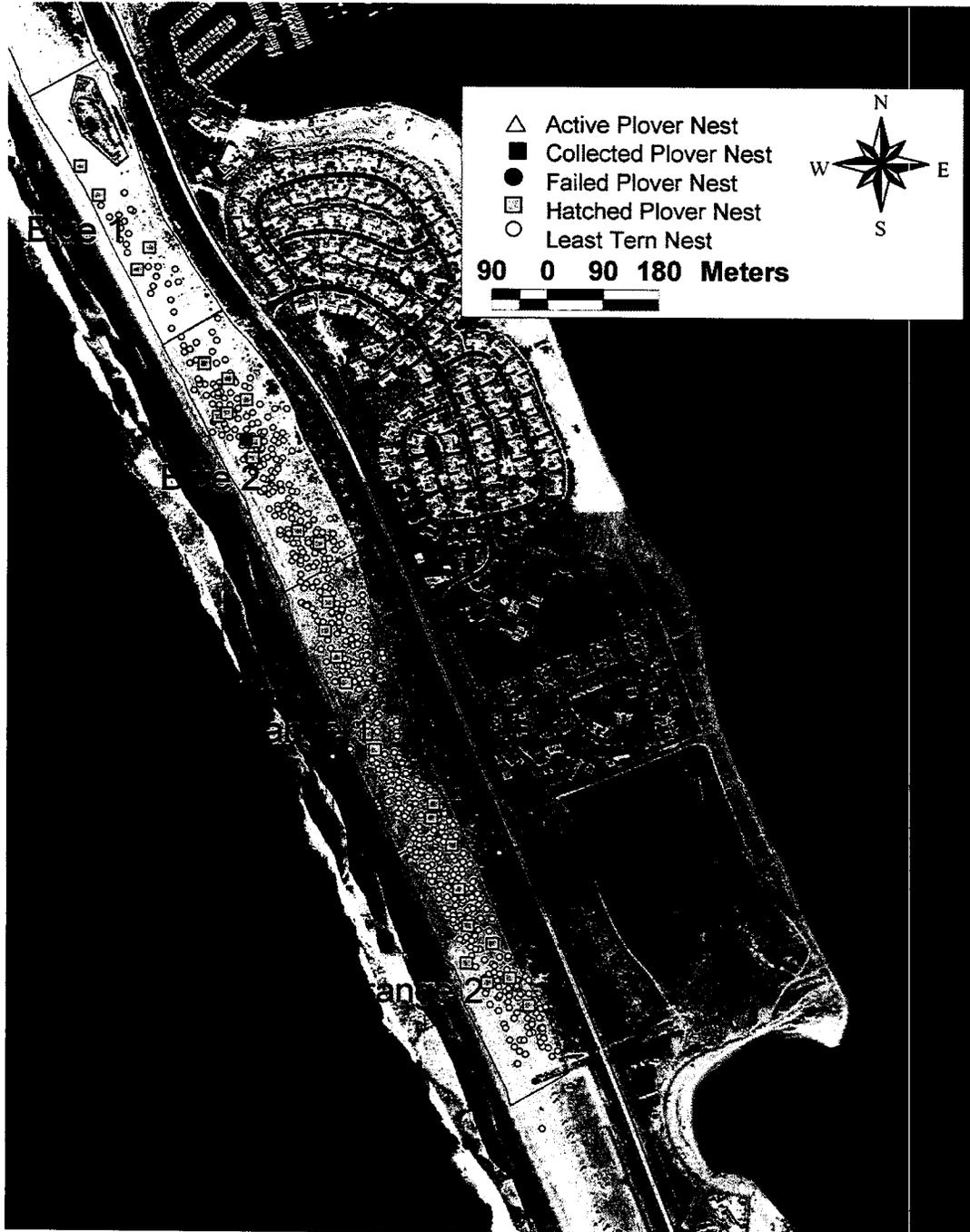


Figure 6b. California Least Tern and Western Snowy Plover 2008 Nest Distribution at SSTC-N Beach Lanes Blue 1 to Orange 2.



The occupied beaches included in the action area provide important breeding habitat for the California least tern. Proximity to both the ocean and San Diego Bay make the action area

beaches particularly attractive to the California least tern, which forage in the ocean and San Diego Bay (Baird 1997). From 2005 to 2009, the Navy directed training during the least tern nesting season to the northern 7 beach lanes and avoided the southern 3 beach lanes at SSTC-North Beach. During this time, an average of 17.8 percent of the U.S. rangewide least tern population nested in the action area, making it second only to Camp Pendleton in terms of numerical importance to the species (Appendix D). Under actual levels of training from 2005 to 2009, an average of 11.3 percent (range from 7 to 13.6 percent) of the U.S. rangewide least tern nests were initiated annually on the SSTC-N Beach, with an average of 4.9 percent initiated in the northern 7 beach lanes, and an average of 6.3 percent initiated in the southern 3 beach lanes (Appendix E, Table E.2). During this time period, an average of 6.0 percent (range from 4.6 to 8.1 percent) of the U.S. rangewide least tern nests were initiated on the Delta Beaches (Appendix E, Table E.2).

The number of least terns observed within the action area has increased significantly in recent years. The number of least tern nests recorded within the action area has increased from 229 nests in 1994 to 1,741 nests in 2009 (Table 10). Most of the increase has occurred in tern nesting areas protected from training during the breeding season (i.e., from 228 nests in 1999 to 1,272 nests in 2009). The relative number of least terns nesting on SSTC-N beach lanes has increased when compared to the number nesting on the Delta Beaches and consequently, SSTC-N Beach now supports a higher percentage of the least tern nests within the action area than the Delta Beaches (Table 11). Training use affects the distribution of least terns on the SSTC-N Beach. Least tern nest density is highest in training lanes that are protected from disturbance under baseline conditions (i.e., Blue 2, Orange 1, and Orange 2) (Figure 7).

Table 10. Number and Distribution of California Least Tern Nests in Action Area

	1994	95	96	97	98	99	2000	01	02	03	04	05	06	07	08	09
<i>Delta N</i>	210	177	224	349	337	344	229	271	257	285	263	351	223	224	295	413
<i>Delta S</i>	18	1	21	25	80	81	70	81	84	216	195	215	155	156	174	235
Delta Beach Totals	228	178	245	374	417	425	299	352	341	501	458	566	378	380	469	648
SSTC-N Beach (Oceanfront)																
Yellow 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellow 2	0	0	0	0	0	0	0	0	0	0	0	0	44	47	52	69
Red 1	0	0	0	0	1	0	0	0	0	9	24	70	206	142	231	248
Red 2	0	0	8	6	18	28	19	33	30	61	50	47	89	59	77	84
Green 1	0	13	21	27	68	101	81	101	116	155	141	108	56	32	37	29
Green 2	1	18	54	46	48	58	54	75	46*	71	35	42	19	19	22	23
Blue 1	0	0	1	0	0	6	6	7	8*	14	13	27	41	31	24	16
Blue 2	0	0	0	11	41	57	101	126	108	138	130	97	232	132	209	221
<i>Orange 1</i>	0	0	0	1	6	15	36	69	57	69	69	77	145	146	173	152
<i>Orange 2</i>	0	0	0	0	2	13	33	52	36	106	115	102	215	174	230	251
SSTC-N Beach Totals	1	31	84	91	184	278	330	463	401	623	577	570	1047	782	1055	1093
Total in Active Training Lanes	0	31	84	45	136	220	276	115	84	155	0	294	455	330	443	469
Totals in Protected Areas, Including Delta Beaches	229	178	245	420	465	483	353	700	658	1124	913	842	970	832	1081	1272
Action Area Totals	229	209	329	465	601	703	629	815	742	1124	1035	1136	1425	1162	1524	1741

• The number of nests, as recorded in this table, is greater than the number of tern pairs, because terms may re-nest after failure. For comparison, pair estimates for 2008 were 267 for Delta N, 162 for Delta S, and 906 for SSTC-N beach.

• The area that has protected from human disturbance has changed throughout the years. For each year, the italicized text and numbers highlight the areas that were marked and avoided (i.e., protected from human disturbances). Delta Beaches were protected in all years.

Table 11. Comparison of Least Tern Numbers at Delta Beaches and SSTC-N Beach

Year	Delta Beaches N and S Nests- "bayside" (percent of overall nests in action area)	SSTC-N Beach Nests- "oceanfront" (percent of overall nests in action area)	Total Nests Within Action Area
1999	425 (60)	278 (40)	703
2000	299 (48)	330 (52)	630
2001	352 (43)	462 (57)	815
2002	341 (46)	401 (54)	742
2003	501 (45)	623 (55)	1124
2004	455 (45)	549 (55)	1007
2005	566 (50)	570 (50)	1136
2006	378 (27)	1047 (73)	1425
2007	380 (33)	782 (67)	1162
2008	469 (31)	1055 (69)	1524
2009	648 (37)	1093 (63)	1741

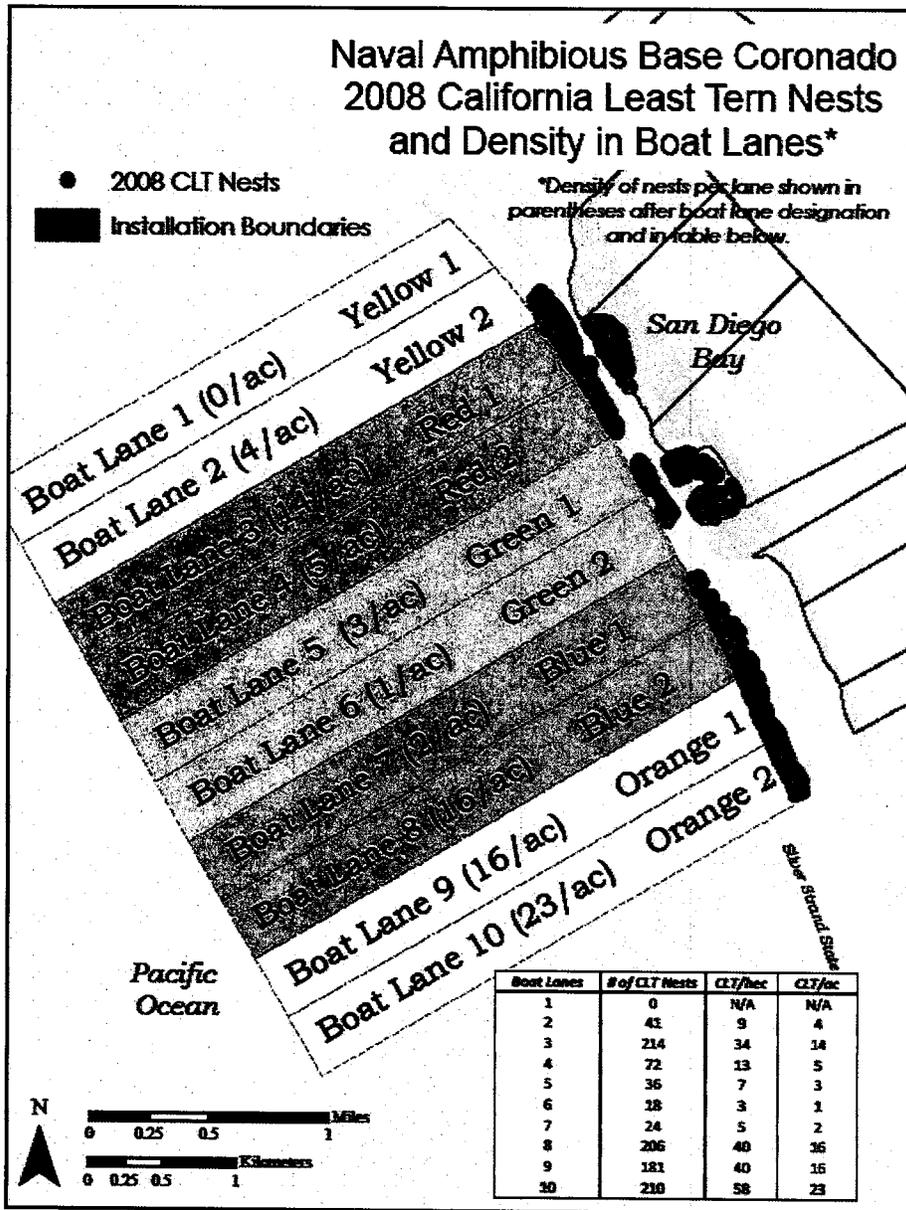
The increase in the number of least tern nests observed within the action area is likely a result of the general resurgence in the least tern population, the proximity of the action area to ocean and bay foraging resources, the suitability of the beach habitat for least tern nesting, predator management, and successful nest avoidance efforts of the Navy. The number of least tern nests observed may be greater than the number of pairs using action area beaches because some pairs initiate a second nest after a nest failure.

Least terns within the action area are affected by baseline levels of military training; however, the benefit of the current Navy management to the least tern appears to have outweighed the impacts to individual nests or chicks that have occurred over the past 10 years. Least tern nests, eggs, and chicks have been lost as a result of training activities, as detected by monitoring activities, which are conducted several times per week throughout the breeding season. Given the intensity of training under baseline conditions in areas that are immediately adjacent to, or among least tern nests (Table 5), the recorded incidental take of least terns is exceedingly small. The low level of observed take during the past 4 years may, however, be due to the actual level of training, which may be lower than the Navy's estimated "baseline" level of training. No least tern eggs/chicks were injured or killed in 2004, when the Navy avoided all tern nests. The number of eggs/chicks injured or killed as a result of training has increased in the past 3 years, likely because tern nests are not marked for avoidance outside of the protected beach lanes. From 0 to 15 eggs have been moved and 0 to 45 least tern eggs/chicks have been injured or killed each year between 1999 and 2009 due to training activities, but no adults have been reported as injured or killed (Table 12). Nonetheless, the possibility of complete loss of nests, chicks, and eggs has been present, particularly in beach lanes that support more intensive training activities such as Beach Camps, Beach Parties, and LCAC Landings (Appendix C).

Least terns within the action area are affected by vandalism and foot and vehicle traffic of unknown origin. Although the Navy's goal is to prohibit recreational and other unauthorized activities on the SSTC-N Beach, impacts to least terns have occurred during periods where the

impact did not coincide with a scheduled training activity. Such impacts likely occurred due to recreational activities. From 0 to 7 least tern eggs/chicks have been injured or killed each year between 1999 and 2009 due to vandalism or foot and vehicle traffic of unknown origin (Table 12).

Figure 7. California Least Tern 2008 Nest Density at SSTC-N Beach Lanes*



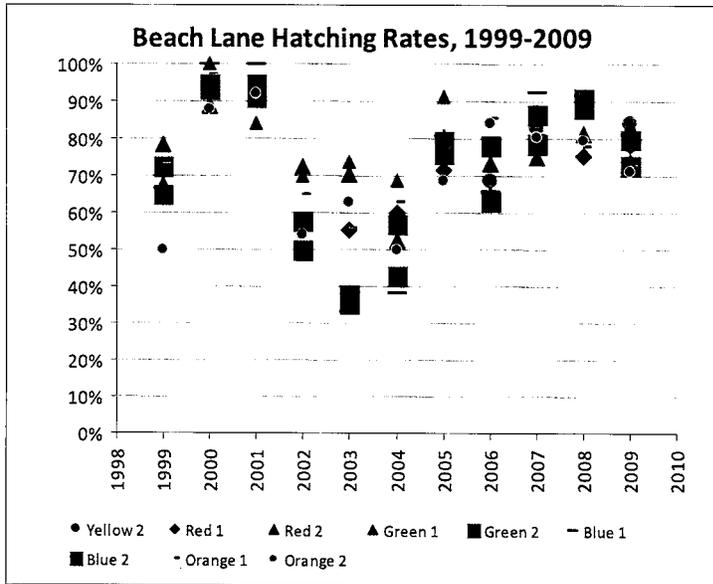
• Tern nest numbers in each lane in Figure 7 vary from those presented in Table 10, because this figure was derived from GIS data

Table 12: Recorded Human Impacts to California Least Tern Eggs/Chicks at SSTC-N Beach

	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999
Estimated Eggs/Chicks in Active Training Lanes*	938	886	660	910	588	0	310	168	230	552	440
Eggs/Chicks Taken as a Result of Training (Percent of Total Eggs/Chicks in Active Training Lanes)	45 (4.8)	30 (3.4)	34 (5.2)	23 (2.5)	38 (6.5)	0 (0)	9 (2.9)	3 (1.8)	1 (.4)	2 (.4)	1 (.2)
Eggs/Chicks Taken as a Result of Vandalism, Unknown Foot Traffic, or Unknown Vehicles	1	0	6	3	0	0	6	0	7	3	5
Eggs moved out of training area to protected area	6	4	4	0	0	15	10	5	1	0	0
Eggs Collected From Training Lanes	0	0	0	0	0	0	51	50	0	0	0
Eggs damaged during monitoring	0	0	2	1	0	1	0	0	1	0	0

* Based on active nest numbers in lanes used for training given in Table 10 and average 2 egg clutch size.

Figure 7.a. Least Tern Hatching Rates by Beach Lane



Data provided by Shepherd, 2010.

The recorded hatching rate of least tern eggs at SSTC varies by beach lane and by year; however, hatch rates are relatively high in most years, even in the active training lanes. Predation, food availability, variation in yearly management techniques, and location and type of training activity

could influence hatching rates within different beach lanes; however, no clear pattern is evident from the available data.

Previous biological opinions have exempted incidental take far in excess of that observed to date to address the possibility of complete loss in active training lanes, given the nature and uncertainties of the training activities, and lack of marking/avoidance across sections of the beach. To offset the potential injury or death of tern eggs and chicks in beach training lanes, the Navy has continued to mark and avoid a beach segment that is less desirable for most training needs from 2005 to 2009 (Blue 2, Orange 1 and 2). The low level of observed training impacts to tern eggs and chicks is due to the avoidance of tern nests in the protected beach lanes, additional avoidance/ scheduling measures implemented by the Navy, and the concentration of least terns in areas that receive less training use.

Predation is a significant limiting factor for least tern productivity throughout their range and is addressed within the Navy-managed portions of the action area by an intensive predator management program. Most predators are removed from nest sites as a result of this program. Predation by gull-billed terns, however, remains a threat to least terns in the action area that is unmanaged at this time. The Navy has attempted, unsuccessfully, to deter gull-billed terns from least tern nesting sites (Bonesteel 2009). The Navy submitted depredation permit requests to the Service's Division of Migratory Bird Management from 2005 to 2009 in an effort to address this threat to the least terns within the action area. Depredation permit requests have been denied each year by the Service, due to concern regarding the status of the gull-billed tern. Biological monitors contracted by the Navy observed over 12 percent of the least tern chicks that had hatched within the action area taken by gull-billed terns between May and June 15, 2009 (DoN 2009a). Monitors, Navy staff, and Service NWR staff infer, given the limited time period over which observations were made, high visibility of many foraging gull-billed terns, and the rapid disappearance of most chicks, that most of the least tern chicks that hatched during this period were taken by gull-billed terns. The low least tern reproductive success recently observed within the action area is thus believed to be primarily due to predation by gull-billed terns (DoN 2009a). The low observed productivity of least terns in the San Diego Bay area may result in changes in the local abundance and distribution of least terns, including declines in abundance, in coming years, however no decline in local abundance has yet occurred, based on the available information. A study to determine the age structure of the least terns that nest within the action area and other nesting areas around San Diego Bay is underway to determine whether the local least tern population is over represented in older age classes as a result of low juvenile recruitment.

The South San Diego Bay NWR supports the nesting colony of gull-billed terns in San Diego Bay. The NWR recently drafted an Environmental Assessment (Service 2009) outlining the threat that gull-billed terns pose to the least tern and describing a proposed pilot program to study the effectiveness of reducing gull-billed tern reproductive success in reducing predation pressure within the action area and surrounding area. The pilot program was not implemented during the 2009 breeding season, but it may be implemented in future years after completion of the National Environmental Policy Act process.

We anticipate that predation by the gull-billed tern is likely to continue to exert a visible, and potentially significant, impact on least tern and snowy plover reproductive success within the action area. The Service has prioritized development of a management strategy to address the interaction between the gull-billed tern, least tern, and snowy plover in the vicinity of San Diego Bay.

Western Snowy Plover

The action area has historically been used for nesting by western snowy plovers. Records of western snowy plover use of Coronado and Silver Strand beaches include specimens currently housed at San Diego Natural History Museum and the Los Angeles County Museum. The San Diego Natural History Museum has one snowy plover specimen collected from “the Strand” in the spring of 1918, one specimen collected from Coronado in April 1926, as well as eggs collected from “the Strand” in 1921 and from Imperial Beach in 1928 (SDNHM museum records). The Los Angeles County Museum collections include two western snowy plover skins (one male and one female taken on the same day) collected on May 27, 1899, on “Coronado Beach” (LACM museum records). Snowy plover pairs were also reported by L. E. Stenzel and S. C. Peaslee on the Silver Strand in May 1978 as part of an extensive study of the distribution and ecology of the species through California (Page and Stenzel 1981). While the collection location of these specimens is not precise, it is likely, given the habitat affinities of western snowy plovers that this species historically nested throughout the action area.

In areas where appropriate physical conditions exist, plovers in the action area successfully reproduce in proximity to occasional disturbances (primarily military training) when the area immediately surrounding the nest site has been protected. Disturbance during the breeding season, by human activities, pets, or predators, may preclude plover nesting or roosting on otherwise suitable beaches (Service 2007b).

Sandy beaches suitable for western snowy plover nesting and roosting are currently present across most of the ocean and bay-side beaches that lie within the action area. The Navy’s management actions, including predator management, prohibitions on beach raking, and nest avoidance have contributed to the persistence of plovers on these beaches. Plovers nest on the SSTC-S Beach, SSTC-N Beach, NASNI Beach, and on Silver Strand State Beach. Plover nests are distributed primarily within areas that are marked and avoided at Silver Strand State Beach, SSTC-N, and the NASNI Beach (Table 13, Figures 6a and 6b and 8). The plover nest distribution on the beach is clustered. Nests occur in active military training lanes, but are located more frequently in areas that are protected from disturbance during the breeding season (Figure 9, Table 14 a). The higher frequency of nests located within protected areas is likely a function of the lower levels of human activity that occurs within these areas. However, for some unknown reason, plover nesting is rare on the protected Delta Beaches.

Table 13. Western Snowy Plover Total Nest Numbers in Action Area.

Year	NASNI Beach	NASNI Airfield	Delta Beach North	Delta Beach South	SSTC-N	SSTC-S	Total NBC	Silver Strand State Beach	Total Within the Action Area
2000	4	0	2	5	37	1	49	19	68
2001	13	0	0	0	34	2	49	14	63
2002	26	0	1	2	57	13	99	24-26	123-125
2003	31	0	0	2	59	9	101	22	123
2004	13	23	0	2	63	14	116	24	140
2005	10	20	0	0	42	8	80	21	101
2006	12	11	1	0	43	6	73	20	93
2007	9	1	0	0	26	6	42	12	56
2008	26	12	0	0	41	12	91	18	109
2009	40	12	0	0	68	14	134	25	159

Table 13 a. Western Snowy Plover Breeding Season Window Survey Results 2003-2009*.

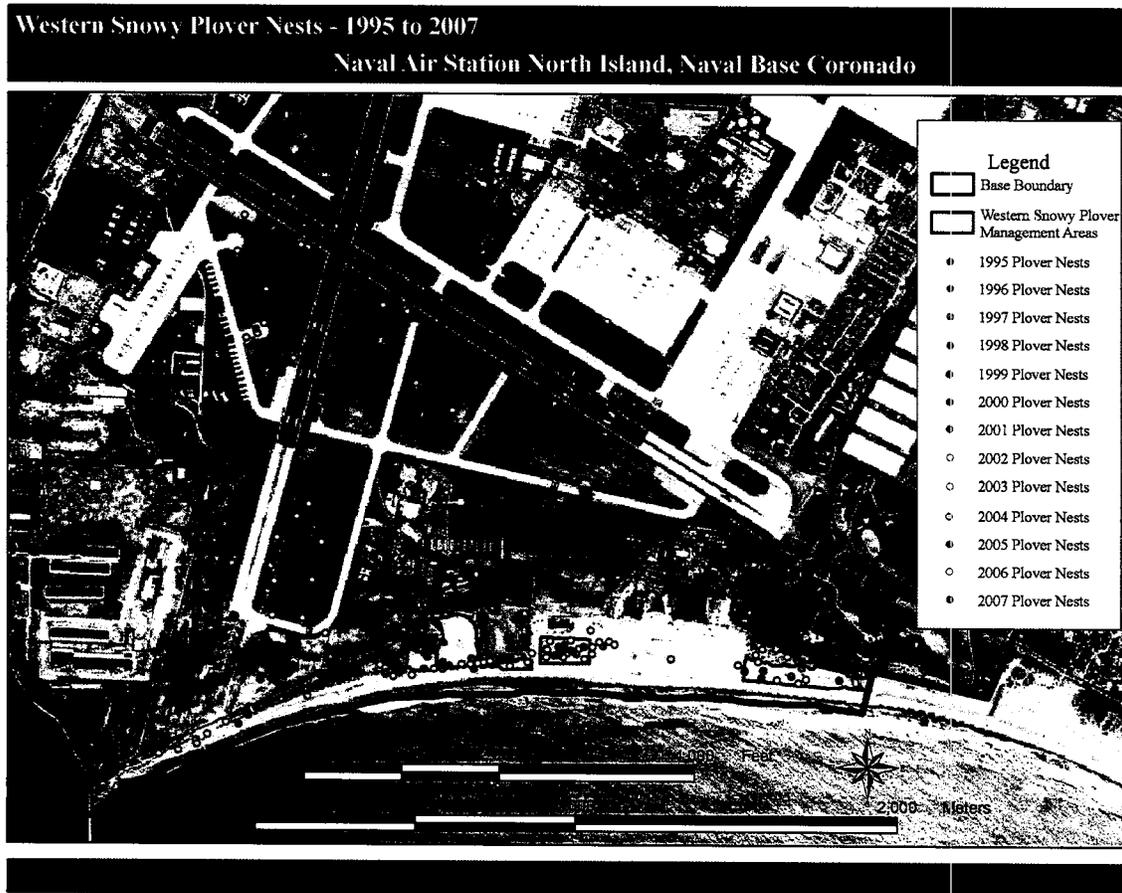
Year	NASNI BEACH**	Delta Beach North	Delta Beach South	SSTC-N	SSTC-S	NBC Total***	Silver Strand State Beach	Silver Strand (SSTC-N, SSTC-S, SSSB)	Action Area Total
2003	17	0	1	n/a**	n/a**	n/a**	n/a**	58	76
2004	18	0	1	n/a**	n/a**	n/a**	n/a**	56	75
2005	4	0	0	21	0	25	5	26	30
2006	22	0	2	36	8	68	8-9	52-53	76-77
2007	4	0	2	11-17	3	20-26	7	21-27	27-33
2008	15	0	0	33	8	56	15	56	71
2009	17	0	0	28	8	53	10	46	63

* unpublished data (Service 2004, 2009)

** in 2003 and 2004, data was not recorded on the individual beach units along the Silver Strand, but was recorded as a total for SSSB, SSTC-N, and SSTC-S.

Plovers can re-nest up to six times post failure and can also produce two or three clutches in a successful season (Wilson 1980, Warriner et al. 1986, Page et al. 1995), so the total number of nests present on a beach may provide a significant over estimate of the number of birds using a nesting beach. To provide an accurate estimate of the minimum number of birds present, the Navy supports an intensive monitoring program and uses the maximum concurrent active nest numbers observed (rather than total number of nests over the course of the season) as the basis for a minimum pair estimate (Table 14).

Figure 8. Western Snowy Plover Nest Distribution at NASNI Beach.



Western snowy plovers have coexisted within and adjacent to the active amphibious training areas at NASNI, SSTC-N, and SSTC-S subject to baseline levels of training disturbance. Snowy plovers currently nest and forage within and adjacent to SSTC beach lanes used during the breeding season for training exercises. The need for consistency in training, combined with the Navy’s successful avoidance and minimization measures, has resulted in reduced human and vehicle traffic in some areas of the training active beach lanes and also protected each plover nest that is detected on the beach. The status of the SSTC-N and SSTC-S Beaches as military training areas has also resulted in reduced recreational use compared to municipal beaches, which improves conditions for snowy plover nesting. Within beach lanes currently subject to training during the breeding season, snowy plovers exhibit some tolerance of adjacent disturbances, and some have repeatedly nested adjacent to some of the more intensively used portions of the beach. The Navy’s ongoing avoidance and buffering of plover nests has protected the nests, and avoidance of the southern 3 beach lanes has also provided an undisturbed area to which adult plovers and broods can retreat during periods of training use.

Table 14. Snowy Plover Maximum Concurrent Active Nest/Minimum Pair Estimates

Year	NASNI BEAC H**	Delta Beach North	Delta Beach South	SSTC- N	SSTC-S	SSTC-N and SSTC-S Total***	NBC Total***	Silver Strand State Beach
2000	2	2	3	13	1	na	na	8
2001	5	0	0	13	2	na	na	8
2002	12	1	2	20	5	na	na	7
2003	13	0	1	20	5	22	33	9
2004	12	0	1	20	5	24	33	7
2005	7	0	0	15	3	18	21	8
2006	7	1	0	19	3	22	27	9
2007	3	0	0	9	3	11	13	5
2008	14	0	0	14	4	16	26	8
2009	13	0	0	19	4	22	33	9
Avg. 2005- 2009	9	0	0	15	3	18	24	8

** NASNI Airfield not included because nests are actively removed*** Total Numbers are not additive since the maximum number of concurrent nests in subsets of the larger area may not occur on the same day. This results in a total for NBC that is not the sum of the individual areas within NBC

The current snowy plover nest distribution within the action area reflects the relative infrequency of recreational use on military training beaches and the footprint of baseline training activities. Relatively low plover densities are recorded on SSTC-S Beach, which is subject to extensive unauthorized recreational use, including dog walking. The lower density of plovers detected at SSTC-S beach is likely related to disturbance resulting from the unauthorized recreational use. At SSTC-N, lower plover numbers are observed in lanes that support training activities than in lanes that are avoided during the breeding season (Table 14a). The lowest densities of plovers observed on the SSTC-N Beach in 2008 occurred within the beach lanes that were not marked and avoided during the breeding season (Yellow 1 through Blue 1; average 0.11 nests per acre), and the highest densities occurred in the areas marked and avoided during the breeding season (Blue 2, Orange 1, and Orange 2; average 0.8 nests per acre) (Figure 9). Although the number of plover nests observed in active training lanes is lower than the number observed in less disturbed lanes, snowy plovers have demonstrated some habituation to training disturbances as evidenced by nesting within active training lanes in recent years (Table 14a).

Table 14 a. Maximum Active Plover Nests By SSTC-N Beach Lane (2005-2009)***

	2005	2006	2007	2008	2009
Yellow 1	0	0	0	0	0
Yellow 2	2	1	1	1	3
Red 1	2	4	3	3	3
Red 2	2	2	0	1	2
Blue 2	3	6	3	5	6
Orange 1	3	2	2	4	5
Orange 2	5	4	1	4	6
Y1-B1*	6	7	4	4	8
B2-O2**	9	11	8	10	13

* Maximum active in lanes Yellow 1 through Blue 1 combined.

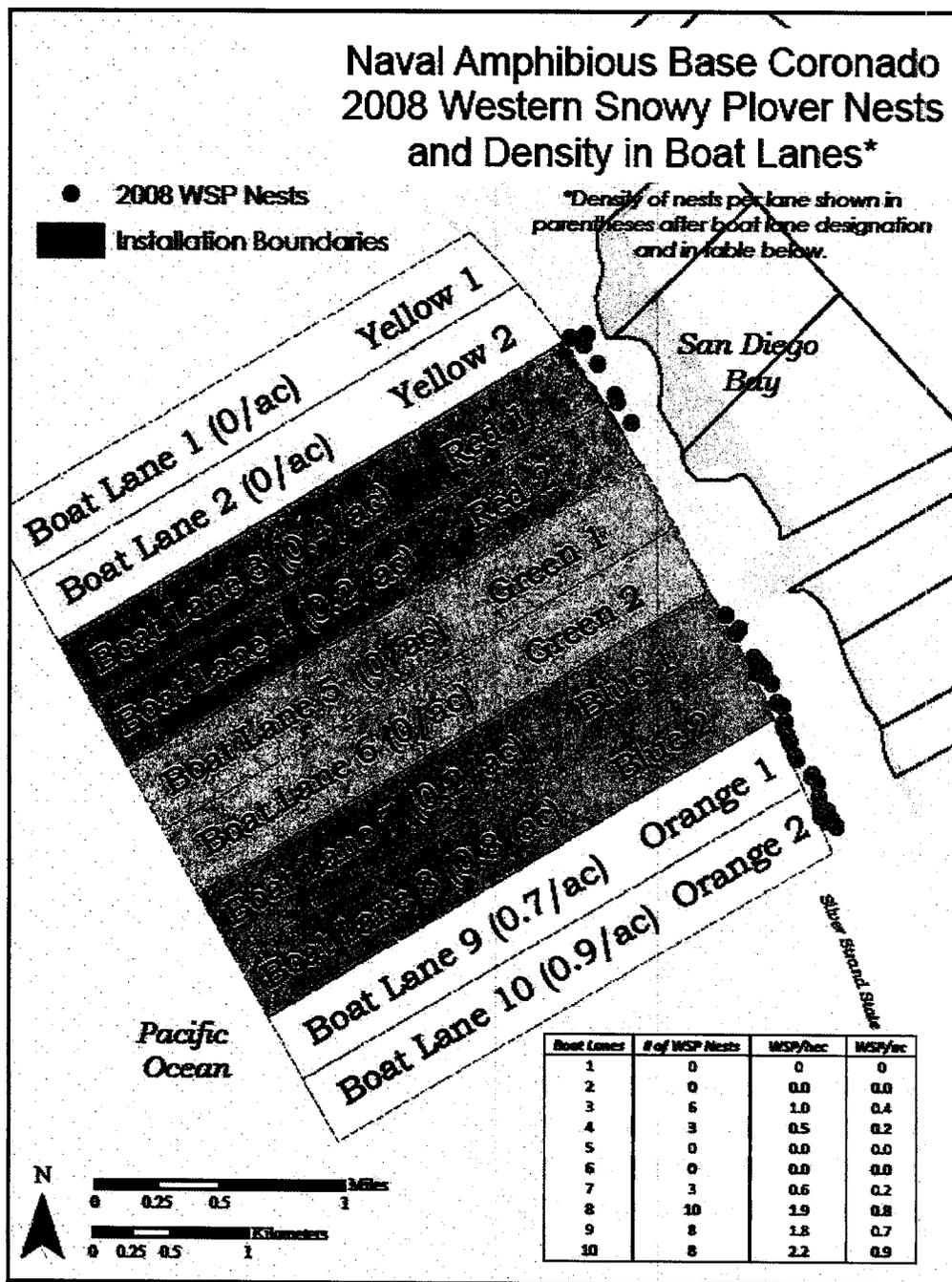
** Maximum active in lanes Blue 2 through Orange 2 combined.

*** Unpublished Navy data. Total Numbers are not additive since the maximum number of concurrent nests in subsets of the larger area may not occur on the same day.

The WSP recovery plan identifies six recovery units across the range of the western snowy plover. The action area lies within Recovery Unit 6, which includes Los Angeles, Orange, and San Diego Counties. The beaches included in the action area provide important breeding and wintering habitat for the western snowy plover.

The Recovery Plan identifies criteria for each of the six recovery units that will be used by the Service to determine if recovery objectives have been met. One of the criteria for Unit 6 is 500 breeding adults (averaged over a 10 year period). Based on available data, Recovery Unit 6 supported an estimated average of only 316 breeding adults averaged over the 5-year period from 2005 to 2009 (Appendix C). Approximately 25 percent of the plovers counted within Unit 6 during the breeding season window surveys (2003 to 2009) were within the action area (Appendix C), demonstrating the importance of the action area to the recovery of the snowy plover.

Figure 9. Western Snowy Plover 2008 Nest Density at SSTC-N Beach Lanes



- Plover nest numbers in each lane in Figure 9 vary from those presented in Table 14, because this figure was derived from GIS data.

Each recovery unit and beach segment within the recovery unit also has a “Management Potential Breeding Number” identified to indicate the number of plovers that may, with active management, support attainment of the recovery criteria. The Management Potential Breeding Number for Recovery Unit 6 and the beach segments within the action area is 615 and 95 breeding adults, respectively. The average number of breeding adults estimated within Recovery Unit 6 between 2005 and 2009 (i.e., 316) is approximately half of the Management Potential Breeding Number. The Management Potential Breeding Number for the action area beaches (i.e., 95) represents 15 percent of that for all of Recovery Unit 6a. Beach segments within the action area supported an estimated maximum of 79 plovers between 2005 and 2009 (Appendix C), so they have not attained the Management Potential Breeding Number (i.e., 95).

The Recovery Plan also identifies reproductive success, defined as at least one fledgling per adult male over a 5-year period, as one of the recovery criteria necessary for reclassification of the species. Fledgling estimates within the action area range from 22 to 61 between 2005 and 2009 (U.S. Navy, unpublished data, Appendix C). Since plovers are not individually marked, the number of males is not known; consequently the reproductive success, in terms of fledglings per adult male, cannot be determined from available data.

The NASNI airfield, adjacent to the action area, also provides conditions appropriate for plover nesting. Plover nesting within the boundaries of the airfield (including runway ovals and other adjacent areas) is considered a potential safety hazard by the Navy due to the Bird Aircraft Strike Hazard (BASH) risk, so plovers are actively discouraged from nesting here, and nests are removed if they are detected. The Navy consulted with the Service on these management activities (FWS-SDG-3908.3). As a result of airfield management, 112 plover eggs (33 nests) have been removed from the NASNI airfield since 2004. The eggs are taken to a Project Wildlife volunteer, who incubates, hatches, and rears the chicks. When chicks have reached independence, they are released on beaches within the action area. Approximately 112 eggs have resulted in the release of 51 western snowy plover chicks within the action area in this time period (DoN 2009b). Plovers continue to nest on the airfield despite the ongoing removal of eggs from this site. The number of plovers that have been recruited into the population from release efforts is unknown because released birds are currently not banded with individual color combinations, although released birds do receive a federal numbered band and a cohort (year) color band (DoN 2009b).

Plovers within the action area are affected by human disturbance from recreation and military training activities, predation, and illnesses/deaths from an undiagnosed health problem. Human disturbances within the action from recreation activities are frequent, primarily as a result of recreational use of the beaches within and adjacent to the SSTC beaches and a lack of available Navy security and patrol personnel (Tiffany Shepherd, 2009b). Recreational use includes primarily foot traffic and dog-walking, which sometimes extends above the beach crest and into nesting areas. Uncertainty pertaining to installation boundaries and jurisdiction has also contributed to a lack of enforcement and the high level of recreational use, particularly at the SSTC-S, which is unfenced and poorly marked, and adjacent to the Silver Strand State Beach and the City of Imperial Beach. Security personnel that might normally be stationed at NBC are

currently deployed, leaving gaps in the availability of Security staff available to assure that people (and dogs) do not trespass onto Navy training areas (Tiffany Shepherd 2009c). Military training activities can result in disturbance during breeding, foraging, and roosting activities, however plover nests are avoided during training activities and few instances of incidental take have been documented.

Predation is a major factor limiting snowy plover reproductive success at many Pacific coast sites (Service 2007b) and is addressed within the Navy-managed portions of the action area by an intensive predator management program. Predators within the action area include non-native species and feral animals such as Norway rats (*Rattus norvegicus*) and cats (*Felis domesticus*) but also include native species such as gull-billed terns, American kestrels (*Falco sparverius*), loggerhead shrikes (*Lanius ludovicianus*), burrowing owls (*Speotyto cunicularia*), peregrine falcons (*Falco peregrinus*), great blue herons (*Ardea herodias*), coyotes (*Canis latrans*), and others. As surrounding areas have become more urbanized and plover populations more concentrated and localized, native predators have arisen as a significant issue.

Most predators, including native and non-native species, are removed from plover nest sites as a part of the Navy's predator management program, which benefits the plover by reducing the potential for nest loss from predation. Predation by gull-billed terns, however, remains a threat to snowy plovers in the action area that is unmanaged at this time. Gull-billed terns forage frequently throughout the action area and have been observed capturing and consuming plover chicks (Copper 2009b). In addition, intensive monitoring efforts have failed to re-locate most chicks hatched within the action area, particularly during the portion of the plover breeding season that overlaps with gull-billed tern presence in the area. As stated above, the Navy submitted yearly depredation permit requests to the Service's Division of Migratory Bird Management from 2005 to 2008 to address this threat to the least terns and snowy plovers in the action area. Depredation permit requests have been denied each year due to concern regarding the status of the gull-billed tern.

An undiagnosed health issue has resulted in annual deaths of western snowy plovers primarily within the action area, although sick or dead plovers have been found elsewhere in southern California (Service 2007b). The suspected cause of the sick plovers is domoic acid poisoning or botulism; however, no conclusions have been drawn from the limited necropsy work that has been done to date. The Navy has supported local necropsy of plovers by the San Diego County veterinarian, and the Service has supported study of deceased or sick plovers at the National Wildlife Health Center in Madison, Wisconsin.

Although plover nests are distributed across active training lanes, the Navy has actively avoided direct impacts to most nests by monitoring for the presence of nests, and marking and avoiding nest that are detected. Plovers outside the protected area immediately surrounding each nest are at risk of being harmed by training activities if they are underway; however, there are few recorded instances of nest, chick, or adult loss associated with training (DoN 2008).

Western snowy plovers use the action area beaches for roosting and foraging during the winter months. Table 15 depicts the number of western snowy plovers observed in the action area during the non-breeding season window surveys, conducted in January of each year. During the winter months, no management or special protection directed at western snowy plovers is conducted. During 2008 Winter Window surveys, the action area supported approximately 229 plovers, which represents 33 percent of the plovers detected within Recovery Unit 6, and 7 percent of the plovers detected along the U.S. Pacific Coast.

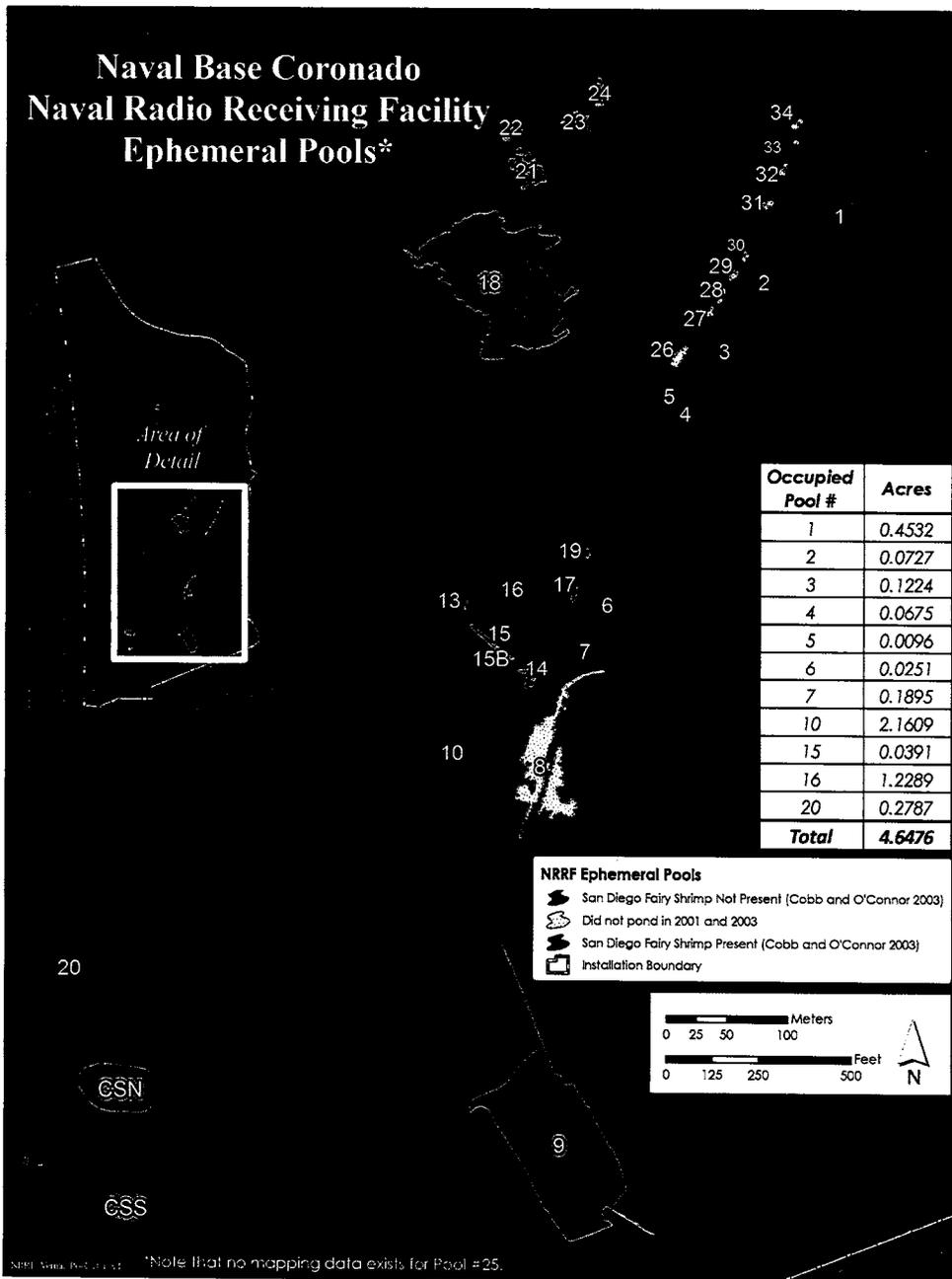
Table 15: Western Snowy Plover Winter Window Survey Results

Location	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008
NASNI	37	60	81	59	60
Coronado	0	0	0	0	0
SSTC-N (NAB Ocean)	60	86	123	77	96
Delta Beaches	-	-	-	-	52
Silver Strand State Beach	-	14	0	0	0
SSTC-S	34	0	17	21	21
Action Area-Wide	131	160	221	157	229
San Diego County-Wide	518	466	671	405	349
Recovery Unit 6	870	895	1166	693	684
Pacific Coast	4522	3426	4261	3546	3290

San Diego Fairy Shrimp

The San Diego fairy shrimp surveys at the SSTC-S Inland were done during the winter of 2000-2001 and in February through May 2003. Of the 35 ephemeral pools surveyed, 11 pools [1.9 ha (4.6 ac)] were occupied by San Diego fairy shrimp (Figure 10) (DoN 2001, DoN 2003). However, six pools where San Diego fairy shrimp have not been found were not surveyed according to Service protocol and no other surveys have been completed to date, so the current distribution of San Diego fairy shrimp at SSTC-S Inland is uncertain. Most of the occupied pools are less than 0.08 ha (0.2 ac) in size, while 3 pools are 0.4 to 0.8 ha (1 to 2 ac) in size. Most of the smaller pools occur on either side of a road that traverses the area. The SSTC-S pools were not known to be occupied by the San Diego fairy shrimp at the time the VP recovery plan (Service 1998) was completed, and so they are not identified in that recovery plan as part of a recovery unit.

Figure 10. Location of Vernal Pools at SSTC-S



Under current conditions, no activity is allowed in vernal pools, and vehicle traffic adjacent to vernal pools is limited to paved roads, with the exception of infrequent emergency/security vehicles that may travel through pools 5 and 20, which lie within unpaved roads. SSTC-S is fenced, which helps prevent unauthorized public access to the vernal pools under baseline

conditions. Vehicle traffic has occurred within SSTC-S Inland, based on the presence of vehicle tracks observed during the site visits conducted in support of this consultation (Sandy Vissman, personal observation, 2009). With the exception of unauthorized activities and infrequent emergency/security vehicle use described above, San Diego fairy shrimp at SSTC-S Inland are not subject to direct human impacts under current conditions.

The vernal pools at SSTC-S are of interest because adjacent pools apparently have very different salinities. Immediately adjacent to some pools that support San Diego fairy shrimp are saline pools that support pickleweed (*Salicornia sp*) and brine shrimp (*Artemia sp.*). The baseline hydrology and water quality of the different pools on the base has not been determined. The pools likely benefit from the general weed monitoring and management activities that are conducted at SSTC-S Inland under baseline conditions; however, no focused assessment or management of the pools is conducted under baseline conditions.

EFFECTS OF THE ACTION

1. General Effects

Proposed changes in training activities and associated management strategies will increase the level of training activity and related disturbance in areas occupied by the least tern, snowy plover, and San Diego fairy shrimp. In general, the proposed increases in training will result in:

- 1) increased human and vehicle activity and disturbance on action area beaches and the SSTC-S Inland Area;
- 2) increased boating activity and training disturbance in the nearshore bay and ocean waters;
- 3) increased aircraft activity over land and water; and
- 4) introduction of military working dogs to SSTC-N Beach, SSTC-S Beach and SSTC-S Inland

Training may occur both day and night. The extent to which increased frequency of training and associated disturbance will affect the least tern, snowy plover and San Diego fairy shrimp is difficult to predict because the current location, timing, and frequency of training exercises is not tracked to determine whether or how a particular training activity or group of activities is impacting the specific distribution and abundance of terns, plovers and fairy shrimp within the action area. Thus, our ability to equate the observed level of incidental take under current conditions to a particular level of human activity is limited.

Increased Human and Vehicle Activity on Beaches and SSTC-S Inland Area

Although the exact number of terrestrial activities conducted in each part of the action area under current conditions is not available (Delphine Lee 2009a), an approximation of the “baseline” and future increased frequency of each terrestrial activity has been provided in the BA and included in Table 1. Each numbered training exercise identified in Table 1 includes a breakdown of the terrestrial activities that will occur as part of each training exercise.

We focused our analysis on the training activities that are proposed to occur during the peak tern and plover breeding season, which occurs roughly from April 1 through July 31, or approximately 4 months of each year. To approximate the baseline level of terrestrial activity within different parts of the action area and provide a basis for comparison to the proposed action, we used information provided in the BA and during consultation. For our analysis, we presumed that training activities take place at a constant rate throughout the year, so the number of activities expected to take place during the 4-month peak breeding season corresponds to one third of the annual total. Figures that depict an approximation of the footprint of each type of terrestrial activity are provided in Appendix A. We used the expected frequency and footprint of each activity to approximate the likely increase in use that would be expected given the proposed increases in training and the proposed scheduling priorities. Increase in the level of human disturbance will not occur immediately, but it is likely to occur gradually or intermittently as training needs change.

SSTC-N Beach

The effect of the increase in training disturbance associated with the proposed action will depend primarily on where the various activities are scheduled in relationship to distribution of the tern and plover. Each type of training exercise and associated marine or terrestrial activity typically occurs in beach or ocean lane(s) particularly suited for the exercise (Table 16, Table 17). For example, since the Yellow beach lanes are closest to classroom facilities, offices, quarters, and physical fitness equipment, many physical fitness training activities occur in these beach lanes. Many activities that entail heavy equipment use beach lanes Green 1, Green 2 and Blue 1 due to the proximity of the access gate off of Highway 75 and resulting lower transit time associated with accessing the beach. As a result of the higher suitability of particular training lanes for particular training activities, the level and type of human, dog and vehicle activity across the SSTC-N Beach varies by beach lane, so the increase in disturbance will vary accordingly. Many activities will occur primarily in the hard-packed beach area or on the beach above the high tide line, but below the beach crest. Based on the figures provided in Appendix A and information from Table 1, most training activities are conducted less than 60 m (196.85 ft) inland of the beach crest. The proposed continuation of the current scheduling preferences and practices (scheduling activities in suitable beach lanes that support fewer nesting birds when mission compatible) is likely to result in an overall training footprint that is similar to that observed under baseline conditions. However, the increase in the number of exercises is likely to increase the area affected, since training routes are not defined, and each exercise may result in foot or vehicle traffic over a slightly different area within the general footprint. In addition, the need for increased training flexibility is likely to contribute to some increase in the observed training footprint.

Information is available regarding specific impacts to terns and plovers (i.e., numbers of birds killed or injured, nests lost, etc.) from current levels of training activities within occupied nesting habitat. The effect of the increase in training disturbance associated with the proposed action will depend primarily on where the various activities are scheduled in relationship to distribution of the tern and plover. An analysis of the spatial distribution and frequency of baseline training

activities was not provided in the BA; however, information from the BA and provided during consultation was used to estimate the baseline frequency and distribution of training to allow comparison to anticipated future training.

At SSTC-N Beach, the level of training activity is likely to increase approximately 23 percent over the identified baseline, resulting in approximately 747 more activities on the SSTC-N Beach each year than occur under baseline conditions (Table 16). Thus, approximately one third of the annual total, or 249, more activities are expected to occur on the SSTC-N Beach during the 4-month peak breeding season under full implementation of proposed training increases. The biggest increase in the number of activities during the peak breeding season will result from an additional 141 training activities requiring logistical and safety vehicle presence on the beach, followed by a significant increase in foot traffic within beach lanes as part of reconnaissance, observation post, foot patrol and ambush, and vehicle patrol activities (Table 16).

Table 16. Anticipated Change in Frequency of Terrestrial Activities at SSTC-N Beach

Terrestrial Activity	Total Baseline/ Proposed Annual Activities (from Table 1)	Percent of Total Activities that are on SSTC-N**	Baseline SSTC-N Annual Activities*	Baseline SSTC-N Activities April 1- July 31**	Proposed SSTC-N Annual Activities	Proposed SSTC-N Activities April 1 - July 31	Anticipated Increase in Number of Activities April 1-July 31 (percent increase)	Anticipated Lanes Used, North to South***
Beach Party Teams	202/ 226	100%	202	68	226	75	7 (1)	Red 1-Orange 1 (7 lanes)
MCM Beaching	32/ 58	10%	3	1	6	2	1 (100)	Blue 1 and 2 (2 lanes)
Beach Camps	1/ 2	100%	1	0	2	0	0 (0)	Green 1 and 2 (2 lanes)
Equipment Offload/Stage	2/ 4	100%	2	1	4	1	0 (0)	Green 1 and 2 (2 lanes)
Causeway/ ELCAS	12/ 15	80%	10	3	12	4	1 (33)	Green 1 and 2 (2 lanes)
LCAC Landing	4/ 4	100%	4	1	4	1	0 (0)	Green 2 (1 lane)
Beach Crossing and OTB	444/ 526	50%	222	74	263	88	14 (19)	Yellow 2-Blue 1 (6 lanes)
Raids	60/ 60	50%	30	10	30	10	0 (0)	Yellow 2- Green 2 (5 lanes)
Foot Patrol and Ambush	139/ 238	50%	70	23	119	39	16 (70)	Red 1-Blue 1 (5 lanes)
Vehicle Patrol	1/ 51	75%	1	0-1	38	13	12 (1200)	Yellow 1 and 2, Green 1 and 2 (4 lanes)
Observation Post	50/ 84	100%	50	16	84	28	12 (75)	Red 1-Green 2 (4 lanes)

Reconnaissance	141/ 236	100%	141	51	236	80	29 (57)	Red 1- Green 2 (4 lanes)
Logistic and Safety Vehicles	2065/ 2628	75%	1549	516	1971	657	141 (27)	Red 1-Blue 1 (5 lanes)
Running	948/ 952	90%	853	284	857	286	2 (1)	Yellow 1- Orange 2 (10 lanes)
Manual Excavation	68/ 102	90%	61	20	92	31	11 (55)	Red 1-Green 2 (4 lanes)
Visual Observations	156/ 160	50%	78	26	80	27	1 (4)	Yellow 1 and 2 (2 lanes)
SSTC-S Off road Foot		0%	0	0	0	0	0	none
Total	4325/ 5346		3277	1092	4024	1341	249 (23)	

* Number of annual terrestrial activities derived from Table 1 and Table 2. Annual number was determined by summing all training exercises that included the terrestrial activity. This does not calculate 'beach days', as some training exercises may entail more than 1 day of terrestrial activity. Annual number in SSTC was multiplied by the percentage conducted at SSTC-N to obtain number of activities at SSTC-N. This number was divided by 3 to determine the number proposed for the 4-month period that coincides with the peak of the breeding season (April 1-July 31).

** The percentage of activities anticipated at SSTC-N represents a "worst-case scenario" percentage breakdown with training activities biased towards SSTC-N Beach lanes.

*** 'Anticipated Lanes used' include the two listed lanes and all lanes in between, e.g., 'Red 1- Blue 1' indicates that the activity takes place in Red 1, Red 2, Green 1, Green 2, and Blue 1. Beach lanes listed are those anticipated for use for each type of activity, however training may occur in other lanes depending on the scenario and the lanes presented for each activity are not fixed training requirements/restrictions.

Total Number of Activities Y 1 Y 2 R 1 R 2 G 1 G 2 B 1 B 2 O 1 O 2

A. Proposed Total	391	405	477	319	286	309	232	205	203	203		
B. Baseline Total	371	381	428	276	250	271	220	195	195	195		
C. Increase in Total Number of Activities (Row A minus Row B)	20	14	49	43	36	38	12	10	8	8		
D. Increase in total number of activities per month (Row C/ 4)	5	4	12	11	9	10	3	3	2	2		
E. Proposed Total not including safety vehicles (Row A minus Row 2)	306	317	374	250	224	242	182	161	159	159		
F. Baseline Total not Including Safety Vehicles (Row B minus Row 2)	302	310	349	225	204	221	179	159	159	159		
G. Proposed Total not including safety vehicles and running events (Row E minus Row 14)	20	31	88	91	65	83	23	2	0	0		
H. Baseline Total not including safety vehicles and running events (Row F minus Row 14)	16	24	63	66	45	62	20	0	0	0		
I. Increase in Total not including safety vehicles and running events (Row G minus Row H)	4	7	25	25	20	21	3	2	0	0		
J. Monthly increase in number of events not including safety vehicles and running events (Row I/4)	1	2	6	6	5	5	1	1	0	0		

The information provided in Table 17 allows for a rough assessment of the anticipated increase in the level of training activity in SSTC-N beach lanes that would be necessary to fully meet training requirements under the proposed action. The information included in the table is based on the number of activities provided in the BA, but it does not consider the length of various activities. Some activities could extend over more than one day, while others last for a shorter time period. In addition, the “baseline” information in the table may not reflect the actual level

of activity on the beach at the present time, since troops are currently deployed overseas and/or training in desert areas, and the training that is currently being conducted is considered below the baseline (DoN 2008). This assessment, however, provides a general depiction of the anticipated changes in the number of activities expected over the “baseline.” No information is available on the actual current level of training for comparison to the “baseline.”

Safety/logistical vehicle use and running events are the most frequent training activities at SSTC-N Beach (Table 17), and they occur primarily on the hard packed portion of the beach where the substrate is more stable and suitable for travel. Both of these activities entail primarily linear travel along the tide line, rather than travel from the water to the more landward portion of the beach above the crest. For safety/logistical vehicle activities, the focus of the activity is usually a swimming/boating event that is in the ocean, or a running event that is traveling along the beachfront. The anticipated frequency of SSTC-N Beach training activities that include use of logistical/safety vehicles (Table 17, Row 2) will increase from 516 events per year to 657 events per year. The frequency of running events (Table 17, Row 14) will not increase but will remain at 286 events per year. The route of travel for most of these activities is expected to avoid the portion of the beach used for nesting by terns and plovers. However, in instances where high tide or improved vantage point (for safety vehicles) necessitates use of the area above the beach crest, however, these activities may extend into the tern and plover nesting area.

Terrestrial activities that may involve use of heavy mechanized equipment on the beach include exercises with a mechanized Beach Party (Table 17, Row 1), Beach Camp (Row 3), Raids (Row 9), Equipment Offload (Row 10), Causeway/ELCAS (Row 11), and LCAC (Row 13). These activities are less frequent than running or logistical/safety vehicle use, but they have a footprint that is more likely to extend into tern and plover nesting areas above the crest (see Appendix A). In addition, mechanized equipment may produce noise that increases the sphere of disturbance associated with the activity. Most of these activities occur in beach lanes Green 1 and Green 2 and Blue 1 under current levels of training, and anticipated increases in these types of training are expected to remain primarily in these lanes. Based on discussion with training operators, Beach Party activities may also extend into beach lane Blue 2 on an infrequent basis to meet training needs. If such activities are conducted in beach lane Blue 2, the impact to terns and plovers is likely to be greater than in other beach lanes that support fewer nesting terns and plovers.

Vehicle Patrol (Table 17, Row 4), a new training activity for SSTC-N, is proposed within beach lanes Yellow 1, Yellow 2, Green 1, and Green 2. This activity entails groups of up to 20 people in 6 light-wheeled vehicles driving throughout the beach lane for familiarization with driving techniques and vehicle walk-through. The footprint for this activity includes the entire beach lane inland of the beach crest and thus will extend across tern and plover nesting habitat (Appendix A). This activity is likely to increase the amount of disturbance in these lanes. To minimize the higher degree of impact associated with this new activity, the Navy will only conduct this activity in the beach lanes that typically support fewer tern and plover nests and are already intensively used for other training activities (i.e., Yellow 1 and Yellow 2, Green 1 and

Green 2). Vehicle patrols could occur up to 13 times during the peak breeding season, dispersed through the 4 beach lanes in which they may be conducted.

Several types of terrestrial activity entail foot traffic and maneuvering or positioning personnel above the beach crest. Although these activities do not involve heavy equipment, they could potentially result in significant impacts to nesting terns and plovers depending on the exact route of travel. Terrestrial activities that involve foot traffic above the beach crest traveling in a non-linear fashion include Patrolling and Ambushes (Table 17, Row 5), Beach Crossing (Row 6), Observation Posts (Row 7), Reconnaissance (Row 8), and some Raids (Row 9). Approximations of the training footprints for these activities are provided in Appendix A. Activities that involve foot traffic above the beach crest are expected to increase in the northern 7 SSTC-N beach lanes (i.e., Yellow 1 to Blue 1), including Red 1 and Red 2. Beach lanes Red 1 and Red 2 support a higher nesting density than other active training lanes under baseline conditions, so the relative effect of increasing activities in these beach lanes is likely to be higher than the increases in other training lanes. In addition, the routes of travel for these training activities are expected to vary since there will be no defined routes of travel. Since the exact footprint may change each time the activity is conducted, the cumulative footprint of all of the training activities may be relatively large. Under current conditions, however, numerous foot traffic training activities occur in beach lanes Red 1 and 2, yet the abundance of least tern and snowy plover nests in these lanes is relatively high, approaching the abundance in the lanes that are currently protected from disturbance during the tern and plover breeding season. In summary, approximately 1 to 6 more training events each month during the tern and plover breeding season (not including the more frequent running and linear logistical/safety vehicle travel along the shore) could occur in the northern 7 SSTC-N beach lanes (i.e., Yellow 1 to Blue 1) under full implementation of the proposed increases in training frequency (Table 17).

Under baseline conditions, the Navy implements an impact minimization measure that excludes training on the southern 3 SSTC-N beach lanes (i.e., Blue 2, Orange 1, and Orange 2) during the tern and plover breeding season (FWS-SDG-3452.3). To accommodate the proposed increases in training, the southern 3 beach lanes may be needed for training activities during the tern and plover breeding season. The southern 3 beach lanes would only be needed infrequently for training since adequate space to accommodate most training exercises is available within the other 7 training lanes at SSTC-N (discussed above) and 4 training lanes at SSTC-S, and additional training in these lanes to increase flexibility is expected to be infrequent.

The Navy anticipates that under full implementation of the proposed action, training activities that include running and the use of logistical or safety vehicles could occur in the southern 3 lanes during the tern and plover breeding season, if other suitable lanes are unavailable, or in instances where flexibility or realism necessitates use of these lanes. We expect that most running and safety/logistical vehicle activities on beach lanes Blue 2, Orange 1, or Orange 2 will occur on the hardpack and in a linear fashion that parallels the beach outside of nesting areas. If these linear activities require access onto the nesting area inland of the beach crest, it will likely be infrequent and occur in a corridor parallel to the ocean extending approximately 15 m (16 yd) inland of the crest (Appendix A). These activities could still avoid tern and plover nests if

personnel conducting the exercise are aware of the nest locations; however, the proposed action does not include a marking technique for the southern 3 beach lanes, which will increase the potential for running foot traffic and vehicles to crush nests, chicks, or eggs. The Navy also anticipates that approximately one MCM beaching operation and six beach party team training activities may be necessary during the breeding season in beach lane Blue 2. The single anticipated MCM operation is expected to cause only minor impacts because it typically has a very small footprint, few personnel, and occurs on the hard-pack outside of nesting areas. The six beach party team activities could significantly disrupt tern and plover nesting on the beach due to the heavy equipment and number of people typically present during this type of operation, particularly if personnel are not aware of nest locations. The absence of some type of marking to notify personnel on the beach of the location of the densest nesting locations is likely to result in a higher level of foot traffic activity in these areas.

Increases in training activities associated with implementation of the proposed action are not anticipated until “after the war”; however, some use of the southern 3 lanes may be necessary prior to the anticipated increases to meet training requirements. The level of training at SSTC-N will likely be dynamic and vary between years. In some years, the southern 3 beach lanes may not be necessary for training, while in other years use could include more and different activities than predicted.

SSTC-S Beach and Inland

Data regarding the frequency of training activity at SSTC-S Beach was not provided during consultation; however, data was provided regarding the total number of terrestrial activities anticipated at SSTC and the percentage of the SSTC terrestrial activities that would be conducted at SSTC-N. To assess the level of baseline use at SSTC-S and the expected change in training frequency in this area, we assumed that all activities not conducted at SSTC-N would be conducted at SSTC-S. We recognize that this assumption is not completely accurate since some activities may actually be conducted in areas other than SSTC-N or SSTC-S; however, no other data is available to allow us to assess the anticipated increases in training in this area associated with the proposed action. With this assumption, we anticipate that training activity at SSTC-S Beach is likely to increase approximately 50 percent over the identified baseline, resulting in approximately 212 more activities on the SSTC-S beaches each year during the peak breeding season than occur under baseline conditions (Table 18). The most significant increase is expected to be in foot patrol and ambush activities, which will increase 243 percent from approximately 23 to 79 activities each peak breeding season. Although low in number, logistical and safety vehicle use and vehicle patrol activities are new activities expected to be introduced into the area above the beach crest at SSTC-S.

SSTC-S Inland includes a more developed northern section and a less developed southern section, as described in the Environmental Baseline section. Although many new operations are proposed for SSTC-S Inland, the majority of these operations will occur within the more developed northern section in order to use the facilities available in that part of the installation. Under baseline conditions, no foot traffic is allowed off road in and around the vernal pools

occupied by the San Diego fairy shrimp in the undeveloped southeastern portion of SSTC-S Inland SSTC-S Inland. The proposed action will, however, increase use of the less developed southern portion of SSTC-S and includes the potential for off-road foot traffic in SSTC-S when the vernal pools are dry, as determined by the NASNI NRO Botanist. For the purposes of our assessment, we estimated that pools would be dry for 7 to 11 months out of each year and that activities would occur evenly throughout the year. During this time period, the southern part of SSTC-S Inland could be subject to approximately 266 to 422 operations that could entail foot traffic, including parachute drops, through the area (Table 18). Parachute drop zones or other ingress and egress points have not been identified, so likely future travel patterns are unknown.

Table 18. Change in Anticipated Frequency of Terrestrial Activities at SSTC-S*

Beach Party Teams	202/226	0	0	0	0	0	0
MCM Beaching	32/58	90%	□□□□10	10	52	17	7 (70)
Beach Camps	1/2	0	0	0	0	0	0
Equipment Offload/Stage	2/4	0	0	0	0	0	0
Causeway/ELCAS	12/15	20%	0	0	0	0	0
LCAC Landing	4/4	0	0	0	0	0	0
Beach Crossing and OTB	444/526	50%	216	72	263	87	15 (21)
Raids	60/60	50%	30	10	30	10	0
Foot Patrol and Ambush	139/238	50%	70	23	238	79	56 (243)
Vehicle Patrol	1/51	25%	0	0	13	4	4 (na)
Observation Post	50/84	0	0	0	0	0	0
Reconnaissance	141/236	0	0	0	0	0	0
Logistic and Safety Vehicle	2065/2628	25%	569	189	668	227	38 (20)

Running	948/ 952	10%	95	32	95	32	0
Manual Excavation	68/ 102	10%	7	2	10	3	1 (50)
Visual Observations	156/ 160	50%	78	26	80	27	1 (4)
Activity	Baseline/ Proposed	Percent at SSTC-S	Baseline Annual Activities	Baseline Annual Activities in Vernal Pool Area	Anticipated Annual Activities in vernal pool area and developed area)	Anticipated Activities during dry periods (i.e., 7 to 11 months of year)	
SSTC-S Off road Foot	422/459	100%	422	<i>0</i>	459	<i>266 to 422</i>	

- ** This table assumes that all activities other than those at SSTC-N would occur at SSTC-S, and thereby potentially overestimates the number of activities at SSTC-S under baseline and proposed training frequencies. Specific data regarding the level of use at areas outside of SSTC-N was not available.*
- *** The estimated percentage is a maximum. The percentage of activities conducted in SSTC-N was subtracted from 100% to obtain the percentage in this column.*
- **** Pools are likely to be dry for 7 to 11 months of the year. This time period differs from the other numbers in the column, to reflect the time period of concern in the vicinity of vernal pools. The duration of dry conditions will vary from year to year, sometimes significantly. This number is used to provide a general estimate of the level of foot traffic anticipated.*

NASNI Beach

Information regarding the baseline and proposed level of use at NASNI Beach was not explicitly provided in the BA; however, based on Table 1, use of NASNI Beach is expected to increase as part of the proposed action. Three hundred twenty-four (324) training exercises, under baseline levels of use, include NASNI Beach as one of the potential locations where the exercise could be conducted (Table 1). Under the proposed action, the number of training exercises that include the NASNI Beach as a potential training location could potentially increase to 370, although no new activities are proposed for this part of the action area (Table 1, Table 2).

City of Coronado Beach

No numerical information is available regarding the baseline or proposed level of use at the City of Coronado Beach. Use of the City of Coronado Beach is infrequent and involves linear foot travel of small groups or individuals along the beach from NASNI to SSTC-N. The frequency of use is not expected to substantially increase, based on discussions during consultation (Tamara Conkle 2009).

Silver Strand State Beach

No numerical information is available regarding the baseline or proposed level of use at Silver Strand State Beach. Use of the Silver Strand State Beach is infrequent and involves linear travel of vehicles or foot travel by small groups or individuals along the beach from SSTC-N through SSSB en route to SSTC-S. Personnel and vehicles that use Silver Strand State Beach for transit stay outside of the marked and protected area. The frequency of use of SSSB is not expected to substantially increase, based on discussions during consultation (Tamara Conkle 2009).

Increased Boating Activity and Training Disturbance in San Diego Bay and Pacific Ocean Waters

Quantification of the current human use within action area bay and ocean waters is unavailable; however, the action area waters are already subject to a relatively high level of human activity associated with recreational use, commercial use, and military training. The proposed action will increase the level of in-water activity in waters that lie within the action area. Activities that are conducted exclusively in-water will increase from 999 to 1,584 activities per year (i.e., 59 percent) (from information in Table 1 and Table 2).

In-water activities include the operation of large motorized vessels, small watercraft, underwater demolitions, as well as swimming operations involving small groups of people. Specific information regarding the baseline level of activity and relative increases of various types of activity in different portions of the action area is not available. However, each individual training event in the marine portion of the action area will involve use of a relatively small discrete area compared to the overall size of the action area. We presume that the level of disturbance created by the increase in boating and swimming activity will be insignificant compared to the overall baseline level of boating and swimming activity within the action area. The increases associated with the proposed action will, however, contribute to the incremental increases in human disturbance in San Diego Bay and the nearshore ocean waters.

Exercises that include potential for underwater demolition activities will increase approximately 48 percent from approximately 398 to 759 times per year. Activities will be conducted in the ocean waters adjacent to SSCT-S and SSTC-N, but they will not occur within the waters of San Diego Bay.

Increased Aircraft Activity Over Land and Water

The number of activities that entail helicopter use is projected to increase as part of the proposed action. Under baseline conditions, approximately 754 sorties are flown per year for SSTC training with an estimated 80 percent of these activities extending over the water. Helicopter sorties would increase by approximately 110 percent to an estimated 1,508 sorties per year. Helicopter travel will increase over San Diego Bay as helicopters travel from NASNI and NAB to training areas in SSTC-N (bay-side boat training lanes) or SSTC-S Inland (Figure 1a). The number of sorties over San Diego Bay will increase from approximately 100 to 150 per year to

350 to 400 per year. Helicopters will travel below 152 m (500 ft) above ground level when enroute down the bay and will travel over waters that are within the boundaries of the South San Diego Bay Unit of the San Diego Bay NWR. Helicopters will not hover at low altitude directly over the beach and will land only within the existing designated landing area at NASNI and Turner Field (inside the Bayside compound of NAB) and the northern inland portion of SSTC-S.

Helicopter rotors create high velocity air movement and noise that may disturb birds or other wildlife. Some studies on shorebirds and seabirds have detected only minor, short duration disturbances associated with nearby helicopter activity (Kushlan 1979, Johnston 1995). Helicopters that are enroute to action area destinations will be travelling rapidly, primarily over the water. Birds may react to the passing helicopter by becoming alert, running, or flushing. Since these aircraft will: 1) not usually be passing directly over the nest sites on land; 2) will not hover over the beach, and; 3) will land only in the existing designated landing area, the potential disturbance associated with the aircraft travel and associated impacts to nesting birds will be reduced. The noise and potential disturbance associated with aircraft travel is, however, expected to incrementally reduce the suitability of the adjacent nest sites by contributing to the level of human activity in the area. In addition, helicopters will pass over nest sites on the beach at NASNI and at SSTC-S. Birds that nest or forage under the flight path are likely to be subjected to increasing levels of disturbance as helicopter training increases. Aircraft may also hover over the water, which will lengthen the duration of the noise and rotor wash in discrete areas during training activities and may temporarily affect foraging behavior of birds in the bay or ocean.

Introduction of Military Working Dogs to SSTC-N, SSTC-S Beach, and Inland

The proposed action will result in regular presence of military working dogs on SSTC-N Beach and eventually at SSTC-S Beach once kennel construction is planned and completed. The presence of military working dogs is likely to disturb birds that use SSTC-Beaches for nesting, roosting, and foraging.

2. Species-Specific Effects

California least tern

Increased frequency training, and addition of new activities, will increase the level of human activity in the least tern breeding, roosting, and foraging areas within the action area and is likely to result in increases in disturbance, observed injury or death to individuals, and reduction in the reproductive success of least terns nesting at SSTC-N Beach.

Seabirds such as the least tern breed in colonies and are particularly sensitive to the presence of human activities within or near the colony (Chardine and Mendenhall 1998). Several studies have been done on the responses of seabirds and shorebirds to disturbance resulting from human activities (see reviews by Hockin et al. 1992, Carney and Sydeman 1999, and Nisbet 2000). In general, the responses of least terns to training activities are likely to be similar to the response of

other seabirds and shorebirds to similar human activities, although the responses of birds to human activities varies between species (Blumstein et al. 2005) and may depend on: the distance to and relative quality of other suitable sites; the relative risk of predation or density of competitors at alternate sites; and the investment that an individual has made in a site (Gill et al. 2001). Reactions to human activities in or around a seabird colony include: temporary changes in behavior or internal state such as heart rate; changes in habitat use; reduced adult attendance at nest sites; increased vulnerability to predation; alarm responses; decreased foraging and resting; increased movement and energy expenditure; reduced productivity; and permanent nest site abandonment (Smith and Visser 1993, Liley and Sutherland 2007, Ruhlen et al. 2003, Keller 1988, Chardine and Mendenhall 1998, Johnston 1995, Woodfield and Langston 2004). Population and/or fitness-enhancing behaviors, such as parental care and mating, may be detrimentally impacted in response to repeated disturbance, even when overt reactions to disturbance are not visible (Weston and Elgar 2007). Consequently, human activities may impact the reproduction, survival, and local population persistence of birds.

No assessment of least tern behavioral response to military training activities within or near nesting areas at SSTC-N has been conducted; however, examination of least tern response to military training activities was conducted at Camp Pendleton (Johnston 1995). Least terns nesting at undisturbed sites within Camp Pendleton spent significantly more time sleeping, brooding, and normally incubating than terns at training sites within Camp Pendleton. We expect that least terns nesting on SSTC-N beaches will exhibit behavioral responses similar to those observed at the training sites at Camp Pendleton. However, birds may also habituate to human activities (Baudains and Lloyd 2007, Lord et al. 2001), particularly if they do not result in predation events or nest loss. Based upon the continued use of the SSTC-N Beach for least tern nesting, roosting and foraging, it appears that some level of least tern habituation to the baseline level of human activity has occurred within the action area.

The effects of future changes in training activities on the least tern depend primarily on the footprint, timing, and frequency of training events during the breeding season in relationship to the least tern nest distribution. If the frequency of training activities in the immediate vicinity of tern nests increases, the potential for disturbance, harm or injury to least terns will increase. The dynamic nature of military training and least tern nesting complicates effects analysis regarding the proposed changes in training and management within the action area. Although generalities regarding the frequency and location of training activities may be estimated, as presented above (Table 16, Table 17), the exact number, timing, and location of future training events is unavailable. Likewise, baseline distribution of least tern nests is known, but future distribution within the action area may shift in response to reproductive failures or changes in topography or disturbance.

The Navy's ability to identify areas that are likely to support tern nests and schedule training activities outside of these areas is an important minimization measure that will reduce the impacts of future training activities. Due to the level of uncertainty regarding future training and tern distribution, our analysis regarding the effects of the proposed action is based on the following presumptions:

- 1) The models developed in support of the BA to predict future activity scheduling at SSTC-N Beach provide an accurate depiction of future activity levels and distribution of various training activities;
- 2) Training activities will be spaced evenly throughout the year;
- 3) Navy schedulers will be provided with weekly reports that depict nest abundance and distribution information and will use this information to bias activities with heavier beach use towards beach lanes with fewer nests, when it does not impact the realism of training or training needs;
- 4) Future terrestrial training needs in the southern 3 beach lanes at SSTC-N will be infrequent; and
- 5) Least terns will exhibit the same response to adjacent training activities that has been observed from 1994 to the present.

The proposed action will allow for increases in military training activities in and adjacent to the SSTC-N Beach and thereby reduce the suitability of this habitat to support least tern nesting. Approximately 51.92 ha (128.29 ac) of least tern habitat at SSTC-N Beach will be directly or indirectly affected by the proposed action (Table 6). The proposed action also calls for continued management of the Delta Beaches to encourage least terns to use of this site.

The effects of the proposed action on tern and plover nesting and roosting habitat that is included within the southern 3 beach lanes (i.e., Blue 2, Orange 1, and Orange 2 [6.44 ha (40.63 ac)]) is of primary concern, since: 1) this area was marked and avoided during the breeding season under baseline conditions from 2005 to 2009 to provide an area free from human activity for nesting terns and plovers; 2) this area is used as a night roost by least terns; 3) this area supported an average of 6.3 percent of the U.S. rangewide least tern nests initiated annually from 2005 to 2009, and 4) no marking of this area and assurance of avoidance is proposed as part of the current Proposed Action.

From 2005 to 2009, the Navy trained in northern 7 beach lanes (i.e., Yellow1 to Blue 1) without marking or avoiding least tern nests that occur in these lanes. Frequent monitoring of the tern and plover nests within the beach lanes has been supported by the Navy, so information regarding recorded incidental take due to training activities is available. Information regarding the precise location and timing of training activities is, however, lacking.

Effects on Nesting

Proposed increases in the frequency and footprint of military training activities will result in increased frequency of foot, vehicle, and air traffic at SSTC-N Beach (Table 17) and increased air traffic in the vicinity of the Delta Beaches and the San Diego Bay NWR. The frequency of foot, vehicle, and air traffic will vary depending on the beach lane or location and is also likely to vary between years as training needs change. People and equipment may be present on the beach during the day and the night. Foot traffic, air traffic, and vehicle traffic at SSTC-N Beach and the Delta Beaches is likely to result in noise and/or potential disturbance that may affect the nesting behavior of least terns and reduce their ability to nest in some areas. Although an

increase in helicopter traffic is anticipated over South San Diego Bay Unit of Service's NWR, the distance between the route of travel and terns nesting at the NWR is approximately 2 km (1.2 miles). Therefore, we do not anticipate the increase in helicopter traffic over the bay to cause any appreciable disturbance to terns nesting at the NWR.

If terns nest in SSTC training lanes, nests may be crushed by foot or vehicle traffic, or left unattended or abandoned by adult terns due to disturbance. Nests that are unattended may also be exposed to increased predation risk, or reduced hatching rates from interruption of incubation. Least terns that are disturbed at night, particularly if vehicle headlights are approaching them, are likely to flush and fly erratically, sometimes towards the light (Brian Bonesteel 2009). Least terns that do flush and fly from nests will face increased exposure to nocturnal predators, such as burrowing owls (*Athene cunicularia*). If vehicles are driven through nesting areas at night without headlights, nesting adult terns may not flush in time to escape being run over. As the frequency of training increases at the SSTC-N Beach, it is likely that the overall suitability of the SSTC-N Beach for nesting will be reduced, particularly in beach lanes with frequent training activities above the beach crest. Beach lanes that continue to sustain low levels of training activity above the beach crest are likely to remain more suitable for nesting than other beach lanes due to the lower frequency of training activity.

The introduction of military working dogs to the SSTC-N Beach is of particular concern because seabirds and shorebirds respond more strongly to the presence of dogs than to the presence of people. Burger et al. (2007) reported that shorebirds studied in Delaware responded most strongly to the presence of dogs when compared to other types of disturbance and did not return to beaches following a disturbance by a dog. Dogs may respond to the presence of birds on the beach by chasing birds, causing further disturbance. The potential for military working dogs to chase shorebirds is reduced by the Navy proposal to keep the dogs on leash maximum of 3m (10 ft)] at all times, however Lord et al. (2001) provided experimental evidence that shorebirds perceive dogs, even leashed and muzzled, as posing more of a threat than humans and that shorebird avoidance response to dogs exceeds their response to humans. Dog walking may result in the displacement of native bird species (Banks and Bryant 2007).

The potential for military working dogs to encounter least terns during physical conditioning activities is reduced by the Navy proposal to enter and exit the beach only at beach lane Yellow 1, which is more intensively used under baseline conditions, supports little potential habitat, and does not currently support nesting least terns. Since military working dogs and dog handlers will not typically cross the beach with dogs, but will travel along the shoreline below the beach crest and mean high tide line, the potential for disturbing terns is also reduced. However, if training is conducted during at high tide, dogs will pass in proximity to tern nests and are more likely to illicit a behavioral response. In some instances, crossing the beach will be required and personnel and dogs will travel across the beach to the sand road along the inland border of the training lanes. Crossing the beach is likely to result in greater disturbance and impacts to least terns than running along the shoreline, since the dogs are likely to run toward and pass more closely to the tern nests. Traveling along some portions of the sand road is also likely to result in

disturbance to nesting terns, particularly in areas where there is a direct line of sight between the sand road and nearby nests.

As stated above, the Navy will conduct a study to assess the effects of military working dogs on tern and plover behavior and productivity prior to conducting exercising of the dogs in the southern 3 beach lanes at SSTC-N, or using military working dogs in OTB training activities at SSTC-N Beach. Results from this study will be used to determine whether use of dogs is likely to cause additional effects to terns and plovers and to develop additional conservation measures, if necessary.

If dogs are effectively restricted to areas below the crest and mean high tide line and the sand road, and if they maintain a rapid pace as they transit to the area, we do not anticipate that they will cause any measurable effect on tern use and productivity at SSTC-N Beach. However, if dogs come within proximity [i.e., 30 m (98 ft)] and in line of sight of nests, we anticipate that terns will flush from their nests and leave nests unattended for some period of time. It is unknown whether or not least terns will habituate to repeated exposure to passing leashed dogs over time. Based on studies of other bird species, it is likely that least terns will continue to exhibit a response to dogs that they see passing in proximity to their nests. Exposure of nests will increase the potential for predation by species such as the gull-billed tern and also increase the potential for other adverse effects from inadequate incubation or reduced parental care.

Least terns nesting at SSTC-N appear to be tolerant of some adjacent disturbances under the current levels of training (Table 10). Overall, the number of least tern nests on SSTC-N Beach has increased from 577 nests in 2004 to over 1,272 nests in 2009 (Table 10). Of this total, the number of nests within the northern 7 beach lanes increased from 294 to 469 (Table 10). This level of nesting activity has occurred at the site while the northern 7 beach lanes supported training activities during the breeding season, although the exact number of activities is unknown. During this time period, relatively few eggs or chicks have been recorded as harmed or killed as a result of training activities (Table 12) despite the training occurring in the northern 7 beach lanes. Under current conditions, the tern nests in the northern 7 beach lanes have not been marked for avoidance, but nest locations have been delineated with tongue depressors for monitoring purposes. Training personnel have been anecdotally reported to avoid tern nests in these lanes despite the lack of a requirement to do so (U.S. Navy 2009e). In addition, many of the training activities at SSTC-N Beach entail amphibious activities that may occur at adequate distance from the tern nesting activity to reduce the associated disturbance to a level acceptable by many least terns.

Least terns nesting at SSTC-N Beach also appear to respond to cumulative training disturbances by nesting more frequently on the portions of the training lanes that are subject to lower levels of disturbance (Table 10, Figure 7). From 2005 to 2009, the average nest density of 11.2 tern nests per ha (4.5 tern nests per acre) in the northern 7 beach lanes used for training during the breeding season (i.e., Yellow 1 to Blue 1) was lower than the average nest density of 31.1 tern nests per ha (12.6 tern nests per ac) observed in the southern 3 beach lanes that were not used for training during the breeding season (i.e., Blue 2, Orange 1, and Orange 2) (Figure 7) (Appendix E).

The lowest densities of terns at the SSTC-N Beach occur within beach lanes Green 1, Green 2, and Blue 1, where larger training activities are prioritized, and beach topography has been modified to discourage nesting, and at Yellow 1, which hosts a small beach and is frequently used for physical fitness training (Figure 7). The projected 23 percent increase in training exercises (Table 16) is likely to increase the training footprint in the area, thereby by reducing the suitability of the site for nesting and increasing the potential for injury or death of least terns. Based on the lane-by-lane assessment of baseline and proposed training activities given above, the increase in training footprint is not expected to be extensive since most beach lanes will continue to support the same types of training activities as they have in the past and the number of activities conducted during the breeding season will not increase significantly in most beach lanes (Table 17).

The observed distribution and abundance of least terns across the SSTC-N Beach is consistent with observations elsewhere that show least terns can occur at relatively high numbers and densities adjacent to heavy use areas at small sites that are predictably free from regular foot, vehicle, and dog traffic (e.g. Venice Beach, Huntington Beach, Lindberg Field; CDFG 2008). The lower density observed within the most frequently used areas at SSTC-N is consistent with the lack of least tern nesting observed on recreational beaches (Service 2006), which are likely to have unpredictable and intensive human presence. For example, terns do not currently nest within the action area on the City of Coronado Beach, Silver Strand State Beach, or the SSTC-S Beach, which host more extensive human recreation activities and a higher frequency of potential disturbances than the SSTC-N or Delta Beaches. If future training use at SSTC-N Beach increases the frequency of potential disturbance to the level observed in the most frequently used beach lanes, Silver Strand State Beach, or the City of Coronado Beach, tern density throughout SSTC-N Beach might decrease to the 0 to 5 nest per ha (0 to 2 nests per acre) observed in these high use areas. However, disturbance from level of training activity proposed throughout SSTC-N Beach is not expected to approach the level of disturbance observed in the most frequently used beach lanes, or at the nearby recreational beaches (Table 16, Table 17).

Based on the anticipated frequency of training events and proposed prioritized lane scheduling in beach lanes that support fewer tern nests, training patterns and the resulting disturbance footprint is expected to remain similar to baseline conditions, with some exceptions, including a small number of activities that may occur in new locations (e.g., vehicle patrol in Yellow 2, Green 1, Green 2 and introduction of limited activities in Blue 2, Orange 1, and Orange 2). The most intensive training activities are expected to occur primarily in the beach lanes that have supported intensive activities in the recent past (Green 1, Green 2 and Blue 1), due to the Navy's proposed scheduling priorities. In addition, there remains uncertainty about when any increases in training use will be observed, since troops are currently deployed overseas far from these training areas.

If intensive training activities are underway on the SSTC-N Beach when least terns arrive in April, we anticipate that the terns will respond to the disturbance present on site and will initiate most nests away from areas that are repeatedly disturbed. Least terns that nest within the training footprint may suffer nest failure as a result of training activities and are likely to re-nest

at adjacent less disturbed sites on the SSTC-N Beach or Delta Beaches, or disperse to other sites within the San Diego Bay area (e.g. Salt Works, D Street Fill). We anticipate that least tern numbers and nest density will decline over time in areas that are subjected to repeated disturbances associated with increased training frequency. The numbers and density of least terns in adjacent less disturbed habitat is likely to increase as terns re-nest in these areas. Over time, we anticipate that least tern distribution will mirror the activity patterns on the beach, and that terns will continue to nest on the beach predominantly on the portions of the beach where less training and other human activities occur. Under the proposed action, few training exercises are expected in the southern 3 beach lanes at SSTC-N; consequently, we expect these lanes to support a higher proportion of the least tern nests on the SSTC-N Beach.

We expect the number of least tern nests to decline in beach lanes Yellow 2, Green 1, and Green 2, due to the anticipated increase in training frequency and the introduction of Vehicle Patrol training exercises. Vehicle Patrol exercises will entail vehicle travel across the beach in lanes Yellow 1, Yellow 2, Green 1, and Green 2 and could occur approximately 14 times total, or 3 to 4 times in each lane, per breeding season. The scope of the activity is likely to result in an increase in the number of eggs and chicks that are crushed each year during training events. Increased foot traffic may also disturb terns and cause them to relocate to less disturbed portions of the SSTC-N Beach. The Navy's proposal to limit the Vehicle Patrol exercises to the beach lanes that typically have fewer nests during the breeding season (i.e. Yellow 2, Green 1, and Green 2) will reduce the likelihood of injury or mortality to eggs, chicks, and adults associated with the activity.

Beach lanes Red 1 and Red 2 are likely to experience an increase primarily in the frequency of training-related foot traffic that extends beyond the beach crest and into the nesting area. Under baseline conditions between 2005 to 2009, an average of 243 least tern nests (ranging from 117-317) were established in beach lanes Red 1 and Red 2 (Table 10). Increased foot traffic in these beach lanes is likely to result in an increase in the number of eggs and chicks that are crushed each year during training events. Nest failure or disturbance from increased foot traffic may cause least terns to relocate to less disturbed portions of the beach. Overall, we anticipate that the increase in foot traffic in beach lanes Red 1 and Red 2 is likely to result in a reduction in the number of least tern nests observed in these lanes. Under baseline conditions, however, beach lane Red 1 is subject to a relatively high frequency of foot traffic (Group 1) activities, yet supports many least tern nests (Table 10, Figure 7). This pattern may continue, particularly if foot traffic activities occur repeatedly within the same area that is utilized for these activities under baseline conditions.

The most significant potential effect of the proposed action on the least tern is from future human activities within the southern 3 beach lanes that under baseline conditions from 2005 to 2009 have been marked and avoided during the breeding season (i.e., Blue 2, Orange 1 and Orange 2). This area currently provides a relatively consistent disturbance-free site to encourage nesting away from the most desired training areas. Under the proposed action, the current nest area marking techniques (flexistakes around the perimeter of the lane) will no longer be used. Instead, the Navy will mark only the eastern edge of these lanes to deter pedestrians that enter

the area from Highway 75 and mark the boundary between the SSTC-N Beach and Silver Strand State Beach by installing improved signage, a temporary barrier, and a guard shack equipped with a camera. The proposed boundary marking measures are expected to provide some level of deterrence to would-be recreational users; however, the absence of visible delineation around the nesting area may allow for increased foot and vehicle traffic into the nesting area if people travel onto the SSTC-N Beach or if linear vehicle or foot exercises stray above the crest into the nesting area. Even with perimeter signage, human intrusion unrelated to training has occurred within the southern 3 beach lanes and resulted in losses of up to 7 eggs/chicks (up to 4 nests) per year since 1999 (Table 12). We expect that such losses are likely to continue and may increase in the absence of markers delineating the southern 3 beach lanes and without intensified security to protect nesting sites. Depending on the effectiveness of markers in reducing non-training uses, and the effectiveness of beach lane scheduling, the southern 3 beach lanes may continue to be relatively undisturbed. However, the ability to facilitate and enforce avoidance where possible and appropriate (e.g., recreational activity, as well as physical fitness training and linear vehicle travel supporting in-water activities) will be reduced by the absence of perimeter markers around the nesting area. Without any delineation of the nesting areas, loss of eggs and chicks, which might be avoidable with clear delineation of the area as a nesting area, is more likely to occur during linear terrestrial activities including running exercises and logistical/support vehicle use.

Least terns often re-nest at the same sites year after year (Atwood and Massey 1988). From 2005 to 2009, the Navy trained in beach lanes Yellow 1 to Blue 1 (i.e., the northern 7 beach lanes) without marking or avoiding least tern nests, and many least terns have continued to nest in these beach lanes. The combined total number of nests that occurred in the northern 7 training beach lanes averaged 398 nests per year from 2005 to 2009, and the density of nests averaged 11.2 nests per ha (4.5 nests per ac)(Appendix E). Since the types of training activities conducted under the proposed action will be similar to those conducted under baseline conditions, we anticipate that least terns will continue to nest in beach lanes Yellow 1 to Blue 1 in spite of the increased disturbance and possible nest loss resulting from increased frequency of military training operations.

Likewise, we anticipate that least terns will continue to nest in the southern 3 beach lanes despite increased human activities associated with recreational uses and introduction of infrequent training activities into these lanes. The frequency of training is likely to remain low in the southern 3 beach lanes when compared to adjacent training lanes. Expansion of training into these lanes to resolve scheduling conflicts does not appear imminent, since troops are currently deployed overseas and training in desert areas, and the current training at SSTC is not even at "baseline" levels. Rather, in the near term, it is likely that infrequent training will only occur in these lanes to meet needs for training realism. Even when training returns to "baseline" levels and increases to meet future training needs, we expect relatively few activities to be necessary in the southern 3 beach lanes. Based on the lower expected frequency of training in these lanes and the fact that least terns have continued to nest in the northern 7 beach lanes despite training, least terns can be expected to continue to nest in high numbers (e.g. hundreds of nests) within the southern 3 beach lanes, Blue 2, Orange 1, and Orange 2.

It is likely that damage or destruction of nests, eggs, and chicks will continue to occur during training exercises, since the cryptic nests are not marked for avoidance, and nests are likely to be initiated within active training lanes. Nests, eggs, and chicks may be injured or killed as a result of foot or vehicle traffic at or around active least tern nests. In the absence of empirical information regarding the potential for nest loss, we had previously exempted the loss of all least tern nests initiated within training lanes (FWS-SDG-3452.3). Since that time, the Navy has collected information regarding the actual loss of eggs and chicks that has occurred in beach lanes that support training activities during the breeding season. Prior to 2005, relatively few instances of egg or chick death or injury were observed on the SSTC-N Beach, primarily due to the Navy's successful avoidance of tern nests (Table 10). Between 2005 to 2009, when training activities were unconstrained and least tern nests were not marked for avoidance on beach lanes Yellow 1 to Blue 1, 23 to 45 least tern eggs/chicks (equal to 12 to 22 nests assuming each nest produces approximately 2 eggs/chicks) were observed to be destroyed from training activities each year (primarily in Red 1) (Table 12). This represents 2.5 to 6.5 percent (average 4.5 percent) of the total eggs/chicks observed in the active training lanes each year during this time period (Table 12), which is much lower than the 100 percent take exempted in the past (FWS-SDG-3452.3).

Because of the uncertainties regarding the future least tern nest distribution, and location and timing of training activities during the breeding season, we cannot determine the exact number of tern eggs and chicks that will be crushed, injured, or killed, by future training activities. However, we anticipate that the number of tern eggs/chicks injured or killed as a result of training activities will increase as a result anticipated terrestrial training activity at SSTC-N Beach and the potential for a limited number of activities to occur in beach lanes Blue 2, Orange 1, and Orange 2. We also anticipate that the number of tern eggs/chicks injured or killed will remain low relative to the number of terns nesting on the SSTC-N Beach.

The Navy developed several models, described in the BA, to assess future impacts to terns from training activities. The Navy's models used anticipated training frequencies at the SSTC-N Beach (Table 1, Table 17) combined with the terrestrial activity footprint information (Appendix A) to generate a coarse estimate of the number of least tern nests (given 2006 baseline distribution) that would likely lie within the operational footprint over an entire breeding season. A general explanation of the models is included within the Navy's BA; however, the actual models were not provided during consultation. We have considered the Navy models, the level of incidental take observed under the current level of training, and the anticipated changes in training frequency and location to develop projections regarding the number of least tern eggs and chicks that we anticipate will be crushed, injured, or killed as training increases.

The Navy's model originally estimated that 269 least tern nests (538 eggs/chicks) could lie within the footprint of all future training activities conducted at SSTC-N Beach during the 4-month peak breeding season (DoN 2008). However, when modified to account for temporal changes in nest presence and training activities during the breeding season, the Navy's model estimated that 88 tern nests (166 eggs/chicks) per year would be injured or killed under

“baseline” levels of training, and that 105 nests (210 eggs/chicks) per year would be injured or killed under future increased levels of training.

The “baseline” level of incidental take predicted by the Navy’s models, even after refinement to account for temporal changes in nest presence and training activities, is far higher than the level of incidental take that has been observed under current levels of training. For example, the observed level of injury or death of eggs/chicks in 2006 was 14 eggs/chicks (i.e., 7 nests), which is far lower the loss of 166 eggs/chicks (88 nests) predicted by the model under “baseline” levels of training. Based on this comparison of modeled and actual loss in 2006, the Navy’s model appears to considerably overestimate the likely levels of incidental take. However, the model is using expected “baseline” training data, which may not reflect the current level of training at SSTC.

Under the current level of training, a maximum of 6.5 percent of the eggs/chicks in northern 7 beach lanes were injured or killed by training activities from 2005 to 2009 (Table 12), when training was avoided in southern 3 beach lanes during the breeding season. The Navy’s models indicated that nest loss will increase from the predicted “baseline” of 88 nests/year to 105 nests/year (i.e., 19 percent) due to increases in training activity. Applying the model’s predicted 19 percent increase to the maximum observed loss of 6.5 percent of the eggs/chicks affected by existing training, we estimate that up to 8 percent of the eggs/chicks at the SSTC-N Beach could be killed or injured each year due to increased training activities. The estimated loss of up to 8 percent of the eggs/chicks at SSTC-N does not take into account the difference, which is unknown, between the current level of training activity, and the level of activity identified as “baseline” in the BA. As training levels increase and approach the “baseline” identified in the BA, re-assessment of the anticipated levels of incidental take may be required.

The Navy proposes to continue its successful practice of moving least tern nests (eggs) small distances to safer locations when they are initiated in high risk training areas (e.g., in the Blue 1 Demo Pit, Beach Crossing Lanes).. Since 1999, between 0 and 15 eggs have been moved each year (39 eggs total) (Table 12), and most of these successfully hatched. Due to the proposed increases in training activities (including vehicle travel in the southern 3 beach lanes), we anticipate that more nests may require location, and up to 10 tern nests (20 eggs) will be moved small distances to safer locations at SSTC-N Beach.

The Navy has proposed to actively discourage tern nesting at SSTC-S Beach by destroying nest scrapes and removing any least tern eggs that are laid. Based on the estimated 34 percent increase in training activities anticipated at SSTC-S Beach (Table 18), we believe that the likelihood of least tern nesting will diminish as training increases, and this is not a measure we recommend or authorize to minimize impacts to the least tern. Should least terns attempt to nest in this area, the potential for incidental take of nests and chicks from training activities can be addressed by amendment to this biological opinion.

Beyond the direct impact to individual nests, eggs, and chicks described above, the proposed action could result in a change in the least tern distribution within the action area. For example,

it is possible that the relative distribution of least tern nests may increase at North Delta Beach and South Delta Beach as disturbance at SSTC-N Beach increases; however, habitat conditions at the Delta Beach sites appear less favorable to those of the oceanfront beach, given the shift in least tern distribution to favor the SSTC-N Beach in recent years (Table 11). The future status of South Delta Beach may also be affected by remediation needs, since this site is a Munitions Response Program site contaminated with an unknown level of historical munitions, and it may require future cleanup. We anticipate that without enhancement, least terns will continue to favor the oceanfront beaches at SSTC-N over the Delta Beaches.

The Navy proposes to develop and implement a Long Term Habitat Enhancement Plan, which is expected to improve the nesting conditions for terns in select areas of SSTC-N, Delta Beaches, and SSTC-S. Improving nesting conditions in selected areas at SSTC will provide additional nesting habitat and may allow terns to relocate within the action area if they are displaced by training activities. Habitat enhancement will include removal of non-native plants followed by revegetation with native plant species. The Long Term Habitat Enhancement Plan will include measures to ensure that any terns using sandy beach areas upon removal of non-native vegetation are not subsequently disturbed or harmed during restoration or site maintenance activities if they occur during the breeding season. These measures may include: coordination with tern/plover monitors, passive irrigation systems, timing planting, and maintenance to reduce conflict.

Predator management activities will continue to provide some benefit to terns on the Silver Strand on SSTC-S, SSTC-N, and NASNI beaches. However, the effectiveness of predator management is likely to continue to be reduced by vandalism to traps and ME's and the inability to stop predation by the gull-billed tern.

At SSTC-N Beach, we expect a change in the distribution of least tern nesting activity with a smaller proportion of the SSTC-N Beach tern nests initiated in the northern 7 lanes, a greater proportion initiated in the southern 3 beach lanes (Blue 2, Orange 1, and Orange 2) and overall, a reduction in the number of nests initiated on the SSTC-N Beach. Management of these beach lanes in a manner that minimizes impacts (e.g., proposed scheduling of activities preferentially in beach lanes with fewer least tern nests) will continue to be important to the least tern. Based on the types and frequencies of training activities proposed, we do not expect the proposed change in the training footprint or frequency to significantly change the overall use of the SSTC-N Beach for nesting by the least tern. Thus, though shifts may occur in the distribution of nests, we expect the average density of nests across the beach as a whole to remain similar to that observed under baseline conditions between 2005 and 2009 [i.e., between 11 and 21.1 nests per ha (4.4 and 8.5 nests per ac) (Appendix E, Table E.1)]. The number of least tern nests initiated across all beach lanes each year under baseline conditions between 2005 and 2009 at SSTC-N Beach represented between 7 and 13.6 percent of the total U.S. rangewide least tern nests, averaging 11.3 percent of the rangewide nest number (Appendix E, Table E.2). Under the proposed action, we expect SSTC-N Beach to continue to support least tern nesting activity within this range. We recognize, however, that any future assessment of changes in the size and distribution of tern colony at SSTC-N must take into account gull-billed tern depredation and other factors that could affect the colony but are unrelated to training.

Effects on Night Roosting

Least tern night roosts in the action area have not been extensively studied, but a night roost has been observed in the southern 3 beach lanes at SSTC-N Beach (i.e., Blue 2, Orange 1 and Orange 2) and in area near the mudflats at Delta Beach North and South. The roosting site shifts within the 3 southern beach lanes (DoN 2009a, Brian Bonesteel 2009). Nighttime training activities could disturb roosting terns and result in mortality of individual adults. Least terns that are disturbed, particularly if headlights are approaching them, are likely to flush and fly erratically, sometimes towards the light (Brian Bonesteel 2009). Least terns that do flush and fly from the night roost will face increased exposure to nocturnal predators, such as burrowing owls (*Athene cunicularia*). If vehicles are driven through the night roost without headlights, the roosting terns may not flush in time to escape being run over. If the night roost is repeatedly disrupted by nighttime training activities, especially if lighting is used, least terns may discontinue roosting in the 3 southern beach lanes.

Only infrequent training activity is anticipated in the southern 3 beach lanes. The frequency of nighttime and daytime activities is not provided, so the likelihood of nighttime activity within this beach lane is unknown, but it is considered unlikely to occur on a regular basis. We anticipate, in most cases, nighttime training will cause roosting least terns to shift slightly and on rare occasions cause terns to fly to the roosting site near the mudflats at Delta Beach North and South. Due to the likely infrequency of nighttime training within the southern 3 beach lanes at SSTC-N Beach, we anticipate that terns will continue roosting in these lanes and that one adult least tern per year may be injured or killed as a result of nighttime training activities.

Effects on Foraging

Increases in training activities, including boating and helicopter activities, are proposed in or over waters that are foraging areas for least terns. The proposed increases in training frequency are expected to increase the level of human disturbance in foraging habitat within the action area, primarily in the nearshore ocean waters in the SSTC-N, SSTC-S, and NASNI boat lanes, but also in San Diego Bay. Least terns may respond by avoiding the areas of disturbance, and since some of the in-water training areas are adjacent to least tern nesting colonies, disturbance may result in deterrence of least terns from foraging in habitat that is closest to the nesting colonies.

Increases in disturbance to foraging areas in San Diego Bay are potentially more significant than in the ocean waters, since habitat within San Diego Bay is more limited than ocean foraging habitat and may provide resources not available in the ocean during years with less food supply (Service 2006f). Based on examination of the various proposed training activities, it appears that most training in San Diego Bay will entail transit of vessels between berths at NAB and nearshore ocean training areas in the SSTC-N, SSTC-S, and NASNI Boat Lanes. Helicopter transit between NASNINAB and SSTC-S will also increase the potential for localized disturbance within the San Diego Bay foraging areas. In addition, other limited training in San Diego Bay will usually include only a small number of boat or aircraft (e.g., no battalion sized landings).

Generally, increased disturbances associated with boating can displace waterbird access to feeding areas and may result in subsequent loss of production of young (Conservation Committee Report 1978, Huffman 1999, Manning 2002). Increased boating activity, particularly high speed boating, can reduce foraging by least terns. Birds that forage slowly or ineffectively, such as fledglings, may not be able build the requisite fat reserves that are especially important to successfully make their upcoming migratory journey (Lafferty 2001). As such, survivorship of first-year least terns (i.e., recruits) could be affected by increased disturbances within foraging areas, especially in years when the food base is low.

The Navy (2003) found that least terns tended to forage in areas with relatively less boating activity. Bailey (1995) suggests that heavy boating activity in an estuary near Alameda Naval Air Station dissuades least terns from foraging in suitable habitat at this location. Though the least terns that are displaced from highly disturbed foraging habitat may fly to other areas to forage, resulting increases in the number of flights or flight times can result in energy inefficiencies. Energy inefficiencies can result in reduced productivity and fitness (Manning 2002).

Air traffic (i.e., helicopter sorties) over least tern foraging areas will also increase with implementation of the proposed action. Helicopter noise and air turbulence is likely to result in temporary displacement of foraging least terns. We expect that least terns will avoid helicopters that are training over the water, and the potential for air strike from increased helicopter activity to be low.

The level of activity and associated disturbance within bay and nearshore ocean waters of the action area is expected to increase over baseline conditions; however, activities within the nearshore bay and ocean waters are distributed between numerous sites throughout a large area, as are the foraging resources for the least tern. The level of increased activity at any particular location throughout the action area is unknown. We expect that temporary disturbances may result in displacement of terns, but we also expect that adequate resources will be available in the adjacent nearshore waters of the action area. If the boating and air traffic disturbance levels increase to an unknown threshold, they could result in a reduction in the foraging success of terns, negatively affect the fitness or reproductive success of some least terns within the colony by reducing clutch sizes, lowering chick weights, and increasing levels of egg abandonment and non-predator chick mortality (Atwood and Kelly 1984, Massey 1988, Massey et al. 1992). Due to the widely dispersed, temporary and intermittent nature of marine training events, we consider such effects to least tern possible, but unlikely.

Underwater demolition training could temporarily disturb, injure, or kill terns that may be foraging in the water near the planned training event. However, the Navy proposes to time sequential charges in a manner that minimizes the potential for impacts to diving birds, and to conduct underwater demolition activities only after pre-exercise surveys have assured that diving seabirds are not within the training area. It is possible that terns could be overlooked during pre-exercise surveys due to their small size and the large area that will require survey prior to each exercise. However, terns forage by quickly diving onto and removing prey from the water

surface. Based on the proposed minimization measures and least tern's foraging behavior, underwater demolition training is not expected to cause any measurable impact to the tern.

Effect on Recovery

The most recent least tern recovery plan was published in 1985 (Service 1985). Since completion of the recovery plan, new information about the least tern's distribution, numbers, population dynamics and threats to the species have been identified and discussed in the Service's 5-year review of the least tern's status. The Least Tern 5-Year Review recommends that the least tern be downlisted to threatened status based on recovery efforts (e.g., reduction in threats through management of nest sites) and increases in the species abundance from 600 pairs in 1973 to roughly 7,100 pairs in 2005 (Service 2006a). The management actions carried out for least terns on military lands in southern California, including the intensive management at SSTC-N and Delta Beaches, has contributed greatly to the improved status of the least tern. The Service's 5-year review recognizes the importance of maintaining management actions at least tern nest sites to effect recovery of the species.

Future increases in training are expected to increase disturbance to least terns and their habitat within the action area and result in additional loss of eggs, chicks, and adults. However, the Navy will continue to minimize the effects of their training activities on least terns (e.g., prioritization of training activities in lanes with fewer nests) and to actively manage least tern nesting sites within the action area. (e.g., predator management, site preparation, and monitoring). With implementation of these actions, the SSTC-N Beach and the Delta Beaches will continue to support abundant least tern nesting activity and thereby continue to make a substantial contribution to the recovery of the species.

Western Snowy Plover

The effect of future training on the snowy plover depends primarily on the footprint, timing, and frequency of training events. Although generalities regarding training are known, the exact number, timing, and location of future training events is unavailable. Likewise, baseline distribution of western snowy plover nests is known, but future distribution may shift in response to reproductive failures or changes in topography or disturbance.

The proposed action will increase military training activities and associated disturbance on a total of approximately 97.33 ha (240.54 ac) of action area beaches [51.92 ha (128.29 ac) at SSTC-N, 18.34 ha (45.35 ac) at SSTC-S, and 27.07 ha (66.9 ac) at NASNI]. This will incrementally reduce the suitability of this habitat to support snowy plovers. The area that is included within the southern three beach lanes at SSTC-N, Blue 2, Orange 1, and Orange 2 (i.e., 16.44 ha or 40.63 ac) is of particular concern, since this area is not disturbed during the breeding season under baseline conditions and provides a refuge for male plovers and their broods once they leave the protection of the nest.

Effects on Nesting

Increased human and dog activity, and associated disturbance on the action area beaches, is likely to affect the breeding activity of plovers and the location of plover nests. Plover nests occur within active training lanes at SSTC-N, where they will experience more frequent exposure to foot and vehicle traffic as training activities increase. Plovers also nest at SSTC-S and NASNI under the flight path used by military helicopters, where they will be more frequently exposed to noise and rotor wash. Plovers nesting at SSTC-N and SSTC-S are also likely to be disturbed by the introduction of military working dogs, as discussed above for the tern.

Under baseline conditions, the frequent presence of recreational dogs at SSTC-S Beach likely contributes to the lower overall nesting use by plovers at this beach. The introduction of military dogs may further reduce the plover use of SSTC-S Beach; however, if appropriately managed, the presence of leashed working dogs may result in a lower degree of impact than detected in previous studies (e.g., Burger et al. 2007) of less controlled situations involving dogs.

Military dogs will remain on a 3m (10 ft) leash to reduce the possibility that they will chase plovers; however, plovers are still likely to respond to the presence of dogs on the beach. Handlers with dogs will enter/exit the SSTC-N Beach only at beach lane Yellow 1, which is more intensively used, supports little potential habitat, and does not currently support nesting snowy plovers. Dogs will usually remain in transit, running, and on the hard pack; however, some use of the soft packed sand on the sand road or near the beach crest may occur. Plovers that are foraging or nesting near the beach crest, sand road, or near the demo pit, may observe or encounter dogs and react to their presence. Since dogs will be on-leash and in transit parallel to the shore, they will present less of a threat to nesting birds than they might if they were running in a freer more erratic fashion. Whether plovers at SSTC-N Beach will acclimate to the presence of military working dogs as they appear to have acclimated to some other types of disturbances at this beach remains unknown. Dogs may respond to the presence of birds on the beach by chasing birds, causing further disturbance, however the potential for chasing behavior may be limited by the wild animal avoidance training that the dogs will receive prior to exercising at SSTC Beach. The high number (i.e. hundreds) of birds present at the SSTC-N Beach during the breeding season, including terns and plovers, is likely to present a potential distraction to the dogs that are exercising. Dogs that are proposed to be exercised at SSTC-N and SSTC-S Beaches will, however, be trained to avoid wild animals, which may limit the response of the dogs to plovers and terns on the beach.

SSTC-S Beach experiences a significant level of recreational trespass, including off leash dog walking, under baseline conditions. Introduction of the exercise activities for up to 10 Military Working Dogs may, however, substantially increase the amount of canine activity at SSTC-S Beach and disrupt plover foraging and breeding activities. As stated above, the Navy will conduct a study to assess the effects of military working dogs on plovers that will be used to develop additional conservation measures, if necessary.

Plovers will be less likely to initiate nests in areas that experience significant increases in disturbance during the breeding season. For example, plovers currently nest at SSTC-S on the beach that is likely to experience an increase in foot and vehicle traffic as part of Amphibious Assault exercises, and will also experience an increase in helicopter traffic as helicopters travel from the ocean to SSTC-S Inland area. As frequency of training activity increases, we expect the likelihood of plover nest establishment in this area to diminish. Plovers may respond to increased activity by seeking alternative, less disturbed nest sites, potentially within the marked boundaries of the adjacent Silver Strand State Beach nesting area, the southern 3 beach lanes at SSTC-N, or more distant locations. Some plovers are, however, likely to continue to use SSTC-S Beach, since it will remain less disturbed than adjacent recreational beaches, even with the increased helicopter traffic, vehicle patrols and presence of dogs.

We anticipate that plovers will respond to increased activities in some parts of the beach by relocating and that the number of plover nests, over time, will increase in parts of the action area that receive less disturbance primarily within beach lanes Blue 2, Orange 1, and Orange 2, protected areas at NASNI Beach, and Delta Beaches. The presence of increasing numbers of least terns in these areas is also anticipated, as outlined above. High tern density may reduce the suitability of some area(s) for plover use, since plovers usually nest in association with terns, but outside of higher tern density nesting areas. This pattern has not been observed at the southern 3 lanes of SSTC-N Beach (i.e., plovers continue to nest predominantly in the southern 3 beach lanes despite higher tern density), however, so plovers may nest in high density tern colonies in the absence of other nearby undisturbed habitat.

The proposed increase in training activities is likely to result in an increase in the number of plover adults, chicks, or eggs that are killed or injured during training activities, particularly if the number of simultaneous nests exceeds 22, since avoidance measures (i.e., marking and buffering) will be implemented only for 22 concurrent nests. From 2005 to 2009, the maximum concurrent active plover nests at SSTC-N and SSTC -S Beaches ranged from 12 to 22 nests (Table 14). Therefore the proposed avoidance of up to 22 concurrent nests is likely to result in the continued protection of most of the plover nests at SSTC-N and SSTC -S Beaches, though plover chicks and adults will be at increased risk once they depart from their nests since more training activities will be occurring on the beaches.

Plover chicks often move extensively across the beach with the adult male parent (Fancher 2003), and the adult male parent is likely to lead the chicks to an area of reduced disturbance. Under current conditions, an area of reduced disturbance is provided by the marked buffers surrounding nests and the marking and avoidance of the southern 3 beach lanes at SSTC-N. In these areas chicks and adults are less likely to be crushed as they move across the beach. Limitations on the number of nests buffered and marked and introduction of training activities into the southern 3 beach lanes is likely to reduce the amount of available undisturbed area for movement across the beach. It is likely that the survivorship of plover chicks at SSTC will decrease as the frequency of training increases, particularly if no undisturbed area is available. Ruhlén et al. 2003, reported evidence of reduced snowy plover chick survival on recreational beaches during periods of peak human use.

The lack of a proposal to continue to mark the southern 3 beach lanes (when training is not occurring) to facilitate avoidance may also result in increased unscheduled or unauthorized uses, resulting in additional disturbance and impacts to adults, eggs and chicks. However, based on the Navy's commitment to use beach scheduling procedures to bias activities with heavier beach use towards beach lanes with fewer nests when it does not impact the realism of training or training needs, the southern 3 beach lanes are likely to remain less disturbed by training activities than the northern 7 beach lanes.

Under baseline conditions, up to one plover chick per year has been documented to be killed by training, with no documented plover death or injury during most years. In light of the proposed increase in training and changes in conservation measures, we anticipate that 1 active nest, including up to 3 eggs or 3 recently hatched chicks, and an additional 5 chicks (i.e., already mobile and out of the nest) per year could be killed or injured due to training activities at the SSTC-N and SSTC-S Beaches.

The Navy proposes to develop and implement a Long Term Habitat Enhancement Plan that is expected to improve the nesting conditions for terns and plovers in select areas of SSTC-N, Delta Beaches, and SSTC-S. Improving nesting conditions in selected areas at SSTC will provide additional nesting habitat and may allow plovers to relocate within the action area if they are displaced by training activities. Habitat enhancement will include removal of non-native plants followed by revegetation with native plant species. The Long Term Habitat Enhancement Plan will include measures to ensure that any plovers using sandy beach areas upon removal of non-native vegetation are not subsequently disturbed or harmed during restoration or site maintenance activities if they occur during the breeding season.. These measures may include: coordination with tern/plover monitors, passive irrigation systems, timing planting and maintenance to reduce conflict.

Predator management activities will continue to provide some benefit to plovers on the Silver Strand on SSTC-S, STTC-N, and NASNI beaches. However, the effectiveness of predator management is likely to continue to be reduced by vandalism to traps and ME's and the inability to stop predation by the gull-billed tern.

Overall, we expect plovers to continue to nest within the action area on the Silver Strand on SSTC-S, STTC-N, and NASNI beaches. We anticipate that nest numbers may decline at SSTC, but that the SSTC beaches will continue to support, as estimated using maximum active nest numbers, an average of 18 plover pairs (range of 11 to 22) over a 5-year period. We also anticipate that NASNI will continue to support an average of 10 plover pairs (range of 7 to 14) over a 5-year period. If unforeseen impacts to plovers occur as a result of disease, food supply, weather, or other unpredictable variables, the number of plovers may change. Under the proposed action, the NASNI Beach is expected to experience a slight increase in the level of training use. The slight increase in disturbance associated with training use is not expected to alter the habitat quality for the plover on the NASNI Beach. We anticipate that the Navy will continue to protect and manage adequate snowy plover habitat to support 12 to 13 pairs of plovers on NASNI Beach.

The Navy proposes to continue its nest relocation program. Under baseline conditions, few plover nests have been moved; however, the proposed increased training may modify plover nest placement on the beach and result in more nests that are at risk of crushing or tidal inundation. The Navy also proposes to continue to salvage eggs of abandoned nests and release juveniles reared from salvaged eggs in an effort to reduce nest losses associated with abandonment. The number of nests that have been abandoned under baseline conditions has been less than one per year; however, we anticipate the likelihood of nest abandonment to increase as human and dog activity levels on the SSTC-N Beach increases, especially if plover nest numbers exceed 22 and some nests are not marked with blue flexistakes and avoided. Consequently, we anticipate that up to three plover nests (nine eggs) will be abandoned each year within the action area and be brought into captivity for incubation, rearing, and release onto action area beaches. Relocating nests, incubating eggs and releasing juveniles onto the action area beach, as proposed, are expected to minimize the impacts of training that could occur as a result of the proposed action.

Effects on Foraging

Western snowy plovers forage within and around the surf cast beach wrack on the ocean and bay front beaches. Because plover adults and chicks forage on the beach and may transit between nests and foraging areas, they are more likely to encounter dogs and terrestrial training activities than terns. Plovers select sites that contain fewer people and dogs than the habitat as a whole. Increased disturbance from people and dogs within foraging areas is likely to result in increased time spent in vigilance, when plovers are not searching for food. Studies of piping plovers have found that in habitats with few people, plovers can spend 90 percent of their foraging time actively searching for prey and feeding, whereas on beaches with many people they may spend less than 50 percent of their foraging time in these activities (Burger 1989). Pets within 50 m (164 ft) of piping plovers caused birds to stop feeding 52 percent of the time (Hoopes et al. 1992). Although individual disturbances are seemingly inconsequential, the cumulative effect of disturbances may result in less foraging time and reduce the fitness or reproduction of plovers. We anticipate that the increased training will cause a reduction in the suitability of the SSTC-N and SSTC-S Beaches, but that these areas will continue to support plover foraging.

Effects on Wintering

Under baseline conditions in 2008, approximately 7 percent of the Pacific Coast plovers documented during winter window surveys occurred within the action area (Table 15). Increasing levels of human activity will incrementally reduce the suitability of the action area for use by wintering western snowy plovers. Activities may result in disturbance to plovers and cause plovers to interrupt foraging activities or fly from the area. No avoidance measures are included within the proposed action to avoid beach segments identified as roosting areas for wintering plovers. If disturbed by training, however, plovers are likely to move to adjacent, less disturbed beach segments within the action area. Since it is unlikely that the entire beach will be used for training at the same time, we presume that adequate undisturbed area would remain available to support the winter population.

Effect on Recovery

The beaches included in the action area provide important breeding, feeding, and sheltering habitat for the western snowy plover and therefore have value to the recovery of this species. The action area is in Recovery Unit 6 identified in the WSP recovery plan (Service 2007a). The WSP recovery plan identifies a Management Potential Breeding Number of 65 breeding adults for the Silver Strand (including SSTC and SSSB) to help meet the recovery criteria established for Unit 6. From 2005 to 2009, the maximum concurrent active plover nests at SSTC-N and SSTC -S Beaches ranged from 11 to 22 nests or 22 to 44 breeding adults (Table 14). Future increases in training are expected to increase disturbance and reduce the suitability of SSTC and NASNI Beaches for plover nesting. An increase in plover mortality (adults, chicks, and eggs) is also anticipated. The anticipated increase in disturbance, increased mortality, and limitations placed on plover protection (e.g., introduction of training into southern 3 beach lanes at SSTC-N during the plover breeding season, only protect up to 22 plover nests) are in turn expected to limit or reduce the recovery potential of the western snowy plover in the action area compared to baseline conditions.

Despite the expected increase in training and reduction in protections afforded the plover under the proposed action, future Navy management, including: scheduling training in lanes that support fewer nests to the extent consistent with training need; predator management; habitat enhancement at the Delta Beaches, SSTC-N, and SSTC-S; monitoring; and nest marking and buffering will continue to provide a contribution towards the recovery of the western snowy plover. The Navy's proposal is not expected to preclude recovery of the plover. However, it is expected to reduce the likelihood of future population growth within the action area due to the cap placed on nest avoidance (i.e., 22 concurrent nests) and the projected increase in human activities. Thus, the proposed action may necessitate additional conservation efforts within the action area or in other parts of Unit 6 to allow for population increases that meet the recovery criteria for Unit 6 (Appendix C).

San Diego Fairy Shrimp

The Navy will establish training area boundaries for specific groups of vernal pools at SSTC-S Inland. The Navy proposes to allow foot traffic in and around the vernal pools when all the pools in a particular training area are dry. Foot traffic could include transit, activities that entail stealthy movement, parachute drops. Past surveys in 2000, 2001 and 2003 detected San Diego fairy shrimp in 11 of the pools found on site [1.9 ha (4.6 ac)] (Figure 10). However, no other surveys have been completed to date, so the current distribution of San Diego fairy shrimp at SSTC-S Inland is uncertain.

Foot traffic, including stealthy movement, parachute drops, or walking, in and around the pools may alter the pools and their watersheds, affecting hydrology, water quality, chemistry, or salinity, and thereby indirectly affect San Diego fairy shrimp. Changes in the natural microtopography of the vernal pools and their watersheds from foot traffic (e.g., trails) could alter pool hydrology by causing a breach, compacting the soil, or increasing sedimentation in the pools.

Activities that alter hydrology have the potential to limit the survivability of San Diego fairy shrimp (Service 1998). Foot traffic is also likely to increase the introduction and expansion of invasive plant species throughout SSTC-S Inland, including occupied vernal pools. Invasive plants could change the hydrology of occupied pools so that they no longer pond or pond less frequently so that fairy shrimp could not complete their life cycle (Marty 2005).

Under baseline conditions, an unpaved road runs through Pool 20, which is occupied by San Diego fairy shrimp. Pool 5, which is also occupied by San Diego fairy shrimp, is at the edge of another unpaved road and therefore subject to vehicle traffic. Limited emergency/security vehicle use may occur within these pools which may crush adult San Diego fairy shrimp or cysts and may also alter the pools and their watersheds, affecting hydrology, water quality, chemistry, or salinity, and thereby indirectly affect San Diego fairy shrimp.

The vernal pools occupied by San Diego fairy shrimp at SSTC-S Inland are interspersed with salt marsh vegetation and pools that support brine shrimp (*Artemia sp.*), which occur in saline waters and soils. San Diego fairy shrimp are “osmoregulators” that maintain constant internal chemical concentrations, but cannot tolerate wide extremes in sodium or bicarbonate concentrations so they are vulnerable to runoff and watershed quality that alter levels of salts and alkalinity (Service 1998). Foot traffic could directly introduce saline soils or alter watersheds in a way that increases salinity in pools, and thereby reduce the viability of the San Diego fairy shrimp in the pools.

Foot traffic through occupied pools during dry periods may also crush San Diego fairy shrimp cysts within the pools or translocate cysts to drier, upland habitats thereby reducing their viability. Several of the smaller vernal pools occupied by San Diego fairy shrimp are located adjacent to a roadway, and these pools are more likely to suffer impacts from the proposed activities given their small size, location near the road, and nearby vegetation that might provide an attractive hiding place during military maneuvers in the area.

Approximately 268 training activities could occur when the pools are dry (Table 18). While the amount of foot traffic from these activities that will occur is uncertain, the Navy estimated that between 12 and 116 people might enter the vernal pools each year (BA). For most activities people will be walking through the area, but for some activities people could be moving on their knees or bellies or dropping in by parachute. The impact of the foot traffic on San Diego fairy shrimp will depend on the intensity and frequency of training exercises within individual vernal pools, but this information is not available. Thus, the Navy proposes to minimize the potential impacts to fairy shrimp by limiting training to time periods when the pools are dry as determined by a Navy Botanist or Wildlife Biologist. Under dry conditions, cysts will be less susceptible to crushing and translocation, since soils in the pools will be more stable and less susceptible to compaction or adhering to the boots of trainees than during wet conditions. However, training could still occur during the rainy season, and it is unclear how dry conditions will be determined (i.e., what threshold pool soil moisture will be used and how it will be measured). In addition, the number of dry pools at any given time will vary depending on the amount of rainfall with the larger pools staying wet longer in wet years and smaller pools staying wet longer in dry years.

For our analysis, we assumed that training will not be allowed in a training area if any one pool in the training area is wet.

The Navy also proposes to continue invasive species identification and control programs at SSTC-S as part of the INRMP for this area. This measure is expected to reduce the indirect effects of invasive plant species on the vernal pools occupied by San Diego fairy shrimp. However, the Navy does not propose any vernal pool restoration and/or enhancement to minimize potential impacts.

In summary, we expect that foot traffic will: 1) directly crush and translocate San Diego fairy shrimp cysts; and 2) cause minor changes in hydrology, salinity and invasive plant cover in occupied pools that will prevent cysts from hatching or completing their life cycle. We also expect that infrequent emergency/security vehicle traffic in pools 5 and 20 will: 1) directly crush adult fairy shrimp; 2) directly crush and translocate San Diego fairy shrimp cysts; and 3) cause minor changes in hydrology, salinity and invasive plant cover in occupied pools that will prevent cysts from hatching or completing their life cycle. However, with the conservation measures proposed by the Navy, we expect these impacts to be minimized such that only a small number of cysts are impacted annually and the currently occupied pools will continue to support viable fairy shrimp populations.

Effect on Recovery

The VP recovery plan that included the San Diego fairy shrimp was published in 1998 (Service 1998). Since completion of the recovery plan, new information about the San Diego fairy shrimp's distribution and genetics has become available. The San Diego fairy shrimp 5-Year Review (Service 2008a) recommends that the VP recovery plan be revised to include this new information. Therefore, when evaluating the impacts of specific actions or projects on the recovery of San Diego fairy shrimp, we no longer use the VP recovery plan alone to identify vernal pool complexes important to recovery of the San Diego fairy shrimp. Instead, we use an updated database of extant complexes occupied by the San Diego fairy shrimp (Appendix 1 of Service 2008a) and evaluate potential impacts to these complexes on a project-specific basis to determine the impact of the activity or project on the recovery of the San Diego fairy shrimp.

Eleven of the pools at SSTC-S Inland are occupied by the San Diego fairy shrimp and therefore have value to the recovery of the San Diego fairy shrimp because they support the breeding, feeding, and sheltering needs of this species. As discussed above, the proposed training activities and emergency/security vehicle could directly crush and translocate San Diego fairy shrimp cysts and cause changes in hydrology, salinity and invasive plant cover in occupied pools that will prevent cysts from hatching or completing their life cycle. However, a low frequency of foot and vehicle traffic is anticipated in and around the pools and only when they are dry. The Navy will monitor the pools to confirm the validity of this expectation, consistent with the VP recovery plan Task 5. In addition, the Navy will manage the pools, including invasive plant species control, consistent with the VP recovery plan Task 4. With implementation of these actions and the other conservation measures proposed by the Navy, we expect that the currently

occupied pools will continue to support viable fairy shrimp populations in support of recovery of the species.

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. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act and, therefore, are not considered cumulative to the proposed project. Because most of the project area is under Navy control and we are not aware of any future non-federal actions in the project area outside of the Navy's control (i.e., City of Coronado and Silver Strand State Beach), we have not identified any cumulative effects in the action area that should be considered in this biological opinion.

CONCLUSION

After reviewing the current status of the California least tern, western snowy plover, and the San Diego fairy shrimp, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed action is not likely to jeopardize the continued existence of these species. We reached this conclusion by considering the following:

California least tern

- 1) The status of the least tern has significantly improved since its listing in 1970 due to successful efforts rangewide to protect and manage least tern nesting and foraging areas. The Navy has contributed to the improved status of this species by successfully managing sites within the action area, including SSTC-N Beach and the Delta Beaches. While populations fluctuate annually, rangewide population estimates have increased to an estimated 7,124 pairs in 2009. The Service recommended downlisting the least tern to threatened status in our 2006 5-Year Review based on its improved status and a reduction of threats.
- 2) The ongoing and proposed minimization measures for SSTC-N Beach, including use of beach scheduling procedures to bias activities with heavier beach use towards beach lanes with fewer nests when it does not impact the realism of training or training needs, are anticipated to maintain the suitability of least tern habitat at this location over the long term.
- 3) The number of least terns injured or killed annually by training activities is expected to be small relative to the overall least tern population throughout its range and is not expected to result in an appreciable reduction in the numbers, reproduction, or distribution of the least tern;

- 4) The Navy's proposed action includes: ongoing nesting site preparation at the Delta Beaches; predator management; population monitoring; a Long Term Habitat Enhancement Plan; and efforts to eliminate unauthorized recreational trespass, which are all conservation measures that support the recovery of the least tern. We expect implementation of these conservation measures will maintain the suitability of least tern habitat within the action area over the long term.
- 5) We expect that maintenance of suitable habitat conditions for the least tern will result in continued presence of this species at Delta Beach South, Delta Beach North, and the SSTC-N Beach. We expect the percentage of the U.S. rangewide least tern nests initiated on the SSTC-N Beach and the Delta Beaches to remain within the range observed from 2005 to 2009 (i.e., 7 to 13.6 percent, averaging 11.3 percent; and 4.6 to 8.1 percent, averaging 6.0 percent, respectively) (Appendix E, Table E.2).

Western snowy plover

- 1) The Pacific coast western snowy plover population is widely distributed along the Pacific coast from Washington State to Baja California, Mexico;
- 2) The death or injury of 1 active nest and 5 chicks per year in association with the proposed training would reduce the productivity of less than 0.1 percent of the estimated Pacific coast western snowy plover population within the U.S. annually; this low-level impact is not expected to result in an appreciable reduction in the numbers, reproduction, or distribution of the Pacific coast population of the western snowy plover;
- 3) Although the suitability of beaches within the action area is likely to be reduced as a result of the proposed action, we anticipate that western snowy plovers will continue to use beaches within the action area for breeding foraging, and wintering; and
- 4) The Navy's proposed action includes ongoing predator management and population monitoring that support recovery of the snowy plover.

San Diego fairy shrimp

- 1) The proposed foot traffic impacts will impact less than 1 percent of the vernal pool complexes known to be occupied by the San Diego fairy shrimp throughout the range of this species;
- 2) We anticipate that the Navy will not allow foot traffic in or around the occupied vernal pools when they are wet, and that the level of foot traffic that will occur during dry periods is likely to be low;

- 3) We anticipate that foot traffic when the pools are dry will only injure or kill a small number of San Diego fairy shrimp cysts and cause only minor impacts to the occupied vernal pools and their watersheds; and
- 4) We anticipate that the occupied pools will continue to support viable populations of San Diego fairy shrimp thereby supporting recovery of this species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act, and Federal regulations issued pursuant to section 4(d) of the Act, prohibit take of endangered and threatened species without a special exemption. Take is defined as harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that actually kills or injures a listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an action that creates the likelihood of injury to a listed species 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), such incidental taking is not considered to be a prohibited taking under the Act provided that such taking is in compliance with this Incidental Take Statement.

The measures described below are nondiscretionary and must be undertaken by the Navy for the exemption in section 7(o)(2) to apply. The Navy has a continuing duty to regulate the activity covered by this incidental take statement. If the Navy (1) fails to adhere to the terms and conditions, (2) fails to require the enforceable terms that are added to the permit, and/or (3) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse.

To monitor the impacts of incidental take, the Navy 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)]

Amount or Extent of Take

California Least Tern

1. We anticipate that up to 8 percent of the least tern eggs/chicks at SSTC-N Beach per year may be injured, abandoned, or killed due to training activities;
2. We anticipate that up to one least tern adult per year may be killed or injured during night time training activities at the SSTC-N Beach; and

3. We anticipate that up to 10 least tern nests (20 eggs) per year may be moved small distances, as necessary and appropriate, to reduce the potential for crushing due to training.

The Navy has proposed to implement measures to eliminate recreational use of the SSTC Beaches. Thus, take of active least tern nests by recreational users is not considered “incidental to an otherwise lawful activity” and is not authorized by this incidental take statement.

Western Snowy Plover

1. We anticipate that up to 1 active nest per year will be destroyed by training activities at the SSTC-N and SSTC-S Beaches and result in injury or death of the nest’s eggs or chicks.
2. We anticipate that up to 5 snowy plover chicks will be killed or injured per year by training activities at the SSTC-N and SSTC-S Beaches;
3. We anticipate that up to 3 snowy plover nests (9 eggs) per year at the SSTC-N and SSTC-S Beaches will be moved small distances, as necessary and appropriate, to reduce the potential for crushing due to training, or to avoid excessive tides; and
4. We anticipate that up to 3 nests (9 eggs) per year will be abandoned for unknown reasons within the action area and be brought into captivity for incubation, rearing, and release onto action area beaches.

The Navy proposes to implement measures to eliminate recreational use of the SSTC Beaches. Thus, take of active western snowy plover nests by recreational users is not considered “incidental to an otherwise lawful activity” and is not authorized by this incidental take statement.

San Diego Fairy Shrimp

1. We anticipate that San Diego fairy shrimp cysts are likely to: 1) be crushed or carried out of the occupied vernal pools at SSTC-S Inland by foot traffic during dry periods; and 2) fail to hatch or complete their life cycle due to changes in to pool hydrology, salinity and invasive plant cover. San Diego fairy shrimp in pools 5 and 20 may also be crushed, and cysts may be crushed or carried out of these pools, by infrequent emergency/security vehicle traffic. Estimating the precise number of San Diego fairy shrimp cysts that may be injured or killed as a result of the proposed action is difficult due to: 1) uncertainties regarding the precise level of impact that will be caused by future foot traffic; and 2) variability in the size of the San Diego fairy shrimp population in each occupied vernal pool. However, because training activities within vernal pools will be limited to periods when pools are dry, we anticipate that the overall loss of fairy shrimp cysts will be small and that all occupied pools will continue to support viable fairy shrimp populations. Thus, the take threshold will be exceeded if monitoring reveals that training impacts are impacting occupied pools in a manner that could lead to the extirpation of fairy shrimp in any individual pool.

Because the Navy will prohibit driving of vehicles off of established roads at SSTC-S Inland, no take of fairy shrimp is authorized or exempted for off-road vehicular activity at SSTC-S Inland.

EFFECT OF THE TAKE

In the accompanying biological opinion, we determined that the level of anticipated incidental take of California least terns, western snowy plovers, and San Diego fairy shrimp is not likely to result in jeopardy to these species.

REASONABLE AND PRUDENT MEASURES

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impact of incidental take of California least terns, western snowy plovers, and San Diego fairy shrimp.

California Least Tern and Western Snowy Plover

1. The Navy will minimize the potential for incidental take of least tern and snowy plover nests and chicks at SSTC-N and SSTC-S Beaches during the breeding season;
2. The Navy will monitor training activities to ascertain the impact of training activities on least tern and snowy plover distribution within the action area and report any observed incidental take to the Service annually.

San Diego Fairy Shrimp

3. The Navy will use scheduling and/or planning measures to minimize the potential for incidental take of San Diego fairy shrimp;
4. The Navy will establish the baseline distribution and abundance of San Diego fairy shrimp and condition of their vernal pool habitat at SSTC-S Inland and monitor training activities to ascertain the impact of training activities on San Diego fairy shrimp distribution and abundance within the action area. The Navy will report the monitoring results and any observed incidental take to the Service annually, and
5. The Navy will manage the vernal pools occupied by San Diego fairy shrimp to minimize any training impacts detected by monitoring.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Endangered Species Act, the Navy must ensure that their military personnel, including all agents and contractors anticipated herein, comply with the following terms and conditions, which implement the reasonable and prudent

measures described above and outline the required reporting/monitoring requirements. These terms and conditions are non-discretionary.

California Least Tern and Western Snowy Plover

The following terms and conditions implement reasonable and prudent measures 1 and 2:

- 1.1 The Navy will consider the tide conditions when developing training schedules, and schedule training activities that could be conducted on the hardpack during low tides to the maximum extent consistent with training needs.
- 1.2 The Navy will mark and buffer, as described in the proposed action, up to 22 concurrent snowy plover nests established at SSTC-N and SSTC-S Beaches plus any additional nests that exceed 22 that are initiated in beach lanes Orange 1 and Orange 2.
- 1.3 Under baseline conditions, the southern 3 beach lanes are marked to facilitate avoidance of tern and plover nests. Since the Navy has determined that the level of marking done under baseline conditions presents an impediment to training, the Navy will develop a marking strategy to delineate least tern and snowy plover nesting areas that does not encumber training activities. Such a marking strategy may entail signage affixed to existing beach lane sign posts and a limited number of additional markers, as determined appropriate by Navy staff.
- 1.4 The Navy will delineate the boundary of SSTC-S that parallels the mean high tide line in a manner that does not encumber training exercises.
- 1.5 If relocation of any least tern or snowy plover nest/egg is necessary as a protective measure, each nest/egg will be relocated the shortest distance possible into suitable habitat by Service-approved monitors to increase the chances for nest success. The weekly reports to be submitted to the CFWO under the proposed project will include: a) date the nests/eggs were moved; b) number of nests/eggs moved; c) original and ending location of nests/eggs moved; and (d) distance the nests/eggs were moved.
- 1.6 NBC Natural Resources staff will brief all dog handlers, annually, or more frequently if necessary, of the following guidelines pertaining to the use of military working dogs on SSTC beaches.
 - 1.6.1 Military working dogs and dog handlers will be notified weekly of the locations of plover nests and, to the maximum extent possible, remain a minimum of 30 m (90 ft) from markers that delineate the locations of nesting plovers.
 - 1.6.2 If physical conditioning on soft pack sand is necessary, handlers and military working dogs will run on the sand road (SSTC-N) or within 20 feet of the hard pack sand to reduce the disturbance and impact to nesting tern and plovers.

- 1.6.3 At SSTC-N, military working dogs will exercise primarily between beach lanes Yellow 1 and Blue 1, where they may cross the beach to get to the sand road at the existing route immediately to the north of the demo pit. The Navy will not conduct physical conditioning using dogs in the southern 3 beach lanes until: a) completing a study to evaluate the effects of military working dogs on terns and plovers and b) coordinating with the Service to develop conservation measures to minimize any additional effects.
- 1.6.4 If military working dog training is requested as part of Platoon OTB activities at SSTC-N, the Platoon OTB activities will be scheduled in beach lanes Yellow 1, the northern half of Yellow 2, Green 1 or Green 2, pending the results of the Navy's study to evaluate the response of terns and plovers to military working dog presence.
- 1.6.5 The Navy will coordinate with the Service in the development of the study to evaluate the effects of military working dogs on terns and plovers and will submit the study design and scope of work to the Service for review and approval. The Navy will allow the Service 30 days to submit comments and an additional 30 days to approve the final study design and scope of work.
- 1.7 The Navy will coordinate with the Service in the development of the Long Term Habitat Enhancement Plan for SSTC and will submit the plan to the Service for review and approval. The navy will allow the Service 30 days to submit comments, and an additional 30 days to approve the final study design and scope of work.
- 2.1 The Navy will include the following information in the yearly reports to be submitted to the Service under the proposed project: a) the number and distribution of terns and plovers observed in each training lane; b) the number of any dead or injured least terns or snowy plovers (including eggs, chicks or adults) observed in each training lane; c) the hatching rate of terns and plovers in each beach lane; d) maps of the locations of tern and plover roosts within the action area; e) the timing and number of training events within the southern 3 beach lanes, and other beach lanes, to the extent available; f) the date and condition of any dead or injured tern or plover; g) the fledging numbers at NASNI, SSTC-N, and SSTC-S; and h) any measures taken to prevent additional tern or plover death or injury.
- 2.2 The Navy will ensure that biological monitors look for and document the location of least tern or snowy plover nests, eggs and chicks prior to and after all military training exercises, to allow assessment of take associated with training activities.

San Diego Fairy Shrimp

The following terms and conditions implement reasonable and prudent measures 3, 4 and 5:

- 3.1 The Navy will avoid vernal pools occupied by San Diego fairy shrimp and their watersheds when designating parachute drop zones in SSTC-S Inland. The Navy will identify the vernal pools and assure that drop zones are located at least 30 m (100 ft) from each occupied pool.
- 3.2 The Navy will consider the location of vernal pools occupied by San Diego fairy shrimp and their watersheds when planning training involving off-road foot traffic at SSTC-S Inland. To the maximum extent consistent with training need, off-road foot traffic will avoid the occupied vernal pools and their watersheds.
- 3.3 The Navy will avoid the occupied vernal pools and their watersheds adjacent to the road at SSTC-S Inland (i.e., pools 1 through 7) year round to the maximum extent consistent with training need. Avoidance may be accomplished using markers, maps, GPS coordinates or any other means consistent with training needs.
- 3.4 The Navy will assure that military dogs do not enter vernal pools at SSTC-S Inland year round.
- 4.1 The Navy will mark pools to facilitate monitoring, and monitor the occupied vernal pools and their watersheds at the SSTC-S Inland to determine the baseline and ongoing conditions regarding: San Diego fairy shrimp distribution and abundance; botanical resources; topography; hydrology; and water chemistry (including salinity). The Navy will submit a draft monitoring plan to the Service and allow the Service at least 30 days to review and approve this plan. The plan will include a map of SSTC-S Inland training area boundaries and vernal pools and their watersheds, and the following provisions to establish baseline conditions: a) focused invasive plant survey including visual/photopoint inspection of vernal pools and their watersheds; b) plant, topographic, hydrological and water quality surveys/data; and c) protocol fairy shrimp surveys of the vernal pools. The plan will outline the qualifications necessary for personnel that determine if all pools in a given unit are “dry”, as well as the methodology for determining that the pools are dry. The plan will include the following provisions for monitoring ongoing conditions to determine if training impacts have occurred: a) focused invasive plant monitoring and visual/photopoint inspection of vernal pools and their watersheds annually; b) plant, topographic, hydrological and water quality monitoring every 2 years; and c) protocol fairy shrimp surveys of the vernal pools every 3 years. Annual monitoring reports will identify management measures to minimize any training impacts detected by monitoring (e.g., spread of invasive weeds, change in pool topography). The plan will identify measures to minimize the potential for adverse effects to fairy shrimp from weed abatement, pool restoration or pool augmentation. The results of each year’s monitoring will be submitted to the Service annually. Baseline monitoring will be completed prior to initiating training activities in or around the vernal pools at SSTC-S Inland.

- 4.2 The Navy will install markers that indicate the pool number (as presented in DoN 2003) to aid monitoring.
- 5.1 The Navy will implement management measures identified in annual monitoring reports to minimize any impacts detected by monitoring (e.g., invasive weed control, correcting changes in pool topography).

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 minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the Navy's responsibility for these species, pursuant to section 7(a)(1) of the Act.

1. We recommend that the Navy continue marking and avoiding suitable nesting habitat at the southern 3 beach lanes. As an option to the marking that has been successfully implemented and conducted in accordance with past consultations, we suggest markers be installed around the nesting area in a manner that accommodates linear travel along a corridor parallel to the beach crest. The markers could then be temporarily removed to accommodate training exercises that require use of one or more of the southern 3 beach lanes to meet the Navy's current need for increased training flexibility.
2. We recommend that the Navy continue to mark all plover nests on SSTC-N and SSTC-S Beaches with a buffer and avoid the buffered nest sites until they are not being used by plovers (e.g. until approximately 15 days post-hatch). If such marking cannot be done as in past consultations, we suggest that the size and configuration of buffered areas be adjusted to avoid impacts to training activities or that the Navy implement the measures used to move plover nests out of beach crossing lanes, to gradually relocate the plover nest so it does not affect the training activity.
3. Recreational use of the SSTC-Beach is occurring on the SSTC-Beaches and reducing the habitat suitability for snowy plovers and least terns. Recreational use of the beaches is counter to the NBC INRMP and the current proposed action. We recommend that the Navy obtain jurisdiction over SSTC-N Beach to facilitate improved enforcement within this area. We also recommend that the Navy improve delineations of base boundaries and increase enforcement to reduce the non-training uses of the Navy's beaches at SSTC. Specifically, we recommend that the Navy improve the delineation by: a) installing improved signage adjacent to the Carnation Avenue beach crossover, the jetty at SSTC-S, and the beach between SSTC-N and SSSB; b) installing a kiosk at Camp Surf, with security personnel stationed at the site to educate civilians about the need to keep dogs on leash and remain outside the boundaries of SSTC-S Navy-administered land; c) citing

violators and recording the number of violations, in collaboration with State Parks Rangers, City of Coronado Police, and Lifeguards; and d) installing a fence between Highway 75 and SSTC-N Beach to reduce the recreational trespass and other unauthorized entry. We recommend that the Navy improve enforcement by: a) preventing public access to SSTC-S where plovers nest; b) coordinating with the patrol assigned to Silver Strand State Beach (SSSB), the Imperial Beach Police Department, and the Coronado Police Department to enforce leash laws on any beach segments that are under State jurisdiction adjacent to the SSTC; c) contracting or hiring at least one full-time seasonal security position or Department of Defense Warden to eliminate recreational trespass and other unscheduled use onto the SSTC-N and SSTC-S Beaches.

4. Under the proposed action, the Navy, in coordination with the Service, will develop a Long Term Habitat Enhancement Plan for SSTC that will include portions of the Delta Beaches, SSTC-S, and SSTC-N Beach. In addition, cleanup and remediation activities are likely to be necessary at South Delta Beach (MRP site 5). We recommend that prior to initiating the breeding season training use of the southern 3 beach lanes at SSTC-N Beach, the Navy develop and implement the Long Term Habitat Enhancement Plan and remediate MRP Site 5. In this manner, additional suitable habitat will be available to offset the loss of habitat rendered unsuitable by increased frequency and extent of military training activity.
5. Plover habitat at NASNI Beach is increasingly affected by human uses, including dog walking, yet this area adjoins the currently designated "Coronado Dog Beach." The Coronado Dog Beach is within walking distance of the residences and Navy Lodge at NASNI. We recommend that the Navy re-establish the "no dogs" rule at NASNI Beach to improve conditions for the snowy plover. Individuals stationed on base could exercise dogs within Coronado Dog Beach to improve conditions for the plover and help the Navy meet the commitment to manage adequate habitat at NASNI to support 12 to 13 pairs of plovers (FWS-SDG-3908.3).
6. Increased foot traffic is expected at NASNI Beach as a result of Navy Lodge Expansion and increases in training. As foot traffic increases, less undisturbed area will be available for foraging plover chicks and adults at NASNI Beach. We recommend that the Navy reduce foot traffic at the western end of NASNI Beach, which lies within the surface danger zone of the small arms range, to improve the conditions for plovers. To reduce foot traffic into this area, we recommend that the Navy improve signage and improve delineation and enforcement of existing restrictions on pedestrian access. If these measures prove ineffective, we recommend that the Navy install a fence between the recreational beach and the western end of the NASNI Beach.
7. We recommend that the Navy, as previously recommended by the Service (FWS-SDG-3908.3), coordinate with the Army Corps of Engineers or other entities regarding sand replenishment on the western end of the NASNI Beach. This beach is used for plover nesting and foraging under baseline conditions; however, the narrow width of the beach results in inundation under high tides. Widening this beach by sand replenishment would

increase the area available for plover nesting and foraging that is not subject to recreational foot traffic.

8. We recommend that if lands adjacent to SSTC become available for acquisition or lease, the Navy explore the potential for acquisition or lease of these areas for their conservation and buffer values. Acquisition or lease of adjacent lands would allow the Navy to buffer training areas from adjacent recreational use and provide added ability to accomplish conservation objectives while reducing encumbrances on training areas.
9. We recommend that the Navy fence the limits of vernal pools that are occupied by the San Diego fairy shrimp at SSTC-S Inland. Fencing the pool boundaries would facilitate avoidance of the pools during training exercises.
10. This consultation on the effects of Navy training activities at SSTC has been complicated by the uncertainties associated with the frequency and location of training activities that occur under baseline conditions. The Navy has produced scheduling models that we used to project the future intensity of beach use and resulting impacts. However, uncertainty remains regarding the baseline distribution of training activities as it relates to the observed least tern and snowy plover nesting distribution, and the future training patterns and associated impacts of the proposed action. Based upon the available data, training activities at historical and proposed levels, if managed appropriately, appear compatible with persistence of the least tern and western snowy plover at SSTC. To improve future assessment of training activities and associated effects to the tern and plover, we recommend that the Navy annually report the timing, number, type and distribution of training activities in each training lane during the tern and plover breeding seasons, to the extent consistent with national security. This information may then be compared to that year's distribution of least terns and snowy plovers at SSTC-N when the Service and the Navy conduct a post-breeding season assessment of incidental take within the action area. Information about training will be useful to determine if any observed population declines were caused by training activities or some other factor such as predation.

REINITIATION NOTICE

This concludes formal consultation on the proposed action. 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.

We appreciate the Navy's efforts to improve the status of the endangered and threatened species on the Silver Strand Training Complex while implementing its military mission. We also

recognize the need for adaptive management of these sensitive resources to address the Navy's need for flexibility and realism in training. To facilitate this need, we have set anticipated levels of incidental take for least terns and western snowy plovers that will be monitored during the breeding season and provided as a cumulative total for assessment only at the end of the breeding season. In this manner, training scheduled for the year will continue as necessary to support the military mission and an annual assessment will be completed to determine whether the level of incidental take has been exceeded in any given breeding season.

Because we are providing this assurance to the Navy that training activities scheduled during a given year will not be interrupted, the Navy should continue to include the Service in ongoing coordination meetings during the least tern and snowy plover breeding season and meet with the Service after the breeding season to assess the status of the tern and plover and any incidental take that has occurred. If the end-of-year monitoring report reveals that the effects of the action exceed those anticipated in this opinion or if the authorized level of incidental take for the tern or plover was exceeded, the Navy and the Service should meet to evaluate the factors related to the exceeded level of anticipated take to determine whether: 1) our effects analysis and take authorization needs to be revised and/or 2) additional conservation measures should be implemented during future breeding seasons to further minimize any incidental take caused by training activities.

Overall, we anticipate that the proposed training, in conjunction with proposed conservation measures, will allow for the persistence of: 1) a large least tern nesting colony at SSTC-N Beach; 2) snowy plover nesting and wintering at SSTC-N, SSTC-S, and NASNI Beaches; and 3) San Diego fairy shrimp within all currently occupied vernal pool habitat at SSTC-S Inland. If new information reveals that the increased training is affecting the species addressed in this biological opinion in a manner inconsistent with this conclusion, reinitiation of consultation may be warranted.

For example, reinitiation of consultation may be warranted if monitoring indicates that the relative use of SSTC-N beach by breeding least terns declines to a level below that observed under baseline conditions between 2005 to 2009 [i.e., an average 11.2 of the U.S. range-wide population (ranging between 7.3 and 13.0 percent) during a 5-year period (Appendix E, Table E.3)]. If least tern use of SSTC-N Beach declines, Service and Navy biologists will evaluate alternative explanations for any observed decline (e.g., continuation of low productivity associated with predation) and the need for additional conservation measures.

Likewise, if monitoring indicates that the western snowy plover numbers within the action area decline below the 5-year average, as determined by maximum active nest numbers: average of 18 plover pairs at SSTC (range of 11 to 22); 10 plover pairs at NASNI (range of 7 to 14); and 8 plover pairs at SSSB (range of 5 to 9), reinitiation of consultation may be warranted. If snowy plover use of SSTC beaches declines, Service and Navy biologists will evaluate alternative explanations for any observed decline (e.g., continuation of low productivity associated with predation) and the need for additional conservation measures.

We look forward to continuing our partnership with the Navy to conserve the natural resources on the Silver Strand Training Complex. If you have any questions or comments concerning this biological opinion, please feel free to contact us. Future coordination efforts to implement this programmatic biological opinion should be directed to Sandy Vissman or David Zoutendyk of my staff at (760) 431-9440.

Sincerely,

A handwritten signature in cursive script that reads "Karen A. Bartel".

Jim A. Bartel
Field Supervisor

Handwritten initials "JAB" in a stylized, cursive font.

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Appendix A. Schematic representations of training activities proposed for SSTC beaches (from DoN 2008).

The Silver Strand beaches stretch inland and slope upward from the mean high tide line approximately 20 yards inland, towards a feature called the beach crest. The beach crest is a high point on the beach where the slope of the shore levels out. The beach remains generally flat, with gentle dunes in some areas, from the beach crest to Highway 75. The beach above the crest is about half as wide at SSTC-S compared to SSTC-N, and the dunes are intermittent along the length of the SSTC on the oceanside.

Least terns and snowy plovers generally nest above the beach crest, and nests may occur at higher density closer to the crest than further inland. Training activities use the beach below the beach crest in the intertidal area and hardpacked sand, and some use the beach above the beach crest in the area that supports nesting least terns and snowy plovers.

The figures and descriptions below provide general information regarding the general footprint for each type of training activity to aid in assessment of how each type of activity may affect nesting least terns and snowy plovers. Each training activity is described and the footprint and location is depicted as a line drawing or shape.

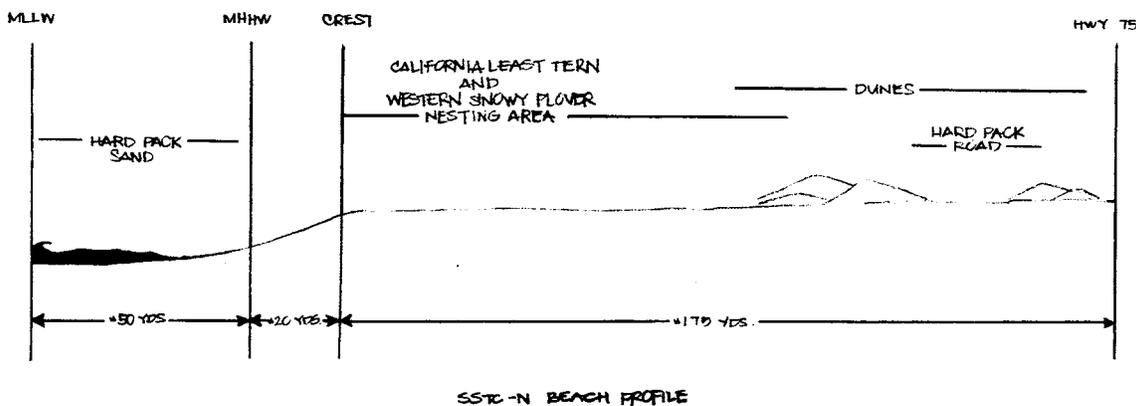


Figure A-1: Generalized Beach Profile for the Silver Strand Beaches (from DoN 2008)

A profile view of the beach is provided in Figure A-1, and an overhead view of the beach cross-section is provided in Figure A-2. These figures also show the water, crest, nesting area, and dunes. The red dashed line in Figure A-2 represents the area where actions were modeled for their effect on nesting birds. Because this area begins at the crest and extends to Highway 75, parts of the actions which take place below the crest are not indicated in the action diagrams. This is the area in which training activities may overlap with nesting birds on the beach.

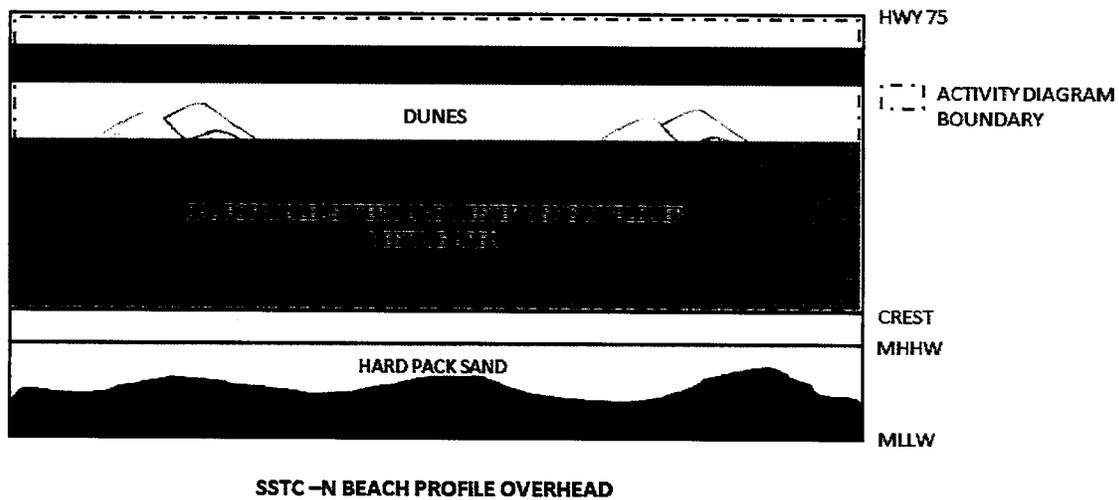


Figure A-2: Beach Profile Overhead Showing Outline of the Action Diagram Boundary

The area depicted as the footprint of each action below is the maximum extent of the footprint on the beach, which may result in an overestimate of the actual area that is likely to be impacted, since most training activities are not likely to extend across every square yard within their footprint perimeter.

Beach Party Teams. Training exercises that include a Beach Party Team are proposed only in SSTC-N, and would occur approximately 534 times per year under the Proposed Action. The beach party teams consist of support vehicles and heavy equipment that set up, operate, and maneuver along the beach to facilitate activities that are occurring in the water and during beaching activities. Beach party teams typically take place on the hard pack sand of the beach near the water line as well as along the crest, out of the water. Vehicles and equipment may operate on a segment of the beach lane width, or up to the full 500 yard width of the beach lane. This figure (A-3), as well as the rest of the action figures, represent the likely footprint of each action on the beach.

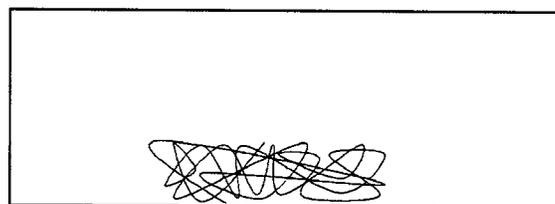


Figure A-3: Approximate Footprint of a Beach Party Team

Beach Camp. Training exercises that include a Beach camp are infrequent at SSTC, but have a large potential footprint and impact (Figure A-4) and are proposed at both SSTC-N and SSTC-S beach. Two training events are proposed per year. The number of beach lanes requested varies,

depending on the number of personnel that will take part in the particular camp. This training activity consists of setting up a self-sustaining field camp. Mock aggressions may also be included.

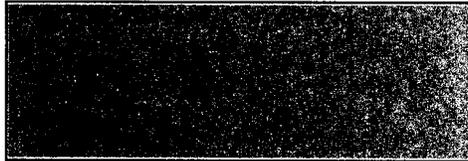


Figure A-4: Approximate Footprint of a Beach Camp

Equipment Offload and Staging. This infrequent training activity typically takes place at SSTC-N. Materials, equipment, and vehicles are unloaded from barge ferry sections onto the beach. The action footprint includes the area used to store items on the beach. Depending on the amount of equipment to be offloaded, this staging and maneuver area has the potential to impact the entire beach lane in which it is scheduled (Figure A-5).

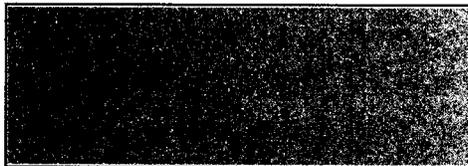


Figure A-5: Approximate Footprint of Equipment Offload and Staging Action

Causeway and ELCAS. These activities involve the insertion of a causeway onto the beach. Most of the causeway remains floating offshore, anchored by driven piles; the onshore area includes the footprint of the front end of the landing unit as well as additional area that may be mechanically excavated for its landing or to remove it off of the beach at the conclusion of the activity (Figure A-6). Construction of ELCAS does not require the excavation of sand, but does require heavy equipment to level the sand where the causeway is planned for construction and prepare it for pile driving and anchoring. Causeway actions occur primarily on SSTC-N oceanside training lanes, but also periodically in the bayside training area Bravo.

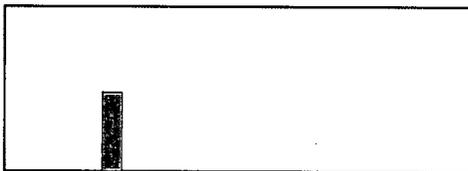


Figure A-6: Approximate Footprint of Causeway and ELCAS Action

MCM Beaching Action. These are Mine Countermeasure Beaching Actions and occur during MCM Activities, approximately 42 times per year under the Proposed Action. They occur occasionally on SSTC-N, primarily at SSTC-S. This portion of the MCM activity occurs after the mine shape has been neutralized offshore and involves towing the mine to shore for follow-on procedures. Vessels and the mine itself remain on the hardpack sand. Personnel dragging the mine onto shore with a rope may walk up onto the crest. In addition, logistical vehicles may park up along the crest (Figure A-7).

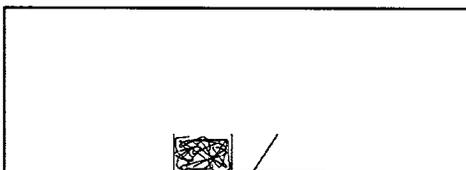


Figure A-7: Approximate Footprint of MCM Beaching Action

LCAC Landing. An LCAC, or hovercraft, landing action takes place as part of a single activity, four times per year under the Proposed Action. An LCAC is a large craft that uses fans to hover above the water or land. Its footprint includes its physical structure plus the area surrounding it, which is affected by the strong winds it produces. LCACs beach near the crest of the beach and have the potential to disperse sand along the full width and length of the beach lane (Figure A-8). Landings occur entirely on SSTC-N ocean training lanes.



Figure A-8: Approximate Footprint of an LCAC Landing

Vehicle Patrol. Vehicle patrolling takes place primarily on SSTC-N about 56 times per year during a single activity. It involves vehicles driving along the hard pack and soft pack sand patrolling the beach in directions determined by the trainees so that they can learn to drive and operate the vehicles in varying terrain. It is limited to SSTC-N beach lanes Yellow 1 and 2 and Green 1 and 2 because of the large potential impact it can have on nesting resources on the beach over the course of multiple patrolling actions. It is conservatively estimated to impact about half of the available beach lane over the course of the year (Figure A-9).

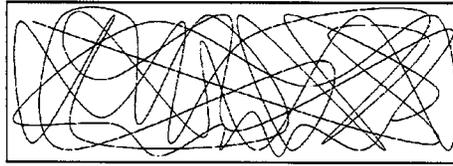


Figure A-9: Approximate Footprint of Vehicle Patrol Action

Raids. Raids consist of groups of people entering the beach from the water, spreading out, hiding, and moving across the beach. This action normally takes place in an east to west orientation (along the short axis of the beach) with troops moving inland from the water (Figure A-10). Under the Proposed Action this action would occur approximately 204 times per year, about half the time on SSTC-N oceanside training lanes, and the rest of the time on SSTC-S and in the designated NASNI training area.

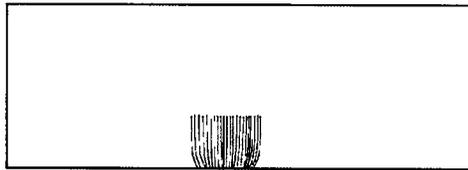


Figure A-10: Approximate Footprint of Raid Action

Foot Patrol and Ambush. This action involves groups of individuals walking in single file line formation on the beach. Individuals typically patrol walking north and/or south (along the long axis of the beach). Patrols sometime include ambushes, which often include pop-ups or individuals that hide in designated places. When ambushed, patrolling individuals retreat and retain formation where possible (Figure A-11). Foot patrol and ambushes are expected to take place 472 times per year under the Proposed Action. About half of these activities occur on the SSTC-N oceanside beach lanes, with the rest distributed between SSTC-N bayside lanes, SSTC-S, and the designated NASNI training area.

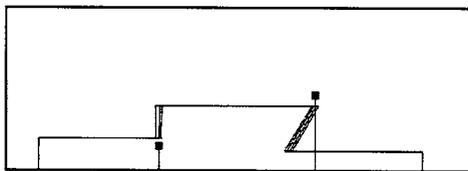


Figure A-11: Approximate Footprint of Foot Patrol and Ambush Action

Beach Crossing and OTB. This action is fairly common and involves small groups on foot transiting across the beach. The groups typically transit in a line formation (may include multiple lines of personnel), and individuals may be carrying inflatable boats (Figure A-12). This action is analyzed separately from Foot Patrolling and Ambush because individuals are moving across the

beach along a different axis (along the short axis). This results in a different footprint and potential impact. This action could take place 480 times per year under the Proposed Action, about half the time on the SSTC-N beaches and otherwise distributed across SSTC-S, bayside beaches, and the designated NASNI training area.

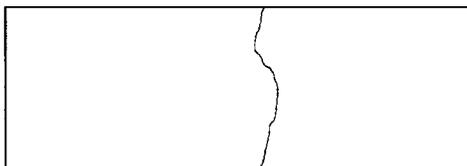


Figure A-12: Approximate Footprint of Beach Crossing and OTB Action

Observation Posts. This action involves individuals setting up 2 to 3 observation posts on the beach, approximately 10x10 sq yd in dimension. Equipment and vehicles typically remain on the sand road or along the hardpack sand. Personnel will station the observation posts, and communicate and sneak between posts (Figure A-13). The action often includes coordinated attacks from the observation posts on a target, which is evaluated under the patrolling and ambush action. Observation posts take place 84 times per year under the Proposed Action, 100 percent of the time on the SSTC-N beaches, and under one activity: Amphibious Warfare Activity.

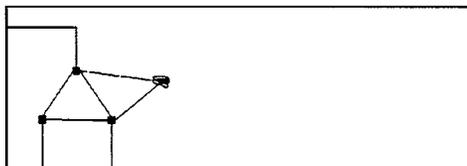


Figure A-13: Approximate Footprint of Observation Post Action

Reconnaissance. Reconnaissance takes place approximately 396 times per year under the Proposed Action, always on the SSTC-N beaches. It consists of individuals possibly entering the beach area from the water, and reconnoitering the beach for potential aggressors as well noting characteristics about the beach to aid follow-on activities. It is generally conducted by two or three persons who will circuit the beach on foot to check for enemy aggressors prior to a larger group landing on shore (Figure A-14).

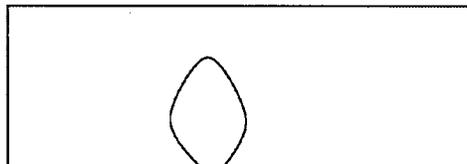


Figure A-14: Approximate Footprint of Reconnaissance Action

Logistic and Safety Vehicles. This action is common to most of the activities that occur on SSTC. Even activities which do not otherwise access the shore often require on-shore vehicles monitoring for safety and logistical reasons. Under the Proposed Action this action would take place 4,672 times per year, about 75 percent of the time on the SSTC-N beaches, the rest of the time dispersed throughout the action area. It consists of vehicles driving or sitting stationary on the beach from the best vantage point, and out of the way of other beach activities. If they are observing or supporting offshore activities they may transit along the beach crest or on the hard pack sand between the crest and high tide line (Figure A-15).

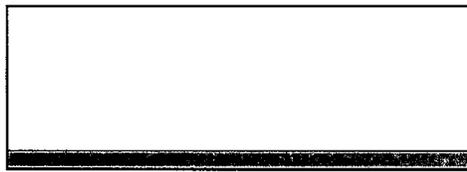


Figure A-15: Approximate Footprint of Logistic and Safety Vehicles

Running. Running takes place under physical fitness activities and consists of individuals or groups using the beach’s varied sand conditions for physical conditioning. It typically takes place along the long axis of the beach in varied sand types depending on the type of conditioning desired. Individuals will run on the hard pack sand , along the crest where the sand is soft and challenging, and along the sand road at the back of the beach, which provides a medium level of difficulty (Figure A-16). It occurs approximately 976 times per year, about 90 percent of the time at SSTC-N and otherwise at SSTC-S and NASNI beaches.

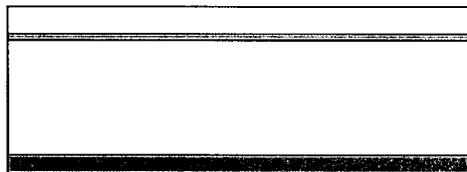


Figure A-16: Approximate Footprint of Running Action

Manual Excavations. Manual excavations take place 52 times per year under the Proposed Action, about 90 percent of the time on the SSTC-N oceanside beaches. They consist of individuals digging trenches, latrines, burying/excavating items hidden in the sand, and concealing beached boats. Individuals will often bury these items just below the crest of the beach where the slope face makes the burying easier. It is localized with a small (10 x 10 yard) footprint on the beach (Figure A-17).

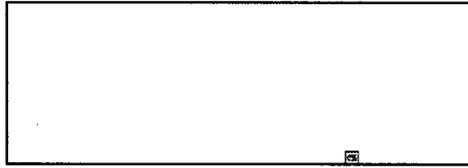


Figure A-17: Approximate Footprint of Manual Excavations

Visual Observation. Visual observation takes place about 160 times per year under the Proposed Action, about 50 percent of the time at SSTC-N and the rest of the time at SSTC-S and NASNI. Individuals stand on the crest of the beach where they have a good view of the waves, offshore, and beach activities to observe and record their observations (Figure A-18). Trainees are fairly stationary and therefore the action does not cast a large footprint.

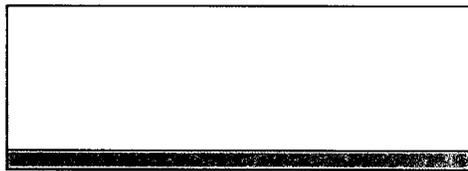


Figure A-18: Approximate Footprint of Visual Observation

Off Road Foot Traffic in the SSTC-S Inland Area. This action was identified from the Proposed Action specifically to analyze for the effect on San Diego fairy shrimp. Activities that include off-road foot traffic as an action and request access to the SSTC-S inland area amount to 460 times of potential foot training in the SSTC-S inland area. Activities that request the inland area as a training location could also potentially train at other SSTC locations; an estimated 5 percent of the training would actually occur in the SSTC-S inland area. This leaves 23 times of foot training that could potentially occur in vernal pools at SSTC. Effects on fairy shrimp are dependent on the actual level of foot traffic in the pools.

Appendix B: Biological Opinions and MOU's Regarding Activities Within the Action Area

- 2009 - Electronic mail message from USFWS that extended the findings of the 2005-2006 biological opinion and associated incidental take coverage to the 2009 breeding season.
- 2008 - Correspondence that extended the findings of the 2005-2006 biological opinion and associated incidental take coverage to the 2008 breeding season.
- 2007 - Biological Opinion (FWS-SDG-3452.3 July 16, 2007) on military training and conservation actions during 2007 breeding seasons at NAB Coronado, NASNI, and NRRF Imperial Beach, NBC.
- 2005 - Biological Opinion (FWS-SDG-3452.3 March 10, 2005) on military training during 2005 and 2006 breeding seasons at NAB Coronado, NASNI, and NRRF Imperial Beach, NBC.
- 2004 - Biological Opinion (FWS-SDG-3452.2 August 9, 2004) on military training during 2004 breeding seasons at NAB Coronado, NASNI, and NRRF Imperial Beach, Naval Base Coronado.
- 2003 - Biological Opinion (FWS-SDG-3452.1 May 15, 2003) on military training during the 2003 breeding seasons at NAB, Coronado, and NRRF, Imperial Beach, Naval Base Coronado. Amends BO FWS-SDG-3452.1 of 1 week earlier to correct the length of beach that would be staked with 3-foot tall markers delineating the Alpha crossing lane, and to incorporate by reference the scheduling procedures dated October 2002 that were developed in response to Term and Condition 2c of BO 1-6-02-2645.1 dated April 16, 2002. Also incorporated by reference procedures for incubating and hand rearing of collected least tern and snowy plover eggs.
- 2003 - Biological Opinion (FWS-SDG-3452.1 May 8, 2003) on military training during the 2003 breeding seasons at NAB, Coronado, and NRRF, Imperial Beach, Naval Base Coronado.
- 2002 - Biological Opinion (1-6-02-F-2645.1 April 16, 2002) on management strategies during the 2002 California least tern and western snowy plover breeding season at NAB Coronado beaches. Expanded beach crossing area and added raking as a deterrence measure.
- 2001 - Biological Opinion (April 16, 2001) extending BO 1-6-99-F-28 to add marking of all nests, introduce five beach crossing lanes and eliminate 500-yard coned off beach, establish a training schedule protocol during the breeding season.
- 2000 - Biological Opinion (June 12, 2000) extending BO 1-6-99-F-28 and take authorized under BO 1-6-97-F-37.

1999 - Biological Opinion (1-6-99-F-28 May 3, 1999) reinitiating consultation on management strategies during the 1999 California least tern and western snowy plover breeding seasons at NAB Coronado to extend the take authorization under BO 1-6-97-F-37 and add western snowy plover to the take permit coverage.

1997 - Biological Opinion (1-6-97-F-37 June 2, 1997) on military training on NAB Coronado beaches to reduce the protected area to a 500-yard (457-meter) section of Green 2. Service letter (8 April 1998) to Commanding Officer of NBC extended take authorization under BO 1-6-97-F-37.

Naval Base Coronado Biological Opinions and MOU Addressing Tern Foraging

2007 - Biological Opinion (FWS-SDG-4032.6) on the Fiddler's Cove Marina Repairs and Improvements Project, San Diego County, California.

2004 - Two-year, programmatic MOU (Service – U.S. Navy) establishing standards and conditions for in-water construction activities in San Diego Bay to prevent adverse effects to the endangered California least tern (DoN and Service 1993, 1999, 2000, 2004).

2002 - Biological Opinion (FWS-SDG-3025.1 August 7, 2002) Proposed Repelling Tower at the Naval Radio Receiving Facility.

NASNI Biological Opinions and MOU Addressing Construction, Airfield Operations and Training

2006 - Biological Opinion (FWS-SDG-3908.4 June 20, 2005) on military training during 2005 breeding seasons at NASNI.

2005 - Biological Opinion (FWS-SDG-3908.5 July 20, 2005) on the Navy Lodge Expansion on NASNI.

2005 - Letter of Amendment (FWS-SDG-3908.4 June 20, 2005) to BO FWS-SDG-3908.3, on ongoing operations and 2005 management strategy for the western snowy plover and California least tern at NASNI due to the elevated level of take on snowy plovers incurred on NASNI due to operations.

2005 - Biological Opinion (FWS-SDG-3908.3 April 1, 2005) on ongoing operations and the 2005 management strategy for the western snowy plover and California least tern at NASNI and expansion of the Navy Lodge on NASNI, including military operations on the NASNI beach.

1984 - MOU (March 12, 1984) between the Department of Navy and Service Relating to the Designation and Management of a Preserve for the California Least Tern at Naval Amphibious Base, Coronado.

- 1983 - Biological Opinion (1-1-82-F-123 March 2, 1983) regarding changes in the Maintenance and Training Facility (MAT) site (helicopter take-off and landing facility) repair project and construction of the Light Airborne Multipurpose Systems (LAMPS) helicopter maintenance and training facilities.
- 1980 - Biological Opinion (1-1-80-F-18 March 5, 1980) regarding displacement of tern nesting sites at a helicopter parking, landing, and takeoff area and around the airfield at NASNI.

Table C.2.

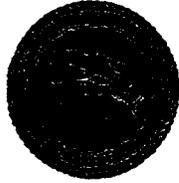
U.S. Rangewide, Recovery Unit 6, and Action Area Breeding WSP Observed During Breeding Season Window Surveys and Estimated Abundance

Year	U.S. Rangewide WSP Adults Observed	Estimated U.S. Abundance (observed x 1.3)	Recovery Unit 6 WSP Observed	Estimated Recovery Unit 6 Abundance (observed x 1.3)	Action Area WSP Observed (% of plovers observed in RU 6)
1991	1371	1782	88	114	na
2000	976	1269	171	222	na
2002	1517	1972	195	254	na
2003	1575	2048	264	343	76 (29)
2004	2039	2651	250	325	75 (30)
2005	1817	2362	209	272	30 (14)
2006	1877	2440	298	387	76-77 (26)
2007	1537	1998	183	238	27-33 (15-18)
2008	1541	2003	269	350	71(26)
2009	1587	2063	257	334	63 (25)

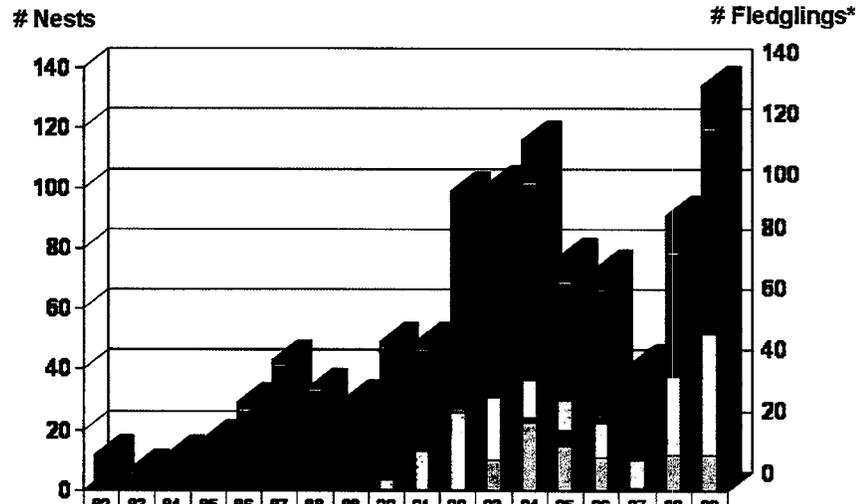
C.3. Plover Abundance Calculations

An average of 60 to 61 snowy plover adults were detected in the action area during breeding season window surveys conducted from 2005 to 2009 (based on data in Table 13a.). Not all plovers are detected during the window surveys, however the number detected (i.e., average 60 to 61) can be used to estimate the number present by multiplying by a correction factor. A site-specific correction factor has not been developed to address potential differences across the range of the snowy plover, however the Service has used a correction factor of 1.3 (Service 2007a) to provide a rough estimate of the rangewide population. Using this method, an estimated average of 78-79 adult plovers inhabited the action area during breeding seasons 2005-2009. Another method used to estimate the minimum number of breeding plovers on site is to determine the number of nests that are active each day throughout the breeding season, then find the maximum number of nests that were active at the same time. Since one female and male are associated with each active nest, the number of active nests can be multiplied by 2 to provide an estimate of the minimum number of plovers actually present onsite. Using this method, the number of breeding adults within the action area averaged 61 between 2005 -2009 (based on data in Table 14).

C.4. NBC Total Plover Nest Numbers and Fledgling Numbers



Naval Base Coronado Western Snowy Plover Nesting Data



	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09
■ NRRF					2	1	0	0	1	2	13	9	14	8	6	6	12	14
■ NAB OCEAN BEACHES	3	2	10	16	24	37	27	25	37	34	57	60	63	38	43	26	41	60
■ NAB DELTA BEACH SOUTH	2	1	0	1	1	6	7	3	6	0	2	2	2	0	0	0	0	0
■ NAB DELTA BEACH NORTH	7	4	2	0	2	0	0	2	2	0	1	0	0	0	1	0	0	0
□ NASNI OCEAN									4	13	26	21	13	10	12	9	26	40
■ NASNI FIELD or UNKNOWN													1	5	0	0	0	0
□ NASNI AIRFIELD											10	23	15	11	1	12	12	
TOTAL	12	7	12	17	29	43	34	30	49	49	99	101	116	77	73	42	91	134

*Data before 2000 unavailable. Some years had estimates for # fledged. Higher number used if estimate given.

Appendix D. 2007 Least Tern U.S. Rangelwide Breeding Season Data.

2007- Preliminary Data Site	Estimated Number of Breeding Pairs		Number of Nests	Estimated Number of Fledglings		Fledgling per Pair Ratio	
	Minimum	Maximum		Minimum	Maximum	Minimum	Maximum
San Francisco Bay Area							
Pittsburg Power Plant	7	8	7	0	0	0.00	0.00
Alameda Point	355	358	394	148	311	0.41	0.88
Hayward Regional Shoreline	35	35	35	49	49	1.40	1.40
San Luis Obispo/Santa Barbara Counties							
Oceano Dunes SVRA	54	54	66	70	70	1.30	1.30
Guadalupe-Mussel Rock	1	1	1	1	1	1.00	1.00
Vandenberg AFB	18	18	18	16	16	0.89	0.89
Coal Oil Point Reserve	4	4	6	0	0	0.00	0.00
Ventura County							
Santa Clara River/McGrath State Beach	56	77	77	76	76	0.99	1.36
Ormond Beach	49	50	52	35	35	0.70	0.71
Hollywood Beach	1	1	1	2	2	2.00	2.00
Pt Mugu- Totals	349	428	431	139	139	0.32	0.40
Holiday Beach	57	63	65	4	4	0.06	0.07
Holiday Beach Salt Panne	4	6	6	0	0	0.00	0.00
Ormond Beach East	286	350	351	134	134	0.38	0.47
Eastern Arm	2	9	9	1	1	0.11	0.50
Los Angeles/Orange Counties							
Venice Beach	449	453	547	446	446	0.98	0.99
LA Harbor	669	669	710	186	186	0.28	0.28
Seal Beach NWR - Anahiem Bay	164	166	166	12	12	0.07	0.07
Bolsa Chica Ecological Reserve	200	200	226	15	15	0.08	0.08
Huntington State Beach	445	445	485	215	215	0.48	0.48
Burris Sand Pit	8	9	8	9	9	1.00	1.13
Upper Newport Bay Ecological Reserve	37	37	42	12	18	0.32	0.49
San Diego County							
MCB Camp Pendleton- Totals	1422	1422	1530	243	267	0.17	0.19
Red Beach	12	12	14	1	2	0.08	0.17
White Beach	109	109	117	5	7	0.05	0.06
Santa Margarita River - North Beach North	266	266	288	10	14	0.04	0.05
Santa Margarita River - North Beach South	922	922	984	226	243	0.25	0.26
Santa Margarita River - Saltflats	74	74	85	1	1	0.01	0.01
Santa Margarita River - Saltflats Island	39	39	42	0	0	0.00	0.00
Batiquitos Lagoon Ecological Reserve- Totals	579	579	594	138	190	0.24	0.33
W1	40	40	40	15	19	0.38	0.48
W2	371	371	379	110	158	0.30	0.43
E1	163	163	170	13	13	0.08	0.08
E2	0	0	0	0	0	0.00	0.00
E3	5	5	5	0	0	0.00	0.00
San Elijo Lagoon Ecological Reserve	0	0	0	0	0	0.00	0.00
Mission Bay							
FAA Island	22	22	28	2	2	0.09	0.09

2007- Preliminary Data	Estimated Number of Breeding Pairs		Number of Nests	Estimated Number of Fledglings		Fledgling per Pair Ratio	
	Minimum	Maximum		Minimum	Maximum	Minimum	Maximum
Site							
North Fiesta Island	20	30	39	6	8	0.20	0.40
Mariner's Point	75	75	105	20	30	0.27	0.40
Stony Point	30	40	45	8	10	0.20	0.33
San Diego River Mouth	20	20	30	8	10	0.40	0.50
San Diego Bay							
Lindbergh Field & Former Naval Training Center	120	127	135	34	42	0.27	0.35
USN- Totals	1149	1149	1285	231	232	0.20	0.20
NI MAT	115	115	123	31	32	0.27	0.28
Delta Beach North	207	207	224	50	50	0.24	0.24
Delta Beach South	147	147	156	35	35	0.24	0.24
NAB Ocean	680	680	782	115	115	0.17	0.17
D Street Fill/Sweetwater Marsh NWR	100	115	130	25	28	0.22	0.28
Chula Vista Wildlife Reserve	33	39	46	0	0	0.00	0.00
South San Diego Bay Unit, SDNWR - Saltworks	50	73	97	13	18	0.18	0.36
Tijuana Estuary NERR	188	239	291	29	47	0.12	0.25
San Diego Bay (excluding Tijuana Estuary) Subtotal	2789	2891	1693	563	599	2	2
Totals:	6709	6943	7627	2188	2484	0.32	0.37

Appendix E. Calculations Pertaining to Relative Least Tern Abundance and Density

Table E.1 Average Density of California Least Tern Nests at SSTC-N

	2005	2006	2007	2008		
Number of Tern Nests in Northern 7 Lanes ^a	294	455	330	443		
Area of Northern 7 Lanes ^b	35.46 ha (87.66 ac)	35.46 ha (87.66 ac)	35.46 ha (87.66 ac)	35.46 ha (87.66 ac)		
Tern Nest Density in Northern 7 Lanes	8.3/ha (3.4/ac)	12.8/ha (5.2/ac)	9.3/ha (3.8/ac)	12.5/ha (5.1/ac)		
Number of Tern Nests in Southern 3 Lanes ^a	276	592	452	612		
Area of Southern 3 Lanes ^b	16.44 ha (40.63 ac)	16.44 ha (40.63 ac)	16.44 ha (40.63 ac)	16.44 ha (40.63 ac)		
Tern Nest Density in Southern 3 Lanes	16.8/ha (6.8/ac)	36.1/ha (14.6/ac)	27.6/ha (11.1/ac)	37.3/ha (15.1/ac)		
Total Number of Tern Nests in SSTC N Lanes	570	1047	782	1055		
Total Area of SSTC-N Lanes	51.92 ha (128.29 ac)	51.92 ha (128.29 ac)	51.92 ha (128.29 ac)	51.92 ha (128.29 ac)		
SSTC-N Lane Density	11/ha 4.4/ac	20.2/ha 8.2/ac	15.1/ha 6.1/ac	20.3/ha 8.2/ac		

a; data from DoN, unpublished reports 2005, 2006, 2007, 2008

b; data from Conkle, T. pers. comm., 2005.

Appendix E Continued.

Table E.2. Percentage of Rangewide Tern Nests Initiated at SSTC-N

	2005	2006	2007	2008		
Rangewide Total Nests ^a	8124	8173	7627	8223		
Number Tern Nests within Northern 7 lanes ^b	294	455	330	443		
Percent of Rangewide Total in Northern 7 Lanes	3.6	5.6	4.3	5.4		
Number of Tern Nests in Southern 3 Lanes ^b	276	592	452	612		
Percent of Rangewide Total in southern 3 lanes ^b	3.4	7.2	5.9	7.4		
Number of Tern Nests on SSTC-Beach Including all beach lanes	570	1047	782	1055		
Percent of Rangewide Total on SSTC-N Beach	7.0	12.8	10.3	12.8		
Number of Tern Nests on Delta Beaches	566	378	380	469		
Percent of Rangewide Total on Delta Beaches	6.7	4.6	5.0	5.7		

a. data from CDFG reports: Marschalek 2006, 2007, 2008, 2009

b. data from unpublished Navy reports 2005, 2006, 2007, 2008, 2010

Appendix E Continued.

Table E.3. California Least Tern Minimum Pair Estimates, Rangewide and Within Action Area

	Rangewide Min Pair Estimate ^a	SSTC-N Beach Min Pair Estimate ^a	% of Rangewide Estimate	Delta Beach Min Pair Estimate ^a	% of Rangewide Estimate	Action Area Min Pair Estimate ^b	% of Rangewide Estimate
2005	6865	502	7.3	507	7.4	1009	14.7
2006	7006	884	12.6	342	4.9	1226	17.5
2007	6744	680	10.1	354	5.2	1034	15.3
2008	6998	912	13.0	535	7.6	1447	20.7
2009	7124	914	12.8	550	7.7	1464	20.6
AVG	6947	778	11.1	458	6.6	1236	17.8

a from CDFG reports; Marschalek, D. 2006, 2007, 2008, 2009