U.S. Fish and Wildlife Service

Post-Delisting Monitoring Plan for Five San Clemente Island Taxa

San Clemente Bell's sparrow
San Clemente Island lotus
San Clemente Island paintbrush
San Clemente Island larkspur
San Clemente Island bush-mallow

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Cover Photos

Top row: San Clemente Island bush-mallow (USFWS); San Clemente Bell's sparrow (Nicole Desnoyers).

Bottom row: San Clemente Island paintbrush (Tiffany McFarland); San Clemente Island lotus (USFWS); San Clemente Island larkspur (U.S. Navy)

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Acknowledgments

This Post-Delisting Monitoring Plan for the five taxa on San Clemente Island, including the San Clemente Bell's sparrow (*Artemisiospiza belli clementeae;* Bell's sparrow), *Acmispon dendroideus var. traskiae* (San Clemente Island lotus), *Castilleja grisea* (San Clemente Island paintbrush), *Delphinium variegatum ssp. kinkiense* (San Clemente Island larkspur), and *Malacothamnus clementinus* (San Clemente Island bush-mallow), was developed by the U.S. Fish and Wildlife Service in cooperation with the U.S. Department of the Navy. This plan was completed by Brendan Himelright, Julie Simonsen, and Sandy Vissman of the Carlsbad Fish and Wildlife Office, Carlsbad, California. We wish to acknowledge the extensive assistance and cooperation of the core team who helped in the development and preparation of this plan: Joyce Sisson, Kimberly O'Connor, Daniel Leavitt, Melissa Booker, Bryan Munson, Susan Meiman, Andrew Bridges, Betty Lee, Julie Lambert, Nancy Ferguson, and Bradd Baskerville-Bridges.

Anti-deficiency Act Disclaimer

Post-delisting monitoring is a cooperative effort between the U.S. Fish and Wildlife Service, State and Tribal governments, other Federal agencies, and nongovernmental partners. Funding of post-delisting monitoring presents a challenge for all partners committed to ensuring the continued viability of the five taxa in this monitoring plan following removal of protections afforded under the Endangered Species Act, as amended. To the extent feasible, the Service and our partners intend to provide funding for post-delisting monitoring efforts through the annual appropriations process. Nonetheless, nothing in this Post-Delisting Monitoring Plan should be construed as a commitment or requirement that any Federal agency obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation.

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A. SAN CLEMENTE ISLAND POST-DELISTING MONITORING PLAN

A.1 INTRODUCTION

We are proposing to delist five taxa endemic to San Clemente Island, including the San Clemente Bell's (=sage) sparrow [*Artemisiospiza (=Amphispiza) belli clementeae*)(Bell's sparrow)], *Acmispon dendroideus var. traskiae* (San Clemente Island lotus), *Castilleja grisea* (San Clemente Island paintbrush), *Delphinium variegatum ssp. kinkiense* (San Clemente Island larkspur), and *Malacothamnus clementinus* (San Clemente Island bush-mallow), based on a review of the species' status as presented in the Species Status Assessments prepared by Texas A&M University (USFWS 2022a, USFWS 2022b, USFWS 2022c, USFWS 2022d and USFWS 2022e). This document was prepared to describe the post-delisting monitoring for these species and follows the Service's August 2008, *Post-Delisting Monitoring Plan Guidance Under the Endangered Species Act* (USFWS and NMFS 2008, entire).

Post-delisting monitoring (PDM) refers to activities undertaken to verify that a species delisted due to recovery remains secure from risk of extinction after the protections of the Endangered Species Act (Act) are no longer applicable. A primary goal of PDM is to monitor the species to detect any changes in status, and if a substantial decline in the species (numbers of individuals or populations) or an increase in threats is identified, to enact measures to halt the decline so that re-proposing the species as threatened or endangered is not needed.

Section 4(g) of the Act requires the Secretary of the Interior to implement a system in cooperation with states to monitor for not less than 5 years the status of all species that have recovered and been removed from the Federal List of Endangered and Threatened Wildlife (List). Section 4(g)(2) of the Act directs the U.S. Fish and Wildlife Service (Service) to make prompt use of its emergency listing authorities under section 4(b)(7) to prevent significant risk to the well-being of any recovered species. While not specifically mentioned in section 4(g), authorities to list species in accordance with the process prescribed in sections 4(b)(5) and 4(b)(6) may also be utilized to reinstate species on the List, if warranted.

The Service and states have latitude to determine the extent and intensity of PDM that is needed and appropriate. The Act does not require the development of a formal PDM Plan. However, we generally desire to follow a written planning document to provide for the effective implementation of section 4(g) by guiding collection and evaluation of pertinent information over the monitoring period and articulating the associated funding needs.

A.2 SAN CLEMENTE ISLAND

San Clemente Island (SCI) is located 68 nautical miles (mi) [125 kilometers (km)] west of San Diego, California, and is the southernmost of the California Channel Islands (Figure A2–1) (US Navy 2013b, p. 1-4). SCI is approximately 56 square mi (145 square km, 36,073 acres, or 14,598 hectares) (Junak and Wilken 1998, p. 2) and is long and narrow: 21 mi (34 km) long by 1.5 mi (2.4 km) wide at the north end and 4 mi (6.4 km) wide at the south end (USFWS 1984, p. 5). The island consists of a relatively broad open plateau that slopes gently to the west. The western side of the island is characterized by conspicuous marine terraces, and the southeastern side of the island is characterized by steep escarpments that drop precipitously to the rocky coastline. Deep, narrow canyons extend from the central plateau to both the eastern and western shorelines of the island. Mount Thirst, the highest point on the island, rises to approximately 1,965 ft (599 m) (US Navy 2013b, p. 1-4).

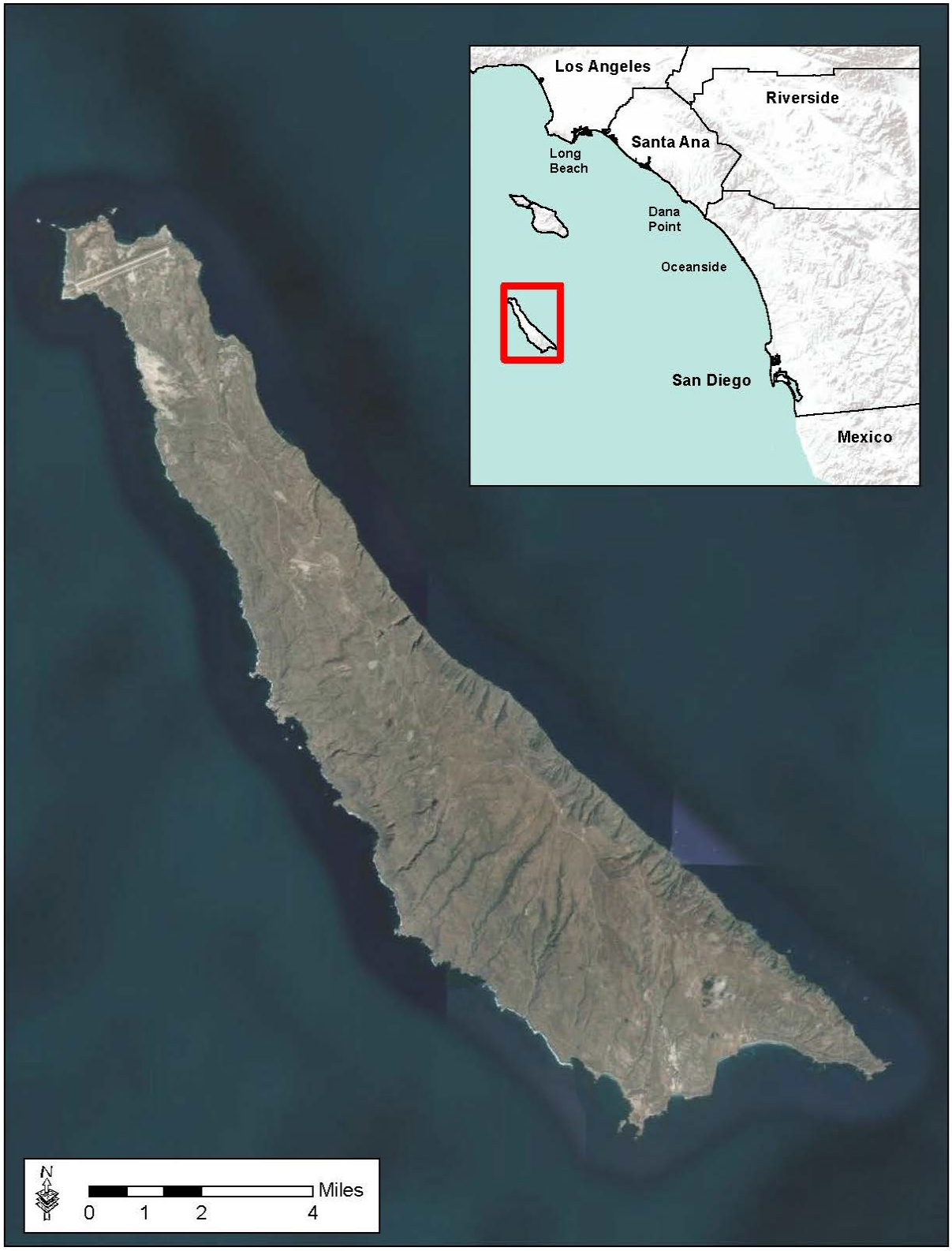

Figure A2-1. San Clemente Island is Located West of San Diego, California, and is the Southernmost of the California Channel Islands.

Average monthly temperatures range from 58°F (14°C) to 66°F (19°C), with a monthly maximum temperature of 72°F (27°C) in August and a monthly minimum of 51°F (10°C) in December (US Navy 2013b, p. 3-11). Average monthly relative humidity varies from 54 to 86 percent depending on location and time of year, and the island experiences dramatic fluctuations in annual rainfall, averaging approximately 6.6 in (16.8 cm) (US Navy 2013b, pp. 3-11, 3-13). Precipitation is received mainly from November through April, with little from May through October. In addition to precipitation, fog drip during the typical dry season is a vital source of moisture to the SCI ecosystem (US Navy 2013b, pp. 3-9, 3-13).

SCI supports a unique assemblage of flora and fauna, with numerous species endemic to the island or the Channel Islands. SCI was used for sheep ranching from 1862–1934 (Scott and Morrison 1990, pp. 25–27; Ferguson 1979, pp. 3–8), cattle ranching from 1850–1934 (up to 1,000 head of cattle), pig farming (1,700 pigs removed 1972-1987), and supported a population of over 12,000 feral goats that were removed by 1991 (Keegan et al. 1994, p. 58). Habitat conversion caused by nonnative ungulates from the mid-1800s to 1993 reduced native vegetation and subsequent habitat for native species on the island. There is limited information about the ecology of the island prior to the introduction of the nonnative ungulates. However, grazing and browsing by nonnative ungulates resulted in impacts to the soil, flora, and fauna of SCI. Persistent grazing and browsing defoliated large areas of the island, and the animals caused trampling and trail proliferation, which exacerbated erosion. Although limited information is available on the early ecology of the island, habitat alteration likely resulted in the documented extirpation of several species from the island and apparently reduced the distribution of some species, including island endemics. Since the cessation of ranching and the more recent successful removal of nonnative goats, the island vegetation is in a state of recovery. Visible expansion of shrublands is evident on the plateau, on the slopes, and in the canyons of SCI.

SCI is owned by the U.S. Department of the Navy (US Navy) and, with its associated offshore range complex, the island is the primary maritime training area for the Pacific Fleet and Sea Air and Land Teams (SEALs) (USFWS 2012, p. 29078). SCI also supports training by the U.S. Marine Corps, the U.S. Air Force, the U.S. Army, and other military organizations. As the western most training range in the eastern Pacific Basin, where training operations are performed prior to troop deployments, portions of the island receive intensive use by the military (US Navy 2008, p. 2-2). SCI supports a military airfield, a fuel distribution system, a landfill, berthing facilities, and infrastructure to support training activities. Training activities occur within delineated training areas that designate allowable types of training (e.g., live fire vs blank fire, detonations, troop movement, assault vehicle and heavy equipment operation, artillery use, helicopter landing and loading, bombardment, land navigation). Military training activities can have direct and indirect effects to the natural resources on the island. Military activities are conducted in tandem with managing the natural resources on the island. The Navy drafted, updates, and implements (in coordination with natural resources agency partners, the San Clemente Island Integrated Natural Resources Management Plan (INRMP) in accordance with the Sikes Act. The INRMP identifies natural resources on the island and outlines a strategy for ongoing conservation consistent with military training needs. Natural resources management on SCI includes inventory and monitoring of natural resources, research to improve our understanding of status and requirements of target species, active management of identified threats, and identification of sensitive areas to avoid or minimize potential impacts.

The target taxa on SCI also benefit from the portion of their population that overlaps with the Island Night Lizard Management Area (INLMA), which encompasses 9,653 ac (3906 ha) of high-quality island night lizard habitat on the western side of the island (USFWS 2021; US Navy 2013a, p. 3.222; USFWS 1997, p. 13). The INLMA was established in 1997 to facilitate planning to avoid impacts and provided for the offset of impacts elsewhere on the island, thereby ensuring the continued persistence of the island night lizard (USFWS 1997, p. 13). INLMA designation within the SCI INRMP is used to recognize the area as important for species management and impact minimization, as practical, within support of the military mission. The INLMA overlaps with approximately 3,800 acres of high-quality Bell's sparrow habitat (Figure A2-1; USFWS 2020a, p. 24). Training activities are limited in the INLMA, reducing potential impacts to the target species that occur there.

Additionally, we encourage the Navy to consider implementation of four SCI Management Areas (Figure A2-1) as recommended in the Biological Opinion on Combat Aircraft Loading Area (USFWS 2020a, p. 24). The approximate 9,564-acre management areas would help protect high quality habitat, aid in sustainable restoration, and would increase the likelihood that a large number of Bell's sparrows persist in the future (USFWS 2021). The proposed management areas may also provide benefits to the target plant taxa. We are also recommending the Navy continue habitat restoration to benefit the Bell's sparrow, and to enter into a Conservation Agreement with the Service to support future management.

A.3 PURPOSE AND IMPLEMENTATION

The purpose of PDM is to monitor the status of the target species so that management actions may be implemented to halt or reverse potential declines. It also describes the conditions under which relisting would be evaluated. This PDM Plan includes a monitoring approach to evaluate the status of each species and its habitat, as well as the potential effects of residual stressors. Quantitative triggers for assessing potential declines in species' persistence are identified so that proactive actions can be implemented. Each species' status will be summarized in annual monitoring reports and formally evaluated by the Service every 3 years (Table A3-1). The roles of all cooperators in post-delisting monitoring are described below.

U.S. Fish and Wildlife Service

We are responsible for ensuring that effective PDM of the Bell's sparrow, *Acmispon dendroideus var. traskiae*, *Castilleja grisea*, *Delphinium variegatum ssp. kinkiense*, and *Malacothamnus clementinus* is accomplished through coordination and maintaining oversight of all activities implemented in cooperation with the Navy on SCI. At this time, we do not anticipate having sufficient personnel and resources available for conducting the necessary field work, data analysis, and reporting required for the PDM effort. Therefore, we will work with the Navy to implement activities outlined in this PDM Plan using Navy-administered funds, and will also seek funding opportunities, if necessary, through existing grant programs. The Service will evaluate the species' status every 3 years based on annual reports provided by the Navy.

U.S. Navy

The Navy is responsible for the management of the species and their habitats on SCI following policies and guidance incorporated in the Integrated Natural Resources Management Plan. Based on their extensive knowledge of the island and the target species, the Navy contributed significantly to

the development of this PDM Plan and will implement and fund PDM on SCI for a minimum of 9 years. The Navy will implement management, monitoring, and research objectives, based on monitoring triggers and in coordination with the Service, to prevent future declines. The Navy will be responsible for providing island-wide monitoring data (including precipitation, temperature), maps, and associated GIS data on an annual basis to support PDM, including fire severity/frequency and areas burned, as well as any changes in the location of the military training areas or type of training conducted.

Table A3-1. Implementation Schedule for Post-Delisting Monitoring

Monitoring Action	Year 1-2 (2023-2024)	Year 3 (2025)	Year 4-5 (2026-2027)	Year 6 (2028)	Year 7-8 (2029-2030)	Year 9 (2031)
Data Collection	X	X	X	X	X	X
Data Analysis and Reporting	X	X	X	X	X	X
Service Evaluation of Triggers		X		X		X

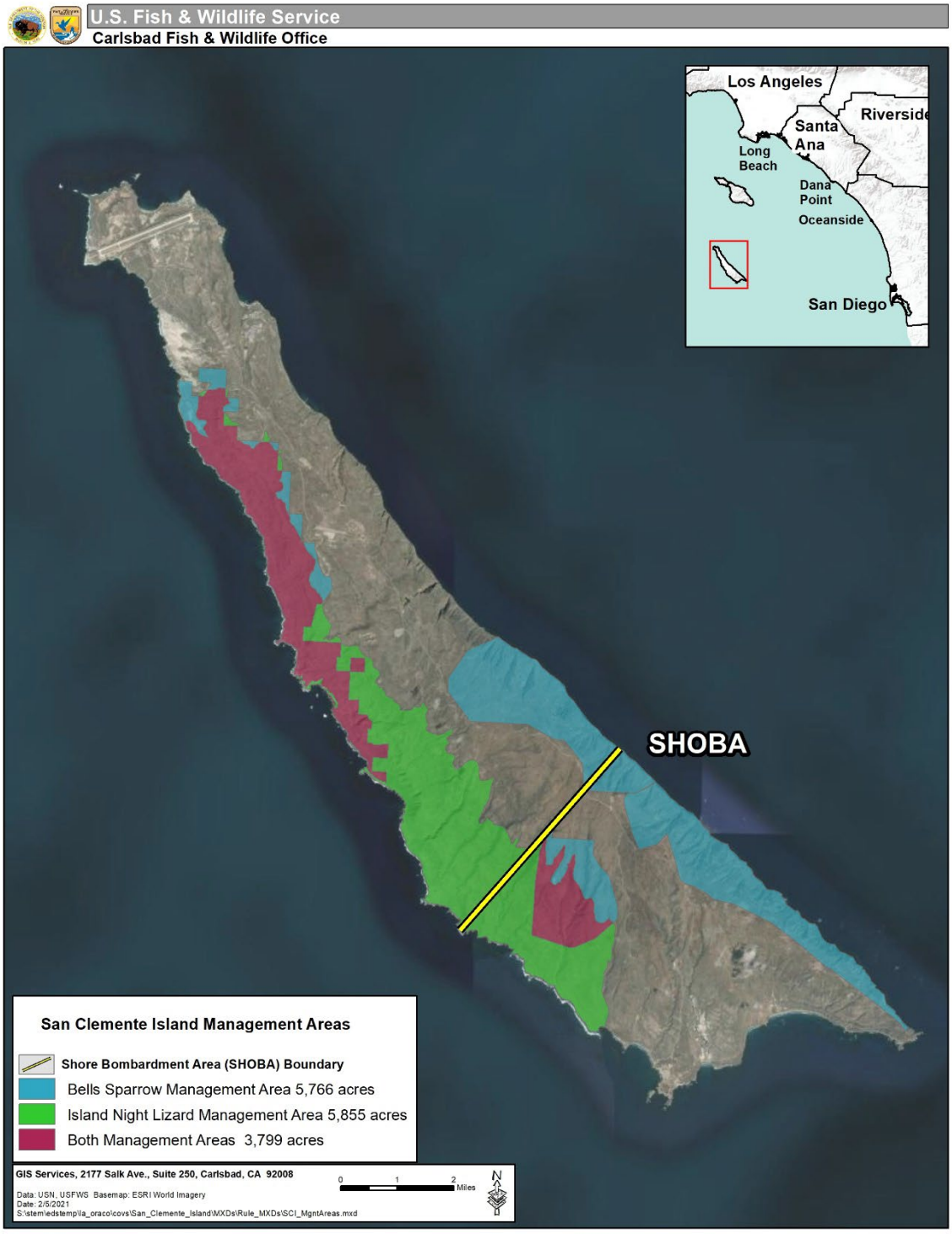

Figure A2-1. Map of Island Night Lizard and Proposed San Clemente Island Bell's Sparrow Management Areas (Figure 4 from USFWS 2020a, p. 24). Upper Cave Canyon/Plateau = 594 ha (1,469 ac), Dunes to Mail Point = 1412 ha (3,489 ac), SHOBA Eastern Escarpment = 905 ha (2,236 ac), Mid-Island Eastern Escarpment = 959 ha (2,370 ac).

B. SAN CLEMENTE BELL'S SPARROW

B.1 SPECIES CLASSIFICATION AND LISTING HISTORY

We listed the Bell's sparrow as threatened under the Act on August 11, 1977, due to habitat loss and modification from the introduction of nonnative herbivores, nonnative plant species, and predation (USFWS 1977, 42 FR 40682). The Service initiated a 5-year review of San Clemente Sage sparrow (*Amphispiza belli clementeae*; redesignated as the San Clemente Bell's sparrow by Chesser et al. 2012) on September 27, 1982 (USFWS 1982, p. 42387) and opened a 120-day period to receive information. An additional 90-day period to receive information was reopened on February 3, 1983 (USFWS 1983, p. 4860). The review was completed and no change in the listing status was recommended; however, at that time no summary was required to be published. Subsequently another review of the listing status of the species was initiated on July 7, 1987 (USFWS 1987, p. 25523). The results of this review were not published; however, the species continued to be listed as threatened in the table at 50 CFW 17.11. Most recently, the Service completed a 5-year review of San Clemente sage sparrow on August 13, 2009 (USFWS 2009) and recommended no change in the status of the species. No review of the listing status of this species has been initiated since completion of the 2009 5-year Review (75 FR 28639). Bell's sparrow was also listed by the State of California as a bird species of special concern in 1977 (USFWS 2009, p. 3).

In 2020, based on the best available scientific information, we determined that the Bell's sparrow has recovered due to the amelioration of all substantial threats and ongoing management of potential threats to the species and its habitat by the Navy. For additional background information on the Bell's sparrow, refer to the San Clemente Bell's Sparrow Species Status Assessment (USFWS 2022a, entire) and proposed delisting rule (USFWS 2022b, entire).

B.2 SUMMARY OF SPECIES STATUS AT TIME OF DELISTING

Distribution

The Bell's sparrow is a non-migratory subspecies endemic to SCI. It was historically common in shrub habitat on the hillsides and lower elevation mesas on SCI (Grinnell 1897, p. 18; Breninger 1904, p. 221; Linton 1908, p. 85). At listing, the Bell's sparrow was primarily distributed within the boxthorn-dominated maritime desert scrub community on the lower marine terraces along the northwestern portion of SCI (Figure B2-1; Figure B2-2) (Willey 1997, p. 219). Our most recent 5-year review reflects this understanding of the subspecies distribution (USFWS 2009, p. 8). However, the Bell's sparrow has more recently been found to occur across SCI (although at extremely low densities in many areas), bringing recent estimates of potential available habitat from approximately 4,196 ha (10,369 acres) in 2009 (USFWS 2009, p. 8) to approximately 13,132 ha (32,449 acres, almost 90 percent of SCI) (Meiman et al. 2018, p. 5). As the native habitats recovered following the removal of the grazing and browsing animals, the distribution of Bell's sparrow expanded on SCI (Meiman et al. 2019, pp. 2–4). The west shore Maritime Desert Scrub habitat, characterized by California boxthorn (*Lycium californicum*), where the species was originally described, remains densely occupied and an important area for the Bell's sparrow population.

Population

Several studies of Bell's sparrow distribution were conducted between 1976–1997 (Byers 1976; Hyde 1985). At its lowest reported population index, the San Clemente Bell's sparrow was close to extinction, with 38 individual adults in 1984 (Hyde 1985, p. 30). The population was estimated to be 316 in 1981, 38 in 1984, and 294 in 1997 (Beaudry et al. 2003, pp. 1–2). Some of the population fluctuation may be related to differences in survey methods and areas surveyed (Kaiser et al. 2008, pp. 31–33). Early studies may have underestimated the Bell's sparrow population in the 1970s and 1980s, as they did not include *Lycium californicum* habitat at higher elevations and thus may have underestimated the total suitable habitat on SCI (Kaiser et al. 2008, pp. 31–33). However, Byers (1976, p. 7) noted that some habitat that seemed "appropriate" was not occupied despite its similarity to occupied habitat, indicating that not all potentially suitable habitat was occupied at listing.

Starting in 1999, a standardized method to estimate San Clemente Bell's sparrow population size was established, including repeated surveys of transects located within known and historical Bell's sparrow habitat on the western terrace (Meiman et al. 2018, p. 2). The estimated population size ranged from 600 to 727 adults between 1999 and 2009 and from 452 to 1,546 between 2009 to 2012. Observations of Bell's sparrows outside the west shore during the breeding season prompted an 1-weekend early-breeding-season survey, in 2010. This weekend survey was not intended to provide an island-wide population estimate but suggested that the population range and size were likely being underestimated (Docherty et al. 2011, p. 1; Ehlers et al. 2012, p. 1).

In order to more accurately estimate distribution and population size, Bell's sparrow breeding season survey methods were revised in 2012, implementing an island-wide random stratified sampling approach. This new methodology was implemented island-wide in 2013 (after a 2012 pilot survey). The sampling frame for monitoring includes most of the island, which is stratified across eight vegetation strata using a combination of aerial images and ground truthing (Reference table above; Figure B2-1; B2-2; Meiman et al. 2016). Strata include Boxthorn (north and south), Sagebrush, Mixed Shrub, Cactus, Grassland/Herbaceous (north and south) and Canyon/Woodland or Bare. "Canyon/woodland or Bare" is a lumped category of vegetation types that are not potential habitat for San Clemente Bell's sparrow (Appendix I). The 2013 monitoring effort resulted in an island-wide estimate of 4,534 adult sparrows (2,267 pairs). The population estimates have consistently been over 4,000 adults since 2013 (4,194–7,656) (Figure B2-3; Figure B2-4).

Although Bell's sparrows may be found in most plant communities or strata on SCI, territory density varies significantly between the strata (Figure B2-2) (Meiman et al. 2018, p. 16; Meiman et al. 2019, p. 15). In most years, estimated territory density is highest (0.45 territories/ha in 2018) in the Boxthorn-N strata (North of Mail Point/Stone Station line), which corresponds to the northern segment of the habitat monitored during transect surveys (1999-2012). The Sagebrush strata also

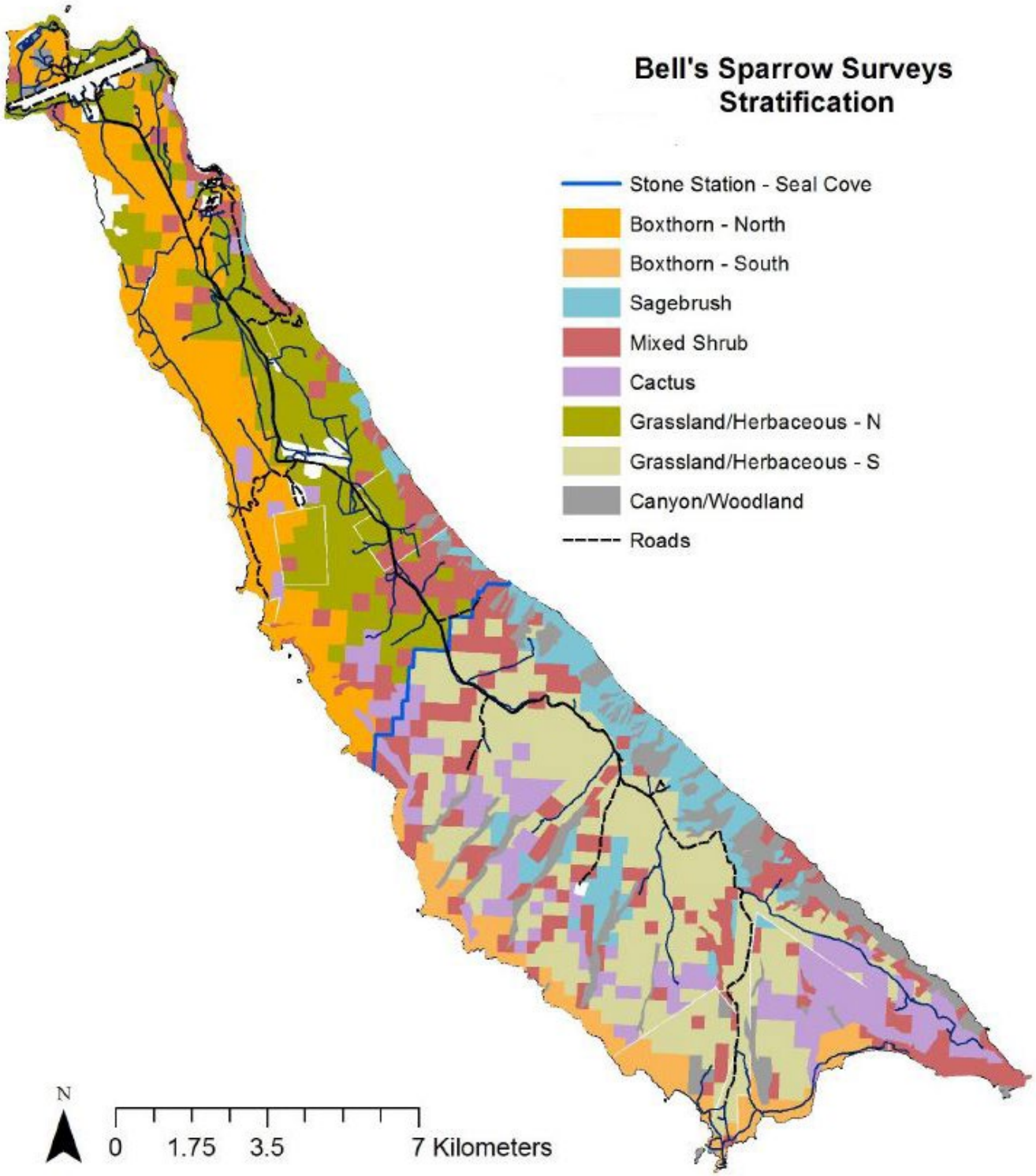

Figure B2-1. Vegetation Strata Mapped on San Clemente Island

(Figure used with permission; Meiman et al. 2016, p. 22).

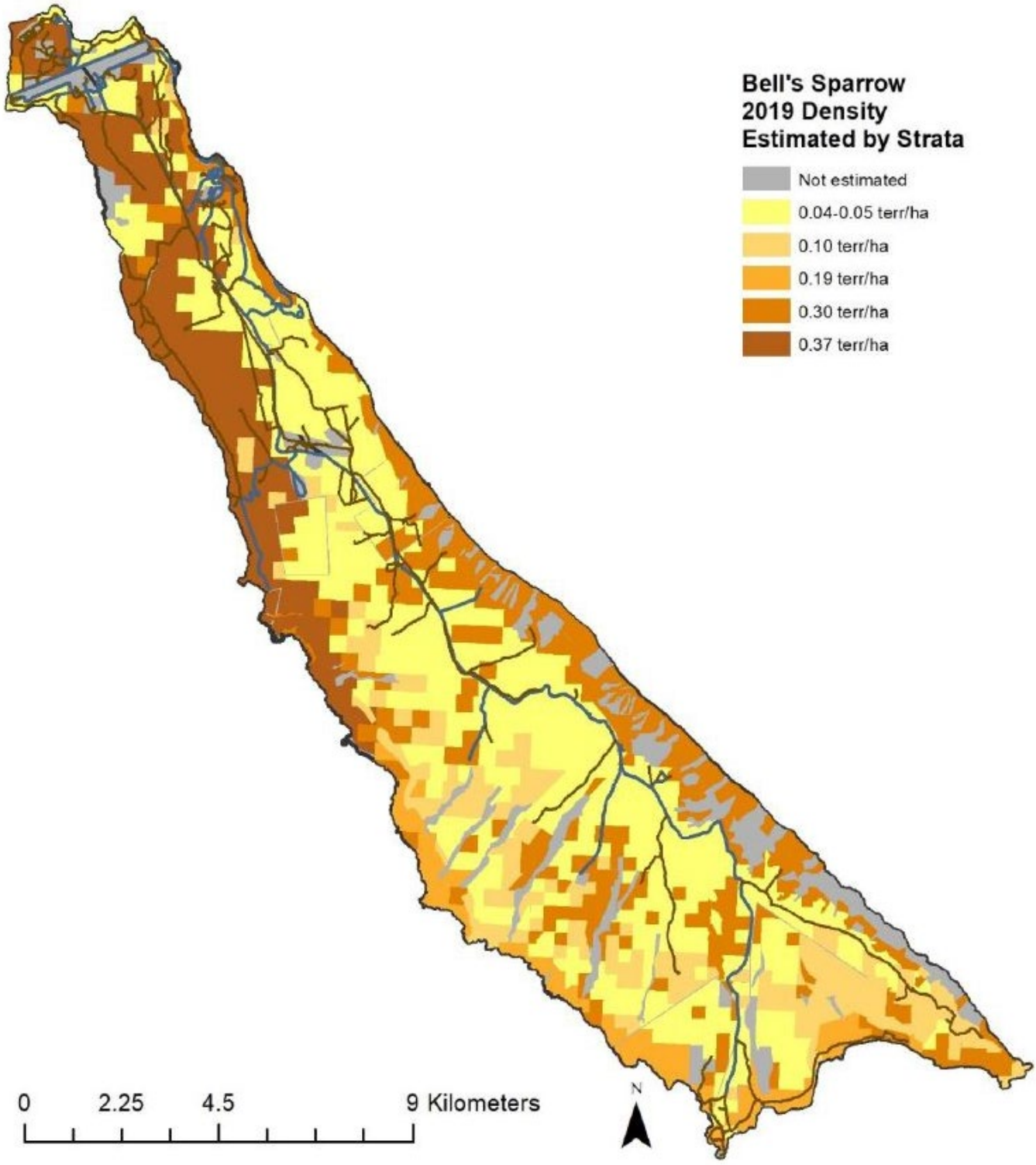

Figure B2-2. Estimated Densities of San Clemente Bell's Sparrow Territories on San Clemente Island (Figure used with permission, Meiman et al. 2020, p. 16).

supports high estimated densities (0.37 territories/ha in 2018). Combined, the Boxthorn-N strata and the Sagebrush strata encompass roughly 21 percent of the potential habitat on the island in 2019, yet they support a disproportionately high percentage (46 percent) of sparrow territories and support more uniformly high-quality habitat than other strata. Conversely, the Cactus, Grassland-Herbaceous-N, Grassland-Herbaceous-S, and Boxthorn-S strata support significantly lower Bell's sparrow densities with many plots sampled in these strata not supporting any Bell's sparrows. Combined, these lower-density strata encompass a much larger percentage of the potential habitat on the island (roughly 63 percent) and support a disproportionally smaller proportion (roughly 27 percent) of the Bell's sparrow territories. Density estimates for non-boxthorn plots have generally increased (2013-2018), although there is significant variation among plots within some strata as well as fluctuation among years (Meiman et al. 2019, p. 37). Table B2-1 summarizes the latest strata estimates from 2019 as described in Meiman et al. 2020.

The most current population viability analysis (PVA) (Beaudry et al. 2003, pp. 46–47; Kaiser et al. 2008, p. 47), using demographic information from 2000–2007, suggested that the primary variable contributing to extinction risk was juvenile mortality and the secondary variable is the effects of drought (USFWS 2008b, pp. 167–185). Juvenile mortality was likely overestimated in the PVA, because juvenile immigration to other parts of the island was not factored into the PVA. No PVA has been run using the complete island wide data collected surveys started in 2013.

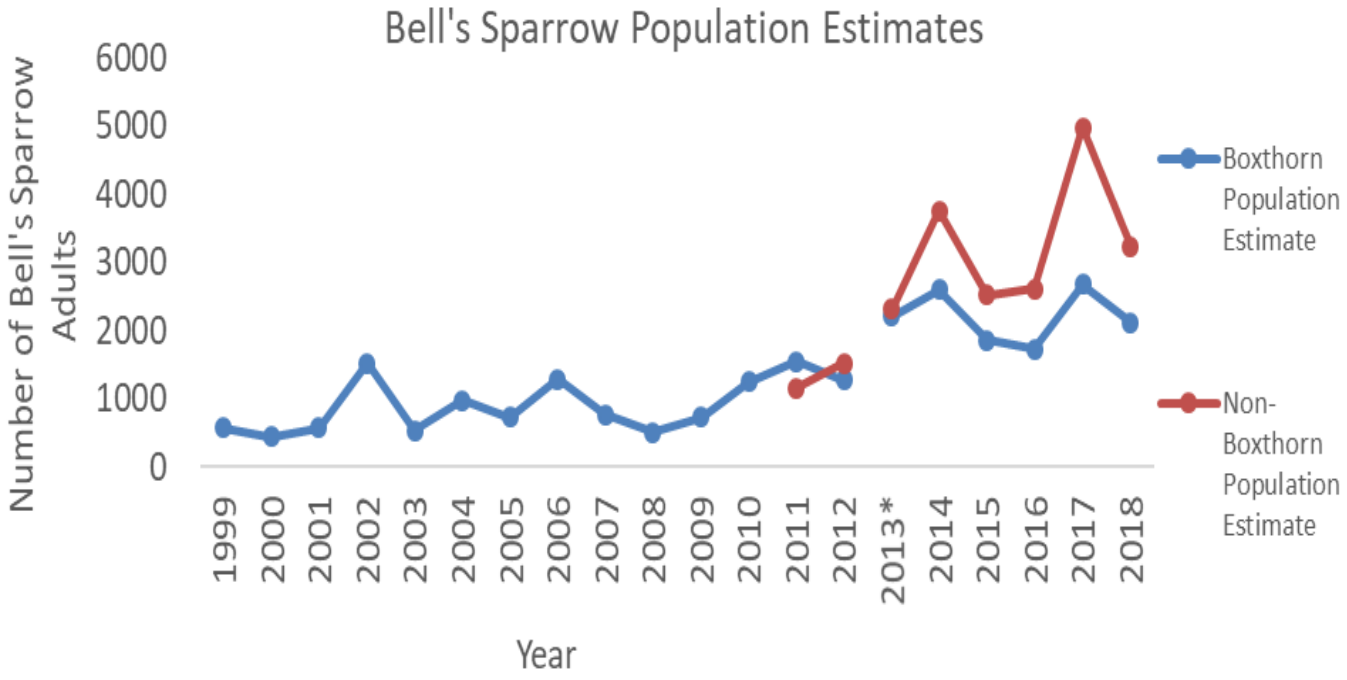

Figure B2-3. Bell's Sparrow Population Estimates From 1999 Through 2018, in Boxthorn and Outside Boxthorn Habitat on San Clemente Island, California. Sampling changed in 2013 and estimates after 2013 are only roughly comparable to the pre-2013 data (from Meiman et al. 2019, p. 37).

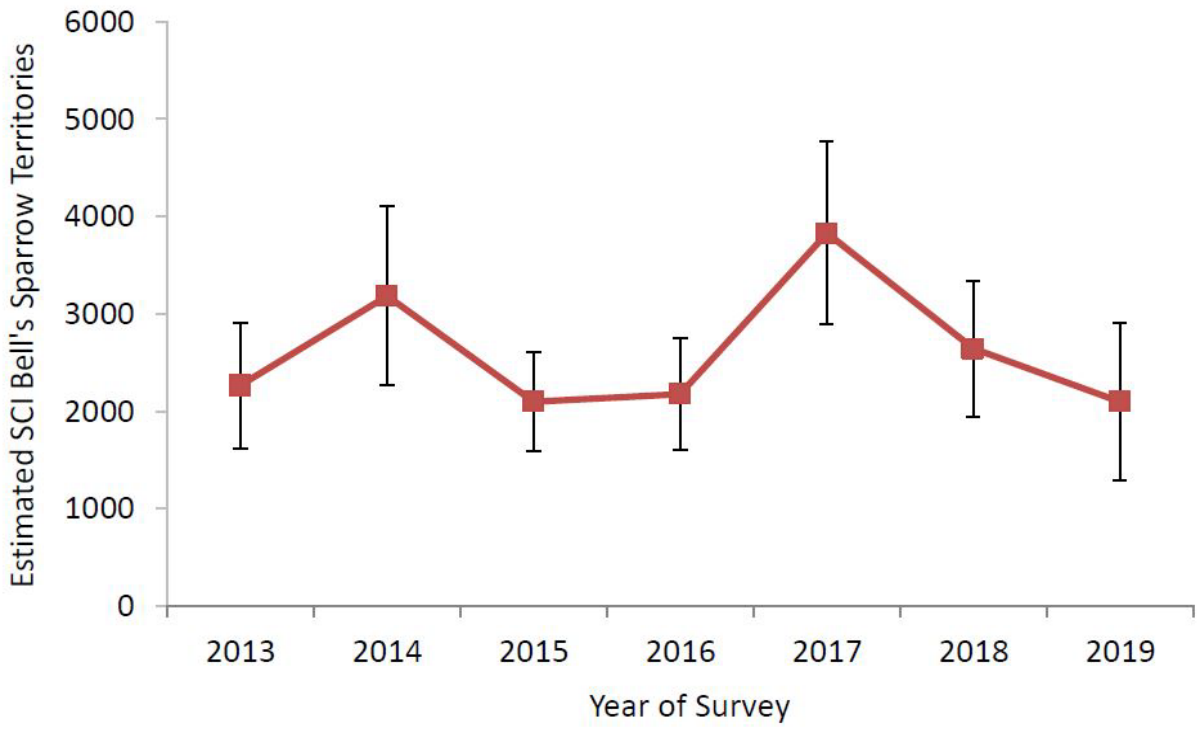

Figure B2-4. Estimated Total San Clemente Bell's Sparrow Territories on San Clemente Island (bars indicate 95 percent confidence intervals) by Year From 2013–2019 (Meiman et al. 2020, p. 34).

Table B2-1. Summary of 2019 Survey Results Including Estimated Population Densities, the Number of Plots and Total Area Surveyed.

Stratum	Plots Surveyed	Total Area (ha)	Percent of Habitat	2019 Estimated Densities (terr/ha)	2019 Estimated number of territories
Boxthorn-N	24	2009.4	15.3	0.37	743
Boxthorn-S	6	664.7	5.1	0.19	126
Sagebrush	15	724.9	5.5	0.30	217
Mixed Shrub	15	2,098.1	16.0	0.30	629
Grassland-Herbaceous-N	16	2,362.3	18.0	0.05	118
Grassland-Herbaceous-S	28	3,530.0	26.9	0.04	141
Cactus	22	1,729.8	13.2	0.10	173
Total	126	13,119.2	100		2,149

San Clemente Bell's sparrow recruitment appears to be affected by weather conditions. During drought years, Bell's sparrows may not reproduce at all, or a subset of the population may suppress breeding (Kaiser et al. 2007, p. iv; Stahl et al. 2010, p. 48; Meiman et al. 2019, p. 35). This variation in reproduction and resulting recruitment may result in depressed populations following drought years. Bell's sparrows appear to respond to favorable precipitation patterns and resulting conditions by producing multiple clutches. Elevated productivity and recruitment may drive population numbers up in years that follow "good" precipitation years (Kaiser et al. 2007, p. iv; Stahl et al. 2010, p. 50). Nesting success and clutch size as well as productivity and breeding season length, all appear to be influenced by average total rainfall (Meiman et al. 2018, pp. 34–36).

Habitat

San Clemente Bell's sparrows demonstrate a positive association with structural shrub cover (Meiman et al. 2015b, p. 34), as they typically use shrubs for nesting substrate and use the gaps between and area underneath shrubs for foraging. Bell's sparrows forage on seeds and berries, as well as invertebrates. The abundance of shrubs, particularly California boxthorn (*Lycium californicum*) and Sagebrush (*Artemisia sp*), has been positively associated with sparrow density (Meiman et al. 2018, p. 26). High grass cover has been associated with lower sparrow densities and larger territory sizes, which may indicate that grasses are not as effective as a nesting and foraging resource during the nesting season (Turner 2009, pp. 53–54).

Habitat conversion on SCI caused by nonnative ungulates (1800-1991) reduced the availability of shrubs that are an important component of Bell's sparrow nesting and foraging habitat. The island is now in a state of vegetation recovery, and shrub distribution has expanded. Increased shrub distribution that may benefit Bell's sparrows is most evident in the upper marine terraces (boxthorn-dominated community) and the Maritime sage scrub community on the southern portions of the island. Maritime desert scrub boxthorn habitat has also regenerated in some previously degraded areas, improving nesting opportunities (USFWS 2008b, p. 173). Recent habitat mapping efforts show plots classified as boxthorn occurring at higher elevations than in a 1994 vegetation map (Kellogg and Kellogg 1994 in Meiman et al. 2015a, p. 42). Sagebrush (*Artemisia californica, A. nesiotica*) is recruiting and moving out of the canyons and into the coastal terraces (Booker 2019, pers. comm.) and increasing in cover on SCI. For example, in 1994 the sagebrush community was estimated to cover 1 percent of the island (Tierra Data Inc. 2005, p. 26). By 2013, 6 percent was included in the Sagebrush strata based on aerial images and ground-truthing (Meiman et al. 2015a, p. 41). In addition, shrub species other than boxthorn and sagebrush have also expanded their range significantly (Tierra Data Inc. 2005, pp. 24–26). For example, about 19 percent of the island area is now classified as "Mixed-shrub" or Baccharis-savannah based on habitat characterizations used to establish Bell's sparrow monitoring plots (Meiman et al. 2013, p. 43). San Clemente Bell's sparrows now inhabit most plant communities on SCI, including Maritime Desert Scrub in *Lycium* (boxthorn) phase, *Opuntia* (prickly pear) phase, and *Cylindropuntia* (cholla) phase; Maritime Sage Scrub; Canyon Shrubland; and native and nonnative Grasslands. Within these plant communities, Bell's sparrows show an affinity for shrub and cactus (*Opuntia spp.*) dominated areas.

Current monitoring design subdivides SCI into eight vegetation strata (Meiman et al. 2016, p. 22) (Figure B2-1). While the Maritime Desert Scrub, *Lycium* phase corresponds to the Boxthorn-North and Boxthorn-South strata, the other strata do not directly correspond to particular plant

communities (see Appendix I for strata definitions). Canyon Woodland/Bare is the only stratum not considered potential habitat. Boxthorn habitat is considered high quality breeding habitat, and moderate to high population densities are also found in sagebrush and shrub habitat near canyons and along the steep eastern slope. San Clemente Bell's sparrows are present in significantly lower densities in mixed shrub, cactus, and grassland (grass/herb) habitats along the central plateau; however, because these habitats make up a large portion of SCI, they are estimated to support a sizeable number of Bell's sparrow territories in total (Meiman et al. 2018, p. 18). Table B2-2 gives a breakdown of the island by strata area as well as the number of plots and area surveyed in each stratum during 2019.

Table B2-2. Summary of 2019 Survey Results Including the Number of Plots and the Total Area Surveyed as a Proportion of the Available Habitat.

Stratum	Total Area (ha)	Plots Surveyed	Total Survey Area (ha)	Percent of Habitat Surveyed
Boxthorn-N	2009	24	304	15.1
Boxthorn-S	665	6	70	10.5
Sagebrush	725	15	104	14.3
Mixed Shrub	2,098	15	144	6.9
Grassland-Herbaceous-N	2,362	16	232	9.8
Grassland-Herbaceous-S	3,530	28	332	9.4
Cactus	1,730	22	258	14.9
Bare Ground	1044	0	0	0
Total	**14,163**	**126**	**1,444**	**10.2%**

In 2009, approximately 14 percent of SCI (2,098 ha; 5,184 acres) was thought to be suitable for nesting by Bell's sparrows (USFWS 2009, p. 8). Expanded survey effort and detection of Bell's sparrows has resulted in an estimated 13,132 ha (32,450 acres) of potentially suitable habitat, which includes almost 90 percent of SCI. Bell's sparrows, however, occur and breed in extremely low densities across much of the island, and the boxthorn-dominated habitat on the west shore that supported the subspecies at listing (corresponding to the "Boxthorn-N strata" in population estimates) still provides breeding habitat for a significant percentage of the island-wide population (Meiman et al. 2018, p. 5; Figure 9).

B.3 RESIDUAL STRESSORS ON SAN CLEMENTE ISLAND

In our Species Status Assessments, we determined that under current land use and fire patterns there are no substantial threats affecting the San Clemente Bell's sparrow or its habitat. However, the species remains vulnerable to fire, drought, predation, infrastructure development, military training, and invasive plant species if unmanaged. Where possible, the impacts of these stressors will continue to be avoided or managed post de-listing. For example: 1) the Navy's internal Site Approval Process and National Environmental Protection Act processes will encourage avoidance of high quality sparrow habitat for infrastructure projects; 2) implementation of the SCI Fire Management Plan will support fire prevention, containment, and suppression practices; 3) Navy implementation of the INRMP will support proactive conservation actions while protecting the military mission which includes: predator management, invasive species control, as well as native habitat restoration. The Navy developed a Biosecurity Instruction which is intended to reduce the potential for introduction of new invasive plants and animals that could impact Bell's sparrows. In

addition, project specific minimization measures, such as the Erosion Control Plan developed to reduce erosion impacts at existing Assault Vehicle Maneuver Areas (Science Applications International Corporation 2013), help to ensure that the indirect impacts of training activities are minimized.

B.3.1 Fire

Since the San Clemente Bell's sparrow was listed, over 50 percent of SCI has experienced at least one wildfire (US Navy 2013a, p. 3–47). The historical fire area is approximately 3,954 acres (1,600 ha) and includes habitat burned more than once in the last 20 years (1999-2018), as described in our San Clemente Island Bell's Sparrow Species Status Assessment (USFWS 2022a) (Figure B3-1). The majority of acreage burned is concentrated in the Shore Bombardment Area (SHOBA; US Navy 2013a, p. 3–45) in habitat characterized by a low density of Bell's sparrow (Figure B3-1). However, two live fire training areas, which are potential ignition sources, are situated in high density boxthorn. Although few fires have occurred in boxthorn habitat, sagebrush habitat has experienced recent fire impacts from ignitions that originated in SHOBA. An estimated 241 Bell's sparrow territories were impacted by fires between 2011 and 2013 (USFWS 2017, p. 26), and 223 Bell's sparrow territories were affected by fires in 2017 (Meiman et al. 2018, p. 30). Despite these impacts, current fire patterns do not appear to threaten San Clemente Bell's sparrow population viability (USFWS 2022a, p. 57). The Navy actively implements fire prevention and containment measures as part of the Fire Management Plan to reduce the potential for ignition and spread of fires. The 20-year frequent fire footprint suggest that fires are likely to occur in the same general locations on SCI if ignition sources (primarily training areas and facilities) remain in their current locations. However, changes in the location of ignition sources (e.g., training areas/ infrastructure), climate change, or changes in fuel type or abundance (e.g., spread of invasive plant species) could alter natural fire patterns. If fire becomes more frequent or severe in the future or if fires burn large areas of high-density sparrow habitat, there may be an observable impact on the Bell's sparrow population.

The number of fires, acres burned, and fire-severity varies annually. Under current conditions, most large fires are ignited in SHOBA, and the majority of acreage burned has been concentrated in SHOBA (US Navy 2013a, p. 3-45). Outside of SHOBA, most fires originate in Training Areas and Ranges (TAR) but are quickly suppressed. Typically, due to the patchy nature of fires, not all areas within a fire footprint are burned uniformly; therefore, not all habitat in a burn polygon is necessarily burned or burned at the same severity (SERG 2012, p. 39).

The Navy's implementation of the Fire Management Plan reduces the extent of changes in vegetation resulting from frequent wildfire. The Fire Management Plan calls for an annual review of fire management and fire occurrences that allows for adaptive management and changes in the fire management over time (US Navy 2009, entire; USFWS 2012a, p. 29104). Based on their continued commitment to conservation of SCI taxa, we anticipate that the Navy will continue to implement fire management to minimize the impacts of fire on target species.

B.3.2 Drought

Drought on SCI is potentially a threat to the Bell's sparrow, especially if droughts become more frequent, prolonged, or severe or if other impacts create additional stress on the subspecies and impede its ability to rebound following the drought. The most current population viability analysis (PVA) (Beaudry et al. 2003, pp. 46–47; Kaiser et al. 2008, p. 47), using demographic information

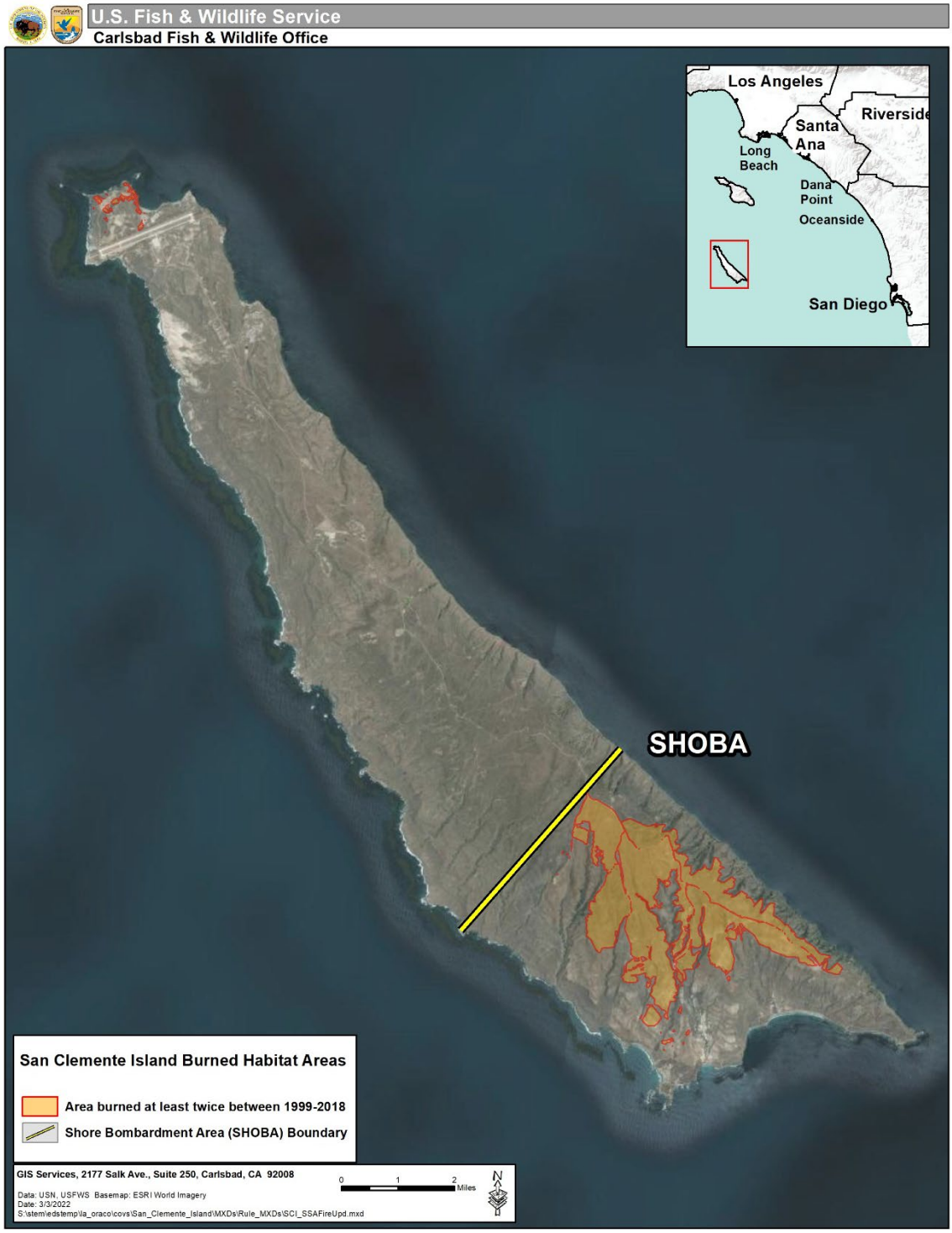

Figure B3-1. Map of the Historical Frequent Fire Area on San Clemente Island. The acreage presented includes areas burned two or more times between 1999 and 2018, consistent with the analysis in the 2022 Species Status Assessments for the target species.

from 2000–2007, suggested that a secondary variable contributing to extinction risk is the effects of drought (USFWS 2008b, pp. 167–185). However, the PVA assumed a closed population contained within the lower western terraces dominated by boxthorn. It did not account for variations in drought response across multiple habitats now occupied by Bell's sparrow or the added resiliency of a larger more widespread population. Data are lacking on how drought currently affects the island-wide population, and additional data would be needed to clarify this relationship.

B.3.3 Climate Change

Climate change is likely to result in warmer and drier conditions with high overall declines in mean seasonal precipitation but with high variability from year to year (IPCC 2007, pp. 1–18). Currently, the presence of fog during the summer months helps to mitigate high temperatures (Halvorson et al.1988, p. 111; Fischer et al. 2009, p. 783). However, coastal cloud cover and fog are poorly addressed in climate change models (Qu et al. 2014, pp. 2603–2605) and fog projections remain uncertain (Field et al. 1999, pp. 21–22; Lebassi-Habtezion et al. 2011, pp. 8–11). Long-term effects of climate change are difficult to predict, however, in the short term, climate change may result in more frequent or severe fires, heavy periods of rainfall that could lead to increased erosion events or periods of drought (Kalansky et al. 2018, p. 10). Though climate change has the ability to greatly impact the vegetation of SCI, the full effects are unclear; however, we do not expect the potential impacts of climate change to have substantial impacts to the Bell's sparrow in the next 20 to 30 years.

B.3.4 Predation

Native species, including the island fox (*Urocyon littoralis clementae*), common raven (*Corvus corax*), and island night lizard (*Xantusia riversiana*), as well as nonnative black rats (*Rattus rattus*) and feral cats are known to prey upon Bell's sparrows and their nests. An ongoing nonnative predator control program is working to control the nonnative predators, however it is unlikely that this threat will ever be removed completely. The Bell's sparrow population has grown despite this stressor and nest success estimates appear to be relatively high across SCI (Meiman et al. 2018, p. 25). Under current management, which includes broad control of feral cats and target control of black rats, Bell's sparrow viability is not currently or likely threatened in the foreseeable future.

B.3.5 Facilities Development and Maintenance

Facilities development and infrastructure maintenance have the potential to alter Bell's sparrow habitat and impact Bell's sparrow individuals or nests. These impacts are associated with roadways, facilities, and infrastructure (e.g., pipelines, buildings, ranges, landing areas). Under current conditions, little infrastructure is present in high-density Bell's sparrow habitat, and the Navy implements measures to reduce the degree of impact such as: habitat surveys to aid in avoidance of habitat during project planning, seasonal restrictions on vegetation clearing, pre-construction outreach and education for construction personnel, and bio-monitor presence during construction activities. These measures should continue, to the extent feasible, after delisting. The Navy projects that new facility development and maintenance will likely occur in the existing developed footprint rather than in currently undeveloped areas of this island (USFWS 2022a, p. vi), thus the impact from future facilities development and maintenance is expected to pose little threat to the Bell's sparrow population.

B.3.6 Military Training

There is a diverse array of military training that occurs on SCI. Each training area includes specific activities that have the potential to impact the target species or their habitat and are described below. Potential impacts to the target taxa or their habitat could occur within training areas that are associated with ground disturbance. The acreage is provided for these training areas and they are also depicted on Figure B3-2.

- The *Shore Bombardment Area* (SHOBA) is the largest terrestrial training area, occupying roughly the southern third of the island, and supports a diversity of military training associated with bombing and live fire. Approximately 44 percent of SHOBA serves as a buffer around Impact Areas I and II and is therefore not directly subject to shore bombardment impacts. Some areas within SHOBA, particularly the escarpment along the eastern coast, have limited training value because precipitous terrain hinders ground access.
- *Impact Areas* (IAs*,* 3,400 acres) support shore bombardment, including naval gun firing, artillery firing, and air-to-ground bombing.
- *Training Areas and Ranges* (TARs*,* 1,794 acres) are operating areas that support demolitions, small arms training, over-the-beach, and tactical ingress and egress training for Naval Special Warfare personnel. Proposed TAR 23 is located on the north-western shore of San Clemente Island, within significant boxthorn habitat that is proposed as a Bell's Sparrow Management Area. While its designation as a TAR indicates that the entire area could be used for training at some point in the future, the current proposal is to use this TAR as a sniper range, with one firing point located on an existing road up on a terrace and targets positioned along the coast, west of West Shore Rd. Thus, when used as a sniper range, given the road access to each location, potential impacts should be limited to the area around the targets, called the "Target Box" in this report. A shift to other types of training that involved more intensive use of this TAR we assume could impact the entire TAR footprint.
- *Assault Vehicle Maneuver Areas* (AVMAs*,* 423 acres) are designated for off-road and tracked-vehicle use. The acreage includes 30 acres of Artillery Maneuver Points outside of the AVMA.
- The *Infantry Operations Area* (IOA*,* 8,828 acres) is designated for dispersed foot traffic by military units in support of a battalion-sized landing, and off-road vehicle use is not authorized in this area.
- *Special Warfare Training Areas* (SWAT) encompass land, water, and associated airspace and are used as ingress and egress of small troops to specific TARs. Basic and advanced special operations training is conducted within these areas; and impacts in these areas are infrequent and dispersed.
- The *Assault Vehicle Maneuver Corridor* (AVMC) consists of the Assault Vehicle Maneuver Areas (AVMAs, 423 acres), Artillery Firing Points (AFPs), Artillery Maneuver Points (AMPs, 30 acres), and the Assault Vehicle Maneuver Road.
- *Landing Zones* (LZs) include 31 proposed landing areas for a variety of aircraft, as well as ingress egress areas for troops inserted at each LZ.

Military training has the potential to directly affect target plant taxa or to degrade their habitat through ground disturbances and the potential for recurrent fire (USFWS 2007d, p. 12). Military training activities within training areas (primarily the IOA, TARs, and AVMAs) can entail the movement of vehicles and troops over the landscape and thus include the potential of trampling or crushing individuals or groups of plants (USFWS 2012, p. 29114). Training could directly destroy

habitat occupied by this species, disturb soil and vegetation, spread nonnative plant species, create ruts and trails, increase erosion, and compact soils (USFWS 2008b, pp. 110–112).

Military training activities on SCI include a wide variety of activities that have the potential to significantly affect habitat and individuals. Land navigation and reconnaissance, insertion and extraction of troops via boats, helicopters, and assault vehicles, detonations, use of small arms and high explosives, missile impacts, movement of vehicles and troops on roadways or over the landscape, can result in direct and indirect effects to Bell's sparrow individuals in the vicinity of training areas. Noise and vibration, nighttime illumination, habitat modification/degradation, spread of invasive plant propagules, vehicle collision, trampling or crushing of individuals or nests, fires, and erosion have all been identified as potential direct or indirect effects of military training on SCI. (USFWS 2012, p. 29114; USFWS 2008b, pp. 110–112).

Military training occurs within designated training areas, and currently, the intensive training (e.g. assault vehicle use, shore bombardment, Basic Underwater Demolition School training) occurs in areas that have little overlap with high density Bell's sparrow habitat strata. Impacts are difficult to quantify, but the stability of the Bell's sparrow population under baseline conditions implies that the current and proposed location and intensity of training does not threaten the Bell's sparrow population (USFWS 2022a, entire). In addition, the threat to Bell's sparrow habitat from military training is reduced by the fire prevention, containment, and suppression as outlined in the Fire Management Plan and erosion control measures as outlined the Erosion Control Plan (specific to Assault Vehicle Maneuver Areas) (USFWS 2013, p. 45406).

Training that is expected to have high intensity impacts currently occurs on less than 20 percent of SCI. The Navy projects that future military training will likely occur in the existing training footprint (USFWS 2022a, p. vi); thus, the impact from military training is expected to pose little threat to the Bell's sparrow population. If future military training minimizes, to the extent feasible, new development or substantial impacts within the four recommended management areas (Figure B2-1) and prioritizes resource management in these four areas (i.e., fire management to protect these areas as informed by fire data and risk analysis, and invasive species monitoring and management), the highest density, least fragmented Bell's sparrow habitat will be protected. If, however, proposed training impacts expand or intensify in the case of TAR 23, beyond the current training footprint, particularly if training expands or intensifies within the Boxthorn-N strata (including TAR 23) or the Sagebrush strata, impacts and potential threats to Bell's sparrow would increase.

B.4

The overarching goal of this PDM Plan is to ensure that a viable Bell's sparrow population persists into the future by documenting population abundance and assessing the availability (and vulnerability) of high-density habitats (Boxthorn-N and Sagebrush). The PDM Plan consists of the following components:

(1) An annual population estimate derived from Bell's sparrow densities in eight strata that will also be used to estimate sparrow densities in the four proposed management areas.

(2) An assessment of habitat quality and quantity at several scales including island-wide mapping of disturbance from stated stressors, habitat assessment within sparrow survey plots, annual monitoring within the four proposed management areas and post-fire monitoring.

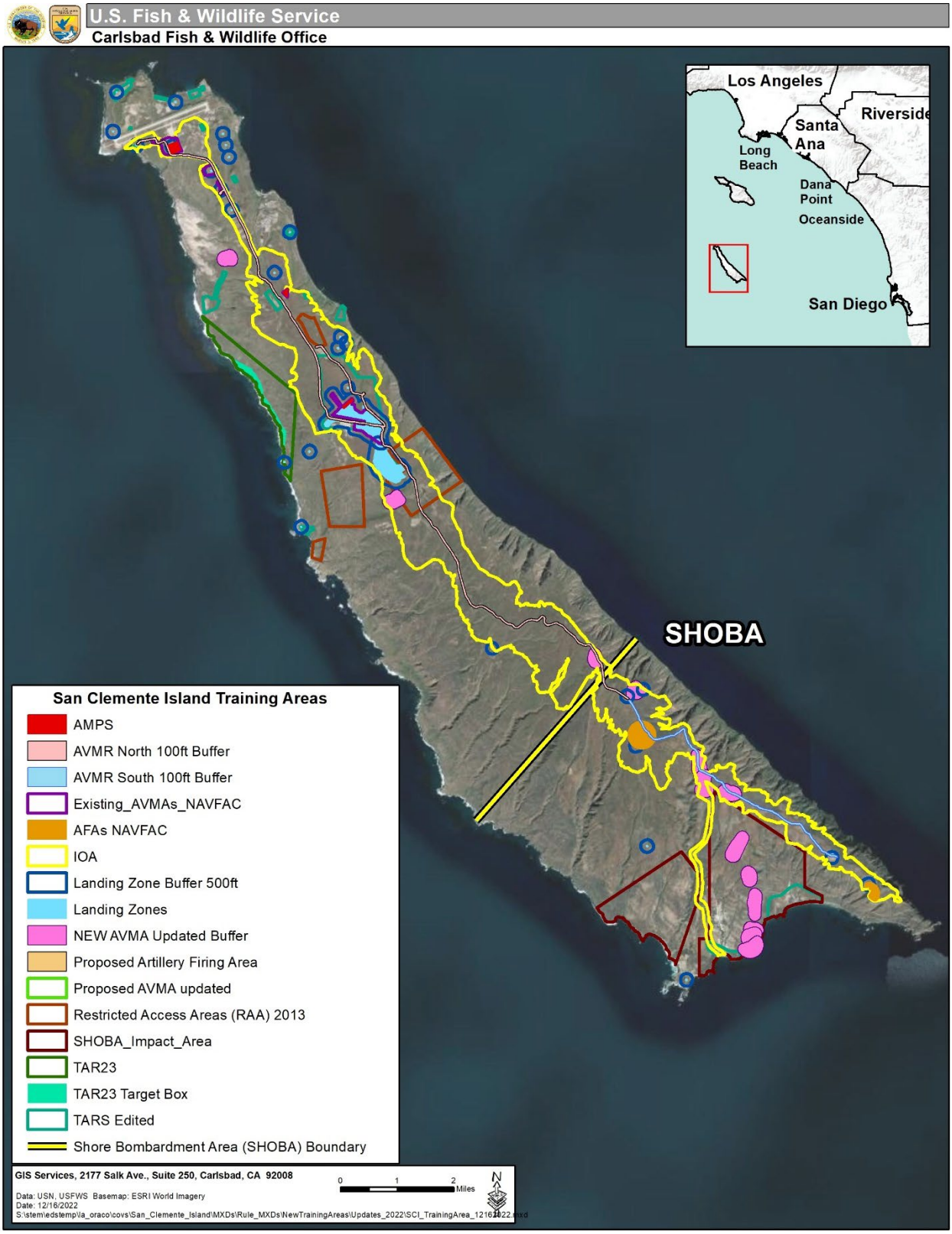

Figure B3-2. Map of San Clemente Island with Training Areas Where Habitat Impacts May Occur.

Monitoring data will be acquired through breeding surveys, territory mapping, assessment of habitat conditions on monitored plots, as well as island-wide mapping of training areas and acres burned. Monitoring and reporting of San Clemente Bell's sparrow as described in this PDM Plan will take place annually for 9 consecutive years and should be initiated within 2 years after delisting. The Service will evaluate the species' status and recovery every 3 years based on the Navy's annual monitoring data and reports. If the Bell's sparrow population remains stable (within 12 percent of baseline levels) or continues to increase throughout the PDM period, no additional monitoring will be required. However, if the number of birds or quantity of high-quality habitat is substantially reduced, monitoring may be extended. A hierarchical framework of population condition triggers is identified below that outlines thresholds for initiating management actions. A PDM planning and implementation schedule is provided in section B.10.

B.4.1 Population Assessment

The existing island-wide, random stratified monitoring strategy (based on Bart and Kern 2014, as amended) subdivided the island into sample plots, as described above. This approach will be continued under this PDM Plan to estimate plot densities and generate an estimate of the Bell's sparrow population, with the following modifications: 1) of the approximately 100 plots sampled each year, 20 selected plots will be monitored annually within the four proposed management areas; and 2) additional post-fire plots will be incorporated to determine the response of the sparrow and its habitat, as access permits.

B.4.2 Habitat Assessment

Habitat Monitoring
Vegetation monitoring will be conducted in most of the sparrow density plots sampled annually, including the 20 selected plots in the four proposed management units. The monitoring is designed to detect changes in vegetation cover and density, including the presence of nonnative plant species. Military and fire activity will also be monitored as part of the population monitoring outline below by the Navy to evaluate impacts to sparrow habitat.

Weather Monitoring
Annual rainfall and temperature will be monitored each year at Navy-operated weather stations across the island. This information will be examined to detect relationships between observed weather patterns and the estimated Bell's sparrow population. The island-wide population estimate for Bell's sparrows has fluctuated and it is not clear if the variation may be due in part to weather conditions. In particular, the potential impacts of droughts of varying duration and severity on the population are unclear, and the mechanisms driving these relationships are unknown. Evaluating weather conditions could provide insight into the long-term stability of the species, therefore, PDM will include annual rainfall and temperature data from Navy operated weather stations throughout the island.

Post-Fire Monitoring
Fires on SCI will be mapped and added to the GIS fire record for SCI. Changes in fire patterns will be assessed based on a comparison of future fire patterns to past fire patterns. Changes in the area burned, and the areas burned twice or more since 2018 will be included in annual reporting. Post-fire monitoring will also be conducted annually in selected plots that burned to document the response and recovery of sparrow densities and habitat. Fire can result in habitat loss and the direct mortality of Bell's sparrow juveniles and nestlings (US Navy 2018, p. 20). Increased fire frequency

from intensified military use could lead to localized changes in vegetation. Fire may have a short-term negative impact on San Clemente Bell's sparrows locally. Frequent, widespread, or high-severity fires could have a longer-term negative impact.

B.5 PLAN RECOMMENDATIONS

Additional research and management are needed to address key uncertainties and will promote Bell's sparrow population persistence in the future. The following recommendations should be considered to inform implementation of the PDM Plan. Where applicable, these recommendations are included as potential management actions in response to specific population condition triggers below.

- Refine the sampling strata to better reflect current vegetation assessments and suitable sparrow habitat, consistent with the current monitoring approach.
- Add an additional 20 permanent plots in the 4 Management Areas to monitor year to year (temporal) variability.
- If determined to improve accuracy of sparrow population estimate, remove plots from the sampling design that do not provide suitable Bell's sparrow habitat.
- Complete a species-specific management plan and Conservation Agreement for Bell's sparrow.
- Continue to study the impacts of climate change and drought to inform management in the future.
- Use existing data to optimize the allocation of survey effort, in anticipation of a scaled-down monitoring effort in the future.
- Continue nonnative predator control and use data on the seasonal and annual variation in feral cat and rat populations to target control efforts.

B.6 SAMPLING METHODOLOGY

We designed this PDM Plan to maximize data continuity and comparability with existing studies and current methodologies. Monitoring methods outlined below follow those currently used and recommended by the Navy on SCI (Meiman et al. 2022, entire). Annual monitoring will be initiated within 2 years after delisting and reporting efforts will be conducted for 9 consecutive years. We will use the Navy's annual reports to evaluate sparrow status for each 3-year PDM evaluation period. In each sampling year, sampling periods will be conducted during the breeding season outlined in the monitoring protocols (Appendix II). To collect comparable data, we recommend the island be sampled during the breeding season from year to year.

We encourage and support the use of the most current established scientific methodologies for monitoring species within funding and logistical constraints and acknowledge that new methods for monitoring species population condition and habitat may be developed during the 9-year post-delisting monitoring process. In the event that new methods are investigated, use of those methods should allow us to more effectively monitor populations while reducing impact on habitats relative to older methods. New methods could also reduce sampling effort in the field and potential dangers to biologists related to unexploded ordinance. However, new monitoring methods should only be considered if they allow for data comparison across monitoring years.

B.7 MONITORING METHODS

B.7.1 Population Assessment

Density

Monitoring will be conducted annually during the breeding season following the current San Clemente Bell's Sparrow Island-Wide Population Monitoring Plan methods (Bart and Kern 2014, entire). SCI is divided into sample plots, varying from 2 to 22 ha (5 to 54 ac) in size. Each year, a new set of approximately 100 randomly selected plots is surveyed. A subset of the randomly selected plots (10 "intensive plots") will be surveyed up to eight times throughout the breeding season to increase the certainty that all territories have been detected. All plots on the island ("rapid plots") are surveyed once during the breeding season. So "intensive plots" are surveyed using both rapid and intensive methods. The results of surveys on the "intensive plots" are used to develop a correction factor for the plots surveyed only as "rapid plots," which generate a density estimate for each stratum. The resulting density estimates are extrapolated across each vegetation stratum to estimate the number of territories on the island. The island-wide population estimate is derived from multiplying the estimated territory density by two and assumes an equal sex ratio.

The sampling frame for monitoring includes most of SCI, which is stratified across eight vegetation strata using a combination of aerial images and ground truthing (Bart and Kern 2014). As summarized above in Table B2-1, 122 plots were surveyed in 7 habitat strata in 2019 including Boxthorn-N, Boxthorn-S, Sagebrush, Mixed Shrub, Cactus, Grassland/Herbaceous-N, Grassland/Herbaceous-S, and Canyon/Woodland or Bare. "Canyon/woodland or Bare" is a lumped category of vegetation types that are not potential habitat for San Clemente Bell's sparrow (Appendix I).

Under PDM, an added emphasis is placed on the four proposed management areas by allocating a minimum of 20 selected plots from the total sampling effort to monitor year to year changes in sparrow density and habitat during the 9-year monitoring period (described in more detail below).

B.7.2 Habitat Assessment

Habitat Monitoring

Sparrow habitat monitoring will be conducted annually in as many plots surveyed as feasible. Plots selection for habitat monitoring will prioritize years since last surveyed and fire effects. The methodology will follow previous monitoring efforts. Sampling points will be located throughout the plots at 100-meter intervals and vegetation will be sampled by visually estimating cover within 25-meter radius plots around each point. Percent vegetation cover by species will be recorded including all shrub (i.e., boxthorn, sagebrush), cactus, and herbaceous species and percent bare ground will also be recorded. The data will be used to calculate percent absolute vegetative cover, cover by strata and cover by shrub species important for sparrow nesting. The data will also be used to confirm or reassign each plot to one of the strata based on the predefined stratum categories (Appendix I).

Habitat monitoring will also occur at the sampling plots located within the four proposed management areas (Table B7-1). Specifically, the Upper Cave Canyon/Plateau Management Area, the Dunes to Mail Point Management Area, SHOBA Eastern Escarpment Management Area, and the Mid-island Eastern Escarpment Management Area will have at least 20 combined plots that are

monitored annually. In addition, any observed impacts to the sparrow or its habitat associated with residual stressors will be recorded and mapped.

The purpose of the habitat assessment is to evaluate significant habitat changes occurring on SCI, with an emphasis on the four proposed management areas, during the post-delisting monitoring period. Habitat assessments will also be used to define suitable sparrow habitat and to estimate the acreage of suitable habitat on the island. This information will be used to track changes in the quantity and quality of sparrow habitat over the course of PDM. If monitoring data indicate that a plot should be reclassified, an updated map of the strata across SCI will be provided as part of the annual report (Table B7-1).

Post-Fire Monitoring

Post-fire monitoring will be conducted in burned habitat to evaluate the vegetation response and determine when burned sites are recolonized by the sparrow. The current methodology described in Meiman (2018, p. 13) will be used to calculate the fire footprint and the sparrow territories impacted. The post-fire habitat surveys will include GIS mapping of the boundaries of the burned area using hand-held GPS units. The fire perimeter, severity, and acres burned will also be informed by fire maps created by the Navy, which will be provided each year to the Service. Vegetation sampling will follow the approach described above for habitat monitoring. Habitat use by sparrows and sparrow densities will also be determined using the population density methodology discussed previously. This data will be used to evaluate post-fire and pre-fire conditions. Where possible, having pre- and post-fire data from the same plot will more accurately document habitat recovery and the temporal impacts to the sparrows.

Surveys to assess vegetation response and Bell's sparrow density will take place within 1 year of the fire on plots within accessible areas burned on the island. In this PDM Plan, newly burned plots will be identified and monitored annually for 3 to 5 consecutive years. The monitoring timeframe may be extended depending on species recovery, habitat response, as well as weather conditions that may limit vegetation recovery. In order to characterize post-fire response across SCI, a minimum number of plots in each habitat strata should be sampled to provide sufficient statistical power. We acknowledge that only a small number of accessible plots may burn, as fires tend to occur most frequently within the inaccessible areas of SHOBA (i.e., Impact Areas). It is not anticipated that all plots that burn will be incorporated into post-fire monitoring.

Table B7-1. Monitoring Timeline for 9 Years of Annual Post-Delisting Monitoring for San Clemente Bell's Sparrow Island Wide.

Sampling Period	Year 1-3 (2023-2025)	Year 4-6 (2026-2028)	Year 7-9 (2029-2031)
Breeding Season	Density	Density	Density
After Breeding Season	Habitat Monitoring	Habitat Monitoring	Habitat Monitoring
Breeding Season	Post-Fire Monitoring**	Post-Fire Monitoring**	Post-Fire Monitoring**

* Sparrow recovery and triggers will be evaluated by the Service after each sampling period of 3 years. Baseline data for habitat assessments was conducted in 2018.

** Plots in the four management areas will be monitored for 3-5 consecutive years after a burn event.

B.8 RELISTING TRIGGERS AND POTENTIAL ADAPTIVE MANAGEMENT RESPONSES

The overarching goal of the PDM Plan is to monitor the species to ensure that the status does not deteriorate, and if a substantial decline in the population abundance or an increase in threats is detected, to take measures to halt the decline so that re-proposing it as a threatened or endangered species is not needed. We will review data at the end of each survey year, at the end of each 3-year PDM evaluation period, and at the end of the planned 9-year PDM period, to assess population condition and persistence of the San Clemente Bell's sparrow and determine whether any changes in species protection are needed. At the end of each 3-year evaluation, potential outcomes include, but may not be limited to:

A. *PDM indicates that the species remains secure without ESA protections.* PDM could be concluded at the completion of the PDM period. Additional monitoring may continue at the discretion of the Service and its partners, depending on availability of funding and resources.

B. *PDM indicates that the species may be less secure than anticipated at the time of delisting, but information does not indicate that the species meets the definition of threatened or endangered.* The quantitative triggers outlined below will be used to determine if the species status is imperiled and will be used to initiate management actions to ensure the health of the population. In addition, the frequency of monitoring or duration of the PDM period may be extended, based on Service review over the PDM period.

C. *PDM yields substantial information indicating threats are causing a decline in the species' status since delisting, such that listing the species as threatened or endangered may be warranted.* In addition to activities discussed under B, above, the Service should initiate a status review to assess changes in threats to the species, its abundance, productivity, survival, and distribution and determine whether proposal for relisting is appropriate.

D. *PDM documents a decline in the species' probability of persistence, such that the species once again meets the definition of a threatened or endangered species under the Act*. In the event that PDM reveals the target species is threatened (likely to become endangered in the foreseeable future throughout all or a significant portion of its range) or endangered (in danger of extinction throughout all or a significant portion of its range), then the species should be promptly proposed for relisting under the ESA in accordance with procedures in section 4(b)(5). Likewise, if the best available information indicates an emergency that poses a significant risk to the well-being of a delisted species, then the Service should exercise its emergency listing authority under section 4(b)(7) accordingly.

The overarching goal of the PDM Plan is to monitor the status of the sparrow after ESA protections have been lifted. Individual triggers are established to assess whether additional actions or protections are needed or whether the PDM Plan can be concluded.

B.8.1 Triggers

Quantitative triggers were developed to guide decision making under the different outcomes described above. Implementation of management actions, research directives, or extending monitoring are options that have been identified to address a decline in population condition or

impacts associated with stressors. Triggers were developed in a hierarchical framework such that a formal status review would be initiated only after the preceding triggers and management actions were deemed unsuccessful. Therefore, the triggers below directly correspond to the PDM outcomes described above. As a note, negative impacts to habitat from fires are included in habitat loss described in the triggers below.

1. *The PDM indicates the Bell's sparrow remains secure without ESA protections.*

   PDM could be concluded at the completion of the 9-year monitoring period. Additional monitoring may continue at the discretion of the USFWS and the Navy, depending on availability of funding and resources.

2. *A decrease in either available habitat or population size may make the species less secure than anticipated at the time of delisting, measured by the following:*

   a. *Decrease in island-wide estimated Bell's sparrow population below 4,000 breeding adults for 3 consecutive monitoring years; or*

   b. *Decrease in the estimated Bell's sparrow population in the four proposed management areas below 1,650 breeding adults for 3 consecutive monitoring years.*

   The Service will work collaboratively with the Navy to assess the cause of the decrease and implement appropriate management actions where applicable. A management strategy will be developed where necessary to avoid and minimize future disturbance associated with residual stressors taking into consideration the magnitude of the impact. The monitoring timeframe may be extended.

3. *Further decrease in either available habitat or population size may make the species less secure than anticipated at the time of delisting, measured by the following:*

   a. *Decrease in island-wide estimated Bell's sparrow population below 3,500 breeding adults for 3 consecutive monitoring years; or*

   b. *Decrease in the estimated Bell's sparrow population in the four proposed management areas below 1,500 breeding adults for 3 consecutive monitoring years; or*

   c. *Disturbance footprint (including fire or training) in the four proposed management areas that makes habitat unsuitable and exceeds the Fire Management Plan threshold of 10 percent (644 acres), which may be refined as needed while the Navy is revising the Fire Management Plan.*

The management strategy developed above will be reevaluated and additional measures, such as habitat restoration, may be implemented. The monitoring timeframe may be extended for subsequent years, if necessary, at the discretion of the USFWS and the Navy.

4. *Significant impacts occur outside of the area analyzed in the Bell's sparrow Species Status Assessment, measured by the expansion of new training areas or increased fires or fire severity outside of the footprint analyzed in the SSA:*

    a. *20 percent increase in the disturbance footprint (making habitat unsuitable) island-wide, based on existing training areas (15,411 acres, Figure B3-2) and the frequent fire area (3,954 acres, 1,600 ha; Figure B3-1) outlined in the SSA; or*

    b. *Disturbance footprint (including fire or training) in the four proposed management areas that makes habitat unsuitable and exceeds the Fire Management Plan threshold of 20 percent (1,287 acres), which may be refined as needed while the Navy is revising the Fire Management Plan.*

    If impacts from these threats are realized beyond the areas identified in the original SSA, the Navy will evaluate impacts to Bell's sparrow in these areas. Depending on the level of impact, management actions will be implemented to offset impacts. Additional monitoring sites may be added as needed and the monitoring timeframe may be extended in coordination with the Navy.

5. *A decrease in either available habitat or population size causing a decline in the species' probability of persistence, such that the species may once again meet the definition of a threatened or endangered species under the Act, measured by the following:*

    a. *Decrease in island-wide estimated Bell's sparrow population below 3,200 breeding adults for 3 consecutive monitoring years; or*

    b. *Decrease in the estimated Bell's sparrow population in the four proposed management areas below 1,400 breeding adults for 3 consecutive monitoring years; or*

    c. *Disturbance footprint (including fire or training) in the four proposed management areas that makes habitat unsuitable and exceeds the Fire Management Plan threshold of 30 percent (1931 acres), which can be refined as needed while the Navy is revising the Fire Management Plan.*

If data produced as part of or in conjunction with this PDM Plan suggest that a decline of Bell's sparrow or habitat destruction reaches a magnitude such that the species is likely to become endangered within the foreseeable future, the Service will initiate a status review to

analyze impacts to the species to determine whether a proposal for relisting under the Act is warranted.

Additional Concerns Related to Triggers for Considering Relisting

Although a decrease in abundance of San Clemente Bell's sparrow island-wide or in high/moderate quality habitat strata could occur, it will be important to consider the cause of the decline and how it may relate to the overall status of the species in the context of threats and the regulating mechanism listing would provide to address those threats. If there are new threats that occur in the future or if residual stressors increase to the point that they are severely degrading habitat, a Species Status Assessment would be developed to determine the status of these species.

B.9 ANALYSIS AND REPORTING

Effective PDM requires timely evaluation of data and responsiveness to observed trends. At the end of each 3-year PDM evaluation period, PDM data will be assessed to determine whether the data collection protocols are functioning as anticipated and whether any changes in species protection are needed. A report summarizing the activities, data collected, and results of each component of this PDM Plan should be submitted each year to the USFWS's Carlsbad Fish and Wildlife Office by February 1 of the following year. This will allow sufficient time for the USFWS, in cooperation with the Navy who is implementing the PDM Plan, to evaluate the data collected, ensure efficiency of the monitoring program, allow for adaptive management, and allow for periodic assessment of the status of the species. At the end of each 3-year period of monitoring specified in this PDM Plan, the USFWS will compile all information and synthesize a final report with regard to potential outcomes as specified in the Post-Delisting Monitoring Guidance (USFWS and NMFS 2008, pp. 4-3–4-4). Annual monitoring reports should follow the relevant analysis and discussion used for the current annual population status reports (Meiman et al. 2020, entire) and shall include the following information:

- Names and qualifications of field surveyors
- Dates of field surveys, total person hours spent
- Summary of weather conditions and how they may have affected the survey effort and results, in the context of previous survey years and historical patterns
- Map of habitat strata noting any changes in the classification of plots
- Summary of habitat assessment in random plots noting any threats or important changes in cover
- Acres of potentially suitable habitat by strata
- Sparrow density estimates by strata
- Sparrow population estimate
- Describe the impact of each residual stressor in terms of the historical footprint and magnitude relative to the current distribution and intensity
- Summary of population trend (annual estimate of sparrow population) for the entire island, by strata and within the management areas
- Analysis of population status accounting for year (temporal), location/occurrence (spatial), weather (seasonal), and the presence/magnitude of stressors

B.10 IMPLEMENTATION SCHEDULE

Monitoring should be initiated within 2 years of de-listing to inform our understanding of population dynamics and recovery. Monitoring will occur annually for 9 years (Table B10-1).

Annual reporting will be submitted to the USFWS by February 1 of the following year. The Service will evaluate triggers every 3 years to determine if any changes to the recovery strategy are required.

Table B10-1. San Clemente Bell's Sparrow Implementation Schedule

Task	Frequency	Timeframe
Monitoring	Annually	February-September
Annual Report	Annually	February 1 of the following year
Service PDM Status Evaluation	Every 3 years	2025, 2028, 2031
PDM Plan Working Group Meeting	As-Needed	TBD
Final Reporting	Year 9	2031

B.11 FUNDING ESTIMATE

SCI is federally owned and managed by the Navy. Section 4(g) of the Act explicitly requires cooperation with states in development and implementation of PDM programs, but we remain responsible for compliance with section 4(g) and therefore, must remain actively engaged in all phases of PDM. We have developed and will implement this PDM Plan in cooperation with the Navy. Funding estimates to implement the PDM Plan monitoring as described above are summarized in Table B11-1 below. These are estimated costs and may be updated as needed by the Navy as they implement PDM in the future.

Table B11–1. Estimated Post-Delisting Monitoring Costs for the San Clemente Bell's Sparrow.

Annual Monitoring Action	Annual Cost
Sparrow Density Data Collection & Maintenance Activities	$187,000
Habitat Monitoring	$60,000
Post-Fire Monitoring	$18,000
Data Analysis and Reporting	$20,500
Overhead, Data Analysis, and Reporting	$60,000
Total Estimated Annual Cost of PDM (1 year)	**$345,500**
Total Estimated Cost of PDM (9 years)	**$3,109,500***

* Actual cost for term of PDM is likely to be higher as these estimates do not include an estimate of inflation throughout the duration of the PDM period.

C. SAN CLEMENTE ISLAND PLANT TAXA

C.1 SPECIES CLASSIFICATION AND LISTING HISTORY

The four San Clemente Island (SCI) plant taxa were listed as federally endangered on August 11, 1977 (USFWS 1977, p. 40682). A Recovery Plan for Channel Islands species was finalized in 1984 (USFWS 1984). Reclassification from endangered to threatened was recommended in the 5-year status reviews for *Acmispon dendroideus* var. *traskiae* (USFWS 2007a), *Castilleja grisea* (USFWS 2007b), *Delphinium variegatum* ssp. *kinkiense* (USFWS 2008a) and *Malacothamnus clementinus* (USFWS 2007c). Additional information was requested for *D. v.* ssp. *kinkiense* in the May 21, 2010, initiation of 5-year reviews; however, no other reclassification activity was pursued. On May 18, 2010, we received a petition dated May 13, 2010, from the Pacific Legal Foundation to downlist *A. d.* var. *traskiae*, *C. grisea* and *M. clementinus* from endangered to threatened under the Endangered Species Act. On May 16, 2012, a proposed rule to reclassify *C. grisea* and *A. d.* var. *traskiae* from federally endangered to threatened was issued; however, a reclassification of *M. clementinus* was not warranted at that time (USFWS 2012, p. 29078). On July 26, 2013, the final rule to reclassify *A. d.* var. *traskiae* and *C. grisea* from federally endangered to threatened was issued (USFWS 2013). Hereafter, all four species are referred to as target plant taxa.

C.2 SUMMARY OF SAN CLEMENTE ISLAND PLANTS STATUS AT TIME OF DELISTING

The following descriptions include a summary of the abundance of each target plant taxa. Various units were used to characterize abundance and distribution across SCI in previous USFWS documents, including occurrence and watershed. To provide consistency when referring to specific records and locations on SCI in support of development of this PDM Plan, the Navy delineated geographic zones that took into consideration topographical features, vegetation, and natural breaks between plant records. A total of 35 zones are identified across SCI; all areas of the island are incorporated into a zone and given a name related to canyon or landmark (Figure C2-1). Moving forward, rare plant monitoring zones will be used to describe abundance and distribution and will serve as the baseline for evaluating triggers (Table C2-1). The abundance data presented in this section include all records dating back to 1980. Records identified by the Navy as erroneous or no longer extant were removed from the dataset.

Table C2-1. Species Abundance Summarized by Zone, Occurrence and Watershed.

	Acmispon dendroideus var. *traskiae*	*Castilleja grisea*	*Delphinium variegatum* ssp. *kinkiense*	*Malacothamnus clementinus*
Zones	20	25	14	7
Occurrences	29	28	21	11
Watersheds	58	87	22	15

Figure C2-1. Map of Rare Plant Monitoring Zones Including Name and Location on San Clemente Island.

C.2.1 Acmispon dendroideus var. traskiae

Acmispon dendroideus var. *traskiae* is a semi-woody, flowering subshrub in the legume or pea family (Fabaceae). *Acmispon dendroideus* var. *traskiae* has small yellow flowers that are bisexual and arranged in one to five-flowered clusters on stalks that arise from axils between the stem and leaf of terminal shoots (Junak and Wilken 1998, p. 256). The species flowers between February and August, peaking from March to May, and is self-compatible (Junak and Wilken 1998, p. 256; USFWS 2008b, p. 113). *Acmispon dendroideus* var. *traskiae* has high fecundity both in terms of the number of seeds a plant can produce (40,000) and viability of the seed (Vanderplank et. al 2019a, p. 8). It has been known to hybridize with *A. argophyllus* var. *argenteus* in disturbed areas in Wilson Cove; no documented evidence of hybridization has been recorded anywhere else on the island (Liston *et al.* 1990, pp. 239–240; Allan 1999, p. 86). *Acmispon dendroideus* var. *traskiae* is short-lived, with a reported lifespan of less than 5 years (USFWS 2008b, p. 113), although individuals at a restoration site on SCI are believed to live longer than 6 years (Vanderplank et al. 2019a, p. 6).

Habitat

Acmispon dendroideus var. *traskiae* is generally associated with two habitat types on the island, canyon woodland and maritime desert scrub, and has expanded into grassy slopes, rocky outcrops, maritime cactus scrub, canyon bottoms, coastal terraces, flats and canyon walls (Vanderplank *et al.* 2019a, p. 9; Navy 2002, pp. 3.57–3.58). The majority of the occurrences are found in association with *Artemisia californica* (California sagebrush), *Opuntia littoralis* (prickly pear), *Rhus integrifolia* (lemonade berry) and *Lycium californicum* (California boxthorn) (Vanderplank *et al.* 2019a, p. 9). This species establishes on north- and east-facing slopes and ridges at elevations ranging from 8 to 430 meters (25 to 1,400 feet). A preference for sites with large boulders situated in grassland areas and along the interface between grassland and maritime sage scrub has been noted. This species also readily occupies disturbed sites and locations close to buildings, roads, and pipelines (US Navy 2013b, p. 3201). It occurs on well-drained soils where adequate soil moisture is available (Junak and Wilken 1998, p. 256; Navy 2002, p. D-9) and is rarely observed (13 percent of all individuals) on clay to rocky soils (Vanderplank *et. al* 2019a, p. 7).

Distribution

The distribution of *Acmispon dendroideus* var. *traskiae* spans the entire length of SCI from Wilson Cove to the southern tip east of Pyramid Cove, a distance of approximately 19 mi (31 km) (Figure C2-2; Junak and Wilken 1998, p. 261; Junak 2006, Map A–C; Vanderplank et al. 2019a, p. 27). The majority of the locations tend to be clustered on north-facing slopes on the eastern side of the island, with the higher densities to the north (Vanderplank et al. 2019a, p. 7; USFWS 2022a, p. 27). *Acmispon dendroideus* var. *traskiae* tends to occur in small groups of 10 to 50 individuals (Allan 1999, p. 84), but larger groups on the order of 750 to 2,300 individuals have also been recorded (Vanderplank et al. 2019a, p. 14; Junak and Wilken 1998, pp. 256, 261–266).

Abundance

Acmispon dendroideus var. *traskiae* is known from 20 rare plant monitoring zones (467 records from 29 USFWS occurrences and 58 watersheds), comprising numerous point locations (21,251 individuals) (Table C2-1; Figure C2-2; USFWS 2013, p. 45433). This estimate includes surveys conducted in 2011 and 2012 by the Navy, which documented 136 locations and a total of 11,938

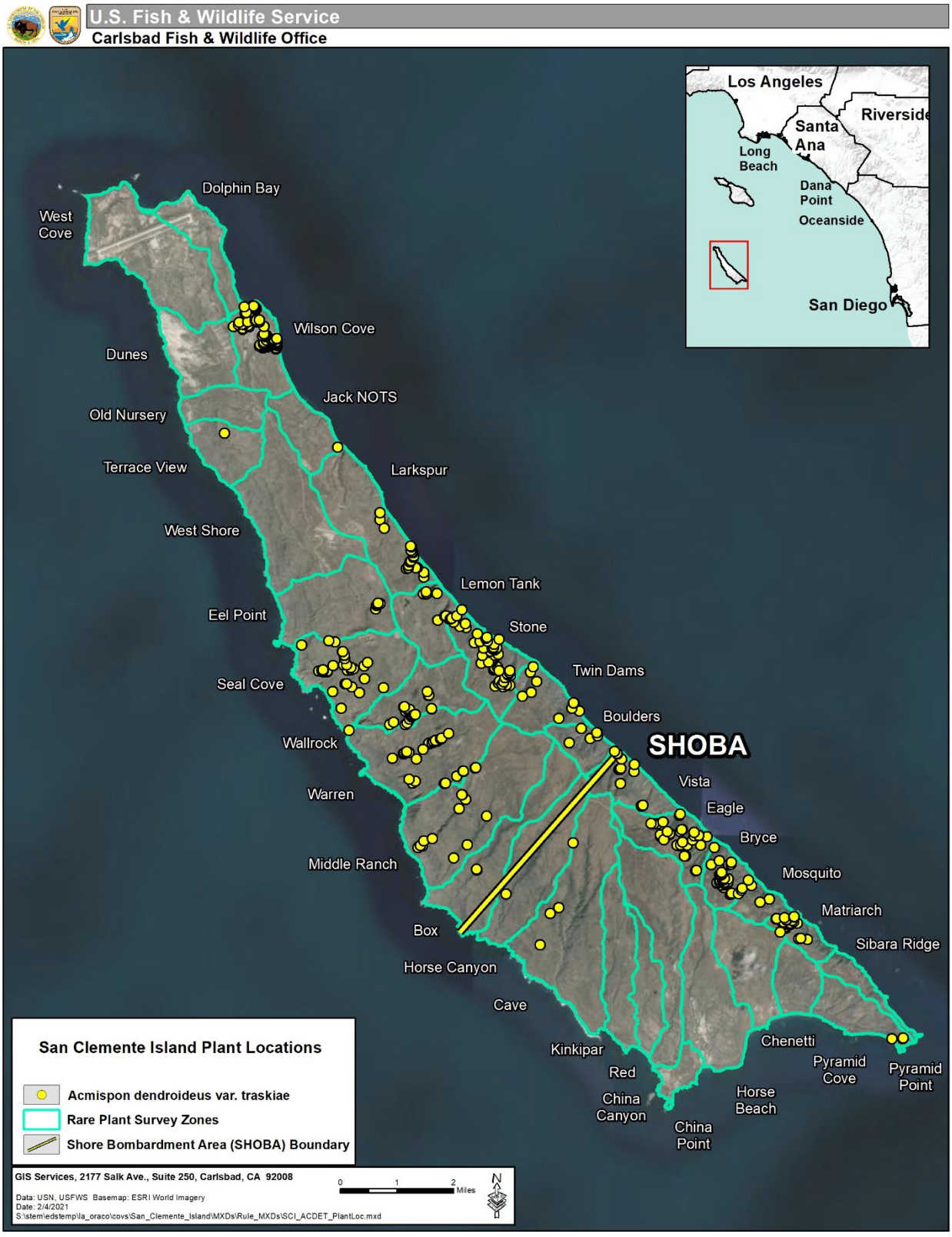

Figure C2-2. *Acmispon dendroideus* var. *traskiae* Distribution Relative to the Rare Plant Monitoring Zones.

individuals (Vanderplank *et al.* 2019a, p. 10). The number of occurrences, range and abundance of *A. d.* var. *traskiae* continues to increase as the vegetation on the island regenerates and habitat expands.

C.2.2 Castilleja grisea

Castilleja grisea is a hemiparsitic perennial herb to subshrub in the Orobanchaceae (broom-rape family). Plants are 0.4 to 0.6 meters (1.3 to 2 feet) tall and ash-gray in color with densely hairy leaves. The yellow flowers are borne on terminal spikes and flower between February and August. The fruits are capsules containing an average of 150 seeds, and the seed coat is netted, a potential adaptation to allow seeds to float (Vanderplank *et al.* 2019b, p. 7). Although the lifespan of *C. grisea* is unknown, *C. levisecta*, a related species with a similar growth pattern (USFWS 2009, pp. II-24, 27), has been documented to live for 5 to 6 years (Dunwiddie et al. 2001, p. 161). The larger stature and woodier habit of *C. grisea* suggest it may be longer lived, with estimates ranging between 5 and 15 years (USFWS 2022c, p. 23).

Habitat

Castilleja grisea appears to be general in its habitat requirements and has been found in steep rocky canyons on the eastern and western sides of SCI; on coastal bluffs, slopes and flats around the island's perimeter; and some of the largest occurrences are located in swales on the coastal terraces in the southern portion of the island. It is historically associated with canyon woodland and maritime desert scrub, and its range now extends to habitats across the island. *Castilleja grisea* often occurs in habitat dominated by *Artemisia californica*, *Cylindropuntia prolifera*, *Opuntia littoralis*, *Rhus integrifolia*, and to a lesser degree in *Stipa* spp. and *Lycium californicum* (Vanderplank *et al.* 2019b, p. 12). *Castilleja grisea* is typically found on non-clay soils and rocky outcrops with no preference for a specific aspect (Vanderplank *et al.* 2019b, p. 14).

Castilleja grisea is hemi-parasitic and appears to be opportunistic with respect to the species of host plants, although potential host plants have not been confirmed in the field beyond documenting associated species (Muller and Junak 2010, p. 5). It exhibits increased vigor due to these associations under greenhouse conditions, which may include increased seed set (Heckard 1962, p. 27; Atsatt and Strong 1970, p. 280; Adler 2002, p. 2704; Adler 2003, p. 2086; Muller 2005, p. 4).

Distribution

Castilleja grisea is distributed throughout SCI, with occurrences concentrated on the southern two thirds, especially on the eastern escarpment and to a lesser degree in the canyons along the western coast (Figure C2-3; Vanderplank *et al.* 2019b, pp. 18, 19). The geographic range appears to be growing as adjacent occurrences expand and merge, aided by the species ability to readily colonize disturbed areas. All individuals on SCI are considered a single population (Vanderplank *et al.* 2019b, p. 24). Potential habitat for *C. grisea* is estimated at 32,812 acres based on its known habitat associations (Vanderplank *et al.* 2019b, p. 27).

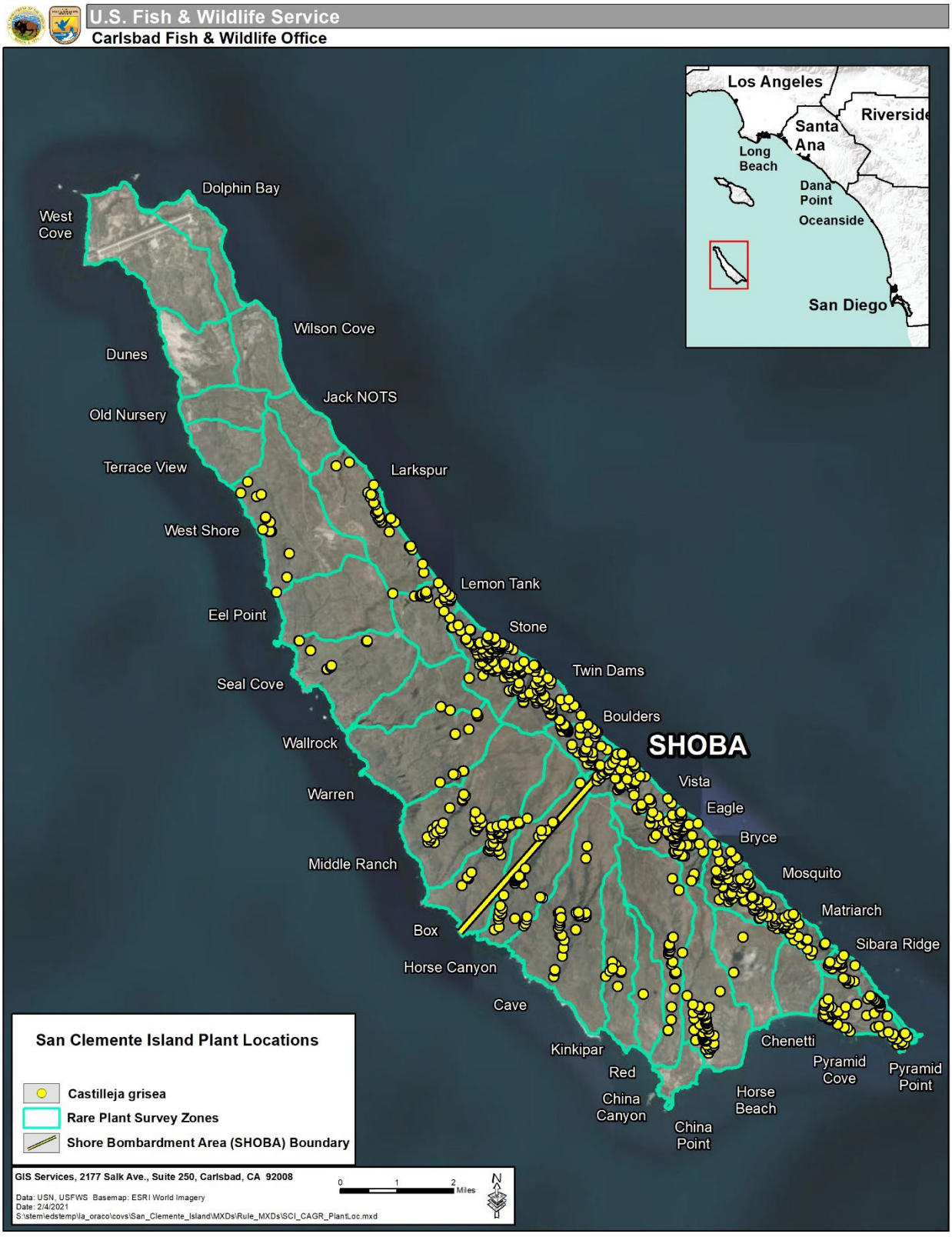

Figure C2-3. *Castilleja grisea* Distribution Relative to the Rare Plant Monitoring Zones.

Abundance

Estimates of abundance are constrained by the wide distribution, terrain, access, and availability of resources to thoroughly survey the island (Vanderplank *et al.* 2019b, p. 25). As of 2012, the distribution of *Castilleja grisea* was described from 25 rare plant monitoring zones (28 occurrences within 87 watersheds), encompassing 939 records (48,181 individuals) broadly distributed across the southern two-thirds of SCI on both the east and west (Table C2-1; USFWS 2020b; USFWS 2022b, p. 28; USFWS 2013, pp. 45409–45410). Population abundance estimates were made prior to a fire in 2017 that impacted several occurrences; the post-fire distribution is expected to be similar, but the number of individuals may be reduced (USFWS 2022b, p. 28). Surveys show a steady increase in distribution and abundance, with some records having coalesced across the landscape (USFWS 2022b, p. 26; Navy 2013b, p. 3205; Vanderplank *et al.* 2019b, p. 26). The density of plants at locations throughout the range vary from a few to several thousand individuals (USFWS 2022b, p. 29). Helenurm *et al.* (2005, p. 1222) reported that most populations consist of individuals across a range of sizes, which indicated that recruitment had been occurring.

C.2.3 Delphinium variegatum ssp. kinkiense

Delphinium variegatum ssp. *kinkiense* is an herbaceous perennial in the buttercup family (Ranunculaceae) with branching roots. It flowers between February and May bearing flowers that are generally light-blue to white. Flowering in *Delphinium* species can be highly variable and may be dependent upon local weather conditions and soil-moisture, with plants either never breaking dormancy or returning to dormancy without flowering in any given year (Lewis and Epling 1959, p. 512). This subspecies is likely self-incompatible, requiring a pollinator for successful seed production. On average, 64.5 to 78.5 percent of flowers produce fruits, with a high proportion of fertile seed (Junak and Wilken 1998, p. 122). Seeds fall from the follicle once it opens and may be dispersed by the wind because they are winged and lightweight (Junak and Wilken 1998, p. 121). Other species of *Delphinium* are known to have persisted without flowering for a decade (Epling and Lewis 1952, p. 256).

Vegetative growth arises from meristematic buds developed within the axils of leaves from shoots that died-back in prior summers; these perennating buds are retained on the woody stem below the soil surface, irregularly sending up new shoots in response to late-autumn or early-winter rains (Kingsley 1911, p. 308; Epling and Lewis 1952, pp. 255–256; Baskin and Baskin 1974, p. 60). Because the rhizomes are fine, it is most likely that the plant reproduces primarily through seed rather than through vegetative spread, though information on mode of demographic increase is lacking. Some proportion of the records on SCI included juvenile plants or seedlings (Junak and Wilken 1998, pp. 129, 138), but there is not sufficient information to describe the age structure. Although definitive data on the longevity of *Delphinium variegatum* ssp. *kinkiense* does not exist other species of *Delphinium* are known to have persisted without flowering for a decade (Epling and Lewis 1952, p. 256).

Habitat

Delphinium variegatum ssp. *kinkiense* is found within mid- to high-elevation grasslands the northern and central portions of SCI along the eastern side. The higher-elevation plateau supports grasslands dominated by the native perennial bunch-grasses interspersed with annual forbs, while the mid- and lower-elevation grasslands tend to be less floristically diverse and dominated by

introduced annual grasses. Along the eastern escarpment of SCI, *D. v.* ssp. *kinkiense* is primarily found within vegetation communities dominated by *Artemisia californica*, nonnative grasslands, and *Baccharis pilularis* (coyote brush) (USFWS 2022c, p. 27). In the central area of SCI towards the western terraces, it occurs within coast prickly pear scrub and purple needle grass grassland (USFWS 2022c, p. 27). Recent survey data indicate that *D. v.* ssp. *kinkiense* occurs at elevations of 83 to 571 m (approximately 275 to 1875 feet) and on slopes of 0 to 30 degrees, with the majority on moderately steep slopes of 6 to 25 degrees (USFWS 2022b, p. 25). It occurs in clay, loam, and rocky soils with soil-depths ranging from shallow to deep.

Distribution

The distribution of *Delphinium variegatum* ssp. *kinkiense* is somewhat unclear due to difficulties distinguishing it from the subspecies *D. v.* ssp. *thornei*. *Delphinium variegatum* ssp. *kinkiense* has been documented primarily on the east side in the northern and central portions of SCI, occurring on gently sloped, grassy terraces (Figure C2-4; USFWS 1984, p. 55), although there are seemingly disjunct records near the southern tip of SCI. Individual occurrences range from a few individuals to several thousand (USFWS 2022c, p. 37). The current distribution of *D. v.* ssp. *kinkiense* has not changed substantially from its historical distribution in in the early 1980s (USFWS 2019); however, data preceding the more than 150 years of grazing and browsing by nonnative ungulates do not exist, so the full extent of the subspecies' historical distribution is unknown.

Abundance

Accurate population estimates of *Delphinium variegatum* ssp. *kinkiense* do not exist due to the high interannual variation because individual plants may not emerge or flower every year. Various surveys have documented the presence of *D. v.* ssp. *kinkiense* on SCI, including an estimated 194 records (21,981 individuals) from 14 rare plant monitoring zones (21 occurrences in 22 watersheds) (Table C2-1; USFWS 2020b; USFWS 2022c, p. 36). It is likely that more plants are present in a dormant or a non-blooming state than are actually counted and that this proportion will vary with annual weather conditions and demographic status. Although abundance within locations has not been tracked over time, estimates vary from 1 to 5,500 plants (USFWS 2019). The NOTS Pier occurrence supports the greatest number of plants observed at one time (i.e., 5,500). Most colonies number about 70 plants (i.e., the median value). Other *Delphinium* species are recorded to persist for long periods and the total population of a colony appears to change very slowly or infrequently (Epling and Lewis 1952, pp. 256–257).

C.2.4 Malacothamnus clementinus

Malacothamnus clementinus, a member of the Malvaceae (mallow family), is a rounded, herbaceous subshrub whose stems are woody only at the base (USFWS 2012, p. 29080). Plants are 2.3 to 3.3-ft (0.7 to 1-m) tall with numerous hairy branched stems arising from the base of the plant (Munz and Johnston 1924, p. 296; Munz and Keck 1959, pp. 122–125). The species flowers from March to August. Plants have the ability to spread vegetatively by underground runners, or rhizomes, resulting in patches of spatially separate, but genetically identical, individuals (Evans and Bohn 1987, p. 538). Rhizomes of *M. clementinus* may extend from 10 to 16 ft (3 to 5 m) from the parent plant (Muller and Junak 2011, p. 50); thus, seemingly isolated individuals may actually be connected to another plant (US Navy 2013b, p. 3-213). Muller and Junak (2011, p. 58) consider that

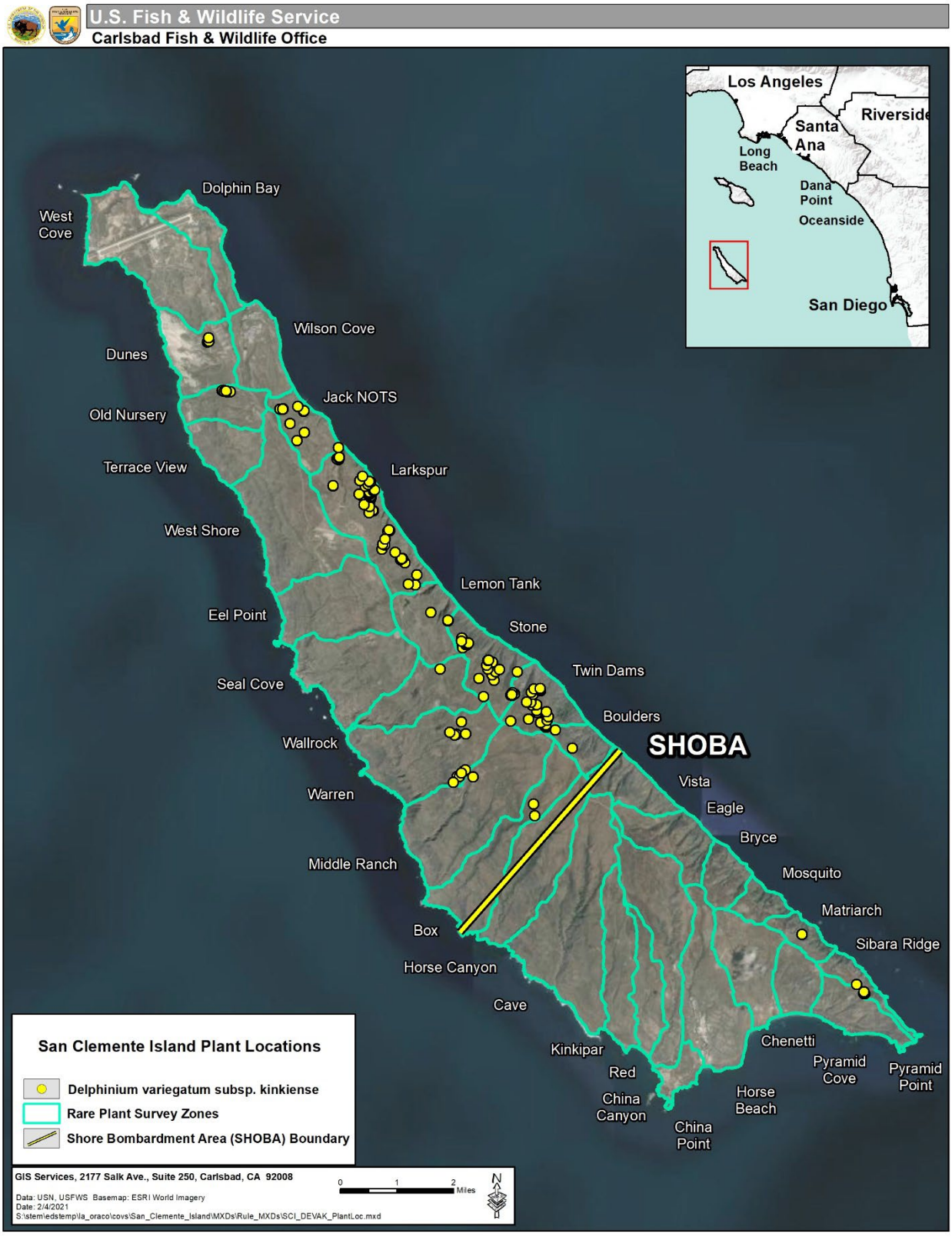

Figure C2-4. *Delphinium variegatum* ssp. *kinkiense* Distribution Relative to the Rare Plant Monitoring Zones

vegetative reproduction is not likely to result in significant spatial expansion of occurrences, but that vegetative reproduction within occurrences is abundant. *Malacothamnus clementinus* produces pink or white and fading lavender flowers in the spring, typically from March to August (Kearney 1951, p. 115). On average, there are 90 flowers per inflorescence (a flower cluster) (Junak and Wilken 1998, p. 291). Each flower can produce about 10 seeds that are 0.08 in (2 mm) long (Munz and Keck 1959, p. 122; Navy 2002, p. C–43). Seeds of *M. clementinus* are small and likely gravity-dispersed, and possibly later transported downhill by water (Muller and Junak 2011, p. 33). A mat of stellate hairs covers both fruits and seeds and could provide flotation during rains (Muller and Junak 2011, p. 33). The seed coat is hard and may have a lengthy period of innate dormancy prior to germination facilitating the development of a long-lived soil seed-bank (Muller and Junak 2011, pp. 34–35).

Specific life-history traits of the species, including low viable seed production, low seed viability, and poor dispersal capabilities, may influence the viability of *Malacothamnus clementinus*. Seed production in natural occurrences of *M. clementinus* may be low, raising concerns that sexual reproduction may be limited (Junak and Wilken 1998, p. 291). Pollination experiments indicate that this species is self-compatible; however, field-observations suggest that plants may be somewhat self-incompatible or incompatible with closely related individuals (US Navy 2013a, p. 3-213). Seed viability under experimental conditions has also been low, 4 to 35 percent (Evans and Bohn 1987, p. 538; Junak and Wilken 1998, p. 291). The characteristics above may be the result of, or are contributing to, low observed genetic diversity. The potential consequences of this are a highly restricted distribution on SCI and possibly compromised ability to survive demographic and environmental stochasticity based on limited genetic resources. *Malacothamnus clementinus* is recorded to survive under cultivation for 4 to 6 years, although it is not clear how that would translate to natural conditions (USFWS 1984, p. 50). Plants have been reported to survive for more than a decade in the wild and seem to be long-lived on SCI (US Navy 2013a, p. 3-212).

Habitat

Malacothamnus clementinus habitat includes coastal cholla vegetation on the southwestern slopes and terraces, and coast prickly pear-California sagebrush in Box, Horse and Chukit canyons at the southern end of SCI (US Navy 2013b, p. 3-102). Moisture that collects in rock crevices and at the base of canyon walls and escarpments is believed to provide more favorable conditions (USFWS 2012, p. 29094). *Malacothamnus clementinus* occurs at elevations ranging from approximately 30 to 900 ft (10 to 275 m) and does not appear to prefer a particular soil type (US Navy 2013b, p. 3-30).

Distribution

Malacothamnus clementinus typically occurs on the western side of SCI (USFWS 2012, p. 29108). The current range of *M. clementinus* is largely unchanged over the last 25 years, although its distribution has expanded on the western terraces between Horse and China canyons (north to south) (Figure C2-5; Junak and Wilken 1998, pp. 298–301). The majority of *M. clementinus* records are located on the western terraces near the SHOBA boundary and in southern canyons, with the northern limit at Lemon Tank Canyon in the middle of the island.

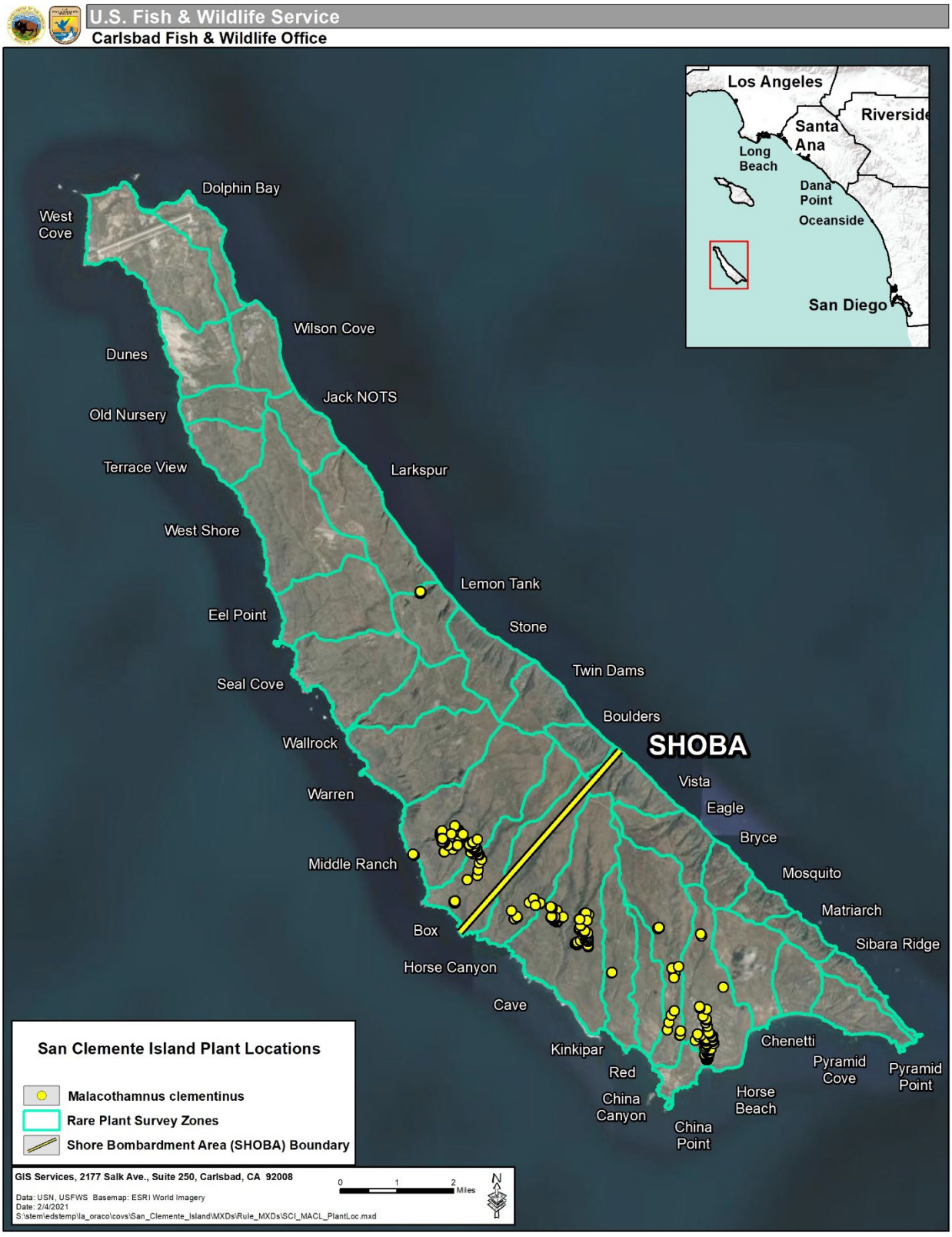

Figure C2-5. *Malacothamnus clementinus* Distribution Relative to the Rare Plant Monitoring Zones

Abundance

The abundance of genetically distinct individuals (genets) is difficult to characterize given the clonal growth form of *Malacothamnus clementinus*. Plants counted in previous surveys may be genets or clones of a single individual. During 2019 surveys, 169 point localities were recorded, not including 42 point-localities from a 2005 survey in areas where access is currently restricted. Considering all survey efforts, *Malacothamnus clementinus* is known from 7 rare plant monitoring zones, 11 occurrences and 406 records (5,611 individuals) across 15 watersheds (Table C2-1; USFWS 2020b).

C.3 RESIDUAL STRESSORS

At this time, there are no substantial threats affecting these four target plant taxa or their habitats. Historical threats including potential impacts from military training (within the current footprint), fire, erosion, nonnative plant species, and infrastructure development are considered residual stressors for the purposes of this PDM Plan (Table C3-1). Impacts from these residual stressors have been reduced or are currently managed by the Navy through policies and actions addressed in the Integrated Natural Resource Management Plan (INRMP) and San Clemente Island Wildland Fire Management Plan, including but not limited to the Erosion Control Plan, Biosecurity Plan, Native Habitat Restoration Program and Site Approval Process. These policies provide guidance for the management of target taxa and their habitats on SCI. In our Species Status Assessments, we made the assumption that military training is not likely to significantly affect these four taxa in the foreseeable future because they are broadly distributed and most records occur outside of the current training footprint, where impacts are likely to occur. Likewise, we assumed that fire impacts will be limited to the footprint observed over the past 20 years. If over the course of PDM, impacts from these activities are observed outside of these footprints, we would need to reassess how new activities are affecting the taxa. While it is recognized that climate change may have potential impacts to the target plant taxa and their habitats, it is unknown how climate change will specifically affect SCI and the target plant taxa that occur there. Hybridization and low genetic diversity remain potential stressors for *Delphinium variegatum* ssp. *kinkiense* and *Malacothamnus clementinus*, respectively. However, at this time threats have been sufficiently minimized or managed by the Navy and are unlikely to impact species viability into the future.

Table C3-1. Summary of Potential Stressors for Each of the Target Plant Taxa

	Military Training * (Current footprint)	Fire * (Current footprint)	Erosion *	Nonnative Plants*	Infrastructure*	Climate Change**	Hybridization**	Genetics**
Acmispon dendroideus var. *traskiae*	X	X	X	X	X	X		
Castilleja grisea	X	X	X	X		X		
Delphinium variegatum ssp. *kinkiense*	X	X	X	X		X	X	
Malacothamnus clementinus	X	X	X	X		X		X

** stressors that are currently managed and monitored under this PDMP,*

*** stressors with some degree of uncertainty that could be better characterized through future research.*

Potential stressors will be incorporated into the PDM Plan through direct monitoring or through management actions to address any future declines in abundance or habitat quality. Though impacts from these stressors have been minimized or managed, potential impacts will be monitored during PDM to ensure that status of the target taxa does not deteriorate after delisting. The stressors specifically monitored under this PDM plan include military training, fire, erosion, and nonnative plants. This section describes the individual stressors and their potential impact on each of the target plant taxa.

C.3.1 Military Training

The primary land-use on SCI with the potential to affect the target plant taxa is military training (Figure B3-2). The movement of vehicles and troops which could crush or destroy plants is considered a low-level residual stressor to the persistence of *Acmispon dendroideus* var. *traskiae* given both the diffuse nature of the potential impact and the fact that the majority of plants occur outside of designated training areas (USFWS 2013, p. 45424). When analyzing impacts on the four plant taxa, a 500-foot zone of impact buffer was added to LZs, AVMAs, and AVMR. Any effects of foot traffic would be dispersed (because the troops are spread out), minor (trampled leaves or broken branches), infrequent (up to twice per year, generally less) and temporary (USFWS 2008b, p. 99; Vanderplank *et al.* 2019a p. 12). Only approximately 1 percent of the current population (22 individuals located in 4 watersheds) lies within one of these training areas (USFWS 2022a, p. 36). Locations within SHOBA are generally located on the eastern slopes and drainages and away from designated training areas. No locations fall inside the boundaries of the AVMAs or Impact Areas, which are subject to heavier impacts. No *A. d.* var. *traskiae* exist within 50 ft of the AVMR. Moreover, some areas within the IOA and TAR that could support *A. d.* var. *traskiae* are not readily accessible to vehicles and troops due to terrain.

The majority (approximately 95 percent) of *Castilleja grisea* occupied habitat occur outside of designated training areas, where the most intensive habitat disturbances were likely to take place (USFWS 2022b, p. 39; USFWS 2012a; Vanderplank *et al.* 2019b, p. 30). Within SHOBA, most of the records are located along the eastern escarpment away from focal training areas and below the elevation of the IOA, where the steep terrain limits training exercises (Vanderplank 2019b *et al.*, p. 28). Individuals trampled by foot or vehicle traffic are expected to recover, even if individual stems were broken (USFWS 2008b, pp. 91–102). Therefore, fires and movement of vehicles and troops within designated training areas are considered to be residual stressors but are unlikely to result in serious impacts to most of the known occurrences of *C. grisea* (USFWS 2013, p. 45423).

Approximately 90 percent of *Delphinium variegatum* ssp. *kinkiense* records occur outside of designated training areas. The remaining 10 percent of records are located within portions of the IOA and TAR 14; the majority are in IOA and only subject to periodic foot traffic (USFWS 2022d, p. 52; USFWS 2008a, pp. 17–20). Military training conducted in the higher-elevation grassy plateau habitat areas that causes ground-disturbance or potentially results in subsequent wildfire and/or erosion has been considered a potential threat to the persistence of this taxon (USFWS 2008a, pp. 16–18). Records within the IOA and TAR 14 may be trampled; some shoots or flowers may be damaged in any given year, but individuals are likely to persist (USFWS 2008b, pp. 108, 112). At this time, the subspecies has not been found within any AVMAs (USFWS 2022c, p. 30). The primary consideration to persistence of *D. v.* ssp. *kinkiense* from use of the IOA was destruction of plants from foot-traffic. The southern-most records of *Delphinium* are located within the Shore

Bombardment Area, but in what is considered buffer area outside of the Impact Areas or the AVMA (USFWS 2008a, p. 18).

The majority of the distribution of *Malacothamnus clementinus* occurs outside of designated training areas, however approximately 15 percent of all of the individuals occur at Horse Beach within Impact Area I. Training activities potentially affecting *M. clementinus* directly are limited to those activities occurring within the IAs, TAR 21, and the AVMC. Impact Areas I and II sustain heavy live fire and are a source of fire ignitions. TAR 21 is located at the base of Impact Area I at Horse Beach, and roughly 10 ac (4 ha) are used for a variety of training activities which include live-fire, land-demolitions, landing and extraction of troops, USMC amphibious assaults, and use of various incendiary devices (e.g., flares, tracers) (USFWS 2008b, p. 30).

Military training is by-and-large concentrated in designated training areas and the Navy monitors training areas following exercises. The threat to the habitat from military training is minimized by protective measures proposed in the Fire Management Plan (USFWS 2013, p. 45418) and the implementation of an Erosion Control Plan to monitor and manage training-related erosion (USFWS 2013, p. 45406). Training proposed by the Navy in late 2020 is anticipated to have little impact on the four plant taxa described above.

C.3.2 Fire

Fire associated with military training is identified as a residual stressor to the target plant taxa as fire is a common occurrence throughout much of SCI (US Navy 2013b, p. 3-45) and that risk of frequent fires (defined as those occurring fewer than 5 years apart) is especially high within the Impact Areas (Figure B3-1; Navy 2002, pp. 5-93, 5-99). Many plant species have adaptations or are tolerant to fire. However, frequent fire can overwhelm a species' tolerance thresholds. At higher than natural fire frequencies, fire has the potential to exceed a plant's capacity to persist by depleting seed banks and reducing reproductive output (Zedler *et al.* 1983, pp. 811–815) and may reduce rhizome viability (Muller and Junak 2011, p. 35). A fire return-interval of 3 years or less has been shown to negatively impact shrubs within the coastal sage scrub plant community (Keeley and Brennan 2015, p. 3).

The number of fires, acres burned, and fire-severity vary annually. Most large fires are ignited in the Impact Areas, and thus, the majority of acreage that has burned has been concentrated in SHOBA (US Navy 2013a, p. 3-45). Fires burn most frequently and repeatedly within a roughly triangular area bounded by Ridge Road, Cave Canyon and the southern shoreline of SCI. Most of these fires are classified as a severity of 4 or 5, considered lightly burned or scorched, which have little effect on shrubs (US Navy 2009, p. 4-52). For fires with associated severity data (2007 to present), 15.6 percent of the area burned has been of a severity class that has detrimental effects on shrubs, classes 1 through 3, considered completely-burned to moderately-severe. The largest area that burned at these severities burned in 2017. Outside of SHOBA, most fires originate in SWATs 1 and 2, but are quickly suppressed and annually burn fewer than 5 acres over all sites (SERG 2012, p. 27). Typically, due to the patchy nature of fires, not all areas within a fire footprint are burned uniformly; therefore, not all plants in a burn polygon are necessarily burned or burned at the same severity (SERG 2012, p. 39).

The Navy's implementation of the Fire Management Plan minimizes possibly detrimental, localized changes in vegetation resulting from frequent wildfire. The Navy conducts an annual review of fire management and fire occurrences that allows for adaptive management and changes in the San Clemente Island Wildland Fire Management Plan over time (US Navy 2009, entire; USFWS 2012a, p. 29104) which should improve the effectiveness of fire-suppression and reduce risk to the target plant taxa. The Fire Management Plan stipulates that management focused plant species be given special consideration and protection from fires (US Navy 2009, p. 4-10).

Fire is considered a residual stressor to *Acmispon dendroideus* var. *traskiae* due to increases in the scale and intensity of military training-operations (USFWS 2007b, p 13; USFWS 2012a; USFWS 2013, p. 45420). The majority of occupied *A. d.* var. *traskiae* habitat lies outside of designated training areas (US Navy 2013b, p. 2-9). Fires that escape from training areas are not likely to disturb the entire distribution of the taxa at one time because this taxon is widely distributed (USFWS 2012, p. 29121). Records within SHOBA occur mostly along the eastern escarpment, away from the Impact Areas and downslope, reducing the potential for frequent fire. The fire frequency at *A. d.* var. *traskiae* occurrences is relatively low and have burned two or less times in the last 38 years; the majority of records have not experienced a fire in more than 20 years (Vanderplank *et al.* 2019a*,* p. 20). The fire tolerance is not well understood. Although adult plants were usually killed in severe fires, individuals have been noted to survive and resprout; subsequent seedling recruitment is high, and dead plants were replaced with a similar number of seedlings (US Navy 2002, p. D.10). Although the seed bank is suspected to persist based on the presence of the species in areas that have previously burned, an increase in fire frequency or high severity fires could be detrimental to stands of *A. d*. var. *traskiae* (Vanderplank *et al.* 2019a, p. 8).

The effects of fire on population dynamics of *Castilleja grisea* are not well understood. Severe fires have been shown to kill individuals and reduce the population substantially (Muller and Junak 2011, p. 16). *Castilleja grisea* has been reported to reoccupy burned sites in similar densities as pre-fire conditions (US Navy 2002, p. D-10; USFWS 2012, p. 29093). It is not clear if the fire or the associated removal of existing vegetation may promote seed germination and recolonization following fire. Frequent or severe fires could threaten the viability of *C. grisea* by overwhelming its resource reserves, which may be dependent on the post-fire response of its host plant (USFWS 2022b, p. 45; USFWS 2012, p. 29121). The distribution of *C. grisea* within SHOBA is mostly along the eastern escarpment, away from the Impact Areas and downslope, reducing the potential for frequent fire. Very few areas where *C. grisea* occur have burned more than once in the last 20 years and none have burned more than three times (USFWS 2022b, p. 46). Fires that escape from training areas are not likely to affect the entire distribution of *C. grisea* at one time because this taxon has sufficient redundancy given its wide distribution in many watersheds. *Castilleja grisea* is also associated with steep canyon areas where fires are less likely to impact individuals (USFWS 2012, p. 29121).

Delphinium variegatum ssp. *kinkiense* is expected to be tolerant of fire because the roots resprout and the species is not solely dependent on a seed bank for persistence (Keeley and Brennan 2015, p. 29; Navy 2009, p. 4.22). If underground storage roots survive fires, the possible benefits of fire include reduction in competitive shading and/or nutrient uptake by nonnative grasses, which would likely increase flowering as well as visibility to pollinators. If fires occur when plants are active or prior to seed set, they could impair seed recruitment and regeneration following fire and kill plants (US Navy 2002, p. D-23). High fire frequency could also be a potential stressor that could limit the

distribution of *D. v.* ssp. *kinkiense* by overwhelming its tolerance threshold to fire and potentially impacting the viability of the roots (USFWS 2013). Intervals of less than 5 years are likely not detrimental and *D. v.* ssp. *thornei* locations have persisted despite having burned up to seven times (USFWS 2022d, p. 61; Keeley and Brennan 2015, p. 29). Habitat supporting *D. v.* ssp. *kinkiense* burns relatively infrequently, approximately half of the record have burned only once or twice (USFWS 2019).

*Malacothamnus clementinu*s is thought to be adapted to fire due to the ability of rhizomes to resprout and the potential for the seeds to respond favorable to fire (USFWS 2008b, p. 77). Frequent fire may be reducing carbohydrate stores, which may lead to a decline of some occurrences (Muller and Junak 2011, p. 37). The majority of the distribution of *M. clementinu*s occurs either within the SHOBA or adjacent to it, including IA I at Horse Beach (USFWS 2018). Most of the *M. clementinus* habitat has burned at least once and up to four burns were recorded within the Impact Areas (USFWS 2019).

C.3.3 Erosion

The unique geology, vegetation, soils, and climate of SCI present challenges to land-managers; many soils have a high clay-content and are vulnerable to soil piping and gully-erosion (US Navy 2013a, p. 1). Because annual precipitation is low and highly variable between years, growth of vegetation is typically slow and often sparse following disturbance (US Navy 2013a, p. 1). Erosion is a residual stressor to the target plant taxa as a direct result of training activities, or indirectly through increased fire-frequency and/or severity (USFWS 2012, p. 29123). To date, erosion has occurred infrequently following fire (SERG 2013, p. 55). Roads can concentrate water flow, causing incised channels and erosion of slopes (Forman and Alexander 1998, pp. 216–217). Grading and resurfacing to reinforce roadbeds may also result in erosion (US Navy 2013a, p.105).

The U.S. Navy manages damage from erosion through their San Clemente Island Native Habitat Restoration Program and the Erosion Control Plan (e.g., SERG 2013, pp. 9–19). The Navy monitors and evaluates erosion on the island and uses multi-year data to assess priorities for remediation (SERG 2006, entire; SERG 2015, entire) and erosion is repaired through revegetation and outplanting efforts. Erosion that may result from military training and operations is mitigated through implementation of the Erosion Control Plan, which includes mapped operational boundaries, best management practices and program for monitoring soil erosion following training (US Navy 2013a, pp. 3, 67, 85, 99, 104). Current erosion issues are localized, and erosion is generally decreasing on the island as the vegetation continues to recover (USFWS 2022a, p. 42).

Proximity to designated training areas and roads is a potential erosion-risk to *Acmispon dendroideus* var. *traskiae*; approximately 2 percent of the known records are located within 30 meters (100 feet) of a road (USFWS 2022a, p. 39). Along the eastern escarpment, *Acmispon dendroideus* var. *traskiae* is found in proximity to Ridge Road, the primary road that traverses most of SCI from northwest to southeast. Roadside records of *A. d.* var. *traskiae* may experience runoff during storm events (US Navy 2008, pp. G.4, G.8). On occasion after particularly heavy rainfall events, localized areas of high erosion stemming from roadways have been noted; however, regular road maintenance and repair of associated damage minimizes the potential for such problems to spread, and erosion impacts to *A. d.* var. *traskiae* from such events have not been observed. The majority of individuals occur on rocky soils (Ustalf cobbly silt) that are not prone to piping and erosion. Only 13 percent of the individuals are located on clay soils, suggesting that erosion is a minor stress to *A.*

d. var. *traskiae* (Vanderplank *et al.*2019a, p. 22).

Military training activities that lead to erosion could impact *Castilleja grisea*, but few individuals occur in these designated training areas (USFWS 2022b, p. 40; Tierra Data Inc. 2007, pp. 1–45). Erosion was the primary concern associated with use of the Assault Vehicle Maneuver Corridor (AVMC), which connects the AVMAs; however, only approximately 0.2 percent of *C. grisea* individuals are located within 30 m (100 ft) of a road or the AVMR (USFWS 2022b, p. 41). *Castilleja grisea* is found mostly on non-clay soils that are not prone to piping, and no piping or soil erosion channels have been observed in *C. grisea* locations (Vanderplank *et al.* 2019b, p. 16).

Erosion is a minor residual stressor for *Delphinium variegatum* ssp. *kinkiense*. Erosion events are typically localized in *D. v.* ssp. *kinkiense* habitat, such as point-source erosion originating from roads (USFWS 2008a, pp. 16, 18). Only one record is within 30 m (100 ft) of an existing road and represents less than 1 percent of the total number of individuals (USFWS 2022d, p. 56).

There is no information that erosion resulting from human activities has impacted habitat occupied by *Malacothamnus clementinus*. Individuals of this species do not occur near roads, where erosion is more likely to occur. *Malacothamnus clementinus* does occur immediately adjacent to the AVMC in Horse Beach Canyon, but potential erosion impacts are limited (USFWS 2019; Navy 2013a, p. 104).

C.3.4 Nonnative Plants

Likely aided by historical feral grazing animals, a large number of invasive nonnative plant species have become naturalized on SCI (US Navy 2013b, p. 3-3). At listing, the spread of nonnative plants was identified as a threat to vegetation recovery (USFWS 1977, pp. 40682, 40684) and is considered an island-wide stressor to native vegetation communities (USFWS 2012, p. 29117). Nonnative plants can alter habitat structure, ecological processes such as fire regimes, nutrient cycling, hydrology, and energy budgets; and they can compete for water, space, light, and nutrients (USFWS 2012, p. 29117). Additional potential impacts of nonnative plants on the target plant taxa include precluding germination or recruitment (*i.e.,* competitive exclusion) and potentially preventing pollination if plants are not obvious to pollinators due to taller stands of nonnative vegetation. In particular, nonnative annual grasses were noted at the end of the grazing period with the most common being *Avena barbata* (slender wild oat), *Bromus madritensis* ssp. *rubens* (red brome)*, B. hordeaceus* (soft brome), *B. diandrus* (ripgut brome) and *Hordeum murinum* (false barley) (Keeley and Brennan 2015, p. 4). Nonnative annual grasses can be found in many plant communities (US Navy 2013b, pp. 3-62–6-79; Wylie 2012, p. 31). They have the potential to change the vegetation types from shrublands to grasslands and increasing the fuel load in wet years (Battlori *et al.* 2013, p. 1119). Nonnative annual grasses are a residual stressor to the target plant taxa because they can alter fire regimes changing the frequency, intensity, extent, or seasonality of fire (USFWS 2012, pp. 29102–29103). Although most of the invasive species likely were brought to SCI while it was being ranched, additional species of nonnative grasses continue to be found on the island; *e.g., Schismus* sp. (schismus) (and the fire-tolerant weeds *Brachypodium distachyon* (purple false brome) (USFWS 2007, p. 5), *Ehrharta calycina*, and *E. longiflora* (African veldt grasses) (US Navy 2013a, p. 3-90).

Nonnative plant species are managed as part of the INRMP. In addition, the Naval Auxiliary Landing Field San Clemente Island Biosecurity Plan addresses the prevention and response to new

nonnative species introductions (US Navy 2016). Additionally, the Fire Management Plan and the Native Habitat Restoration Program address the management of nonnative plants and are highly effective at controlling certain species: e.g., *Foeniculum vulgare* and *Brassica tournefortii* (USFWS 2013, p. 45420). The Navy makes significant efforts to control invasive species to preclude their expansion into habitat areas and other areas largely inaccessible for weed control purposes. The Navy has monitored and controlled the expansion of invasive nonnative plant species on an ongoing basis since the 1990s focusing largely on *B. tounefortii*, *B. nigra* (black mustard), *F. vulgare*, *Asphodelus fistulosus* (aspohodel), *Stipa milaceae* (smilo grass), *Ehrharta calycina*, *Plantago coronopus* (buckhorn plantain), *Tragopogon porrifolius* (salsify), *Carpobrotus edulis* (iceplant); additional invasive species of concern also are treated as they are located (SERG 2015, pp. 63–71; SERG 2016, pp. 45–46). In general, the Navy treats over 100,000 individuals of these various species annually. Control of these invasive plants benefits the ecosystem on SCI by reducing the distribution of these species and precluding them from invading habitat occupied by the target taxa. Invasive species control is conducted most frequently along roads because these areas are the most accessible and easily visible and because roadsides are the areas from which most introductions are likely to occur. In addition, nonnative plant cover is anticipated to decrease as the native vegetation on the island continues to recover.

Nonnative and invasive plant species remained a residual, low-level stressor to habitat for *Acmispon dendroideus* var. *traskiae*. However, given the greatly expanded distribution of this taxon and ongoing management of invasive species conducted by the U.S. Navy, the magnitude of the threat was significantly minimized (USFWS 2013b, p. 45420). Potential impacts of nonnative plants on *A. d.* var. *traskiae* include precluding germination (i.e., competitive exclusion), preventing pollination (e.g., *A. d.* var. *traskiae* plants are not obvious to pollinators due to tall stands of nonnative grasses), and carrying fire in areas that would not otherwise burn. The invasion of nonnative annual grasses on SCI may have caused the greatest structural changes to *A. d.* var. *traskiae* habitat, especially in the coastal terraces and swales (USFWS 2007, pp. 4–5). *Acmispon dendroideus* var. *traskiae* is associated with nonnative annual grasses but they are not considered a dominant portion of the habitat (Junak and Wilken 1998, p. 261; USFWS 2007, pp. 6–7; Vanderplank *et al.* 2019a, p. 12). The rocky soils, which support this species, are less susceptible to invasion by annual grasses (Allan 1999); and there is no evidence that nonnative plants, including annual grasses, are reducing the abundance of the species (Vanderplank *et al.* 2019, p. 18).

Nonnative plants are a residual, low-level stressor to *Castilleja grisea,* particularly to records adjacent to roads (Vanderplank *et al.* 2019b, p. 31). Potential impacts of nonnative plants on *C. grisea* include precluding germination (i.e., competitive exclusion), preventing pollination (e.g., *C. grisea* plants are not obvious to pollinators due to tall stands of nonnative grasses), and carrying fire in areas that would not otherwise burn. The invasion of nonnative annual grasses on SCI may have caused the greatest structural changes to *C. grisea* habitat, especially on the coastal terraces and in swales (USFWS 2007, pp. 4-5). Nonnative annual grasses and forbs occur within *C. grisea* habitat but are not a dominant component of the plant community (USFWS 2007, p. 6; Tierra Data Inc. 2005, pp. 29–42). Surveys conducted in 2011 and 2012 found just four occurrences (170 individuals) of *C. grisea* in communities dominated by invasive grasses, compared to its preferred habitat on rocky soils (Vanderplank *et al.* 2019b, p. 12). While there may be unquantified effects of nonnative species on the fitness of *C. grisea*, they do not seem to be impeding population growth.

The spread and proliferation of invasive, nonnative plants is a residual stressor for *Delphinium variegatum* ssp. *kinkiense*, particularly in perennial grassland habitat (USFWS 2008a, p. 18). Nonnative grasses are the dominant herbaceous plant-form in many of the plant communities in which this subspecies occurs (US Navy 2013b, pp. 3-72, 3-80, 3-97). A number of nonnative plant taxa have been found in association with *D. v.* ssp. *kinkiense* including: herbaceous plants such as *Atriplex semibaccata* (Australian saltbush), *Erodium moschatum* (stork's bill; white-stem filaree), *Hypochaeris glabra* (smooth cat's ear), *Silene gallica* (common catchfly), *Sonchus oleraceus* (common sowthistle), and *Spegularia villosa* (hairy sandspurry) and the following grasses: *Avena fatua* (wild oat), *Bromus diandrus*, and *Bromus madritensis* ssp. *rubens* (USFWS 2008a, p. 13; citing Junak and Wilken 1998). Dense grasses may preempt resources (light, water, and nutrients) making them less available to co-occurring plant species (USFWS 2022d). Given the sensitivity of this species to localized moisture, grasses could reduce habitat suitability for this species and inhibit it from breaking dormancy or flowering. In sufficient densities, grasses could preclude seed germination and/or survival of seedlings. As *D. v.* ssp. *kinkiense* reproduces primarily by seed and not thru vegetative means, this may be an important factor in species persistence.

Nonnative species including *Foeniculum vulgare* and *Brassica tournefortii* are a potential stressor to *Malacothamnus clementinus* (USFWS 2012, p. 29102). Nonnative grasses are also present in the native maritime desert scrub vegetation community and other plant communities where *M. clementinus* is found (Tierra Data Inc. 2005, pp. 36–42). Additionally, *Avena* ssp. has been noted as densely intermingled with *M. clementinus* populations; however, the nature of the interaction between the two taxa is unknown (Muller and Junak 2011, p. 37). Although identified as a residual stressor, there is no quantitative data regarding invasive species within habitat supporting *M. clementinus* or studies regarding potential impacts.

C.3.5 Infrastructure

Infrastructure includes construction and maintenance of roads and fuel-breaks, construction of berthing buildings, development of training facilities, and installation of wind-turbines (USFWS 2012, p. 29101). The Recovery Plan cited construction and infrastructure maintenance as causes of decline of *Acmispon dendroideus* var. *traskiae* (USFWS 1984, p. 63). The magnitude of this stressor is reduced as the distribution of this plant has expanded beyond the cantonment area at Wilson Cove (USFWS 2007b, p. 4).

C.3.6 Climate Change

The potential impacts of ongoing, accelerated climate change have become a recognized threat to the flora and fauna of the United States (IPCC 2007, pp. 1–52; PRBO 2011, pp. 1–68). Throughout the southwest, climate change is predicted to result in warmer and drier conditions with high overall declines in mean seasonal precipitation but with high variability from year to year (IPCC 2007, pp. 1–18). Currently, the presence of fog during the summer months helps to reduce drought stress for many plant species (Halvorson *et al.* 1988, p. 111; Fischer *et al.* 2009, p. 783). Fog could provide a climate refugium by buffering species from the potential impacts of climate change (Vanderplank 2013, entire; Vanderplank and Ezcurra 2015, p. 410). However, coastal cloud cover and fog are poorly addressed in climate change models (Qu *et al.* 2014, pp. 2603–2605) and fog projections remain uncertain (Field *et al.* 1999, pp. 21–22; Lebassi-Habtezion *et al.* 2011, pp. 8–11; PRBO 2011, p. 40). As a result, we acknowledge climate change as a stressor although the type and

magnitude of the potential impacts are unclear.

Climate change may influence the target plant taxa by impacting adult plant persistence, reproduction, germination, altering fire regimes or decoupling phenology; but making predictions about the type and magnitude of the potential affects is difficult. Predicting impacts to the target plant taxa due to climate change are further complicated by the timing of increased or decreased rainfall. For example, wetter conditions in the winter and early spring can lead to more growth early in the season which can provide more fuel for fire later. Changes in temperature or rainfall patterns also has the potential to affect biotic interactions, such as the timing of plant phenology versus insect activity. Long-term effects of climate change are difficult to predict. However, in the short-term, climate change may result in more frequent or severe fires, heavy periods of rainfall that could lead to major erosion events or periods of drought (Kalansky *et al.* 2018, p. 10). Though short-term impacts are possible, our Species Status Assessments suggested that climate change will not have major effects on these target species over the next 20 to 30 years.

Overall, there is much uncertainty in making predictions regarding the possible impacts of climate change on the target plant taxa (USFWS 2013, p. 45426). However, *Acmispon dendroideus* var. *traskiae* and *Castilleja grisea* are expected to be somewhat resilient to climate change due to ample genetic diversity and a wide range of ecological niches (Vanderplank *et al.* 2019a, p. 27; Helenurm *et al.* 2005, p. 1225). In comparison, *Malacothamnus clementinus* may be less resilient to climate change due to reduced genetic variability. However, the growth strategy of both *Delphinium variegatum* ssp. *kinkiense* and *M. clementinus* may provide an adaptive advantage by allowing individuals to persist as underground rhizomes through extended droughts.

C.3.7 Hybridization

Hybridization was noted as a threat to *Acmispon dendroideus* var. *traskiae* and *Delphinium variegatum* ssp. *kinkiense* due to the potential for reduced genetic integrity of the species and could result in decreased genetic variation and lower fitness (USFWS 2012, p. 29115). *Acmispon dendroideus* var. *traskiae* is known to hybridize with *A. argophyllus* var. *argenteus*. Although mentioned in the recovery plan (USFWS 1984, p. 59), hybridization was not considered a threat to *A. d.* var. *traskiae* until 2007, when research suggested the potential for loss of genetic diversity within the listed entity should genetic assimilation occur or reduced fitness result from outbreeding depression (USFWS 2007b, p. 19). Recent genetic work (McGlauglin *et al.* 2018, p. 754) has shown moderate levels of genetic diversity in *A. d.* var. *traskiae*, with gene flow between neighbor populations and little threat from hybridization with other *Acmispon* species (Wallace *et al.* 2017, p. 743). Because hybridization is infrequently documented and is not expected to occur at higher frequencies than occurred historically, we do not have evidence that hybridization is a residual stressor to *A. d*. var. *traskiae*.

The potential for hybridization between the two island subspecies of *Delphinium variegatum* on SCI was also considered a factor that could threaten the genetic integrity of *Delphinium variegatum* ssp. *kinkiense* (USFWS 2008a, p. 25). *Delphinium variegatum* ssp. *kinkiense* and *Delphinium variegatum* ssp. *thornei* (Thorne's larkspur) grow in close proximity and seemingly intermingle in several locations, most notably in the central plateau area of SCI (USFWS 2008b, p. 25). Morphological distinctions between the two island-taxa are not always clear with broad overlap in diagnostic traits. The possibility of genetic exchange between these subspecies was noted as a

potential threat to the genetic integrity of the taxa in the Recovery Plan and further investigations into the distinctions between taxa were recommended. Sympatry was historically considered to occur in the southern portion of SCI in the vicinity of Eagle Canyon and Mosquito Cove (USFWS 1984, pp. 53–54). In review of past surveys, the Navy suggests that floral variation may be static and hybridization may not be a threat to either taxon, however, further taxonomic study would help better understand the relatedness between the subspecies (Dodd and Helenurm 2002; p. 620). Floral coloration at survey sites across the islands will be documented through the PDM.

C.3.8 Genetics

Despite increases in the distribution of *Malacothamnus clementinus*, a low level of detectable genetic variation is considered a residual stressor to *M. clementinus* (USFWS 2007, p. 19). Population genetics studies indicate that *M. clementinus* has low genetic variability both at the population and species levels (Helenurm 1997, p. 50; Helenurm 1999, p. 39) and was very low when compared with other island endemic plant taxa (Helenurm 1999, p. 40). Low genetic diversity may play a role in low seed production through inbreeding depression or some degree of genetic self-incompatibility.

C.3.9 Management Units

The target plant taxa will benefit from the portion of their populations that overlap with the Island Night Lizard Management Area and the four proposed SCI Management Areas (Figure A2-1). In total approximately 15,420 acres of habitat occur within the combined management areas. This designation will help protect high quality habitat and contribute to species viability in the future. See Appendix II for how the distribution of each of the target plant taxa overlap with the combined management areas.

C.4 MONITORING OVERVIEW

The overarching goal of this PDM Plan is to determine whether viable populations will persist into the future by documenting the condition, area occupied, and percent vegetation cover of the target plant taxa throughout their distribution. The PDM Plan was designed to monitor both the status of the populations and evaluate potential stressors. The status of the target plant taxa will be monitored annually. At the end of each survey year, the data will be assessed to determine whether the survey protocols are functioning as anticipated and whether any changes in species management are needed. PDM will be used to determine whether each taxon, once removed from the List of Endangered and Threatened Plants, will become threatened with extinction without the protective measures afforded by the Act. The Service will evaluate the species' status and recovery every 3 years based on the Navy's annual monitoring reports. If the plant populations remain stable or continue to increase in abundance through the PDM period, no additional monitoring will be required. However, if a decrease in the number of occupied zones or vegetation cover is observed, monitoring may be extended. A hierarchical framework of population condition triggers is identified below that outlines thresholds for initiating management, research, or a status review of the target species (see Triggers, section C.8.1).

The PDM Plan goals and objectives are as follows:

Goal: *Ensure that plant populations are viable and persist into the future. The minimum number of occupied rare plant monitoring zones needed for each taxon is as follows, based on maintaining 75 percent of its current distribution:*

- 15 zones of *Acmispon dendroideus* var. *traskiae*,
- 19 zones of *Castilleja grisea*,
- 10 zones of *Delphinium variegatum* ssp. *kinkiense,* and
- 5 zones of *Malacothamnus clementinus*.

Objective 1: *Provide an assessment of population status, including distribution, plant cover, and area occupied to: 1) serve as a baseline, and 2) measure persistence over time.*

Objective 2: *Monitor stressors at the level of the sampling plot to understand the potential impacts on the plant populations.*

This PDM Plan provides a systematic framework for assessing the status of each population and for evaluating stressors to the four target plant taxa. This plan details the sampling design, survey methodology, schedule, and work effort proposed for PDM. The primary criterion for monitoring of target plant taxa is to assure that at least 75 percent of the target plant taxa occurrences are self-sustaining and will persist into the future. To assure that this can be measured and quantified over time, the PDM includes objectives for assessing population condition and the effects of stressors. Data will be acquired through quantitative assessments at sampling plots and mapping of the area occupied by the target plant taxa at these plots. Mapping the area occupied each year will enable us to track annual variation in species expression and provide an estimate of occupied habitat within the survey area. Monitoring will begin within 2 years after delisting and is anticipated to start in 2023. A PDM planning and implementation schedule is provided in Table C10-1. The monitoring methodology is discussed in detail in section C.6 and C.7.

C.4.1 Population Condition Assessment

The condition of each target plant taxa population will be evaluated through a systematic approach where all occupied, rare plant monitoring zones will be visited multiple times over the course of the PDM period. This will include annual revisits to sentinel plots and rotating plots that will be visited every 3 years. Changes in population condition will be assessed through estimates of target species cover, nonnative vegetation cover, and acreage of occupied habitat.

C.4.2 Stressor Assessment

The target plant taxa are vulnerable to on-going activities that are potential stressors to population persistence. The residual threats include military training, fire, erosion, and nonnative plants. A stressor assessment including the presence, proximity, and magnitude of stressors will occur at each sampling plot to determine if they are important covariates that may explain declines in population condition.

C.4.3 Post-Fire Monitoring

Fire is the residual stressor with the largest potential for impact, but the species-specific responses to fire are not well understood. Monitoring fire is proposed to occur at multiple scales. The Navy will continue to map fires and the associated severity across SCI to document which occurrences have burned, the severity of the associated fire, the fire footprint, and the fire history. These data are useful for assessing impacts within each zone and for identifying island-wide trends. A portion of the sentinel sites will be located within the historical fire footprint to assess the response to fire. Because it is unclear which, if any, of the sentinel sites will burn, rotating plots within recently burned areas will be incorporated into annual monitoring post-fire for a minimum of 3 years. Areas selected for post-fire monitoring will be coordinated with the Navy such that the fire response is documented for all four target plant taxa. Post-fire monitoring is anticipated to include between 5 and 10 sampling plots per species to gather sufficient data to characterize the post-fire response. It is not anticipated that all burned plots will be monitored.

C.4.4 Weather Monitoring

The annual expression of the target plant taxa is restricted to varying degrees by weather conditions. Rainfall, temperature, and fog drip affect germination, vegetation growth, and reproduction. In order to assess whether changes in population condition are likely the result of stressors (e.g., military training and erosion) to the species, it is important to understand how weather conditions affect patterns in plant expression under varying environmental conditions. Weather conditions (e.g., temperature and rainfall) will be monitored as a covariate along with the condition of the plant population and the presence and magnitude of stressors to distinguish variability in target species cover due to abiotic factors apart from impacts related to stressors. Collecting weather data will also generate a record of climatic conditions on SCI that may provide insight into plant responses due to projected warmer temperatures and decreased rainfall associated with climate change.

C.5 PLAN RECOMMENDATIONS

Uncertainties in each species' ecology and life history remain and will not be addressed in the current monitoring framework. However, the long-term persistence of the target plant taxa may benefit from initiating research to address key uncertainties and management actions to proactively address potential declines. The following actions are recommended to inform implementation of the PDM Plan. Where applicable, these recommendations are included as potential management actions in response to specific population condition triggers in section C.7.1, below. The following recommendations could be implemented to improve our understanding of the target species.

- Where logistically feasible, presence or absence should be evaluated at recorded observations adjacent to established sampling plots to help determine if potential declines are site-specific or island wide.
- Develop a conceptual model to identify important habitat parameters based on known occurrences. This information could be integrated into a habitat suitability model to identify potentially suitable habitat on SCI.
- Refine each species distribution by incorporating surveys in suitable habitat that is historically unoccupied or by revisiting historical occurrences that are not part of the systematic monitoring covered under the PDM Plan.

- Evaluate the resiliency of the target plant taxa (*Acmispon dendroideus* var. *traskiae*, *Castilleja grisea*, and *Malacothamnus clementinus*) to fire through quantitative assessment of germination, recruitment, vegetation growth and survival.
- Determine the longevity of target plant taxa, particularly clonal species, in the field.
- Determine the relative contribution of sexual reproduction in *Malacothamnus clementinus* through research on seed viability, genetics, and/or monitoring of seed set and recruitment.
- Develop a protocol for collecting seed documenting maternal lines.
- Develop a restoration plan including protocols and triggers for out-planting and use of the ex-situ seed bank.
- Refine how monitoring data will be used to inform management actions.
- Develop species-specific management plans to help prioritize management actions in the INRMP. Management plans could be incorporated into the INRMP as appendices.

C.6 SAMPLING METHODOLOGY

The monitoring approach is based on annual sampling to document target plant cover and identify stressors so that management actions may be implemented to ensure persistence of the populations of target species across SCI. For each plant taxa, SCI is considered a single population. As describe above, sampling is conducted at the scale of the rare plant monitoring zone under this PDM Plan (Figure C2-1). Rare plant monitoring zones are not defined by gene flow or population structure, but are defined based on topographical and vegetation features. Monitoring will be conducted in sampling plots within the zones to evaluate population trends over time. The level of effort for each species, in terms of the number of sampling plots, will follow the number of previously defined USFWS occurrence (Table C2-1).

C.6.1 Site Selection and Sample Size

The selection of sites is an important part of the design process, but it is not necessary that all sites be selected completely at random. Simple random samples are very good at avoiding bias and are statistically robust, but they can also be inefficient, expensive, or impossible to conduct because of restricted access or other impediments. The following methodology was designed to provide a systematic approach to sampling across the range of the target plant taxa occurrences on SCI. Spatial sampling is proposed to be implemented through a rotating panel design (3-year rotation) supplemented with sentinel plots that are visited each year. This design balances effort expended to estimate status (e.g., spatial distributions) with effort expended to document trend (e.g. change through time) (Urquhart and Kinkaid 1999, p. 412). The combination of spatial and temporal data will ultimately help us understand the variability in abundance and allow for subsequent power analyses to determine the most efficient sampling effort.

Management and conservation priorities often dictate that some effort be allocated to sites that are of high value (economically, biologically, socially), suggesting that *a priori* selection of sites based on prior knowledge can add a significant value to an inventory and monitoring design. A set number of sentinel plots will be subjectively located based on density, proximity to stressors, fire interval, historical occupation, access and the co-occurrence of multiple covered species. Sampling plots will be randomly located within these areas. Roughly 25 percent of the sites (23 of 89) have been designated as sentinel sites, which will be visited each year of PDM (Table C6-1, Table C6-2, Table C6-3; Figure C6-1; USFWS 2021). The repeated annual sampling of these sites will help identify the temporal variability of these four target plant taxa on SCI.

Table C6-1. Proposed Monitoring Framework Including Annual Sentinel and Rotating Sampling Plots

	Acmispon dendroideus var. *traskiae*	*Castilleja grisea*	*Delphinium variegatum* ssp. *kinkiense*	*Malacothamnus clementinus*	Total
Number of Zones	20	25	14	7	66
Number of Sampling Plots	29	28	21	11	89
Annual Sentinel Monitoring	8	7	6	2	23
Total Number of Rotating Plots	21	21	15	9	66
Year 1 Rotating Plots	7	7	5	3	22
Year 2 Rotating Plots	7	7	5	3	22
Year 3 Rotating Plots	7	7	5	3	22

In addition to the 23 sentinel plots, the remaining 66 sampling plots will become part of the rotation, with approximately 22 rotating plots being sampled every year (Table C6). A total of 45 sites will be sampled each year including rotating (22) and sentinel (23) sampling plots. The rotating plots are located within occupied rare plant monitoring zones to capture the geographic range of the target species (USFWS 2021). Figures C6-2 thru Figure C6-5 depict the sampling locations relative to the species historical records. Zones were assigned to each year of the rotation to ensure sampling across SCI each year (Figures C6-7 thru Figure C6-9). To maximize effort, all sampling plots within a zone will be surveyed in the same year. However, not all species occur in each zone. This monitoring approach assures that all monitoring plots are visited at least once every 3 years to document that a minimum of 75 percent of the occupied rare plant monitoring zones persist. The 3-year rotation is planned to continue for a minimum of three cycles: 1) years 1-3; 2) years 4-6; and 3) years 7-9. Rotating plots within a given year may be modified to incorporate annual post-fire monitoring in sampling plots that have burned. Post-fire monitoring will occur within the same sampling plot for approximately 3 years and then the sampling plot will be incorporated into the 3-year rotation. Post-fire monitoring is anticipated to include between 5 and 10 sampling plots per species and it is not anticipated that all burned plots will be monitored.

Sampling plots will be tracked by rare plant monitoring zone. Each sampled location will receive a unique code based on the target plant taxa, whether the plots is sentinel (S) or rotating (R), and the zone code. If there are multiple samples within the same zone and watershed, each sample will receive a new number using the following species codes: *Acmispon dendroideus* var. *traskiae* (ACDETR), *Castilleja grisea* (CAGR), *Delphinium variegatum* ssp. *kinkiense* (DEVAKI), and *Malacothamnus clementinus* (MACL) (e.g., Species Code, Sampling Plot Number, Rotating/Sentinel, Zone Code).

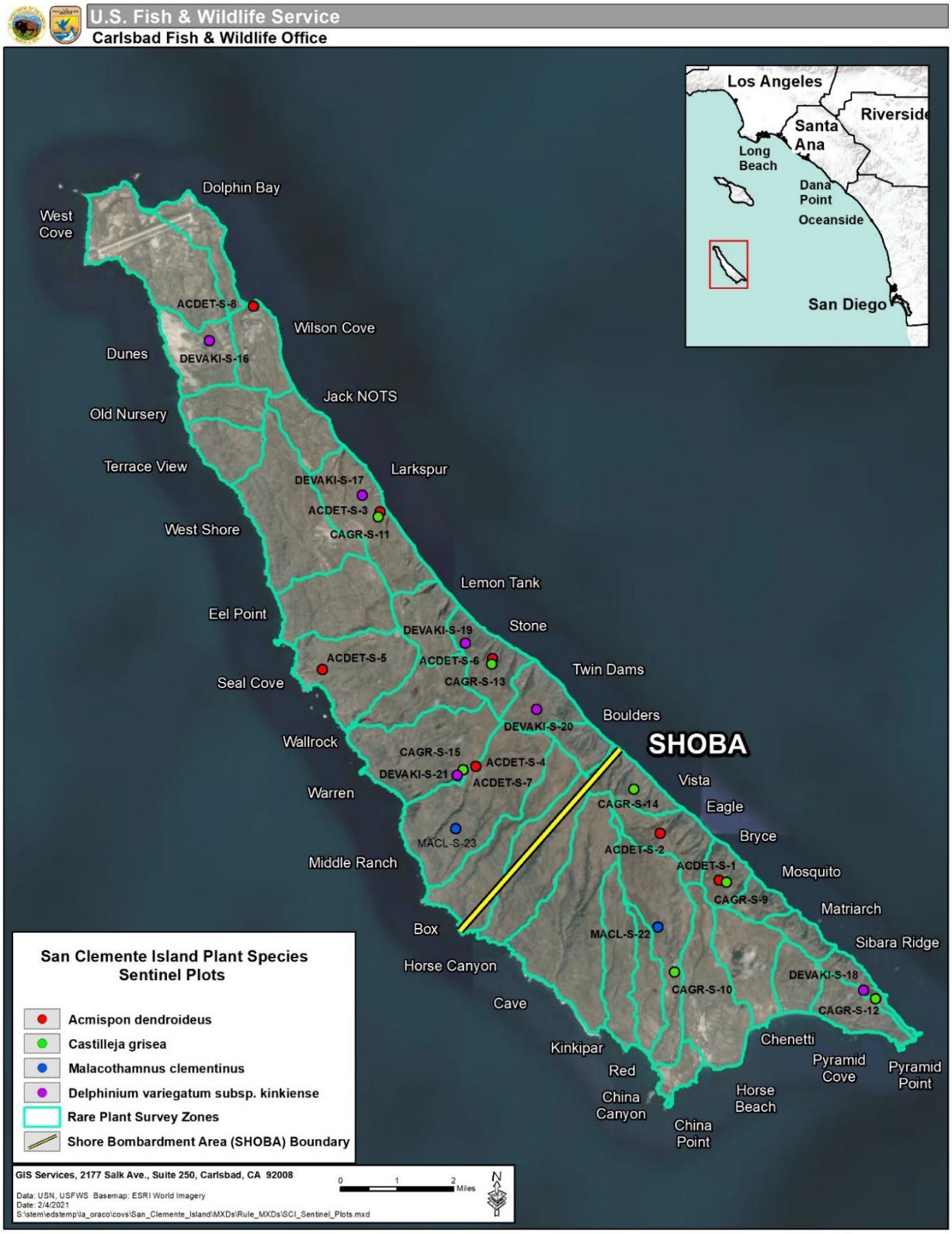

Figure C6-1. Map With the Location of All Sentinel Plots to be Monitored Annually.

Table C6-2. Summary of Sentinel Plots Including Rare Plant Monitoring Zone and Rationale for Selection.

Species	Plot ID	Zone	Within Training Area	Within Fire Area	Rationale
ACDET	S-1	Bryce		X	Previously burned or could potentially burn
ACDET	S-2	Eagle			
ACDET	S-3	Larkspur			Near CAGR, DEVAKI plots
ACDET	S-4	Middle Ranch		X	Near CAGR, MACL plots
ACDET	S-5	Sea Cove		X	
ACDET	S-6	Stone		X	
ACDET	S-7	Warren (Wilson Cove)		X	
ACDET	S-8	Wilson Cove			Foot traffic, invasive plants
CAGR	S-9	Bryce		X	In SHOBA near IAs, near multiple species. MACL on east side of SCI
CAGR	S-10	China Canyon		X	Chalk curve, near MACL plot
CAGR	S-11	Larkspur			
CAGR	S-12	Sibara Ridge			In SHOBA, southern distribution
CAGR	S-13	Stone		X	Often visited by Navy staff
CAGR	S-14	Vista			Outside SHOBA, east side, large field of CAGR
CAGR	S-15	Warren		X	Near MACL on west side of SCI
DEVAKI	S-16	Dunes			West of rifle range, near training area, northern distribution
DEVAKI	S-17	Larkspur			East of training area and road, near CAGR
DEVAKI	S-18	Sibara Ridge	X		Southern distribution, near CAGR
DEVAKI	S-19	Stone			Often visited by Navy staff, near CAGR
DEVAKI	S-20	Twin Dams		X	Potential for shrub succession
DEVAKI	S-21	Warren			Seasonal variability
MACL	S-22	China Canyon		X	Chalk curve, closest accessible location to IAs
MACL	S-23	Middle Ranch		X	

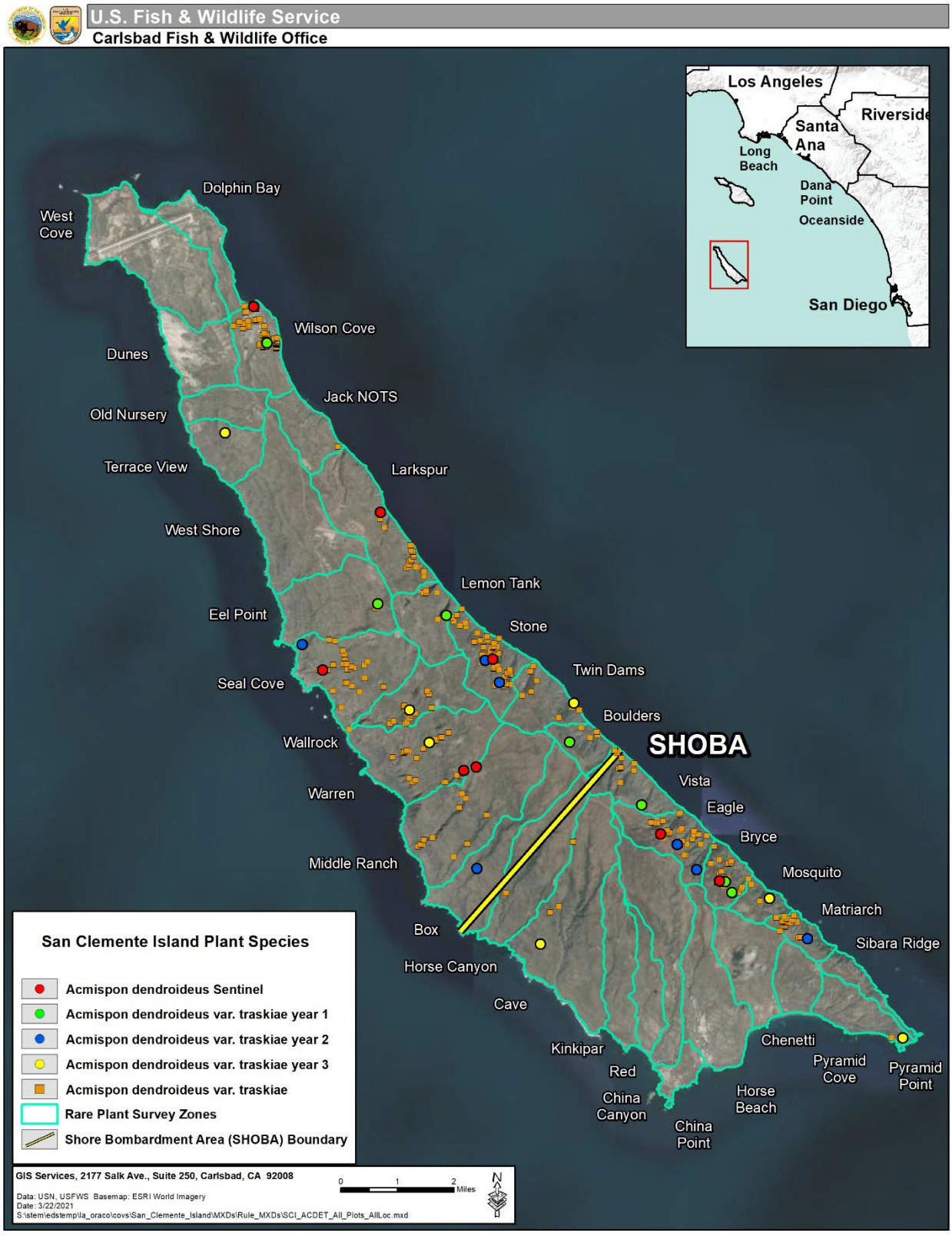

Figure C6-2. *Acmispon dendroideus* var. *traskiae* Sentinel and Rotating Plots.

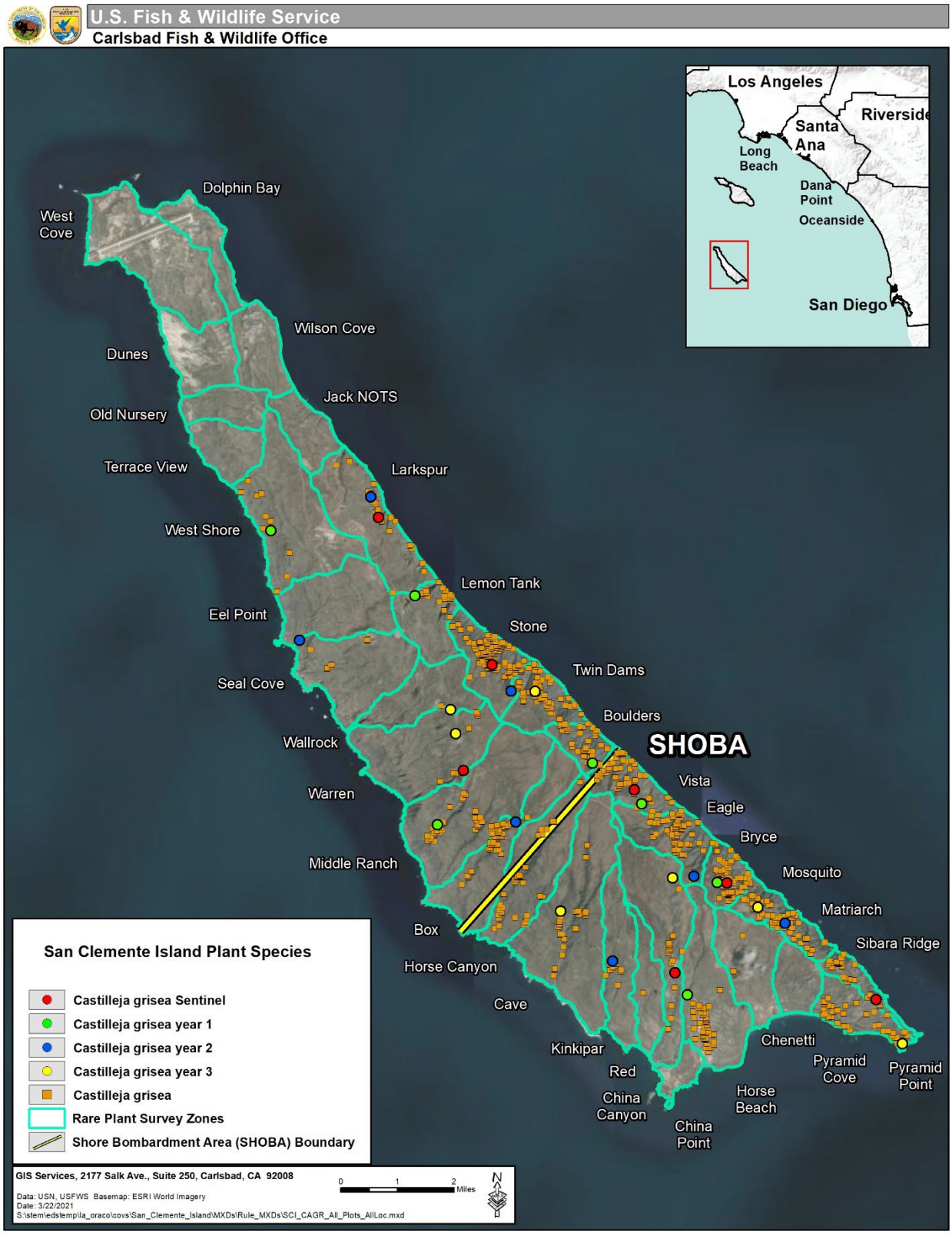

Figure C6-3. *Castilleja grisea* Sentinel and Rotating Plots.

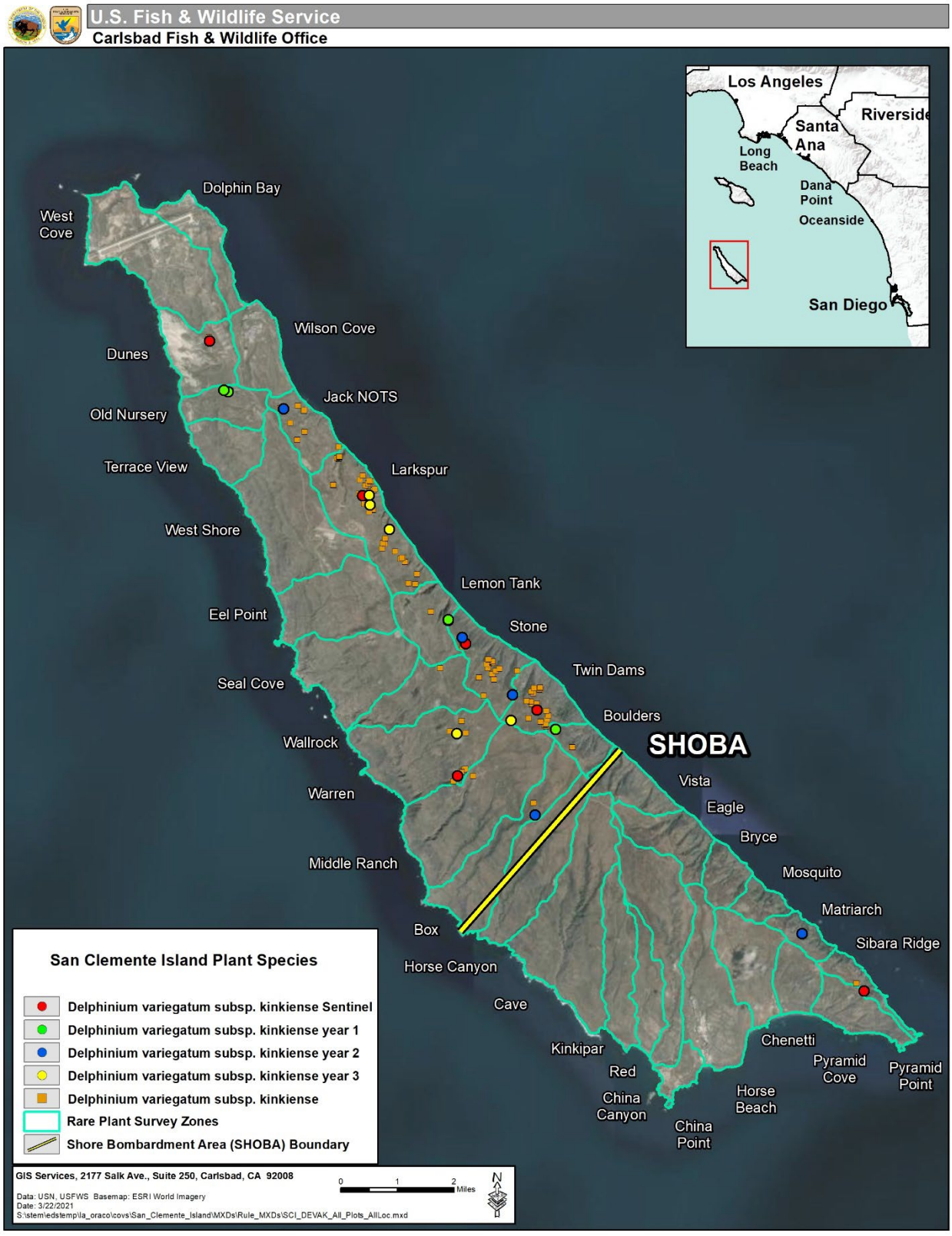

Figure C6-4. *Delphinium variegatum* ssp. *kinkiense* Sentinel and Rotating Plots.

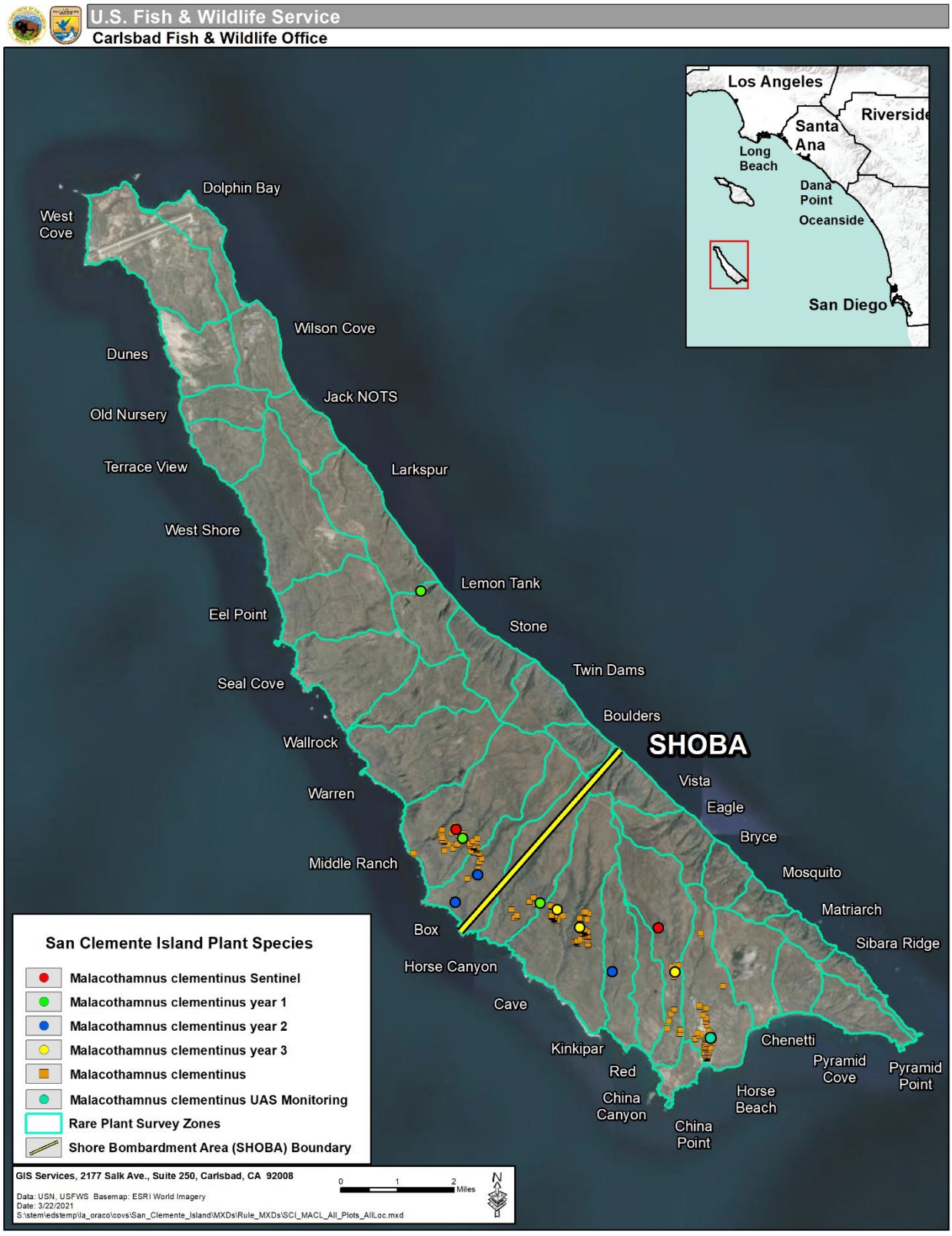

Figure C6-5. *Malacothamnus clementinus* Sentinel and Rotating Plots.

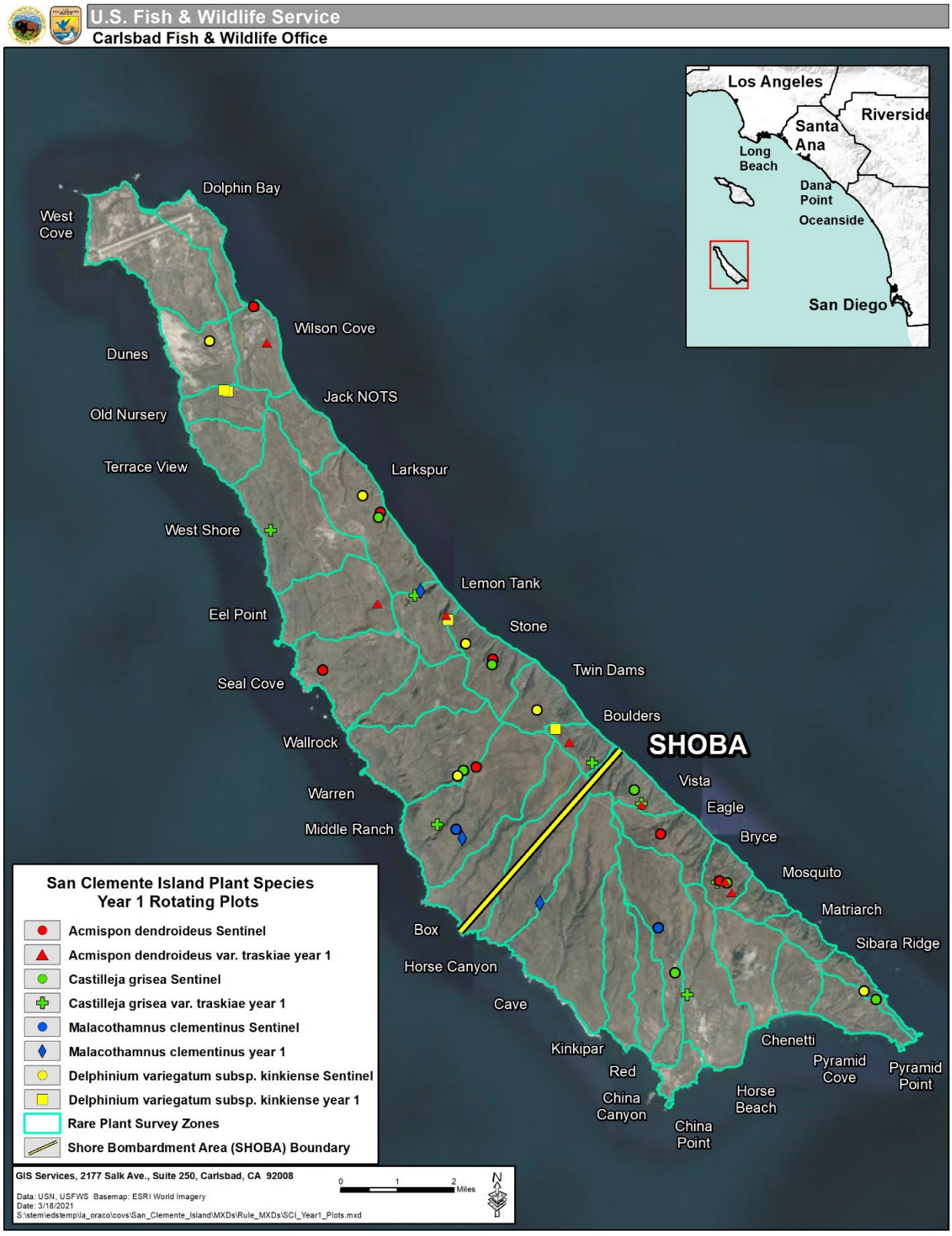

Figure C6-6. Year 1 Sampling Effort Including All Sentinel and Rotating Plots.

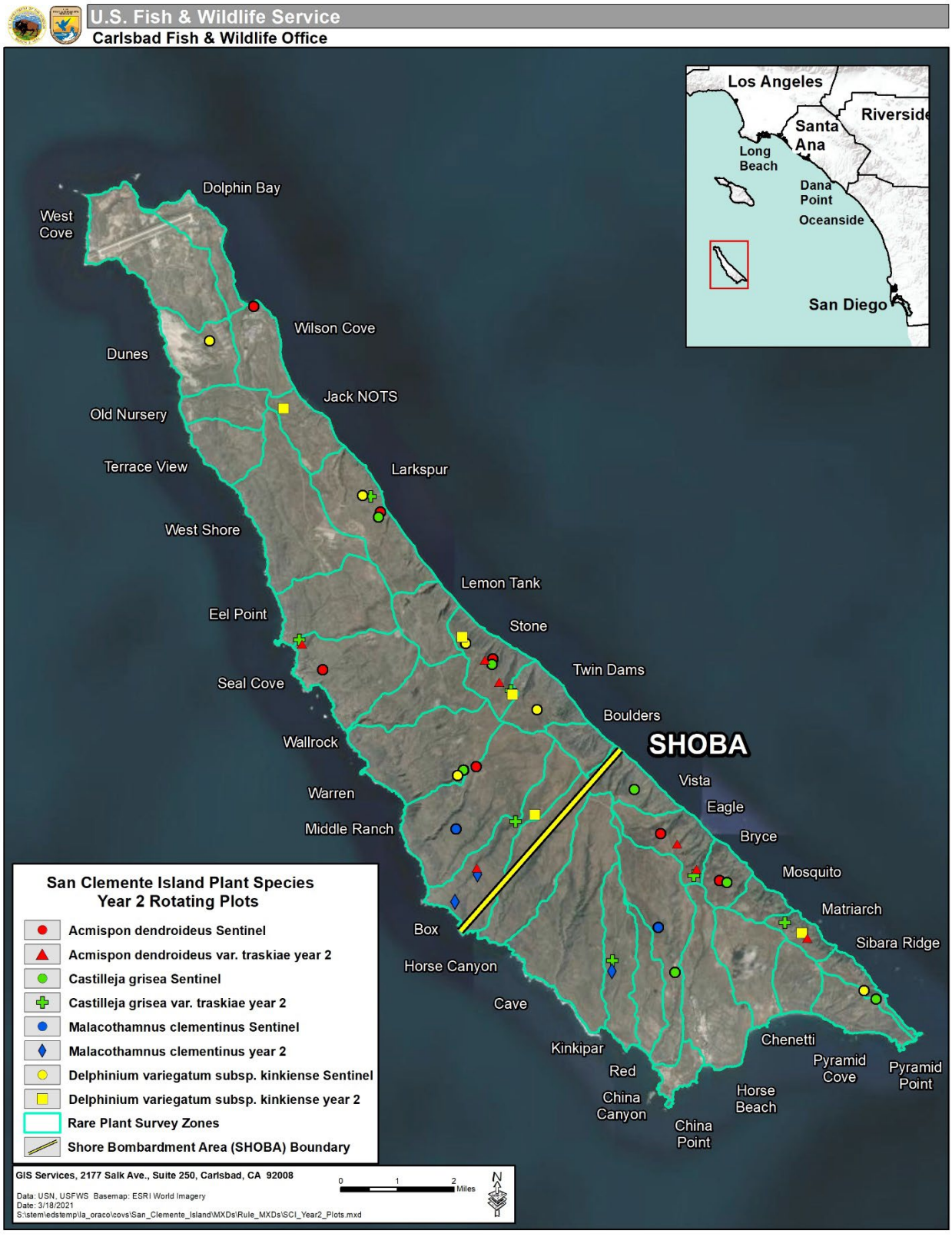

Figure C6-7. Year 2 Sampling Effort Including All Sentinel and Rotating Plots.

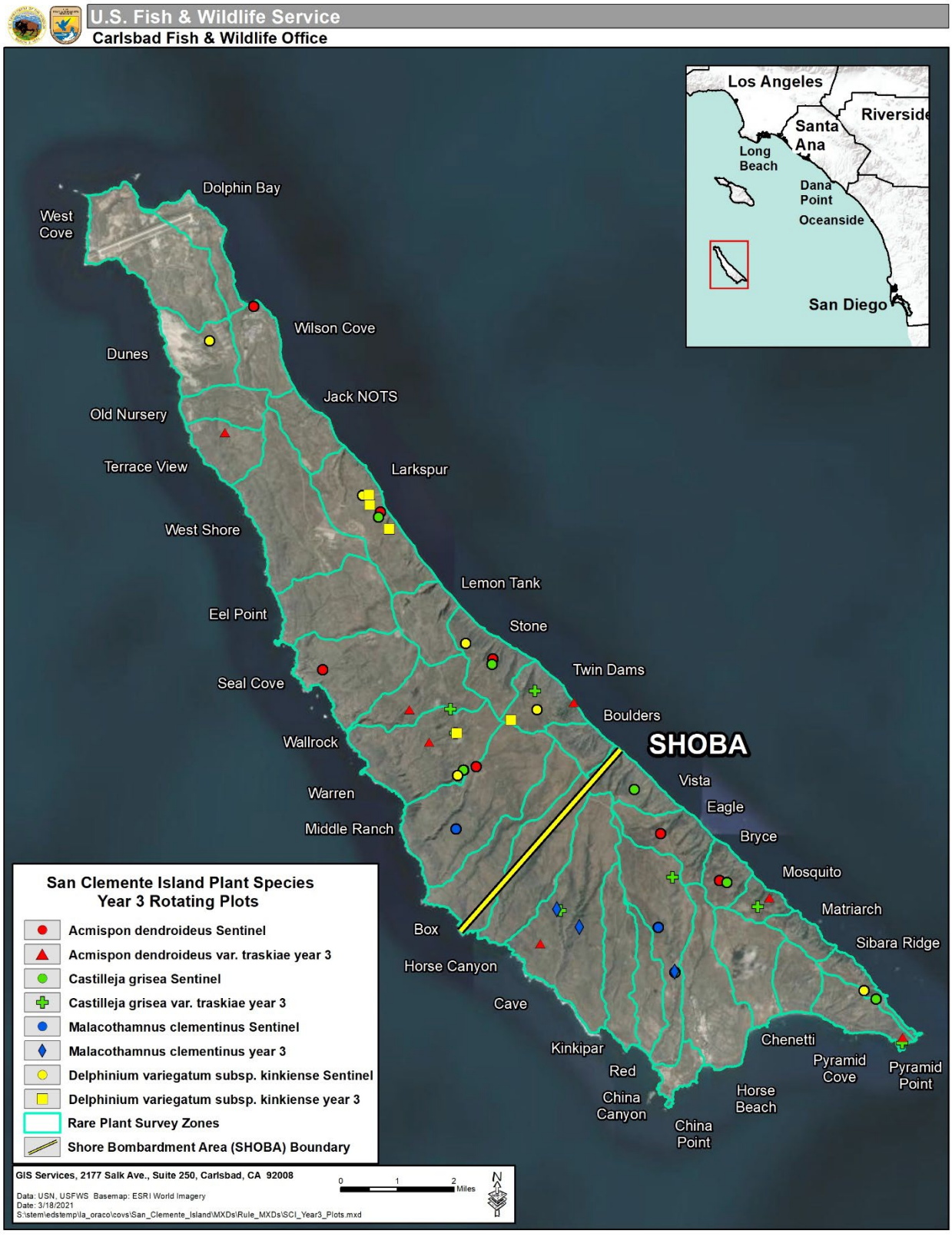

Figure C6-7. Year 3 Sampling Effort Including All Sentinel and Rotating Plots.

Table C6-3. Summary of Rotating Plots by Rare Plant Monitoring Zone.

	Year 1				Year 2				Year 3			
Survey Zones	ACDET	CAGR	DEVAKI	MACL	ACDET	CAGR	DEVAKI	MACL	ACDET	CAGR	DEVAKI	MACL
Boulders	1	1	1									
Bryce	2	1										
Box					1	1	1	2				
Cave									1	1		2
China Beach										1		1
Eagle					2	1						
Eel Point	1											
Horse Beach		1										
Horse Canyon				1								
Kinkipar						1		1				
Jack NOTS							1					
Larkspur						1					3	
Lemon Tank	1	1	2	1								
Matriarch					1	1	1					
Middle Ranch		1		1								
Mosquito									1	1		
Old Nursery			2									
Pyramid Point									1	1		
Sea Cove					1	1						
Stone					2	1	2					
Terrace View									1			
Twin Dams									1	1	1	
Vista	1	1										
Wallrock									1	1		
Warren									1	1	1	
West Shore		1										
Wilson Cove	1											
Total	7	7	5	3	7	7	5	3	7	7	5	3

Table C6-4. Summary of Sentinel Plots by Rare Plant Monitoring Zone

Survey Zones	*Acmispon dendroideus* var. *traskiae*	*Castilleja grisea*	*Delphinium variegatum* ssp. *kinkiense*	*Malacothamnus clementinus*
Bryce	1	1		
China Beach		1		1
Dunes			1	
Eagle	1			
Larkspur	1	1	1	
Middle Ranch	1			1
Sea Cove	1			
Sibara Ridge		1	1	
Stone	1	1	1	
Twin Dams			1	
Vista		1		
Warren		1	1	
Wilson Cove	2			
Total	8	7	6	2

C.7 MONITORING METHODS

The following methodology includes a rapid assessment to characterize population condition and stressors that can be utilized for all four target plant taxa. It provides data with respect to presence/absence, spatial and temporal variation, trends in population condition, categorizes the effect of stressors, and informs our understanding of specific habitat parameters from the same sampling effort. The methodology includes the following components:

1. Map the area occupied around a sampling plot in a given year.
2. Estimate cover and/or density of target and associated species within a permanent 10-meter sampling plot using the CNPS rapid assessment (relevé) methodology.
3. Conduct a stressors assessment within the sampling plot and a 10-meter buffer.
4. Conduct photo-documentation of sampling plots each year.

C.7.1 Area Occupied

The area occupied around a sampling plot should be surveyed by walking meandering transects to delineate the perimeter. Care should be taken to minimize trampling of the target plant taxa and to use different routes, so trails are not created. The area occupied is expected to vary depending on weather conditions, stressors, and plant expression. The area occupied can be visually estimated if the perimeter cannot be walked due to terrain, development, or access constraints. Areas that cannot be walked or visually estimated should include notations as to the limitations and the reasoning for determining the boundary mapped, so that these occurrences are addressed similarly in subsequent years. Generally, the area occupied will be mapped as contiguous biologically relevant clusters that are unbroken within a line of sight and do not include any obvious barriers to dispersal, pollination, or recruitment. To facilitate consistent mapping, the following rule set was developed including

specifications for each species, where appropriate. This rule set will be refined based on field conditions and in coordination with the Navy.

a. The area occupied will be delineated to include adjacent plants less than 15 meters (50 feet) apart.
b. The area surveyed and the maximum area occupied will be limited to 50 meters (164 feet) from the center of sampling plot (approximately 2 acres) to cap the field effort.
c. Perimeters may be visually assessed when they can be drawn within an accuracy of approximately 5 meters (16 feet) using field landmarks.

C.7.2 Rapid Assessment/Relevé

Sampling plots will follow the California Native Plant Society Relevé Protocol for visually estimating cover (CNPS 2000, p. 1). This "semi-quantitative" approach was selected because of the ease in mapping and classifying large areas in a short amount of time compared to transect and quadrat methodologies. It also does not require that an "individual" be defined, which can be problematic for clonal species. Because estimates will be made visually, it is important that training is conducted prior to field surveys to calibrate estimates between surveyors following the guidelines provided in Appendix III. There is an inherent but acceptable level of inaccuracies in this methodology; the accuracy is sufficient to detect changes in target plant taxa cover on the order of 10 percent.

A 10-meter radius circular sampling plot (314 sq. meters, 3,380 sq. feet) will be established within the area occupied. Ideally, sampling points will be located in an area representative of the species' habitat at that location, characterized by structural and compositional homogeneity and placed in area where the species is likely to be recorded consistently (CNPS 2000, p. 1). Sampling plots will be maintained in the same location over time, regardless of a plot being included within the area occupied in a given year. The center of the sampling plot will be permanently marked to increase precision between sampling efforts. A meter tape will be used to measure the radius of the sampling area and flagging tape will be placed to delineate the perimeter of the sampling plot. If the plants are absence from a plot for 5 years, barring drought conditions, the sampling plot/occurrence will assume to be extirpated and no further monitoring will be conducted. Should the occurrence shift beyond the limits of the sampling plot and the occurrence covers more than 5 acres, an additional sampling plot should be located within the occurrence and within the same zone. Where feasible, additional sampling plots may be placed in occurrences that occupy greater than 5 acres. Due to field and budget constraints, most occurrences will be limited to a single sampling plot. Additional plots should be spaced at least 152 meters (500 feet apart) to limit spatial autocorrelations. The center of the sampling plot will be permanently marked to facilitate future monitoring.

Data collection will generally follow the CNPS Rapid Assessment protocol and will be modified to reflect the stressors on SCI (Appendix IV). Absolute cover will be visually estimated for each plant taxa and substrate. Some species are inconspicuous or obscured by surrounding vegetation that impedes accurate estimations, therefore cover estimates may be rounded to the nearest 5 to 10 percent as appropriate. Due to the challenges in visually estimating *Delphinium variegatum* ssp. *kinkiense* cover, population condition will be based on the number of inflorescences. To help fine tune the approach, this species will be assessed through both cover estimates and density classes in the first year to determine repeatable, cost-effective techniques for future monitoring. Individuals

may be counted in several 1 to 3-meter square quadrats to derive a density estimate across the sample plot. The vegetation community within which the plot is located will be noted. The phenology at the time of monitoring will be characterized by estimating the percentage of individuals that are flowering, fruiting or dead/dormant, recorded to the nearest 10 percent, for all species.

Because ground access for natural resources monitoring is prohibited within SHOBA's Impact Areas (IAs), no sentinel sites or rotating plots will be established in the IAs. Monitoring in the IAs will be conducted using Unmanned Aircraft Systems (UAS) to assess the presence/absence of target plant taxa and potential threats (Figure C6-5). This will be done to the extent practicable with a target of once every 3 years to be consistent with the monitoring frequency for rotating panels. Limited ground access to support range maintenance requirements associated with invasive species management is permitted in TAR 21, which is within Impact Area I. Supplemental observational data on *Malacothamnus clementinus* and potential stressors will be collected to the extent practicable while performing this range maintenance activity. Within Restricted Access Areas (RAAs), which have been established in several locations across SCI due to unexploded ordnance safety issues, fieldwork requires escort by an Explosive Ordnance Disposal (EOD) technician, therefore monitoring will be limited to rotating plots.

C.7.3 Stressor Assessment

The stressor assessment will be informed by island-wide mapping provided by the Navy that document changes in the military training areas and the historical fire area, including mapping and severity outlined in the Fire Management Plan. In addition, the monitoring design allows multiple parameters and stressors to be evaluated and potentially correlated to the presence and/or trend in target plant taxa. A CNPS Rapid Assessment Datasheet was developed to reflect the stressor categories and ranking finalized in this PDM Plan (Appendix IV). The presence and potential impact of each individual stressor (e.g. military training, fire, and erosion) on the sampling plot will be evaluated. Nonnative plant stressors will be limited to invasive plant species as defined by the California Invasive Plant Council or species targeted for control on SCI. In addition, the approximate depth of exotic annual grass thatch will be estimated as it may limit germination. The impact of a stressor on a sampling plot will be ranked using the approach below, which accounts for the proximity of the stressor and the proportion of the sampling plot affected:

0. No sign of stressor within area occupied or adjacent 10 m buffer.
1. Stressor detected in buffer but not within area occupied.
2. Stressor detected in less than 10 percent of the sampling plot.
3. Stressor detected in 10 percent to less than 25 percent of the sampling plot.
4. Stressor detected in 25 to less than 50 percent of the sampling plot.
5. Stressor detected in greater than 50 percent of the sampling plot.

C.7.4 Post-fire Monitoring

The purpose is to monitor the habitat and species response during post-fire recovery. Monitoring will help determine how long it takes for the habitat and target plant taxa to recover and characterize the long-term impact of fire to the target species. When fires occur on SCI, rotating plots located within the fire perimeter will be sampled annually post-fire for 3 years and then returned to the 3-year rotation. Not all the plots that are burned will be monitored post-fire. The

intent is to characterize the species-specific response such that up to 10 sampling plots per species will be selected over the 9-year PDM period. Monitoring methods will follow the same approach described herein. The monitoring timeframe may be extended depending on species recovery, habitat response, as well as seasonal weather conditions that may limit vegetation recovery.

C.7.5 Weather Monitoring

Weather conditions are regularly monitored at weather stations located throughout SCI. At a minimum, temperature and rainfall will be summarized monthly and yearly to characterize abiotic conditions and the potential effects on plant expression.

C.7.6 Photo Documentation

Each sampling plot will be photo documented to provide a visual representation of site conditions to help provide a context for understanding or explaining changes in population condition and the magnitude of threats. This approach does not include photo monitoring for the purposes of quantitative comparisons. A single photo point should be located outside the sampling plot and aimed toward the center, capturing the majority of the sampling plot. A whiteboard or other identifying material including the plot name should be placed within the photo frame to facilitate processing. The coordinates and bearing should be recorded to ensure repeatability. One representative photo should be taken at a location that can be easily accessed for future monitoring.

C.7.7 Survey Timing

Appropriate and consistent survey timing is important for detection of the target species and maintaining consistency between survey efforts. To maximize detection of all the target species, the optimal time to conduct surveys generally is expected to be from February through April (Table C7-1). Because flowering peak varies annually depending on weather conditions, survey dates should not be set in advance but determined based on site visits and an assessment of phenology. For *Delphinium variegatum* ssp. *kinkiense*, it is particularly important that surveys be conducted as close as possible to peak flowering because vegetative individuals are cryptic in the often dense grassland habitats they occupy. The methodology includes an assessment of the proportion of individuals flowering, fruiting, and senescing to provide a context for evaluating year to year variation.

Table C7-1 Flowering Phenology

Species	Timeframe
Acmispon dendroideus var. *traskiae*	February to August
Castilleja grisea	February to August
Delphinium variegatum ssp. *kinkiense*	February to May
Malacothamnus clementinus	March to August

C.7.8 Monitoring Timeline

The monitoring timeline is designed to identify long-term trends, taking into account the longevity of each species. Data on the lifespans of the target plant taxa is largely anecdotal but most species are anticipated to survive for at least 5 years, while *Delphinium variegatum* ssp. *kinkiense* and *Malacothamnus clementinus* are expected to be more long-lived. Target plant taxa monitoring is anticipated to occur annually for at least 9 years to account for plants' lifespans and annual variation in weather events such as El Nino. The monitoring may be extended if certain plant species are not deemed to be secure. The Service will evaluate the target plant taxa status relative to the relisting triggers every 3 years of PDM.

C.8 RELISTING TRIGGERS AND POTENTIAL ADAPTIVE MANAGEMENT RESPONSES

The overarching goal of the PDM Plan is to monitor the species to ensure that their status does not deteriorate; and if a substantial decline in the population abundance or an increase in threats is detected, to take measures to halt the decline so that re-proposing any of the target species as threatened or endangered is avoided. Monitoring will be conducted to document that a minimum of 75 percent of the currently occupied rare plant monitoring zones of each target species persist. We will review data at the end of each survey year, at the end of each 3-year PDM evaluation period, and at the end of the PDM, to assess population condition and persistence of each of the four plant taxa, and whether any changes in species protection are needed. Potential outcomes include, but may not be limited to:

A. *PDM indicates that the species remains secure without ESA protections.* PDM could be concluded at the completion of the PDM period. Additional monitoring may continue at the discretion of the Service and the Navy, depending on availability of funding and resources.

B. *PDM indicates that the species may be less secure than anticipated at the time of delisting, but information does not indicate that the species meets the definition of threatened or endangered.* The quantitative triggers outlined below will be used to determine if the species status is imperiled and will be used to initiate management actions to ensure the health of the population. In addition, the frequency of monitoring or duration of the PDM period may be extended, based on Service review over the PDM period.

C. *PDM yields substantial information indicating stressors are causing a decline in the species' status since delisting, such that listing the species as threatened or endangered may be warranted*. In addition to activities discussed under B, above, the Services should initiate a status review to assess changes in threats to the species, its abundance, productivity, survival, and distribution and determine whether proposal for relisting is appropriate.

D. *PDM documents a decline in the species' probability of persistence, such that the species once again meets the definition of a threatened or endangered species under the Act.* In the event that PDM reveals the target species are threatened (likely to become endangered in the foreseeable future throughout all or a significant portion of its range) or endangered (in danger of extinction throughout all or a significant portion of its range), then the species should be promptly proposed for relisting under the ESA in accordance with procedures in section 4(b)(5). Likewise, if the best available information indicates an emergency that poses a significant risk to the well-being of a delisted species, then the Service should exercise its emergency listing authority under section 4(b)(7) accordingly.

C.8.1 Triggers

The Species Status Assessments for these SCI plant taxa evaluated species persistence over 20 to 30 years. Based on the results of those evaluations, it is not likely that residual stressors will impact species persistence during the 9-year PDM period given the on-going commitment by the Navy to manage these species. However, in the event that there is a change in impacts to these species, these quantitative triggers were developed to guide decision making in cooperation with the Navy. Implementation of management actions, research directives, or extending monitoring are options that have been identified to address a decline in population condition or impacts associated with stressors. Triggers were developed in a hierarchical framework such that a formal status review would be initiated only after the preceding triggers and management actions were deemed unsuccessful. Table C.8-1 summarizes the number of occupied rare plant monitoring zones that would initiate a trigger as defined below.

1. *If the PDM indicates the target plant taxa remains secure without ESA protections.*

   The status of the population will be evaluated after 9 years or 3 panel rotations. If a species is deemed to be secure, monitoring is anticipated to conclude.

2. *Substantial information indicates that threats are causing a decline in the species' status and the species is less secure than anticipated at the time of delisting, measured by:*

   a. *15 percent decline in the number of occupied rare plant monitoring zones relative to baseline conditions, or*

   b. *20 percent reduction in absolute vegetation cover, density, or acreage of occupied habitat, averaged over all sampling plots for a period of 3 consecutive monitoring years, not attributable to annual variation.*

   The cause of the decline will be determined and appropriate management actions implemented. A management strategy will be developed to avoid and minimize future disturbance associated with residual stressors including such measures as fencing or limiting access to occupied areas. A portion of the recorded observations will be surveyed to determine their status and to inform whether observed declines are site-specific or island-wide phenomena. For declines associated within nonnative and invasive plant species, weed management will be initiated. Methodologies will be developed based on the nonnative plant species present, taking care to minimize potential impacts to the target plant taxa. Priority occurrences for management will be identified. The monitoring timeframe may be extended.

3. *A decline in the species' probability of persistence is observed that may make the species less secure than anticipated at the time of delisting, measured by:*

   a. *20 percent reduction in the number of occupied rare plant monitoring zones relative to baseline conditions, or*

   b. *30 percent reduction in target plant taxa cover, density, or acreage of occupied habitat averaged over all sampling plots for a period of 3 consecutive monitoring years, not attributable to annual variation or specific threats.*

A portion of the recorded observations will be surveyed to determine their status and to inform whether observed declines are site-specific or island-wide phenomena. A restoration plan will be developed and implemented including a determination for causes in the loss of occupied habitat, as well as methods for seed collection, propagation and out planting. The plan will include criteria for where seed should be collected, methods for tracking maternal lines and the need for manual outcrossing to ensure genetic variability. In addition, species specific considerations should be addressed, such as low genetic diversity in *Malacothamnus clementinus*.

4. *Significant impacts occur outside of the area analyzed in the Species Status Assessments, measured by the expansion of new training areas or increased fires or fire severity outside of the historical footprint, measured by a:*

    a. *20 percent increase in the disturbance footprint based on existing training areas (15,411 acres, Figure B3-2) and the historical fire area (3,954 acres; 1,600 ha; Figure B3-1);*

If impacts from these threats are realized outside of the existing training areas or historical fire perimeter, the Navy will evaluate impacts to the target plant taxa in these areas. Depending on the level of impact, management actions will be implemented to offset impacts. Additional monitoring sites may be added as needed and the monitoring timeframe may be extended in coordination with the Navy.

5. *A decrease in the population causing a decline in the species' probability of persistence, such that the species may once again meet the definition of a threatened or endangered species under the Act, measured by a:*

    a. *30 percent reduction in the number of occupied rare plant monitoring zones relative to baseline conditions; or*

    b. *40 percent reduction in absolute target plant taxa cover, density, or the acreage of occupied habitat averaged over all sampling plots for a period of 3 consecutive monitoring years, not attributable to annual variation; or*

    c. *30 percent increase in the disturbance footprint based on existing training areas (15,411 acres, Figure B3-2) and the historical fire perimeter (18,973 acres, Figures B3-1) that impacts additional target plant taxa occurrences; or*

    d. *Due to the low number of Malacothamnus clementinus occupied zones, the Service will initiate a status review if the number of occupied zones falls below six.*

If data produced as part of or in conjunction with this PDM plan suggest that a target plant taxon is in decline or habitat destruction reaches a magnitude such that the species is likely to become endangered within the foreseeable future, the Service will initiate a status review to analyze impacts to the species to determine whether a proposal for relisting under the Act is warranted.

Table C8-1. Number of Occupied Rare Plant Monitoring Zones and Associated Triggers

	Acmispon dendroideus var. *traskiae*	*Castilleja grisea*	*Delphinium variegatum* ssp. *Kinkiense*	*Malacothamnus clementinus*
Occupied Zones	20	25	14	7
Trigger 2a (15% decline)	17	21	12	6
Trigger 3a (20% decline)	16	20	11	-
Trigger 5a (30% decline)	14	18	10	5*

Trigger would be initiated once the number of occupied zones reaches or falls below the number indicated.
** Due to the low number of Malacothamnus clementinus occupied zones, the Service will initiate a status review if 2 zones are determined to be no longer occupied.*

C.9 ANALYSES AND REPORTING

Effective PDM requires timely evaluation of data and responsiveness to observed trends. The monitoring framework provides for characterization of population condition and the prevalence of identified stressors. Population trend should be characterized using a linear regression or similar analysis. In addition, a number of covariates will be collected to provide context within which to evaluate changes in population condition. The annual report will include an appropriate statistical analysis to characterize population condition and the potential impact of stressors taking into account seasonal variation in plant cover. The condition of the populations should be discussed in terms of the presence and potential impacts of stressors. The results should be presented in the context of the triggers identified and include whether specific management actions have or will be implemented. Variance components analysis should be conducted during the course of the monitoring period to characterize spatial and temporal variation and to make appropriate modifications in the allocation of survey effort, as necessary.

At the end of each survey year, PDM data will be assessed to determine whether the data collection protocols are functioning as anticipated and whether any changes in species protection are needed. A report summarizing the activities conducted, data collected, and results of each component of this PDM Plan should be submitted to the USFWS's Carlsbad Fish and Wildlife Office by December 1st. This will allow proper time for the USFWS, in cooperation with the Navy, who is implementing the PDM Plan, to evaluate the data collected, ensure efficiency of the monitoring program, allow for adaptive management, and periodic assessment of the status of the target species. Annual monitoring results will be summarized in a report including summary statistics on the number of rare plant monitoring zones visited, average cover of target plant taxa, cover by invasive plants, and the presence/ranking of stressors. Annual reports shall include the following information:

- Names and qualification of botanical field surveyors
- Dates of field surveys, total person hours spent
- Summary of weather conditions and how they may have affected the survey effort and plant expression, in the context of previous survey years and historical patterns
- Recorded information for any vouchered specimens
- Photo documentation of the monitoring sites.
- Map of occupied habitat, based on area occupied around the sampling points
- Acres of occupied habitat by species, including relative change over time

- Average absolute cover of target species per occurrence
- List of associated species for each target plant taxa
- Average absolute cover of associated species for each target species
- Average absolute cover by nonnative plant species
- Table summarizing important habitat parameters (e.g., soil type, vegetation community, slope, and aspect) by target species
- Table summarizing the stressors present at each occurrence
- Rank stressors according to number of occurrences affected
- Describe extent of stressor in terms of ranking, disturbance category and proportion of each occurrence impacted.
- Summary of population trend for each species across the monitoring events (years) and for each occurrence.
- Analysis of population status accounting for year (temporal), location/occurrence (spatial), weather (seasonal), and the presence/magnitude of stressors.

The Service will reevaluate triggers and species status every 3 years utilizing the Navy's annual reports. At the end of the period of monitoring specified in this PDM Plan, the USFWS will compile all information and synthesize a final report with regard to potential outcomes as specified in the Post-Delisting Monitoring Guidance (USFWS and NMFS 2008, pp. 4-3–4-4).

C.10 IMPLEMENTATION SCHEDULE

Monitoring should be initiated within 2 years of delisting to inform our understanding of population dynamics and recovery. Monitoring will occur annually for a minimum of 9 years. Timeframes are approximate and based on monitoring beginning in 2022 (Table C10-1). Annual reporting will be submitted to the USFWS by December 1st for the current survey season.

Table C10-1. Implementation Schedule

Task	Frequency	Timeframe
Monitoring	Annually	March-May
Annual Report	Annually	December 1st of the following year
Service PDM Status Evaluation	Every 3 Years	2025, 2028, 2031
PDM Working Group Meeting	As-Needed	TBD
Final Reporting	Year 9	2031

C.11 FUNDING ESTIMATE

SCI is federally owned and managed by the Navy. The Navy will implement this PDMP in coordination with the Service. Section 4(g) of the Act explicitly requires cooperation with states in development and implementation of PDM programs, but we remain responsible for compliance with section 4(g) and therefore, must remain actively engaged in all phases of PDM.

Table C11-1. Estimated Post-Delisting Monitoring Costs for the Four Target Plant Taxa.

Task	Estimated Cost
Annual Sentinel Surveys (23 sampling plots)	$30,000
Yearly Rotating Surveys (22 sampling plots)	$30,000
Post-fire Monitoring (40 sampling plots)	$40,000
Total Estimated Annual Cost of PDM (1 year)	$100,000
Total Estimated Cost of PDM (9 years)	$900,000*

* Actual cost for term of PDM is likely to be higher as these estimates do not include an estimate of inflation throughout the duration of the PDM period.

Funding to implement this level of PDM is estimated at $900,000 over the 9-year PDM period (Table C11-1). Approximate costs for annual field efforts are $60,000 for 23 sentinel and 22 rotating sampling plots. Approximately $40,000 is anticipated for post-fire monitoring. Therefore, approximately $100,000 is needed for the Navy to implement the PDM Plan each year. This does not include additional potential costs associated with addressing triggers and implementing management actions in response to declining population abundance or increasing threats.

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Post- Delisting Monitoring Plan for Five San Clemente Island Taxa

January 2023

U.S. Fish and Wildlife Service Region 8

Carlsbad Fish and Wildlife Office

Carlsbad, California

PAUL SOUZA

Digitally signed by PAUL SOUZA
Date: 2023.01.19 17:29:13 -08'00'

Regional Director
Pacific Southwest Region
U.S. Fish and Wildlife Service

APPENDIX I: VEGETATION STRATIFICATION DEFINITIONS

Table I-1. Stratification assigned to Bell's Sparrow Survey Plots on San Clemente Island, California. Plot classifications were assigned using a combination of ground truthing and aerial images. The classifications are a hierarchical system, and do not (necessarily) represent the dominant cover type for each plot. Rather, they are based on a minimum amount of cover present that we expect to be important for sparrows.

Stratum	**Island Zone**	**Plot-Level Vegetation Assessment Classification Rules**	**2017 25m Point Sampling Classification Rules**	**Total Plots**	**Total Area (ha)**
Boxthorn	N – North of Mail Point/Stone Station line	Sum of all boxthorn in plot covers ≥25%	Average boxthorn in plot ≥15%	144	2,050.5
	S – South of Mail Point/Stone Station line			68	677.1
Sagebrush	All island	Sum of all boxthorn in plot covers < 25% AND sum of all sagebrush covers ≥ 25%	Average boxthorn in plot <15% AND average sagebrush in plot ≥15%	93	750.4
Mixed Shrub	All island	Sum of all boxthorn in plot covers < 25% AND Sum of all sagebrush covers <25% AND Sum of all shrub species covers ≥ 25%	Average boxthorn and sagebrush individually <15%, average of all shrub species covers ≥ 15%.	237	2,317.6
Cactus	All island	Sum of all shrub species covers <25% of plot AND grass and herbaceous cover < cactus cover	Average of all shrub species <15% AND grass and herbaceous cover < cactus cover.	164	1,669.3
Grassland/ Herbaceous	N – North of Mail Point/Stone Station line	Sum of all shrub species covers <25% of plot AND cactus cover < grass or herbaceous cover	Average of all shrub species covers <15% of plot AND cactus cover < grass or herbaceous cover	160	2,279.5
	S – South of Mail Point/Stone Station line			303	3,387.1
Canyon/ Woodland or Bare	All island	Cover consists of tree and woodland species at bottom of canyons, steep and inaccessible eastside slopes, OR Non-vegetated due to human disturbance, such as at the air terminal, Little Baghdad, REWS facility. These plots are not surveyed and are not expected to contribute to the Bell's sparrow population		154	1,044.0

APPENDIX II: DISTRIBUTION OF TARGET PLANT TAXA WITHIN THE INLAND NIGHT LIZARD AND PROPOSED SCI MANAGEMENT AREAS

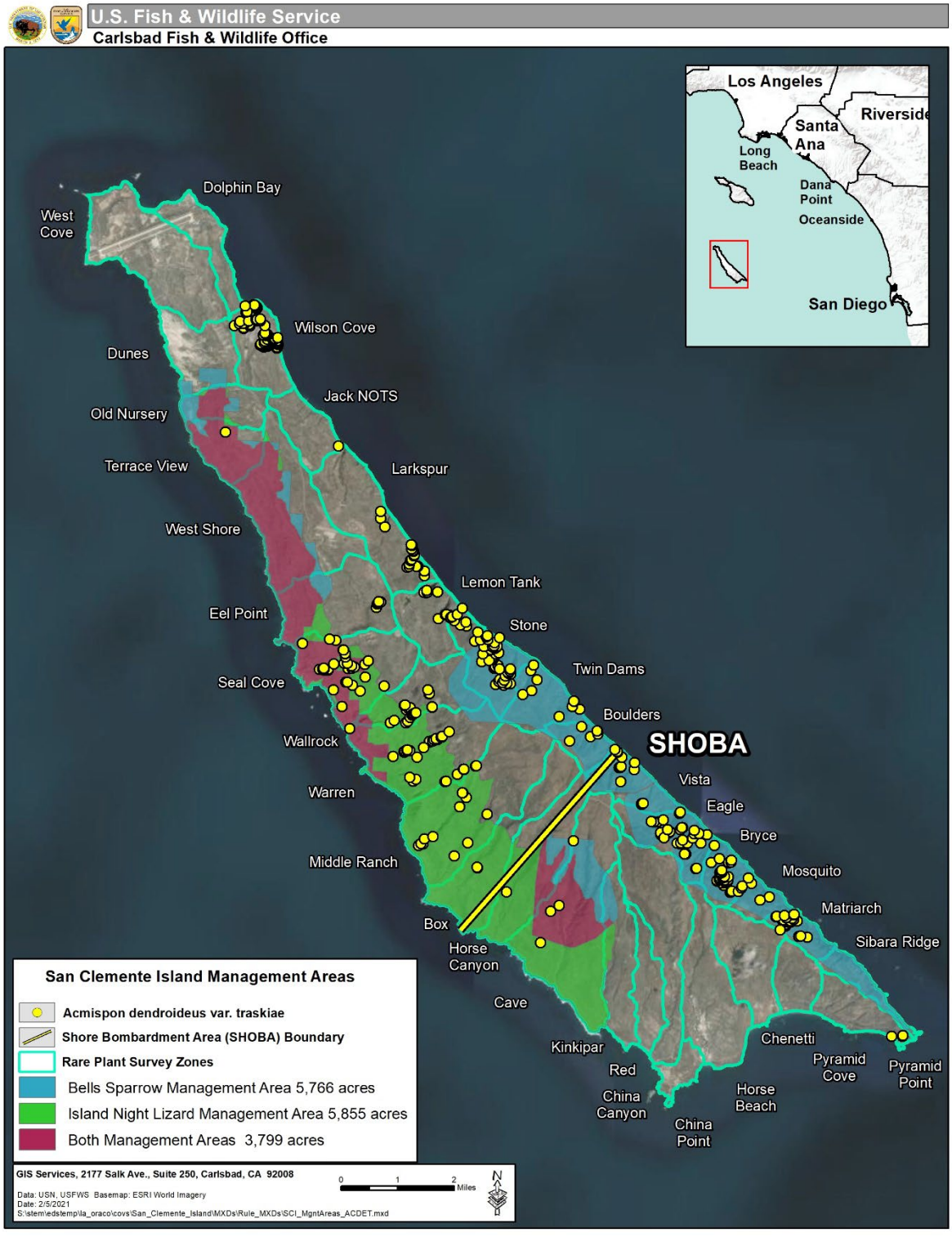

Figure II-1. Distribution of *Acmispon dendroideus var. traskiae* (San Clemente Island lotus) within the island night lizard and proposed San Clemente Island management areas.

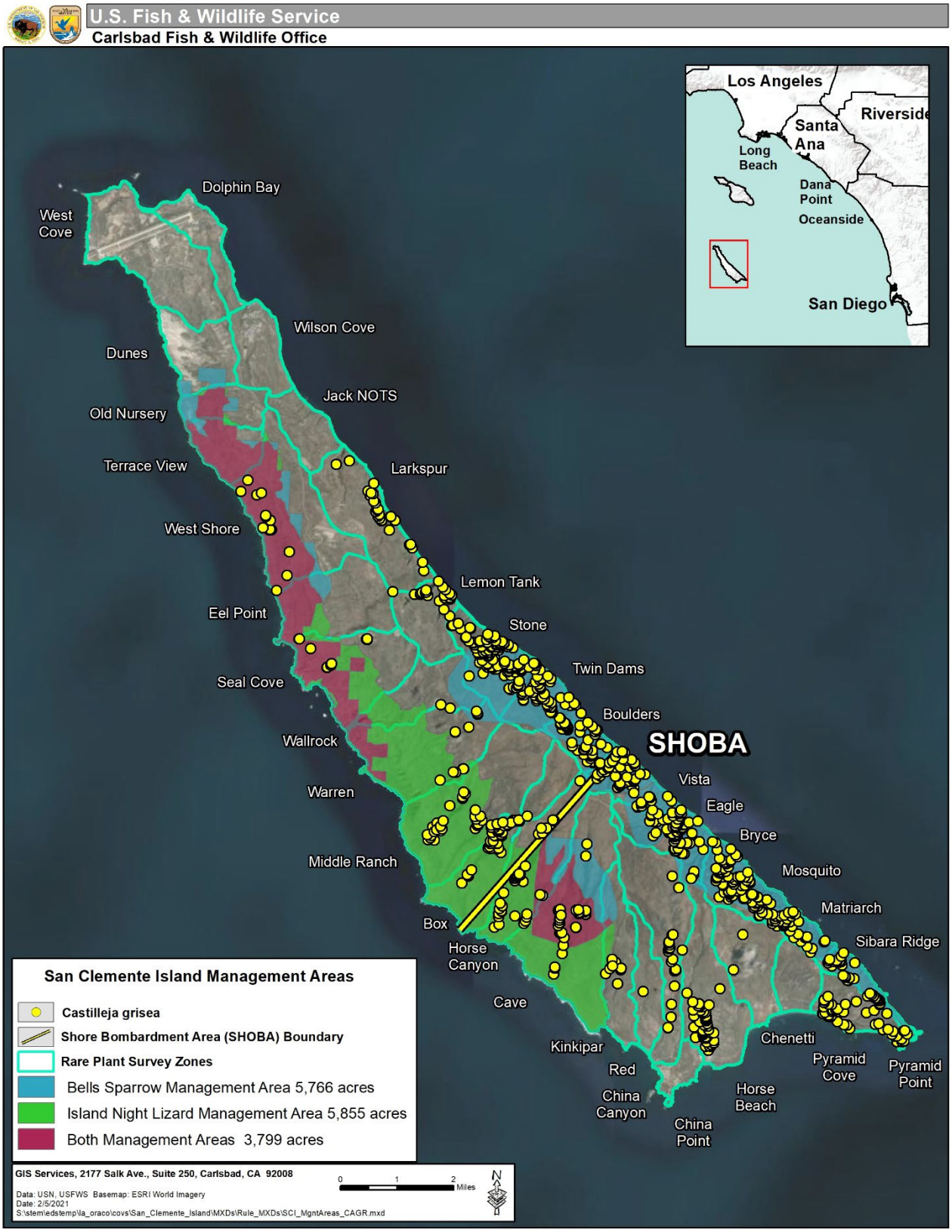

Figure II-2. Distribution of *Castilleja grisea* (San Clemente Island paintbrush) within the island night lizard and proposed San Clemente Island management areas.

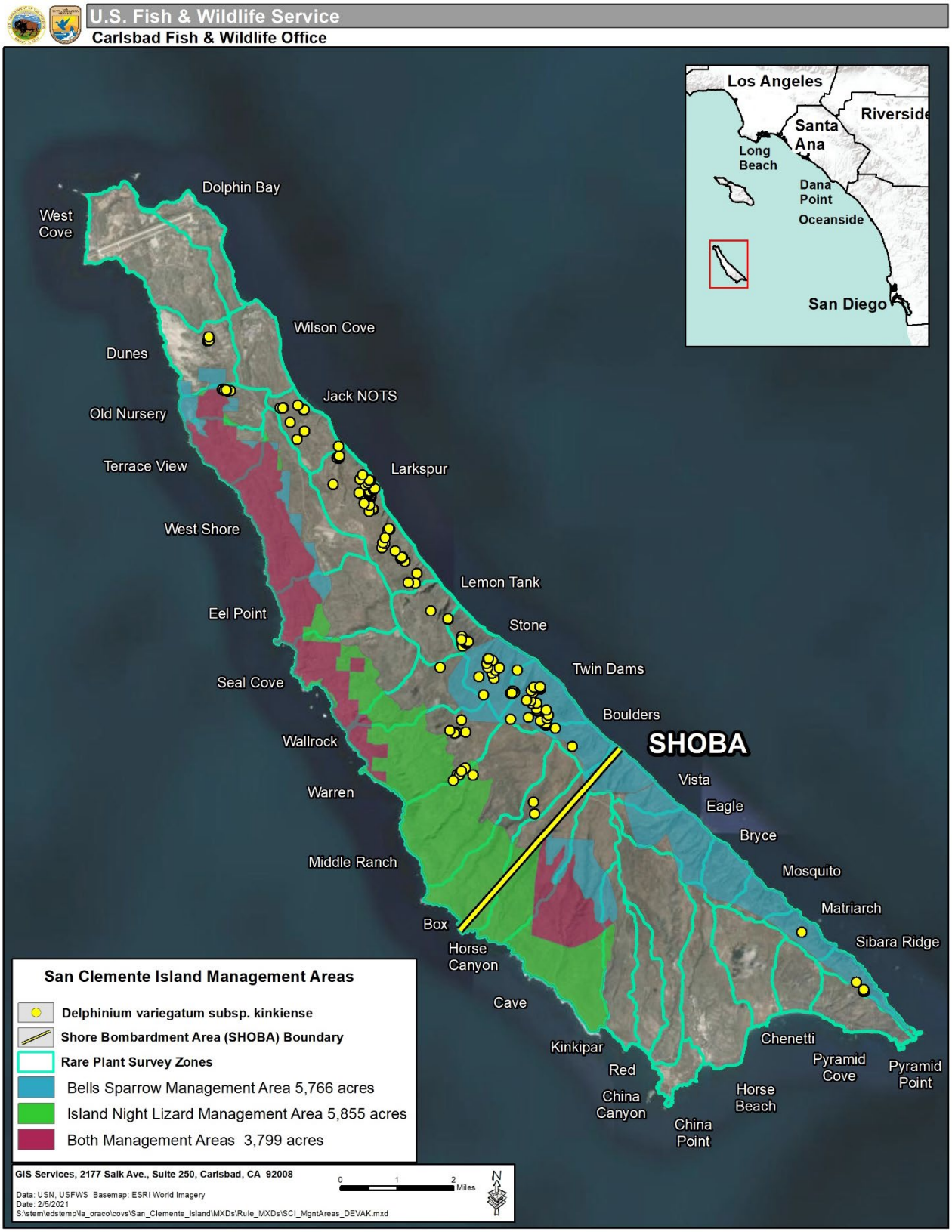

Figure II-3. Distribution of *Delphinium variegatum ssp. kinkiense* (San Clemente Island larkspur) within the island night lizard and proposed San Clemente Island management areas.

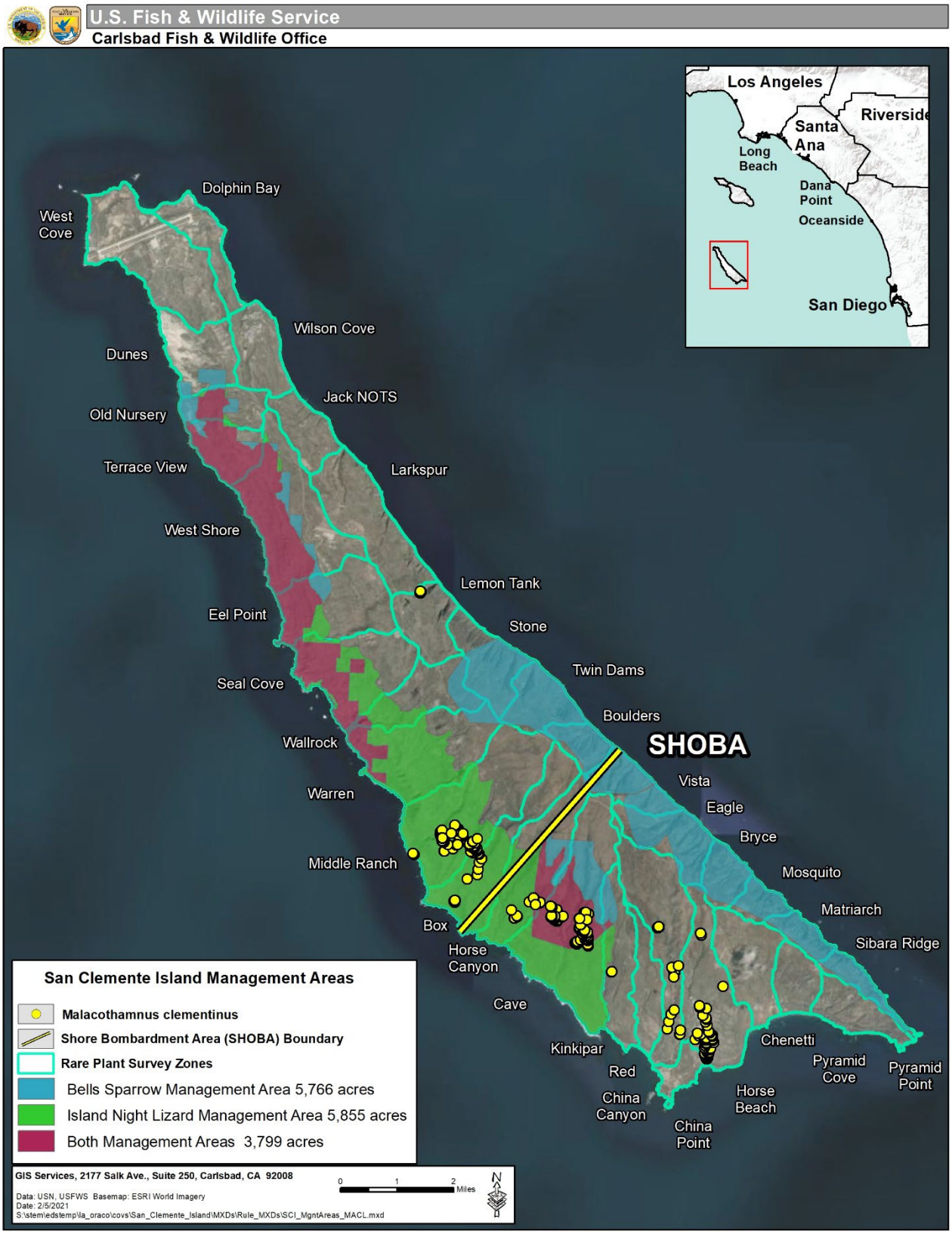

Figure II-4. Distribution of *Malacothamnus clementinus* (San Clemente Island bush-mallow) within the island night lizard and proposed San Clemente Island management areas.

APPENDIX III: CNPS Cover Estimates

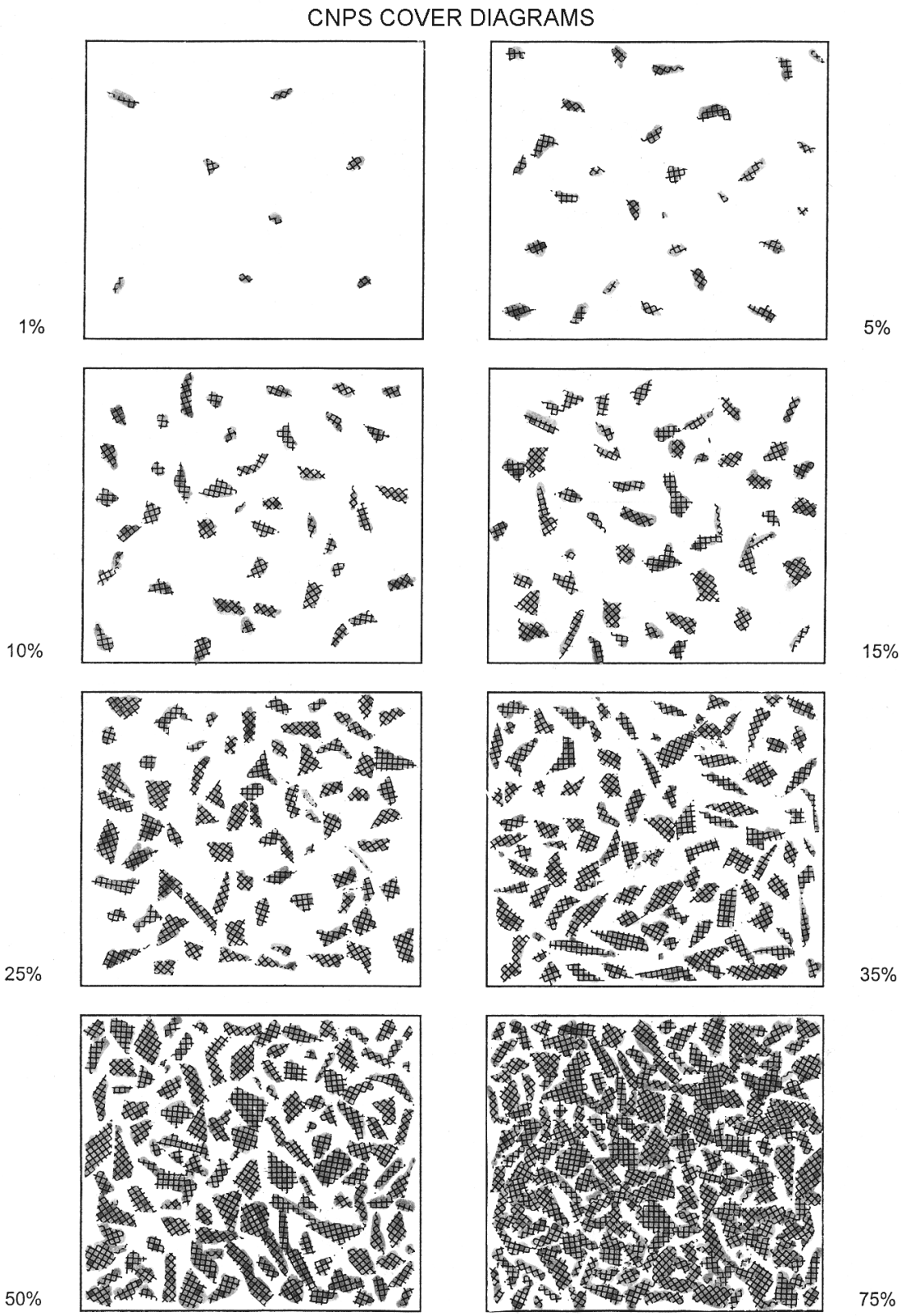

Figure III-1. California Native Plant Society (CNPS) cover estimates for conducting vegetative rapid assessments.

APPENDIX IV: PLANT MONITORING FIELD DATASHEET

SCI Plant PDMP Monitoring Field Form

Species:	Date:
Occurrence ID:	Surveyor(s):
Sample Point ID:	GPS ID:
Watershed ID:	LAT/LONG (center of plot):
Photo-documentation	
LAT/LONG:	Photo ID:
Bearing:	Other Photos:
Location (relative to plot):	
Environmental Description	
Elevation:	Aspect:
Steepness: 0 1-5 5-25 >25	
Site history:	
Current Mapped Extent	
Is sample plot within current extent (Y/N)?	If no, explain:
Area (sq. ft): estimate	GPS data
How delineated (walked perimeter, visual, landmarks):	
Notes:	

Vegetation Assessment

Phenology (% target species): ___ vegetative ___ flowering ___ fruiting ___ dead

Vegetation Community: _____

Percent Total Cover: _____ [Record cover estimate for each species and substrate]

Species	% Cover	Confirmed Identification	Non-Native

Total Cover _____

Bare ground			
Rock			
Litter			

Total Cover _____

Is this post-fire monitoring: (Y?N) _____ First Year Monitored: ____ Signs of recruitment (Y/N): _____

DEVAKI

Color Morph:	White	Mixed	Blue				
DEVAKI Density Classes:	>25	26-50	51-75	76-100	101-150	151-200	>200
DEVAKI Cover Classes:	1 = 0% cover (not detected)			4 = 25% to <50% cover			
	2 = >0% to <10% cover			5 = 50% to <75% cover			
	3 = 10% to <25% cover			6 = ≥75% cover			
Average Thatch Depth :	none	<10 cm	11-20 cm	>21 cm			

Stressor Assessment		
Militatry Training		Notes:
Fire		Notes:
Erosion		Notes:
Development/Infrastructure		Notes:
Non-Natives Plants		Notes:

0 No sign of stressor within maximum extent or adjacent 10 m buffer.
1. Stressor detected in buffer but not within maximum extent.
2. Stressor detected in less than 10% of the area.
3. Stressor detected in 10% to less than 25% of the area.
4. Stressor detected in 25 to less than 50% of the area.
5. Stressor detected in greater than 50% of the area.

Management Recommendations

Figure IV-1. Plant monitoring data sheet.

APPENDIX V: LIST OF SENTINEL AND ROTATING SAMPLING PLOTS

Table V-1. Sentinel and rotating sampling plots for *Acmispon dendroideus var. traskiae* (San Clemente Island lotus, ACDETR), *Castilleja grisea* (San Clemente Island paintbrush, CAGR), *Delphinium variegatum ssp. kinkiense* (San Clemente Island larkspur, DEVAKI), and *Malacothamnus clementinus* (San Clemente Island bush-mallow, MACL) on San Clemente Island.

SPECIES	FWS_ YEAR	POP NO.	X_LONG	Y_LONG	Watersheds	RP_SurveyZ	Plot_Name	POINT_ID	Training/ Burn Area	MGMT Area
ACDETR	2011	60	363714	3640462	1067, 1083, 1084, 1086, 1087, 1088, 1089, 1090, 1091, 1094, 1095	Boulders	ACDET-R1-1	ACDETR_ID_578	NONE	BESP
ACDETR	2009	3	368318	3636186	1139,1141	Bryce	ACDET-R1-2	ACDETR_ID_419	NONE	BESP
ACDETR	2008	20	368134	3636493	1139,1141	Bryce	ACDET-R1-3	ACDETR_ID_412	NONE	BESP
ACDETR	2007	25	358261	3644391	1046	Eel Point	ACDET-R1-4	ACDETR_ID_251	Training Area	None
ACDETR	2011	180	360206	3644053	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Lemon Tank	ACDET-R1-5	ACDETR_ID_654	NONE	None
ACDETR	2011	50	365756	3638677	1110,1111,1116,1117,1119,1120,1123,1124,1126	Vista	ACDET-R1-6	ACDETR_ID_561	NONE	BESP
ACDETR	2011	212	355114	3651800	1003, 1005, 1006, 1007, 1029	Wilson Cove	ACDET-R1-7	ACDETR_ID_646	NONE	None
ACDETR	1996	7	361083	3636871	1092,1098	Box	ACDET-R2-1	ACDETR_ID_223	NONE	INL
ACDETR	2010	50	366766	3637547	1110,1111,1116,1117,1119,1120,1123,1124,1126	Eagle	ACDET-R2-2	ACDETR_ID_555	NONE	BESP
ACDETR	XXXX	2	367320	3636834	1110,1111,1116,1117,1119,1120,1123,1124,1126	Eagle	ACDET-R2-3	ACDETR_ID_414	NONE	BESP
ACDETR	2010	10	370469	3634880	1142,1146,1148,1149,1159,1160,1161,1168,1171,1172	Matriarch	ACDET-R2-4	ACDETR_ID_551	NONE	BESP
ACDETR	2011	14	356115	3643231	1059	Seal Cove	ACDET-R2-5	ACDETR_ID_627	NONE	Both
ACDETR	2005	10	361306	3642778	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Stone	ACDET-R2-6	ACDETR_ID_521	NONE	BESP
ACDETR	2011	30	361718	3642153	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Stone	ACDET-R2-7	ACDETR_ID_144	NONE	BESP
ACDETR	2010	15	362883	3634726	1114,1150,1156,1164,1170	Cave	ACDET-R3-1	ACDETR_ID_465	NONE	INL
ACDETR	2007	30	369388	3636024	1142,1146,1148,1149,1159,1160,1161,1168,1171,1172	Mosquito	ACDET-R3-2	ACDETR_ID_386	NONE	BESP
ACDETR	2013	25	373182	3632062	1184,1194,1198,1202	Pyramid Point	ACDET-R3-3	ACDETR_ID_695	NONE	None

SPECIES	FWS_ YEAR	POP NO.	X_LONG	Y_LONG	Watersheds	RP_SurveyZ	Plot_Name	POINT_ID	Training/ Burn Area	MGMT Area
ACDETR	2012	11	353924	3649241	1003, 1005, 1006, 1007, 1029	Terrace View	ACDET-R3-4	ACDETR_ID_595	NONE	Both
ACDETR	2011	20	363835	3641573	1071, 1072	Twin Dams	ACDET-R3-5	ACDETR_ID_146	NONE	BESP
ACDETR	2011	58	359165	3641371	1068,1079,1085	Wallrock	ACDET-R3-6	ACDETR_ID_638	NONE	None
ACDETR	2011	17	359726	3640445	1077,1078	Warren	ACDET-R3-7	ACDETR_ID_141	NONE	INL
ACDETR	2013	300	367970	3636513	1127,1128,1129,1130,1131,1132,1134,1135,1137,1140	Bryce	ACDET-S-1	ACDETR_ID_704	NONE	BESP
ACDETR	2013	15	366299	3637851	1110,1111,1116,1117,1119,1120,1123,1124,1126	Eagle	ACDET-S-2	ACDETR_ID_712	Burn Area	BESP
ACDETR	2012	50	358340	3646991	1031,1033,1034,1040,1041,1042	Larkspur	ACDET-S-3	ACDETR_ID_680	NONE	None
ACDETR	2006	10	361061	3639752	1082,1112,1115,1122	Middle Ranch	ACDET-S-4	ACDETR_ID_388	NONE	INL
ACDETR	1996	38	356696	3642501	1055,1058,1069,1070,1073,1075	Seal Cove	ACDET-S-5	ACDETR_ID_238	NONE	Both
ACDETR	1997	50	361528	3642816	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Stone	ACDET-S-6	ACDETR_ID_197	NONE	BESP
ACDETR	2004	45	360707	3639659	1080,1105	Warren	ACDET-S-7	ACDETR_ID_515	NONE	INL
ACDETR	2012	200	354735	3652836	1003, 1005, 1006, 1007, 1029	Wilson Cove	ACDET-S-8	ACDETR_ID_585	NONE	None
CAGR	2011	35	364360	3639863	1067, 1083, 1084, 1086, 1087, 1088, 1089, 1090, 1091, 1094, 1095	Boulders	CAGR-R1-1	CAGR_ID_812	NONE	BESP
CAGR	2009	22	367908	3636470	1127,1128,1129,1130,1131,1132,1134,1135,1137,1140	Bryce	CAGR-R1-2	CAGR_ID_517	Burn Area	BESP
CAGR	1996	70	367053	3633286	1153,1163,1106,1121,1145	Horse Beach	CAGR-R1-3	CAGR_ID_1293	NONE	None
CAGR	2006	30	359315	3644619	1043,1048,1049	Lemon Tank	CAGR-R1-4	CAGR_ID_429	NONE	None
CAGR	2011	530	359952	3638116	1082,1112,1115,1122	Middle Ranch	CAGR-R1-5	CAGR_ID_1176	NONE	INL
CAGR	2011	2	365754	3638707	1110,1111,1116,1117,1119,1120,1123,1124,1126	Vista	CAGR-R1-6	CAGR_ID_1018	NONE	BESP
CAGR	1996	350	355218	3646471	1022, 1035, 1036, 1038, 1044, 1045, 1216	West Shore	CAGR-R1-7	CAGR_ID_1273	NONE	Both

SPECIES	FWS_ YEAR	POP NO.	X_LONG	Y_LONG	Watersheds	RP_SurveyZ	Plot_Name	POINT_ID	Training/ Burn Area	MGMT Area
CAGR	2011	10	362177	3638190	1092,1098	Box	CAGR-R2-1	CAGR_ID_984	NONE	None
CAGR	2009	50	367246	3636654	1110,1111,1116,1117,1119,1120,1123,1124,1126	Eagle	CAGR-R2-2	CAGR_ID_515	Burn Area	BESP
CAGR	2011	30	364933	3634234	1136	Kinkipar	CAGR-R2-3	CAGR_ID_1195	NONE	None
CAGR	2013	19	358065	3647426	1031,1033,1034,1040,1041,1042	Larkspur	CAGR-R2-4	CAGR_ID_1105	NONE	None
CAGR	2013	35	369833	3635313	1142,1146,1148,1149,1159,1160,1161,1168,1171,1172	Matriarch	CAGR-R2-5	CAGR_ID_1126	NONE	BESP
CAGR	2004	111	356040	3643351	1059	Seal Cove	CAGR-R2-6	CAGR_ID_619	NONE	Both
CAGR	2011	11	362047	3641909	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Stone	CAGR-R2-7	CAGR_ID_1159	NONE	BESP
CAGR	2011	7	363456	3635663	1114,1150,1156,1164,1170	Cave	CAGR-R3-1	CAGR_ID_940	NONE	Both
CAGR	2011	100	366635	3636600	1118	China Canyon	CAGR-R3-2	CAGR_ID_1168	NONE	None
CAGR	2005	202	369065	3635770	1142,1146,1148,1149,1159,1160,1161,1168,1171,1172	Mosquito	CAGR-R3-3	CAGR_ID_634	Burn Area	BESP
CAGR	2012	24	373165	3631898	1184,1194,1198,1202	Pyramid Point	CAGR-R3-4	CAGR_ID_846	NONE	None
CAGR	2011	62	362734	3641896	1071, 1072	Twin Dams	CAGR-R3-5	CAGR_ID_953	NONE	BESP
CAGR	2011	30	360328	3641385	1068,1079,1085	Wallrock	CAGR-R3-6	CAGR_ID_921	Training Area	None
CAGR	2007	25	360469	3640705	1077,1078	Warren	CAGR-R3-7	CAGR_ID_1313	Training Area	None
CAGR	2011	14	366704	3633913	1118	China Canyon	CAGR-S-10	CAGR_ID_978	Burn Area	None
CAGR	2011	25	358283	3646843	1031,1033,1034,1040,1041,1042	Larkspur	CAGR-S-11	CAGR_ID_910	NONE	None
CAGR	2006	34	372420	3633148	1184,1194,1198,1202	Sibara Ridge	CAGR-S-12	CAGR_ID_757	NONE	BESP
CAGR	2011	100	361508	3642655	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Stone	CAGR-S-13	CAGR_ID_1039	NONE	BESP
CAGR	2011	30	365552	3639100	1096, 1097, 1099, 1100, 1101, 1102, 1103,1104	Vista	CAGR-S-14	CAGR_ID_1161	NONE	BESP

SPECIES	FWS_ YEAR	POP NO.	X_LONG	Y_LONG	Watersheds	RP_SurveyZ	Plot_Name	POINT_ID	Training/ Burn Area	MGMT Area
CAGR	XXXX	85	360693	3639654	1080,1105	Warren	CAGR-S-15	CAGR_ID_1088	NONE	INL
CAGR	2012	125	368183	3636467	1139,1141	Bryce	CAGR-S-9	CAGR_ID_855	Burn Area	BESP
DEVAKI	2011	10	363311	3640823	1067, 1083, 1084, 1086, 1087, 1088, 1089, 1090, 1091, 1094, 1095	Boulders	DEVAKI-R1-1	DEVAKI_ID_170	NONE	BESP
DEVAKI	2013	112	360266	3643935	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Lemon Tank	DEVAKI-R1-2	DEVAKI_ID_221	NONE	None
DEVAKI	2013	161	360267	3643914	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Lemon Tank	DEVAKI-R1-3	DEVAKI_ID_220	NONE	None
DEVAKI	2012	300	353887	3650449		Old Nursery	DEVAKI-R1-4	DEVAKI_ID_100	NONE	Both
DEVAKI	2005	130	354006	3650412		Old Nursery	DEVAKI-R1-5	DEVAKI_ID_132	NONE	INL
DEVAKI	2017	300	362729	3638386	1092,1098	Box	DEVAKI-R2-1	DEVAKI_ID_279	NONE	None
DEVAKI	2013	373	355580	3649930		Jack NOTS	DEVAKI-R2-2	DEVAKI_ID_210	Training Area	None
DEVAKI	2010	50	370316	3635021	1142,1146,1148,1149,1159,1160,1161,1168,1171,1172	Matriarch	DEVAKI-R2-3	DEVAKI_ID_129	NONE	BESP
DEVAKI	2013	15	360660	3643433	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Stone	DEVAKI-R2-4	DEVAKI_ID_211	NONE	None
DEVAKI	2012	250	362087	3641804	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Stone	DEVAKI-R2-5	DEVAKI_ID_156	NONE	BESP
DEVAKI	2013	569	358585	3646499	1043,1048,1049	Larkspur	DEVAKI-R3-1	DEVAKI_ID_191	NONE	None
DEVAKI	1996	440	358038	3647191	1031,1033,1034,1040,1041,1042	Larkspur	DEVAKI-R3-2	DEVAKI_ID_60	NONE	None
DEVAKI	2013	686	358018	3647470	1031,1033,1034,1040,1041,1042	Larkspur	DEVAKI-R3-3	DEVAKI_ID_204	NONE	None
DEVAKI	2013	1000	362043	3641077	1071, 1072	Twin Dams	DEVAKI-R3-4	DEVAKI_ID_265	Training Area	BESP

SPECIES	FWS_ YEAR	POP NO.	X_LONG	Y_LONG	Watersheds	RP_SurveyZ	Plot_Name	POINT_ID	Training/ Burn Area	MGMT Area
DEVAKI	2017	300	360509	3640701	1077,1078	Warren	DEVAKI-R3-5	DEVAKI_ID_281	Training Area	None
DEVAKI	2013	188	353479	3651851		Dunes	DEVAKI-S-16	DEVAKI_ID_194	NONE	None
DEVAKI	2013	1934	357829	3647462	1031,1033,1034,1040,1041,1042	Larkspur	DEVAKI-S-17	DEVAKI_ID_202	NONE	None
DEVAKI	2012	120	372079	3633390	1184,1194,1198,1202	Sibara Ridge	DEVAKI-S-18	DEVAKI_ID_99	Training Area	BESP
DEVAKI	2012	75	360754	3643253	1051,1052,1053,1056,1057,1060,1061,1062,1063,1064,1065,1066	Stone	DEVAKI-S-19	DEVAKI_ID_97	NONE	None
DEVAKI	2013	600	362790	3641369	1071, 1072	Twin Dams	DEVAKI-S-20	DEVAKI_ID_260	NONE	BESP
DEVAKI	2011	21	360531	3639497	1080,1105	Warren	DEVAKI-S-21	DEVAKI_ID_164	NONE	INL
MACL	2011	57	362878	3635894	1153,1163,1106,1121,1145	Horse Canyon	MACL-R1-1	MACL_ID_570	NONE	Both
MACL	2014	2	359480	3644747	1043,1048,1049	Lemon Tank	MACL-R1-2	MACL_ID_625	NONE	None
MACL	2011	20	360676	3637725	1092,1098	Middle Ranch	MACL-R1-3	MACL_ID_534	NONE	INL
MACL	2008	9	360462	3635916	1092,1098	Box	MACL-R2-1	MACL_ID_446	NONE	INL
MACL	2019	100	361095	3636694	1092,1098	Box	MACL-R2-2	MACL_ID_192	NONE	INL
MACL	2019	5	364919	3633944	1136	Kinkipar	MACL-R2-3	MACL_ID_162	NONE	None
MACL	2005	300	364000	3635196	1114,1150,1156,1164,1170	Cave	MACL-R3-1	MACL_ID_517	NONE	Both
MACL	2019	30	363354	3635698	1114,1150,1156,1164,1170	Cave	MACL-R3-2	MACL_ID_193	NONE	Both
MACL	2019	200	366701	3633927	1118	China Canyon	MACL-R3-3	MACL_ID_146	Burn Area	None
MACL	2019	45	366236	3635186	1118	China Canyon	MACL-S-22	MACL_ID_161	Burn Area	None
MACL	2019	2	360481	3637977	1082,1112,1115,1122	Middle Ranch	MACL-S-23	MACL_ID_275	NONE	INL

APENDIX VI: PROPOSED MONITORING SITES AND PROPOSED MILITARY TRAINING FOOTPRINT

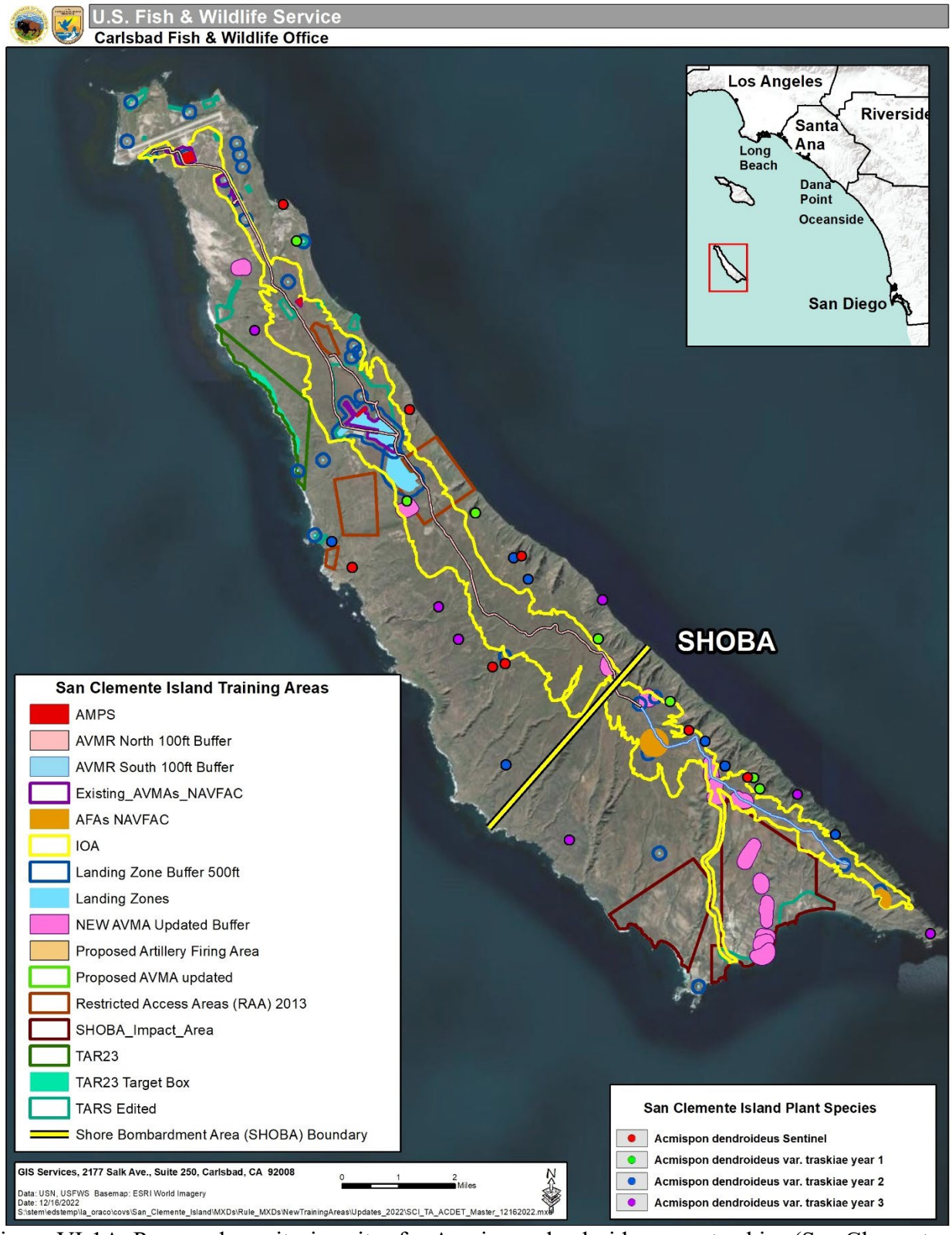

Figure VI-1A. Proposed monitoring sites for Acmispon dendroideus var. traskiae (San Clemente Island lotus) and proposed training locations on San Clemente Island.

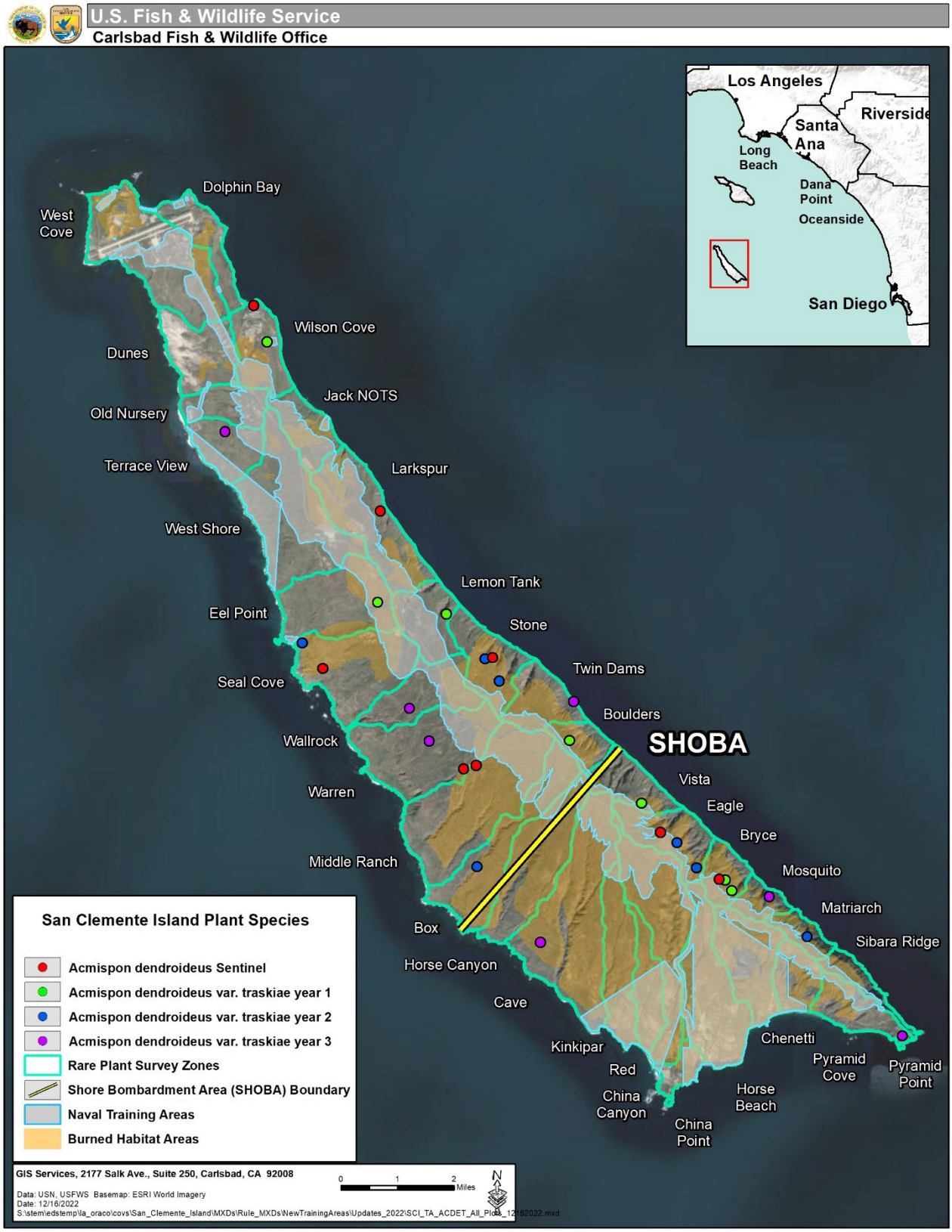

Figure VI-1B. Proposed monitoring sites for *Acmispon dendroideus var. traskiae* (San Clemente Island lotus) and proposed training locations and burned habitat on San Clemente Island.

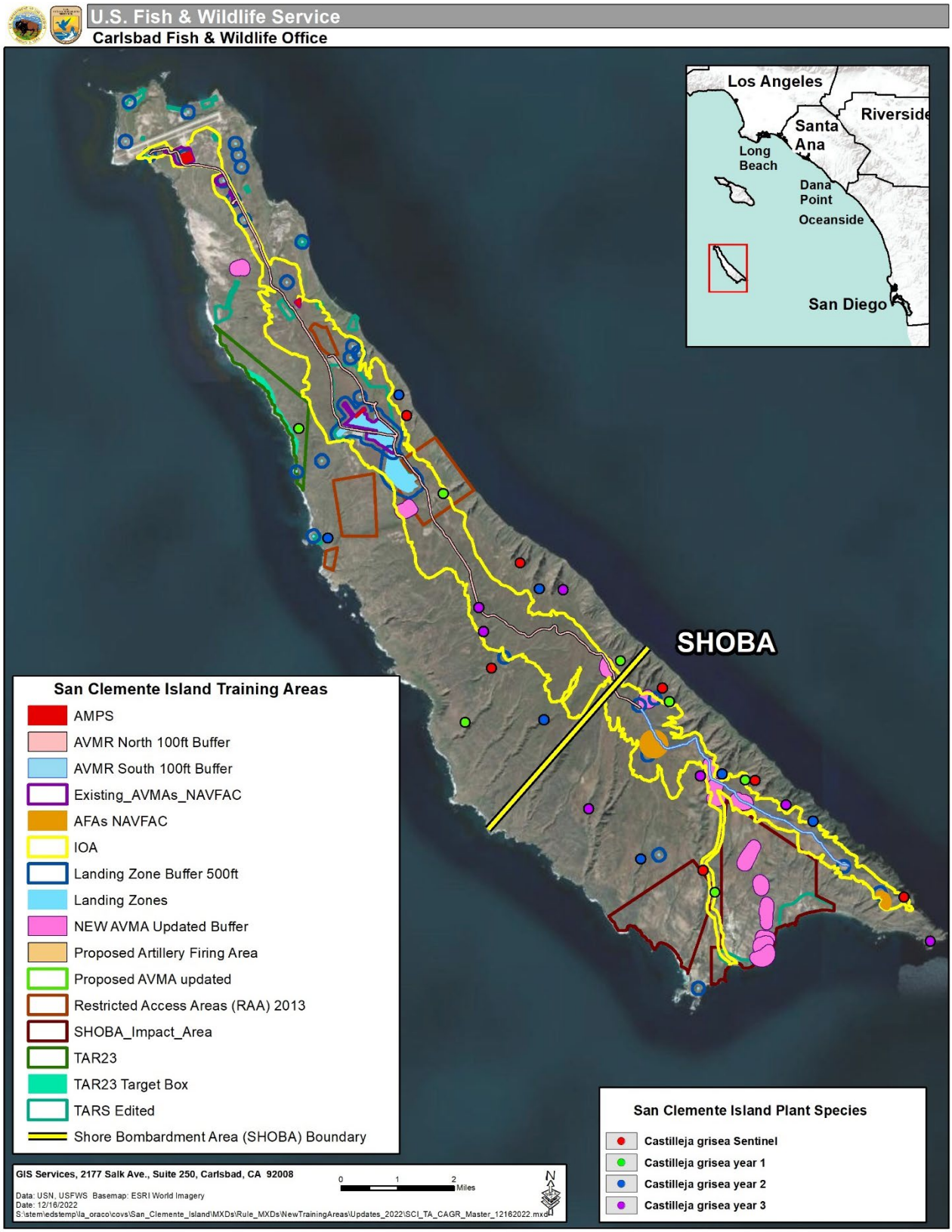

Figure VI-2A. Proposed monitoring sites for *Castilleja grisea* (San Clemente Island paintbrush) and proposed training locations on San Clemente Island.

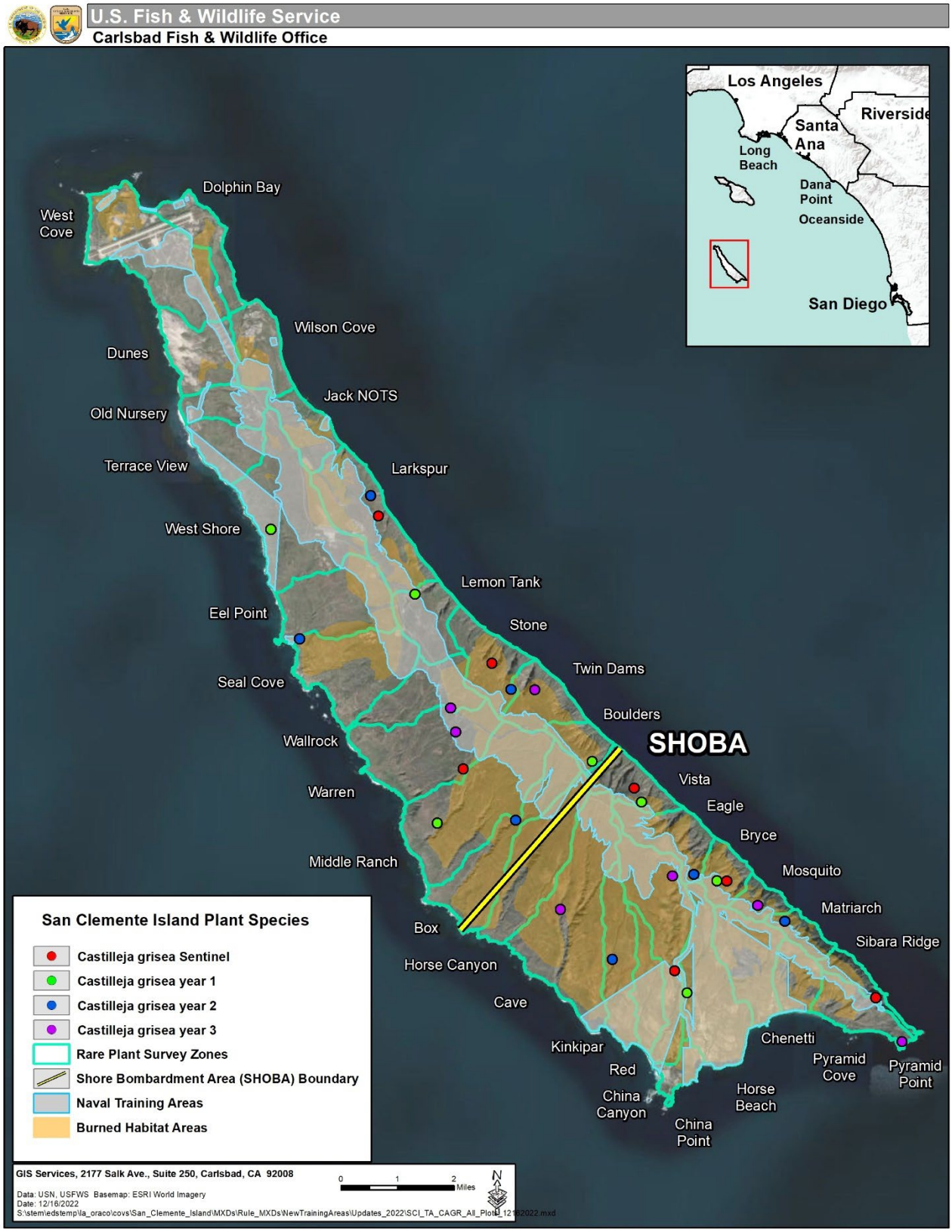

Figure VI-2B. Proposed monitoring sites for *Castilleja grisea* (San Clemente Island paintbrush) and proposed training locations and burned habitat on San Clemente Island.

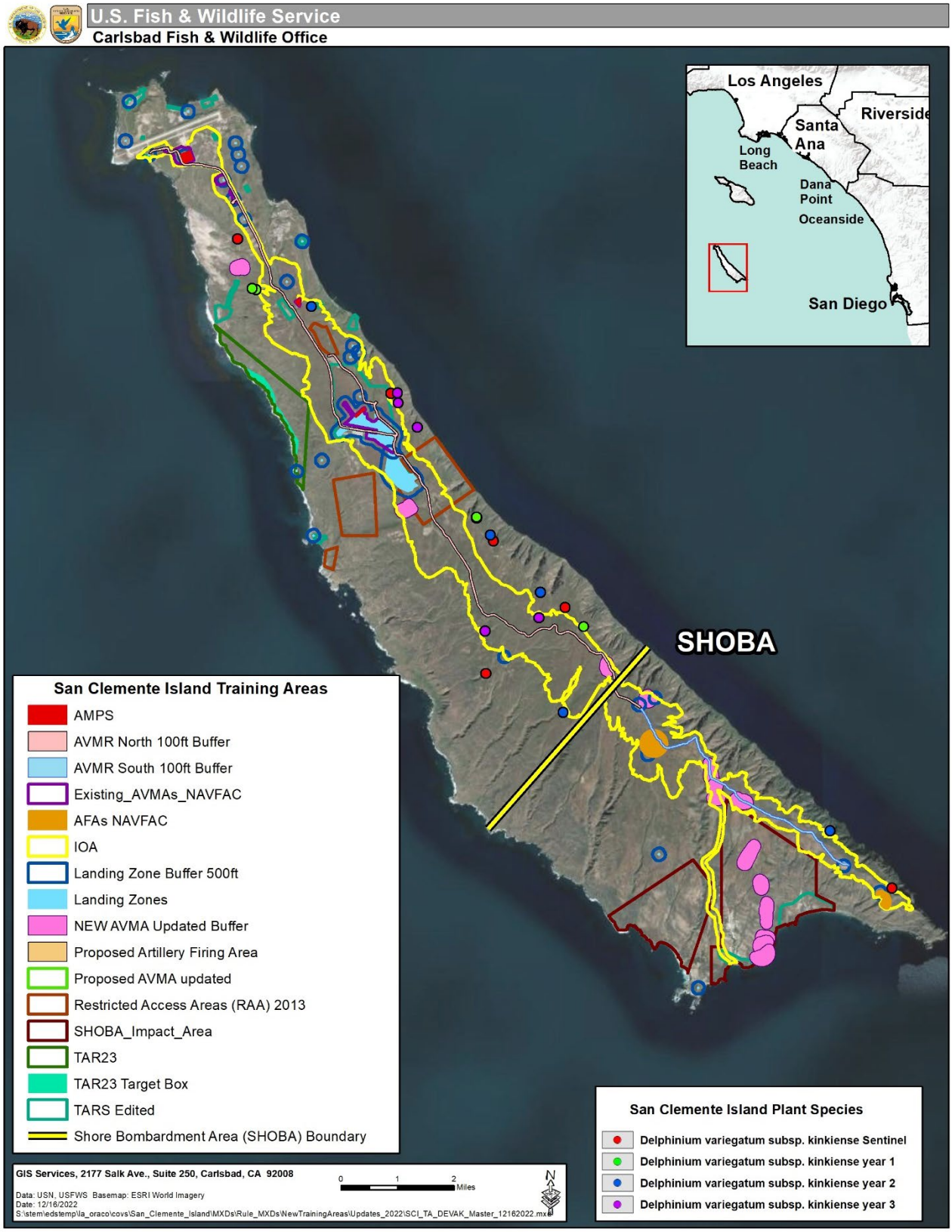

Figure VI-3A. Proposed monitoring sites for *Delphinium variegatum ssp. kinkiense* (San Clemente Island larkspur) and proposed training locations on San Clemente Island.

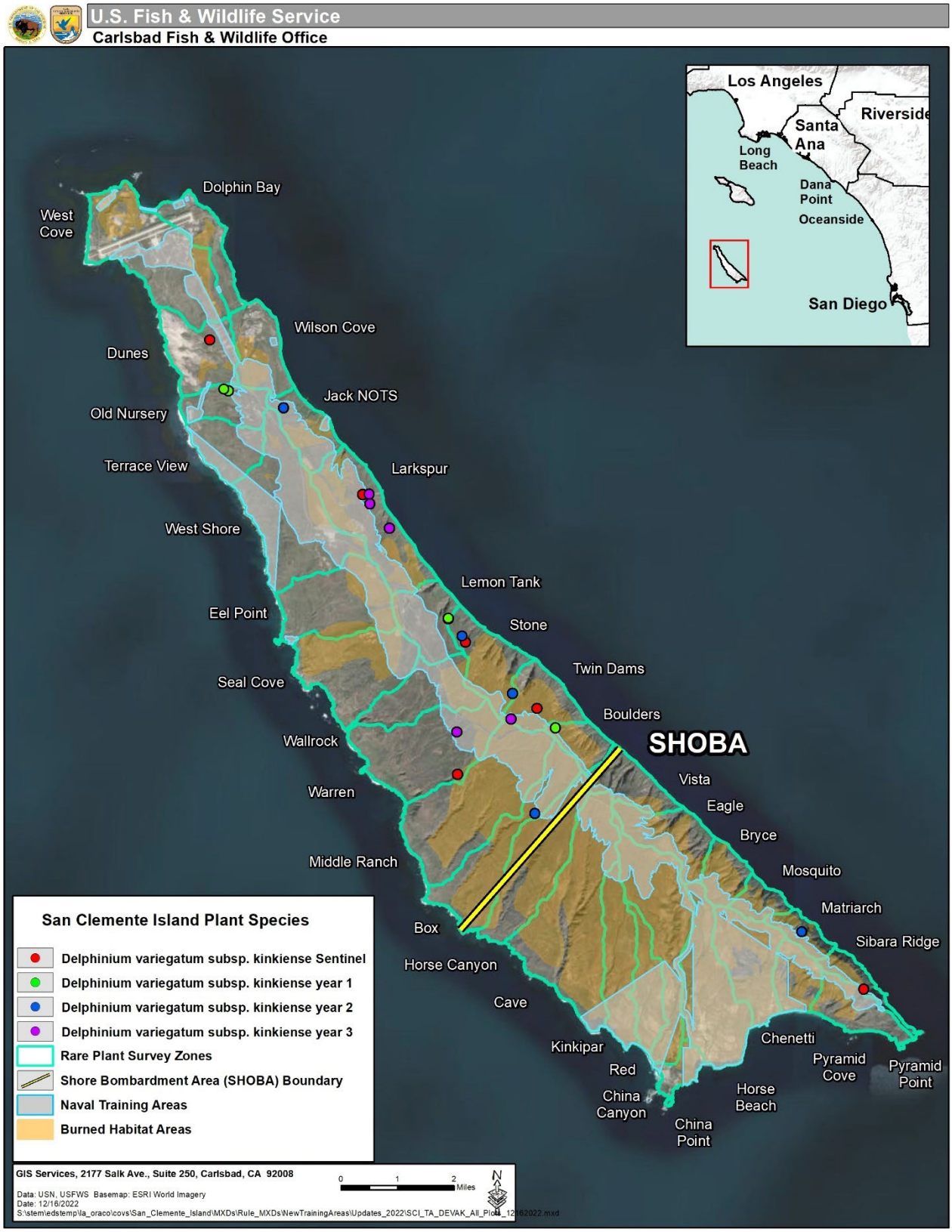

Figure VI-3B. Proposed monitoring sites for *Delphinium variegatum ssp. kinkiense* (San Clemente Island larkspur) and proposed training locations and burned habitat on San Clemente Island.

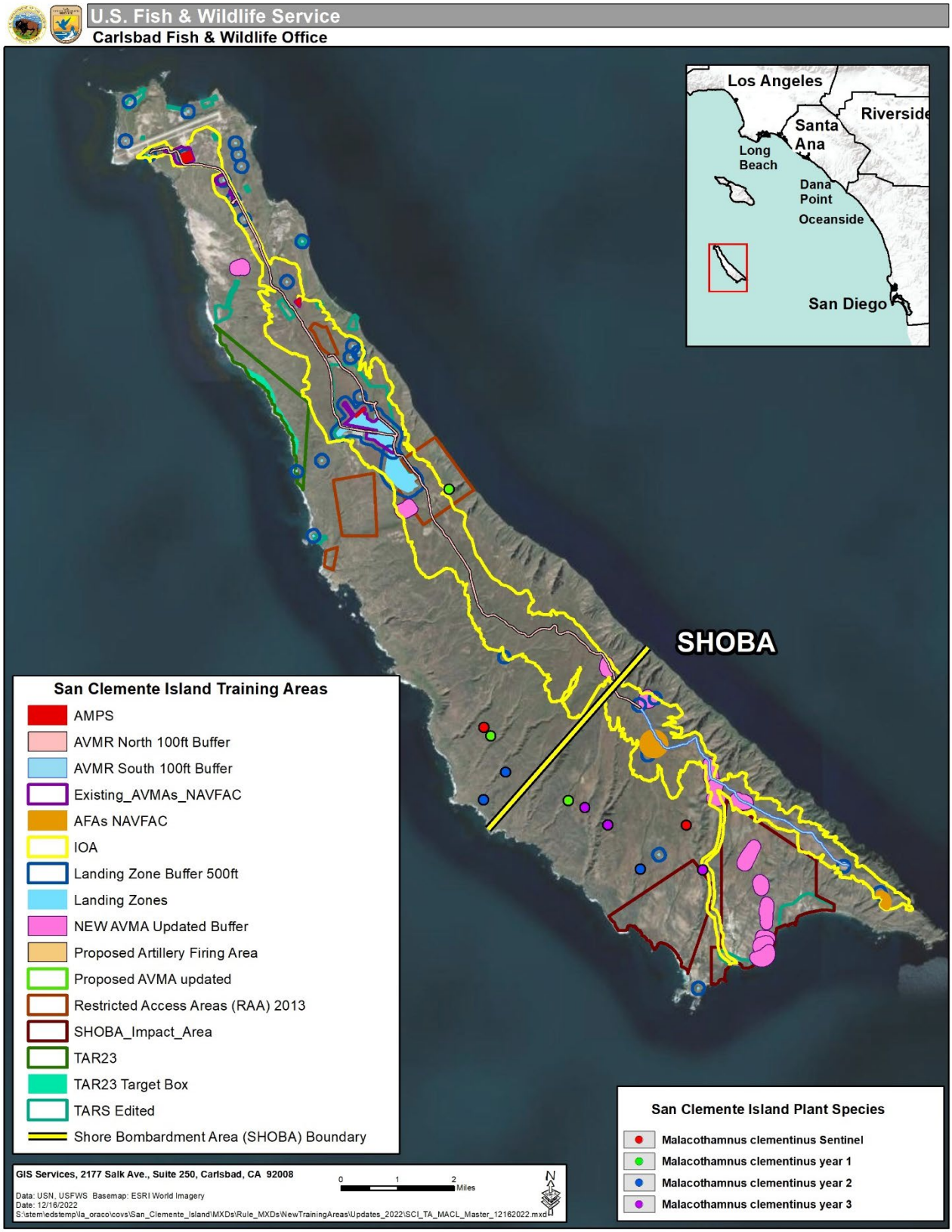

Figure VI-4A. Proposed monitoring sites for *Malacothamnus clementinus* (San Clemente Island bush-mallow) and proposed training locations on San Clemente Island.

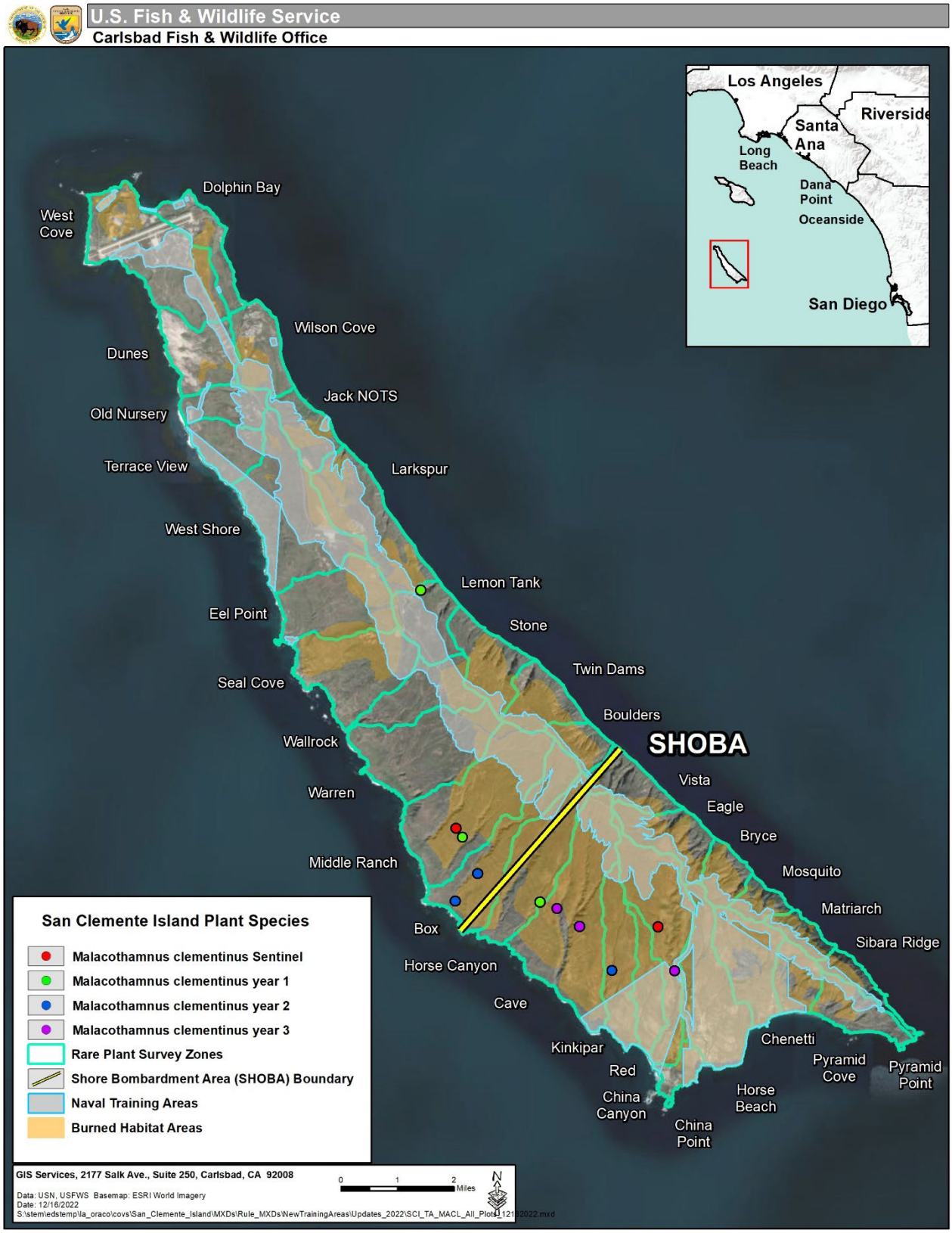

Figure VI-4B. Proposed monitoring sites for *Malacothamnus clementinus* (San Clemente Island bush-mallow) and proposed training locations and burned habitat on San Clemente Island.