



**EUROPEAN BEACHGRASS REMOVAL TO BENEFIT WESTERN SNOWY PLOVER AND LEAST TERN HABITAT
ON GUADALUPE-NIPOMO DUNES NATIONAL WILDLIFE REFUGE**

FINAL REPORT



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List of Figures and Tables

Figure 1: Primary and secondary treatment areas and European beachgrass percent cover (2016).....	5
Figure 2: The treatment areas updated in 2020.	6
Figure 3: Purple ragwort (<i>Senecio elegans</i>) found within Beachgrass treatment area.....	7
Figure 4: Year 1 of treatment completed in February 2019.	8
Figure 5: Year 2 of treatment completed in December 2019.....	9
Figure 6: Year 3 of treatment completed January 2021.	10
Figure 7: Year 4 of treatment completed in January and February 2022.....	11
Figure 8: Pre-treatment European beachgrass cover (February 2019).	13
Figure 9: Post year 1 European beachgrass percent cover (December 2019).....	14
Figure 10: Post year 2 European beachgrass cover (January 2021).	15
Figure 11: Post year 3 treatment European beachgrass percent cover (January 2022).	16
Figure 12: Purple ragwort percent cover surveyed in 2016 and 2022.	17
Figure 14: Western snowy plover nests and hatching success on the Refuge as reported by Trihydro Corp.....	18
Table 1: Annual Western snowy plover nests, successful hatches, and confirmed depredations.....	18

Purpose

The purpose of this project is to improve the delicate and dynamic foredune habitat where sensitive plants and nesting birds call home. Introduced (non-native) invasive plant species such as European beachgrass (*Ammophila arenaria*) threaten to convert the fragile dune ecosystem from coastal foredune and sand sheets, to non-native perennial grassland. Not only do native foredune plants suffer from habitat loss resulting from invasive species expansion, the foraging and nesting habitat for the Western snowy plover (*Charadrius nivosus nivosus*) (WSPL) and California least tern (*Sternula antillarum brownii*) (CLTE) are also impacted. The Recovery Plan for the Pacific Coast Population of the Western Snowy Plover and the Recovery Plan for the California Least Tern, published by the US Fish and Wildlife Service for these two federally-listed species, explicitly acknowledge the threat presented by invasive species, and specifically European beachgrass, and recommend the treatment of invasive species as a recovery action. Thus far, CLTE have not been documented breeding on the Refuge, however the nesting habitat preferences are similar to WSPL.

The purpose of this project is to preserve and restore functionality and dynamism to foredune habitats of Refuge identified as the most important breeding habitat for WSPL on the Refuge, and within the Refuge Priority Management Area 4, as defined in the Comprehensive Conservation Plan.

Scope of Work

The Land Conservancy of San Luis Obispo County (LCSLO) proposed the following tasks to be completed within the scope of this project:

1. Monitor and manage European beachgrass (*Ammophila arenaria*) within the selected project areas of the Guadalupe-Nipomo Dunes National Wildlife Refuge. The area's European beachgrass will be mapped, and then managed using herbicide. Follow up monitoring will be used to track reduction in percent cover.
2. Monitor Western snowy plover population throughout the Guadalupe-Nipomo Dunes National Wildlife Refuge each season to gauge success of restoration efforts.

Task 1: Monitor and Manage European Beachgrass

The original scope of work established in 2017 outlines three treatment areas for European beachgrass: primary (6.5 acres), secondary (63 acres), and tertiary treatment areas (32 acres) (Figure 1&2). The primary treatment area is within the secondary treatment area, and the tertiary treatment area is located north of the secondary treatment area (Figure 1). The tertiary treatment area has greater quantity and density of European beach grass as the invasive species is carried south from the extensive stands in the northwestern portion of the Refuge.

This project was implemented in conjunction with a Dunes Collaborative-funded project that also targeted European beachgrass. In 2020, the treatment areas were shifted to better utilize current funding sources (Figure 2). With the Dunes Collaborative funding supporting the on the ground treatment of European beachgrass within all treatment areas, Torch funding directly supported the Western snowy plover monitoring. Together the two funding sources managed European beachgrass across 261.95 acres and provided necessary Western snowy plover monitoring along the shore of the Refuge.

Herbicide treatment was completed in the winter for four consecutive years. In year 1, 19.4 acres of European beachgrass was treated within the primary and secondary treatment areas (Figure 4). Year 2 treatment expanded the treatment area into the Tertiary Treatment Area, treating 21.72-acres of European beachgrass (Figure 5). Year 3 & 4 expanded to 95 additional acres instead of the originally planned 32 acres (Figure 6 & 7).

The treatment area was surveyed before each herbicide treatment to flag special status species. When special status species were found, the area was well marked with flags and documented with a GPS. LCSLO's restoration crew is well trained in coastal dune special status species identification and did not use herbicide near special status species. When possible, a shield was used to protect herbicide application from nearby special status species. If the European beachgrass was too close to the special status species, it was hand-removed to the best of their ability, without harming the neighboring plants.

In years 3 and 4, purple ragwort (*Senecio elegans*) was observed growing in the dead European beachgrass clumps (Figure 3). Purple ragwort is an annual species with some plants appearing to be biennial and is a prolific seeder that displaces native dune plants. Purple ragwort has the potential to establish throughout the foredunes as habitat becomes available within dead European beachgrass. In 2021, LCSLO was awarded a Coastal Program grant to manage purple ragwort on the Refuge. LCSLO's restoration crew spent time removing purple ragwort by hand throughout the beachgrass treatment area in year 4 (2022) through the newly acquired funding.

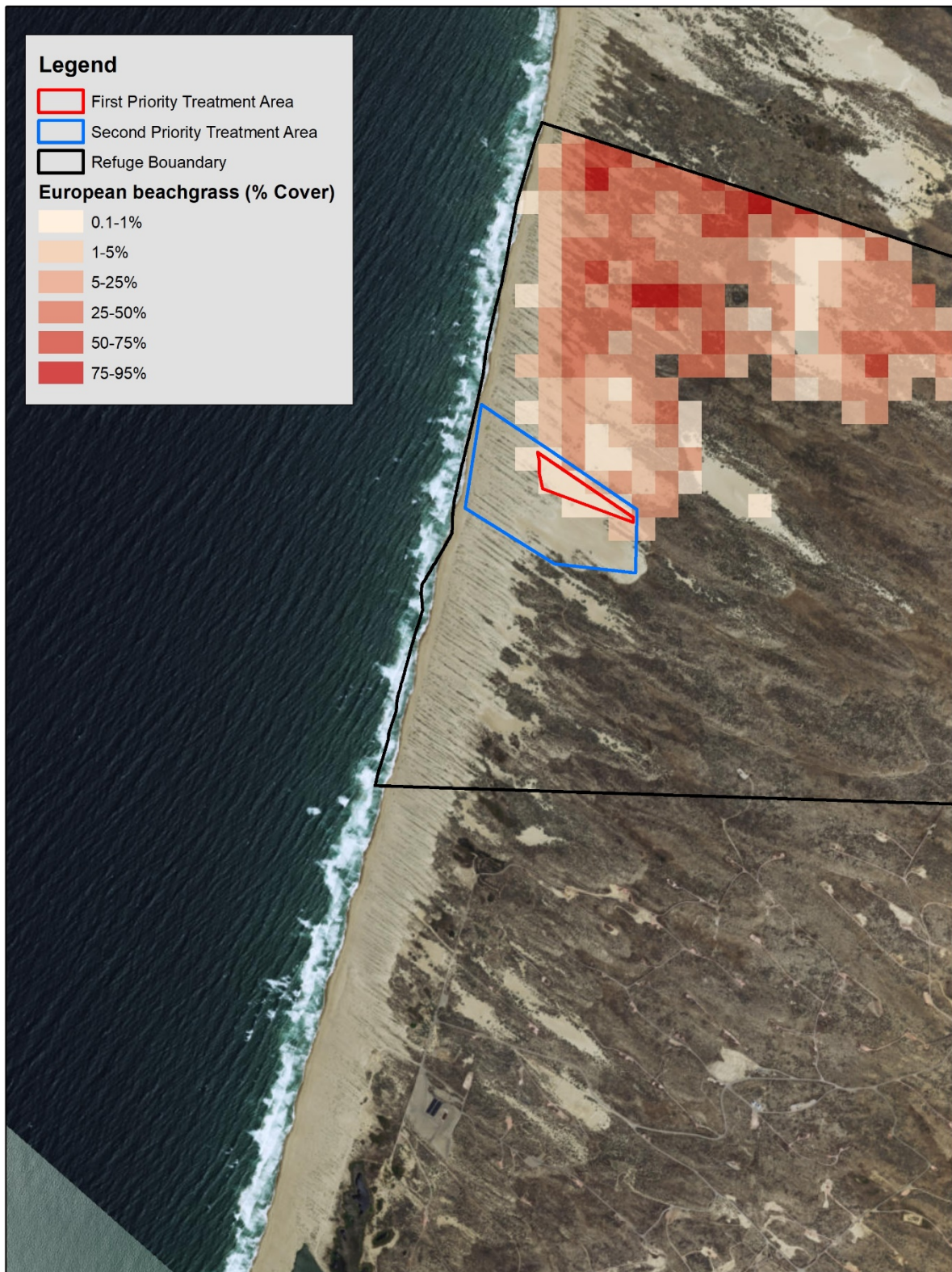


Figure 1: Primary and secondary treatment areas and European beachgrass percent cover (2016).

Refuge Beachgrass Treatment Areas

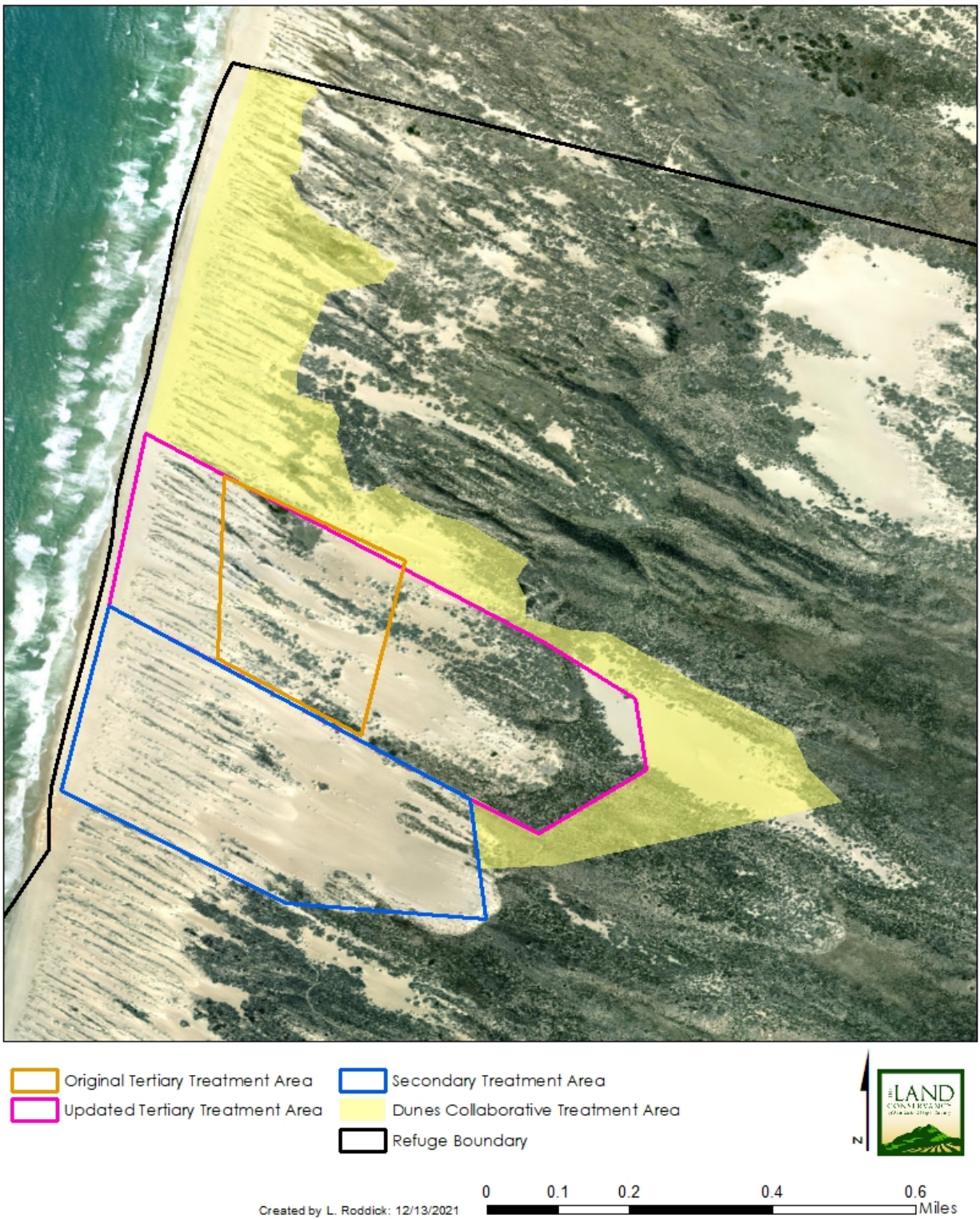


Figure 2: The treatment areas updated in 2020.



Figure 3: Purple ragwort (Senecio elegans) found within Beachgrass treatment area.



Guadalupe Nipomo Dunes National Wildlife Refuge

European Beachgrass Treatment

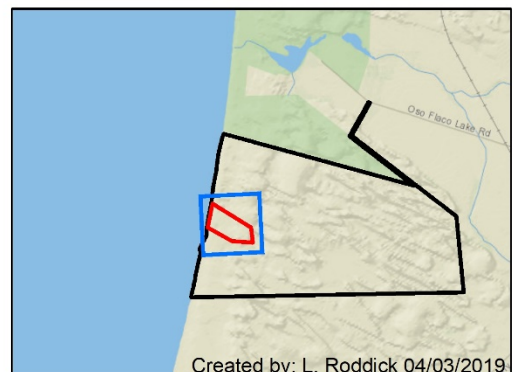
Legend

- Beach spectaclepod
- Surf thistle
- Beachgrass Treatment (2/6/2019)
- Treatment Area

0 1 2 4 6 Miles

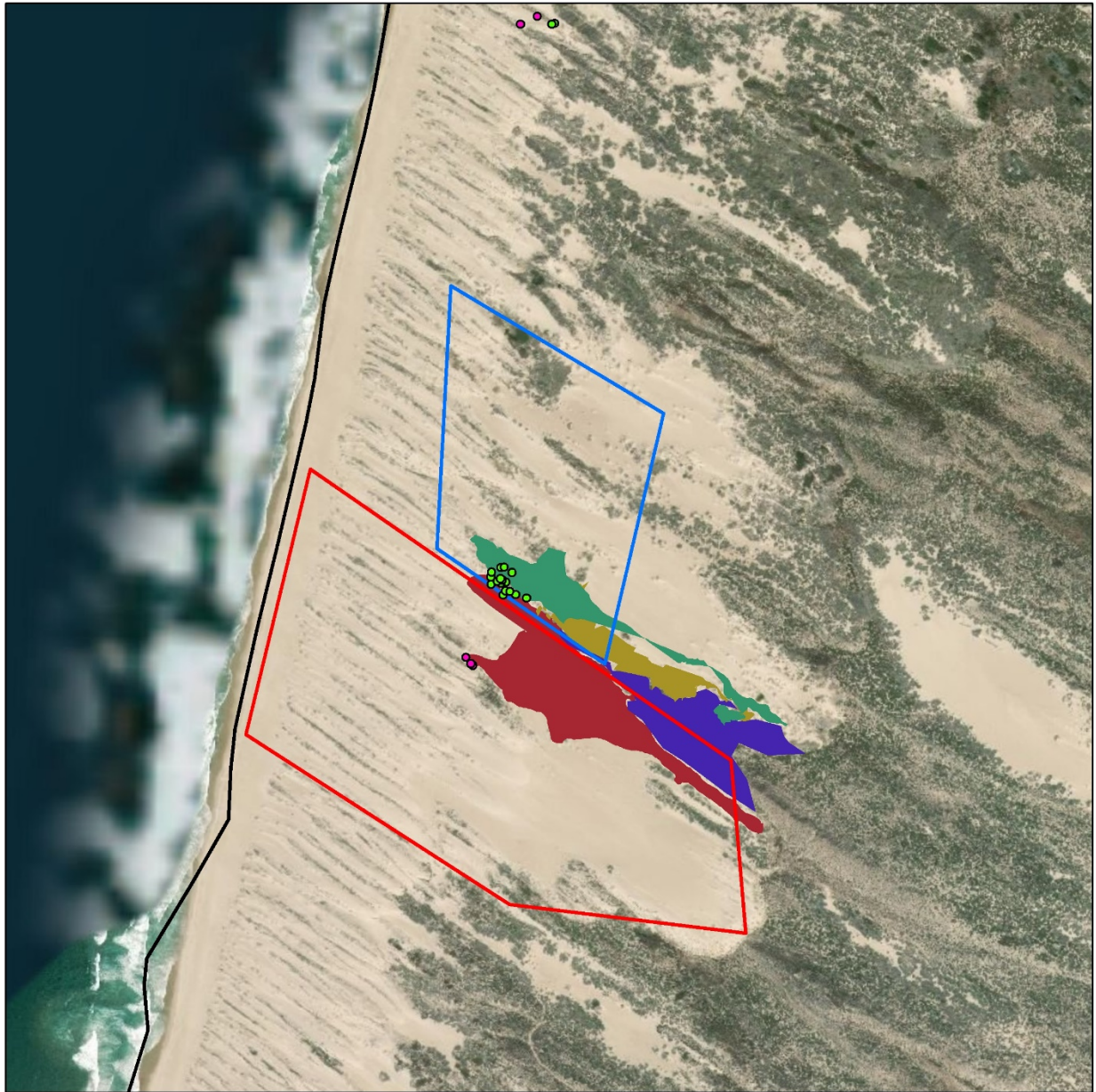


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Created by: L. Roddick 04/03/2019

Figure 4: Year 1 of treatment completed in February 2019.



Guadalupe-Nipomo Dunes National Wildlife Refuge

Year 2 European Beachgrass Treatment

Beachgrass Treatment

-  12/10/2019
-  12/11/2019
-  12/12/2019
-  12/16/2019

Rare Species Found

-  Beach spectaclepod
-  Surf thistle
-  Secondary Treatment Area
-  Tertiary Treatment Area
-  Refuge Boundary

Created by: L. Roddick 2020/03

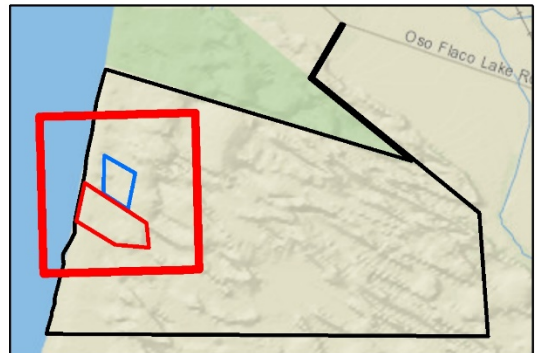
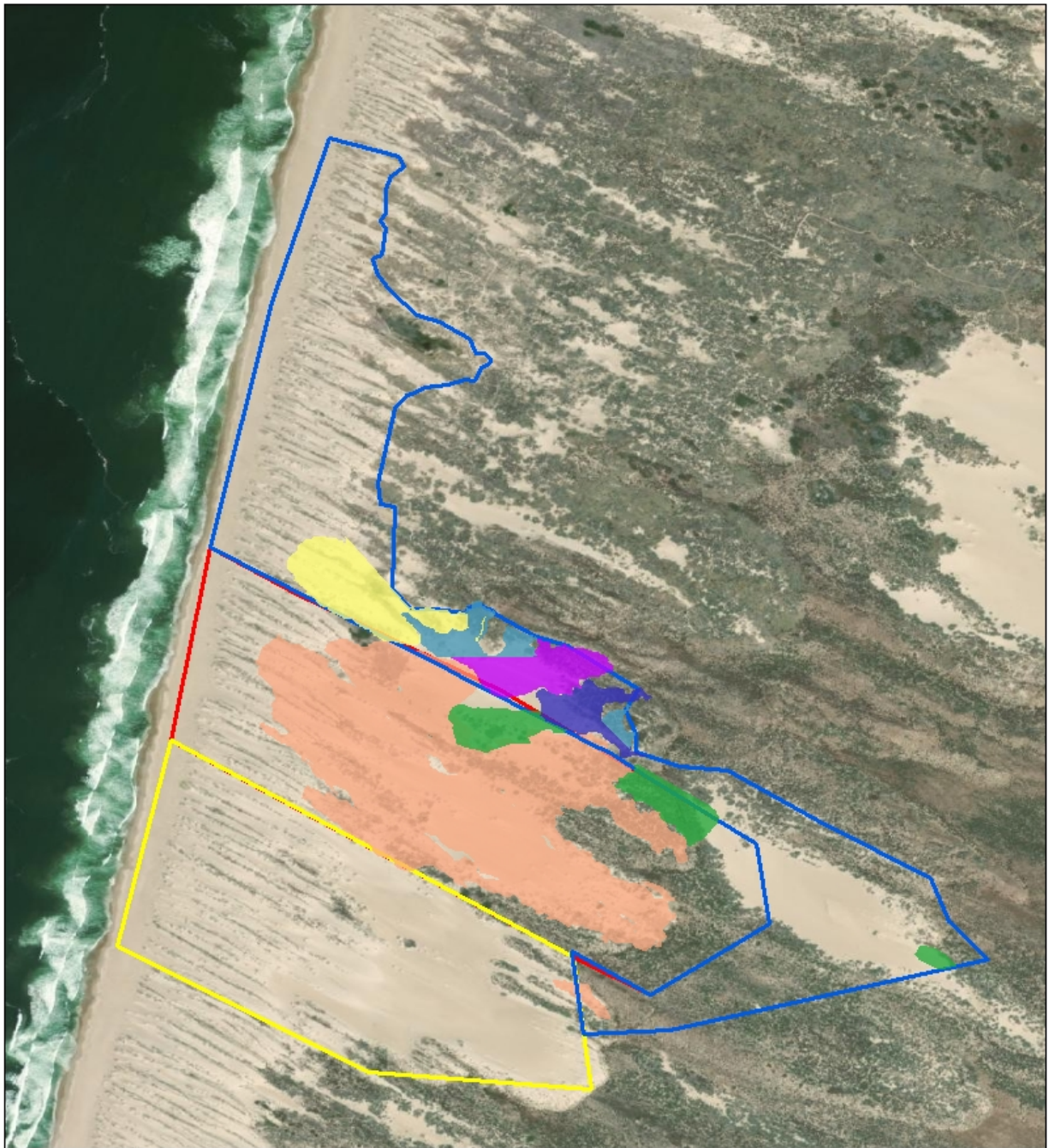


Figure 5: Year 2 of treatment completed in December 2019.



GNDNWR European Beachgrass Herbicide Treatment

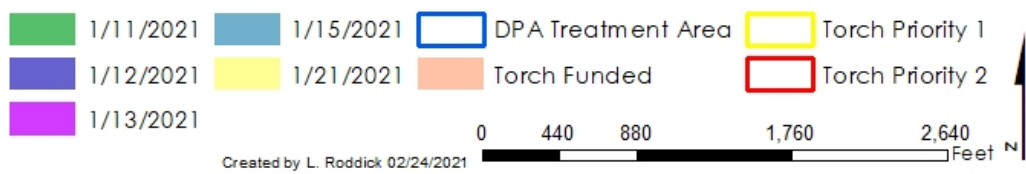


Figure 6: Year 3 of treatment completed January 2021.

Year 4 Beachgrass Treatment

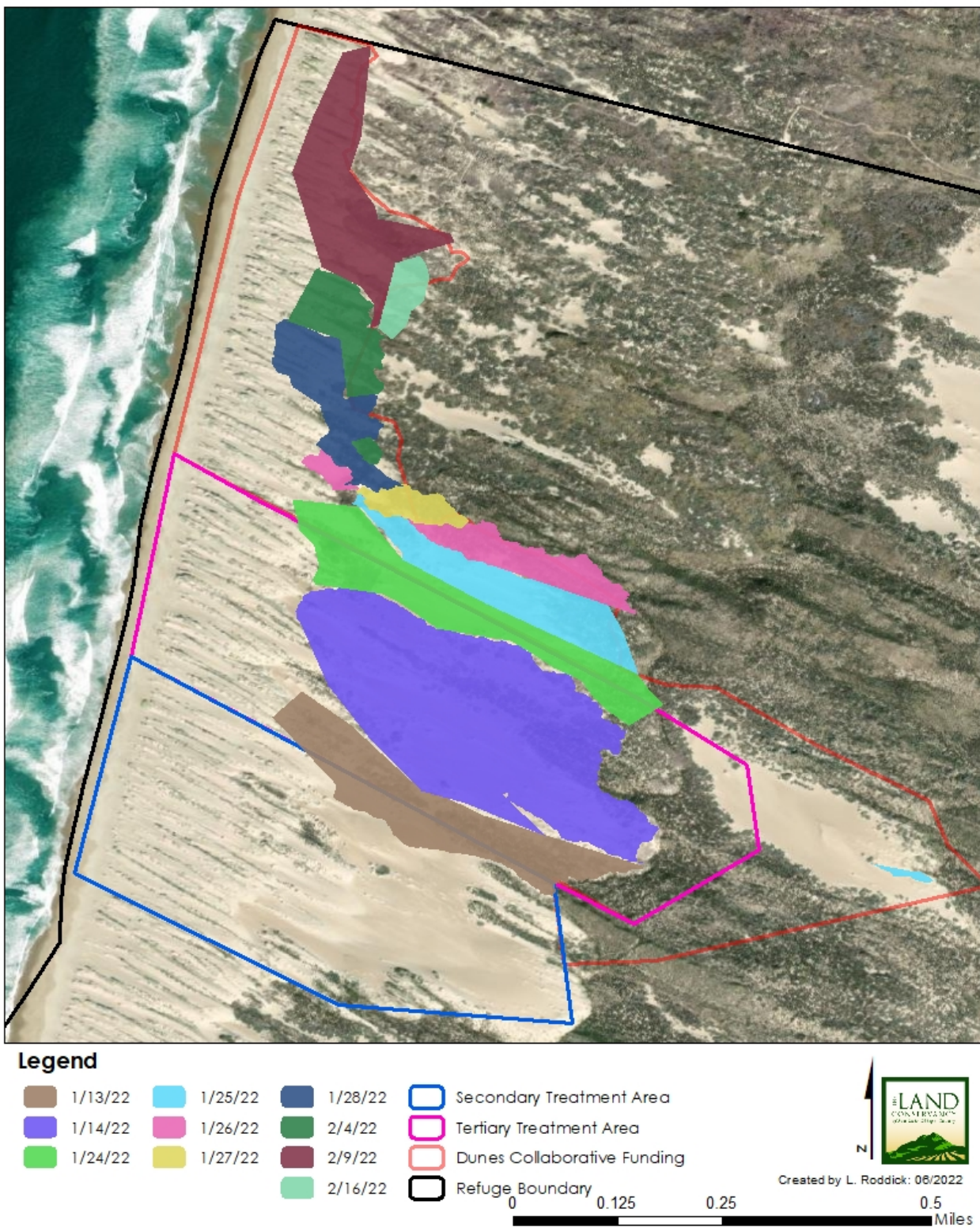
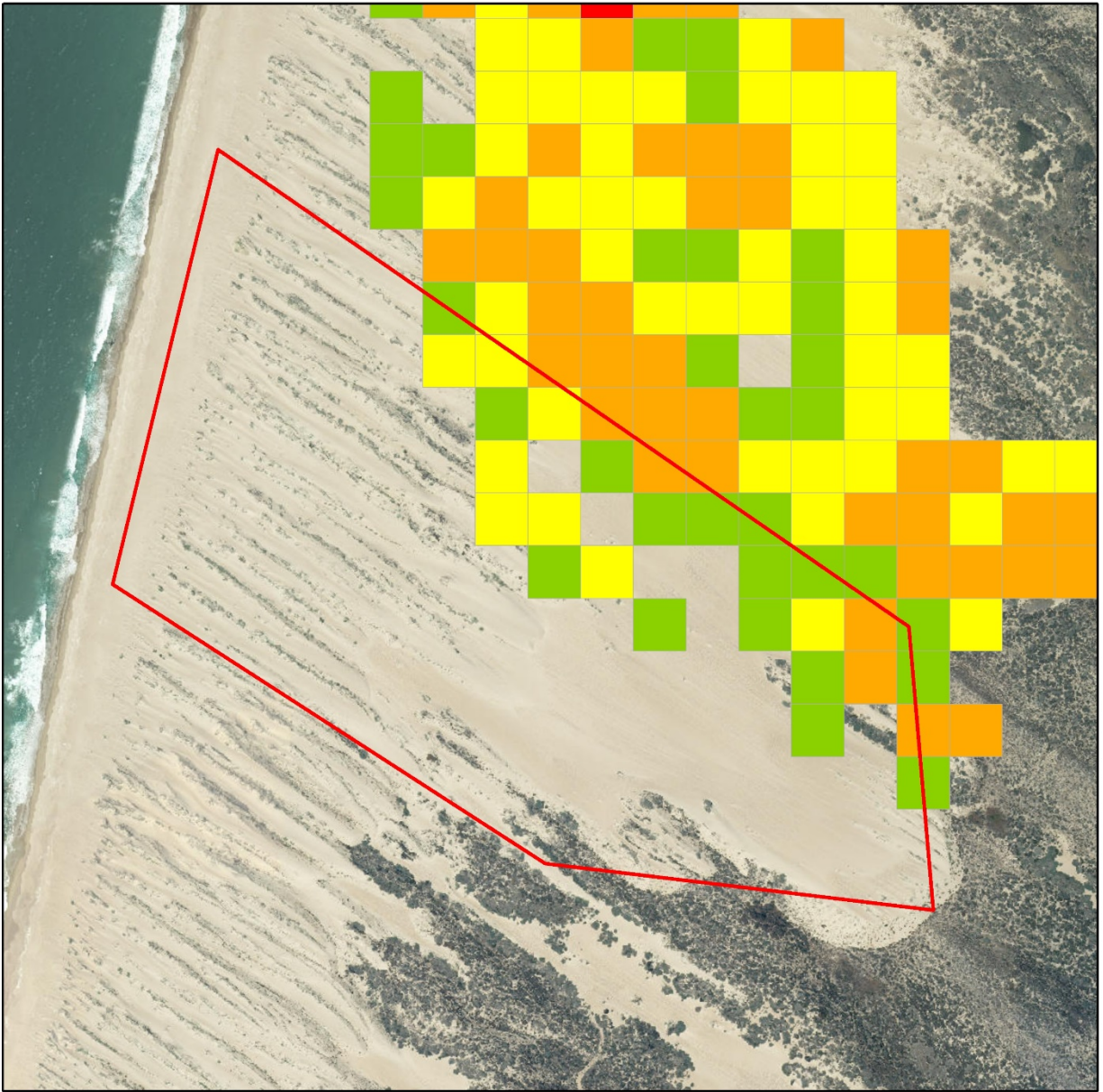


Figure 7: Year 4 of treatment completed in January and February 2022.

Percent Cover Monitoring

Percent cover monitoring was completed before the following year's treatment began. This provides the necessary time for the herbicide to show effectiveness and avoid inaccurate percent cover evaluations. Three post-treatment surveys were conducted in the winter using the 50-meter² grid, following the established monitoring protocol (Figures 9 10, & 11). Each grid cell was visited and the percent cover of European beachgrass was documented. Pre-treatment percent cover is given in Figure 4. A significant reduction in European beachgrass was found each year of treatment with very little European beachgrass found within the treatment areas following the third year of treatment (Figure 11).

Purple ragwort percent cover was collected using the grid monitoring protocol during Winter 2022 beachgrass monitoring. Purple ragwort was last surveyed in 2016 and has significantly expanded since (Figure 12).



Guadalupe Nipomo Dunes National Wildlife Refuge

Pre-Treatment Beachgrass Survey

Legend

- 0-1% Cover
- 1-5% Cover
- 5-25% Cover
- 25-50% Cover
- Treatment Area



0 1 2 4 6 Miles

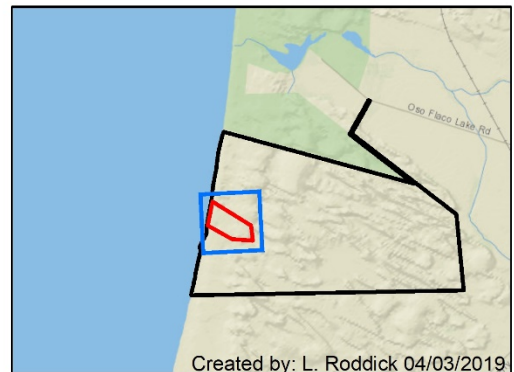
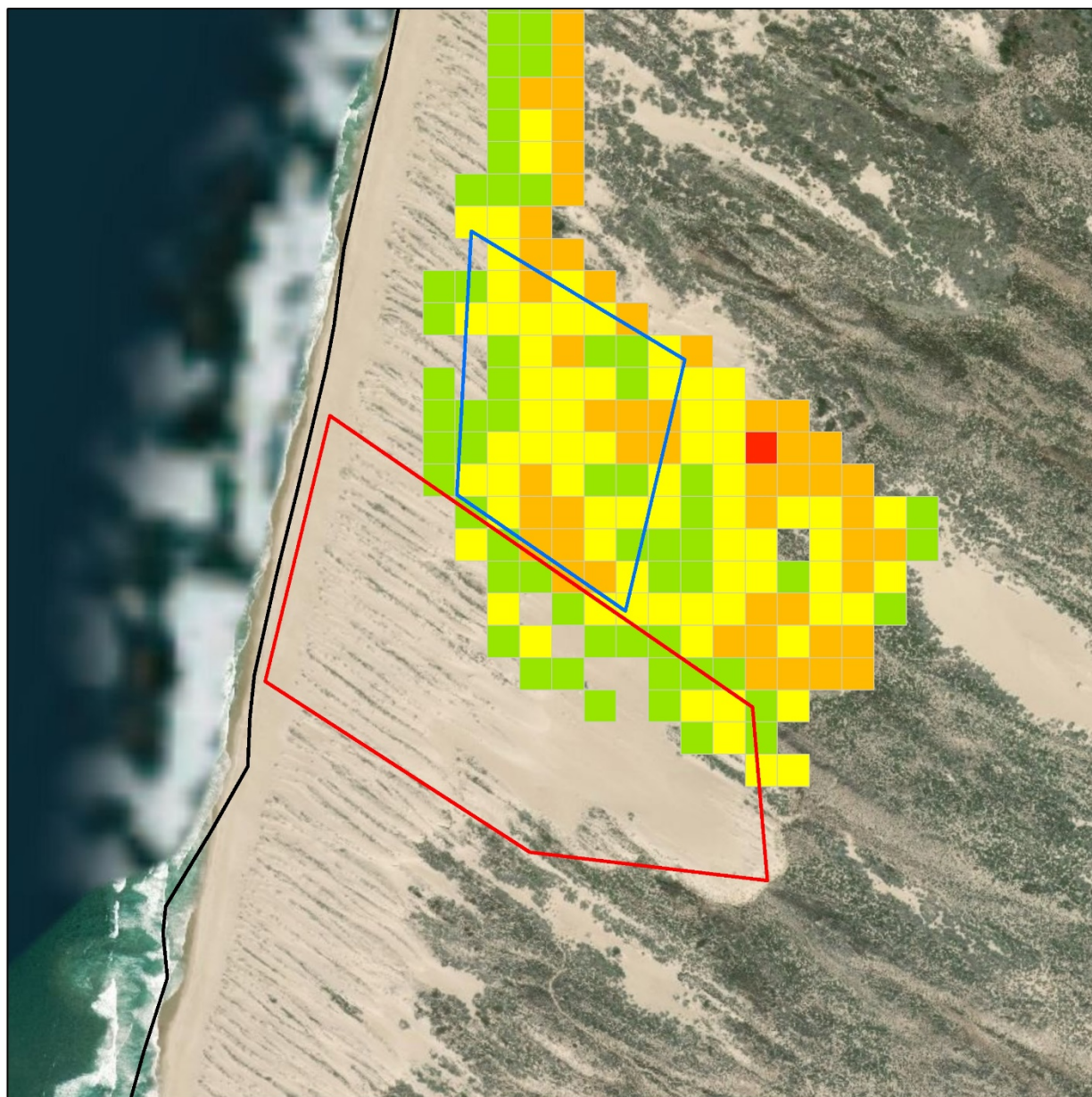


Figure 8: Pre-treatment European beachgrass cover (February 2019).



Guadalupe-Nipomo Dunes National Wildlife Refuge

Post Year 1 Beachgrass Survey

Beachgrass

- 0-1% Cover
- 1-5% Cover
- 5-25% Cover
- 25-50% Cover

- ⬢ Secondary Treatment Area
- ⬢ Tertiary Treatment Area
- ⬢ Refuge Boundary

Created by: L. Roddick 2020/03

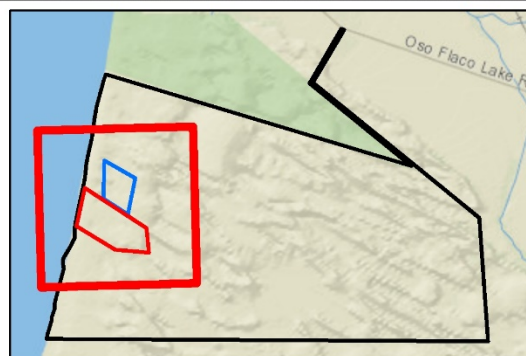


Figure 9: Post year 1 European beachgrass percent cover (December 2019).

Refuge TORCH Funded Beachgrass Treatment

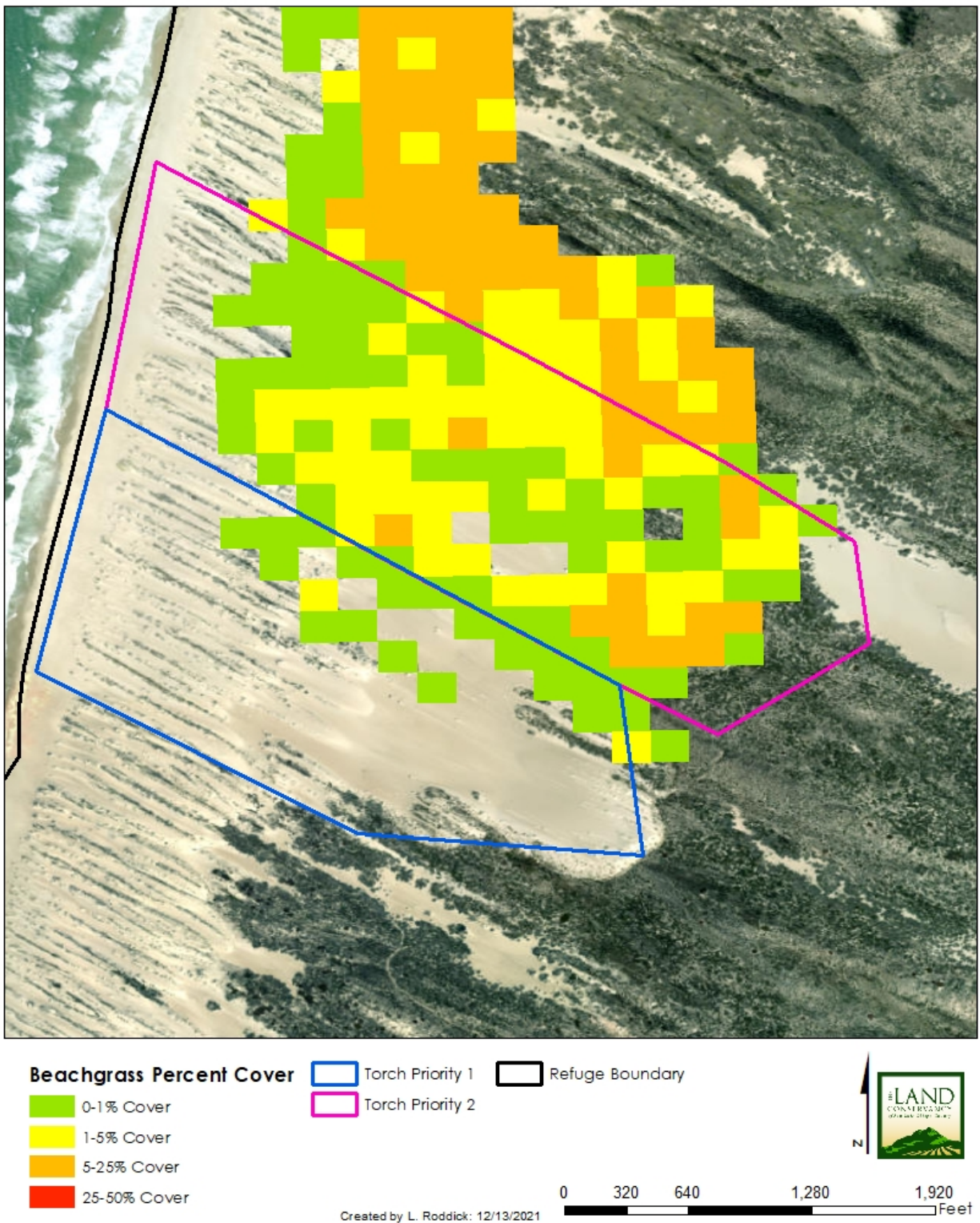


Figure 10: Post year 2 European beachgrass cover (January 2021).

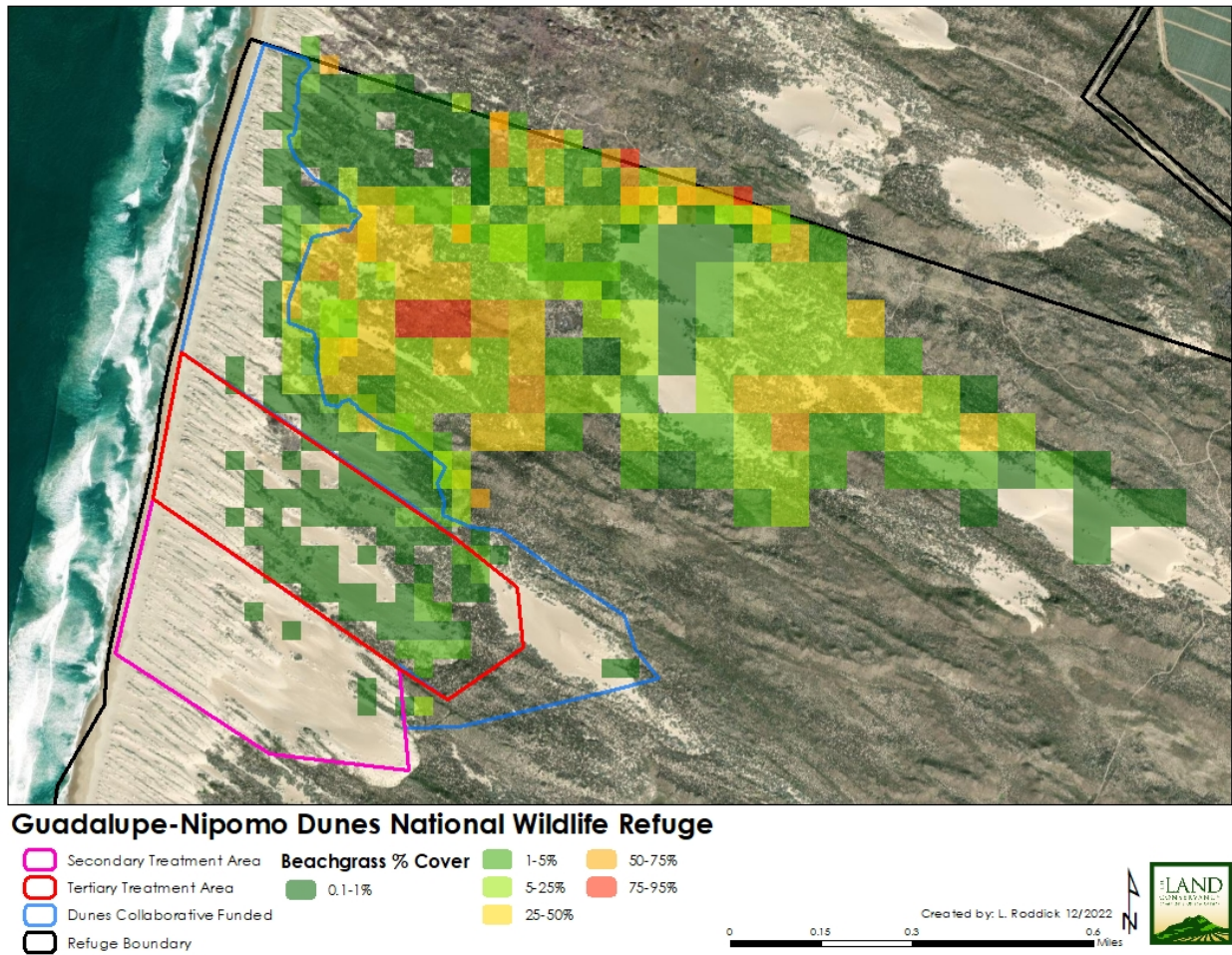


Figure 11: Post year 3 treatment European beachgrass percent cover (January 2022).

Purple Ragwort January 2022

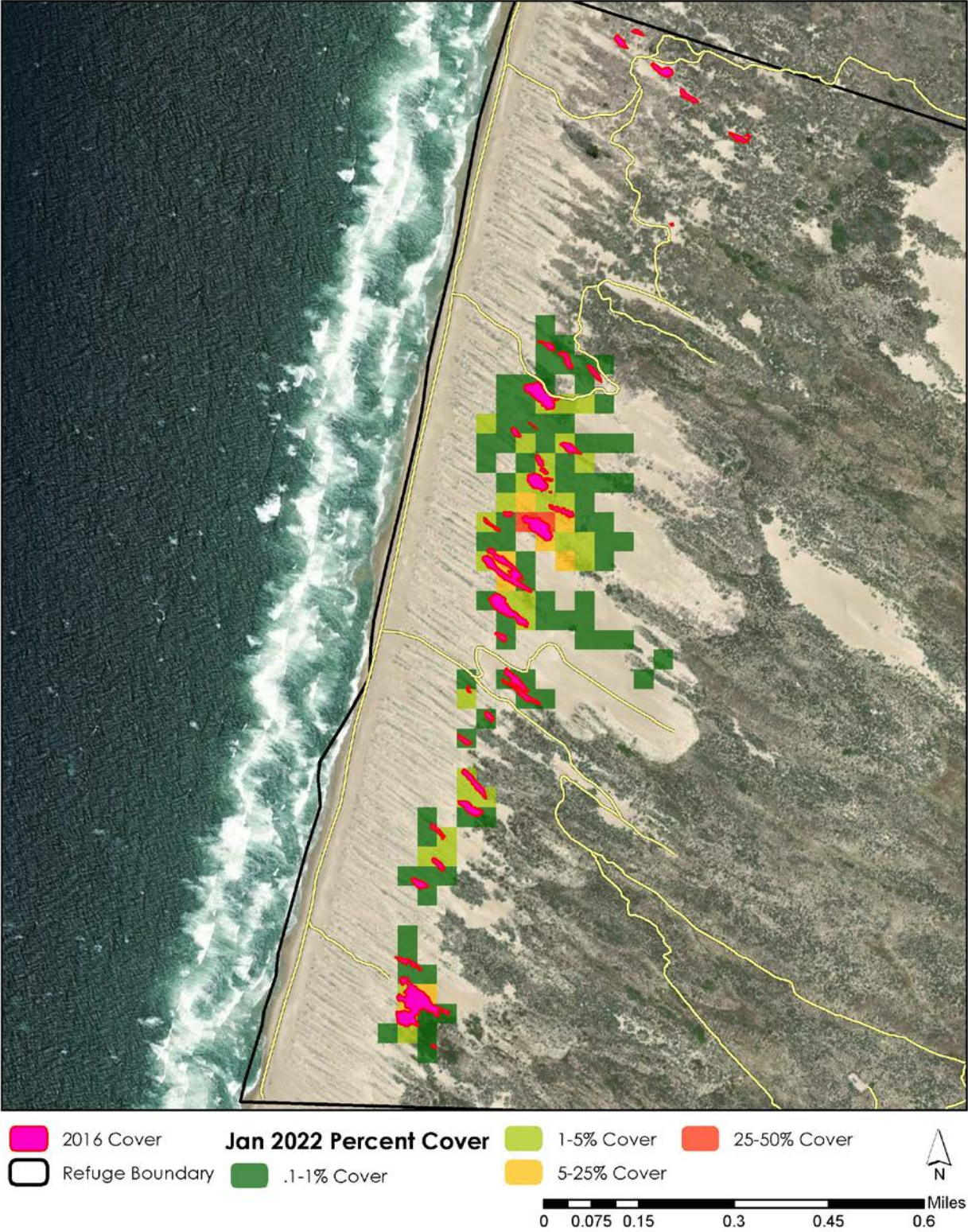


Figure 12: Purple ragwort percent cover surveyed in 2016 and 2022.

Task 2: Western Snowy Plover Monitoring

Western snowy plover monitoring was completed annually by Trihydro Corporation throughout the nesting season (March through October). Periodic in-season updates were reported to Refuge staff and annual reports were provided documenting number of nests found, number of nests with successful hatches, depredations, and likely predators (See Appendices for full annual reports).

Table 1: Annual Western snowy plover nests, successful hatches, and confirmed depredations.

Monitoring Year	Western Snowy Plover Nests	Nests with Successful Hatches	Percent Success	Number of Confirmed Nest Depredations	Percent Lost
2019	37	10	27%	15	40%
2020	39	20	51%	5	12%
2021	29	5	17%	6	17%
2022	24	8	33%	8	33%

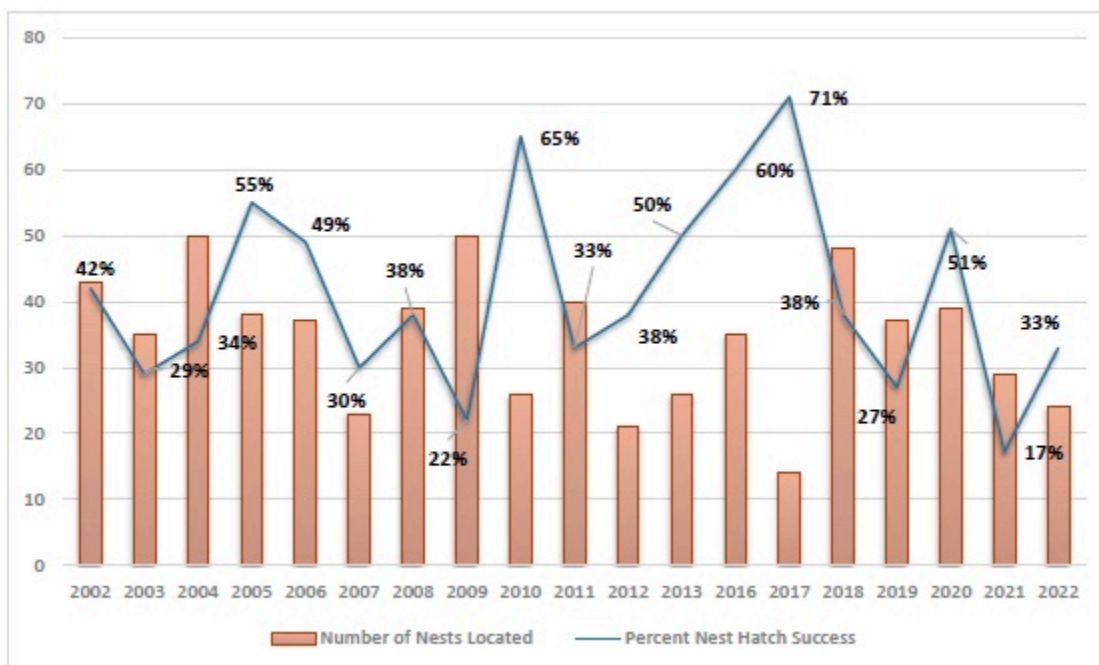


Figure 13: Western snowy plover nests and hatching success on the Refuge as reported by Trihydro Corp.

Monitoring reports described where plover nests were found within the Refuge. Most of the nests found in 2022 (83 percent) were placed throughout the length of the beach within the foredune habitat. These nests were often located within, or just west, of the foredunes. This is where natural debris (logs, sticks, and dried kelp) is most abundant. In the southern part of the Refuge some nests were placed further back in the foredunes. This habitat consists of open sand sheets and vegetated dunes. Nests are placed on top of tall dunes within dead iceplant. The iceplant has been treated in the southern region for the last seven years. Other plover nests in this area were placed further back in low growing abronia and

ambrosia plants. As European beachgrass dies and native foredune vegetation establishes in the northern portion of the Refuge, we hope to see additional nests within the project area.

Conclusions

Four years of herbicide treatment in the northern region of the Refuge has significantly decreased the percent cover of European beachgrass. Treatment efforts were completed using truck sprayers and backpack sprayers following rare species monitoring within the treatment area. Additional funding was procured during this project in order to expand the treatment area.

Western Snowy plover monitoring reports completed by Trihydro Corporation recommend continued work within the foredunes to remove non-native species specifically European beachgrass and iceplant to create suitable nesting habitat for both western snowy plovers and least terns. The reports recommend continuing the weed eradication effort on the Refuge, specifically European beachgrass and ice plant. The removal of these species has already started creating additional, preferable, nesting habitat in the southern portion of the foredunes at the Refuge and with time, we also hope to see additional nests within the project area.

This project intended to gauge restoration success by the number of Western snowy plover nests found within the project area. While this is the ultimate goal of the project, we have found additional time and effort will be necessary to meet that goal. Four years is not enough time for European beachgrass to be treated, and for the sand below the dead biomass to reactivate with the wind. Once the sand is reactivated, native foredune vegetation can establish providing the preferred habitat for nesting. An increase in nests in the southern portion of the Refuge came after a longer treatment period and with iceplant, a plant that once dead quickly allows sand to reactivate. Additional years of treatment and monitoring are necessary to ensure native foredune vegetation establishes in the project area. Western snowy plovers are also facing several additional threats predominately from predators who remove eggs from established nests. A predator management program and/or nest exclosures were recommended for the Refuge to better protect established nests.