Oceano Dunes State Vehicular Recreation Area
Dust Control Program

DRAFT 2022 Annual Report and Work Plan

August 1, 2022

State of California
Department of Parks and Recreation

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ODSVRA Dust Control Program
DRAFT 2022 Annual Report and Work Plan

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DRAFT 2022 Annual Report and Work Plan Attachments (Separate Documents)

Acronym/Symbol	Full Phrase or Description
µg/m^3	Micrograms Per Cubic Meter
ARWP	Annual Report and Work Plan
ASU	Arizona State University
BAM	Beta Attenuation Monitor
BSNE	Big Springs Number Eight
CAAQS	California Ambient Air Quality Standards
CARB	California Air Resources Board
CCC	California Coastal Commission
CFR	Code of Federal Regulations
CGS	California Geological Survey
DEM	Digital Elevation Model
DRI	Desert Research Institute
GCD	Geomorphic Change Detection
GIS	Geographic Information System
GPS	Global Positioning System
M	Meter
MP	Megapixel
NAAQS	National Ambient Air Quality Standards
NDRE	Normalized Difference Red-Edge Index
NDVI	Normalized Difference Vegetation Index
NSF	Normalized Sand Flux
ODSVRA	Oceano Dunes State Vehicular Recreation Area
OHMVR Commission	Off-Highway Motor Vehicle Recreation Commission
OHV	Off-Highway Vehicle
PI-SWERL	Portable In-Situ Wind Erosion Laboratory
PM_{10}	Particulate Matter 10
PMRP	Particulate Matter Reduction Plan
PPK	Post-Processing Kinematic GPS Positioning
RCD	Coastal San Luis Resource Conservation District
RGB	Red, Green, and Blue
SAG	Scientific Advisory Group
SB	Straw Bale
Scripps	Scripps Institution of Oceanography

Acronym/Symbol	Full Phrase or Description
SfM	Structure-From-Motion photogrammetry
SLOAPCD	San Luis Obispo County Air Pollution Control District
SOA	Stipulated Order of Abatement
SODAR	Sonic Detection and Ranging Instrument
ST	Straw Treatment
State Parks	California Department of Parks and Recreation (also State Parks)
SVRA	State Vehicular Recreation Area
TV	Temporary Vehicle Exclusion
UAS	Uncrewed Aerial System
UCSB	University of California, Santa Barbara
USEPA	United States Environmental Protection Agency
VG	Vegetation
WF	Wind Fencing
WPD	Wind Power Density

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1 INTRODUCTION

The California Department of Parks and Recreation (State Parks) has prepared this Draft 2022 Annual Report and Work Plan (ARWP) for the Oceano Dunes State Vehicular Recreation Area (ODSVRA) Dust Control Program to comply with the Stipulated Order of Abatement (SOA) approved by the San Luis Obispo County Air Pollution Control District (SLOAPCD) Hearing Board in April 2018 (Case No. 17-01) and amended in November 2019.[1]

The current SOA, Conditions 4 and 5, as amended, requires State Parks to prepare and submit to the SLOAPCD, and the SOA Scientific Advisory Group (SAG), an ARWP, by August 1st of each year, from 2019 to 2022. In general, SOA Condition 4 requires the ARWP to:

- Review dust control activities implemented over the previous 12-month period and, using tracking metrics specified in State Parks' Particulate Matter Reduction Plan (PMRP), document progress towards SOA goals. For this 2022 ARWP, the previous 12-month period started on August 1, 2021, and ended on July 31, 2022.
- Identify dust control activities proposed to be undertaken or completed in the next 12-month period and, using tracking metrics specified in the PMRP, document expected outcomes and potential emission reductions for these activities. For this 2022 ARWP, the next 12-month period starts on August 1, 2022, and ends on July 31, 2023; however, SOA Condition 6.a establishes that the SLOAPCD Hearing Board retains jurisdiction over the SOA until December 1, 2023. Therefore, this ARWP describes dust control activities proposed to be undertaken or completed in the 16-month period beginning August 1, 2022, and ending December 1, 2023.
- Using air quality modeling, estimate the downwind benefits and anticipated reductions in respirable particulate matter (PM_{10}) concentrations associated with proposed dust control activities.
- Describe the budgetary considerations for the development and implementation of proposed dust control activities.
- Provide a detailed implementation schedule with deadlines associated with the physical deployment of proposed dust control actions.

Chapter 2 of this ARWP **reports** on Dust Control Program activities implemented in the previous 12 months (August 1, 2021, to July 31, 2022), including progress made towards SOA goals.

Chapter 3 of this ARWP **proposes** Dust Control Program activities to be undertaken or completed inthe coming 16 months (August 1, 2022, to December 1, 2023).

[1] The SOA, as amended, is available for review on the following SLOAPCD website: https://www.slocleanair.org/who/board/hearing-board/actions.php

Chapter 4 and Chapter 5 of this ARWP **describe** budget considerations and implementation schedules for the proposed Dust Control Program activities to be initiated, undertaken, and/or completed in the coming 16 months.

As described in more detail in this 2022 ARWP, State Parks has made significant reductions in PM_{10} emissions from the ODSVRA and substantially improved air quality conditions on the Nipomo Mesa downwind of the ODSVRA. State Parks, therefore, plans to petition the SLOAPCD Hearing Board to modify the requirements of current SOA 17-01. State Parks' petition will be consistent with the SAG's defensible, scientifically justified basis for recommending revisions to the current SOA. This 2022 ARWP supports State Parks planned petition, in part, and has been developed to demonstrate consistency with the SAG's recommended revisions to the SOA.

This 2022 ARWP has been prepared under the supervision of Ronnie Glick, Senior Environmental Scientist, and Jon O'Brien, Environmental Program Manager, Off-Highway Motor Vehicle Recreation (OHMVR) Division, who State Parks has designated as the Project Manager for the Dust Control Program pursuant to Condition 13 of the SOA, as amended. State Parks' development of the 2022 ARWP was done in consultation and coordination with the SAG ARWP subcommittee.

2 ANNUAL REPORT (AUGUST 1, 2021, TO JULY 31, 2022)

This chapter of the 2022 ARWP reports on Dust Control Program activities undertaken from August 1, 2021, to July 31, 2022, estimates progress towards achieving current SOA goals, and presents additional information on other activities related to the Dust Control Program undertaken by State Parks and/or the SAG. State Parks' planned petition to the Hearing Board to modify the requirements of SOA 17-01 affects State Parks' reporting on Dust Control Program activities performed during this period. Specifically, as described in more detail in this chapter, State Parks is reporting progress made towards achieving current SOA and SAG-recommended dust reduction goals under two different modeling scenarios.

From August 1, 2021, to July 31, 2022, State Parks installed 90.0 acres of new dust control measures at ODSVRA, converted 53.1 acres of existing, temporary dust control measures to native dune vegetation, performed as-needed maintenance and supplemental planting activities on dust control measures throughout ODSVRA, and continued robust data collection and modeling efforts intended to improve the effectiveness of State Parks' Dust Control Program. State Parks undertook the above activities in consultation and coordination with the SAG and SLOAPCD. In addition, in October 2021 State Parks also closed approximately 293.3 acres of seasonal open riding and camping area that supports nesting of the western snowy plover and California least tern. This closure prohibits vehicular and non-vehicular recreation and, therefore, supports State Parks' Dust Control Program goals by allowing the natural progression of foredune formation. **As of July 31, 2022, the total amount of land at ODSVRA that State Parks manages to control dust emissions equals approximately 705.5 acres.** More than 89% of the land that State Parks manages to reduce dust emissions is in the ODSVRA's open riding and camping area (629.6 acres out of 705.5 acres). The closure of 629.6 acres of land to vehicular recreation represents a 42% reduction in the ODSVRA's 1,500-acre open riding and camping area. **The current Desert Research Institute (DRI) air quality model, being used per Section 2.c of the SOA, estimates State Parks' dust control efforts as of July 31, 2022, have resulted in a minimum 40.8% reduction in modeled baseline PM_{10} mass emissions at ODSVRA.** These cumulative reductions represent continued progress towards the current SOA's goal of a 50% reduction in mass emissions from the ODSVRA open riding and camping area. **In addition, as explained further in this 2022 ARWP (see Section 2.2.3 and 2.2.4), State Parks' Dust Control Program has reduced modeled PM_{10} mass emissions at ODSVRA and 24-hour average PM_{10} concentrations to levels below the levels modeled by DRI, based on SAG-suggested assumptions, for 1939 and 1966 "pre-disturbance" scenarios**. Thus, State Parks' Dust Control Program has made substantial progress in reducing PM_{10} mass emissions and ambient air concentrations.

State Parks notes that while the SOA requires State Parks to report on activities "implemented over the previous year" by August 1, 2022, this 2022 ARWP reports on activities that were

started more than one year ago (i.e., before August 1, 2021) and completed in the past year (i.e., between August 1, 2021, and July 31, 2022). It also reports on activities started in the past year, which State Parks or the SAG did not expect to complete in time for reporting in this ARWP cycle. This lag in reporting is due to the seasonal nature of data collection efforts and the time involved to process, analyze, interpret, review, and report the data collected for the Dust Control Program. The year 2021 ARWP actions/results that are not available to State Parks for reporting in this 2022 ARWP will be made available upon request when completed.

2.1 REPORT ON DUST CONTROL MEASURES INSTALLED AT ODSVRA

State Parks' ODSVRA Dust Control Program is a multi-year, adaptive management program involving an iterative series of dust control projects intended to improve air quality downwind of ODSVRA.

Dust control projects are control measures that State Parks puts on or into the ground to cover the ground surface or reduce surface disturbance, break the flow of wind across the landscape, and reduce or halt saltation and dust generation. The Dust Control Program includes seasonal dust control measures, temporary dust control measures, and vegetation dust control measures. A seasonal dust control measure is a project that State Parks implements to control saltation and dust generation for a defined period, usually between March 1st and October 31st of each calendar year. In contrast, temporary dust control measures control saltation and dust generation indefinitely, but not permanently.

Seasonal and temporary dust control measures generally include wind fencing, straw bales and other straw treatments, porous roughness elements, and other materials that can sometimes, but not always, be recovered and reused in subsequent dust control projects.[2] State Parks also excludes vehicles from areas (vehicle exclusion areas) and has explored, in a very limited manner, the use of soil stabilizers as a form of seasonal and/or temporary dust control at ODSVRA. In contrast to seasonal and temporary measures like wind fencing, vegetation planted by State Parks at ODSVRA is generally considered a long-term dust control measure; however, vegetation is subject to fluctuation in growing conditions, sand migration, etc.

Finally, State Parks also implements a track-out control program to prevent track-out of sand onto Grand Avenue and Pier Avenue entrances to ODSVRA.

State Parks' report on ODSVRA dust control measures as of July 31, 2022, is provided below.

[2] Straw bales were used for specific dust control projects and are identified as such (11-SB-01, 14-SB-01, 18-SB-01, and 18-SB-02) in Attachment 01 of this ARWP. Other projects have employed a mix of straw mats, straw blankets, fiber rolls, and blown straw and are collectively referred to in this ARWP as "straw treatment" projects.

2.1.1 DUST CONTROL MEASURES INSTALLED BETWEEN AUGUST 1, 2021, AND JULY 31, 2022

From August 1, 2021, to July 31, 2022, State Parks installed 90.0 acres of new dust control projects at ODSVRA.[3] State Parks:

- Initiated planting of 65.9 acres of new vegetation using sterile grass seed in five (5) different treatment areas.
- Installed 24.1 acres of new, temporary dust control measures in two (2) different areas, both of which consisted of straw treatments.

From August 1, 2021, to July 31, 2022, State Parks also converted and/or maintained approximately 106.1 acres of existing dust control projects. State Parks:

- Converted 53.1 acres of existing, temporary wind fencing, straw treatment, and vehicle exclosure measures to native dune vegetation.
- Conducted supplemental plantings in existing vegetation plots.
- Maintained 53.0 acres of existing wind fencing installed as part of the 2019 and 2020 ARWPs.

The dust control projects implemented by State Parks from August 1, 2021, to July 31, 2022, total 143.1 acres as listed in Table 2-1, shown in Figure 2-1, and briefly summarized below.[4.]

Refer to Attachment 01, 2011 to 2022 Dust Control Measures, for additional maps showing historical dust control measure locations, the dust control measures installed between August 1, 2021, and July 31, 2022, and all dust control measures in place as of July 31, 2022. Refer to Section 2.3.7 and Attachment 02, PMRP Evaluation Metrics, for additional information on dust control projects at ODSVRA, dust mitigation targets, and other indicators of dust control progress at ODSVRA.

[3] As recommended by the SAG, the main body of this ARWP document and Attachment 01 to this ARWP report the size of dust control measures to the nearest tenth of an acre, with acreage values rounded up (values 0.05 and above) or down (values below 0.05) to the nearest tenth of an acre as necessary.

[4] The 143.1 -acre estimate of dust control measures implemented between August 1, 2021, and July 31, 2022, includes 90.0 acres of new dust control measures (i.e., land area not previously controlled) and 53.1 acres of temporary dust control measures converted to vegetation dust control measures (i.e., land area already controlled but changed to a different dust control measure). The maintenance of wind fencing and minor supplemental vegetation planting are not included in the 143.1-acre estimate because there was no meaningful change in the type or amount of dust control occurring in these areas.

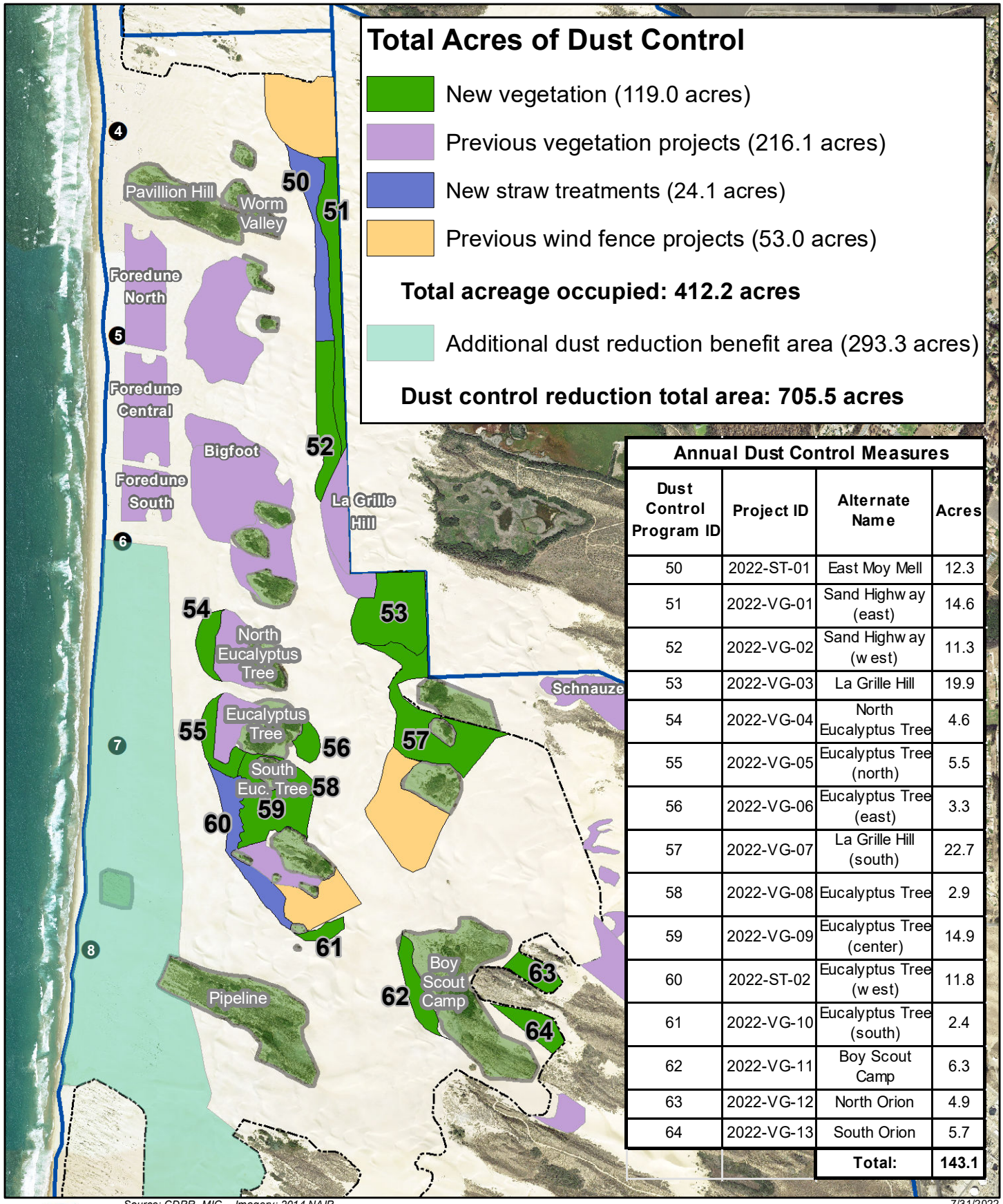
Table 2-1. Dust Control Measures Installed from August 1, 2021, to July 31, 2022				
Dust Control Program ID[A]	**Dust Control Measure ID[B]**	**New or Converted Dust Control Measure**	**Status of Dust Control Measure**	**Dust Control Measure Size in Acres[C]**
Converted Dust Control Projects				
53	22-VG-03	Converted to Vegetation	Long-term	19.9[D]
54	22-VG-04	Converted to Vegetation	Long-term	4.6
55	22-VG-05	Converted to Vegetation	Long-term	5.5
56	22-VG-06	Converted to Vegetation	Long-term	3.3
58	22-VG-08	Converted to Vegetation	Long-term	2.9
62	22-VG-11	Converted to Vegetation	Long-term	6.3
63	22-VG-12	Converted to Vegetation	Long-Term	4.9
64	22-VG-13	Converted to Vegetation	Long-term	5.7
		Subtotal, Converted Dust Control Projects		*53.1*
New Dust Control Projects				
50	22-ST-01	New Straw Treatment	Temporary	12.3
51	22-VG-01	New Vegetation	Long-term	14.6
52	22-VG-02	New Vegetation	Long-term	11.3
57	22-VG-07	New Vegetation	Long-term	22.7
59	22-VG-09	New Vegetation	Long-term	14.9
60	22-ST-02	New Straw Treatment	Temporary	11.8
61	22-VG-10	New Vegetation	Long-term	2.4
		Subtotal, New Dust Control Projects		*90.0*
Total Dust Control Measure Acreage Installed, August 1, 2021, to July 31, 2022				**143.1**

(A) State Parks has implemented a series of dust control projects at ODSVRA since 2011. The "Dust Control Program ID" represents the chronological order of these dust control projects, beginning with the first straw bale pilot project in 2011 (ID #01) and concluding with the final vegetation project in 2022 (ID #64). For projects installed in the same dust control year (defined from August 1st of one year to July 31st of the next year), projects are numbered from north to south.

(B) The "Dust Control Measure ID" identifies the dust control year, type of measure, and how many of the same type of measures were installed in the dust control year. For example, "22-VG-05" is the fifth vegetation treatment project installed in the 2022 dust control year (identified from north to south). "ST" refers to straw treatment, "WF" refers to wind fencing, "TV" refers to temporary vehicle exclusion area, and "VG" refers to vegetation.

(C) As recommended by the SAG, this 2022 ARWP document reports dust control measure acreages to the nearest tenth of an acre. See footnote 3. Refer to Figure 2-1 and Attachment 01, 2011 to 2022 Dust Control Measures, for dust control measure location and acreage amounts.

(D) Minor changes in the size of converted dust control projects occur due to changes in topography and public access needs. The total net difference in converted acreage is a positive 0.1 acres (i.e., 2022 projects occupy approximately 0.1 acres more than the previous projects they replaced).



Annual Dust Control Measures			
Dust Control Program ID	Project ID	Alternate Name	Acres
50	2022-ST-01	East Moy Mell	12.3
51	2022-VG-01	Sand Highway (east)	14.6
52	2022-VG-02	Sand Highway (west)	11.3
53	2022-VG-03	La Grille Hill	19.9
54	2022-VG-04	North Eucalyptus Tree	4.6
55	2022-VG-05	Eucalyptus Tree (north)	5.5
56	2022-VG-06	Eucalyptus Tree (east)	3.3
57	2022-VG-07	La Grille Hill (south)	22.7
58	2022-VG-08	Eucalyptus Tree	2.9
59	2022-VG-09	Eucalyptus Tree (center)	14.9
60	2022-ST-02	Eucalyptus Tree (west)	11.8
61	2022-VG-10	Eucalyptus Tree (south)	2.4
62	2022-VG-11	Boy Scout Camp	6.3
63	2022-VG-12	North Orion	4.9
64	2022-VG-13	South Orion	5.7
		Total:	**143.1**

Source: CDPR, MIG Imagery: 2014 NAIP

7/31/2022

0 500 1,000 2,000 Feet

N

Figure 2-1: 2021-2022 Dust Control Measures

2022 ARWP

Marker post

Existing fenced vegetated islands

Park boundary

Open riding and camping area boundary fence

2.1.1.1 New Vegetation Measures

In late spring 2022, State Parks initiated the planting of approximately 65.9 new acres of vegetation at ODSVRA in five (5) different project areas selected in consultation with the SAG:

- Vegetation measures 22-VG-01 (14.6 acres) and 22-VG-02 (11.3 acres) are located along the northeastern border of ODSVRA, with one project (22-VG-02) inside the open riding and camping area and one project (22-VG-01) outside the open riding and camping area. These new planting areas are located adjacent to a new straw treatment project (22-ST-01). Together, these three new projects fill in and/or expand and increase the size of existing dust control treatment areas 18 VG-01 and 20-WF-01 (see Attachment 01, Figures A01-09 and A01-11).
- Vegetation measure 22-VG-07 (22.7 acres) is located along the eastern boundary of the ODSVRA's open riding and camping area (perpendicular to marker post 7). This new planting area is located adjacent to a vegetation conversion project (22-VG-03). Together, these planting efforts fill in and/or expand and increase the size of existing dust control treatment areas 21-VG-02 and 21-WF-01 (see Attachment 01, Figure A01-12.
- Vegetation measure 22-VG-09 (14.9 acres) is located south of the South Eucalyptus vegetation island, in the center of the ODSVRA's open riding and camping area (perpendicular to marker post 7). This new planting area is located adjacent to a new straw treatment measure (22-ST-02), two vegetation conversion projects (22-VG-05 and 22-VG-08), and a historical vegetation project (21-VG-04, see Attachment 01, Figure A01-12). This vegetation measure expands and increases the size of a large dust control treatment area in the center of the open riding and camping area.
- Vegetation measure 22-VG-10 (2.4 acres) is located south of the Tabletop vegetation island, in the center of the ODSVRA's open riding and camping area (perpendicular to marker post 8). This new planting area is located adjacent to a new straw treatment measure (22-ST-02) and a historical wind fencing project (21-WF-02, see Attachment 01, Figure A01-12). This new vegetation measure expands and increases the size of a large dust control treatment area in the center of the open riding and camping area.

In total, State Parks spread 875 pounds of sterile cereal grains within the new vegetation projects listed above. Due to the timing of the seeding (late in the growing season), germination was limited in each treatment area. State Parks will, as necessary, stabilize and seed these areas using locally collected native seed during the 2022/23 planting season; container plants were not used in newly vegetated areas in 2022.

State Parks' seeding methods are fully described in Chapter 6 of the June 2019 Draft PMRP. Refer to Attachment 03, 2021/2022 ODSVRA Dust Control Program Vegetation Restoration

Projects, for a detailed breakdown of new vegetation areas and the amount of non-native seeding activity (pounds applied) in each treatment area.

2.1.1.2 New Temporary Dust Control Measures

In spring 2022, State Parks installed approximately 24.1 acres of new, temporary dust control measures at ODSVRA in two (2) different areas selected in consultation with the SAG:

- Straw treatment measure 22-ST-01 (12.3 acres) is located along the northeastern border of the ODSVRA open riding and camping area. This new straw treatment area is located adjacent to two new vegetation projects (22-VG-01 and 22-VG-02). Together, the new straw treatment and vegetation projects fill in and/or expand and increase the size of existing dust control treatment areas 18 VG-01 and 20-WF-01 (see Attachment 01, Figures A01-09 and A01-11).
- Straw treatment measure 22-ST-02 (11.8 acres) is located west of the South Eucalyptus and Tabletop vegetation islands, in the center of the ODSVRA's open riding and camping area (perpendicular to marker posts 7 and 8). This new straw treatment measure is adjacent to two new vegetation projects (22-VG-09 and 22-VG-10), two vegetation conversion projects (22-VG-05 and 22-VG-08), and historical vegetation and wind fencing projects (21-VG-04 and 21-WF-02, see Attachment 01, Figure A01-12). This straw treatment measure expands and increases the size of a large dust control treatment area in the center of the open riding and camping area.

State Parks applies straw to a depth of approximately six-to-eight inches; however, the amount of straw applied varies by treatment area due to topography.

2.1.1.3 Conversion of Existing Temporary Measures to Long-Term Vegetation Dust Control Measures

In fall 2021 and winter 2022, State Parks converted 53.1 acres of temporary wind fencing, straw treatment, and vehicle exclosure measures to long-term vegetation dust control measures:

- Vegetation measure 22-VG-03 (19.9 acres) is located along the eastern boundary of the ODSVRA open riding and camping area (perpendicular to marker post 6). This measure replaced 19.8 acres of wind fencing installed in 2020 (20-WF-02, see Attachment 01, Figure A01-11).
- Vegetation measure 22-VG-04 (4.6 acres) is located west of the North Eucalyptus Tree vegetation island, in the center of the ODSVRA open riding and camping area. This measure replaced 4.7 acres of straw treatment installed in 2021 (21-ST-01, see Attachment 01, Figure A01-12).
- Vegetation measure 22-VG-05 (5.5 acres) is located west of the Eucalyptus Tree vegetation island, in the center of the ODSVRA open riding and camping area. This measure replaced 5.5 acres of straw treatment (21-ST-02) installed in 2021 (see

Attachment 01, Figure A01-12).

- Vegetation measure 22-VG-06 (3.3 acres) is located east of the Eucalyptus Tree vegetation island, in the center of the ODSVRA open riding and camping area. This measure replaced 3.2 acres of vehicle exclosure area (21-TV-01) installed in 2021 (see Attachment 01, Figure A01-12).
- Vegetation measure 22-VG-08 (2.9 acres) is located east of the South Eucalyptus vegetation island, in the center of the ODSVRA open riding and camping area. This measure replaced 2.7 acres of vehicle exclosure area (21-TV-02) installed in 2021 (see Attachment 01, Figure A01-12).
- Vegetation measures 22-VG-11 (6.3 acres), 22-VG-12 (4.9 acres), and 22-VG-13 (5.7 acres) are located along the southeastern boundary of the ODSVRA open riding and camping area, near the Boyscout Camp vegetation island. These vegetation measures replace straw treatment measures 21-ST-03 (6.5 acres), 21-ST-04 (5.0 acres), and 21-ST-05 (5.6 acres), which were all installed in 2021 (see Attachment 01, Figure A01-12).

In total, State Parks planted approximately 117,700 plants and spread 540.1 pounds of native dune seed and 2,675 pounds of sterile seed in the eight (8) converted vegetation projects identified above. Refer to Attachment 03, 2021/2022 ODSVRA Dust Control Program Supplemental Vegetation Restoration Projects, for a detailed breakdown of converted vegetation areas, the type of species planted, and the amount of native and non-native seeding (pounds applied) and planting (number of seedlings planted) activity in each treatment area.

2.1.1.4 Supplemental Vegetation Plantings

From fall 2021 to spring 2022, State Parks planted approximately 5,025 plants and spread approximately 10.9 pounds of native dune seed (and 525 pounds of sterile seed) in areas previously treated with native vegetation. In total, this supplemental planting covered approximately 2.7 acres of previously treated areas. Supplemental planting often focuses on the west-facing portions of vegetation installations where direct wind and sand activity bury or undermine treatments. Some supplemental planting areas require straw, while others are treated with native plants and/or seeds. The areas that received supplemental plantings during the 2021/22 planting season included the North Eucalyptus Tree (2019-VG-02) and Eucalyptus Tree (21-VG-03) vegetated areas (see Attachment 01, Figures A01-10, and A01-12).

In addition, State Parks conducted supplemental planting activities on approximately two (2)-acres of land near the Boy Scout Camp vegetation island. This area is near an existing dust control measure (21-ST-03) but is not added to the dust control acreage values or the estimates

of container plants and seed reported in this 2022 ARWP.[5]

Refer to Attachment 03, 2021/2022 ODSVRA Dust Control Program Vegetation Restoration Projects, for a detailed breakdown of the supplemental planting treatment areas, the type of species planted, and the amount of supplemental seed (pounds applied) and planting (number of seedlings planted) activity in each treatment area.

While State Parks' supplemental vegetation planting activities may be necessary to support the establishment and success of a vegetation project, such activities (in terms of acres of supplemental plantings) are not reported in this section or Table 2-1 because these activities take place in project areas that have already been reported on in prior ARWP documents and counted as vegetation dust control projects (see Section 2.1.2).

2.1.1.5 Maintenance of Existing Temporary Dust Control Measures

Consistent with SOA Condition 1.b., State Parks maintained 53.0 acres of existing wind fencing projects installed at ODSVRA before August 1, 2021. These include projects 20-WF-01 (20.5 acres) in the northeast corner of the ODSVRA open riding and camping area, 21-WF-01 (21.7 acres) in the center of the open riding and camping area (perpendicular to marker post 7), and 21-WF-02 (10.8 acres) south of the Tabletop vegetation island also in the center of the open riding and camping area (see Attachment 01, Figures A01-11 and A01-12). Maintenance activities included replacing fence posts and fencing materials and installing new fence rows to maintain historical design control values for wind fencing arrays.

2.1.1.6 Western Snowy Plover Exclosure

Management of the ODSVRA includes a substantial, ongoing effort to enhance habitat for the western snowy plover (*Charadrius nivosus nivosus*; federal-listed as threatened) and California least tern (*Sterna antillarum browni*, state and federally listed endangered) and to protect these species' nesting sites. Historically, this management effort has included the installation of temporary fencing to protect nesting western snowy plover and California least tern from March 1 to September 30 each year. Between 2004 and 2021, the size of this temporary nesting exclosure ranged between 271 and 307 acres, with the average size of the nesting exclosure equal to 293.3 acres.

In October 2021, as part of its ongoing operations, State Parks closed 293.3 acres of land within the ODSVRA open riding and camping area. The closure of this land prohibits vehicular and non-vehicular recreation from occurring and, therefore, is similar to temporary vehicle exclosure projects that State Parks has historically implemented under its Dust Control Program. The

[5] In the Boy Scout Camp vegetated area, State Parks planted approximately 2,650 plants and spread approximately 5.8 pounds of native dune seed (and 160 pounds of sterile seed). In total, State Parks planted approximately 7,670 plants and spread 16.7 pounds of native dune seed and 685 pounds of sterile seed over approximately 3.4 acres of supplemental vegetation restoration projects.

permanent closure of the nesting exclosure is anticipated to result in a dust reduction benefit similar to other temporary vehicle exclosures by allowing the natural progression of foredune formation. This 2022 ARWP, therefore, takes credit for the modeled dust reduction benefit associated with the nesting exclosure (see Section 2.2.1.3).

The decision to close this area was an operational choice that could be reversed at some point in the future. If this area were to be re-opened at some point in the future, State Parks would identify other areas for dust control that equal the credited mass emissions reductions occurring from this area.

2.1.2 CUMULATIVE DUST CONTROL MEASURES INSTALLED AS OF JULY 31, 2022

As of July 31, 2022, 38 dust control projects are in the ground at ODSVRA. State Parks actively manages and maintains each of these projects. In total, the 38 dust control projects plus the closed nesting exclosure occupy 705.5 acres of land at ODSVRA. The dust control measures in the ground at ODSVRA as of July 31, 2022 are summarized in Table 2-2 and shown in Figure 2-2. Refer to Attachment 01 for additional maps showing historical dust control measure locations and all dust control measures in place as of July 31, 2022. Refer to Section 2.3.7 and Attachment 02, PMRP Evaluation Metrics, for additional information on dust control projects at ODSVRA, dust mitigation targets, and other indicators of dust control progress at ODSVRA.

Table 2-2. Cumulative Dust Control Measures Installed as of July 31, 2022				
Type of Dust Control Measure	**Number of Projects[(A)]**	**Acres Controlled by Dust Control Measures**		
		Inside Open Riding and Camping Area	**Outside Open Riding and Camping Area**	**SVRA Total**
Vegetation Dust Control Measures				
Foredune	3	48.0	0.0	48.0
Backdune	30	211.2	75.9	287.1
Subtotal	*33*	*259.2*	*75.9*	*335.1*
Seasonal and/or Temporary Dust Control Measures				
Straw Treatment	2	24.1	0.0	24.1
Wind Fencing	3	53.0	0.0	53.0
Temporary Vehicle Exclosure	0	0.0	0.0	0.0
Other[(B)]	0	0.0	0.0	0.0
Subtotal	*5*	*77.1*	*0.0*	*77.1*
Other Operational Activity				
Closure of Nesting Exclosure	-	293.3	0.0	293.3
Totals	**38**	**629.6[(C)]**	**75.9**	**705.5[(C)]**

(A) Value reflects the number of projects forecast to be in the ground as of July 31, 2022 and does not consider planned activities described in Chapter 3 of this ARWP.

(B) Other refers to porous roughness elements, soil stabilizers, or other types of dust control measures.

(C) Without the plover exclosure, there are 336.3 acres of dust control inside the open riding and camping area and 412.2 total acres of dust control at ODSVRA.

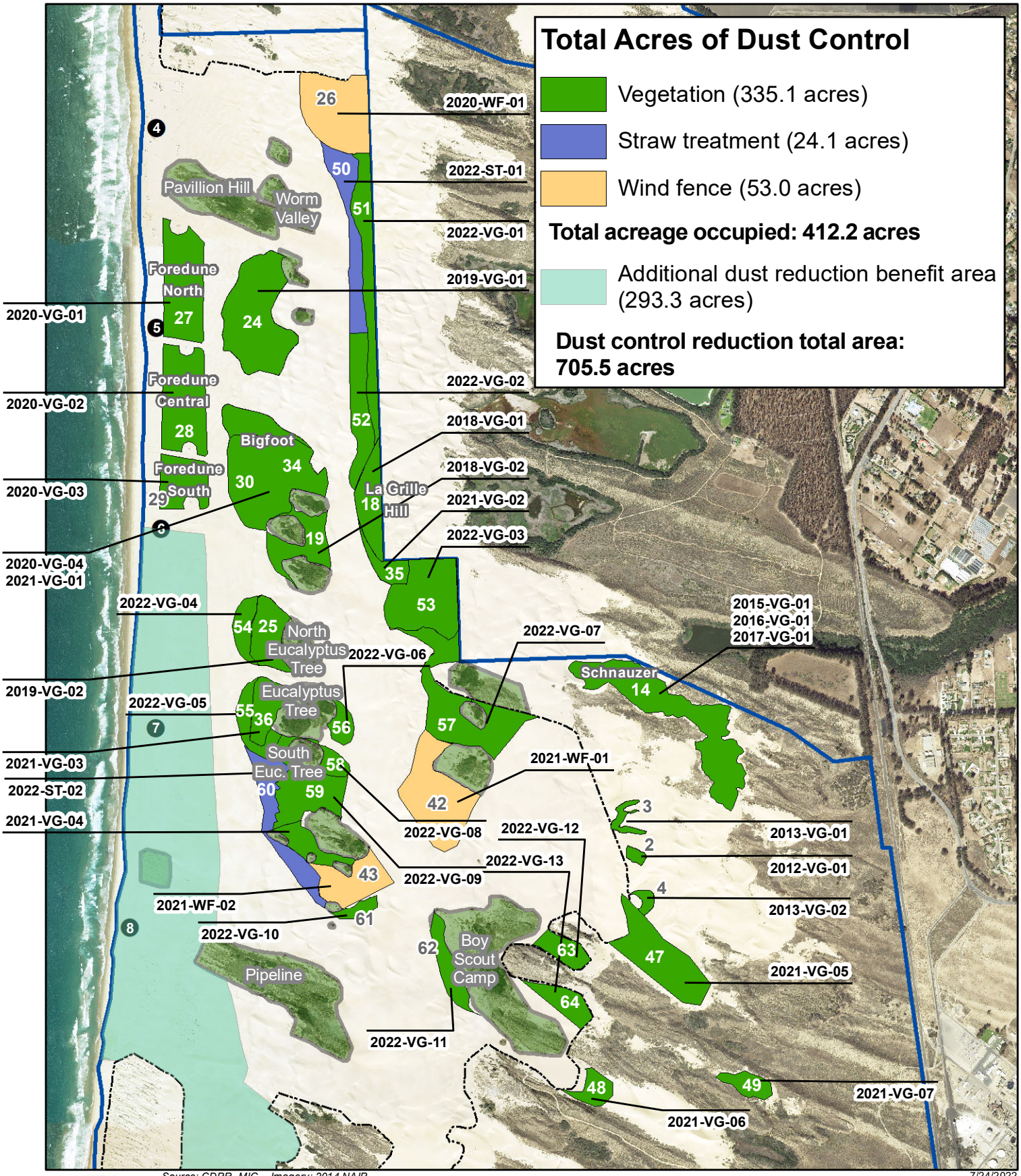


Figure 2-2: Dust Control Installed as of 07/31/2022

2022 ARWP

2.2 REPORT ON PROGRESS TOWARDS SOA GOALS

The current SOA 17-01, as amended, establishes project, emission reduction, and air quality standard requirements:

- Condition 1.a. and Item 1 of the SOA, as amended, required State Parks to fence off a foredune area (identified in Map 1 of Attachment 1 of the SOA) and install 74-acres of wind fencing projects by September 15, 2018 (referred to as initial particulate matter reduction actions, or "Initial SOA" dust control measures). Pursuant to the SOA, State Parks is to prioritize the conversion of wind fencing projects to vegetation. As amended in November 2019, the SOA also requires State Parks to finish installing perimeter fencing for a 48-acre foredune area and complete an additional 4.2 acres of vegetation in an area approved by the SAG.
- Condition 1.c. required State Parks to install SLOAPCD-approved sand track-out control devices at the Grand and Pier Avenue entrances to ODSVRA.
- Condition 2.b. required State Parks' PMRP to be designed to achieve the state and federal ambient air quality standards for PM_{10}. These standards are typically California Ambient Air Quality Standards (CAAQS) and National Ambient Air Quality Standards (NAAQS). The CAAQS and NAAQS for PM_{10} are shown in Table 2-3. The CAAQS and NAAQS are mass concentration-based standards that required measurement and analysis of ambient air to determine compliance with the standard. Progress towards compliance with SOA Condition 2.b is measured by evaluating modeled and actual measured concentrations of PM_{10} concentrations at the SLOAPCD's CDF and Mesa2 air monitoring stations.
- Condition 2.c required the PMRP to reduce maximum 24-hour PM_{10} baseline emissions by 50%. This requirement is assessed through air quality modeling to define the baseline emissions conditions from May 1, 2013, through August 31, 2013, before any major dust controls were implemented. After the issuance of the SOA, baseline emissions conditions were defined as the PM_{10} mass emissions occurring within the ODSVRA open riding and camping area, as averaged over the ten windiest days from May 1, 2013, to August 31, 2013. In contrast to the CAAQS and NAAQS, which are mass-concentration-based standards, this SOA requirement is a mass emissions-based standard. Progress towards compliance with SOA Condition 2.c. is measured by modeling and identifying the maximum amount of PM_{10} mass (e.g., metric tons/day) emitted by the ODSVRA open riding and camping area during the 2013 baseline period, inputting dust control measures into the model, and determining the total reduction in PM_{10} mass achieved by the dust control measures based on the use of the air quality model.

Table 2-3. California and National Ambient Air Quality Standards for PM_{10}		
Averaging Time	**California Standard(A)**	**National Standard (A)**
24-Hour Average	50 µg/m^3	150 µg/m^3
Annual Arithmetic Mean(B)	20 µg/m^3	No standard adopted

Source: CARB, 2016 (https://ww2.arb.ca.gov/sites/default/files/2020-07/aaqs2.pdf)

(A) µg/m^3 = micrograms per cubic meter

(B) The California Health Safety Code, Division 26, Part I does not define "annual arithmetic mean" or annual average. The Code of Federal Regulations generally defines the annual arithmetic mean to be a weighed arithmetic mean, based on four quarterly means in a calendar year (see 40 CFR Part 50).

As noted in Chapter 1, the SAG has identified potential revisions to SOA 17-01, as amended, which form the basis for State Parks' planned petition to modify the current SOA. Summaries of the SAG's basis for identifying potential revisions to the SOA and State Parks' progress made towards complying with the current SOA's requirements, as well as SAG-identified SOA revisions, are provided below.

2.2.1 Revisiting the SOA Targets and SAG-Recommended Changes to Air Quality Modeling

Section 3.3 of the 2020 ARWP states:

> "All parties [i.e., SAG, DRI staff, and State Parks staff] will continue coordination on possible SOA Goal Alternatives, noting that the foremost goal is to achieve reductions in PM_{10} concentrations toward attaining state and federal air quality standards while minimizing impacts to public recreation opportunities."

SOA provision 2.c. directs that State Parks:

> "[establish] an initial target of reducing the maximum 24-hour PM_{10} baseline emissions by fifty percent (50%), based on air quality modeling based on a modeling scenario for the period May 1 through August 31, 2013."

Whereas SOA provision 2.d. allows that:

> "[t]he estimates of emission reductions identified in 2c may be modified based on air quality modeling conducted by [the California Air Resources Board, or CARB] or another modeling subject to the review of the SAG."

Over the past two years, the SAG has worked with State Parks and the SLOAPCD to identify potential scientifically informed refinements to the initial SOA target of reducing PM_{10} emissions from the ODSVRA open riding and camping area by 50% relative to 2013 modeled baseline conditions. This proposed refinement, which is informed by improved understanding and modeling of historical and current PM_{10} emissions from ODSVRA, is based on a comprehensive determination of the difference in PM_{10} emissions between the SOA's 2013 baseline scenario and a "pre-disturbance" historical scenario identified to simulate conditions prior to significant off-highway vehicle (OHV) disturbance. This pre-disturbance scenario is

informed by analysis of differences between PM_{10} emissivity within riding and non-riding areas, as well as by a comprehensive analysis of historical vegetation changes within ODSVRA (see Section 2.3.6.3). The SAG's analysis also provides a refined understanding of the effectiveness of recent dust mitigation treatments and identifies specific changes to incorporate into the current DRI model to more accurately account for changes in surface emissivity, PM_{10} mass emissions, PM_{10} concentration reductions, and overall Dust Control Program progress.

The SAG's proposed potential alternatives to the current SOA and recommended model changes are described in full in the SAG's memorandum entitled *Scientific Basis for Possible Revision of the Stipulated Order of Abatement* dated February 7, 2022.[6]

2.2.1.1 1939 and 1966 Pre-Disturbance Scenarios

As described in Section 2.2, Condition 2.c of the SOA requires State Parks' PMRP to reduce maximum 24-hour PM_{10} baseline emissions by 50%, based on air quality modeling. This initial target was developed by SLOAPCD staff based on a comparison of PM_{10} concentrations at the SLOAPCD's CDF air quality monitoring station, which is downwind of the ODSVRA open riding and camping area, and State Parks' Oso Flaco air quality monitoring station, which is located in the southeast corner of the ODSVRA and experiences negligible disturbance from OHVs. This approach represented an estimate of the incremental contribution of OHV recreation to PM_{10} emissions and concentrations above the levels that would occur under natural or background conditions without OHV recreation. Subsequently, the SAG recommended a refined SOA target based on a modeling approach that compared modeled PM_{10} mass emissions and PM_{10} concentrations for a pre-disturbance scenario, reflecting conditions prior to OHV disturbance, to 2013 baseline modeled PM_{10} mass emissions and PM_{10} concentrations, which reflect conditions after OHV disturbance, but prior to implementation of significant dust control measures at ODSVRA. The SAG also recommended that any modeling of pre-disturbance conditions should account for the lower average PM_{10} emissivity in non-riding areas (as compared to the ODSVRA open riding and camping area), the documented north-south gradient in PM_{10} emissivity (in which PM_{10} emissivity decreases from north to south, both inside and outside the open riding and camping area), and historical changes in vegetation coverage. The SAG's recommended parameters for the pre-disturbance modeling scenarios are summarized in Table 2-4.

[6] This SAG memo is available for review available at https://ohv.parks.ca.gov/?page_id=27160. See OHMVR Commission meeting materials for February 17, 2022.

Table 2-4. SAG Parameters for Refined Pre-Disturbance Emissions Scenarios			
Variable	**2013 Baseline Scenario**	**Pre-Disturbance Scenario 1 (1939)**	**Pre-Disturbance Scenario 2 (1966)**
PM_{10} emissivity of open sand areas	2013 PI-SWERL Grid for riding and non-riding areas	Use mean emissivity of adjacent non-riding areas, subdivided into northern, central, and southern zones	
Vegetation Coverage(A)	2013 vegetation islands	Vegetation cover estimated by UCSB from 1939 air photography	Vegetation cover estimated by UCSB from 1966 air photography
(A) Refer to Section 2.3.6.3 for a description of UCSB's historical vegetation analysis.			

The results of DRI's modeling using the SAG-suggested assumptions developed to represent pre-disturbance emissivity and vegetation cover conditions are summarized in Table 2-5, Table 2-6, and Table 2-7.

Table 2-5. Modeled 2013 Baseline and Pre-Disturbance PM_{10} Mass Emissions				
Variable	**2013 Baseline Scenario**	**Current SOA Target(A)**	**Pre-Disturbance Scenario 1 (1939)**	**Pre-Disturbance Scenario 2 (1966)**
PM_{10} mass emissions (metric tons / day)	182.8(A)	91.4	108.4	108.9
Percent reduction relative to 2013 baseline	--	50.0%	40.7%	40.4%
(A) Current SOA target is a 50% reduction in maximum modeled PM_{10} baseline mass emissions from 2013 (see Section 2.2.3 and Table 2-9).				

Table 2-6. Modeled 2013 Baseline and Pre-Disturbance 24-Hour Average PM_{10} Concentrations (CDF)				
Variable	**2013 Baseline Scenario**	**SOA Target(A)**	**Pre-Disturbance Scenario 1 (1939)**	**Pre-Disturbance Scenario 2 (1966)**
24-hour average PM_{10} concentration ($\mu g/m^3$)	124.7(A)	50.0	88.0	87.0
Percent reduction relative to 2013 baseline	--	59.9%	29.4%	30.2%
(A) Current SOA target is achievement of ambient air quality standards (see Section 2.2.4 and Table 2-11).				

Table 2-7. Modeled 2013 Baseline and Pre-Disturbance 24-Hour Average PM_{10} Concentrations (Mesa2)				
Variable	**2013 Baseline Scenario**	**SOA Target(A)**	**Pre-Disturbance Scenario 1 (1939)**	**Pre-Disturbance Scenario 2 (1966)**
24-hour average PM_{10} concentration ($\mu g/m^3$)	97.5(A)	50.0	71.2	75.7
Percent reduction relative to 2013 baseline	--	48.7%	27.0%	22.4%
(A) Current SOA target is achievement of ambient air quality standards (see Section 2.2.4 and Table 2-13).				

2.2.1.2 SAG-Recommended Updates to SOA Dust Control

Based on the results of the pre-disturbance modeling, the SAG found that if the management objective for State Parks ODSVRA Dust Control Program is to reduce emissions of PM_{10} to a level consistent with dust emissions prior to significant OHV disturbance, then there is strong scientific justification for adjusting the SOA's current PM_{10} mass emissions reduction target from the current 50% reduction requirement set forth in SOA Condition 2.c to a new target of 40.7% (see Table 2-5).

The SAG concluded PM_{10} mass emissions reductions at ODSVRA will significantly reduce airborne PM_{10} concentrations downwind of the SVRA, but notes that "while PM_{10} air quality is substantially improved for the pre-disturbance scenarios relative to the 2013 baseline, PM_{10} concentrations for these scenarios still substantially exceed the 50 $\mu g/m^3$ California PM_{10} air quality standards. These standards reflect the fact that the ODSVRA is a naturally dusty environment even in the absence of OHV activity. For context, the California PM_{10} standard is occasionally exceeded at the Oso Flaco monitoring site, which is assumed to be unaffected by human disturbance . . . Therefore, a management approach seeking to complete eliminate exceedances of the California PM_{10} standard would likely require reducing PM_{10} emissions far below what existed prior to OHV disturbance."

The SAG's recommended 40.7% PM_{10} mass emissions reduction target is a scientifically defensible target that is:

1) Consistent with the SOA and the SLOAPCD's intent for regulating dust emissions from ODSVRA – to reduce PM_{10} emissions commensurate with the estimated effect that human disturbance had on PM_{10} levels downwind of ODSVRA; and
2) Based on multiple years of peer-reviewed and published emissivity data, the use of a peer reviewed and published emission and dispersion model, and a SAG-reviewed study of historical vegetation coverage at ODSVRA.

On February 22, 2022, State Parks affirmed its overall support for the SAG recommendations in a report to the SLOAPCD Hearing Board. On May 13, 2022, the OHMVR Commission prepared a letter expressing its preference for the revised SOA target over the existing SOA target, while also expressing fundamental concerns about the underlying SOA framework.[7]

2.2.1.3 SAG-Recommended Changes to DRI Model Assumptions

As explained in Section 2.2, Condition 2.c of the SOA, as amended, stipulates the use of air quality modeling to define 2013 baseline emissions conditions and estimate mass emissions reductions achieved by the Dust Control Program. The "current" DRI model was approved by State Parks, the SAG, and the SLOAPCD in October 2018. Subsequent verification of the model demonstrated the correlation between modeled and measured PM_{10} concentrations is good across a range of conditions. Refer to State Parks' 2019 Draft PMRP (Chapter 3) and 2020 ARWP (Section 2.3.3) for a description of the current DRI model and the model verification analysis, respectively.

In parallel with its efforts to revisit and refine current SOA targets, the SAG also consulted with State Parks and the SLOACPD on methods to more accurately account for the effectiveness of dust mitigation treatments. This effort led to the following recommendations for a "revised" DRI model that incorporates SAG-recommend changes to the assumptions and approach used to estimate and account for PM_{10} emissions reductions from State Parks' Dust Control Program. The SAG-recommended changes that DRI has incorporated into its revised model include:

1. **Updated PI-SWERL grid.** The current DRI model uses the 2013 PI-SWERL grid for modeling PM_{10} emissivity across the ODSVRA (for both the 2013 baseline scenario and subsequent dust control scenarios). The revised DRI model incorporates an updated 2019 PI-SWERL grid for dust control scenarios because this information represents the most recent emissivity conditions in the ODSVRA based on an equivalent number of PI-SWERL emissivity measurements as conducted in 2013. The original 2013 PI-SWERL grid is now only used for modeling the 2013 baseline scenario.
2. **Increased PM_{10} emissions within temporary fence arrays.** The current DRI model assumes that emissivity is zero within wind fence arrays (i.e., 100% control effectiveness). The revised DRI model incorporates the assumption that PM_{10} emissivity is 28% of its pre-treatment value within such arrays (i.e., 72% control effectiveness). This assumption is based on normalized sand flux (NSF) values reported within such arrays in the 2020 ARWP (Section 2.3.2) and 2021 ARWP (Attachment 06).

[7] These materials are available at https://ohv.parks.ca.gov/?page_id=27160. See OHMVR Commission meeting materials for February 17, 2022. Specifically, see the *SOA Letter to Officer Willey, Director Quintero, and the APCD Hearing Board* link.

3. **Increased PM_{10} emissions within the 48-acre foredune:** The current DRI model assumes that emissivity is zero within the 48-acre foredune (i.e., 100% control effectiveness). The revised DRI model incorporates the assumption that PM_{10} emissivity is equal to the mean emissivity for all non-riding areas (using the 2019 PI-SWERL grid).

4. **Increased PM_{10} emissions within nesting exclosure.** Consistent with previous assumptions for temporary vehicle exclosures, the current DRI model assumes that emissivity is zero within the closed nesting exclosure. The revised DRI model incorporates the assumption that PM_{10} emissivity is equal to 50% of the actual mean emissivity for the nesting exclosure, based on the 2019 PI-SWERL emissions grid. As described further below, this change is scientifically justified and based on the best information currently available to the SAG and State Parks.

   As explained in Section 2.1.1.6, State Parks made the operational decision to close the nesting exclosure to OHV activity in October 2021; however, the nesting exclosure had already been closed to OHV recreation for some time prior to October 2021. Specifically, due to normal seasonal nesting exclosure restrictions, the nesting exclosure had been essentially closed to OHV activity since March 2021.[8]

   As noted above, the SAG recommended the revised model incorporate the 2019 PI-SWERL emissivity grid. In addition, DRI recommended, and the SAG supported, a further reduction in the mass emission contribution from the 293.3-acre nesting exclosure area. This reduction was recommended to account for the transition from seasonally allowed OHV recreation (historically October to March) to the year-round closure to OHV recreation of the nesting exclosure. The credit applied to the closed nesting exclosure area is based on the DRI study that examined the changes in surface emissivity that occurred at ODSVRA over the approximately seven month-period ODSVRA was closed to vehicular access due to COVID-19 restrictions (from approximately March to October 2020). This study found ODSVRA experienced an almost 50% reduction in PM_{10} for equivalent wind power density between April and August 2020, which suggests that emissivity across ODSVRA, including the nesting exclosure, was reduced by 50% over this five-month period. Refer to State Parks 2021 ARWP, Attachment 10, for additional information on the DRI study examining changes in emissivity at ODSVRA in 2020.

   As noted above, the nesting exclosure area has been closed to OHV recreation since March 2021, or approximately 17 months as of August 1, 2022. Therefore, as recommended by DRI and the SAG, the revised model applies a 50% reduction to the mean 2019 PI-SWERL emissivity measured in the nesting exclosure. State Parks notes

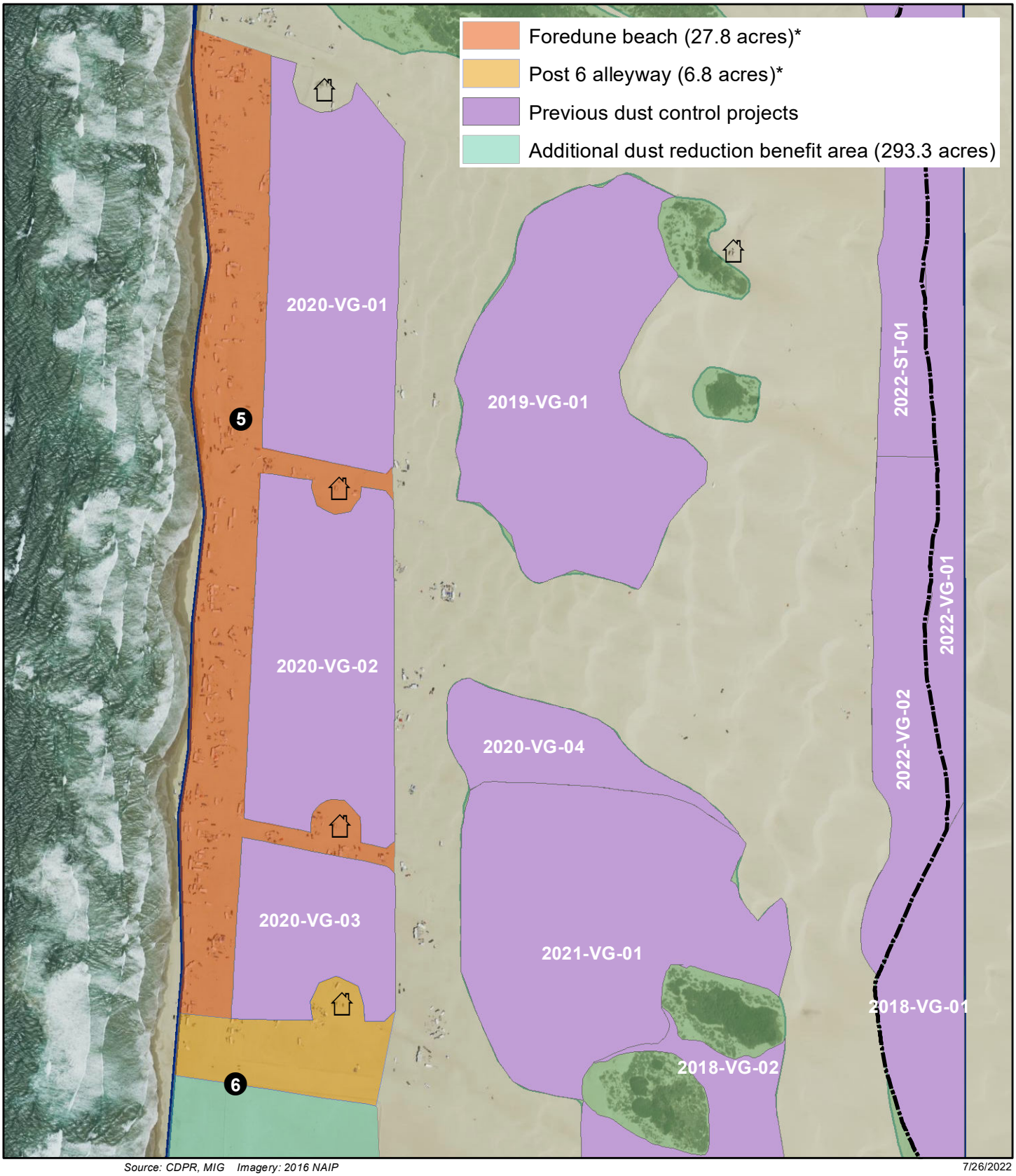
[8] The nesting exclosure area was open to OHV activity for a brief period in October 2021 (totaling 11 days) but has been closed to OHV activity for the majority of time since March 2021.

this SAG-recommended revised model assumption is preliminary. Given the immature development of the nesting exclosure (as compared to other established foredune areas), this preliminary assumption may be an overestimate relative to actual emissions reductions. State Parks will, in consultation with the SAG, continue to evaluate and refine emissivity and mass emission reduction within the nesting exclosure (as well as the 48-acre foredune) using upcoming PI-SWERL sampling planned for October 2022 (see Section 3.1.5.2) and continued study of factors such as vegetation cover in the nesting exclosure and/or 48-acre foredune (see Sections 2.3.3 and 2.3.6).

5. **Decreased PM_{10} emissions downwind of foredune areas.** The current DRI model assumes that foredunes reduce PM_{10} emissions to zero (i.e., 100% control effectiveness) within their footprint but have no effect on PM_{10} emissions immediately downwind. The revised DRI model incorporates the results of computation fluid dynamic (CFD) modeling conducted by DRI and the University of California at Santa Barbra (UCSB) to include a capture recovery curve that accounts for downwind foredune sheltering effects. This sheltering effect has been applied downwind of the 48-acre foredune area and the 293.3-acre nesting exclosure area. Refer to Section 2.3.4 and Attachment 06-03 for more detailed information on the CFD modeling methodology and results.

In addition to the SAG-recommended changes to the current DRI model, State Parks has requested DRI incorporate the following change to the current model:

6. **Decreased PM_{10} emissions in foredune beach and corridors.** The current DRI model assumes PM_{10} emissions from the beach area upwind of the 48-acre foredune and the corridors within the 48-acre foredune area are uncontrolled. State Parks has requested the revised DRI model incorporate the assumption that PM_{10} emissivity in these areas is equal to the mean emissivity for all non-riding areas. The basis for this request is that the foredune beach and corridor areas have been closed to OHV recreation for approximately seven months due to seasonal nesting activities since 2020. In contrast, prior to the installation of the 48-acre foredune project in 2020, these areas were open to OHV recreation year-round. The foredune beach and corridor areas that would be subject to this requested change are show in Figure 2-3. Due to time constraints, DRI has not yet incorporated this change into the revised model. State Parks notes this change to the DRI model would be subject to further coordination and consultation with the SAG. State Parks will, in consultation with the SAG, continue to evaluate and refine emissivity in the foredune beach and corridor areas using upcoming PI-SWERL sampling planned for October 2022 (see Section 3.1.5.2).



Source: CDPR, MIG Imagery: 2016 NAIP 7/26/2022

Figure 2-3: Modeled Foredune Beach and Corridor Areas

2022 ARWP

Feet
0 500 1,000 2,000

N

Marker post
Vault toilets
Open riding and camping area boundary fence
Existing fenced vegetated islands
Park boundary

* Closed 7 months each year during nesting season.

The model refinements described above address the SAG's recommendations for improving the current DRI model. State Parks and the SAG recognize that some modeling assumptions will require further consideration, such as the dynamic nature of the evolving dunes and treatment areas, and how to appropriately model these dynamic changes in PM_{10} emissions. Refer to Section 3.1.6.1 for information on potential future modeling refinements.

The key assumptions of the current and revised DRI models are summarized and compared in Table 2-8.

Table 2-8. Comparison of Key Assumptions in the Current and Revised DRI Models

Variable	Current DRI Model		Revised DRI Model Dust Control Scenarios
	2013 Modeled Baseline	Dust Control Scenarios	
PI-SWERL Emissivity Grid	2013 PI-SWERL	2013 PI-SWERL	2019 PI-SWERL
PM_{10} Emissions Inside of Wind Fence Arrays	2013 PI-SWERL	Modeled as 100% Effective	Modeled as 72% Effective
PM_{10} Emissions Inside the 48-acre Foredune Project	2013 PI-SWERL	Modeled as 100% Effective	Modeled as Mean Emissivity of All Non-riding Areas
PM_{10} Emissions Inside the Closed Nesting Exclosure	2013 PI-SWERL	Modeled as 100% Effective	Modeled as 50% of Mean Emissivity of All Non-riding Areas
PM_{10} Emissions Downwind of 48-acre Foredune Project and Closed Nesting Exclosure	2013 PI-SWERL	2013 PI-SWERL (No Credit Applied)	Emissivity based on Computational Fluid Dynamics Modeling
PM_{10} Emissions from Foredune Beach and Corridor Areas	2013 PI-SWERL	2013 PI-SWERL (No Credit Applied)	Modeled as Mean Emissivity for All Non-riding Areas (not yet implemented)

2.2.2 Report On Progress Towards Specific SOA Projects

State Parks achieved the following progress towards the specific projects identified in the current SOA,as amended:

- **Foredune Project:** State Parks installed perimeter fencing for the 48-acre foredune project in 2019 (20-VG-01, 20-VG-02, 20-VG-03; see Attachment 01, Figure A01-11). During the 2019/20 growing season, State Parks implemented six different foredune treatment areas, including seed or seedling planting strategies, in consultation with the SAG (see Section 2.3.2.2). State Parks is monitoring foredune development in consultation with the SAG and UCSB.

- **Initial SOA Wind Fencing Projects:** State Parks installed 48.7 acres of wind fencing in three different treatment areas in summer 2018. By July 31, 2021, State Parks had converted all 48.7 acres of Initial SOA wind fencing projects to vegetation.
    - *Heather, Acacia, and Cottonwood (aka "Paw Print" or "Bigfoot"):* State Parks installed two wind fencing arrays on 35.2 acres of land adjacent to the Heather, Acacia, and Cottonwood vegetation islands in summer 2018 (18-WF-01 and 18-WF-02, see Attachment 01, Figure A01-09). State Parks converted most of this wind fencing (20.4 acres) to dune scrub vegetation in December 2019 (20-VG-04, see Attachment 01, Figure A01-11). State Parks removed the remaining 14.8 acres of wind fencing treatments in September 2019, installed straw bales in the same area in March 2020 (20-ST-01, see Attachment 01, Figure A01-11), and converted this straw to vegetation in Winter 2021 (21-VG-01, see Attachment 01, Figure A01-12).
    - *Eucalyptus Tree and South Eucalyptus:* State Parks installed wind fencing arrays on 8.0 acres of land adjacent to the Eucalyptus Tree vegetation island (18-WF-04). State Parks converted this wind fencing to vegetation in Winter 2021 (21-VG-03, see Attachment 01, Figure A01-12).
    - *Tabletop:* State Parks installed wind fencing arrays on 5.5 acres adjacent to the Tabletop vegetation island (18-WF-05). State Parks converted this wind fencing to vegetation in Winter 2021 (21-VG-04, see Attachment 01, Figure A01-12).
- **Initial SOA Straw Bale Projects:** State Parks installed 36.1 acres of straw bales in two different treatment areas in Summer 2018. By July 31, 2021, State Parks had converted all 36.1 acres of Initial SOA straw bale projects to vegetation.
    - *BBQ Flats:* State Parks installed approximately 3,630 strawbales on 27.0 acres of land adjacent to the BBQ Flats vegetation islands in the northern part of the ODSVRA's open riding and camping area (18-SB-01, see Attachment 01, Figure A01-09). In winter 2018, State Parks converted these straw bales to vegetation (19-VG-01, see Attachment 01, Figure A01-10).
    - *North Eucalyptus Tree:* State Parks installed approximately 1,360 straw bales on 9.1 acres of land adjacent to the North Eucalyptus Tree vegetation island in the ODSVRA's open riding and camping center area (18-SB-02, see Attachment 01, Figure A01-09). In winter 2018, State Parks planted vegetation within this treatment area that replaced the straw bales installed in Summer 2018 (19- VG-02, see Attachment 01, Figure A01-10).
    - *Amended SOA 4.2-Acres of Permanent Dust Control:* State Parks installed straw treatment on 4.1 acres of land along the eastern edge of the ODSVRA open riding

and camping area, perpendicular to marker post 6, in January 2020 (20-ST-02, see Attachment 01, Figure A01-11), which was subsequently converted to vegetation in winter 2021 (21-VG-02, see Attachment 01, Figure A01-12).

2.2.3 REPORT ON PROGRESS TOWARDS 50% MASS EMISSIONS REDUCTION

The current DRI model estimates the maximum amount of PM_{10} mass (e.g., metric tons/day) emitted by the dune surfaces in the ODSVRA open riding and camping area during the stipulated 2013 baseline period to be 182.8 metric tons/day.[9]

As explained in Section 2.2.1.3, State Parks' progress in reducing modeled baselinePM_{10} mass emissions is estimated for two (2) modeling scenarios:

- **Current DRI Model:** This scenario relies on the current DRI modeling methodology and input parameters to estimate PM_{10} mass emissions reductions, including the assumption that all dust control measures are 100% effective from their date of installation.[10]
- **Revised DRI Model:** This scenario incorporates the SAG-recommended changes to the DRI model discussed in Section 2.2.1.3 (e.g., use of the 2019 PI-SWERL emissivity grid instead of the 2013 PI-SWERL emissivity grid, wind fence array control effectiveness of 72% instead of 100%, etc.).

See Attachment 04, Oceano Dunes: Status 2022, for DRI model estimates of baseline mass emission reductions for both modeling scenarios. Refer also to Attachment 02, PMRP Evaluation Metrics, for information on dust control projects at ODSVRA, dust mitigation targets, and other indicators of dust control progress at ODSVRA.

2.2.3.1 Mass Emissions Reductions – Current DRI Model

State Parks' progress in reducing modeled baseline PM_{10} mass emissions, as estimated using the current DRI model, is summarized in Table 2-9. State Parks notes Table 2-9 compares the Dust Control Program's modeled mass emissions reductions against the SAG's 1939 and 1966 "pre- disturbance" mass emissions scenarios, as well as current SOA condition 2.c (reduce maximum 24-hour PM_{10} baseline emissions by 50%).

[9] One metric ton is equal to 1.1 short tons (U.S. tons). One metric ton is approximately 2,204.6 pounds while one U.S. ton is 2,000 pounds.

[10] The estimated baseline emissions are based on 2013 Portable In-Situ Wind Erosion Laboratory (PI-SWERL) emissivity data using the $1/r^2$, 5 nearest neighbor interpolation/extrapolation methodology) and reflect the average amount of PM_{10} mass emitted from the open riding and camping area on the 10 highest emitting days during the baseline period.

Table 2-9. Current DRI Model PM_{10} Mass Emissions at ODSVRA through July 31, 2022

Scenario/Evaluation	Acres Controlled	PM_{10} Mass Emissions (Metric Tons/Day)	Percent Reduction in PM_{10} Mass Emissions from 2013 Baseline
2013 Modeled Baseline Emissions from Open Riding and Camping Area (No Dust Control Measures in Place)	0	182.8(A)	0.0%
Cumulative Dust Control Measures in Place as of July 31, 2021	*322.2*	*142.0(B)*	*-22.3%(B)*
Incremental New Dust Control Measures Installed between August 1, 2021, and July 31, 2022	*90.0*	*127.4*(C)	*-30.3%*(C)
Additional Dust Control Benefit from Closure of Nesting Exclosure in October 2021	*293.3*	*108.2*(D)	*-40.8%*(D)
Cumulative Dust Control Benefit as of July 31, 2022	**705.5**	**108.2**	**-40.8%**
1939 Modeled "Pre-Disturbance" Scenario	**-**	**108.4(E)**	**-40.7%(E)**
1966 Modeled "Pre-Disturbance" Scenario	**-**	**108.9(E)**	**-40.4%(E)**
Current SOA Condition 2.c Goal	**--**	**91.4(F)**	**-50.0%**

Source: DRI, 2022 (see Attachment 04), modified by State Parks.

(A) Pursuant to the SOA, the 2013 modeled baseline for mass emissions is based on emissions from the ODSVRA open riding and camping area only; however, the mass emissions reductions needed to comply with the SOA, as amended, may occur from both inside and outside the open riding and camping area.

(B) The cumulative dust control measures in place throughout the ODSVRA as of July 31, 2021, reduced 2013 modeled baseline mass emission from 182.8 metric tons per day to 142.0 metric tons per day, a reduction of 40.8 metric tons per day. This equals a 22.3% reduction in 2013 modeled baseline emissions (40.8 /182.8 = 22.3%).

(C) The new dust control measures installed throughout the ODSVRA between August 1, 2021, and July 31, 2022, reduced modeled PM_{10} mass emissions from 142.0 (as of July 31, 2021) to 127.4 metric tons per day, a reduction of 14.6 metric tons per day, which equals 8.0% of 2013 modeled baseline emissions levels (14.6 /182.8 = 8.0%). The cumulative reduction in modeled PM10 mass emissions as of July 31, 2022, is 55.4 metric tons per day, which equals a 30.3% reduction in 2013 modeled baseline emissions (55.4 /182.8 = 30.3%).

(D) The additional dust control benefit from the closure of the western snowy plover exclosure reduced modeled PM_{10} mass emissions from 127.4 (as of July 31, 2022) to 108.2 metric tons per day, a reduction of 19.2 metric tons per day, which equals 10.5% of 2013 modeled baseline emissions levels (19.2 /182.8 = 10.5%). The cumulative reduction in modeled PM_{10} mass emissions with this additional benefit as of July 31, 2022, is 74.6 metric tons per day, which equals a 40.8% reduction in 2013 modeled baseline emissions (74.6/182.8 = 40.8%).

(E) Refer to Section 2.2.1.1 for modeled pre-disturbance scenario details.

(F) A 50% reduction in 2013 modeled baseline mass emissions (182.8 metric tons/day) equals 91.4 metric tons.

As of July 31, 2021, the current DRI model estimates State Parks' dust control measures reduced PM_{10} mass emissions by 40.8 metric tons per day, a 22.3% reduction in modeled baseline mass emissions. The new dust control measures installed by State Parks between August 1, 2021, and July 31, 2022, reduced mass emissions by an additional 14.6 metric tons per day, or 8.0% of the modeled baseline mass emissions level of 182.8 metric tons per day. The closure of the nesting exclosure further reduced mass emissions by 19.2 metric tons per day, or 10.5% of modeled baseline emissions. In total, the DRI model estimates the cumulative reduction in modeled PM_{10} baseline mass emissions achieved by the 705.5 acres of dust control measures in the ground at ODSVRA as of July 31, 2022, is 74.6 metric tons per day, which equals a 40.8% reduction in baseline mass emissions. Most of the estimated reductions in PM_{10} mass emissions (67.9 out of 74.6 metric tons per day, or 91.0 % of the modeled baseline mass emissions reductions) have been achieved by dust control measures installed inside the ODSVRA open riding and camping area (629.6 of the 705.5 total acres of dust control benefits, see Table 2-2 and Section 2.1.2). The 40.8% cumulative reduction in modeled baseline PM_{10} mass emissions represents continued progress towards achieving the 50% reduction in baseline mass emissions required by the current SOA. The resulting modeled baseline PM_{10} mass emissions level of 108.2 metric tons/day is also below the mass emissions levels that the current DRI model estimates would have occurred within the ODSVRA open riding and camping area boundary under the land use conditions present in 1939 (108.4 metric tons per day) and 1966 (108.9 metric tons per day). Refer to Section 2.2.1.1 for additional discussion of DRI's modeling of PM_{10} mass emissions based on SAG-suggested assumptions developed to represent pre-disturbance emissivity and vegetation cover conditions.

2.2.3.2 Mass Emissions Reductions – Revised DRI Model

State Parks' progress in reducing modeled baseline mass emissions using the revised DRI model is summarized in Table 2-10. State Parks notes the revised DRI model does not alter or affect the modeled 2013 baseline PM_{10} mass emissions value of 182.8 metric tons/day. The changes associated with the revised DRI model are only applied to modeled dust control scenarios. Refer to Section 2.2.1.3 for a discussion of revised DRI model assumptions.

Table 2-10. Revised DRI Model PM_{10} Mass Emissions at ODSVRA through July 31, 2022

Scenario/Evaluation	Acres Controlled	PM_{10} Mass Emissions (Metric Tons/Day)	Percent Reduction in PM_{10} Mass Emissions from 2013 Baseline
2013 Modeled Baseline Emissions from Open Riding and Camping Area (No Dust Control Measures in Place)	0	182.8(A)	0.0%
Cumulative Dust Control Measures in Place as of July 31, 2021	*322.2*	*123.9*	*-32.2%*
Incremental New Dust Control Measures Installed between August 1, 2021, and July 31, 2022	*90.0*	*113.2*	*-38.1%*
Additional Dust Control Benefit from Closure of Nesting Exclosure in October 2021	*293.3*	*104.0*	*-43.1%*
Cumulative Dust Control Benefit as of July 31, 2022	**705.5**	**104.0**	**-43.1%**
1939 Modeled "Pre-Disturbance" Scenario	**-**	**108.4(E)**	**-40.7%(E)**
1966 Modeled "Pre-Disturbance" Scenario	**-**	**108.9(E)**	**-40.4%(E)**
Current SOA Condition 2.c Goal	**--**	**91.4(F)**	**-50.0%**

Source: DRI, 2022 (see Attachment 04), modified by State Parks.

(A) Pursuant to the SOA, the 2013 modeled baseline for mass emissions is based on emissions from the ODSVRA open riding and camping area only; however, the mass emissions reductions needed to comply with the SOA, as amended, may occur from both inside and outside the open riding and camping area.

(B) The cumulative dust control measures in place throughout the ODSVRA as of July 31, 2021, reduced 2013 modeled baseline mass emission from 182.8 metric tons per day to 123.9 metric tons per day, a reduction of 58.9 metric tons per day. This equals a 32.2% reduction in 2013 modeled baseline emissions (58.9 /182.8 = 32.2%).

(C) The new dust control measures installed throughout the ODSVRA between August 1, 2021, and July 31, 2022 reduced modeled PM_{10} mass emissions from 123.9 (as of July 31, 2021) to 113.2 metric tons per day, a reduction of 10.7 metric tons per day, which equals 5.9% of 2013 modeled baseline emissions levels (10.7 /182.8 = 5.9%). The cumulative reduction in modeled PM_{10} mass emissions as of July 31, 2022, is 69.6 metric tons per day, which equals a 38.1% reduction in 2013 modeled baseline emissions (69.6 /182.8 = 38.1%).

(D) The additional dust control benefit from the closure of the nesting exclosure reduced modeled PM_{10} mass emissions from 113.2 (as of July 31, 2022) to 104.0 metric tons per day, a reduction of 9.2 metric tons per day, which equals 5.0% of 2013 modeled baseline emissions levels (9.2 /182.8 = 5.0%). The cumulative reduction in modeled PM_{10} mass emissions with this additional benefit as of July 31, 2022, is 78.8 metric tons per day, which equals a 43.1% reduction in 2013 modeled baseline emissions (78.8/182.8 = 43.1%).

(E) Refer to Section 2.2.1.1 for modeled pre-disturbance scenario details.

(F) A 50% reduction in 2013 modeled baseline mass emissions (182.8 metric tons per day) equals 91.4 metric tons per day.

As of July 31, 2021, the revised DRI model estimates State Parks' dust control measures reduced PM_{10} mass emissions by 58.9 metric tons per day, a 32.2% reduction in modeled baseline mass emissions. The new dust control measures installed by State Parks between August 1, 2021, and July 31, 2022, reduced mass emissions by an additional 10.7 metric tons per day, or 5.9% of the modeled baseline mass emissions level of 182.8 metric tons per day. The closure of the nesting exclosure is credited to further reduce mass emissions by 9.2 metric tons per day, or 5.0% of modeled baseline emissions. In total, the revised DRI model estimates the cumulative reduction in modeled baseline mass emissions achieved by the 705.5 acres of dust control measures in the ground at the ODSVRA as of July 31, 2022, is 78.8 metric tons per day, which equals a 43.1% reduction in baseline PM_{10} mass emissions. Most of the estimated reductions in PM_{10} mass emissions (72.6 out of 78.8 metric tons per day, or 92.1 % of the modeled baseline mass emissions reductions) have been achieved by dust control measures installed inside the open riding and camping area (629.6 of the 705.5 total acres of dust control benefits, see Table 2-2 and Section 2.1.2). The 43.1% cumulative reduction in modeled baseline PM_{10} mass emissions represents continued progress towards achieving the 50% reduction in baseline mass emissions required by the current SOA. The resulting modeled PM_{10} mass emissions estimate of 104.0 metric tons per day is also below the mass emissions levels that the current DRI model estimates would have occurred within the ODSVRA open riding and camping area boundary under the land use conditions present in 1939 (108.4 metric tons per day) and 1966 (108.9 metric tons per day). Refer to Section 2.2.1.1 for additional discussion of DRI's modeling of PM_{10} mass emissions based on SAG-suggested assumptions developed to represent pre-disturbance emissivity and vegetation cover conditions.

2.2.4 Report On Progress Towards Ambient Air Quality Standards

The current DRI model is also used to evaluate potential changes in downwind PM_{10} concentrations at selected receptor sites such as the SLOAPCD's CDF and Mesa2 air quality monitoring stations. The model estimates the 24-hour average PM_{10} concentration at CDF and Mesa2 during the stipulated 2013 baseline period to be 124.7 and 97.5 $\mu g/m^3$, respectively.

Like the mass emissions reductions described in Section 2.2.3, State Parks' progress in reducing 24-hour average PM_{10} concentration at CDF and Mesa2 is estimated for both the current DRI model and the revised DRI model.

Refer to Attachment 04, Oceano Dunes: Status 2022, for DRI model estimates of PM_{10} concentration reductions downwind of ODSVRA. Refer also to Attachment 02, PMRP Evaluation Metrics, for information on dust control projects at ODSVRA, dust mitigation targets, and other indicators of dust control progress at ODSVRA.

2.2.4.1 CDF Air Quality Monitoring Station – Current DRI Model

State Parks' progress in reducing 2013 modeled baseline PM_{10} concentrations at the SLOAPCD's CDF air quality monitoring station, as estimated using the current DRI model, is summarized in Table 2-11. State Parks notes Table 2-11 compares the Dust Control Program's modeled PM_{10} concentration reductions against the SAG's 1939 and 1966 pre-disturbance scenarios, as well as current SOA condition 2.b (achieve state and federal ambient air quality standards for PM_{10}).

As of July 31, 2021, the current DRI model estimates State Parks' dust control measures reduced downwind 24-hour PM_{10} concentrations at the CDF station by 52.5 µg/m^3, a 42.1% reduction in baseline PM_{10} concentrations for this site. The new dust control measures installed by State Parks between August 1, 2021, and July 31, 2022, reduced 24-hour PM_{10} concentrations at the CDF station by an additional 5.8 µg/m^3, or 4.7% of baseline PM_{10} concentrations. The closure of the nesting exclosure further reduced baseline PM_{10} concentrations by 0.7 metric tons per day, or 0.6% of modeled baseline concentrations. This limited reduction is because the exclosure is located south of marker post 6 and is not directly upwind of the CDF station. In total, the current DRI model estimates the cumulative reduction in 24-hour PM_{10} concentrations at the CDF station from the 705.5 acres of dust control measures in the ground at ODSVRA as of July 31, 2022, is 59.0 µg/m^3, which equals a 47.3% reduction in baseline modeled 24-hour PM_{10} concentrations. This 47.3% cumulative reduction in 24-hour PM_{10} concentrations at the CDF site represents continued progress towards achieving the CAAQS (50 µg/m^3) as required by SOA Condition 2.b. The resulting modeled 24-hour average PM_{10} concentration of 65.7 µg/m^3 at the CDF station is also substantially lower than the 24-hour average PM_{10} concentration levels that the current DRI model estimates would have occurred at the CDF station under the land use conditions present in 1939 (88.0 µg/m^3) and 1966 (87.0 µg/m^3). Refer to Section 2.2.1.1 for additional discussion of DRI's modeling of PM_{10} concentrations based on SAG-suggested assumptions developed to represent pre-disturbance emissivity and vegetation cover conditions.

Table 2-11. Current DRI Model 24-hour Average PM_{10} Concentrations at CDF

Scenario/Evaluation	Acres Controlled	CDF PM_{10} 24-hour Average Concentration ($\mu g/m^3$)	Percent Reduction in PM_{10} Concentration from 2013 Baseline
2013 Modeled Baseline (No Dust Control Measures in Place)	0	124.7**(A)**	0.0%
Cumulative Dust Control Measures in Place as of July 31, 2021	*322.2*	*72.2(B)*	*-42.1%(B)*
Incremental New Dust Control Measures Installed between August 1, 2021, and July 31, 2022	*90.0*	*66.4*(C)	*-46.8%*(C)
Additional Dust Control Benefit from Closure of Nesting Exclosure in October 2021	*293.3*	*65.7*(D)	*-47.3%*(D)
Cumulative Dust Control Benefit as of July 31, 2022	**705.5**	**65.7**	**-47.3%**
1939 Modeled "Pre-Disturbance" Scenario	**-**	**88.0(E)**	**-29.4%(E)**
1966 Modeled "Pre-Disturbance" Scenario	**-**	**87.0(E)**	**-30.2%(E)**
Current SOA Condition 2.b. Goal	**--**	**50.0(F)**	**-59.9%**

Source: DRI, 2022 (see Attachment 04), modified by State Parks.

(A) Pursuant to the SOA, the 2013 modeled baseline for PM_{10} concentration ($\mu g/m^3$) is based on emissions from riding and non-riding areas at ODSVRA.

(B) The cumulative dust control measures in place as of July 31, 2021, reduced modeled baseline 24-hour average PM_{10} concentrations at CDF from 124.7 $\mu g/m^3$ to 72.2 $\mu g/m^3$, a reduction of 52.5 $\mu g/m^3$. This equals a 42.1% reduction in 2013 modeled baseline 24-hour average PM_{10} concentrations (52.5/124.7 = 42.1%).

(C) The new dust control measures installed between August 1, 2021, and July 31, 2022 reduced modeled baseline 24-hour average PM_{10} concentrations at CDF from 72.2 $\mu g/m^3$ (as of July 31, 2021) to 66.4 $\mu g/m^3$, a reduction of 5.8 $\mu g/m^3$, which equals a 4.7% reduction in 2013 modeled baseline 24-hour average PM_{10} concentrations (5.8 /124.7 = 4.7%). The cumulative reduction in modeled baseline 24-hour average PM_{10} concentrations as of July 31, 2022, is 58.3 $\mu g/m^3$, which equals a 46.8% reduction in 2013 modeled baseline concentrations (58.3/124.7 = 46.8%)

(D) The additional dust control benefit from the closure of the nesting exclosure reduced modeled baseline 24-hour average PM_{10} concentrations at CDF from 66.4 $\mu g/m^3$ (as of July 31, 2022) to 65.7 $\mu g/m^3$, a reduction of 0.7 $\mu g/m^3$, which equals a 0.6 % reduction in 2013 modeled baseline 24-hour average PM_{10} concentrations (0.7 /124.7 = 0.6%). The cumulative reduction in modeled baseline 24-hour average PM_{10} concentrations with this additional benefit as of July 31, 2022, is 59.0 $\mu g/m^3$, which equals a 47.3% reduction in 2013 modeled baseline concentrations (59.0/124.7 = 47.3%).

(E) Refer to Section 2.2.1.1 for modeled pre-disturbance scenario details.

(F) The SOA goal is based on the CAAQS of 50 $\mu g/m^3$ (see Table 2-3).

2.2.4.2 CDF Air Quality Monitoring Station – Revised DRI Model

State Parks' progress in reducing in reducing 2013 modeled baseline PM_{10} concentrations at the SLOAPCD's CDF air quality monitoring station, as estimated using the revised DRI model, is summarized in Table 2-12. State Parks notes the revised DRI model does not alter or affect the modeled 2013 baseline 24-hour average PM_{10} concentration at CDF of 124.7 µg/m^3. The changes associated with the revised DRI model are only applied to modeled dust control scenarios. Refer to Section 2.2.1.3 for a discussion of revised DRI model assumptions.

Table 2-12. Revised DRI Model 24-hour Average PM_{10} Concentrations at CDF

Scenario/Evaluation	Acres Controlled	CDF PM_{10} 24-hour Average Concentration (µg/m^3)	Percent Reduction in PM_{10} Concentration from 2013 Baseline
2013 Modeled Baseline (No Dust Control Measures in Place)	0	124.7(A)	0.0%
Cumulative Dust Control Measures in Place as of July 31, 2021	*322.2*	*Not Available*	*Not Available*
Incremental New Dust Control Measures Installed between August 1, 2021, and July 31, 2022	*90.0*	*Not Available*	*Not Available*
Additional Dust Control Benefit from Closure of Nesting Exclosure in October 2021	*293.3*	*Not Available*	*Not Available*
Cumulative Dust Control Benefit as of July 31, 2022	**705.5**	**63.8(B)**	**-48.8%(B)**
1939 Modeled "Pre-Disturbance" Scenario	**-**	**88.0(C)**	**-29.4%(C)**
1966 Modeled "Pre-Disturbance" Scenario	**-**	**87.0(C)**	**-30.2%(C)**
Current SOA Condition 2.b. Goal	**--**	**50.0(C)**	**-59.9%**

Source: DRI, 2022 (see Attachment 04), modified by State Parks.

(A) Pursuant to the SOA, the 2013 modeled baseline for PM_{10} concentration (µg/m^3) is based on emissions from riding and non-riding areas at ODSVRA.

(B) The cumulative reduction in modeled baseline 24-hour average PM_{10} concentrations at CDF as of July 31, 2022, is 60.9 µg/m^3, which equals a 48.8% reduction in 2013 modeled baseline concentrations (60.9/124.7 = 48.8%).

(C) Refer to Section 2.2.1.1 for modeled pre-disturbance scenario details.

(D) The SOA goal is based on the CAAQS of 50 µg/m^3 (see Table 2-3).

In total, as of July 31, 2022, the revised DRI model estimates the cumulative reduction in 24-hour PM_{10} concentrations at the CDF station from the 705.5 acres of dust control measures in the ground at Ocean Dunes SVRA as of July 31, 2022, is 60.9 µg/m^3, which equals a 48.8%

reduction in baseline modeled 24-hour PM_{10} concentrations. This 48.8% cumulative reduction in 24-hour PM_{10} concentrations at the CDF site represents continued progress towards achieving the CAAQS (50 µg/m^3) as required by SOA Condition 2.b. The resulting modeled 24-hour average PM_{10} concentration of 63.8 µg/m^3 at the CDF station is also substantially lower than the 24-hour average PM_{10} concentration levels that the current DRI model estimates would have occurred at the CDF station under the land use conditions present in 1939 (88.0 µg/m^3) and 1966 (87.0 µg/m^3). Refer to Section 2.2.1.1 for additional discussion of DRI's modeling of PM_{10} concentrations based on SAG-suggested assumptions developed to represent pre-disturbance emissivity and vegetation cover conditions.

2.2.4.3 Mesa2 Air Quality Monitoring Station – Current DRI Model

State Parks' progress in reducing 2013 modeled baseline PM_{10} concentrations at the SLOAPCD's Mesa2 air quality monitoring station is summarized in Table 2-13. State Parks' notes Table 2-13 compares the Dust Control Program's modeled PM_{10} concentration reductions against the SAG's 1939 and 1966 pre-disturbance scenarios, as well as current SOA condition 2.b (achieve state and federal ambient air quality standards for PM_{10}). Refer to Attachment 04 for additional information on DRI model estimates of 24-hour PM_{10} concentrations at the Mesa2 station.

Based on the dust controls in place as of July 31, 2021, the current DRI model estimates that State Parks' dust control measures reduced downwind 24-hour PM_{10} concentrations at the Mesa2 station by 23.7 µg/m^3, a 24.3% reduction in baseline PM_{10} concentrations at this site. The new dust control measures installed by State Parks between August 1, 2021, and July 31, 2022, reduced 24-hour PM_{10} concentrations at the Mesa2 station by an additional 6.9 µg/m^3, or 7.1% of baseline PM_{10} concentrations. The closure of the western snowy plover exclosure further reduced baseline PM_{10} concentrations by 7.0 metric tons per day, or 7.2% of modeled baseline concentrations. In total, the current DRI model estimates the cumulative reduction in 24-hour PM_{10} concentrations at the Mesa2 station from the 705.5 acres of dust control measures in the ground at Ocean Dunes SVRA as of July 31, 2022, is 37.6 µg/m^3, which equals a 38.6 % reduction in modeled baseline 24-hour PM_{10} concentrations. This 38.6 % cumulative reduction in modeled baseline 24-hour PM_{10} concentrations at the Mesa2 station represents continued progress towards achieving the CAAQS (50 µg/m^3) as required by SOA Condition 2.b. The resulting modeled 24-hour average PM_{10} concentration of 59.9 µg/m^3 at the Mesa2 station is also substantially lower than the 24-hour average PM_{10} concentration levels that the current DRI model estimates would have occurred at the Mesa2 station under the land use conditions present in 1939 (71.2 µg/m^3) and 1966 (75.7 µg/m^3). Refer to Section 2.2.1.1 for additional discussion of DRI's modeling of PM_{10} concentrations based on SAG-suggested assumptions developed to represent pre-disturbance emissivity and vegetation cover conditions.

Table 2-13. Current DRI Model 24-hour Average PM_{10} Concentrations at Mesa2

Scenario/Evaluation	Acres Controlled	Mesa2 PM_{10} 24-hour Average Concentration ($\mu g/m^3$)	Percent Reduction in PM_{10} Concentration from 2013 Baseline
2013 Modeled Baseline (No Dust Control Measures in Place)	0	97.5 **(A)**	0.0%
Cumulative Dust Control Measures in Place as of July 31, 2021	*322.2*	*73.8 (B)*	*-24.3% (B)*
Incremental New Dust Control Measures Installed between August 1, 2021, and July 31, 2022	*90.0*	*66.9 (C)*	*-31.4% (C)*
Additional Dust Control Benefit from Closure of Western Snowy Plover Exclosure in October 2021	*293.3*	*59.9 (D)*	*-38.6% (D)*
Cumulative Dust Control Benefit as of July 31, 2022	**705.5**	**59.9**	**-38.6%**
1939 Modeled "Pre-Disturbance" Scenario	**-**	**71.2 (E)**	**-27.0% (E)**
1966 Modeled "Pre-Disturbance" Scenario	**-**	**75.7 (E)**	**-22.4% (E)**
SOA Condition 2.c. Goal	**--**	**50.0 (F)**	**-48.7%**

Source: DRI, 2022 (see Attachment 04), modified by State Parks.

(A) Pursuant to the SOA, the 2013 modeled baseline for PM_{10} concentration ($\mu g/m^3$) is based on emissions from riding and non-riding areas at ODSVRA.

(B) The cumulative dust control measures in place as of July 31, 2021, reduced modeled baseline 24-hour average PM_{10} concentrations at Mesa2 from 97.5 $\mu g/m^3$ to 73.8 $\mu g/m^3$, a reduction of 23.7 $\mu g/m^3$. This equals a 24.3% reduction in 2013 modeled baseline 24-hour average PM_{10} concentrations (23.7/97.5 = 24.3%).

(C) The new dust control measures installed between August 1, 2021, and July 31, 2022, reduced modeled baseline 24-hour average PM_{10} concentrations at Mesa2 from 73.8 $\mu g/m^3$ (as of July 31, 2021) to 66.9 $\mu g/m^3$, a reduction of 6.9 $\mu g/m^3$, which equals a 7.1% reduction in 2013 modeled baseline 24-hour average PM_{10} concentrations (6.9/97.5 = 7.1%). The cumulative reduction in modeled baseline 24-hour average PM_{10} concentrations as of July 31, 2022, is 30.6 $\mu g/m^3$, which equals a 31.4% reduction in 2013 modeled baseline concentrations (30.6/97.5 = 31.4%)

(D) The additional dust control benefit from the closure of the nesting exclosure reduced modeled baseline 24-hour average PM_{10} concentrations at Mesa2 from 66.9 $\mu g/m^3$ (as of July 31, 2022) to 59.9 $\mu g/m^3$, a reduction of 7.0 $\mu g/m^3$, which equals a 7.2% reduction in 2013 modeled baseline 24-hour average PM_{10} concentrations (7.0/97.5 = 7.2%). The cumulative reduction in modeled baseline 24-hour average PM_{10} concentrations with this additional benefit as of July 31, 2022, is 37.6 $\mu g/m^3$, which equals a 38.6% reduction in 2013 modeled baseline concentrations (37.6/97.5 = 38.6%).

(E) Refer to Section 2.2.1.1 for modeled pre-disturbance scenario details.

(F) The SOA goal is based on the CAAQS of 50 $\mu g/m^3$ (see Table 2-3).

2.2.4.4 Mesa2 Air Quality Monitoring Station – Revised DRI Model

State Parks' progress in reducing in reducing 2013 modeled baseline PM_{10} concentrations at the SLOAPCD's Mesa2 air quality monitoring station, as estimated using the revised DRI model, is summarized in Table 2-14. State Parks notes the revised DRI model does not alter or affect the modeled 2013 baseline 24-hour average PM_{10} concentration at Mesa2 of 97.5 µg/m^3. The changes associated with the revised DRI model are only applied to modeled dust control scenarios. Refer to Section 2.2.1.3 for a discussion of revised DRI model assumptions.

Table 2-14. Revised DRI Model 24-hour Average PM_{10} Concentrations at Mesa2

Scenario/Evaluation	Acres Controlled	Mesa2 PM_{10} 24-hour Average Concentration (µg/m^3)	Percent Reduction in PM_{10} Concentration from 2013 Baseline
2013 Modeled Baseline (No Dust Control Measures in Place)	0	97.5(A)	0.0%
Cumulative Dust Control Measures in Place as of July 31, 2021	*322.2*	*Not Available*	*Not Available*
Incremental New Dust Control Measures Installed between August 1, 2021, and July 31, 2022	*90.0*	*Not Available*	*Not Available*
Additional Dust Control Benefit from Closure of Western Snowy Plover Exclosure in October 2021	*293.3*	*Not Available*	*Not Available*
Cumulative Dust Control Benefit as of July 31, 2022	**705.5**	**63.7(B)**	**-34.7%(B)**
1939 Modeled "Pre-Disturbance" Scenario	**-**	**71.2(C)**	**-27.0%(C)**
1966 Modeled "Pre-Disturbance" Scenario	**-**	**75.7(C)**	**-22.4%(C)**
SOA Condition 2.c. Goal	**--**	**50.0(D)**	**-48.7%**

Source: DRI, 2022 (see Attachment 04), modified by State Parks.

(A) Pursuant to the SOA, the 2013 modeled baseline for PM_{10} concentration (µg/m^3) is based on emissions from riding and non-riding areas at ODSVRA.

(B) The cumulative reduction in modeled baseline 24-hour average PM_{10} concentrations at Mesa2 as of July 31, 2022, is 33.8 µg/m^3, which equals a 34.7% reduction in 2013 modeled baseline concentrations (33.8/97.5 = 34.7%).

(C) Refer to Section 2.2.1.1 for modeled pre-disturbance scenario details.

(D) The SOA goal is based on the CAAQS of 50 µg/m^3 (see Table 2-3).

In total, as of July 31, 2022, the revised DRI model estimates the cumulative reduction in 24-hour PM_{10} concentrations at the Mesa2 station from the 705.5 acres of dust control measures in the ground at Ocean Dunes SVRA as of July 31, 2022, is 33.8 µg/m^3, which equals a 34.7% reduction in modeled baseline 24-hour PM_{10} concentrations. This 34.7 % cumulative reduction in modeled baseline 24-hour PM_{10} concentrations at theMesa2 station represents continued progress towards achieving the CAAQS (50 µg/m^3) as required by SOA Condition 2.b. The resulting modeled 24-hour average PM_{10} concentration of 63.7 µg/m^3 at the Mesa2 station is also substantially lower than the 24-hour average PM_{10} concentration levels the current DRI model estimates would have occurred at the Mesa2 station under the land use conditions present in 1939 (71.2 µg/m^3) and 1966 (75.7 µg/m^3). Refer to Section 2.2.1.1 for additional discussion of DRI's modeling of PM_{10} concentrations based on SAG-suggested assumptions developed to represent pre-disturbance emissivity and vegetation cover conditions.

2.2.5 REPORT ON PROGRESS TOWARDS TRACK-OUT CONTROL

State Parks has developed engineered drawings for permanent track-out control at Grand and Pier Avenues. Those plans were finalized in 2020, but the physical projects were not installed during the 2021 reporting period because control agencies had not approved funding. A contract is currently under review for construction of a permanent track-out device at Grand Avenue and construction is anticipated to start in Summer 2022 and last approximately 90 days. Given the uncertainties of the future Pier Avenue entrance to be in operation beyond 2022, State Parks opted to continue to use the temporary rubber track-out mats installed at this location in May 2019. The temporary mats are regularly cleaned when the beach is open to public vehicle activity. Refer to State Parks' 2021 ARWP, Attachment 5 (Sediment Track-out Prevention Measures), for detailed plans for track-out control at Grand Avenue.

Ongoing street sweeping activities on Pier and Grand Avenues occur three times per week using a combination of State Parks' sweepers and a private contractor on Pier Avenue.

2.3 REPORT ON FIELD MONITORING AND AIR QUALITY MODELING

Chapter 3 of State Parks' 2019 Draft PMRP provides a basic overview of dispersion modeling and presents the methodology, key inputs, data sources, and assumptions experts from DRI, the SAG, CARB, SLOAPCD, and State Parks have incorporated into the SOA's air quality modeling. As noted in Section 3.4 of the approved PMRP: CDF

> "The United States Environmental Protection Agency's (USEPA) Guideline on Air Quality Models states, 'the formulation and application of air quality models are accompanied by several sources of uncertainty.' The Guideline document describes two specific sources of uncertainty. 'Irreducible' uncertainty stems from unknown conditions, which may not be explicitly accounted for in the model, and which are likely to lead to deviations from the actual, observed concentrations for any individual event.

> 'Reducible' uncertainties are caused by uncertainties in the "known" input conditions (e.g., emission characteristics and meteorological data, errors in measured concentrations, and inadequate model physics and formulation)."

State Parks' adaptative management approach to dust control at ODSVRA involves collecting data that supports the evaluation and improvement of model performance and dust control measure effectiveness. Incorporating new information and comparing model predictions to observations from actual air quality stations such as CDF facilitates model improvements and public understanding and confidence in the model's results.

For example, State Parks' meteorological and PM_{10} monitoring network (see Section 2.3.1) provides data on meteorological and PM_{10} conditions across the spatial domain of ODSVRA and at locations external to the SVRA. These data are important for modeling the dispersion of PM_{10} for the time frame beginning with its establishment (effectively for 2017 to the present).[11] For the baseline year, the stations set up in 2013, at different locations, provided wind speed and wind direction data and PM_{10} measurements across the spatial domain as input into the current and revised DRI model. These data are used within the model to verify model predicted PM_{10} at the monitoring locations, adjusted to reflect the measurement if the model values diverge from those local values. The monitoring network data are also used to investigate how the dust emission system has changed through time, allowing evaluation of how dust controls have modulated the PM levels on a regional scale.

State Parks' report on field monitoring activities and progress towards improving the measurement, modeling, and evaluation of compliance with SOA goals is described below.

2.3.1 METEOROLOGICAL AND PM_{10} MONITORING

State Parks has installed seasonal and temporary meteorological and PM_{10} monitoring sites at ODSVRA since the SLOAPCD first began evaluating PM_{10} emissions on the Nipomo Mesa as part of its Phase 1 and Phase 2 studies. The purpose of these instruments is to help assess individual project effectiveness and update and refine meteorological inputs needed for the SOA's air quality modeling.

State Parks' S1 meteorological tower (located near marker post 6) was installed in June 2010 and continues to operate and support Dust Control Program activities. In 2013, State Parks deployed a temporary network of meteorological and PM_{10} monitoring equipment throughout ODSVRA. This temporary network, mostly removed in 2013, has generally informed the basis and need for subsequent meteorological and PM_{10} data collection efforts and monitoring locations in subsequent years.

[11] Wind and PM monitoring began in 2013 but the network of monitoring stations that is installed annually with MetOne 212-2 Particle Profilers began in 2017 and reached the current compliment of stations in 2019.

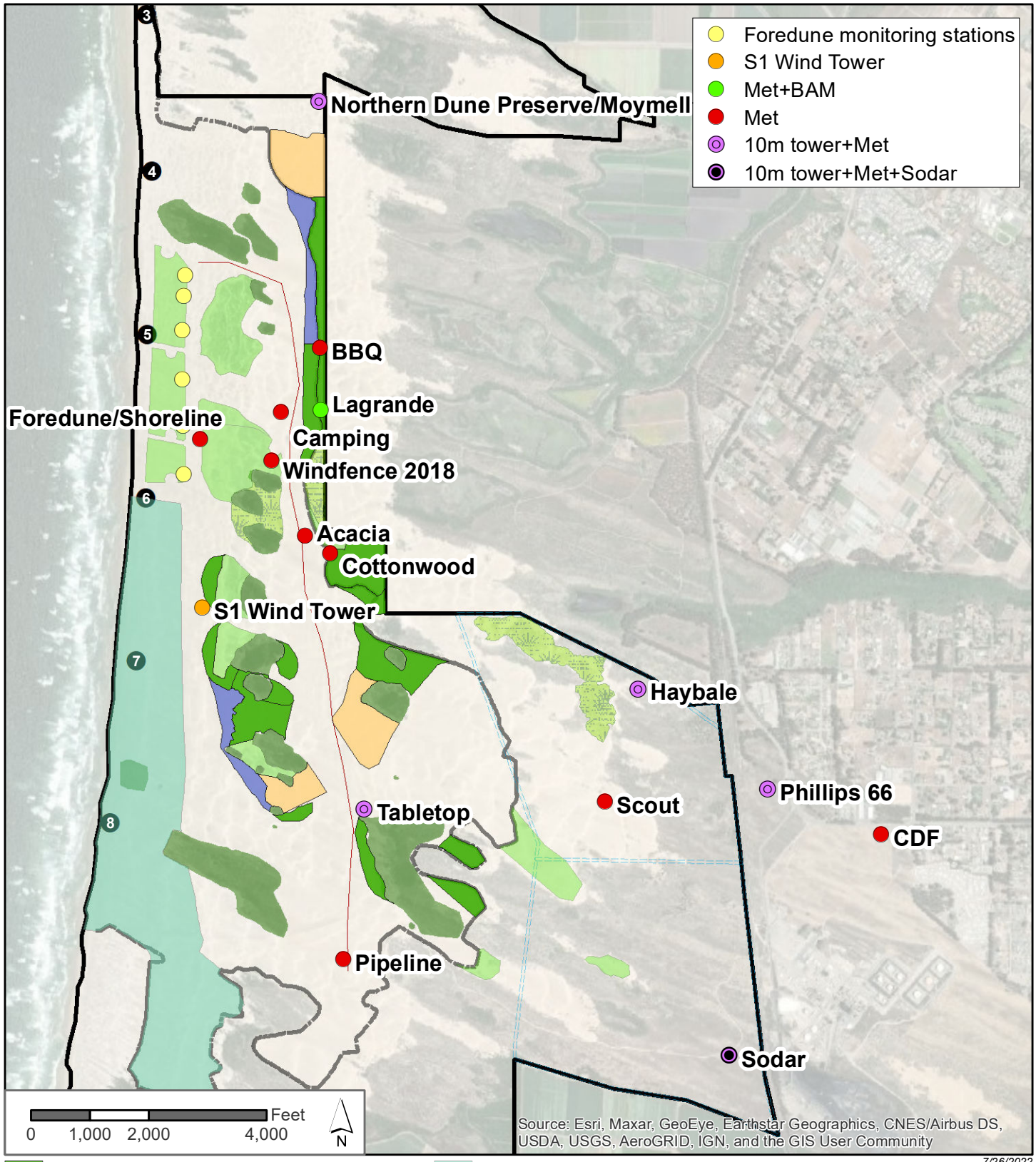
State Parks' meteorological and PM_{10} monitoring network varies slightly from year to year depending on specific goals, objectives, and dust control measures identified in the ARWP cycle. From approximately April 1, 2021, to October 31, 2021, State Parks maintained the monitoring network shown in Figure 2-4, including:

- Six (6) foredune meteorological and PM monitoring sites
- Fifteen (15) other meteorological and PM monitoring sites located throughout and downwind of ODSVRA
- One (1) sonic detection and ranging (SODAR) instrument station

State Parks installed the same monitoring network beginning in April 2022 and will maintain this network through approximately October 2022. Typically, the 15 monitoring sites each consist of a suite of instruments affixed to a tripod, platform, or tower located 3.5 to 10 meters above ground level (see Figure 2-5). Instruments collect wind speed and wind direction (using two-dimensional sonic anemometry), ambient temperature, relative humidity (RH), and barometric pressure. The SODAR instrument station (originally installed in May 2019) records three-dimensional velocity vector data from approximately 40 meters to 200 meters above ground level (see Figure 2-6). A Sensit instrument is also deployed at/near the ground level to measure saltation activity in active sand transport areas. Foredune monitoring is described in Section 2.3.2.2.

The particulate matter at each station is measured using a MetOne 212-2 Particle Profiler that measures particle counts in eight size (geometric mean diameter in micrometers, or µm) bins (0.39 µm, 0.59 µm, 0.84 µm, 1.41 µm, 2.24 µm, 3.53 µm, 7.07 µm, and 10+ µm) per sampled flow volume using an optically based measurement system. These particle count bins are used to derive a PM_{10} concentration on a minute and hourly basis. The PM_{10} concentration is derived from environmentally controlled and field calibration relationships between particle count data collected by the Particle Profiler and mass-based PM_{10} concentration data collected by an EPA Federal Equivalent Method (FEM) Beta Attenuation Mass (BAM) PM_{10} monitor.[12] This calibration ensures that each MetOne 212-2 Particle Profiler instrument has a specific calibration relationship to provide the best estimate of PM_{10} during deployment at ODSVRA.

[12] DRI conducted initial, environmentally controlled calibration procedures in 2020 and concluded the consistency of the calibration relationship among the Met One 212-2 Particle Profiler units was good for particles through size bin six both before and after field deployment.[12] In addition, field calibrations indicate the MetOne Particle Profilers are not adversely affected by high wind conditions (above 5 meters per second). In April 2021, DRI repeated the environmentally controlled calibration procedures with similar results. The same calibration procedure was repeated by DRI in April 2022. Refer to the 2021 ARWP, Attachment 06, for a detailed summary of DRI's MetOne 212-2 Particle Profiler PM_{10} calibration procedures.



7/26/2022

New vegetation (118.5 acres)
Straw treatment (24.1 acres)
Wind fence (53.0 acres)
SOA vegetation projects (163.4 acres)
Pre-SOA vegetation project (2014 and 2017)
Existing fenced vegetation islands (186 acres)
Additional dust reduction benefit area (293.3 acres)
Phillips 66 Lease area
Sand Highway, approx.
Marker post
Open riding and camping area boundary fence
Park boundary

Figure 2-4: 2021 - 2022 Monitoring Network

2022 ARWP

Figure 2-5. Typical Meteorological and PM Monitoring Station at ODSVRA

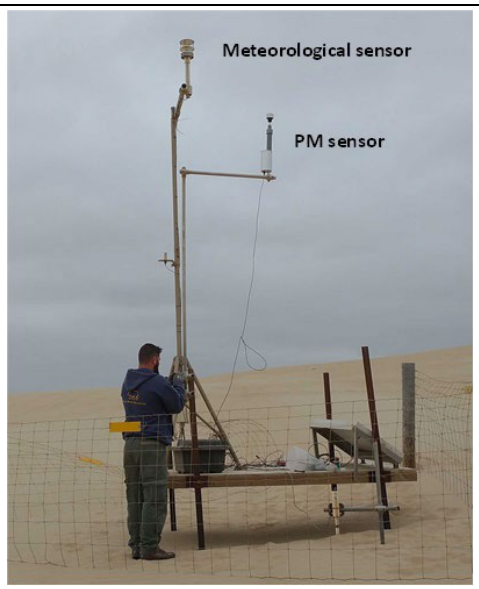


Figure 2-5. Typical meteorological (sonic anemometer) and PM (MetOne 212-2 Particle Profiler)monitoring site.

Figure 2-6. SODAR Monitoring Station

Figure 2-6. The SODAR upper-air measurement station is located near the southeast corner of ODSVRA. The photo shows the co-located 10-meter meteorological tower and the Phillips 66 refinery in the back left. UCSB operates the station.

The MetOne 212-2 units deployed in 2021 and 2022 were calibrated by DRI using the same methodology employed for previous monitoring efforts. The units were first calibrated against a FEM BAM PM_{10} monitor in an environmental chamber prior to field placement, then collocated with an in-Park FEM BAM to check if environmentally controlled calibration relationships are, or are not, changing following field deployment. If a significant change is observed, the in-Park derived calibration will be used to convert the PMbin6 value to BAM-equivalent PM_{10}. All units will be brought back to DRI in the fall and winter of 2022 to derive post-field deployment relations to determine if a relation has drifted significantly from the pre-deployment one and to assess the performance specifications (e.g., flow rate). The 2022 calibration procedures ensure that each MetOne 212-2 Particle Profiler instrument has a specific calibration relationship to provide the best estimate of PM_{10} during deployment. The key purpose of the monitoring network is to collect PM_{10} and meteorological data to provide a means to evaluate the relation between wind conditions and PM_{10} during the primary dust-season (April-September). This annual characterization allows for the assessment of changes in the PM_{10} levels interior and downwind of the ODSVRA open riding and camping area as it relates to meteorology and dust control projects.

2.3.2 SALTATION MONITORING

In addition to meteorological and airborne PM_{10} measurements, State Parks also operates instruments that physically collect or count the movement of sand particles when high wind events actuate the saltation process. These instruments include the Big Springs Number Eight (BSNE) dust collector and the Sensit saltation monitor. The saltation monitoring instruments help assess individual project effectiveness. The saltation monitoring also informs understanding of the mean threshold wind speed for the saltation process. Based on Sensit data for the monitoring sites that had operational Sensit instruments in 2021 (Northern Dune Preserve, BBQ, Camping, LaGrande, Foredune, Acacia, and Tabletop sites; see Figure 2-4), DRI reports the mean threshold wind speed for saltation in 2021 was 6.4 meters per second ($\pm$ 0.7 meters per second). This mean threshold is based on wind speeds measured 3.5 meters above ground level.

2.3.2.1 Wind Fence Array Saltation Flux Measurements

The control effectiveness of a wind fencing array is defined by the NSF, defined as the sand flux internal to the array divided by the sand flux upwind of the array). As reported in prior ARWP's, the mean percent reduction in sand flux across the width of the wind fence array has been approximately 72%. From August 1, 2021, to July 31, 2022, no new saltation monitoring occurred within installed wind fence arrays.

2.3.2.2 Foredune Restoration Area Saltation Flux Measurements

State Parks initiated the 48-acre foredune restoration treatment in 2019. The restoration

treatment is based on a SAG design in which the 48-acre treatment area is sub-divided into six different treatment areas, as shown in Figure 2-7. The treatment areas include:

- Plot 1 – Foredune North (18.6 acres, 20-VG-01):
  - Treatment 1 (4.0 acres): There is no treatment other than sheep's footsurface texturing to create divots for seeds and low-level aerodynamic roughness.
  - Treatment 2 (5.2 acres): Native seed mix with sheep's foot surface texturing.
  - Treatment 3 (9.6 acres): Sheep's foot texturing with sterile ryegrass and native seed mix.
- Plot 2 – Foredune Central (18.8 acres, 20-VG-02):
  - Treatment 4 (9.1 acres): Low-density random node planting (with a spacing derived from a natural analog site near Oso Flaco Lake) with approximately nine foredune-specific plants per node planted within a 12-foot radius zone of straw to protect seedlings.
  - Treatment 5 (9.7 acres): High-density random node planting with the same planting and straw protection strategy.
- Plot 3 – Foredune South (9.9 acres 20-VG-03):
  - Treatment 6 (9.9 acres): "Parks' Classic" restoration consisting of sheep's foot surface texturing, spread straw over the entire area, planting of foredune specific species, and seeding the area with native seed.

From August 1, 2021, to July 31, 2022, State Parks, Coastal San Luis Resource Conservation District (San Luis RCD), DRI, and UCSB conducted meteorological and saltation flux measurements in each of the six foredune treatment areas. These measurements are intended to characterize wind changes, monitor saltation activity, and relate these data to changes in vegetation cover and dune morphology through time. The measurements were conducted with a suite of instruments on a three-meter tower on a platform deployed near the eastern edge of each treatment plot, approximately ten meters west of the eastern fence line and halfway along the north-south length of the treatment area. The foredune monitoring stations have almost the same configuration as those deployed across and exterior to ODSVRA to measure temperature, RH, wind speed and direction, and pressure (see Section 2.3.1 and Figure 2-5); however, the foredune monitoring stations do not measure PM_{10}. Sensit saltation sensors are located at each station to provide data on threshold wind speed for sand transport and relative saltation activity. A remote camera system is also deployed at each station to provide additional information on the frequency and relative magnitude of sand transport events as well as weather conditions, sea state, plant cover changes, dune form, and development changes. Three tipping bucket rain gauges are deployed across the restoration area (north, middle, south) to provide data on precipitation across the foredune restoration zone. To date, no analysis of the data collected by the remote camera system has occurred by State Parks or the SAG.

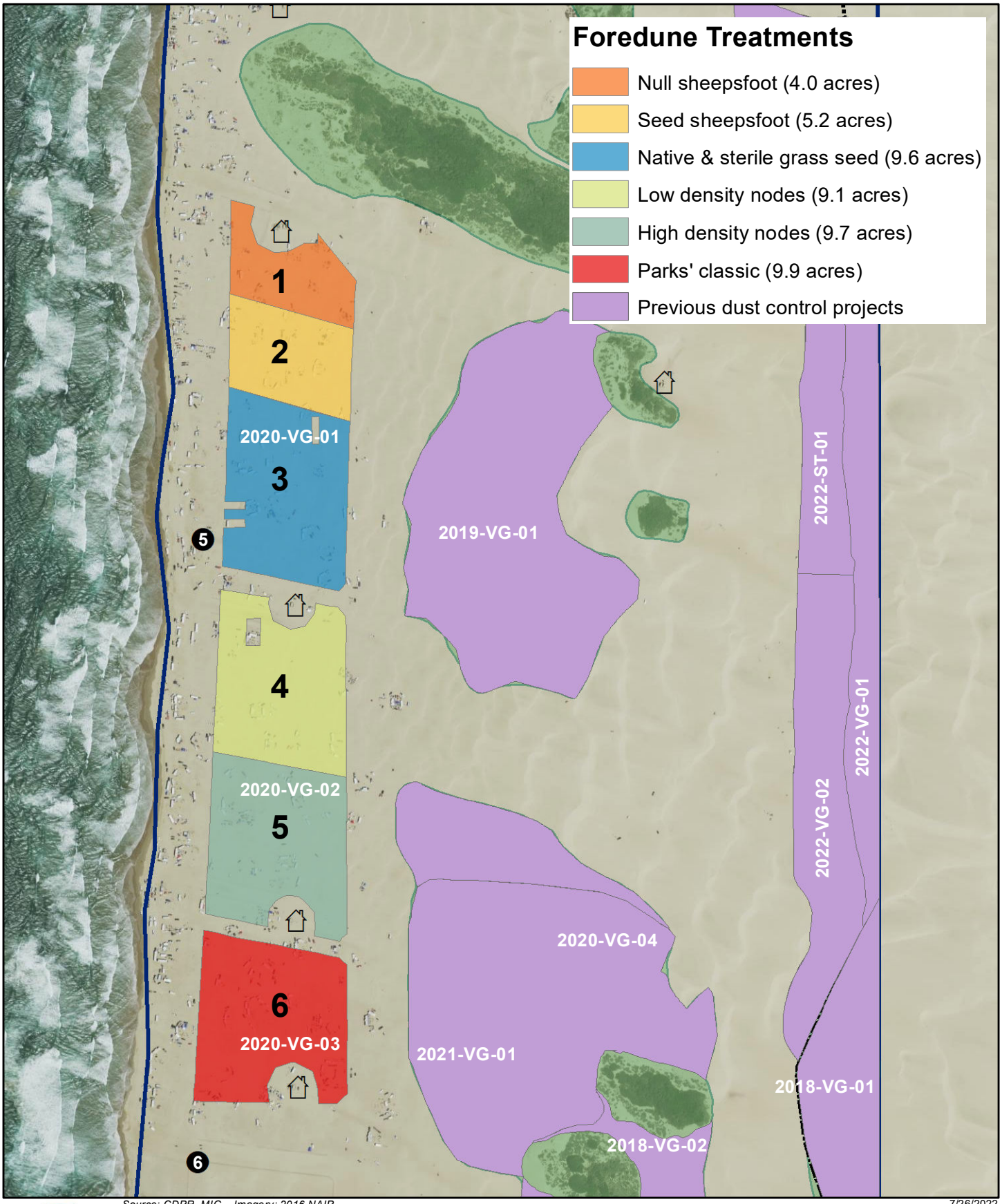


Figure 2-7: Foredune Treatment Areas

2022 ARWP

The Sensit instrument was used to monitor saltation on the downwind (i.e., eastern) edges of the six foredune restoration areas. The mean threshold wind speed at a height of 3.5 meters above ground level for each treatment area and the total number of hours in which saltation was observed at each treatment area are shown in Figure 2-8 (from February 2021 to February 2022). As shown in Figure 2-8, the mean threshold wind speed was lowest in treatment areas 1 and 2. This is most likely due to the fact that treatment areas 1 and 2 have lower levels of plant and straw coverage than treatment areas 3, 4, 5, and 6 (see Section 2.3.6). It is noted that the saltation thresholds identified in Figure 2-8 are not a precise measurement, i.e., saltation may or may not occur each time the hourly wind speed exceeds the threshold value, and there may also be saltation activity below the threshold value. Analysis of data collected after February 2022 is ongoing.

2.3.3 UNCREWED AERIAL SYSTEM (UAS) SURVEYS

Since October 2019, State Parks, in collaboration with a team from UCSB, has conducted bi-annual UAS surveys using a Wingtra One fixed-wing UAS (also known as a drone) to survey and monitor changes in dune morphodynamics, vegetation cover, and sediment budgets (volumetric change) at ODSVRA. The Wingtra One UAS is a fully autonomous drone. Flight paths are pre-programmed into the drone and monitored by an FAA-certified pilot. The drone is typically flown at altitudes over 100 meters above ground level. The system is equipped with post-processing kinematic (PPK) Global Positioning System (GPS) correction capabilities referenced during data collection to a survey-grade Trimble R10 base station that operates in static collection mode. These GPS data are then used to provide precise georeferencing for each photo collected by the onboard payload within mm-scale accuracy. The UAS surveys occur each February and October to avoid the western snowy plover nesting season. Flights are coordinated with State Parks staff and wildlife monitors to ensure safety and minimal disturbance to birds and wildlife during the flight campaigns.

The UAS imagery datasets are used to create four main data products:

- Georeferenced, orthorectified aerial photo mosaics of the study site in the visual (RGB) bands.
- Georeferenced, orthorectified multispectral maps of vegetation cover using Normalized Difference Vegetation Index (NDVI) andother spectral methods.
- Three-dimensional digital elevation models (DEMs) derived from structure-from-motion(SfM) photogrammetry.

Geomorphic change detection (GCD) maps from consecutive time steps show differences in elevation derived by comparing DEMs over time using spatial statistics. The GCD maps are then used to calculate volumes of sediment changebetween surveys that can be used to identify and interpret dune development, evolution, erosion/deposition patterns, and sediment budgets. In contrast to the point measurement of the BSNEs, the GCD maps provide spatial patterns of geomorphic change.

Figure 2-8. Foredune Treatments – Mean Threshold Wind Speed and Observed Saltation

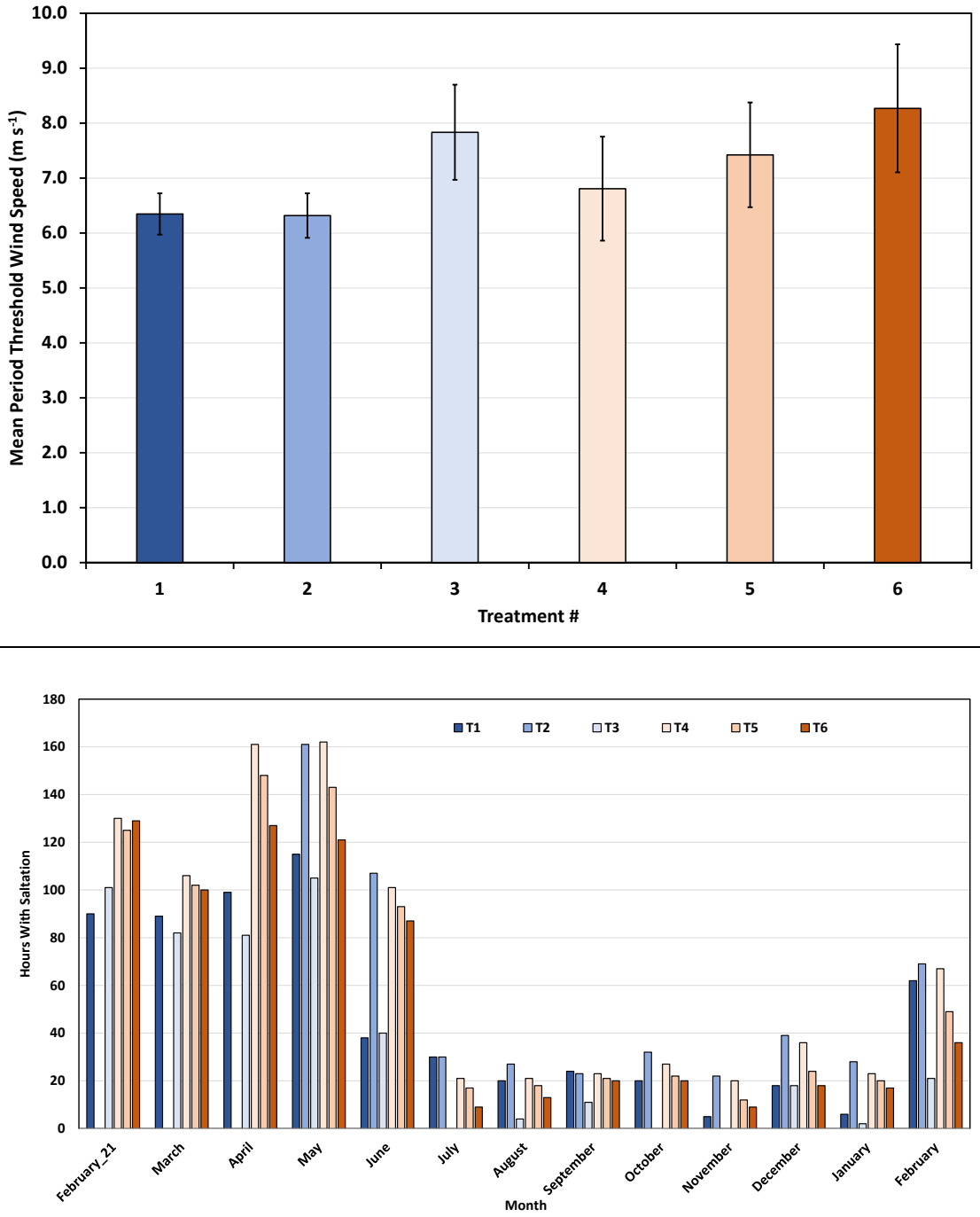


Figure 2-8. Top: The mean threshold wind speed, as measured at 3.5 meters above ground level, for each of the treatment areas for the period February 2021 to February 2022. The error bar represents the standard deviation of the mean from the 13 months of observation. Bottom: Monthly summation of hours with observed saltation for each treatment area from February 2021 to February 2022. The Sensit malfunctioned in treatment 2 from February 2021 to April 2021.

As of July 31, 2022, six (6) UAS survey campaigns have been flown at ODSVRA (see Table 2-15). Initial UAS survey efforts in October 2019 focused on mapping an area of 588 acres along the shoreline of ODSVRA, including the 48-acre foredune treatment areas (20-VG-01, 20-VG-02, and 20-VG-03, see Attachment 01, Figure A01-11). In early 2020, State Parks and the SAG decided to expand UAS surveys to include the full extent of ODSVRA's open riding and camping area (approximately 1,500 acres), including key reference sites of high OHV activity, protected non-riding areas, aeolian sand transport (saltation) pathways, vegetated restoration areas, natural foredune sites, and other highly emissive areas.

Table 2-15. Summary of UAS Surveys at ODSVRA

UAS Survey Campaigns	Survey Dates	Sensor Payload (spectral bands)	Coverage Area(square kilometers)	Average Altitude (meters)
1: Baseline Pre-Restoration Survey	October 1-2, 2019	Sony RX1R II (42 Megapixel, RGB)	3.83	114
2: Initial Treatment Installations	February 10-11, 2020	Sony RX1R II (42 Megapixel, RGB)	5.41	123
3: First Post-Treatment Survey	October 13-15, 2020	Sony RX1R II (42Megapixel, RGB)	5.98	121
	October 16, 2020	Micasense RedEdge-MX (RGB, RE, NIR)	4.63	113
4: First Year of Treatment Response	February 17-18, 2021	Sony RX1R II (42 Megapixel, RGB)	5.95	120
	February 18-21, 2021	Micasense RedEdge-MX (RGB, RE, NIR)	5.79	118
5: Second Growing Season	October 4-5, 2021	Sony RX1R II (42 Megapixel, RGB)	5.98	121
	October 5-7, 2021	Micasense RedEdge-MX (RGB, RE, NIR)	6.95	119
6: Second year of treatment response	February 23-25, 2022	Sony RX1R II (42 Megapixel, RGB)	7.56	112
	February 25-26, 2022	Micasense RedEdge-MX (RGB, RE, NIR)	5.91	116

The extents of the coverage in the most recent UAS surveys for this reporting interval, August 1, 2021, to July 31, 2022, are shown in Table 2-15. Since October 2020, high-resolution digital imagery has been captured from two different sensors: 1) a Sony RX1RII 42-megapixel (MP) full-

frame red, green, and blue (RGB) camera at approximately 1.5 to 2 cm resolution, and 2) a Micasense Rededge-MX sensor that provides multispectral (RGB, Rededge/RE, and near-infrared/NIR) imagery at a resolution of approximately 7 to 9 cm. The multispectral imagery allows for improved detection of vegetation in the dunes and, using various spectral indices, such as NDVI and Normalized Difference Red-Edge Index (NDRE), seasonal changes in vegetation cover can also be identified.

To date, the UAS surveys encompass a baseline (pre-restoration) interval from October 2019 – February 2020, and two subsequent years of plant growth and sand transport seasons. The results and interpretations of the UAS surveys to February 2021 were presented to State Parks in a report by UCSB in September 2021 and results current to October 2021 are summarized in a paper submitted for review to a peer-reviewed scientific journal. State Parks will report on the results of the UCSB analyses following review of these reports, which is anticipated to be complete by fall 2022.

2.3.4 COMPUTATIONAL FLUID DYNAMICS

Computational fluid dynamics (CFD) is the science of producing fluid flow simulations using large computational resources. The CFD modeling can be used to evaluate how the evolving foredune treatment areas will modulate the boundary-layer flow (wind speed, direction, and surface shear velocity) over and in the lee of dust control projects. Currently, the DRI model only accounts for localized reductions in dust emissivity directly within dust control treatment areas. Incorporating CFD into the DRI model could provide a more accurate assessment of the effectiveness of mitigation treatments by accounting for flow changes within and downwind of treatment areas.[13]

2.3.4.1 Foredune CFD Modeling

As described in Section 2.2.2, State Parks initiated a 48-acre foredune restoration treatment in 2019. Currently, foredunes are absent across much of the north-south extent of the beach area at ODSVRA, but they are established in the south of the park where OHV activity is not permitted. Historical aerial photography of the site indicates that hummocky foredunes did exist at the ODSVRA in the 1930s. A well-developed foredune system could disrupt incoming boundary layer flow from the ocean, reduce surface shear stress, decrease sand flux across its width and for some distance on the lee side, thereby reducing saltation-driven dust emissions and contributing to improved air quality downwind.

Quantifying the benefit of the presence of a foredune on modulating sand transport and dust emissions is a challenge. DRI used a CFD approach to characterize the value of foredunes, typified by those in the south Oso Flaco area of the ODSVRA, with respect to their potential

[13] Refer to the 2021 ARWP, Attachment 09 – DRI 2021/2022 CFD Report, for a detailed description of CFD modeling inputs, methodology, and benefits.

contribution to reducing saltation and dust emissions. The assumption is that a re-established foredune along part of the ODSVRA will evolve to have aerodynamic characteristics similar to the foredunes at south Oso Flaco. The simulations provided a means to quantify the potential effect on sand transport and dust emissions if an Oso Flaco-like foredune was re-established within the ODSVRA.

DRI has conducted simulations of flow over the Oso Flaco coastal nebkha foredune to back dune system using high resolution topographic data and measured flow conditions to develop a realistic boundary condition that characterizes the incoming flow conditions to the foredunes from the beach for input into the CFD model (see Figure 2-9).

Figure 2-9. Sheer Stress Visualization – Oso Flaco Topography

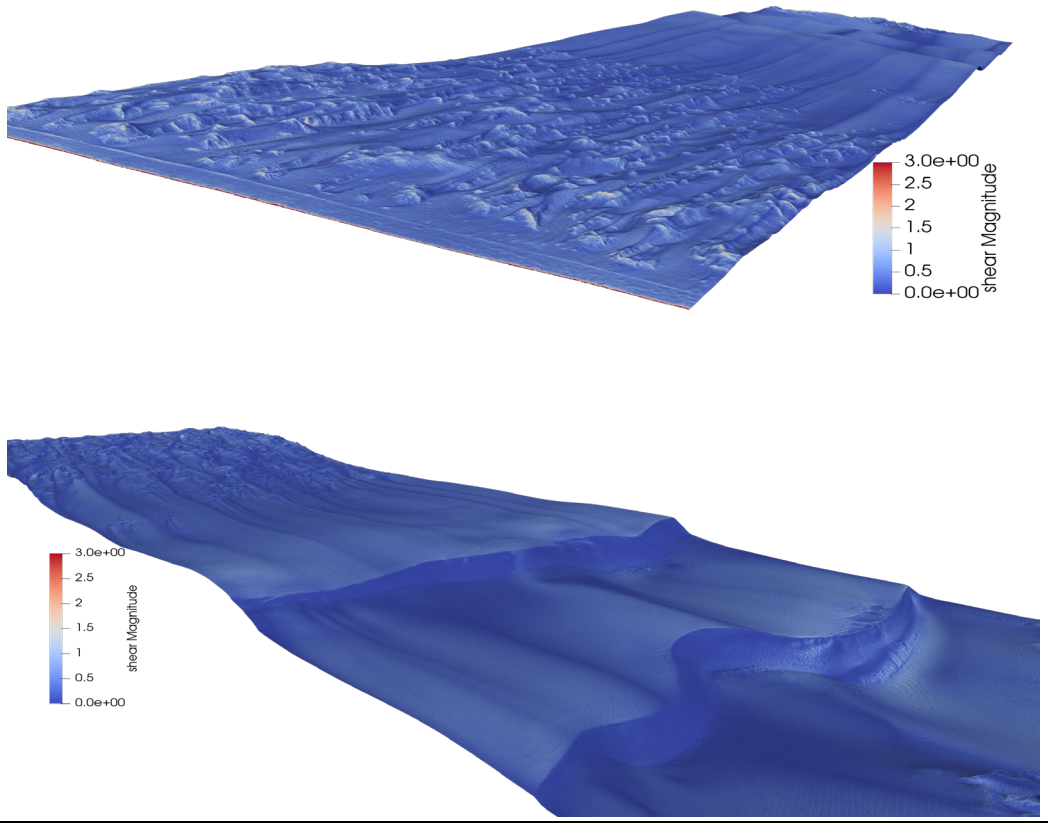


Figure 2-9. A visualization of the shear stress on the Oso Flaco topography. Top: A view of the foredune looking downwind. Bottom: A view of the non-vegetated dune system looking upwind.

DRI also conducted additional simulations on modified topographies to isolate the downwind effects of the foredune on shear stress and dust emissions. DRI has determined that nebkha hummocks in the foredune are effective at providing shelter in their lee, where shear is reduced, that modulates saltation flux, despite the forms being highly aerodynamic. DRI observed higher shear on the transverse dunes as compared to the foredune, although the

foredune removes momentum from the wind field before it reaches the transverse dunes. The removal of the foredune was found to increase the area-normalized level of shear on the surface and reduced downwind sheltering effects. Vegetation was found to play the critical role in providing shelter to the foredune, in terms of the reduction of total shear force, dust emissions, and surface area where saltation could occur within the domain studied. The data presented suggest that in terms of a management strategy to mitigate dust emissions from the ODSVRA that impact air quality downwind, the establishment of a foredune is justified for that purpose as it reduces the integrated shear across the domain. As PM_{10} dust emissions scale non-linearly with increasing shear, even relatively modest reductions can have significant effects on the mass emissions and concentrations downwind.

Refer to Attachment 06-03, Computation Fluid Dynamic Modeling of ODSVRA Foredunes, for a detailed description of CFD modeling of the Oso Flaco foredunes and the quantification of their shear-reducing capacity within the foredunes, to the lee of the foredunes, and on the transverse dunes downwind of the foredune area and potential effects on dust emissions.

2.3.5 PI-SWERL/EMISSIVITY MONITORING

Since 2013, DRI has undertaken PI-SWERL measurements of PM_{10} emissivity across ODSVRA in riding and non-riding areas annually. The measurements have been repeated over time by revisiting the 2013 sampling locations. Measurements have also been made in areas deemed critical to understanding changes in emissivity throughout ODSVRA. In total, between 2013 and 2022, DRI conducted 1,172 individual PI-SWERL emissivity tests within the ODSVRA riding area and 377 PI-SWERL emissivity tests outside the riding area.

A PI-SWERL measurement campaign was planned for May 2021 but did not occur due to logistical and weather constraints. In May 2022, DRI completed a PI-SWERL campaign consisting of 216 tests that repeated PI-SWERL measurements at 100 locations previously sampled in 2020. If repeated sample locations were affected by new dust control measures (e.g., covered with straw), new sampling locations were selected in areas as close to the previously sampled location as feasible. Due to the complex topography in the non-riding areas observed in 2022, measurements were made along paired transects in areas where the topography was amenable for ingress and egress.

Data analysis for the May 2022 PI-SWERL sampling is ongoing.

2.3.5.1 Increments of Progress Towards Meeting Air Quality Objectives, 2013 to 2021

Dust controls including temporary wind fences and vegetation projects have been used to reduce the mass emissions of PM_{10} originating from ODSVRA and lower the regional PM_{10} burden on the Nipomo Mesa. Since 2013, when there was effectively no dust control measures in place at ODSVRA, the amount of acreage managed for dust control purposes has increased to 705.5 acres as of July 31, 2022.

The PM_{10} data measured at CDF and Mesa2 and the wind data measured at State Parks' S1 meteorological tower, or at other suitable meteorological network monitoring stations (see Section 2.3.1), are used to demonstrate that the dust emission system in ODSVRA produces less PM_{10} now than it did prior to the emplacement of dust controls and that this reduction in PM_{10} scales with the increase in acres of dust control. The metric used to evaluate the production of PM_{10} from the ODSVRA is the ratio of total hourly PM_{10} (TPM_{10}, $\mu g/m^3$) and total hourly wind power density (TWPD, in terms of watts per square meter) during a set time period.

DRI has prepared a preliminary update on the relationship between TPM_{10}:TWPD and acres of dust control using data from May to September, 2021; however, this preliminary report is still being reviewed by the SAG and DRI pursuant to the scientific review process described in Section 2.4.3. DRI anticipates this report will be completed by September 30, 2022.

2.3.6 VEGETATION MONITORING

From August 1, 2021, to July 31, 2022, State Parks developed and reported the vegetation sampling methods described below in consultation with SAG's vegetation working group.

2.3.6.1 Line Intercept Transect Sampling Method

The line intercept method was used to estimate the percent cover of species within each of the six (6) foredune treatment areas, backdune areas, and three (3) reference sites that had been closed to vehicular activity for at least 20 years and not subject to restoration plantings in the past. Within each foredune area and reference site, a total of four (4), 30-meter transects were sampled. Within each backdune area and reference site, a total of three (3), 30-meter transects were sampled. Backdune sampling includes early seral and late seral reference sites.

State Parks sampled the following areas in 2021:

- The 48-acre foredune area (2020-VG-01, 2020-VG-02, and 2020-VG-03, planted in February 2020). This area was also surveyed in 2020.
- A foredune reference site in the North Oso Flaco area of ODSVRA.
- A backdune vegetation project east of the North Eucalyptus Tree vegetation island (2019-VG-02, 9.1 acres).
- A backdune vegetation project adjacent to the eastern boundary of the ODSVRA open riding and camping area, perpendicular to marker post 6 (2018-VG-01, 9.1 acres).
- Early Seral Reference-South Oso Flaco Back Dunes, sampled summer 2022
- Late Seral Reference-Pipeline/Maidenform Islands Reference, sampled fall 2021

The starting points for the transect lines were randomly selected within each project area using Geographic Information System (GIS) software. Three transect lines in each project area were

randomly selected from the eight cardinal and intermediate directions (i.e., N, NE, E, SE, etc.). For the foredune site, a fourth transect line was included that was parallel to the prevailing wind direction. A measuring tape was run along the transect and secured with wooden stakes. As the vegetation canopy intersected the line, the species was noted on a data sheet along with the beginning and ending canopy measurements. When the canopies of two different species overlapped, each species was documented separately as two different canopies. A closed canopy for a given species was assumed until gaps in vegetation exceed the width of five (5) centimeters. Dead vegetation was not included in the measurements unless it was clearly the result of the seasonal dieback of a perennial plant that was still viable. Once each 30-meter transect was surveyed, staff conducted a walk-around assessment within an area of ten meters from the transect line for the entire length of the transect (a "belt transect"), and all additional species observed were noted.

The results of State Parks' 2021 line intercept transect sampling are summarized below. Refer to Attachment 05, Summary of Vegetation Monitoring of Restoration Sites at ODSVRA (2021), for detailed information on State Parks line intercept sampling methodology and results.

48-Acre Foredune Project Results

As expected in the first growing season (2020), and reported in State Parks' 2021 ARWP, none of the foredune treatment areas approached the vegetative cover of the Oso Flaco reference site (23.0%); however, three of the six treatment areas did have species diversity similar to the Oso Flaco reference site. In 2021, after the second growing season, an increase in vegetation cover was observed in each of the foredune treatment areas, excepting the control area; however, none of the treatment areas met the vegetative cover of the North Oso Flaco reference site (23.0%). In addition, only one of the six foredune treatment areas (Treatment Area 5) met the species diversity of the North Oso Flaco reference site with at least 10 species represented.

The treatment area that achieved the highest percent cover was Area 3 with 12.66% cover (compared to 4.02% in 2020), followed closely by Area 3 with 12.31% cover. Both Area 5 and Area 6 showed the highest level of species diversity, with ten and eight species represented, respectively. Plant coverage was variable between transects in all treatment areas due to the clustered pattern of the vegetation. The results of the foredune line-intersection sampling are summarized in Table 2-16.

Table 2-16. Summary of Foredune Line Intercept Sampling Results			
Survey Site[(A)]	**Species Richness**	**Total Percent Cover**	**Percent Cover 95% Confidence Interval**
Foredune Area 1 – Control	0	0.0%	± 0.0%
Foredune Area 2 – Native Seed	4	1.9%	± 6.1%
Foredune Area 3 – Native and Grain Seed	5	12.3%	± 20.9%
Foredune Area 4 – Low Density Nodes	6	5.7%	± 8.7%
Foredune Area 5 – High Density Nodes	10	2.1%	± 4.3%
Foredune Area 6 – Parks Classic	8	12.7%	± 9.5%
Reference Site – North Oso Flaco Foredune	10	23.0%	± 39.7%
(A) The foredune was planted in 2020. All foredune treatment areas were approximately 1.5 years old at the time of the 2021 line intercept sampling.			

Comparison of Line Intercept Transect Sampling Results with Other Recent Studies

Other recent analyses have evaluated vegetative cover within the ODSVRA using different sources of aerial imagery, including UCSB's historic vegetation report (see Section 2.3.6.3 and Attachment 06-04) and UCSB's and Arizona State University's (ASU) foredune restoration UAS survey report (see Section 2.3.3 and State Parks' 2021 ARWP, Attachment 08).

UCSB's historic vegetation report evaluated vegetation coverage in the same area of the North Oso Flaco foredune as State Parks' transect monitoring. The UCSB report found that vegetation cover in the North Oso Flaco foredune ranged from approximately 24.4% in 2012 to approximately 19.1% in 2020. State Parks line intercept sampling corroborates these findings, identifying a mean vegetation coverage of 23.0% in the North Oso Flaco foredune. It is noted that State Parks' sampling was based on four (4) randomly selected transects whereas the UCSB analysis evaluated the entire North Oso Flaco area, so a direct comparison of results between these studies is limited.

The UCSB and ASU UAS survey report analyzed vegetation cover within State Parks 48-acre foredune project. State Park's line intercept sampling is generally consistent with findings of the UAS survey report, which found vegetation cover increasing with time for all foredune treatments except the control area (Treatment 1); however, there is a different in findings for treatment areas 4 and 5 between the studies, possibly due to the high degree of variability in cover between transects in these areas. It is also noted that the two studies had different ways of defining vegetation, with State Parks using canopy cover (including woody stems and dormant plants) and UCSB and ASU using the NDVI method to determine leaf cover (i.e., generally excluding woody stems and dormant plants). A comparison of vegetative cover between State Parks' transect monitoring and the UAS survey report is presented in Table 2-17. Refer to Attachment 05 for additional information comparing State Parks line intercept sampling methodology and results with other recent studies.

Table 2-17. Comparison of 48-Acre Foredune Treatment Vegetation Cover between State Parks Transect Monitoring and UAS Survey Report						
Survey	**Foredune Treatment Area Percent Vegetation Cover**					
	1	**2**	**3**	**4**	**5**	**6**
State Parks 2020 Sampling(A)	0.0%	0.1%	4.0%	0.8%	0.4%	3.6%
UAS Survey October 2020(B)	0.0%	0.4%	2.4%	0.8%	1.5%	2.2%
UAS Survey February 2020(B)	0.0%	0.6%	3.2%	1.3%	2.4%	4.9%
State Parks 2021 Sampling(C)	0.0%	1.9%	12.3%	5.7%	2.1%	12.7%

(A) Vegetation cover is the mean of three (3) 30-meter transects.
(B) Vegetation cover is the mean of the entire treatment area. Refer to State Parks 2021 ARWP, Attachment 08 for UAS survey results.
(C) Vegetation cover is the mean of four (4) 30-meter transects.

Backdune Project Results

All backdune project areas that were surveyed showed healthy levels of vegetation coverage. The dominant species within the early seral reference site, *Lupinus chamissonis*, showed similar percent cover in the project areas with a mean cover of 27.8% in the project areas and 29.3% in the reference site; however, all project areas had an overall lower percent cover than both the early and late seral reference sites. State Parks anticipates vegetation growth and coverage will continue and will approach the reference sites condition within the upcoming growing seasons.

All backdune project areas had similar vegetation composition to the early seral reference site. Of the 20 native species present within the early seral reference site, the project areas had between 12 and 14 of them and a total native species richness of between 16 and 23 species.

The results of the backdune line-intersection sampling are summarized in Table 2-18.

Table 2-18. Summary of Backdune Line Intercept Sampling Results				
Survey Site	**Age of Planting (Years)**	**Species Richness**	**Total Percent Cover**	**Percent Cover 95% Confidence Interval**
BBQ Flats	1.5	23	31.4%	± 17.1%
La Grille Hille	3.5	17	35.0%	± 44.1%
North Eucalyptus Tree	2.5	16	51.4%	± 55.6%
Reference Site – Early Seral	-	22	68.8%	± 17.5%
Reference Site – Late Seral	-	14	77.1%	± 3.5%

2.3.6.2 Photo Point Monitoring

In 2021, State Parks continued its on-the-ground and drone photo point monitoring of backdune and foredune project areas.

On-the ground photo point monitoring of the 48-acre foredune project has occurred since

2020. Initial photo-point monitoring occurred before the installation of the foredune in February 2020. Subsequent monitoring has occurred in May 2020, October 2020, and October 2021. Photo points are located on all four corners of each treatment area. For each photo point, two photos are taken, each with one of the treatment area boundary lines on the outer edge of the photo with the interior of the treatment area centered in the photo. There is also one photo point overlooking the entire 48-acre foredune treatment area. The photo point monitoring is scheduled to continue into 2023.

On-the-ground photo point monitoring of back dune areas has occurred annually since 2018 and conducted again in the summer and fall of 2021. Back dune photo points are positioned to capture changes within the general areas where back dune projects are located. The number of photos for each photo point and the number of photo points varies at each location to sufficiently capture each area. In total, 53 photo points were monitored in the back dunes in 2021.

Drone aerial imagery photo point monitoring has occurred since 2020. For the foredune project, drone photo points were taken in May 2020, December 2020, and December 2021. Two photo points were taken of each treatment area (one from the east and one from the west for each area). Drone photo points were also conducted within the backdune project areas in December 2020 and again in December 2021. The number of photos for each photo point and the number of photo points varied at each location to sufficiently capture each area. Drone photo point monitoring of the foredune and backdune areas is scheduled to continue into 2023.

Select photo point samples are shown in Figure 2-10, Figure 2-11, and Figure 2-12.

Refer to Attachment 05, Summary of Vegetation Monitoring of Restoration Sites at ODSVRA (2021), for detailed information on State Parks photo point sampling methodology and results.

Figure 2-10. Example Ground Photo Point Monitoring – Foredune Project

Figure 2-10. Left: Ground photo point of foredune treatment area 3 prior to treatment. The photo is facing north and was taken February 4, 2020. Right: Ground photo point of the same foredune treatment area after 1.5 years of growth. The photo was taken on October 19, 2021.

Figure 2-11. Example Ground Photo Point Monitoring – Backdune Project

Figure 2-11. Left: Ground photo point of backdune vegetation project west of the North Eucalyptus Tree vegetation island (2019-VG-02). The photo is facing northeast and was taken October 17, 2018. Right: Ground photo point of the same backdune vegetation project after 2.5 years of growth. The photo was taken November 8, 2021.

Figure 2-12. Example Drone Photo Point Monitoring – Backdune Project

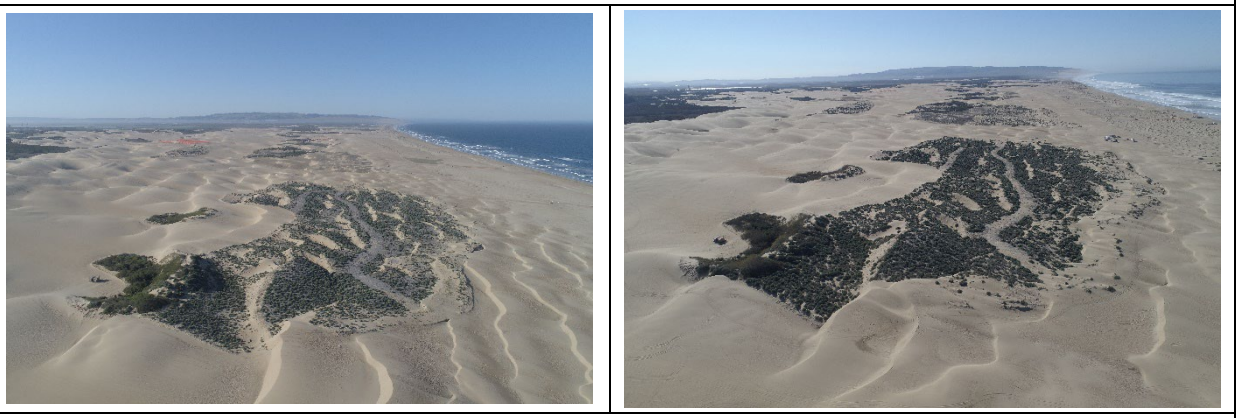


Figure 2-12. Left: Drone photo point of backdune vegetation projects near the BBQ Flats vegetation island (2019-VG-01). The photo is facing south and was taken May 5, 2020. Right: Drone photo point of the same backdune vegetation project on February 17, 2022.

2.3.6.3 Historical Vegetation Study

At the request of State Parks, UCSB conducted a study to examine changes in historical vegetation cover within the ODSVRA between 1930 and 2020. Trends in plant cover were mapped using a GIS and best available historical aerial photography obtained from State Parks, UCSB Library's Geospatial Collection, and the National Agriculture Imagery Program (NAIP), from a total of 16 years with sufficient coverage of ODSVRA between 1930 and 2020. A summary of the UCSB study is provide below; refer to Attachment 06-04 for UCSB's full historical vegetation cover change analysis.[14]

To examine and interpret vegetation cover trends and allow comparison between different regions of the ODSVRA, the historical vegetation study focused on:

- The area of the ODSVRA located south of Arroyo Grande Creek, which represents approximately 75% of the total area of the ODSVRA, referred to as the "ODSVRA sub-area".
- The ODSVRA's open riding and camping area (as of 2013).
- The North Oso Flaco foredune complex, which serves as a reference site for foredunes closed to OHV activity since 1982.

[14] UCSB's final historic vegetation cover change analysis report available for review available at https://ohv.parks.ca.gov/?page_id=27160. Specifically, see OHMVR Commission meeting materials for February 17, 2022, *SAG Memo: Scientific Basis for Possible Revision of the Stipulated Order of Abatement (SOA)*, Attachment 2.

- The South Oso Flaco dune complex, including both foredune and backdune areas, which serves as a reference site for mature foredunes and backdune areas that have not seen OHV activity since at least 1982,
- The foredune zone within the above areas in which foredune vegetation and dunes would typically exist in the region. The foredune zone extends approximately 400 meters inland from the high-water mark.
- The new foredune restoration sites planted in 2020 (2020-VG-01, 2020-VG-02, and 2020-VG-03).

A supervised classification was used to examine changes in vegetation cover from historical aerial photography and quantify changes since the 1930s. Change patterns were characterized over four time periods relating to different land management intervals, as follows:

- 1939 - 1985: Landscape responses preceding the modern management of ODSVRA by State Parks, which began in 1982.
- 1985 - 2012: Landscape responses during the management of ODSVRA by State Parks up to adoption of SLOAPCD Rule 1001 (2011) and related PMRPs.
- 2012 - 2020: Landscape responses following implementation of PMRP mitigation efforts resulting from Rule 1001 (2011) and the eventual Stipulated Order of Abatement (SOA) in 2018.
- 1939 - 2020: Total landscape change over the historic aerial photo record that compares a time prior to widespread OHV riding and the current state of dune ecosystems and vegetation cover.

Plant cover trends within ODSVRA have varied significantly over time and differ notably between the different regions of the ODSVRA. Within the broader ODSVRA sub-area, vegetation generally increased in cover over time, from approximately 25% in 1939, to a peak of 37% in 2012, to just over 35% in 2020. In the ODSVRA's open riding and camping area, however, plant cover has been generally much lower over time and declined appreciably from a peak of 12% in 1966, to a low of 3.9% in 1985, and remained low (<5%) until the early 2000s. After this point in time, plant cover gradually increased to 8% by 2020 in response to revegetation efforts by State Parks. Similar trends occur within the foredune zone across all areas, albeit with generally less plant cover. The foredune zone at the South Oso Flaco reference site had very low plant cover (2.3%) in 1939, but increased by an order of magnitude to over 30% in the 2010's. For comparison, foredune vegetation in the open riding and camping area also had low cover (2.6%) in 1939, rose to a peak of 5.3% in 1966, but steadily declined to very low values ~1% from 1985 to 1998. Since 2005, plant cover increased slightly in the open riding and camping area to 2.4% by 2020, mostly due to new plants on the margins of fenced

vegetation islands and in the seasonal nesting exclosures. At North Oso Flaco, foredune vegetation cover was very low (<1%) in the 1930s, less than in the SVRA's open riding and camping area, but after 1985 the values increased to over 24% in 2012.

Broader ecological and climatic conditions aside, observed patterns and differences in vegetation trends across these areas is largely attributable to three main factors:

1) The presence of recreation activities and OHV riding (sanctioned or otherwise) in the dunes.
2) The widespread and targeted removals of invasive grass species in some areas (e.g., South Oso Flaco).
3) Land management and plant community restoration efforts by State Parks since establishment of the ODSVRA in 1982 and in response to PMRPs associated with Rule 1001 (2011) and the 2018 SOA.

The interpretation of positive (vegetation gain) and negative (vegetation loss) changes over the three reference time periods indicates the following:

- 1939 - 1985: A general decline in plant cover in the foredune and backdune zones of the ODSVRA open riding and camping area (from 11% to 4%) while vegetation in the broader ODSVRA increased notably from 1939-1966, then declined until 1985. In the open riding and camping area, overall change is characterized by 10% negative change (plant losses) and only 2% positive gains.
- 1985 - 2012: Mostly increasing plant cover with over 15% gains in the broader ODSVRA sub-area, mainly around existing vegetation and other targeted restoration areas, particularly between 2005 and 2012.
- 2012 - 2020: A general decline in plant cover across the ODSVRA and South Oso Flaco areas compared to previous intervals with 8% total change in the ODSVRA sub-area. Some of this decline reflects removal of invasive plants by State Parks. Within the SVRA's open riding and camping area, plant cover remained steady at ~8% during this time.

2.3.7 EVALUATION METRICS

The 2021 ARWP incorporated a new set of evaluation metrics intended to provide a streamlined dashboard for reporting PMRP evaluation metrics, tracking Dust Control Program progress, and informing adaptive management strategies at ODSVRA. The updated evaluation metrics include "Dust Mitigation Targets" that compile specific, measurable endpoints and "Dust Mitigation Indicators" that document progress in key areas that lack a specific, measurable target or endpoint for various reasons.

State Parks summary report on PMRP evaluation metrics is provided below. Refer to Attachment 02 for a detailed summary of evaluation metrics.

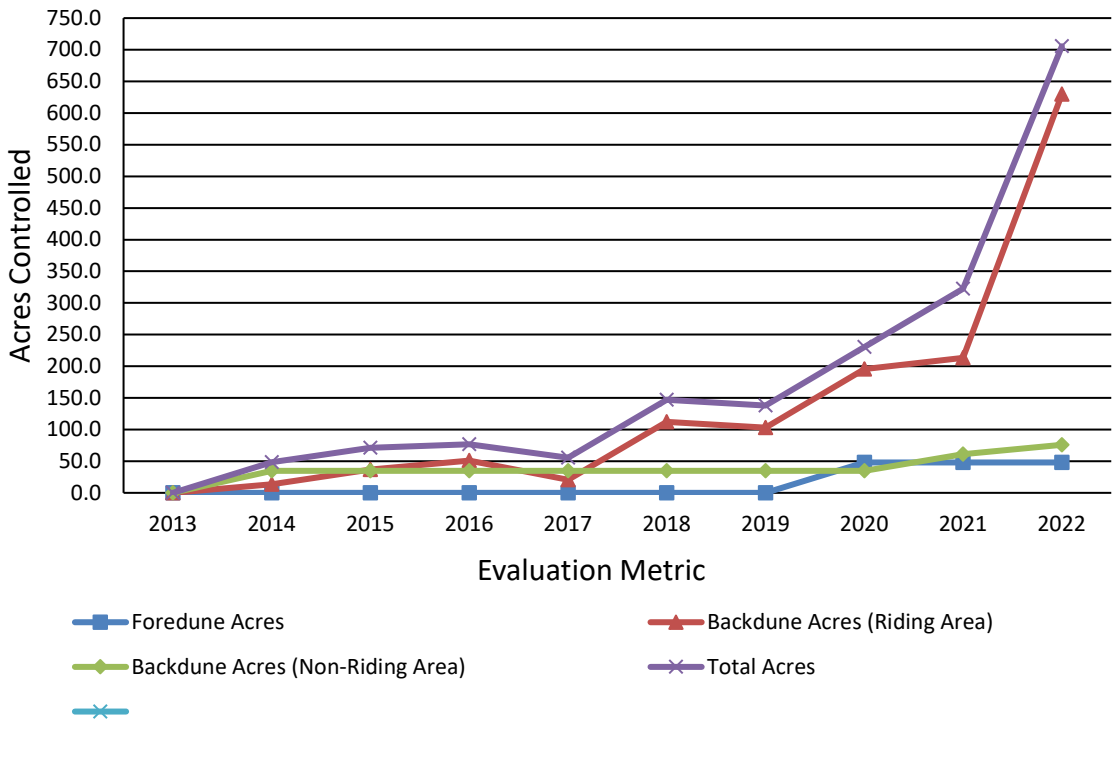
2.3.7.1 Dust Mitigation Targets

Key dust mitigation targets include the amount of cumulative dust control measures installed at ODSVRA, the PM_{10} mass emissions reductions achieved from the ODSVRA (as of July 31st of the ARWP reporting year), and the 24-hour average PM_{10} concentration reductions achieved at the CDF and Mesa2 air quality monitoring stations (as of July 31st of the ARWP reporting year. Dust mitigation targets are compared against 2013 baseline conditions as set forth in the SOA (see Section 2.2).

Dust Mitigation Treatments

Compared to 2013 baseline conditions, when there were no permanent dust control measures at ODSVRA, State Parks now manages 705.5 acres of land for dust control benefits (see Figure 2-13). More than 89% of these managed lands are located inside the ODSVRA open riding and camping area. Refer to Section 2.1 for State Park's detailed report on dust control measures installed at ODSVRA as of July 31, 2022.

Figure 2-13. ODSVRA Dust Mitigation Treatments, July 31, 2013 to July 31, 2022



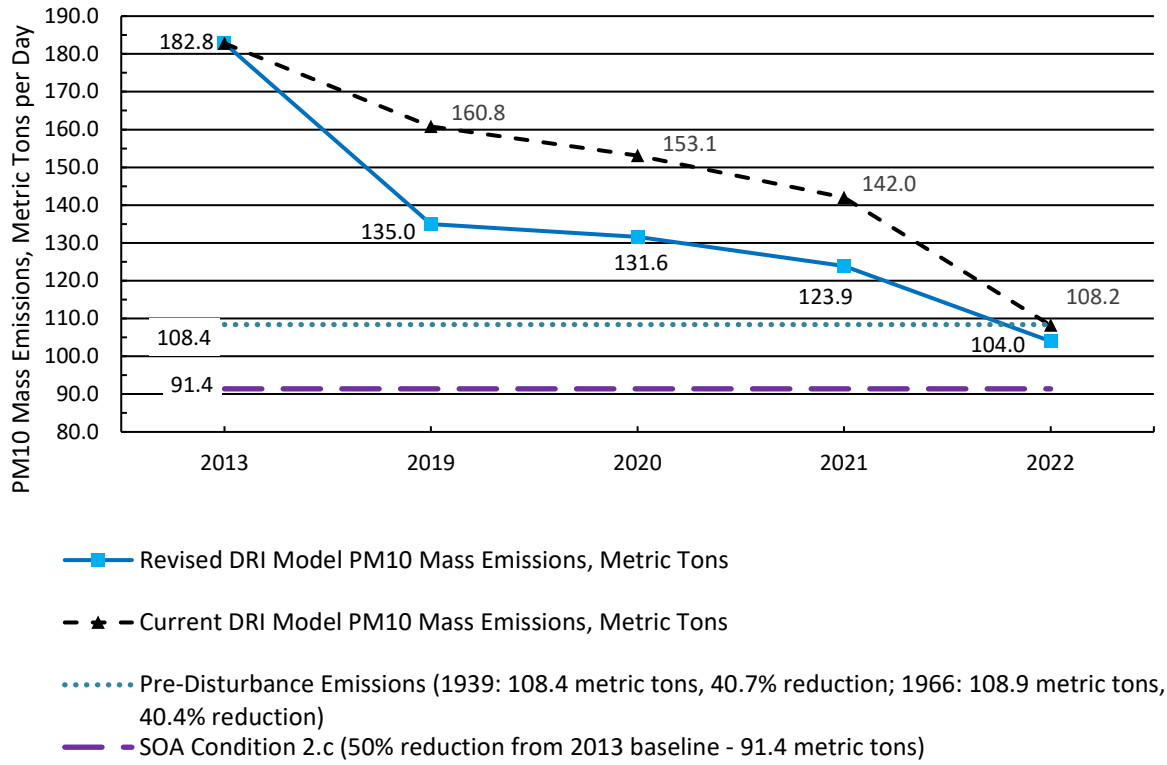
PM_{10} Mass Emissions Reductions

As of July 31, 2022, State Parks has reduced mass emissions at ODSVRA to levels below the lowest mass emissions estimate that DRI predicts would have occurred within the ODSVRA open riding and camping area boundary under the land use conditions present in 1939 (108.4 metric tons per day of PM_{10} mass emissions) and 1966 (108.9 metric tons per day of PM_{10} mass emissions). State Parks continues to make progress towards the 50% reduction in baseline emissions required by current SOA condition 2.c.

- **Current DRI Model:** Compared to 2013 baseline PM_{10} mass emissions levels, which were determined, via the current DRI model, to be 182.8 metric tons of PM_{10} mass emissions, State Parks has reduced PM_{10} mass emissions to no more than 108.2 metric tons day, a reduction of 74.6 metric tons (see Figure 2-14).
- **Revised DRI Model:** Compared to the 2013 baseline PM_{10} mass emissions levels (182.8 metric tons of PM_{10} mass emission), the revised DRI model estimates State Parks has reduced PM_{10} mass emissions to no more than 104.0 metric tons day, a reduction of 78.8 metric tons (see Figure 2-14).

Refer to Section 2.2.3 for State Park's detailed report on PM_{10} mass emissions reductions at ODSVRA as of July 31, 2022.

Figure 2-14. ODSVRA PM_{10} Mass Emissions Reductions, 2013 to July 31, 2022



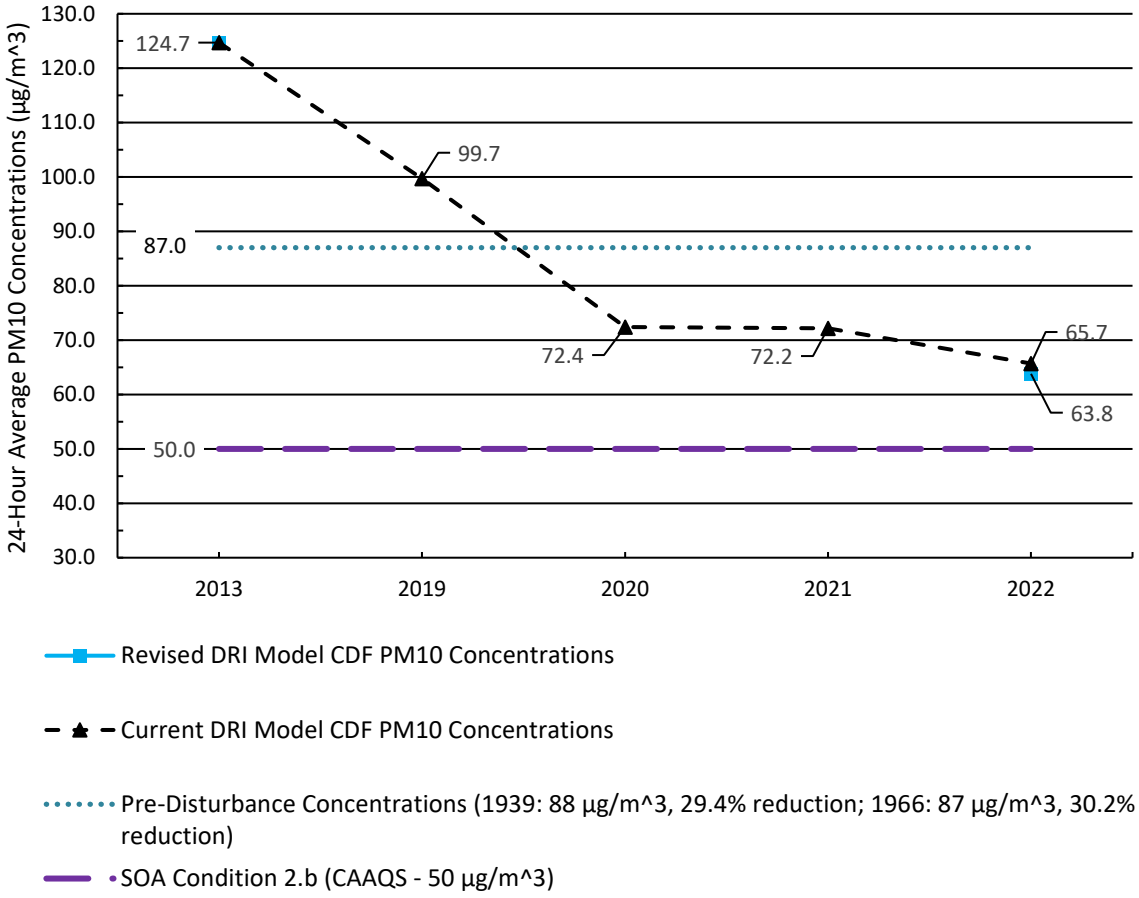
PM_{10} Concentration Reductions

As of July 31, 2022, State Parks has reduced 24-hour average PM_{10} concentrations at the SLOAPCD's CDF and Mesa 2 air quality monitoring stations to levels below the concentration estimates that DRI predicts would have occurred at the CDF and Mesa2 stations under the 1939 and 1966 pre-disturbance modeling scenarios. As described in more detail in Section 2.2.1.1, DRI modeling indicates 24-hour average PM_{10} concentrations at CDF were higher for the 1939 pre-disturbance scenario (88.0 µg/m^3) than the 1966 scenario (87.0 µg/m^3). In contrast, DRI modeling indicates 24-hour average PM_{10} concentrations at Mesa2 were lower for the 1939 pre-disturbance scenario (71.2 µg/m^3) than the 1939 scenario (75.7 µg/m^3). State Parks continues to make progress towards the CAAQS standard of 50.0 µg/m^3 as required by current SOA condition 2.b.

- **Current DRI Model:** Compared to 2013 baseline 24-hour average PM_{10} concentrations, which were determined, via the current DRI model, to be 124.7 µg/m^3 and 95.7 µg/m^3 at the SLOAPCD's CDF and Mesa 2 air quality monitoring stations, respectively, State Parks has reduced PM_{10} concentrations to 65.7 µg/m^3 at CDF (see Figure 2-15) and 59.9 µg/m^3 at Mesa 2 (see Figure 2-16).
- **Revised DRI Model:** Compared to 2013 baseline 24-hour average PM_{10} concentrations (124.7 µg/m^3 and 95.7 µg/m^3 at the SLOAPCD's CDF and Mesa 2 air quality monitoring stations, respectively), the revised DRI model estimates State Parks has reduced PM_{10} concentrations to 63.8 µg/m^3 at CDF (see Figure 2-15) and 63.7 µg/m^3 at Mesa 2 (see Figure 2-16).

Refer to Section 2.2.4 for State Park's detailed report on 24-hour average PM_{10} concentration reductions downwind of the ODSVRA as of July 31, 2022.

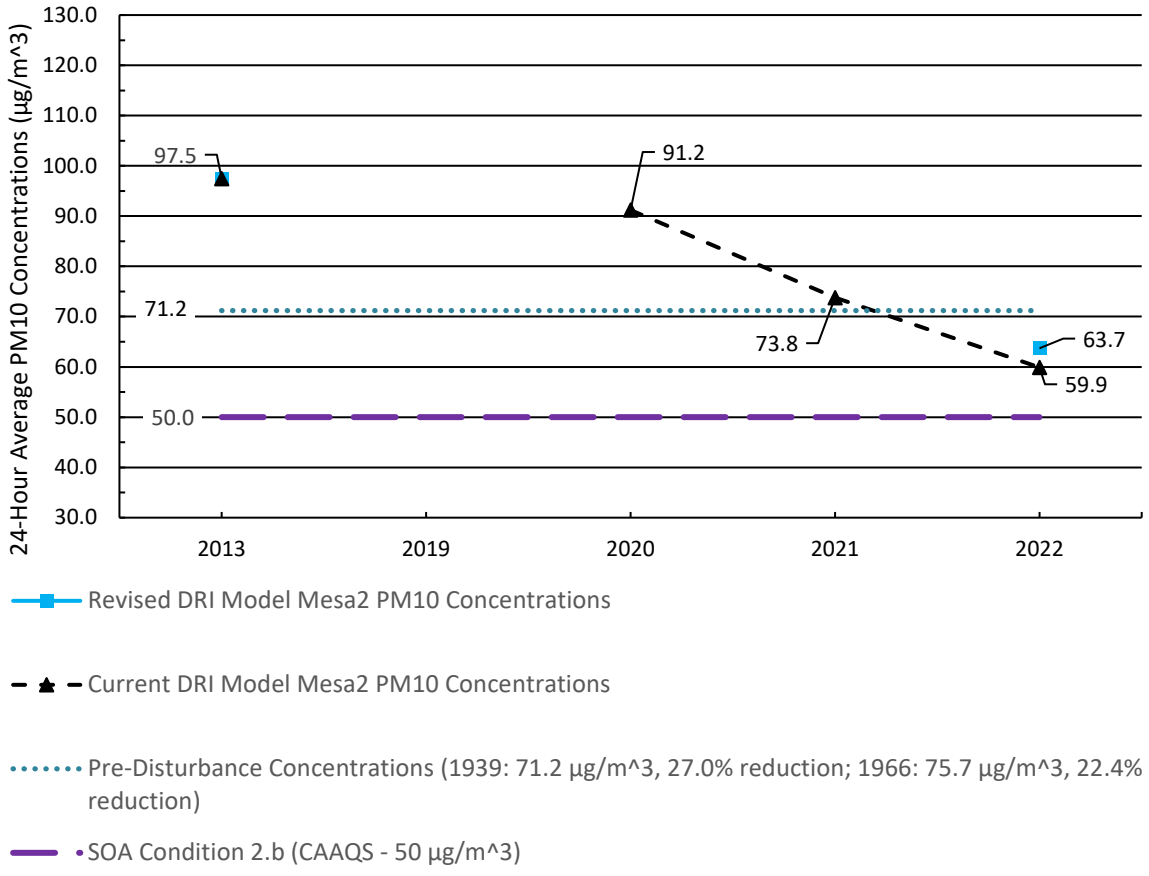
Figure 2-15. CDF 24-Hour PM_{10} Concentration Reductions, 2013 to July 31, 2022



2.3.7.2 Dust Mitigation Indicators

Key dust mitigation indicators include the number of high wind days and the number of exceedances of the state and federal ambient air quality standards, the status of the 48-acre foredune restoration project, and the amount of backdune stabilization occurring under the Dust Control Program. Dust mitigation indicators are compared against 2013 baseline conditions where appropriate but do not have a specific measurable target or goal to achieve.

Figure 2-16. Mesa2 24-Hour PM_{10} Concentration Reductions, July 31, 2013 to July 31, 2022



Air Quality Indicators

Between January 1, 2022, and June 28, 2022, the number of high wind event days at the SLOAPCD's CDF air quality monitoring station was substantially higher (64 days) compared to the number of days for the same period in 2019 (30 days), 2020 (55 days), and 2021 (51 days). Consequently, the number of days the 24-hour average PM_{10} CAAQS of 50 µg/m^3 was exceeded at the SLOAPCD's CDF station in 2022 (54 days) was higher than the same comparable period in 2019 (16 days), 2020 (30 days), and 2021 (28 days). Likewise, the 24-hour average PM_{10} CAAQS of 50 µg/m^3 was exceeded at the SLOAPCD's Mesa2 station in 2022 (38 days) was higher than the same comparable period in 2019 (14 days), 2020 (28 days), and 2021 (30 days). There have been no exceedances of the NAAQS of 150 µg/m^3 at either the CDF or the Mesa2 station. The last exceedance of the NAAQS occurred at the CDF station in 2013.

Foredune Restoration

In its second growing season (2021), there was a general increase in vegetation cover in each of the foredune treatment areas, with the exception of the control area. Treatment areas 3 and 6 were observed to have greater than 12% vegetation coverage, while treatment areas 4, 5, and 2

were observed to have approximately 5.7%, 2.1%, and 1.9% vegetation cover, respectively. The greatest year over year change occurred in treatment area 6, which went from 3.6% coverage in 2021 to 12.7% coverage in 2022. In 2022, species richness generally decreased or remained static in each of the treatment areas as compared to findings in 2021. Refer to Section 2.3.6 for detailed information on State Parks vegetation monitoring activities.

As described in Section 2.3.3, analysis of volumetric changes in foredune sand volumes is currently under review by State Parks.

Backdune Stabilization

Compared to 2013 baseline conditions, when there were no permanent dust control measures at ODSVRA, State Parks now manages 705.5 acres of land for dust control benefits, including the 293.3-acre plover exclosure. Excluding this area, State Parks has installed 412.2 acres of total dust control measures at ODSVRA, including 364.2 total acres of back dune stabilization measures. As of July 31, 2022, backdune stabilization consist of 287.1 aces of vegetation, 24.1 acres of straw treatments, and 53.0 acres of wind fencing. Refer to Section 2.1 for State Park's detailed report on dust control measures installed at ODSVRA as of July 31, 2022.

2.4 REPORT ON OTHER DUST CONTROL PROGRAM-RELATED ACTIVITIES

Chapter 7 of State Parks' approved PMRP describes potential actions that State Parks, the SAG, and the SLOAPCD may undertake to further support and inform the overall adaptive management approach to dust control at ODSVRA. State Parks' report on other dust control program-related activities is provided below.

2.4.1 SAG RESPONSES TO STUDIES

During the 2022 ARWP Reporting Period (August 1, 2021, to July 31, 2022), the SAG provided formal responses/reviews to studies and reports listed below. Refer to Attachment 06, Compilation of Studies Reviewed and Comments Provided by the Scientific Advisory Group from 08/01/21 to 07/31/22, for copies of the studies reviewed and the comments provided by the SAG.

Report: Dust emissions and OHV activity at the ODSVRA
Author: Jon O'Brien
Draft Date: July 26, 2021 (see Attachment 06-01)
SAG Response Date: August 9, 2021 (see Attachment 06-01)
Final Publication Date: August 26, 2021 (see Attachment 06-01)[15]

[15] This final report is also available for review at https://ohv.parks.ca.gov/?page_id=30498. Specifically, see OHMVR Commission meeting materials for August 26-27, 2021, *Oceano Dunes SVRA Dust Report* link.

Report: Scripps/UCSD Interim Report 2021: Preliminary Results from May 2021 Aerosol Measurements
Author: Lynn M. Russell
Draft Date: September 30, 2021 (see Attachment 06-02)
SAG Response Date: October 20, 2021 (see Attachment 06-02)
Scripps Response to SAG: October 25, 2021 (see Attachment 06-02)[16]
Final Publication Date: November 8, 2021 (see Attachment 06-02)[17]
SAG Response to Scripps Letter: November 22, 2021 (see Attachment 06-02)
SAG Response to Scripps Letter: December 1, 2021 (see Attachment 06-02)[18]

Report: Quantifying the value of a coastal foredune for wind erosion and dust emissions through numerical simulation (see Attachment 06-03)
Author: E. Furtak-Cole, J. Gillies, I. Walker, Z. Hilgendorf
Draft Date: October 28, 2021 (see Attachment 06-03)
SAG Response Date: November 23, 2021 (see Attachment 06-03)
Final Publication Date: December 2, 2021 (see Attachment 06-03)[19]

Report: UCSB Historical Vegetation Cover Change Analysis (see Attachment 06-04)
Author: Nitzan Swet, Zach Hilgendorf, and Ian Walker
Draft Date: December 2021 (see Attachment 06-04)
SAG Response Date: January 7, 2022 (see Attachment 06-04)
Final Publication Date: February 7, 2022 (see Attachment 06-04)[20]

2.4.2 SAG Participation In Meetings

During the 2022 ARWP Reporting Period (August 1, 2021, to July 31, 2022), the SAG participated in various meetings. Table 2-19 lists significant meetings of the full SAG, meetings of the SAG with other entities, and presentations by SAG members at public events. All meetings are virtual unless otherwise indicated.

[16] Scripps' response to the SAG, the final Scripps Study, and the SAG's response to Scripps are also available for review at https://ohv.parks.ca.gov/?page_id=30498. Specifically, see OHMVR Commission meeting materials for December 9, 2021, *Scripps response to SAG comments and supplemental report, Scripps Interim Year 3 Report, and SAG Open Letter Scripps Year 3* links.
[17] IBID.
[18] IBID.
[19] This final report is also available for review at https://ohv.parks.ca.gov/?page_id=27160. Specifically, see OHMVR Commission meeting materials for February 17, 2022, SAG *Memo: Scientific Basis for Possible Revision of the Stipulated Order of Abatement (SOA)* link, Attachment 6.
[20] See footnote 14 in Section 2.3.6.3.

Table 2-19. SAG Participation in Meetings, August 2021 - July 2022			
Date(s)	**Meeting Name**	**SAG Role**	**Participants**
August 3, 2021	SAG monthly meeting	Discuss ARWP activities	SAG
September 10, 2021	SAG monthly meeting	Discuss ARWP activities	SAG
October 1, 2021	SAG monthly meeting	Discuss ARWP activities	SAG
October 6, 2021	SLOAPCD Hearing Board pre-meeting	Coordinate with SLOAPCD and State Parks for Hearing Board meeting	SAG, SLOAPCD, Hearing Board, State Parks
October 14, 2021	SLOAPCD Hearing Board meeting and ARWP Public Workshop	Present on SAG review of 2021 ARWP	SAG, SLOAPCD, State Parks
November 1, 2021	SAG quarterly meeting	Extended discussion of ARWP activities	SAG, SLOAPCD, State Parks
November 5, 2021	SAG monthly meeting	Discuss ARWP activities	SAG
December 10, 2021	SAG monthly meeting	Discuss ARWP activities	SAG
January 11, 2022	SAG monthly meeting	Discuss ARWP activities	SAG
January 27, 2022	SAG quarterly meeting	Extended discussion of ARWP activities	SAG, SLOAPCD, State Parks
February 1, 2022	SAG monthly meeting	Discuss ARWP activities	SAG
February 3, 2022	SAG chair meeting with State Parks on SOA	Discuss SAG recommendations for SOA and upcoming OHMVR Commission Meeting	SAG chair, State Parks
February 17, 2022	OHMVR Commission Meeting	Present SAG recommendations for SOA	SAG, State Parks, OHMVR Commission
March 1, 2022	SAG monthly meeting	Discuss ARWP activities	SAG
April 1, 2022	SAG monthly meeting	Discuss ARWP activities	SAG
May 6, 2022	SAG quarterly meeting	Extended discussion of ARWP activities	SAG, SLOAPCD, State Parks
June 3, 2022	SAG monthly meeting	Discuss ARWP activities	SAG
June 17, 2022	SLOAPCD Hearing Board Meeting	Present SAG recommendations for SOA	SAG, SLOAPCD, Hearing Board, State Parks
June 23-24, 2022	SAG quarterly meeting (in-person at Oceano, CA)	Extended discussion of ARWP activities	SAG, SLOAPCD, State Parks
July 14, 2022	SAG monthly meeting	Discuss ARWP activities	SAG

2.4.3 SCIENTIFIC REVIEW PROCESS

As conveyed in this and prior ARWPs, substantial research has and continues to be conducted at ODSVRA to better understand the science of dust emissions, dust controls, and dune restoration at the park. Until last year, there has not been a standardized approach for the review and publication or public release of scientific documents regarding dust emissions and/or dune restoration at ODSVRA. The SOA established the SAG with the charge to "…evaluate, assess, and provide recommendations on the mitigation of windblown PM_{10} emissions from ODSVRA…" Furthermore, State Parks periodically commissions and publishes studies by third-party researchers regarding dust emissions, aeolian (windblown) processes, dust controls, and dune geomorphology at ODSVRA.

In August 2021, the SAG and State Parks agreed to a process for the review and publication of scientific documents related to dust emissions and dune restoration at ODSVRA. The goal of this process is to streamline, standardize, and ensure all research related to dust receives the same level of expert review and is robust and as defensible as possible before it enters the public sphere. The scientific review process describes the procedures by which the SAG, State Parks, and third parties contracted by State Parks, are involved in the preparation, scientific review, publication, and public release of research and scientific reports related to dust/particulate matter, aeolian processes, dust controls, and/or dune restoration at ODSVRA. The process addresses when and how the SAG is asked to provide peer review of a research study, and what steps are needed to release a document to the public. The process only applies to research directly related to dust emissions, aeolian processes, dust controls, or dune geomorphology and restoration at ODSVRA that State Parks has commissioned to be conducted by third parties. Scientific reports directly produced by the SAG, which is an independent entity established by the SOA, are not subject to this process.

The studies identified in Section 2.4.1 were prepared through this scientific review process. Refer to Attachment 07, ODSVRA Dust Control Program Scientific Review Process, for the full procedures agreed upon by State Parks and the SAG.

2.4.4 OTHER SOURCES OF DUST

As amended, SOA 17-01 recognizes that PM_{10} concentrations measured at CDF and on the Nipomo Mesa may come from various sources external to ODSVRA (SOA pg. 6,lines 19 to 23 and SOA pg. 14, lines 13 to 15). In response, State Parks and the SLOAPCD continued studying other potential PM_{10} emission sources and their relative contributions to PM_{10} concentrations on the Nipomo Mesa.

2.4.4.1 PM_{10} Speciation Sampling

In 2020, the SLOAPCD collected 13 PM_{10} samples for speciation analysis at CDF to further investigate the amount of salt, inorganic aerosols, crustal material, etc. there is in the PM_{10}

sampled at the CDF station. The preliminary analyses of these samples was reported in the 2021 ARWP. The SLOAPCD subsequently conducted a more ambitious sampling plan in 2021. The SLOAPCD continues to analyze the results of the 2020 and 2021 speciation sampling; however, there is currently no timetable for the conclusion of these analyses.

Refer to State Parks 2021 ARWP, Attachment 13, for more information on the speciation analyses completed to date and the SLOAPCD's speciation sampling completed in 2021.

2.4.4.2 Scripps Institution of Oceanography Study

The Scripps Institution of Oceanography (Scripps), in collaboration with State Parks and the California Geological Survey (CGS), continued into year three of its investigation of airborne PM_{10} constituents at ODSVRA and vicinity. In spring of 2021, Scripps atmospheric chemistry Professor Lynn Russell organized a sampling strategy and used custom PM sampling instruments that collected airborne particulate matter samples at the CDF sites. Analyses and findings of this sample campaign were presented to the OHMVR Commission on December 9, 2021. Data presented indicate that 14% of BAM PM_{10} measured at the CDF site, as measured over the course of the spring 2021 campaign, consists of mineral dust, and the mineral dust fraction ranged from 2% to 32% on high-PM_{10} days in May 2021. Scripps is moving forward with submittal of its investigation to a scientific journal for publication in 2022. Refer to Attachment 06-02 for the Scripps study, and the SAG's comments on the Scripps study.[21]

2.4.5 Public Relations Campaign

State Parks, in consultation with the SAG, continues to develop and refine a public relations campaign to educate the public on regional air quality issues in southern San Luis Obispo County surrounding ODSVRA, how they are being addressed, and how the public can be part of the solution. State Parks provided an updated public relations campaign to the SAG for review in July 2022.

2.4.6 Coastal Commission Coordination

State Parks submitted an application to amend Coastal Development Permit 3-12-050 on October 25, 2021 shortly after the final 2021 Annual Report and Workplan was approved by the APCO and Reviewed in a public hearing by the SLO APCD Hearing Board. The California Coastal Commission considered this application at a hearing on December 17, 2021 and issued an amended permit for the 2022 projects on January 4, 2022. In February 2022, a court issued a Temporary Restraining Order against State Parks from implementing the 2022 dust control projects. The order was ultimately lifted in April 2022 and all planned dust control projects were installed by May 2022.

[21] See also note 16 in Section 2.4.1.

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3 WORK PLAN (AUGUST 1, 2022, TO DECEMBER 1, 2023, AND LATER)

This chapter of the ARWP proposes activities that State Parks will undertake to maintain and sustain the progress the Dust Control Program has made in reducing PM_{10} emissions and ambient air concentrations.

As of July 31, 2022, State Parks' Dust Control Program has reduced modeled PM_{10} mass emissions to levels below the SAG's recommended, scientifically defensible, pre-disturbance mass emissions reduction target of 40.7% (see Sections 2.2.1 and 2.2.3). State Parks plans to petition the SLOAPCD Hearing Board to modify the SOA to reflect the SAG's recommended pre-disturbance target. Accordingly, this Work Plan does not propose the installation of any new dust control measures. Instead, State Parks' 2022 ARWP focuses on Dust Control Program activities that support State Parks' sustained achievement of the SAG's recommended pre-disturbance PM_{10} mass emissions and concentration targets, including ongoing replacement of temporary dust control measures with vegetation, supplemental planting in existing vegetated areas, monitoring, and adaptative management activities.

Pursuant to the SOA, State Parks' Work Plan covers the period between August 1, 2022, and December 1, 2023. State Parks' Work Plan also addresses potential activities that are likely to occur after December 1, 2023, including commitments to vegetate remaining wind fencing and straw treatment projects, provide supplemental vegetation in foredune and backdune projects, continued monitoring of field conditions to verify data and assumptions incorporated into the DRI air quality model, and continued prediction and monitoring of modeled and actual PM_{10} mass emissions and concentrations. As part of the overall adaptive management strategy on which the Dust Control Program is based, State Parks is committed to consulting and coordinating with the SAG, as needed, on all activities described in this Work Plan beyond December 1, 2023.

3.1 PROPOSED DUST CONTROL ACTIVITIES

State Parks is proposing to initiate,undertake, and/or complete the following dust control project activities:

- Before July 31, 2023, convert 27.3 acres of existing temporary dust control measures to long-term vegetation measures, including 6.8 acres of straw treatments installed in 2022 and 20.5 acres of wind fencing installed in 2021.
- After December 1, 2023, continue to replace any remaining temporary dust control measures with vegetation and conduct supplemental planting in backdune and foredune vegetation projects.
- Supplemental vegetation planting in previous vegetation treatment areas (non-foredune only)

- Continue foredune monitoring and assessment.
- Dune emissivity (PI-SWERL) sampling campaign, such as within the foredune restoration zone.
- Maintain existing wind fencing measures.
- Continue Dust Control Program field monitoring and air quality modeling activities.
- Continue SAG consultation, including updating the approach to evaluating SOA progress and requirements and facilitating adaptive management decisions based on monitoring results and assessment campaigns.
- Initiate a Dust Control Program public relations campaign in consultation with the SAG.
- Coordinate with the California Coastal Commission on 2022 ARWP permitting requirements, if needed.
- Continue Dust Control Program activities related to identifying other potential sources of dust and PM_{10} contributing to air quality conditions.

State Parks' description of proposed Dust Control Program projects and activities is provided below.

3.1.1 Convert Existing Temporary Dust Control Measures to Vegetation

State Parks proposes to convert a total of 27.3 acres of existing temporary dust control measures to native dune vegetation:

- **Existing Straw:** State Parks proposes to convert 6.8 acres of an 11.8-acre straw treatment installed in 2022 (22-ST-02, see Figure 2-1) to native dune vegetation. This project is located west of the Eucalyptus South and Tabletop vegetation islands, in the center of the ODSVRA's open riding and camping area (perpendicular to marker posts 7 and 8), adjacent to one existing wind fencing (21-WF-02, see Attachment 01, Figure A01-12) and five existing vegetation projects (21-VG-04, 22-VG-05, 22-VG-08, 22-VG-09 and 22-VG-10; see Attachment 01, Figure A01-12 and Figure 2-1).
- **Existing Wind Fencing:** State Parks proposes to convert 20.5 acres of wind fencing installed in 2020 (20-WF-01, see Attachment 01, Figure A01-11) to native dune vegetation. This project is located in the northeast corner of the ODSVRA open riding and camping area, adjacent to another existing straw treatment (22-ST-01, see Figure 2-1) and vegetation project (22-VG-01, see Figure 2-1).

In addition to the conversion of wind fencing and straw projects, State Parks is also replacing 14.9 acres of sterile seed spread near the Eucalyptus Tree vegetation island as part of the 2021 ARWP (22-VG-09) with container plants and native seed. The sterile seed was planted late in the growing season which limits growth, requiring State Parks to plant vegetation in the fall and winter of 2022/2023. State Parks is not taking credit for this project as a new or converted

vegetation project because this project was already credited as a vegetation project in the 2021 ARWP.

Refer to Figure 2-2 for the locations of State Parks' proposed conversion projects.

3.1.1.1 Measures to Avoid Delays in Implementation

Following removal of existing dust control measures and/or preparation of treatment areas for vegetation plantings (e.g., reapplication of straw along upwind edges that may have become inundated with sand), State Parks will restore the project areas. State Parks' restoration methods are described in Chapter 6 of the June 2019 Draft PMRP. State Parks will schedule conversion efforts (e.g., the initial removal of fencing) to occur as late as possible, given other park operations requirements and the need to ensure sufficient planting time. State Parks will also perform these restoration efforts in a manner that minimizes the delay between removing the existing wind fencing and applying straw/initiating planting activities as much as possible given potential constraints (e.g., equipment, staffing, and material availability, other park operations requirements). For restoration work, State Parks will maintain a perimeter fence to prohibit OHV activity and camping in the restoration area.

3.1.1.2 Planting Palette / Estimate of Plants and Seed Needed for Conversions

State Parks will coordinate with the SAG to prepare a planting palette with targets for container stock and native seed needed for dust control projects over the next year. As of August 1, 2022, State Parks estimates up to approximately 116,700 plants and 475 pounds of native seed would be required to complete the conversion of approximately 27.3 acres of temporary dust control projects to native dune vegetation and the replacement of dust control measure 22-VG-09.

Additional plants would be required for State Parks proposed supplemental planting activities (see Section 3.1.3). With this additional activity, State Parks estimates a total of up to approximately 127,700 plants and 523 pounds of native seed would be required to complete the proposed 2022 vegetation planting activities.

Refer to Attachment 08, 2022/2023 ODSVRA Dust Control Program Vegetation Restoration Projects, for State Parks' proposed 2022 ARWP planting projects and estimates ofplanting and seeding activity by the project.

3.1.1.3 Planning for Future Plant Growing Activities

State Parks is contracted with Cal Poly for horticulture work through June 2023. If necessary, State Parks will coordinate with Cal Poly on a contract extension or new contract for plant-growing activities that support the sustained success of the Dust Control Program.

3.1.2 CONVERSION/SUPPLEMENTATION OF PROJECTS AFTER DECEMBER 1, 2023

State Parks will, in coordination and consultation with the SAG, continue to replace temporary dust control measures with vegetation as necessary, including:

- Straw treatments: State Parks will coordinate with the SAG and the SLOAPCD to replace the remaining 17.3 acres of straw treatments at ODSVRA. This includes the remaining 5.0 acres of an 11.8-acre straw treatment project west of the Eucalyptus South and Tabletop vegetation islands (22-ST-02, see Figure 2-1), and a 12.3-acre straw treatment project (22-ST-01, see Figure 2-1) in the northern part of the ODSCRA open riding and camping area.
- Wind fencing: State Parks will coordinate with the SAG and the SLOAPCD to replace the remaining 32.5 acres of wind fencing at ODSVRA. This includes a 21.7-acre wind fencing project and a 10.8-acre project (21-WF-01 and 21-WF-02, see Attachment 01, Figure A01-12) installed in 2021 in the center of the ODSVRA open riding and camping area (perpendicular to markers posts 7 and 8).

In addition, State Parks will, in coordination and consultation with the SAG, continue to evaluate and monitor backdune vegetation projects and conduct supplemental planting activities in areas where vegetation has not yet become established (see Section 3.1.4.1 for State Parks' criteria for supplemental planting activities).

3.1.3 CONTINUED FOREDUNE MONITORING AND ASSESSMENT

State Parks will continue coordinating with the SAG on foredune monitoring and assessment activities from August 1, 2022, to December 1, 2023, and, potentially, beyond 2023.

Vegetation monitoring includes transects within each treatment plot as outlined in Section 2.3.6.1, collaboration with UCSB on topographic and vegetation changes based on UAS monitoring outlined in Section2.3.3, and analysis of images from monitoring stations within the treatment area (see Section 2.3.6.2). State Parks will coordinate with the SAG on the monitoring methods for evaluating vegetation cover and species diversity in foredune treatment areas.

The SAG has not currently identified the need to conduct supplemental planting activities within the 48-acre foredune project. State Parks will coordinate with the SAG on supplemental planting and restoration activities in the 48-acre foredune project after December 1, 2023, if necessary.

3.1.4 CONTINUE SUPPLEMENTAL PLANTING IN PREVIOUS TREATMENT AREAS

State Parks proposes to perform supplemental planting and seeding activities on previously installed vegetation projects, including approximately two (2) acres near the BBQ Flats vegetation island (19-VG-01, See Attachment 01, Figure A01-10), one (1) acre near the North

Eucalyptus Tree vegetation island (22-VG-04, see Figure 2-1), approximately one (1) acre near the Eucalyptus Tree vegetation island (22-VG-05, see Figure 2-1), and approximately one (1) acre located along the eastern edge of the open riding and camping area, perpendicular to marker post 6 (22-VG-03, see Figure 2-1). Refer also to Figure 2-2 for the location of State Park's supplemental planting activities planned to occur during the fall and winter of 2022/2023.

As of August 1, 2022, State Parks estimates up to approximately 11,000 plants and 48 pounds of native seed would be required to complete the supplemental planting activities (5.0 acres) planned for existing vegetation projects. State Parks' supplemental planting activities would be in addition to other vegetation planting activities proposed in the 2022 ARWP (converting existing temporary dust control measures to vegetation; see Section 3.1.1). In total, State Parks estimates up to approximately 127,700 plants and 523 pounds of native seed would be required to complete all proposed 2022 vegetation planting activities identified in the2022 ARWP.

Refer to Attachment 08 for State Parks' proposed 2022/2023 planting projects and estimates of planting and seeding activity by the project.

State Parks will, in coordination and consultation with the SAG, continue to evaluate and monitor backdune vegetation projects and conduct supplemental planting activities in areas where vegetation has not yet become established. State Parks' criteria for identifying supplemental planting activities is described below.

3.1.4.1 Criteria for Supplemental Planting

This section describes the process by which State parks determines which areas require supplemental vegetation efforts.

State Parks evaluates past Dust Control Program vegetation projects in late spring and again in late summer after heavy spring winds have subsided to determine potential locations for supplemental planting activities. Sections of past project areas are chosen for supplementation if a substantial percentage of initial plantings did not establish, typically as a result of sand inundation, sand scouring, and/or poor weather conditions following initial planting. Past project areas where vegetation initially established and in subsequent years suffered substantial loss are also evaluated for supplemental planting. Dune topography upwind has a major impact on whether or not conditions will result in a high probability of planting success. For example, a quickly moving dune ridge upwind of the project area will likely result in planting burial and subsequent loss.

In general, areas where supplemental planting has a high probability of success in the near future are prioritized over areas that would have a higher probability of success if supplemental plantings were postponed to a future date when conditions improve.

Candidate areas for supplementation are prioritized based on the following criteria in order of highest priority to lowest priority:

1. Past project areas with significant loss that are contiguous with new project areas which in-turn will improve upwind protection for supplemental plantings
2. Past project areas with partial loss where previously established vegetation will act as support cover for supplemental plantings.
3. Past project areas where loss was clearly a result of poor weather conditions and not from sand inundation. In this scenario, supplemental planting during the most advantageous weather conditions would be prioritized.
4. Past project areas with significant loss where dune topography has improved upwind since initial plantings, resulting in improved planting conditions.
5. Past project areas with significant loss where conditions have not changed. Additional methods are used to improve likelihood of success including application of additional stabilization measures and/or a species planting pallet that is more resilient to disturbance than in the initial planting.

3.1.5 Maintenance of Existing Straw Treatment and Wind Fencing Measures

State Parks will maintain all existing straw treatment and wind fencing projects installed before August 1, 2022, including projects 21-WF-01 (approximately 21.7 acres), 21-WF-02 (approximately 10.8 acres), 22-ST-01 (approximately 5.0 acres remaining), and 22-ST-02 (approximately 12.3 acres). State Parks will continue to maintain these existing straw treatment and wind fence arrays as needed until they are replaced with vegetation (see Section 3.1.2). Potential maintenance activities that may be required to maintain effective dust control in wind fencing areas include repairing and/or replacing straw treatments, fencing components (poles and netting), and/or installing new fence extensions or rows (if warranted due to shifting sand conditions).

3.1.6 Field Monitoring and Air Quality Modeling Activities

State Parks, DRI, and the SAG propose to conduct the field monitoring and air quality modeling activities described below from August 1, 2022, to December 1, 2023. State Parks will coordinate and consult with the SAG on the need for field monitoring and air quality modeling activities after December 1, 2023 pursuant to the Dust Control Program's adaptive management framework (see Section 3.4).

3.1.6.1 Meteorological, PM, and Saltation Monitoring

In consultation and coordination with the RCD, DRI, and UCSB, State Parks will continue to operate and maintain the existing meteorological, PM, and saltation monitoring

instruments/sites shown in Figure 2-4 and described in Section 2.3.1. This effort will include post-deployment calibration of MetOne Particle Profilers and continued evaluation of key evaluation metrics (see Section 2.3.7 and Attachment 02 for more information on evaluation metrics). In addition, State Parks, in consultation with the RCD, DRI, and the SAG, may deploy new instruments in existing dust control measures intended to assess and evaluate the continued effectiveness of measures installed at ODSVRA.

3.1.6.2 PI-SWERL Surveys

DRI will conduct another PI-SWERL campaign in fall 2022 following the conclusion of the Plover nesting and fledging period. Specifically, DRI will measure emissivity within the six foredune restoration area test plots and the nesting exclosure area following the proposed sampling grid that was set in 2020. DRI may also measure emissivity in the foredune beach and corridor areas.

In consultation with DRI, State Parks will work with the SAG to determine if additional useful PI-SWERL measurement campaigns should be carried out in 2022/2023 to further the current understanding of the dust emissions system and inform air quality modeling and management of dust emissions at ODSVRA.

3.1.6.3 UAS Surveys

Consistent with previous years (see Section 2.3.3), UAS surveys for the 2022 ARWP Work Plan (August 1, 2022, to December 1, 2023) will occur in October 2022, February 2023, and October 2023. Campaigns will involve flights with RGB and multispectral payloads as in the 2021-22 period. The same data products mentioned in Section 2.3.3 will be produced (georeferenced digital orthophoto mosaics, DEMs, GCD maps).

3.1.6.4 Planning for Future Monitoring Work

Contracts for current SAG members are set to expire on March 31, 2023, before completion of the term of the SOA. In addition, changes to the composition of the SAG may be needed as current SAG members find it necessary to rotate off the group. State Parks will work expeditiously to renew the contracts of SAG members who continue beyond March 31, 2023. State Parks will also coordinate closely with the current SAG and the SLOAPCD, pursuant to the terms of the SOA, to identify new SAG members with appropriate expertise as needed to support the sustained success of the Dust Control Program.

3.1.7 CONTINUED SAG CONSULTATION

Pursuant to the SOA, as amended, State Parks will continue to utilize the SAG for consultation and evaluation. Priority areas for State Parks consultation with the SAG in 2022-23 include, but are not limited to the following:

- Update approach to evaluating SOA progress and requirements (Section 3.1.6.1).

- Developing a work plan for SOA progress, if needed (see Section 3.1.6.2).
- Planning for SAG membership in 2023 and, potentially, longer (see Section 3.1.6.3).

The SAG will continue to exercise its independent advisory role by preparing scientific reports and reviews that inform the implementation and monitoring of ODSVRA dust mitigation activities. In particular, the SAG anticipates publishing a "State of the Science" report in fall 2022 to provide a synthesis and review of existing white papers, reports, and scientific literature relevant to dust mitigation efforts at ODSVRA. The SAG may consult with State Parks and SLOAPCD to ensure access to relevant context and information in preparing such reports and reviews. However, to ensure independence, the content and timeline for the final publication of SAG reports and reviews will be at the sole discretion of the SAG, although the SAG will consider timeline considerations from either agency.

3.1.7.1 Refine Approach to Dust Control Program Success

As described in Section 2.2.1, the SAG has proposed a possible alternative to the SOA's PM_{10} mass emissions reduction target that is defensible, scientifically justified, and based on the results of peer-reviewed data, studies, and reports. The SAG has also recommended improvements to the current DRI model that are intended to more accurately account for the effectiveness of dust mitigation treatments (see Section 2.2.1.3), which were incorporated into the modeling reported in this 2022 ARWP (see Section 2.2.3 and 2.2.4).

The SLOAPCD Hearing Board received initial reports on these SAG proposals at its meeting on June 17, 2022, but has not taken action on the SAG's recommendations. State Parks plans to petition the SLOAPCD Hearing Board to modify the SOA to reflect the SAG's recommended proposals for evaluating Dust Control Program success. In addition to the specific recommendations of the SAG, State Parks anticipates a refined approach to evaluating the success of the Dust Control Program will need to address:

- **DRI Model Refinements:** State Parks and DRI, in consultation with the SAG, will continue to identify additional changes to the DRI model that further refine the approach to modeling dynamic changes in PM_{10} emissivity within ODSVRA. Potential refinements may include, but are not limited to, changes in PM_{10} emissivity associated with continuing evolution of the restored foredune, which may include further CFD modeling. State Parks and DRI, in consultation with the SAG, will work to identify useful refinements to the DRI model that could be implemented between August 1, 2022 and December 1, 2023.
- **Continued Verification of Modeled Results:** State Parks, in consultation with the SAG, will continue to verify the results of the air quality modeling conducted for the Dust Control Program by continuing appropriate research, field monitoring activities (see Section 3.1.5), and data analyses.

- **Assessment of Changes in Emissivity and Other Conditions:** State Parks, in consultation with the SAG, will identify the scope and frequency with which the assumptions used to determine Dust Control Program success are monitored. Such assumptions may include, but are not limited to, changes in emissivity as dust control measures mature or public use patterns are modified and changes in the direct or indirect effectiveness of specific dust control measures at ODSVRA.

State Parks anticipates the refined approach to evaluating the success of the Dust Control Program will be directly informed by the framework for adaptative management that will guide the Dust Control Program beyond December 1, 2023 (see Section 3.4).

3.1.7.2 Work Plan

As described in Section 2.2.1 and Section 3.1.6.1, the SAG has recommended defensible, scientifically justified refinements to the current SOA that are based on the results of peer-reviewed data, studies, and reports. State Parks will coordinate with the SAG on a work plan to ensure refinements agreed upon by State Parks, the SAG, and the SLOACPD are implemented in a timely manner.

3.1.7.3 Planning for SAG Membership

As described in Section 3.1.5.4, contracts for current SAG members are set to expire on March 31, 2023, before completion of the term of the SOA on December 1, 2023. State Parks will work expeditiously to renew the contracts of SAG members who continue beyond March 31, 2023. In addition, State Parks will work closely with the current SAG and the SLOAPCD, as needed, to identify new SAG members with the appropriate expertise to support to support the sustained success of the Dust Control Program.

3.1.8 SAG Meetings and Workshops

The SAG anticipates the following meeting and workshop activities in 2022-23:

- Quarterly full-day SAG meetings, with the participation of State Parks and SLOAPCD staff as needed. Public health conditions permitting, it is anticipated that Fall 2022, Spring 2023, and Fall 2023 meetings will be held in person at ODSVRA. Winter 2023 and Summer 2023 meetings will be held via videoconference.
- Regular monthly calls among the full SAG, with State Parks and SLOAPCD staff as needed.
- Additional ad hoc calls among subgroups of the SAG to address specific work tasks with State Parks and SLOAPCD staff as needed.
- SAG presentations at public meetings and workshops, as requested by State Parks and SLOAPCD.

3.1.9 PUBLIC RELATIONS CAMPAIGN

State Parks will continue to coordinate and consult with the SAG to develop a clear PR campaign that meaningfully engages ODSVRA visitors, surrounding community members, and other relevant stakeholders.

3.1.10 COASTAL COMMISSION COORDINATION

Some of State Parks' proposed Dust Control Program activities for the August 1, 2022 to December 1, 2023 period may constitute development under the California Coastal Act (e.g., installing monitoring equipment, etc.). Therefore, these activities may require a Coastal Development Permit (CDP) from the California Coastal Commission (CCC). In September 2017, the CCC approved CDP 3-12-050 to implement a five-year adaptive management Dust Control Program at ODSVRA. This permit is subject to certain conditions, including, but not limited to, the type and amount of Dust Control Program activities, the area in which Dust Control Program activities may occur, and the need for annual review of Dust Control Program activities at ODSVRA. State Parks will coordinate with CCC staff on the appropriate CDP process for the proposed 2022 ARWP activities. The appropriate CDP process may include an amendment to CDP #3-12-050.[22]

If necessary, State Parks will submit a formal CDP application to the California Coastal Commission by November 1, 2022, pending SLOAPCD approval of the 2022 ARWP by October 31, 2022. State Parks will coordinate weekly with a representative from the CCC to track the progress of this application and answer questions or concerns that arise during the review of the application materials. The goal is to have an approved CDP for the 2022 ARWP activities no later than February 2023. This timeline is tentative and subject to change based on the final approved 2022 ARWP and issues outside the control of State Parks, including CCC staff workload and other complex Coastal Act issues.

3.2 MODELED PM_{10} MASS EMISSIONS AND CONCENTRATION REDUCTIONS

As described in Section2.2.2 , State Parks has completed the installation of the specific dust control projects required by SOA condition 2.a. In addition, as described in Section 2.2.3, State Parks' Dust Control Program, as of July 31, 2022, has reduced modeled PM_{10} mass emissions from ODSVRA (108.2 metric tons/day using the current DRI model and 104.0 metric tons/day using the revised DRI model) to levels below DRI's modeled pre-disturbance mass emissions levels (108.4 metric tons/day for the 1939 pre-disturbance scenario, as modeled using SAG-suggested assumptions), which form the basis for the SAG's recommended, refined SOA mass emissions reduction target. Finally, as described in Section 2.2.4, State Parks Dust Control

[22] In March 2021, the CCC voted to ban OHV recreation and limit street-legal vehicle use and camping at ODSVRA by 2024. This action is subject to several ongoing lawsuits. State Parks will continue to operate ODSVRA in a manner that supports OHV recreation and the Dust Control Program for the immediate future.

Program, as of July 31, 2022, has reduced modeled 24-hour average PM_{10} concentrations at the SLOAPCD's CDF and Mesa2 air quality monitoring stations to levels that are substantially below DRI's modeled pre-disturbance concentration levels. Based on this information, State Parks will petition the SLOAPCD Hearing Board to modify the SOA commensurate with the SAG's recommendations for refining SOA requirements (see Section 2.2.1.2 and 2.2.1.3). Accordingly, State Parks has not proposed new dust control measures as part of this 2022 ARWP and, therefore, there are no estimates of the PM_{10} mass emissions and concentration reductions to present for 2023 dust control measures.

3.2.1 ADDITIONAL DUST CONTROLS NEEDED TO ACHIEVE SOA GOALS

State Parks' June 2019 PMRP included a preliminary compliance analysis, or sensitivity analysis, based on a series of hypothetical dust control modeling scenarios (prepared by DRI) that evaluated the approximate size, scale, and level of effort necessary to comply with the SOA's air quality objectives, namely the 50% reduction in maximum modeled baseline PM_{10} mass emissions identified in SOA condition 2.c. The preliminary PMRP modeling conducted by DRI indicated that approximately 500 acres of dust control measures could be needed to achieve SOA air quality objectives.

State Parks' 2021 ARWP included an updated estimate of the amount of dust control measures that may be required to achieve SOA air quality objectives. The 2021 ARWP's updated sensitivity analysis increased the estimate of the amount of dust control measures necessary to comply with SOA Condition 2.C, up from 500 acres (as preliminary estimated in the 2019 PMRP) to 602 acres, assuming 100% effectiveness for all dust control measures.

The dust control strategy identified in the PMRP was always envisioned as and continues to be an iterative, adaptive management process that would be updated over time to incorporate the latest science and data collected as part of the PMRP and ARWP processes. The ARWP process functions as a mechanism to not only present the results and findings from the prior year's work, but to also summarize the latest advances in the science and understanding of the physical processes that lead to dust generation at ODSVRA. Each ARWP, therefore, also provides an opportunity to update and refine previous information reported by State Parks in its PMRP and ARWPs.

As described in Section 2.2.3 and Section 2.2.4, State Parks' Dust Control Program, as of July 31, 2022, has reduced modeled PM_{10} mass emissions from the ODSVRA (108.2 metric tons/day using the current DRI model and 104.0 metric tons/day using the revised DRI model) to levels below DRI's modeled pre-disturbance mass emissions levels (108.4 metric tons/day for the 1939 pre-disturbance scenario, as modeled using SAG-suggested assumptions), and has reduced modeled 24-hour average PM_{10} concentrations at the SLOAPCD's CDF and Mesa2 air quality monitoring stations to levels that are substantially below DRI's modeled pre-disturbance

concentration levels. Based on this information, State Parks will petition the SLOAPCD Hearing Board to modify the SOA commensurate with the SAG's recommendations for refining SOA requirements (see Section 2.2.1.2 and 2.2.1.3). Accordingly, State Parks has not proposed new dust control measures as part of this 2022 ARWP and, therefore, there are no estimates for the additional amount of dust control measures needed to meet SOA goals necessary at this time.

3.2.2 Further Refinement Of Modeled Reductions In PM_{10} Emissions

State Parks and DRI will, in consultation with the SAG, continue to evaluate and incorporate defensible, scientifically justified improvements to the DRI air quality model as necessary.

3.2.3 Increments of Progress Towards Air Quality Objectives, 2013 to 2022

The DRI will provide an updated evaluation regarding the incremental progress made toward achieving SOA air quality objectives based on dust control projects installed as of July 31, 2022 by winter 2023.

3.3 ADDITIONAL ASSESSMENTS

As described in Section 2.4.5, SOA 17-01, as amended, recognizes that PM_{10} concentrations measured at CDF and on the Nipomo Mesa may come from various sources external to ODSVRA. Accordingly, State Parks and the SLOAPCD proposed to continue studying other potential PM_{10} emission sources and their relative contributions to PM_{10} concentrations on the Nipomo Mesa.

3.3.1 Chemical Speciation

State Parks and the SAG will coordinate with the SLOAPCD to review and publish the results of the SLOAPCD's 2020 and 2021 speciation sampling analyses.

3.4 ADAPTIVE MANAGEMENT

State Parks is committed to monitoring, verifying, and adapting measures taken to date to continue to achieve dust emission goals. State Parks will, in consultation with the SAG, develop the framework for adaptative management that will guide the Dust Control Program beyond December 1, 2023. Items that may be included in the framework include, but are not limited to, plans for reporting on outcomes of the 2022 ARWP and plans for long-term meteorological and PM10 monitoring, PI-SWERL monitoring, and monitoring of the 48-acre foredune. The intent of continued monitoring activities would be to track the continuing viability and effectiveness of dust control measures to ensure mass emission and concentration reductions are sustained. Long-term monitoring would also directly inform adaptive management decisions regarding maintenance of dust control measures and/or the need for new measures necessary to maintain mass emission and concentration reductions.

4 BUDGETARY CONSIDERATIONS

State Parks' estimated budget to develop and implement the 2022/2023 dust control actions described in Chapter 3 is $3,627,451. A detailed breakdown of this estimated budget is provided in Table 4-1. This budget covers all activities from July 1, 2022, through June 30, 2023, including existing contracts with SAG members. The approximately $3.63 million budget shown in Table 4-1 is higher than the costs State Parks identified in proposed activities in the 2021 ARWP ($2.92 million).

Table 4-1. Estimated 2022 Work Plan Budget			
Dust Control Activity	**3rd Party Contract Costs**	**Other Costs**	**Total Costs(A)**
Vegetation Plantings (Conversion of Wind Fencing, Foredune, and Supplemental Plantings)			
Labor	$550,000	$175,000	$725,000
Materials	$0	$140,000	$140,000
Equipment	$155,000	$0	$155,000
Greenhouse Facilities	$203,000	$0	$203,000
Subtotals	$908,000	$315,000	$1,223,000
Maintenance and Installation of Wind Fencing			
Labor	$190,000	$90,000	$280,000
Materials	$0	$40,000	$40,000
Equipment	$95,000	$0	$95,000
Subtotals	$285,000	$130,000	$415,000
Monitoring (Sand Flux, Air Quality, Meteorological, and Other Monitoring) and Modeling			
Instrument Operations	$110,000	$30,000	$140,000
Data Analysis	$300,000	$0	$300,000
Subtotals	$410,000	$30,000	$440,000
Dust Control Project Design and Technical Assistance			
Scientific Expertise	$242,000	$0	$242,000
SAG Costs			
Miscellaneous(B)	$715,000	$0	$715,000
Other Items of Expense			
Miscellaneous(B)	$592,451	$0	$592,451
TOTAL COSTS	**$3,152,451**	**$475,000**	**$3,627,451**

(A) The cost estimate does not include permanent State Parks staff positions assigned to these duties but includes seasonalstaff time and overtime for permanent staff.

(B) Miscellaneous costs include SAG contracts for greenhouse assistance, fuel costs, equipment repairs, purchases, andother Dust Control Program support costs.

5 IMPLEMENTATION SCHEDULE

The tables below present schedules for implementing the dust control activities identified in Chapter 3. The tables cover an approximately 14-month period from June 2022 to July 2023. State Parks will, as necessary and in coordination with the SAG, develop implementation schedules covering the period August 1, 2023, to December 1, 2023 and, potentially, past December 1, 2023.

Table 5-1. Convert Existing Temporary Dust Control Measures to Vegetation

CDPR Task/Activity	2022							2023						
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
Consult with SAG on project selection		O	→	→	X								O	→
Collect native seed and plants, cultivate growth, procure additional plants from nurseries	→	→	→	→	→	X								
Remove existing wind fences				O	X									
Distribute straw mulch					O	→	X							
Initiate seeding and planting							O	→	→	X				
Table Key:	O Task Start				→ Task In Progress					X Task Complete				

Table 5-2. Continued Foredune Monitoring and Assessment

CDPR Task/Activity	2022							2023						
	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
Consult with SAG on monitoring		O	→	X									O	→
Transect sampling				O	→	→	→	→	X					
Photo point monitoring					O X									
Data analysis										O	→	X		
Table Key:	O Task Start				→ Task In Progress					X Task Complete				

Table 5-3. Supplemental Planting in Previous Treatment Areas														
CDPR Task/Activity	**2022**							**2023**						
	June	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**June**	**July**
Collect native seed and plants, cultivate growth, procure additional plants from nurseries	→	→	→	→	→	X								
Initiate seeding and planting							O	→	→	X				
Table Key:	O Task Start				→ Task In Progress					X Task Complete				

Table 5-4. Maintenance of Existing Wind Fencing Measures														
CDPR Task/Activity	**2022**							**2023**						
	June	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**June**	**July**
Repair and/or replace fencing components, add new fence extensions or rows if needed									O	→	→	X		
Table Key:	O Task Start				→ Task In Progress					X Task Complete				

Table 5-5. Field Monitoring and Air Quality Modeling Activities														
CDPR Task/Activity	**2022**							**2023**						
	June	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**June**	**July**
Meteorological, PM, and saltation data acquisition	→	→	→	→	→	→	→	→	→	→	→	→	→	→
PI-SWERL Surveys					O	X								
UAS Surveys					O X				O X					
Improve DRI air quality model performance	→	→	→	→	→	→	→	→	→	→	→	→	→	→
KEY:	O Task Start				→ Task In Progress					X Task Complete				

Table 5-6. Continued SAG Consultation and Evaluation														
CDPR Task/Activity	**2022**							**2023**						
	June	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**June**	**July**
Consult with SAG on 2022 ARWP	O	→	→	→	X									
Update approach to evaluating SOA progress			O	→	→	→	→	X						
SAG quarterly meetings			X			X			X			X		
Table Key:	O Task Start				→ Task In Progress					X Task Complete				

Table 5-7. Public Relations Campaign														
CDPR Task/Activity	**2022**							**2023**						
	June	**July**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**June**	**July**
Consult with SAG onPublic Relations Campaign	→	→	→	→	→	→	→	→	→	→	→	→	→	→
Table Key:	O Task Start				→ Task In Progress					X Task Complete				

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