



**DEPARTMENT OF PARKS AND RECREATION**

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**OHMVR COMMISSION MEETING  
Sacramento, CA**

**August 26, 2021**

**STAFF REPORT:**     **Dust Emissions and OHV Activity at ODSVRA**

**STAFF:**             Jon O'Brien, Environmental Program Manager, OHMVR Division

**SUBJECT:**           Update on the Oceano Dust Program and Recent Research

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**Summary**

- State Parks has been working with the San Luis Obispo County Air Pollution Control District since 2011 on dust issues downwind of Oceano Dunes SVRA (ODSVRA)
- State Parks entered into a Stipulated Order of Abatement with the APCD in 2018, with an aim of reducing particulate matter (PM10) in the Oceano Dunes area
- There have been substantial dust mitigation efforts at ODSVRA, in addition to research aimed at better understanding the science around dust at Oceano. Two recent Desert Research Institute reports used seven years of data to explore the questions:
  - What effects, if any, does OHV activity have on dust emissivity at the ODSVRA and PM10 concentrations downwind?
  - Are the dust mitigation projects improving air quality downwind of ODSVRA?
- Dust emissivity measurements at ODSVRA indicate that the dunes within the riding area are two to three times more emissive than the dunes in the non-riding area
- In addition, PM10 concentrations within, and downwind, of ODSVRA decreased through the spring and summer during the COVID closure of ODSVRA in 2020. In 2019, the PM10 concentrations increased through the spring and summer
- However, due to the substantial dust mitigation efforts at ODSVRA since 2014, there have been significant reductions over time in PM10 concentrations downwind of ODSVRA
- These reductions in PM10 concentrations indicate that, even though the riding area is more emissive than the non-riding area, the dust mitigation efforts at ODSVRA are improving air quality in south San Luis Obispo County
- These results show that improved air quality and OHV activity can coexist at ODSVRA, and more dust mitigation projects will be needed to meet the targets of the Stipulated Order of Abatement

## Discussion

Oceano Dunes State Vehicular Recreation Area (ODSVRA) is located on the central coast of California south of the town of San Luis Obispo in the 'five cities' area. It is the only coastal State Vehicular Recreation Area (SVRA), and one of the most popular Park Units in the state with over 2 million visitors annually. ODSVRA is 3,600 acres and is part of the greater Nipomo-Guadalupe Dunes Complex that encompasses approximately 18,000 acres. The riding area within ODSVRA is approximately 1,000 acres. The Nipomo-Guadalupe Dune Complex is characterized by high winds and dusty conditions. Dust, or particulate matter (PM10), is created through a natural process called saltation where the wind causes sand grains to bounce across the dune surface thereby emitting PM10 into the air.

California State Parks (Parks) has been working with the San Luis Obispo County Air Pollution Control District (APCD) on managing PM10 emissions from the riding area since 2011. Concerning air quality at ODSVRA, the APCD imposed Air District Rule 1001 in 2011, requiring Parks to reduce particulate matter; a Consent Decree was signed between Parks and the APCD in 2014. Parks then entered into a Stipulated Order of Abatement (SOA) with the APCD in 2018. The Order was amended in 2019. The SOA has three air quality targets:

1. To meet the State ambient air quality standard for PM10
2. To meet the Federal ambient air quality standard for PM10
3. To reduce the maximum 24-hour PM10 baseline mass emissions by 50% (initial target; based on 2013 mass emission estimate)

Air quality modeling is required, as per the SOA, to determine the change in PM10 mass emissions through time from the baseline year of 2013 for 10 specified days. Mass emissions quantifies the metric tons of PM10 emissions per day. This quantity is derived from a computer model that also predicts PM10 concentrations ( $\mu\text{g m}^{-3}$ ) at downwind locations. As of 2021, Parks had installed over 300 acres of dust mitigation projects at ODSVRA.

Parks has commissioned substantial research at ODSVRA aimed at better understanding the science of dust and emissivity in the area. As part of this effort, the Desert Research Institute (DRI), has been collecting dust emissivity data at ODSVRA since 2013. In addition, a network of air quality and meteorological monitoring stations have been in place within, and downwind, of the park since 2017. Parks also works with a Scientific Advisory Group (SAG) on scientific issues at the park. The SAG was established by the SOA and is comprised of scientists with expertise in atmospheric science, dune geomorphology, botany, and horticulture.

Part of this research has been to answer two fundamental questions:

1. What effects, if any, does OHV activity have on dust emissivity at, and downwind, of ODSVRA?
2. Are the dust mitigation projects in place improving air quality downwind of ODSVRA?

### ***Does OHV have an impact on dust emissions at ODSVRA (see attachment 1)?***

The first question of how OHV may impact dust emissions at ODSVRA has been a point of discussion raised by the OHV Commission, the OHV community, the San Luis Obispo County Air Pollution Control District, and other stakeholders for several years. In addition to analyzing

the impacts off-highway vehicles may have on dust emissivity at ODSVRA, DRI also explored how any impacts on emissivity are related to observed changes in PM10 concentrations in the ODSVRA as well as downwind of the park from 2017 to 2020. For clarity, emissivity is defined as how much particulate matter is released from the sand surface per unit area and time under the action of the wind. PM10 concentration is the mass of PM<sub>10</sub> in a volume of air being moved by the wind and is typically measured at a downwind receptor site.

To address any impacts on emissivity, measurements of emissivity from dune sands were made using a specialized instrument (PI-SWERL®) from 2013 through to 2020 in the area with OHV activity and in areas where OHV access is not permitted. These measurements indicated that the mean emissivity of the sand inside of the riding area was two to three times higher than the mean of the non-riding areas, for wind conditions well-above the threshold where saltation begins on the dunes. In addition, emissivity data specific to the La Grande Tract from 2020 was lower than in 2019. Note that these data quantify the PM10 emissivity of the sand, as opposed to downwind PM10 concentrations.

In addition to analyzing the sand emissivity data, measurements of Wind Power Density (WPD), a measure of the ability of the wind to cause sand to saltate and emit dust and suspended particulate matter (concentrations of PM10) were made at 15 monitoring stations in the riding areas (11 stations) and downwind of the riding areas (4 stations). These measurements have been made annually between May and September 2017 to 2020. In 2017, 2018, and 2019, these data indicate that PM<sub>10</sub> concentrations in the air at ODSVRA, increased from May through July per month for similar wind conditions. The increase was observed from May through September for 2019 (Figures 17 and 18). In 2019, that increase was approximately 12% per month for similar wind conditions (Figure 17). The increase was also observed at the four monitoring stations downwind of the riding area mentioned above (see slide 19 from DRI 'Examining Dust Emissions and OHV Activity at ODSVRA' presentation).

Public vehicle activity was prohibited beginning in late March 2020 due to the SARS-CoV-2 pandemic. In contrast with the 2019 data, measurements of PM<sub>10</sub> and WPD, April to August 2020 in the ODSVRA indicated an approximate 11% decrease per month for similar wind conditions (Figure 20).

The cessation of OHV activity resulted in the dunes producing lower concentrations of PM<sub>10</sub> for similar wind conditions during sand transport (saltation) in the ODSVRA. The decrease was also observed at the four monitoring stations downwind of the riding area (see slide 19 from DRI 'Examining Dust Emissions and OHV Activity at ODSVRA' presentation).

***Are the dust mitigation projects improving air quality downwind of ODSVRA (see attachment 2)?***

Dust controls—temporary wind fences and vegetation projects—have been used within the Oceano Dunes State Vehicular Recreation Area to reduce PM10 emissions originating from within the park. These controls are also expected to lower the PM10 concentrations helping to meet the SOA requirements. Beginning in 2014, 28 acres of dust control was implemented, and the acreage had increased to 223 acres in 2020. That is approximately 15% of the available riding area. According to emission and dispersion modeling undertaken by DRI, the

223 acres reduced PM10 measured at the Cal Fire monitoring station (CDF) by ≈42% with respect to the values modeled for the 2013 baseline days.

Using the PM10 measurements at CDF and wind speed data from the S1 tower in the ODSVRA, DRI demonstrated that dust emission in locations where controls have been placed produces less PM10 now than prior to these controls and that this reduction is consistent with the increase in acres of dust control. Specifically, these data indicate that emplacement of dust controls upwind of the CDF station reduced PM10 production by 48% for similar wind conditions with the controls in place in 2020 compared with the no-control conditions of 2011–2013. DRI's analysis of the data also agrees with model results that indicate PM10 reduction at the CDF receptor site is due to the dust controls.

Air quality modeling and analyses of the wind and PM10 data presented in the DRI report indicate that the actions taken by Parks to reduce dust-generated impacts within the ODSVRA through the dust control program are demonstrable with decreased emissions of PM10 as the size of the control areas have increased through time, and these impacts amount to a reduction of ≈45% near the CDF measurement site since 2011. This has been documented by sophisticated computer modeling of concentrations at sensitive receptor sites and has been verified by measurements at EPA monitoring sites downwind of ODSVRA. This analysis shows that the ongoing dust control efforts have eliminated exceedances of the Federal ambient air quality PM10 standard and are making strong progress to meet the State standard as well.

### **Conclusion:**

***The analyses by DRI indicates that OHV activity increases emissivity and dust levels in the active dune field, in addition to PM10 concentrations, downwind of ODSVRA. However, the dust mitigation measures in place have significantly improved air quality downwind of ODSVRA.*** Parks continues to implement projects to mitigate dust emissions, monitor changes in emissivity and PM10 due to the dust control projects, and refine the DRI dust emission-dispersion model to better understand the relationships between OHV activity and sensitive receptors on the Nipomo Mesa.

In compliance with the SOA, more dust mitigation projects will be installed, which are expected to further reduce PM10 emissions from ODSVRA thereby improving air quality downwind of the park. Both the SAG and the APCD have stated that they believe that it is possible to meet the requirements of the SOA while maintaining off-highway vehicle recreation at ODSVRA. In a letter to the California Coastal Commission on March 12<sup>th</sup>, 2021 (see attachment 3), the SAG wrote, "...from an air quality perspective the work of the SAG thus far indicates that there is a workable approach to achieving the targets set by the SOA while retaining some level of off-highway vehicular activity at the ODSVRA."

Improved air quality and continued OHV activities are compatible at ODSVRA. The ongoing research and analyses continue to help Parks refine dust control efforts and activities. Parks will continue to work with the APCD and the SAG towards meeting the goals of the SOA and improving air quality, while maintaining high quality off-highway vehicle recreational opportunities at ODSVRA.

## **Commission Action**

For information only.

## **Attachments**

1. Examining Dust Emissions and OHV Activity at ODSVRA. Desert Research Institute. February 2021
2. Gillies, J.A, E. Furtak-Cole, V. Etyemezian. Increments of Progress Towards Air Quality Objectives-ODSVRA Dust Controls. Desert Research Institute. December 2020
3. Letter from the SAG to the CA Coastal Commission. March 12<sup>th</sup>, 2021