

September 22, 2026

Memo: Sea Spray

From: Scientific Advisory Group (SAG)

To: Jon O'Brien, California Department of Parks and Recreation (CDPR)

Cc: Sarah Miggins, California Department of Parks and Recreation (CDPR)
Ronnie Glick, California Department of Parks and Recreation (CDPR)
Karl Tupper, SLO Air Pollution Control District (APCD)

In response to your recent request for the SAG to review materials pertaining to the question of sea spray and its importance to air quality concerns at the Oceano Dunes State Vehicular Recreation Area (ODSVRA), we have examined several documents, including:

1. Letter #1 from Friends of Oceano Dunes (FOD) President, Mr. Jim Suty, to OHMVR Commissioners, dated March 2, 2026, with Attachments A through D;
2. Letter #2 from FOD to OHMVR Commissioners, dated August 19, 2026;
3. Letter #3 from FOD to OHMVR Commissioners, also dated August 19, 2026;
4. Letter #4 from FOD to OHMVR Commissioners, dated September 15, 2026;

In Letter #1, FOD asserts that “State Parks is ignoring the ocean’s contribution to PM₁₀ downwind of the SVRA”, and that the “models assume 100% of all particulates measured downwind of the Ocean Dunes SVRA come from the SVRA.” These claims are misplaced because the modeling framework used to assess compliance with the Stipulated Order of Abatement (SOA) is based on surface emissions from the ODSVRA. The model calculates how much ‘dust’ (a term which for the purposes of this memorandum includes many different components contributing to overall PM₁₀ loading) is released from the ODSVRA land surface under specific wind conditions relative to what is estimated to have been released in a pre-disturbance state under the same conditions. The model does not predict PM₁₀ concentrations or loadings downwind of the ODSVRA (i.e., at sampling stations such as Mesa2 or CDF), nor does it predict PM₁₀ concentrations or loadings within the ODSVRA. Thus, there is no need to directly monitor, estimate, or predict PM₁₀ contributions from the ocean—it is not relevant to the modeling framework utilized by State Parks in respect of SOA compliance.

The SAG acknowledges that wave breaking in the surf zone will generate sea spray, especially during high wind events, and that onshore winds will advect some of this material to the shore. The contents of the sea spray (e.g., dissolved salts, biogenic materials) and their concentrations are not known for the ODSVRA, although the attachments to Letter #1 provide some insight derived from studies in other locations that may be relevant. Chow et al. (1996), for example, report marine contributions between 55-63% of PM₁₀ for two coastal sites – figures cited by Mr. Suty in Letter #1 – but also report marine aerosol contributions that more generally fall to between 18-23% further inland, where motor vehicle and road dust sources dominate. These percentages are consistent with recent measurements within the ODSVRA, as reported by the Desert Research Institute (DRI). In one study, the DRI showed that sea salt contributed 22.4% ±

11.7% to the PM₁₀ loading, and in another study, they reported that PM₁₀ loadings close to the beach (at the North Foredune measurement site) are well below the loadings farther inland, especially downwind of the ‘sand highway’ where OHV traffic is prominent (note that these studies are included as attachments to the 2025 and 2026 ARWPs). These spatial trends indicate that (a) there is an oceanic source of PM₁₀; (b) the marine contribution decreases inland; and (c) overall PM₁₀ loadings increase in the landward direction. Together, these observations indicate that the dominant source of PM₁₀ within the ODSVRA is not of marine origin, but rather originates from the open sand areas in the ODSRVA.

While we acknowledge a marine contribution to PM₁₀ in the ODSVRA, not all of this material stays suspended and reaches monitoring stations outside of the ODSVRA. An unknown fraction is deposited on the open sand surfaces and on plants within vegetated areas. This residue is likely most concentrated close to the beach and decreases inland. In either case, this material sits within the sandy matrix close to the surface (likely as thin films on individual sand grains), until a saltation event begins, and it is then released into the air as PM₁₀. Such latent salt deposits also become part of the emissions that are measured by the PI-SWERL instrument, and ultimately contribute to the total loading of PM₁₀ during wind events that the model is designed to predict.

Air quality regulations from both EPA and CARB apply to total PM₁₀ concentrations in the air, regardless of the particulate matter’s source or composition. Further, the model used by State Parks is not intended to predict PM₁₀ concentrations at CDF or Mesa 2, nor does it differentiate the species contributions to the total loadings. Thus, the argument proposed by FOD that the model does not account for sea spray is spurious.

In Letter #2 and Letter #4, FOD asserts that the ocean contribution to PM₁₀ loading in the pre-disturbance scenario differs from the situation today. Although the letters cite changes in shoreline development, population growth, intensity of recreational use, and siting of industrial facilities, there is little to no evidence that any of these changes have contributed to an increase (or decrease) in potential PM₁₀ loadings in the ocean or in the ODSVRA. There are strict environmental regulations governing effluents from industrial facilities that discharge into the ocean, and similarly, there are regulations on waste water outflows. In the absence of any firm evidence demonstrating changes in ocean water quality linked to coastal development, and hence to the marine contribution to PM₁₀ loading within the ODSVRA, the null hypothesis is that marine processes and sea spray contributions in the 1930s are comparable to those today. More to the point, and as noted above, the focus of the model is on emissions from within the ODSVRA, not on extraneous sources of PM₁₀ concentrations.

In Letter #3, FOD notes that there are various factors that have not been accounted for when examining trends toward improved air quality in the region, such as the moisture regime. The SAG acknowledges that moisture (too much or too little) is an important factor in dust emissions from the ODSVRA. However, the methodology used to characterize emissions using the PI-SWERL instrument ensures that measurements are only taken during extended dry periods. To properly tease out the influence of surface moisture conditions on dust emissions, a much more detailed examination is required than simply generalizing that the period 2013-2018 was the “worst drought” in 100 years. One would need to correlate rainfall and fog events with high or

low dust events on a daily basis and then determine whether there is a statistically significant association. Dust emissions are event dependent and not driven by annual moisture regimes.

In sum, the SAG certainly acknowledges that there are secondary factors that may influence the long-term trends in air quality parameters, but the primary control appears to be the dust mitigation efforts undertaken by State Parks in its planting program. Continued monitoring will indicate the degree to which conditions have stabilized or are still in flux.

Respectfully,

The Scientific Advisory Group

Bernard Bauer (Chair), Jack Gillies, Jenny Hand, Leah Mathews, Ian Walker