



MEMORANDUM

DATE: January 5, 2017

To: Mat Fuzie
Acting Deputy Director
California State Parks
Off-Highway Motor Vehicle Recreation Division
1725 23rd Street, Suite 200
Sacramento, CA 95816

FROM: Will Harris
Senior Engineering Geologist

SUBJECT: Acreage Analysis Related to Saltation Potential, Oceano Dunes State Vehicular Recreation Area, San Luis Obispo County, California.

Introduction

Per your request, this memorandum regards the sand dune landscape upwind of two air quality monitors used for the purposes of further implementing Rule 1001, a regulation specific to the Oceano Dunes State Vehicular Recreation Area (Oceano Dunes). The regulation was authored by the San Luis Obispo County Air Pollution Control District (SLOAPCD) and enacted by the Board of the SLOAPCD in November 2011. Oceano Dunes is in San Luis Obispo County, California and is managed by the Off-Highway Motor Vehicle Recreation Division (OHMVR Division) of the California Department of Parks and Recreation (DPR).

Background

The intent of the Rule 1001 is to limit the amount of saltation-derived dust emanating from the off-highway vehicle (OHV) riding area of Oceano Dunes. Saltation is the geologic, dune-building process in which strong prevailing winds push sand shoreward and cause sand grains to creep and bounce along dune surfaces. Larger grains bounced by the saltation process can release finer grains, including dust particles, which are then blown inland. Dune vegetation not overwhelmed by blowing sand will hamper the saltation process: Where there is more dune-covering vegetation there is that much less dust produced from saltation.

Per Rule 1001, the OHMVR Division is to compare concentrations of dust (airborne particles equal to or less than 10 microns in diameter, also known as PM10) measured downwind of the riding area against dust measured downwind of a non-riding “control” area.

Broadly speaking, compliance with Rule 1001 is demonstrated if data from the two locations are similar. Noncompliance occurs if dust concentrations from the “riding area” monitor are 20% higher than dust measured at the “control” monitor.

As written, Rule 1001 allows Parks to choose locations to place air monitors downwind of the OHV riding area and downwind of a “control” location where no riding occurs. However, in practice the de-facto riding area monitor has become the SLOAPCD’s air monitoring station at 2391 Willow

Road, which is a California Department of Forestry (CDF) fire station in Arroyo Grande, and the “control” monitor was placed in the south-easternmost corner of the Oceano Dunes park property (Figure 1). It should be noted that technical deliberation as stipulated in Rule 1001 regarding the comparative appropriateness of these locations did not occur between the OHMVR Division and the SLOAPCD.

Open-Sand Acreage Comparison

When objectively considering dust emission potential, the areas upwind from the CDF “riding area” monitor and the “control” monitor (also called the Oso Flaco monitor because of its proximity to Oso Flaco Lake at the south end of the park) are not physically comparable. This is best demonstrated by making a comparison of the open sand acreage upwind from each monitor because dust generated from the saltation process occurs primarily on the open sand sheets of the dunes. Where dune surfaces are covered by vegetation, saltation is minimal to nonexistent (SLOAPCD, 2010).

Figure 1 (attached) shows a 15 degree wedge of dune landscape upwind from each monitor. The landscape wedges are defined by the prevailing winds that come from the west-northwest. The total acreage of the wedge that is upwind from the CDF riding area monitor is 580 acres, and of that amount, 475 acres consist of open dune sand. Upwind from the Oso Flaco “control” monitor, total wedge acreage is 372 acres—more than 200 acres smaller than the riding area wedge—and there are only 113 acres of open sand acreage—more than 350 acres less than in the riding area wedge.

Further examination shows the open sand acreages within each wedge are also not proportional: The “riding area” landscape wedge is approximately 82% open sand while the “control” landscape wedge is only 30% open sand (Figure 1).

Baseline of Natural Dune Conditions Comparison

The stated intent of Rule 1001 is to reduce dust emissions in the riding area of Oceano Dunes to natural background levels. The “control” monitor in theory determines that baseline by monitoring dust emanating from an area representing natural dune conditions.

To determine if the area upwind of the Oso Flaco “control” monitor represents natural dune conditions, 1930’s aerial imagery of the dunes (Figure 2) was analyzed in same way as presented above for Figure 1. Recreation in the dunes using OHVs did not become popular until after World War II, when there was a surplus of military jeeps (Guiton-Austin, 2011). Imagery from the 1930’s predates this time and so provides a reasonable representation of natural dune conditions.

The 1930’s aerial imagery shows that for the Oso Flaco control wedge, 83% of the dune landscape was open sand, as opposed to the 30% seen today (Figure 2). This 53% reduction in open sand area is largely due to the proliferation of invasive plants introduced before State Parks’ management of the property began in 1982 (Marshall, 2015; USFWS, 2014). The vegetation acreage change also indicates the control area does not represent natural dune conditions.

For the riding area landscape wedge, the percentage of open sand acreage in the 1930’s is essentially the same as today, 82% (Figure 2). The imagery does show more vegetation existed near the shore and less vegetation was found further back in the dunes when compared to today, but with regard to saltation-generated dust emission potential, conditions are essentially unchanged. The vegetation increase in the back area of the dunes and on the lee side of

vegetation islands is due to native revegetation efforts made by State Parks beginning in 1982 (CGS, 2011).

	"Riding Area" Upwind Wedge	"Control Area" Upwind Wedge
Total Wedge Acreage:	580	372
2010 Open Sand Acreage:	474 (82%)	113 (30%)
2010 Vegetation Acreage:	106 (18%)	259 (70%)
1930's Open Sand Acreage:	477 (82%)	308 (83%)
1930's Vegetation Acreage:	103 (18%)	64 (17%)

Table 1. "Control" and "Riding Area" Acreage Comparisons (see Figures 1 & 2).

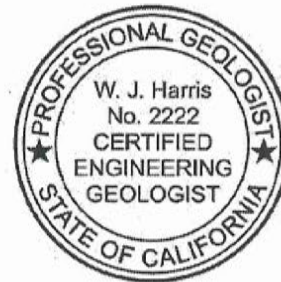
Conclusions

Saltation-generated dust emission potentials as related to open sand acreage of the dune landscapes upwind of the Rule 1001 "control" and "riding area" monitors are demonstrably different with respect to total acreage, open sand acreage, and percent vegetation cover. The dune landscape acreage analyses described above and presented in Figures 1 and 2, attached, quantify this difference. It appears that using these monitors for the implementation of Rule 1001 will result in significant underestimation of "background" dust emissions when compared to the Oceano Dunes riding area monitor. Therefore, the two monitors do not provide comparable physical conditions for the purposes of Rule 1001.

Should you have any questions regarding this memorandum, please do not hesitate to call.

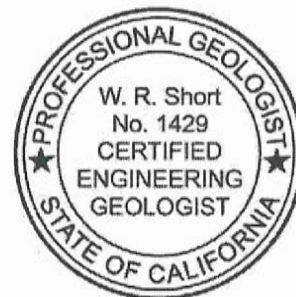
Respectfully submitted,

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Concur:

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Supervising Engineering Geologist



Figures 1 and 2, attached.

References

CGS, 2011. An analysis of wind, soils, and open sand sheet and vegetation acreages in the active dunes of the Callender Dune Sheet, San Luis Obispo County, California. November 1, 2011.

Guiton-Austin, 2011. Personal communication with Linda Guiton-Austin, curator of the Oceano Railroad Depot Museum, October 24, 2011.

Marshall, 2015. Personal communication with Oceano Dunes State Vehicular Recreation Area Superintendent Brent Marshall, July 7, 2015.

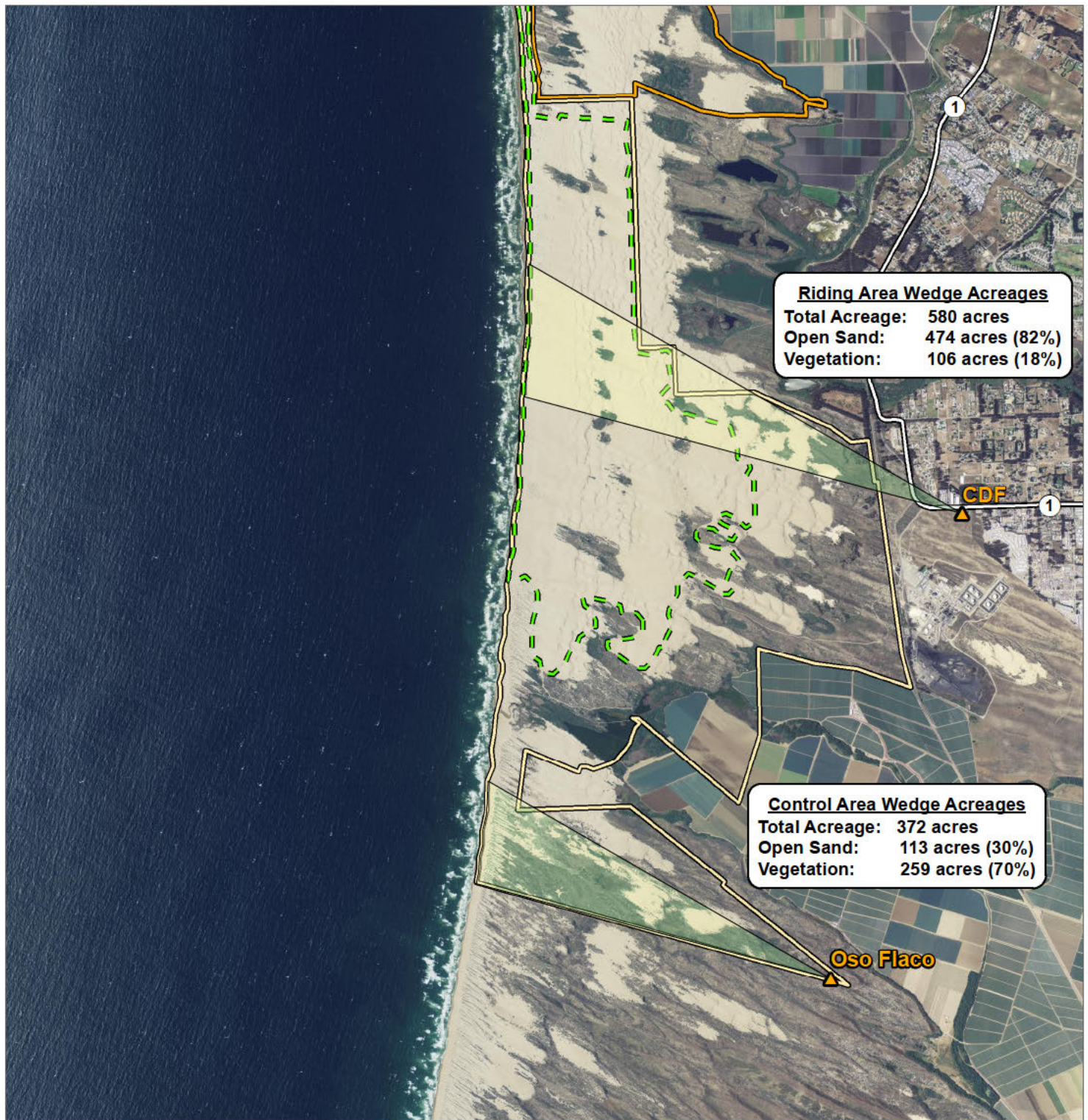
SLOAPCD, 2010. South County Phase 2 Particulate Study, San Luis Obispo County Air Pollution Control District. February 2010.

SLOAPCD, 2011. Rule 1001 Coastal Dunes Dust Requirements, San Luis Obispo County Air Pollution Control District. November 2011.

USFWS, 2014. Draft Environmental Assessment for the Aerial Herbicide Application Research Study, Guadalupe Dunes National Wildlife Refuge, San Luis Obispo County, California. US Fish and Wildlife Service, August 2014.

FIGURE 1

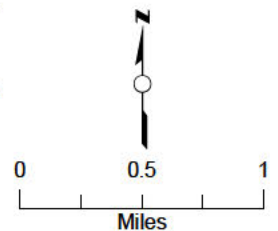
**Present Day Imagery: Open Sand and Vegetation
Acreages Upwind From Each Rule 1001 Air Monitor**



Note: Wind wedges represent west-northwest prevailing winds. Wedges are defined by 15 degree azimuthal arcs, extending from 285° to 300°.

**Oceano Dunes State Vehicular
Recreation Area and Vicinity**

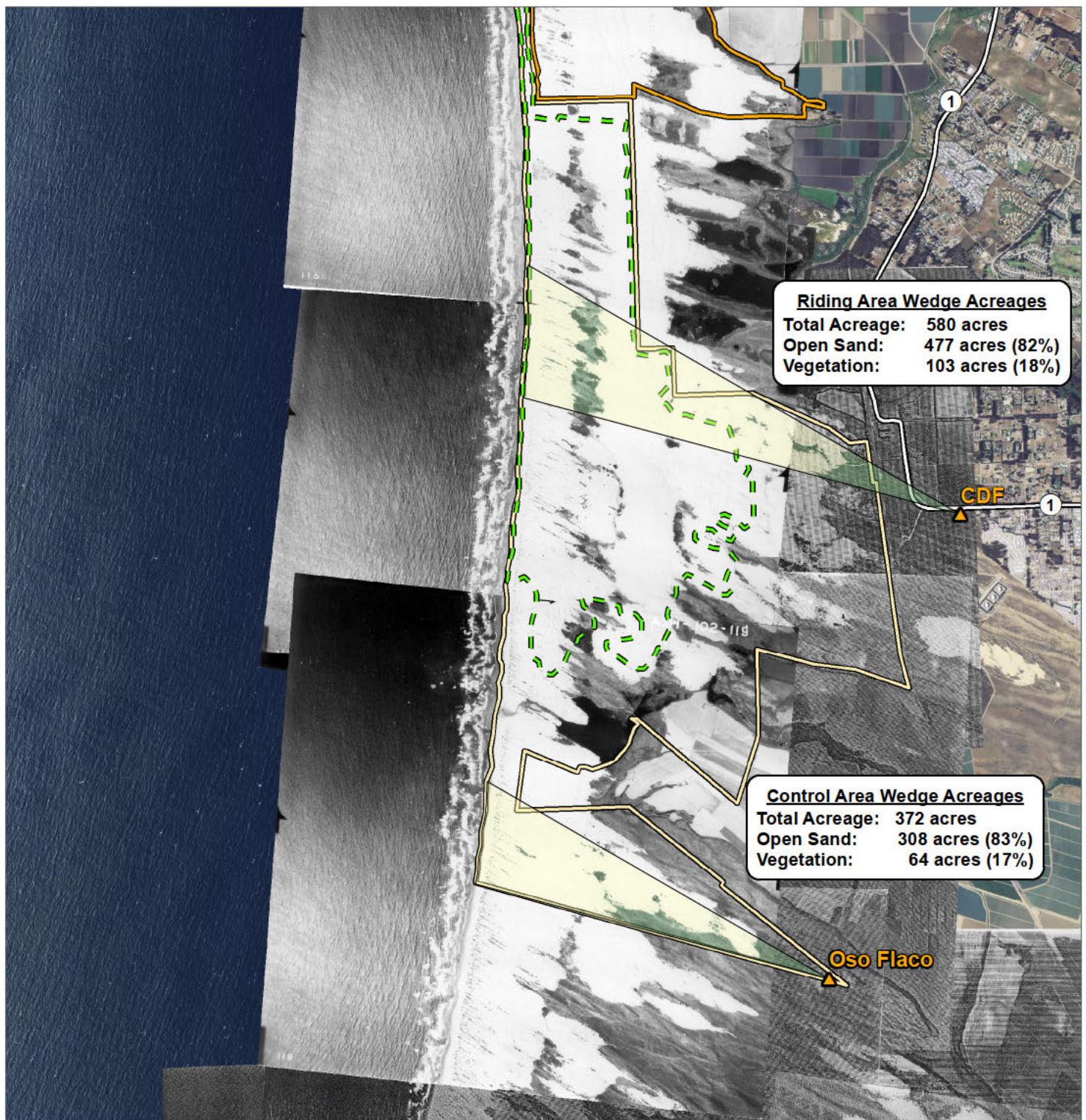
- Prevailing Wind Wedges**
- Vegetation
 - Sand
 - Rule 1001 Air Monitor Locations
 - Off-Highway Vehicle Riding Area
 - Oceano Dunes SVRA State Park Boundary
 - Dune Preserve



Map Scale: 1:50,000

FIGURE 2

**1930s Imagery: Open Sand and Vegetation Acreages
Upwind From Each Rule 1001 Air Monitor**



Note: Wind wedges represent west-northwest prevailing winds. Wedges are defined by 15 degree azimuthal arcs, extending from 285° to 300°.

**Oceano Dunes State Vehicular
Recreation Area and Vicinity**

Prevailing Wind Wedges

- Vegetation
- Sand
- Rule 1001 Air Monitor Locations

- Off-Highway Vehicle Riding Area
- Oceano Dunes SVRA State Park Boundary
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