September 27, 2022

Memo: SAG Review of CDPR "2nd DRAFT 2022 Annual Report and Work Plan" (dated September 14, 2022)

From: Scientific Advisory Group (SAG)

To: Gary Willey, San Luis Obispo Air Pollution Control District (SLOAPCD)
Ronnie Glick, California Department of Parks and Recreation (CDPR)

Cc: Sarah Miggins, California Department of Parks and Recreation (CDPR)
Liz McGuirk, California Department of Parks and Recreation (CDPR)
Jon O'Brien, California Department of Parks and Recreation (CDPR)

Summary statement

Overall, the Scientific Advisory Group (SAG) approves of this second draft 2022 Annual Report and Work Plan (ARWP). Thus, the SAG comments and suggestions offered here are primarily intended to provide context for this current ARWP and to inform the discussion of issues to be considered in the upcoming 2022-23 project year.

The SAG provided many comments on the first draft ARWP, and we find that the second draft mostly addresses these comments. In particular, the SAG appreciates the inclusion of new analyses to better justify proposed Desert Research Institute (DRI) model revisions. These include examination of year-to-year variability in PI-SWERL dust emissivity and analysis of incremental effects of each proposed model change. The second draft ARWP also commits to additional study of certain DRI model revisions (e.g., the effect of the plover exclosure) and to update dust mitigation plans, as necessary, based on this additional study.

SLOAPCD also offered comments on the first draft ARWP. The SAG agrees with some of the comments offered by SLOAPCD, especially those seeking further clarification on DRI model revisions. The SAG also acknowledges that, because the Stipulated Order of Abatement (SOA) has not (yet) been revised, it is appropriate to expect that CDPR provide a plan toward achieving the existing goal to reduce PM_{10} mass emissions by 50% relative to 2013. This has been included as a "secondary work plan" within the second draft ARWP.

However, the SAG disagrees with certain comments provided by SLOAPCD. In particular, the SAG disagrees with SLOAPCD's proposed management objective to "reduce emissions of PM_{10} from the ODSVRA to a level consistent with what dust emissions would be today if the area had never been disturbed by vehicles." While the SAG is generally agnostic to the choice of management objectives, which must balance competing values and interests, the SAG recognizes that CDPR inherited a landscape that had been modified by off-highway vehicle (OHV) activity for decades prior to the establishment of the ODSVRA in 1982. As such, SAG appreciates CDPR's position that SLOAPCD's proposal for modeling a specific alternate history of landscape conditions (dune forms, vegetation cover) at ODSVRA is "speculative." The SAG also notes that such an approach would directly conflict with other management goals (e.g., the

removal of invasive weeds). In its general comments below, the SAG further elaborates on some of its concerns with SLOAPCD's review of the first draft ARWP, including SLOAPCD's proposed new management objective (see comment "L").

The SAG's comments on the second draft ARWP are provided as follows. First, we provide general comments structured around each of the main points within the CDPR cover letter that accompanies the second draft ARWP. Second, we provide additional specific comments in the Appendix.

SAG general comments

A. Inclusion of a scenario to meet the 50% mass reduction in SOA Section 2.c (intro of CDPR cover letter)

The revised ARWP maintains a primary work plan intended to achieve the goal of reducing PM_{10} mass emissions by at least 40.7% relative to the 2013 baseline (Sec. 3.1), but it now also includes a secondary work plan for reducing PM_{10} mass emissions by 50% (Sec. 3.2). The SAG recognizes that the 40.7% and 50% targets are based on two distinctive management alternatives – either to reduce PM_{10} emissions to an estimated "pre-disturbance" level (i.e., the 40.7% reduction), or to reduce PM_{10} emissions to a level similar to the analogue Oso Flaco site (i.e., the 50% reduction). As noted in our comments on the first draft ARWP, the ultimate determination of management objectives goes beyond the scope of the SAG's duties. Nonetheless, the SAG appreciates that dust control measures are presented for both of these possible management objectives.

Overall, the SAG finds that both management scenarios are reasonably presented. However, the SAG offers several comments regarding the primary and secondary work plans:

1. The primary work plan offers no new dust controls in 2022-23. However, it does plan for conversion of some temporary dust controls to vegetation treatments. In contrast, it appears that other temporary treatments (e.g., areas seeded with only sterile grass seed) are not planned for conversion to long-term vegetation, and thus they may lose their effectiveness over time. The SAG has established that the effectiveness of PM_{10} emissions reductions depends on the type of treatment, yet the resulting effect of these proposed treatment changes has not been modeled.
2. The secondary work plan proposes 106.5 acres of new dust control measures in 2022-23, which include 35.1 acres of new straw and sterile grass treatments (Sec. 3.2.1.1), 12.4 acres of temporary vehicle exclusion areas (Sec. 3.2.1.2), and 59.0 acres of nesting area converted to vegetation (Sec. 3.2.2). In total, these treatments are expected to reduce PM_{10} mass emissions by 9.2 metric tons per day relative to 2022. These emissions reductions are estimated using the revised DRI model (Table 3-1). However, it is not stated which of the revised model assumptions are applied to each of these treatment areas, and this does not appear to be explained in Attachment 04 within the section describing secondary work plan model estimates.

3. Among its proposals, the secondary work plan intends to convert 59.0 acres of nesting exclosure area to vegetation (Sec. 3.2.2). Such planting would seem to interfere with plover nesting. Therefore, it would help to clarify if CDPR's intention is to no longer manage these 59.0 acres for plover nesting, and to instead manage them primarily for dust mitigation. It is notable that the selected treatment area, shown in Fig. 3-1, is far from the beach and thus unlikely to interfere with plover nesting activities. However, the specific purpose of, and longer-term management plan for, this 59.0-acre area should be clarified.
4. The modeled effects of the secondary work plan are described in Sec 3.4.1 (Tables 3-1 to 3-3) and in the Evaluation Metrics (Attachment 2). Such effects are presented only for the revised DRI model, leading to the conclusion that PM_{10} emissions would be reduced in 2023 by 50.1% relative to 2013. Results for the current DRI model are not presented, but it should be noted that such modeling would most likely predict a PM_{10} emissions reduction of less than 50% relative to 2013.
5. The presentation of the Evaluation Metrics (Attachment 2) for 2023 is confusing. For item A1, the first 2023 value (revised DRI model estimate) is for the secondary work plan, while the second 2023 value (current DRI model estimate) is for the primary work plan. However, some of the other values (e.g., A2) are presented only for the secondary work plan. This mixing of the primary and secondary work plans within the Evaluation Metrics, though partially explained via footnotes 3 and 6, is confusing. For consistency, the SAG suggests that the Evaluation Metrics present only the primary work plan.

B. Response to SAG comments (first bullet in CDPR cover letter)

The SAG offered two general comments on the first draft ARWP, and this second draft ARWP reflects changes in response to these SAG comments. Overall, the SAG is satisfied with the response to its previous comments, as follows:

1. The SAG's comments on the first draft ARWP clarified that its recommended 40.7% emissions reduction target is based on a specific management objective (reducing PM_{10} emissions to a level similar to pre-disturbance conditions), and noted that the exact PM_{10} target (i.e., 40.7% or 50%, as currently specified in the SOA), would depend on the management objective. In response, the second draft ARWP provides dust mitigation scenarios for both the existing 50% mass emissions reduction target and the proposed new 40.7% emissions reduction target. The SAG approves of the way in which the current ARWP proposes these two potential scenarios, while acknowledging that the ultimate extent of required dust mitigation measures is contingent on potential changes to the SOA, as well as further modeling and monitoring to inform the effectiveness of such measures. (The SAG offers further comments on the selection of the SOA target in comment "L" below.)
2. The SAG's comments on the first draft ARWP identified some concerns with the implementation of the proposed DRI model refinements. In response, the second draft ARWP presents a new analysis of year-to-year variations in PI-SWERL measured emissivity (Sec. 2.3.5.1 and Fig. 2-10), as well as explanations for other specific sources of uncertainty in the refined model. The SAG appreciates inclusion of the new PI-SWERL analysis and agrees that it is reasonable to use 2019 PI-SWERL data for post-

mitigation modeling, though year-to-year variations in PM_{10} emissivity, as determined by the PI-SWERL, should be the subject of further analysis (see comment "C" below). In addition, this analysis of year-to-year variation in PI-SWERL emissivity raises new questions about the appropriateness of using 2013 as the baseline year for comparing subsequent emissions reductions (see comment "K" below). As for the other model refinements, the SAG overall approves of how these are framed, while acknowledging that the specific selection of dust mitigation measures may need to be modified as further refinements to the model are implemented in the coming year.

The SAG also offered multiple additional comments on the first draft ARWP. Overall, the SAG finds that its previous comments are adequately addressed in the second draft ARWP. Any further additional comments/concerns are included in the Appendix below.

C. New analysis of PI-SWERL emissions measurements from 2013-2022 (second bullet in CDPR cover letter)

The SAG appreciates inclusion of the new analysis of PI-SWERL emissions measurements from 2013-2022 (Sec. 2.3.5.1, Fig. 2-10, Fig. 2-11, and Fig. 2-12). This preliminary analysis suggests that PI-SWERL data from 2019 are probably more representative of typical riding area emissions than data from 2013. This new analysis therefore increases confidence in the use of 2019 PI-SWERL emissivity data for modeling ODSVRA post-mitigation PM_{10} emissions, as per the SAG's recommended refined modeling framework. However, as additional PI-SWERL measurements are obtained in future years, the SAG encourages further model refinements to reflect the latest PI-SWERL measurements, possibly via an average of several years to account for year-to-year variability.

The analysis of riding area emissivity between 2013 and 2022 described in Section 2.3.5.1 suggests that variations in seasonal precipitation levels appear to have caused the 2013 mean emissivity level to be substantially higher than that of 2019. The analysis also suggests that changes in OHV activity caused 2013 to be substantially more emissive than 2022, despite similar mean precipitation in these two years. To support these assertions, Figure 2-12 reports precipitation levels and admissions totals (a proxy for OHV ridership) from 2013 through 2022. However, this range is too short for confidently establishing the causes of year-to-year variation in emissivity level, as measured by the PI-SWERL. The SAG suggests that the precipitation record be expanded to cover prior drought periods (1976-77 for example) for examination in comparison with the 2013-2022 record before CDPR concludes that 2013 was indeed an anomaly. If 2013 precipitation levels occur every decade or two, then the SAG recommends that such decadal worst-case precipitation and emissivity years be given some level of consideration when modeling the effectiveness of dust controls.

In addition to informing the modeling of dust mitigation effectiveness, the analysis presented in Sec. 2.3.5.1 calls into question the use of 2013 emissivity data as the baseline for comparison of subsequent changes in PM_{10} emissions, as required by the SOA. As indicated in Fig. 2-10 and Fig. 2-12, emissivity across the ODSVRA is substantially higher in 2013 than in 2014-2016, despite the lack of significant management actions or changes in admissions totals during this

period. In comment "K" below, the SAG addresses the appropriateness of modeling emissions for the 10 baseline days from 2013, as currently mandated by the SOA.

The SAG also notes that the estimate of pre-disturbance emissions for the 1939 and 1966 historical scenarios used to inform potential new emissions reduction targets (SAG, 2022), depends, in part, on assuming the averaged non-riding area PI-SWERL emissivity from 2013-2019, as determined in Gillies et al. (2022). The SAG appreciates that the Gillies et al. analysis uses average emissivity across multiple years (rather than emissivity from a single year), thus avoiding this issue of year-to-year variability and increasing confidence in this analysis of pre-disturbance emissions.

D. Additional justification for use of 2019 emissions grid (third bullet in CDPR cover letter)

As noted in comment "C" above, the new PI-SWERL analysis suggests that use of the 2019 emissions grid for modeling ODSVRA post-mitigation PM_{10} emissions is justified. As additional PI-SWERL measurements are obtained in future years, the SAG encourages further model refinements to reflect the latest PI-SWERL measurements (possibly via an average of several years to account for year-to-year variability).

E. Table showing incremental effect of model changes (fourth bullet in CDPR cover letter)

The SAG appreciates inclusion of Table 2-9 showing the incremental effect of using the current versus the revised DRI model. This analysis demonstrates that the most impactful model revision is updating the PI-SWERL grid, followed by updating emissions from the nesting exclosure. All other model changes have a relatively minor impact on emissions modeling.

The SAG offers several comments on this new analysis:

1. The presentation of the effect of updating the PI-SWERL grid is a bit confusing. Item 1 in Table 2-9 appears to show the overall change in mass emissions across the entire ODSVRA assuming the absence of any other mitigation measures. It would be more useful to know the specific incremental effect of the updated PI-SWERL grid for only those locations within the ODSVRA that are not subject to other mitigation measures (and are thus already accounted for within other rows in Table 2-9). The difference between Tables 2-10 and 2-11 indicates that the net effect of all model revisions through July 31, 2022, is -4.2 metric tons PM_{10} mass emission per day (i.e., 108.2 metric tons per day for the current model and 104.0 metric tons per day for the revised model, not including added beach and corridors). Assuming an overall mass balance and taking this -4.2 metric tons per day difference as the net effect of the DRI model revision, the SAG estimates that the actual incremental change resulting from updating the PI-SWERL grid is -16.5 metric tons per day (rather than the -23.1 metric tons per day shown in Table 2-9).
2. Both the current and revised estimates of PM_{10} emissions within the nesting exclosure remain subject to a large degree of uncertainty. Table 2-9 indicates the important impact of such uncertainty on the overall estimate of PM_{10} emissions. Because of its importance, this model estimate of nesting area PM_{10} emissions will need to be refined in the coming year, and dust mitigation plans will need to be adjusted accordingly. Sec. 2.3.5.1 and

Table 2-17 of the revised ARWP provide a preliminary explanation for the assumed emissivity of the plover exclosure. However, it is doubtful that, in the absence of other controls, the plover exclosure emissivity is less than half of the mean emissivity of all non-riding areas. The SAG appreciates that CDPR has committed in the coming year to further study these model assumptions (i.e., Sec. 2.2.1.3, item 4) and to the installation of additional dust mitigation projects as necessary. As noted above (in item 3 of comment "A"), there are fundamental conflicts in managing this area for bird nesting habitat versus dust mitigation efforts that promote dune growth, so further clarification by CDPR on the longer term management plans for the plover exclosure area is required.

3. The SAG appreciates that this second draft ARWP implements the modeling of the seasonal foredune, beach, and open corridors that were previewed in the first draft ARWP. The updated dust control values and maps resulting from this modeling are mostly reported throughout this ARWP (e.g., Sec. 2 intro, Fig. 2-1, Table 2-2, Fig. 2-2, Table 2-9, Table 2-11, Sec. 2.2.3.2, Sec. 2.3.7.1, Fig. 2-16, Fig. 2-17, and Attachment 2). However, these corridors are not shown in Figs. 2-4 or Fig. 2-7, and the estimated incremental PM_{10} emissions reduction from these corridors seems to be inconsistent between Table 2-9 (2.1 metric tons per day) and Table 2-11 (3.6 metric tons per day). Please check all of these figures and tables for consistency. In addition, the SAG notes that the model assumption that these beach and corridor areas are experiencing mean non-riding area emissions needs to be tested through further data collection. The SAG notes that these corridors are closed for riding for only 7 months per year, which may limit their dust control effectiveness.

F. Commitment to study assumptions in updated model (fifth bullet in CDPR cover letter)

As noted in comment "E" above, the SAG appreciates that CDPR has committed to further study the assumptions in the updated DRI model, especially regarding the effect of the nesting exclosure.

G. Agreement to install additional projects as necessary (sixth bullet in CDPR cover letter)

As noted in comment "E" above, the SAG appreciates that CDPR has committed to install additional projects, as necessary, pending the outcome of model updates.

H. Presenting results for the current and revised DRI model (item 1 in CDPR cover letter on items not incorporated)

In its response to the first draft ARWP, SLOAPCD requested that the revised DRI model *not* utilize the 2019 PI-SWERL emissions grid for modeling the effectiveness of PM_{10} dust mitigation measures. In its cover letter, CDPR rejected this request, citing a new analysis of year-to-year emissivity changes demonstrating the representativeness of the 2019 PI-SWERL emissions grid. As noted in comments "C" and "D" above, the SAG appreciates inclusion of this new PI-SWERL analysis in the second draft ARWP, and we agree with CDPR that use of the 2019 emissions grid is reasonably well justified. However, as also noted in comments "C" and "D" above, the SAG encourages further model refinements in the coming year based on new PI-

SWERL measurements and other data collection. Such updated modeling should then inform adaptive management decisions as mitigation efforts progress.

I. Retaining 2013 PI-SWERL emissions grid within the baseline scenario (item 2 in CDPR cover letter on items not incorporated)

In its response to the first draft ARWP, SLOAPCD also suggested that any revision of the DRI model should include the 2019 emissions grid both for modeling the baseline condition and for modeling dust mitigation effectiveness. In its cover letter, CDPR rejected this suggestion on the basis of feasibility (i.e., not enough time to implement for the current ARWP) but expressed openness to consulting the SAG on alternative approaches to modeling the baseline condition in the coming year. The SAG agrees that implementing such model changes during the current ARWP revision process would not be feasible, and the SAG approves of the plan to revisit the baseline condition in the coming year. The SAG notes that the new PI-SWERL analysis suggests possible problems with the choice of 2013 as the baseline year for PM_{10} mass emissions; however, the current SOA requires use of 2013 as the baseline. In comment "K" below, the SAG notes some important considerations for any potential change to this baseline condition.

J. Appropriateness of mass emissions reduction target (item 1 in CDPR cover letter clarifications)

The SAG agrees that the PM_{10} mass emissions reduction target (SOA provision 2c) remains central to assessment of progress on dust mitigation. Modeling of PM_{10} mass emissions addresses the holistic effect of dust mitigation measures on downwind air quality, whereas PM_{10} concentration targets (SOA provision 2b) address air quality only at specific receptor sites. Both approaches are important and complementary.

K. Appropriateness of the 10 baseline days (item 2 in CDPR cover letter clarifications)

The SAG agrees that the SOA clearly calls for modeling of emissions reductions relative to the 10 baseline days from 2013. This should remain the basis for modeling PM_{10} emissions changes unless the SOA is revised to update these goals. Modeling of the 2013 baseline scenario serves two functions:

1. It sets a baseline for pre-mitigation PM_{10} mass emissions against which current progress may be compared. Within the framework of the current SOA, setting such a baseline is essential for determining a percentage reduction in mass emissions resulting from mitigation measures.
2. It identifies a common set of meteorological scenarios to model the effect of dust mitigation measures. By modeling the same meteorology for the baseline and for mitigation scenarios, year-to-year meteorological changes are ignored and only the specific effect of dust mitigation measures is considered.

The newly reported analysis of year-to-year variability in PM_{10} emissivity (i.e., Fig. 2-10 in second draft ARWP) calls into question whether 2013 is indeed the appropriate year for setting the emissions baseline (see SAG comment "C" above). Relative to all other years, PI-SWERL

measurements from 2013 indicate an anomalously high level of PM_{10} emissivity. 2013's distinctiveness does not appear to be the result of management changes, because emissivity is much lower in the immediately following years (2014-2016), despite the lack of any major new mitigation measures during the intervening years.

This new finding regarding PM_{10} emissivity changes calls into question whether 2013 is indeed the appropriate baseline for assessing progress on PM_{10} mass emissions reductions. One solution to this issue would simply be to remove the percentage-based PM_{10} emissions reduction target and to instead set an absolute target without reference to a baseline. For example, the modeled pre-disturbance emissions (i.e., 108.4 metric tons/day) could be adopted as the target without reference to a percentage change. An alternative solution would be to average over several representative pre-mitigation years (i.e., 2014-16) when setting the baseline emissions scenario, and then to adjust the percentage reduction target accordingly.

If the baseline year is removed or changed as the basis for the PM_{10} emissions reduction target, a decision would also need to be made regarding the continued use of the 10 baseline days from 2013 for meteorological scenarios. Throughout the SOA process, these 10 baseline days have served as the basis for all modeling of PM_{10} mass emissions and ambient concentrations, including for the pre-disturbance scenarios (i.e., 1939 and 1966), the pre-mitigation baseline (i.e., 2013), and all post-mitigation years (i.e., 2018-22). Thus, any change to these 10 baseline meteorology days would require that all of this modeling be redone. Though 2013 experienced a relatively large number of high wind event days compared to other years, this does not necessarily pose an issue for the use of 2013 for the 10 baseline meteorology days. This is because any modeling comparison between current PM_{10} emissions and targeted PM_{10} emissions uses the same exact meteorology scenarios. Given that high wind event days occur dozens of times per year (i.e., see ARWP Attachment 02), selection of a different year for the 10 baseline meteorology days should not significantly affect such relative comparisons.

L. Management objective for SOA (item 3 in CDPR cover letter clarifications)

In its review of the first draft ARWP, the SAG reiterated that its proposed 40.7% emissions reduction target is tied to a specific management objective: to reduce ODSVRA riding area emissions to a level consistent with "pre-disturbance" emissions, as estimated for a 1939 scenario. Though the SAG remains agnostic to the specific choice of management objectives, the SAG strongly supports the use of the best available science to inform whatever management objective may be chosen. In its response to the first draft ARWP, SLOAPCD recommended a new management objective based on estimating the hypothetical present-day PM_{10} emissions from the ODSVRA in the absence of any history of human use. In its rebuttal, CDPR described this new management objective as "speculative" and essentially unknowable. The SAG agrees with CDPR and identifies two main reasons why modeling such an alternative history for the dunes would be difficult and problematic:

1. Identifying the range of factors to include or exclude from this alternative history would necessitate significant guesswork to disentangle global trends (i.e., global climate change impacts on wind climate, rainfall, and vegetation development) and local human impacts (i.e., OHV use, introduction of invasive weeds, and active dune restoration activities) to

include or exclude in such a modeling scenario. The SAG acknowledges that its proposed pre-disturbance scenario approach also makes certain assumptions about the history of OHV use at the ODSVRA, but SLOAPCD's newly proposed approach would greatly increase the number of uncertain and somewhat unknowable modeling assumptions required.

2. Setting a management objective for dust mitigation based on modeling the expansion of invasive weeds (and absence of measures to control such weeds) would be in direct opposition to existing CDPR management goals to improve dune ecology through invasive weed management.

The SAG acknowledges a seemingly irreconcilable set of management objectives embedded within the current SOA. Provision 2b calls for achieving State and Federal ambient air quality standards, which the SAG has acknowledged would require reducing PM_{10} emissions well below pre-disturbance conditions. Provision 2c effectively calls for reducing PM_{10} emissions to a level commensurate with natural background emissions, initially identified as a 50% reduction (based on the Oso Flaco reference site) and potentially to be modified to a 40.7% reduction based on pre-disturbance scenario modeling. Ultimately, reconciliation of these competing goals (i.e., full elimination of air quality violations versus return to natural background conditions) may simply require identification of a compromise air quality target somewhere between these two goals. However, the specific selection of such a management objective would necessarily require negotiations and value judgments that cannot be resolved merely through further modeling.

M. Rule 1001 (item 4 in CDPR cover letter clarifications)

The SAG has been charged with commenting on the adequacy of the ARWP toward meeting the objectives of the SOA. Therefore, the SAG does not take a position on the appropriateness of Rule 1001.

Respectfully,
The Scientific Advisory Group

Dr. Raleigh Martin (Chair of SAG); Dr. William Nickling; Dr. Ian Walker; Ms. Carla Scheidlinger; Mr. Earl Withycombe; Mr. Mike Bush, Dr. John A. Gillies

Appendix: Additional comments on the second Draft 2022 ARWP

1. Introduction (Sec. 1): Fix typo at bottom of page, "inthe"

2. Report on Dust Control Measures Installed at ODSVRA (Sec. 2.1): Mentions of "soil stabilizers" keep appearing in the ARWP, but there has been no data presented and no description of what the treatments are or where they are implemented. Such information should be provided, or else mention of the stabilizers should be eliminated.

3. Dust Control Measures Installed at ODSVRA (Sec. 2.1.1): Vegetation is presented as a long-term dust control effort. However, the vegetation measures installed, as presented in this ARWP, consist only of seeding with sterile grass seed, as described in comment "A" above. The 2022 2nd draft ARWP includes the following statement on p. 2-3:

> *Initiated planting of 65.9 acres of new vegetation using sterile grass seed in five (5) different treatment areas.*

The SAG suggests adding the following qualifier:

> *Sterile grass is not a long-term vegetation measure, however, as the grasses are annuals and do not provide on-going cover as does native vegetation.*

4. 1939 and 1966 Pre-Disturbance Scenarios (Sec. 2.2.1.1): The SAG appreciates inclusion of a new paragraph describing the basis for and uncertainties associated with modeling of the pre-disturbance scenarios. However, it should be clarified that the SAG recommended but did not actually carry out this modeling. Therefore, please replace "The SAG's modeling of the pre-disturbance scenarios…" with "Modeling of the pre-disturbance scenarios, as recommended by the SAG, ..." In addition, the SAG suggests briefly referencing why the 1939 and 1966 scenarios were selected. As described in the SAG's February 2022 memo (SAG, 2022), vegetation cover maps from 1939 and 1966 roughly bracket the period of high vegetation cover that was estimated to have existed within the current extent of the Riding Area prior to substantial OHV activity.

5. SAG-Recommended Changes to DRI Model Assumptions (Sec. 2.2.1.3): The SAG appreciates the clarification, regarding emissions from the 48-acre foredune (item 3) and the foredune beach and corridors (item 6), that the revised DRI model does not incorporate zonal non-riding area emissivity values, but instead uses a mean emissivity for all non-riding areas. This assumption, and the overall approach to modeling the foredunes and adjacent corridors, should be revisited as further data are collected in the coming year. In addition, the statement made regarding emissions from the nesting exclosure (second sentence of item 4) is confusing. What does "actual mean emissivity of the nesting area" refer to with respect to PI-SWERL testing conducted by DRI? Finally, the typo "Santa Barbra" in item 5 should be corrected.

6. Mass Emissions Reductions – Revised DRI Model (Sec. 2.2.3.2): The statement in footnote 13 regarding the assumed 100% effectiveness of wind fences in the revised model is confusing and seems to contradict the statements in Sec. 2.2.1.3 (e.g., item 2) regarding the assumed partial effectiveness of wind fence arrays. Though the SAG appreciates that the incremental effect of

this modeling change is small and temporary, future modeling should be sure to appropriately account for the effectiveness of temporary wind fences on dust emissions reductions.

7. Report on Progress Towards Ambient Air Quality Standards (Sec. 2.2.4): The SAG appreciates and accepts the explanation for the more limited presentation of PM_{10} concentration results for the revised model. As noted in footnote 14, such modeling is computationally expensive. Given the frequency with which such model runs are conducted, CDPR and DRI may want to consider updating model code for deployment on a high performance computing cluster.

8. Mesa2 Air Quality Monitoring Station – Revised DRI Model (Sec. 2.2.4.4): Correct typo in first sentence: "in reducing in reducing."

9. Saltation Monitoring (Sec. 2.3.2): The SAG appreciates the footnote clarifying the decision to report a mean threshold wind speed for saltation rather than quoting a variation in thresholds across the ODSVRA. Though it is true that there is uncertainty in the mean threshold value, this does not eliminate the possibility of a real north-south gradient in saltation threshold, as suggested in the cited 2013 report. Should the determination of threshold wind speeds become important to informing further dust control activities, the SAG encourages a more rigorous statistical analysis of such threshold variations in the future.

10. Shear Stress Visualization (Fig. 2-9): Please fix typo. "Sheer Stress" should be "Shear Stress."

11. Preliminary Analysis of Annual Variability in Riding Area Emissions (Sec. 2.3.5.1): As noted in comment "C," we shouldn't discount the 2013 mean emissivity level as an anomaly until we examine a longer precipitation record (see first full paragraph on p. 2-55).

12. Comparison of Nesting Exclosure Emissions Estimates (Table 2-17): Figure 2-12 reports 2019 mean emissivity levels to be about one third of 2013 emissivity levels. Why then does Table 2-17 show nesting enclosure emissions using 2019 PI-SWERL data to be only 5% lower than emissions using 2013 PI-SWERL data?

13. Vegetation Monitoring (Sec. 2.3.6): In its review of the first draft ARWP, the SAG posed a series of questions regarding the presentation of vegetation monitoring results. However, it does not appear that any of these questions have been addressed in the current second draft ARWP.

14. Historical Vegetation Study (Sec. 2.3.6.3): In the last sentence of the first paragraph, fix the typo, "is provide." In the last bullet of this section, replace "SVRA" with "ODSVRA."

15. ODSVRA Dust Mitigation Treatments, July 31, 2013 to July 31, 2022 (Fig. 2-16): The last two icons in the legend at the bottom of the figure should be erased as they don't refer to any plotted data.

16. SAG Response to Studies (Sec. 2.4.1): The link within footnote 25 is missing.

17. PM_{10} Speciation Sampling (Sec. 2.4.4.1 and Sec. 3.3.1): The SAG remains concerned that SLOAPCD has not yet completed analyses from the speciation sampling. As noted in its previous comments, the SAG urges timely completion of these analyses to help address lingering concerns about the Scripps study. The SAG is disappointed that the SLOAPCD's response to the first draft ARWP did not address its plans for timely completion of these analyses.

18. Install 47.5 Acres of New Dust Control Measures (Sec. 3.2.1): In the second paragraph, please fix the typo, "47.5acres."

19. Temporary Vehicle Exclosure Areas (Sec. 3.2.1.2): In the third sentence, please fix the typo, "would located."

20. Estimated PM_{10} Mass Emissions Reductions (Sec. 3.4.1.1): In the first paragraph, "Table 3-1" is repeated. Please correct this typo.

References

Gillies, J. A., Furtak-Cole, E., Nikolich, G., & Etyemezian, V. (2022). The role of off-highway vehicle activity in augmenting dust emissions at the Oceano Dunes State Vehicular Recreation Area, Oceano, CA. *Atmospheric Environment: X, 13*, 100146, https://doi.org/10.1016/j.aeaoa.2021.100146

SAG (07 February 2022). Memo: Scientific Basis for Possible Revision of the Stipulated Order of Abatement (SOA), https://ohv.parks.ca.gov/pages/1140/files/Memo%20Scientific%20Basis%20for%20Possible%20Revision%20of%20the%20Stipulated%20Order%20of%20Abatement%20(SOA).pdf