

APPENDIX A1

Save the Frogs Comment Letter Attachments

Dear Chairperson Cabral and Commission members,

On behalf of Save the Frogs, and the scholars and professors who have co-signed previous letters, I am here to say that on scientific grounds, we urge you to deny certification of the Final EIR (FEIR) and General Plan (GP) for Carnegie SVRA.

The biological resources section is inadequate. Nowhere do the responses to my previous comments refute the validity of the analyses I and my colleagues submitted. We clearly showed the detrimental effects of OHV use on wildlife, especially amphibians and birds. Our work was richly documented with studies from peer reviewed journals, and I ask, where are the scientific studies to support the repeated assertion that the proposed management guidelines are effective at mitigating the impacts of OHV use? Nowhere does the General Plan or the FEIR provide substantive evidence that the proposed wildlife guidelines have worked in the past at Carnegie to maintain habitat quality, or to prevent decline of species at risk from OHV use.

With respect to quantitative interpretation of data, there is a complete non-equivalence between what is in the FEIR and our analyses. The key response of the FEIR is, and I quote, "The types of comparisons suggested by the commenter (me) are not appropriate for a general plan". This statement concedes that the FEIR does not utilize the wealth of raw data collected by Carnegie staff at Habitat Monitoring System "control" sites to assess OHV use impacts. This is not merely a question of scientists drawing different conclusions from the same data set used by the preparers of the FEIR. This is a question of interpreting data vs. ignoring data.

This FEIR response is an open admission that the General Plan is not committed to science based management. Comparisons over time and control vs. impact are the foundation of a scientific approach to the problem of detecting and measuring the magnitude of *in situ* environmental effects. CEQA states that the purpose of an EIR is "to identify the significant effects on the environment of a project". By asserting that side by side comparisons between Carnegie and Tesla are inappropriate, the authors have undermined the validity of every single aspect of the FEIR and GP which relies on HMS reports to mitigate future impacts through adaptive management.

The FEIR further asserts that the mere existence of HMS reports is sufficient to protect the biological resources at risk. The reports appear years late, are incomplete, and entirely lack appropriate analytical and statistical techniques. Scant progress has been made since the 2009 critique sponsored by OHMVR. In fact, the quality and frequency has declined. Two reports have been issued in 7 years. Reports for 2015 and 2016 are missing. The most recent report covered 2011 to 2014 and had no presentation of vegetative cover data. The report included a grid cell map to show locations of where animals were observed, but the tables (No.35-38) only give the number of each animal, not the location. So when there are observations of a protected species, say burrowing owls, we have no way of knowing if the planned use areas in the General Plan overlap with the locations. Furthermore, I find it hard to believe that CSVRA did full reporting or recording of wildlife -- in 2011 there were 59 species reported and the richness of species reported went down to just 3 species by 2014. Either there was a huge crash of all the vertebrate species not covered by aquatic sampling and point counts of birds, or CSVRA has just stopped keeping track. These small problems are indicative of the larger deficiencies of the Habitat Monitoring System we covered in great detail previously. These failings serve as an indictment of the FEIR strategy to postpone mitigation to the future. CSVRA has shown time and time again that they cannot detect effects because of poor science. I submit here a table with the details of specific responses.

Sincerely yours,

Sarah Kupferberg, Ph.D. , Visiting Scholar UC Berkeley Dept. of Integrative Biology
Board Member of Save the Frogs

Comment (p.)	Issue	OHMVR response	Rebuttal
FEIR I15-2 (8-203)	Lack of comparison between riding and non-riding areas to assess impact	“The types of comparisons suggested by the commenter are not appropriate for a general plan”.	Using CSVRA’s own HMS data, I have shown, using scientifically and statistically sound methods, that there are significant detrimental effects of OHV use on amphibian and birds on several levels of ecological organization, on habitat quality, occupancy rates, population sizes, and community composition. The FEIR response is an open admission that OHMVR has no intention of practicing science-based resource management and that the general planning process has been dedicated to glossing over undeniable facts. With this statement OHMVR is admitting that their quantitative Habitat Monitoring System data were not used to inform the General Plan. By asserting that side by side comparisons between Carnegie and Tesla are inappropriate, they undermine the validity of every other response which refers to reliance on the HMS reports to mitigate future impacts through adaptive management.
FEIR I15-3 (8-203)	Lack of specificity of locations of development will compromise the integrity of HMS control sites	“HMS control sites are not expected to change”	The HMS data collection and reporting process are fraught with methodological errors and inconsistencies and complete lack of synthetic data analysis (see Cashen and Kupferberg comments). Continuing to produce documents that are released many years late and lacking rigorous analytical techniques is not science-based management. Using “control” sites that will then be surrounded by OHV use invalidates the results of any future studies.
FEIR I15-4 (8-203)	Lack of data analysis	“It is not necessary to re-examine the data from the HMS or respond in further detail to the conclusion reached by others when examining the same data”	This response, using the word “re-examine” assumes that the FEIR actually did examine the data to begin with. The data were only utilized to the extent that a catalog list of special status species in the area was developed. The data were not at all examined to detect, assess, or predict impacts of the general plan. For birds, the FEIR does not examine species composition shifts of whole communities of avifauna by habitat type the way we did.
FEIR I16-3 (8-211)	Habitat degradation, lower occupancy rates for vertebrates and reductions in vegetative cover	General Plan provides a detailed set of guidelines to avoid or minimize impacts on	No refutation of the facts we presented regarding species declines, community shifts, and habitat impairment. More importantly no evidence from CSVRA that the guidelines are effective in the context of the in situ ecological conditions and no evidence that these techniques are effective elsewhere.
FEIR I16-4	Lack of annual HMS reports	There have been occasional delays or combined HMS reports	Since the critique in 2009 by Meese et al. seven years ago two HMS reports have produced. This is more than an occasional delay. The most recent report lacked data analysis completely and whole sections, such as vegetative cover reported no results at all. There is not a single example in the FEIR or the General Plan of a management action taken that has effectively reversed a negative trend in a wildlife or vegetation response variable as a result of a finding of an HMS report.

Scott Cashen, M.S, Independent Biological Resources Consultant
Sarah Kupferberg, PhD, Senior Ecologist and Conservation Biologist

February 3, 2016

OHMVR Commissioners
Christopher Conlin, Deputy Director
Dan Canfield, Planning Manager
California State Parks
Off Highway Motor Vehicle Recreation Division
1725 23rd Street, Suite 200
Sacramento, CA 95816

California Department of Parks and Recreation
Off-Highway Motor Vehicle Recreation Division
c/o AECOM, Attn: Carnegie SVRA General Plan
2020 L Street, Suite 400
Sacramento, CA 95811

RE: Draft Final Environmental Impact Report (DFEIR) Prepared for the Carnegie SVRA and Critique of CSVRA Adaptive Management, Wildlife Habitat Protection Plan (WHPP), and Habitat Monitoring System (HMS) – Supplemental Comments to PGP/DEIR Comments

Dear OHMVR Commission, OHMVR Division of California State Parks, and CSVRA General Plan Staff:

This letter is submitted jointly as co-authors of the *Critique of CSVRA Adaptive Management, Wildlife Habitat Protection Plan (WHPP), and Habitat Monitoring System (HMS) Failures to Protect Wildlife and Provide Mitigation* (hereafter referred to as the “*Critique*”). On behalf of Friends of Tesla Park, we submitted the *Critique* as supplemental comments on the Preliminary General Plan (PGP) and Draft Environmental Impact Report (DEIR) on June 29, 2015. The *Critique* was received and is located in the Draft Final Environmental Impact Report (DFEIR) as Comment Letter 030d.

The responses in the DFEIR and GP, however, fail to adequately respond to the detailed evidence and analysis presented in the *Critique*, do not provide any alternative evidence or analysis, and do not resolve the issues raised in our comments.

Because CSVRA directly linked the PGP’s and DEIR’s biological resource impacts analysis and mitigation strategy to the CSVRA’s Wildlife Habitat Protection Plan (WHPP) and Habitat Monitoring System (HMS) assessments, we evaluated CSVRA’s compliance with its WHPP (adopted in 2001) and the associated HMS. In addition, we evaluated the adaptive management actions implemented at the CSVRA, as reflected in the HMS reports. We found that: (1) the CSVRA is not in compliance with the conservation requirements of the

California Public Resources Code with respect to the WHPP and HMS processes, which are intended to detect and remediate adverse effects to the environment from OHV activity; and (2) the activities that have been undertaken at the CSVRA have been ineffective in the conservation of sensitive biological resources. Some of the measures in the WHPP were inappropriate, and remain inappropriate, because they are not linked to clear response variables (e.g., a 50% drop in population size) that would trigger conservation actions. Furthermore, those measures that were appropriate were never implemented. Attached as Exhibit 1 is a table that demonstrates CSVRA's failure to conduct the surveys and conservation actions stipulated in its WHPP. Despite a critical review of the WHPP and HMS in 2009 by an independent team of experts retained by the OHVMR Division, the CSVRA has yet to implement meaningful and consistent improvements. As a result, the WHPP and HMS are incapable of conserving the numerous unique biological resources that occur within the existing CSVRA and proposed expansion area.

The consequences of these findings were confirmed through detailed analysis of the HMS survey data. The analysis was conducted by Kupferberg and Furey and was documented in the *Technical Memorandum – An Independent Impact Analysis using Carnegie State Vehicular Recreation Area Habitat Monitoring System Data* ("Technical Memo"). The *Technical Memo* was submitted as comments on the PGP and DEIR. The *Technical Memo* is located in the DFEIR as Comment Letter 030e.

Data collected by CSVRA for the HMS process confirm that habitat degradation has occurred throughout the CSVRA, resulting in: (a) significantly lower occupancy rates by herpetofauna, (b) significantly lower abundances of key indicator species of birds, (c) extirpation of various species from the riding areas, (d) shifts in the community composition of vertebrates, and (e) decreases in vegetative cover. These effects are biologically significant, and statistical analysis demonstrates they are directly attributable to activities in the existing CSVRA (riding area).

In spite of the extensive evidence and analysis of CSVRA's own performance and survey data documented in the *Critique* and *Technical Memo*, the DFEIR and GP did not resolve our comments or provide any alternative data analysis or evidence. Rather, the responses, if any, simply restated information provided in the PGP and DEIR.

For example, the DFEIR response to our *Critique* was limited to: "[s]ee response to comment O30c-19," which states:

PRC Section 5090.35(c)(1) requires the OHMVR Division to prepare a wildlife habitat protection program. Carnegie SVRA developed a wildlife habitat protection plan in 2001 and is completing an update to this plan. Environmental scientists and consultants monitor, record data, and produce HMS reports annually to inform management actions and ensure compliance with PRC Section 5090.35(c)(1). Any area of the SVRA that is not meeting the wildlife protection plan is addressed appropriately. While the wildlife habitat protection plan and associated habitat monitoring efforts are intended to evolve over time (NRM Guideline 1.4 and 2.4) with involvement from the academic community, the OHMVR Division disagrees

with the commenter's assertion that this evolution equates to noncompliance with PRC requirements.¹

The statements in the response are contradicted by substantial evidence in the record and our analyses referenced herein. That substantial evidence demonstrates the CSVRA *has not* produced HMS reports annually, nor has it adhered to the monitoring and management actions stipulated in its WHPP.² Furthermore, substantial evidence shows that the CSVRA has failed to address issues of noncompliance with the WHPP—even in instances when CSVRA's own environmental scientists and consultants raised those issues in the HMS or other survey reports.³ Despite several clear violations of the WHPP (e.g., OHV damage to special-status plants), portions of the CSVRA that have been extensively impacted by OHV use have not been closed in a timely and effective manner (if ever closed), pursuant to Section 5090.35(c)(2) and (3).⁴ CSVRA has and is operating out of compliance with PRC requirements and its own WHPP and HMS process. Due to the significance of the findings, we have attached another copy of the *Critique* for inclusion in the administrative record.

Due to the issues outlined above, and our review of the extensive evidence and analysis submitted by many other biological resource experts in response to the PGP and DEIR, it is our professional opinion that implementation of the GP would have significant impacts on numerous sensitive biological resources. The DFEIR fails to mitigate those impacts to a less than significant level as required under CEQA, and thus it should not be certified.

Given the conservation value of the expansion area to numerous sensitive biological resources, and the findings from our detailed analyses and assessments of the data, we recommend the OHMVR Division and Commission follow the U.S. Fish and Wildlife Service's and California Department of Fish and Wildlife's guidance that the expansion area be used as compensatory habitat for impacts to listed species at the existing CSVRA.

Sincerely,



Scott Cashen, M.S.
3264 Hudson Avenue
Walnut Creek, CA 94597



Sarah Kupferberg, Ph.D.
818 Mendocino Ave
Berkeley, CA 94707

¹ DFEIR, pp. 7-150, -151, and -154.

² DFEIR, comment O30c-19 and comment letter O30d.

³ DFEIR, comment letter O30d. *See also* Meese RJ, GR Geupel, K Reeves, J Weigand. 2009. Scientific peer review and assessment of the California department of parks and recreation off-highway motor vehicle recreation division habitat monitoring system. California State Parks, OHV Division.

⁴ DFEIR, comment letter O30d.

Exhibit 1. CSVRA's compliance with its Wildlife Habitat Protection Plan and other resource protection programs, 2003-2014.^a

TASK	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Annual HMS report	YES	NO	YES	YES	YES	YES	YES	YES	NO	NO	NO	YES
Annual WHPP review and revision	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Independent WHPP/HMS review (every 5 years)	N/A	N/A	N/A	NO	NO	NO	YES	NO	NO	NO	NO	NO
Complete HCP	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Rare plant surveys (annually)	NO	Partial	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
monitoring program for expansion area	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Develop and implement weed control program	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Elderberry surveys and protection (annually)	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Amphibian surveys (annually)	partial	NO	partial	partial	partial	partial	partial	partial	partial	partial	NO	partial
Fence ponds/reroute trails	NO	NO	NO	NO	NO	NO	NO	2 ponds	2 ponds	2 ponds	2 ponds	2 ponds
Protect spadefoot sites (annually)	NO	NO	partial	NO	NO	NO	NO	NO	NO	NO	NO	NO
Bi-annual raptor surveys	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Small mammals (rodents)	NO	NO	YES	NO	YES	NO	NO	NO	partial	NO	NO	NO
Large mammals	NO	NO	NO	NO	Cameras	NO	NO	NO	NO	NO	NO	NO
Bats	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
Terrestrial reptiles	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
Birds	YES	YES	partial	YES	YES	YES	YES	YES	YES	partial	partial	partial
Vegetation	NO	NO	NO	NO	NO	NO	NO	partial	NO	NO	partial	partial
Soils/trails/water quality	NO	some water	YES	YES	NO	NO	NO	NO	NO	NO	YES	YES
Statistical analyses of trend; riding vs control	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	Descriptive stats only

^a Based on data provided in CSVRA's HMS reports, other documents posted in the General Plan's website library, and information obtained through PRA requests. For more detailed information and analysis, *see* DFEIR Comment Letters O30b through O30e.

Critique of CSVRA Adaptive Management

Wildlife Habitat Protection Plan (WHPP), and Habitat Monitoring System (HMS) Failures to Protect Wildlife and Provide Mitigation

Supplement to PGP/DEIR Comments

Scott Cashen, M.S. and Sarah Kupferberg, PhD

6/29/2015

EXECUTIVE SUMMARY

The existing Carnegie State Vehicular Recreation Area (“CSVRA”) is not in compliance with the conservation requirements of the California Public Resources Code with respect to species and habitat protection. The Wildlife Habitat Protection Plan (“WHPP”) and Habitat Monitoring System (“HMS”), which are intended to detect and remediate adverse effects to the environment from OHV activity, have been ineffective in the conservation of sensitive biological resources. Some of the measures in the WHPP were inappropriate, and remain inappropriate, because they are not linked to clear response variable (e.g., 50% drop in population size) that would trigger conservation actions. Furthermore, those measures that were appropriate were never implemented. Despite a critical review of the WHPP and HMS in 2009 by an independent team of experts, the CSVRA has yet to implement meaningful improvements. Until those improvements have been made, the WHPP and HMS are incapable of conserving the numerous unique biological resources that occur within the existing CSVRA and proposed expansion area.

Table of Contents

1	Organization	4
2	Introduction- Link Between Adaptive Management the WHPP and the HMS.....	4
2.1	Adaptive Management	4
2.2	Wildlife Habitat Protection Plan (WHPP) and Habitat Monitoring System (HMS).....	5
2.3	Stipulations in the WHPP	6
2.3.1	Review and Revision	6
2.3.2	Habitat Conservation Plan (HCP).....	7
2.4	Taxon-specific inadequacies of the WHHP	8
2.4.1	Special-Status Plants	8
2.4.2	Invasive Plants	9
2.4.3	Valley Elderberry Longhorn Beetle.....	10
2.4.4	California Red-Legged Frog	11
2.4.5	California Tiger Salamander	13
2.4.6	San Joaquin Kit Fox.....	14
2.4.7	Foothill Yellow-Legged Frog	15
2.4.8	Western Spadefoot	16
2.4.9	Western Pond Turtle	18
2.4.10	Burrowing Owl	19
2.4.11	Cooper’s Hawk, Golden Eagle, Northern Harrier, and Prairie Falcon	21
2.5	Flawed implementation of Habitat Monitoring System (2003-2009) and Habitat Monitoring System II (2009 - present).....	21
2.5.1	General Peer Review Recommendations ignored.....	21
2.5.2	CSVRA-Specific Recommendations Ignored especially with regard to vegetation monitoring	25
2.6	Conclusion.....	27

1 ORGANIZATION

This document addresses flaws with the Wildlife Habitat Protection Plan (“WHPP”) and the inability of the Habitat Monitoring System (“HMS”) to inform an effective adaptive management program. In total, the defects in the WHPP and the flawed execution of the HMS (described in detail below) undermine the assertion made in the Draft Environmental Impact Report (“DEIR”) that potentially significant impacts to sensitive biological resources can simply be avoided and require no mitigation. The first section of this document addresses flaws with the WHPP; the second section addresses flaws with the original HMS and subsequent revision (termed “HMS II”).

2 INTRODUCTION- LINK BETWEEN ADAPTIVE MANAGEMENT THE WHPP AND THE HMS

2.1 ADAPTIVE MANAGEMENT

The U.S. Department of the Interior defines adaptive management as “a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood.”¹ In discussing adaptive management, Morrison (2002) added:

1. “The concept of adaptive management or adaptive resource management is centered primarily on monitoring the effects of land-use activities on key resources and then using the monitoring results as a basis for modifying those activities to achieve the project’s goals (Walters 1986; Lancia et al. 1996).”
2. “Adaptive management is not a trial-and-error approach.”
3. “Attempting to fix a problem after implementation is quite different from developing an action plan prior to the start of a project.”
4. “Regardless of the specific approach, adaptive management offers a structure whereby clear goals are established and then monitored—and specific actions for responding to deviations are planned at the *outset* of the project.”²

The “adaptive management” approach outlined in the Preliminary General Plan (“PGP”) and DEIR violates each of these concepts, and thus it does not constitute true adaptive management.

¹ Williams BK, RC Szaro, CD Shapiro. 2009. Adaptive Management: The U.S. Department of the Interior Technical Guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC.

² Morrison ML. 2002. Wildlife Restoration: Techniques for Habitat Analysis and Animal Monitoring. Island Press: Washington (DC).

Furthermore, the purpose of adaptive management is to improve long-term management outcomes, by recognizing where key uncertainties impede decision-making, seeking to reduce those uncertainties over time, and applying that learning to subsequent decisions.³ The OHMVR Division has no basis for deferring to adaptive management as the solution because there are no *key uncertainties* to address; the response can already be predicted with reasonable certainty. For example, there is already published literature that documents how golden eagles respond to OHVs so there is no need to implement adaptive management to figure that out. Similarly, there is ample evidence that traffic noise adversely affects breeding birds, so we don't need adaptive management to figure that out either. If the OHMVR Division continues to point to adaptive management as the solution it must apply the concept correctly by developing specific hypotheses, thresholds that trigger changes in management practices, and other means for implementing the feedback loops that define the concept.

2.2 WILDLIFE HABITAT PROTECTION PLAN (WHPP) AND HABITAT MONITORING SYSTEM (HMS)

Adaptive management also relies on accurate interpretation of monitoring results. Unfortunately the system to conduct monitoring and the plans for using the monitoring data to protect habitats and wildlife have been plagued with problems. CSVRA is failing to meet the statutory mandate of the Public Resources Code. Under § 5090.35(c)(1) the OHMVR Division is required to “make an inventory of wildlife populations and their habitats in each state vehicular recreation area and shall prepare a wildlife habitat protection program to sustain a viable species composition specific to each state vehicular recreation areas by July 1, 1989.”

Then,

5090.35(c)(2) If the division determines that the habitat protection program is not being met in any portion of any state vehicular recreation area, the division shall close the noncompliant portion temporarily until the habitat protection program is met.

5090.35(c)(3) If the division determines that the habitat protection program cannot be met in any portion of any state vehicular recreation area, the division shall close and restore that noncompliant portion pursuant to Section 5090.11.

The CSVRA completed its Wildlife Habitat Protection Plan (WHPP) in 2001. The WHPP acknowledged the OHMVR Division's requirements under § 5090.35 and it described the process CSVRA would implement to satisfy the requirements. Specifically, the WHPP stated:

The Wildlife Habitat Conservation Plan (WHPP) is designed to assist resource managers in maintaining and protecting current wildlife populations and their habitats. The WHPP is a three tiered process that includes (1) a baseline inventory of plant and animal species (including special-status species), plant communities (habitats), and soil types; (2) implementing an annual monitoring program; and (3) managing the park to sustain biodiversity. Special-status species populations are identified and monitored to ensure their protection, as well as to identify factors that may contribute to the overall ecological health of the habitats.

³ Walters, C. J. 1986. Adaptive management of renewable resources. Macmillan, New York, New York, USA.

The WHPP proceeded to describe the specific actions CSVRA would accomplish to ensure success of the WHPP. However, few of those actions were ever completed (or even attempted), and despite substantial evidence that the provisions of the habitat protection program were not being met, no portion of the CSVRA was ever closed pursuant to § 5090.35(c)(2) and (3).⁴

In the subsequent sections we outline the specific actions CSVRA claimed it would accomplish to ensure success of the WHPP, and we summarize the scant progress CSVRA has actually made in implementing those actions over the past 14 years.

2.3 STIPULATIONS IN THE WHPP

2.3.1 REVIEW AND REVISION

The WHPP made the following claims regarding reviews and revisions:

“To facilitate the adaptive process, this plan is reviewed annually by the Off-Highway Motor Vehicle Recreation Division’s Resource Team. Carnegie’s Resource Ecologist will revise the plan annually as a result of the data collected and the suggestions of the team. The plan will also be reviewed every five years by a team of resource and wildlife professionals outside the Division.”⁵

We found no evidence that the OHMVR Division’s Resource Team ever conducted annual reviews of the WHPP. Furthermore, Carnegie’s WHPP has *never been revised* despite recommendations from the resource team and data that revealed substantial new information pertaining to sensitive biological resources within the CSVRA (discussed further below).

Review of the WHPP by a team of resource and wildlife professionals outside the Division has occurred only once since 2001. That peer review (published in 2009) identified numerous problems with the WHPP and Carnegie’s Habitat Monitoring System (HMS). Those problems included, and in most case still include (but are not limited to):

1. “protocols and standards...have been inconsistently implemented and not adequately informed by management needs as articulated by site staff.”
2. “data are commonly not analyzed and even less frequently are the results of data analyses interpreted to investigate whether plant and animal populations are changing through time.”
3. “A serious concern is that experimental design is poor in most cases, an understanding of statistical testing is absent from the monitoring system, and no attention is paid to the importance of developing an efficient sample size.”
4. “in only a few instances have the interpreted monitoring results led to changes in resource

⁴ Portions of CSVRA have been closed due to unauthorized trail use and excessive soil loss. However, no closures have occurred due to failures in meeting the provisions of the WHPP. In December 2009, Corral Hollow Creek was closed to off-highway vehicles “to improve water quality by separating the creek and recreational use.” See 2009 HMS Report, p. 45, but the closure zone was too narrow as proven by the 2015 Western Spadefoot Toad situation (see section 3.2.4 Kupferberg and Furey Tech Memo)

⁵ Cull R. 2001. Carnegie State Vehicular Recreation Area: Wildlife Habitat Protection Plan. p. 1.

management.”⁶

Due to the numerous flaws with the WHPP and HMS, the authors of the peer review recommended that the OHMVR Division “design a second generation WHPP/HMS system that is expressly designed to meet the needs of the State Vehicular Recreation Areas in fulfilling the goals set forth in SB877 and subsequent legislation as well as legal obligations as described in state and federal statutes.” The authors then provided recommendations for the “second generation” WHPP/HMS system, including recommendations specific to the existing CSVRA *and proposed expansion area*. The CSVRA has failed to implement most of those recommendations (*see* subsequent discussion of HMS II). The OHMVR Division should not even consider allowing impacts to the proposed expansion area until the CSVRA has implemented all of the recommendations listed in the peer review.

2.3.2 HABITAT CONSERVATION PLAN (HCP)

According to the WHPP:

“The Alameda-Tesla property will not be open to the public until all facilities are completed, a process that may take from one to five years. In the meantime, OHMVR is currently working with the United States Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG) to develop a comprehensive, multi-species, Habitat Conservation Plan (HCP). Once approved, the HCP will cover both the existing park and the new property and will describe specific monitoring protocols for the covered wildlife species. Until the HCP is approved and implemented, the WHPP for Carnegie SVRA will have precedence in park natural resource management procedures.”

The OHMVR Division never completed the multi-species HCP.⁷ The failure to complete and certify the 2004 Draft HCP has several important implications on CSVRA’s ability to conserve sensitive wildlife species and their habitats within the existing CSVRA and proposed expansion area.

First, the existing CSVRA and proposed expansion area are known to support numerous federally listed species (i.e., listed under the federal Endangered Species Act). Without doubt, OHV use and other activities in the existing CSVRA are causing incidental “take” of these species.⁸ Development of the proposed expansion area for OHV use would cause additional take and it would exacerbate consequences to federally listed species. Section 9 of the Endangered Species Act prohibits the take of endangered and threatened species. Anyone whose otherwise-lawful activities will result in the incidental take of a listed wildlife species needs to prepare an HCP in order to obtain an incidental take permit from the U.S. Fish and Wildlife Service (USFWS). As discussed in more detail below, CSVRA is operating without an HCP and

⁶ Meese RJ, GR Geupel, K Reeves, J Weigand. 2009. Scientific peer review and assessment of the California department of parks and recreation off-highway motor vehicle recreation division habitat monitoring system. California State Parks, OHV Division.

⁷ HDR Engineering, Inc. 2004. Draft Multiple Species Habitat Conservation Plan, Carnegie State Vehicular Recreation Area General Plan Amendment.

⁸ The Endangered Species Act defines “take” as “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.” “Harm” includes significant habitat modification that actually kills or injures a listed species through impairing essential behavior such as breeding, feeding, or sheltering.

incidental take authorizations from the USFWS, thus it is not in compliance with the Endangered Species Act.

Second, an HCP serves as a planning document that establishes a partnership between the USFWS and non-federal party(ies) to conserve the ecosystems upon which listed species depend, ultimately contributing to the recovery of those species.⁹ CSVRA's failure to partner with the USFWS has led to ineffective conservation of listed species and their habitats at the CSVRA.

Third, an HCP establishes the measures the non-federal party will undertake to monitor, minimize, and mitigate for potential adverse effects of an activity (including "take") on the species included in the HCP. To date, the CSVRA has not monitored take of listed species, nor has it implemented actions to mitigate the adverse effects of OHV activity previously identified in the 2004 Draft HCP and those substantiated below. Indeed, the WHPP acknowledged the CSVRA was deferring the "specific monitoring protocols" to the forthcoming HCP. Without specific monitoring protocols, the CSVRA is incapable of implementing effective mitigation.

2.4 TAXON-SPECIFIC INADEQUACIES OF THE WHPP

2.4.1 SPECIAL-STATUS PLANTS

The WHPP reported: "[t]o date, no special status plants have been documented on the existing Carnegie SVRA."¹⁰ However, two years later (in 2003) Ecosystems West botanists detected three special-status plant species within the riding area of the existing Carnegie SVRA: (1) Hospital Canyon larkspur [Rare Plant Rank 1B.2]; (2) Jepson's wooly sunflower [Rare Plant Rank 4.3]; and (3) a potentially undescribed *Fritillaria* species (i.e., unknown to science).¹¹ Despite knowledge these species were present within the riding area, the CSVRA did not revise the WHPP as it claimed it would ("*Carnegie's Resource Ecologist will revise the plan annually as a result of the data collected*").¹² Furthermore, the 2004 Draft HCP identified 19 distinct vegetation/habitat types in the expansion area, yet the vast majority of these, such as desert olive scrub, are not addressed in the WHPP.¹³

⁹ U.S. Fish and Wildlife Service. 2011. Habitat Conservation Plans Under the Endangered Species Act. U.S. Fish and Wildlife Service, Endangered Species Program, Arlington (VA), USA. 3 pp.

¹⁰ Cull R. 2001. Carnegie State Vehicular Recreation Area: Wildlife Habitat Protection Plan. p. 4.

¹¹ Ecosystems West Consulting Group. 2004. Botanical Survey of the Carnegie State Vehicular Area, Alameda and San Joaquin Counties, California. Table 2 and pp. 33 through 42.

¹² Cull R. 2001. Carnegie State Vehicular Recreation Area: Wildlife Habitat Protection Plan. p. 1.

¹³ Page 4-8 to 4-9 of HDR's Draft Multiple Species Habitat Conservation Plan from 2004 states: "Nineteen various habitat types have been designated for the site," but 21 types are named: Herb-Dominated Habitat Types (1. California Annual Grassland, 2. Barrens); Upland shrub-dominated Habitat Types (3. Diablan Sage Scrub, 4. Desert Olive Scrub, 5. Choke Cherry Scrub); Upland Forest and Woodland Habitat Types (6. Blue Oak Savannah and 7. Blue Oak Woodland, 8. Valley-Oak-Coast Live Oak Savanna, 9. California Juniper Woodland); Riparian Habitat Types (10. Riparian Scrub, 11. Riparian Scrub-Upper Corral Hollow Creek, 12. Fremont Cottonwood Riparian Forest, 13. Fremont Cottonwood Riparian Forest Disturbed, 14. Fremont Cottonwood Riparian Forest / Riparian Scrub Transition, 15. Riparian Woodland with Willows); Miscellaneous Habitat Types (16. Pond, 17. Dry Pond, 18. Pepper Tree, Tree of Heaven/Pepper Tree, and Mesquite / Tree-of-Heaven/Pepper Tree); Developed and Disturbance Related Habitat Types (19. Developed/Ruderal, 20. Disturbed). Later in the document Seeps are listed as a habitat type with distinct plant species so that makes 21 habitats requiring either protection or management.

The 2001 WHPP's discussion of measures to protect special-status plant species was limited to a promise to develop and implement a monitoring program. It states:

“Special-status plant populations are mapped in the FEIR (Jones and Stokes 2000) and their locations have been protected in the design of the proposed new facilities. We plan to develop a special-status plant monitoring program similar to the program used by the National Park Service. The monitoring program will be in place prior to opening up the new properties to recreational use.”¹⁴

The CSRVA never developed the special-status plant monitoring program referenced in the WHPP. Indeed, there has not been *any* special-status plant monitoring within the existing Carnegie SVRA since the WHPP was developed.¹⁵ This is particularly alarming because the CSVRA was aware the special-status plants were being impacted by OHV activity.¹⁶ Ecosystem West's 2004 report indicated:

- “Active OHV trails pass through several occurrences, and some damage to plants of Hospital Canyon larkspur from OHV use has occurred along these trails.”¹⁷
- The special-status species Hospital Canyon larkspur is abundant in many desert olive scrub stands...In the riding area, the desert olive scrub has been locally affected by OHV traffic, with some trails passing through or along the margins of some stands, although the generally impenetrable nature of desert olive thickets often excludes OHV use.”¹⁸
- “The smaller occurrence [of the undescribed *Fritillaria*] is in the southwest corner of the riding area...An OHV trail passes through this area, and plants in this area could be subject to impacts from OHV use.”¹⁹

Despite this information, there is no evidence the CSVRA implemented measures to protect the special-status plants from further OHV damage.²⁰ Furthermore, there is no evidence in the PGP or DEIR suggesting the CSRVA ever intends to develop and implement a special-status plant monitoring program.

2.4.2 INVASIVE PLANTS

The WHPP recognized the threat of exotic plants at the CSVRA. It stated:

“The exotic pest plants of greatest concern at Carnegie SVRA are: yellow star thistle (*Centaurea solstitialis*) and Russian thistle (*Salsola tragus*). These species have shown themselves to be very invasive and programs for their control are being developed and will be implemented...DPR resource ecologists are working with local agencies to develop an integrated yellow star thistle eradication program. The program will likely

¹⁴ Cull R. 2001. Carnegie State Vehicular Recreation Area: Wildlife Habitat Protection Plan. p. 5.

¹⁵ DEIR, p. 3.3-16. See also 2003 through 2014 HMS reports.

¹⁶ Ecosystems West Consulting Group. 2004. Botanical Survey of the Carnegie State Vehicular Area, Alameda and San Joaquin Counties, California. pp. 20 through 27, 37, and 40.

¹⁷ *Ibid*, p. 37.

¹⁸ *Ibid*, p. 25.

¹⁹ *Ibid*, p. 40.

²⁰ See 2003 through 2014 HMS reports.

include some combination of integrated pest management, prescribed burning, selective grazing or mowing. Implementation of these management tools will result in an increase in native plant species and a decrease in density of the exotics.”²¹

There is no evidence that the CSVRA ever developed or implemented an invasive species control and eradication program. In addition, it is clear from the HMS reports that CSVRA has not been monitoring invasive plant species at the CSVRA, including the non-native trees identified in the 2004 Draft HCP. Monitoring is essential to: (1) quantifying impacts of invasive plants on native ecosystems, (2) evaluating the efficacy of treatments, and (3) assessing the status of the target weed species. Therefore, a control program unaccompanied by monitoring is inherently flawed.

2.4.3 VALLEY ELDERBERRY LONGHORN BEETLE

The valley elderberry longhorn beetle is federally listed as Threatened. Female beetles lay their eggs on elderberry (*Sambucus* spp.) plants that have one or more stems measuring 1.0 inch or greater in diameter at ground level.²² Emerging larvae then spend the entire larval stage within the stems of the elderberry plant.²³ Adult beetles feed on elderberry flowers and foliage.²⁴ Thus, the valley elderberry longhorn beetle is completely dependent on elderberry plants.²⁵

Elderberry plants were known to occur at the CSVRA when the WHPP was prepared.²⁶ The WHPP stated the following regarding the protection of valley elderberry longhorn beetle habitat at CSVRA:

“Measures to protect the habitat for this species include closing existing trails near the elderberry shrubs, restoring habitat, and completing trail surveys to ensure that trails are located at least 20 feet from the outer canopy of any elderberry shrub.”²⁷

There is no evidence that any trails were ever closed to protect elderberry shrubs or that there were any efforts to restore habitat for the valley elderberry longhorn beetle. In addition, there is no evidence that surveys were completed to ensure trails were located at least 20 feet from elderberry shrubs. Nevertheless, a 20-foot buffer is insufficient to ensure protection of the valley elderberry longhorn beetle and its habitat. Conservation guidelines promulgated by the USFWS require a 100-foot buffer around elderberry plants.²⁸ The guidelines indicate: “[t]he Service must be consulted before any disturbances within the buffer area are considered,” and “[a]ny beetle

²¹ Cull R. 2001. Carnegie State Vehicular Recreation Area: Wildlife Habitat Protection Plan. p. 5.

²² U.S. Fish and Wildlife Service. 1999. Conservation Guidelines for the Valley Elderberry Longhorn Beetle. U.S. Fish and Wildlife Service, Sacramento, California. 15 pp.

²³ U.S. Fish and Wildlife Service. 1999. Conservation Guidelines for the Valley Elderberry Longhorn Beetle. U.S. Fish and Wildlife Service, Sacramento, California. 15 pp.

²⁴ U.S. Fish and Wildlife Service. 1984. Valley Elderberry Longhorn Beetle Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. 62 pp.

²⁵ U.S. Fish and Wildlife Service. 1999. Conservation Guidelines for the Valley Elderberry Longhorn Beetle. U.S. Fish and Wildlife Service, Sacramento, California. 15 pp.

²⁶ Cull R. 2001. Carnegie State Vehicular Recreation Area: Wildlife Habitat Protection Plan. Table 1.

²⁷ *Ibid*, p. 6.

²⁸ U.S. Fish and Wildlife Service. 1999. Conservation Guidelines for the Valley Elderberry Longhorn Beetle. U.S. Fish and Wildlife Service, Sacramento, California. 15 pp.

habitat that cannot be avoided [by at least 100 feet] should be considered impacted...”²⁹ Based on this information, the CSVRA has allowed impacts to habitat for the valley elderberry longhorn beetle. There is no evidence CSVRA ever consulted with the USFWS regarding those impacts.

In addition to claiming habitat for the valley elderberry longhorn beetle would be protected, the WHPP claimed:

“The condition of all elderberry plants will be surveyed each year. Plants will be measured, and surveys will determine the presence of exit holes potentially used by VELB [valley elderberry longhorn beetle].”³⁰

There is no evidence (e.g., in CSVRA’s HMS reports) that surveys were conducted each year—or ever—to evaluate the condition of elderberry plants, or to determine the presence of exit holes potentially created by the valley elderberry longhorn beetle.

2.4.4 CALIFORNIA RED-LEGGED FROG

2.4.4.1 Habitat Protection-

The California red-legged frog (CRLF) is federally listed as Threatened and it is considered a Species of Special Concern by the CDFW. The WHPP made the following claim about protection of CRLF habitat:

"Known breeding ponds will be fenced off to prevent access by motorcycles and cattle, and trails relocated to divert traffic away from drainage's and potential upland habitats."³¹

Although the CSVRA claimed it would fence known breeding ponds, only two ponds had been fenced by 2010. CSVRA’s Environmental Scientist and Trails Maintenance Supervisor reported the following in their 2010 HMS report:

As for the amphibian surveys, ten water bodies *had* presence of either California Red-legged Frog or California Tiger Salamander, both federally listed as threatened. The two water bodies with these species present during this year’s survey [“CTS Pond” and “Lime Kiln Pond”] within the SVRA already are protected by fencing. In general, all water bodies should be fenced in order to restrict OHV activity and protect these breeding locations. *More specifically, Lower Juniper and Kiln basin have had special status species in the past and are currently unprotected and should be fenced.*³²

Despite this recommendation from CSVRA’s own staff, the Lower Juniper, Kiln Basin, and other ponds were never fenced and remain unprotected from OHV activity. This undoubtedly has resulted in adverse impacts to the CRLF and its habitat. Indeed, CSVRA’s monitoring data suggest CRLF breeding activity no longer occurs at Lower Juniper Pond, which was the only pond within the riding area known to support breeding CRLFs when the WHPP was prepared in

²⁹ *Ibid.*

³⁰ Cull R. 2001. Carnegie State Vehicular Recreation Area: Wildlife Habitat Protection Plan. p. 7.

³¹ *Ibid.*

³² 2010 HMS Report, p. 6. [emphasis added].

2001.³³ Google Earth imagery (Figure 1) provides evidence of extensive OHV riding through Lower Juniper Pond as recently as 9 June 2014 (date of the most recent imagery).

It is unclear if any trails were rerouted as the WHPP requires, but clearly there still is OHV riding areas through, and in the immediate vicinity of, ponds that have (or had) been used by breeding CRLF (Figure 1).³⁴ In addition, it is clear that extensive trails remain open throughout potential upland habitat for the CRLF.³⁵



Figure 1. Google Earth imagery of Lower Juniper Pond at the CSVRA. OHV tracks are evident throughout the pond. Arrows point to a representative example of where OHVs have driven through the pond to bypass the designated trail. The pond was formerly occupied by breeding red-legged frogs.

2.4.4.1 Monitoring of Breeding Sites

The WHPP acknowledged “red-legged frogs have been observed in sediment ponds and stock ponds throughout both properties,” and that “protection of these sites is a priority for the park.” Consequently, the WHPP claimed “annual surveys will be conducted to monitor [CRLF]

³³ 2010 HMS Report, Table 16.

³⁴ See also Photo 9 in TRA Environmental Sciences, Inc. 2010. Carnegie State Vehicular Recreation Area and Alameda-Tesla Property: Preliminary Delineation of Waters and Wetlands.

³⁵ See TRA Environmental Sciences, Inc. 2010. Carnegie State Vehicular Recreation Area and Alameda-Tesla Property: Preliminary Delineation of Waters and Wetlands.

breeding sites.”³⁶ However, as the HMS reports acknowledge, the OHMVR Division has not conducted annual surveys to monitor CRLF breeding sites within the CSVRA. For example, although CRLF were detected in Lower Juniper Pond in 1995, the pond was not surveyed again until 2003 and 2010.³⁷ Indeed, there is not a single pond within the entire CSVRA that has been surveyed annually for the presence of CRLF (and other sensitive amphibian species).³⁸

2.4.5 CALIFORNIA TIGER SALAMANDER

When the WHPP was prepared in 2001 the California tiger salamander (CTS) was a California Species of Special Concern and it was a candidate for listing under the federal Endangered Species Act (ESA). It subsequently was listed as Threatened under both the federal ESA and California ESA.³⁹ The WHPP was never amended to reflect these changes in the status of the species.

The WHPP “assumed that all suitable ponds in the Carnegie unit provide potential habitat for the California tiger salamander.”⁴⁰ Indeed, the WHPP acknowledged “[a]ll stockponds (except Ponds 2a and 2b, which do not retain sufficient water), portions of Corral Hollow where there is pool habitat, and adjacent surrounding upland habitats up to 1.6 km from a pond within the SVRA are considered suitable habitat for tiger salamanders.”⁴¹ Nevertheless, and despite evidence of breeding activity at 14 ponds in the SVRA in 1998, the WHPP failed to provide any provisions to protect tiger salamanders and their habitat at the CSVRA.⁴² This is significant because there is evidence that OHV activity has had an adverse effect on CTS as indicated by significantly lower occupancy rates of water bodies in OHV areas compared to non-riding areas.⁴³

Similar to the California red-legged frog, the OHMVR Division has failed to conduct annual surveys to monitor the California tiger salamander and its habitat within the CSVRA. For example, the 2006 HMS report states: “[t]he small water body called ‘Tony’s pond’ contained CTS in 2005, but no listed species were found in 2006...*This pond should also be monitored annually.*”⁴⁴ Tony’s pond was surveyed the following year (in 2007) but it has not been surveyed since.⁴⁵ The failure to implement routine monitoring has precluded the OHMVR Division from being able to ensure protection of the California tiger salamander and identify factors that may be affecting the ecological health of its habitats.

³⁶ Cull R. 2001. Carnegie State Vehicular Recreation Area: Wildlife Habitat Protection Plan. p. 7.

³⁷ 2010 HMS Report, Table 16.

³⁸ *Ibid.*

³⁹ Federally listed in 2004 and State listed in 2010.

⁴⁰ Cull R. 2001. Carnegie State Vehicular Recreation Area: Wildlife Habitat Protection Plan. p. 7.

⁴¹ *Ibid.*

⁴² *Ibid.*

⁴³ Kupferberg, S. J. and P. C. Furey 2015. Technical memorandum in support of Draft Environmental Impact Report Comments: Analysis of CSVRA HMS Data.

⁴⁴ 2006 HMS Report, p. 8. [emphasis added].

⁴⁵ See 2008 through 2014 HMS reports.

2.4.6 SAN JOAQUIN KIT FOX

The San Joaquin kit fox is listed as Endangered under the federal Endangered Species Act and as Threatened under the California Endangered Species Act. The WHPP acknowledged that Carnegie SVRA and the Alameda-Tesla properties provide a habitat corridor for this species that is linked to the East Bay foothills.⁴⁶ The WHPP largely ignores the San Joaquin kit fox. It does not contain any measures to ensure the corridor remains viable, nor does it establish measures to protect kit fox habitat. Indeed, the WHPP's discussion of the kit fox is limited to a single measure to prevent "take" of kit fox from new construction activities. It states:

"No groundbreaking activities are allowed in the park without consultation with USFWS and conducting preconstruction surveys in accordance with the Survey Protocols for San Joaquin Kit Fox (USFWS 1997)."⁴⁷

CSVRA has conducted multiple "groundbreaking" activities over the past 14 years (i.e., since the WHPP was finalized). These include construction of the "4x4 Play Area," trail widening projects, and numerous rehabilitation projects requiring bulldozers.⁴⁸ There is no evidence in the administrative record that CSVRA ever conducted pre-construction surveys prior to implementing these projects. Nevertheless, pre-construction surveys are a take avoidance measure; they do not maintain and protect kit fox habitat, or the overall ecological health of that habitat, as stipulated in CSVRA's WHPP.

In addition, consultation with the USFWS appears to have been limited to CSVRA's "Watershed Facilities Maintenance" and "Mitchell Ravine Restoration" projects. Although the USFWS issued biological opinions for both of those projects, the biological opinions were predicated on the assumption that State Parks would prepare a Habitat Conservation Plan (HCP), as stipulated in the WHPP. This is substantiated in an email message from the USFWS to State Parks, which stated:

"State Parks will continue to work with the appropriate resource agencies to obtain permits as needed.' What does this statement mean? Currently State Parks is operating this park without incidental take authorizations (outside of the sediment basins/ponds and one creek restoration) and is not in compliance with the Federal Endangered Species Act. The 2001 Wildlife Protection Plan on your website states that State Parks is working on an Habitat Conservation Plan (HCP). An HCP would provide an incidental take permit for listed species for the operation and use of the park. A biological opinion for the pond maintenance was also issued and analyzed in a specific manner because State Parks was working on the park wide HCP. State Parks is no longer working on the HCP."⁴⁹

⁴⁶ *Ibid.*

⁴⁷ *Ibid.*

⁴⁸ See examples in 2010 HMS Report, pp. 56 through 76.

⁴⁹ 15 July 2013 email communication from Kim Squires, USFWS, to Clinton Elsholz and Randy Caldera, California State Parks.

2.4.7 FOOTHILL YELLOW-LEGGED FROG

The CDFW has listed the foothill yellow-legged frog (“FYLF”) as a Species of Special Concern. The primary threats to this exclusively stream-dwelling species include habitat loss, fragmentation, and degradation of in-stream conditions, especially changes to channel morphology due to altered levels of sedimentation.⁵⁰ The 2004 Draft HCP acknowledged that: “prior to 1997 foothill yellow-legged frogs were frequently observed in Corral Hollow Creek in the project area and downstream for several miles” but that “where the creek re-enters State Parks land and starts flowing east ... the creek becomes more heavily silted with less cobble and pool habitat.” However, no conservation actions to protect FYLF habitat were undertaken. At present there is a petition with the USFWS for the foothill yellow-legged frog to receive protection under the federal Endangered Species Act because of sharp declines throughout the species’ range, but especially because very few populations remain within the genetically distinct central and southern California clade.⁵¹

The foothill yellow-legged frog is at the brink of extirpation from the Corral Hollow watershed.⁵² The species was detected in the proposed expansion area, once either in the year 1998 or 2000 (there are conflicting reports) and again in 2014.⁵³ These constitute the only recent records of the foothill yellow-legged frog in the watershed (the next most recent record is from 1971).⁵⁴ There have been only two documented occurrences of the foothill yellow-legged frog in San Joaquin County, one from 1958 and the other 1971.⁵⁵ In Alameda County, the only other watershed (besides Corral Hollow) with an extant population is the Alameda Creek watershed, and that population is threatened by a combination of stressors including flow regulation, non-native predators, and chytrid fungus.⁵⁶

⁵⁰ Yarnell, S.M., J.F. Mount, and E.W. Larsen. 2006. The influence of relative sediment supply on riverine habitat heterogeneity. *Geomorphology* 80(3):310–324. *See also* Yarnell, S.M., A.J. Lind, and J.F. Mount. 2010. Dynamic flow modeling of riverine amphibian habitat with application to regulated flow management. *River Research and Applications* 28:177–191.

⁵¹ Davidson, C. 2004. Declining downwind: amphibian population declines in California and historical pesticide use. *Ecological Applications* 14: 1892–1902. *See also* Kupferberg, S.J., W.J. Palen, A.J. Lind, S. Bobzien, A. Catenazzi, J. Drennan, and M.E. Power. 2012. Effects of flow regimes altered by dams on survival, population declines, and range-wide losses of California river-breeding frogs. *Conservation Biology* 26: 513–524. *See also* Lind, A.J. 2005. Reintroduction of a declining amphibian: determining an ecologically feasible approach for the foothill yellow-legged frog (*Rana boylei*) through analysis of decline factors, genetic structure, and habitat associations. Doctoral dissertation, University of California, Davis. 169 pp. *See also* United States Forest Service. 2014. Foothill yellow-legged frog (*Rana boylei*) ecology, river regulation, and conservation. Available url of range maps [http://www.fs.fed.us/psw/topics/wildlife/herp/rana_boylei/distribution_map.shtml]. Accessed June 18, 2015.

⁵² California Natural Diversity Database. 2015 Jun 2. RareFind 5 [Internet]. California Department of Fish and Wildlife.

⁵³ 2010 HMS Report, Table 16. *See also* 2011–2014 HMS Report, Table 25.

⁵⁴ California Natural Diversity Database. 2015 Jun 2. RareFind 5 [Internet]. California Department of Fish and Wildlife.

⁵⁵ *Ibid.*

⁵⁶ Adams, A. J., Kupferberg, S. J., Bobzien, S., Grefsrud, M., Vredenburg V., and Briggs, C. J. 2015. Chytrid infection, drought, and flow regulation create multiple stressors on foothill yellow-legged frog populations in the

The WHPP's discussion of conservation measures for the foothill yellow-legged frog is limited to the following:

“Currently, management for this species is primarily directed towards identifying and protecting seasonal breeding habitats at Carnegie SVRA. Amphibian surveys are conducted during the winter and spring to locate and monitor breeding ponds and pools. Temporary fencing will be erected around known breeding areas and will remain in place for the duration of the breeding season.”

This measure was never appropriate. Foothill yellow-legged frogs are not associated with “seasonal” (i.e., ephemeral) habitats, nor do they breed in “ponds and pools.” The foothill yellow-legged frog inhabits small to moderately-sized, perennial streams with cobble-rocky substrate and shallow, flowing water.⁵⁷ The species attaches its eggs to gravel or rocks in moving water near stream margins.⁵⁸ Therefore, surveys designed to locate and monitor breeding ponds and pools, would have been ineffective to ensure conservation of the foothill yellow-legged frog.

2.4.8 WESTERN SPADEFOOT

The WHPP states the following regarding the protection of the western spadefoot and its habitat at the CSVRA:

Currently, management for this species [western spadefoot] is primarily directed towards identifying and protecting seasonal breeding habitats at Carnegie SVRA. Amphibian surveys are conducted during the winter and spring to locate and monitor breeding ponds and pools. Temporary fencing will be erected around known breeding areas and will remain in place for the duration of the breeding season.

These statements are misleading or incorrect. First, not one of the HMS reports (which span 12 years) describes an effort by CSVRA staff to systematically first identify, and second protect, breeding habitat for the western spadefoot in the OHV riding area. Indeed, the 2011-2014 HMS report acknowledged: “[a] limitation with the monitoring program described above is that *breeding habitat for western spadefoot toad is not well surveyed for.*”⁵⁹

There has been either no, or minimal, protection of spadefoot breeding sites. According to the 2004-2005 HMS report: “spadefoot larvae were found in both protected and unprotected areas, but appeared to persist more in the protected areas as pools were checked periodically...Unprotected pools lost larvae quickly as the riding season got underway and *motorcycles were driven through pools.*”⁶⁰ Breeding sites were not protected the following year either. The 2006 HMS report states: “[t]o ensure this species can breed in the park undisturbed, *it is possible to erect temporary exclosures* around the larger pools containing spadefoot tadpoles

Alameda Creek watershed. Proceedings of the California/Nevada Amphibian Population Task Force Annual Meeting; 2015 Jan 8-10; Malibu, CA.

⁵⁷ Jennings MR, MP Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game.

⁵⁸ California Department of Fish and Game, California Interagency Wildlife Task Group. 2000 [update]. California Wildlife Habitat Relationships version 8.1 personal computer program. Sacramento, California.

⁵⁹ 2011-2014 HMS Report, p. 39. [emphasis added].

⁶⁰ 2004-2005 HMS Report, p. 3. [emphasis added].

until metamorphosis and dispersal are complete.”⁶¹ Thus, even though CSVRA staff recognized the need to protect the pools, and the possibility that they could do so with temporary exclosures, they chose not to—in direct opposition to CSVRA’s own WHPP. CSVRA staff violated the provisions of the WHPP again in 2008 and 2010, when spadefoot larvae were detected in the riding area, but no protective actions were reported.⁶²

The western spadefoot was not detected again until this past spring (2015) when larvae were detected in two pools within the riding area⁶³ CSVRA staff placed a single piece of plastic flagging around the border of one of the pools, but provided no protection to the surrounding upland habitat. The plastic flagging fell down on at least one occasion and had to be repaired. The other pool was afforded no protection whatsoever.

CSVRA’s protection measures (when implemented) are insufficient to sustain the western spadefoot population. Western spadefoots spend most of the year below ground (i.e., in aestivation: a state of torpor).⁶⁴ During that time they typically occupy burrows, which they construct themselves.⁶⁵ The burrows are generally located in close proximity to breeding pools and movements to and from breeding ponds have been documented via radio telemetry at distances up to 860 feet from breeding pools within one season.⁶⁶ Other estimates are that distances of 1,207 feet from suitable aquatic breeding habitat can provide protection for western spadefoot toads.⁶⁷ After transformation, recently metamorphosed juveniles seek refuge in drying mud cracks, under boards and other surface objects near the breeding pond. Therefore, conservation of the western spadefoot requires protection of both the breeding site (pool) and surrounding terrestrial habitat.

CSVRA’s protection measures are insufficient for several reasons. First, CSVRA has done nothing to protect terrestrial habitat where the spadefoot spends most of its life cycle. Road grading and soil compaction associated with OHV use undoubtedly crushes aestivating toads. In addition, dispersing toads are perpetually threatened by motor vehicle strikes, which is a significant source of mortality.⁶⁸

Second, activities that produce low frequency noise and vibration near habitat for western spadefoot toads, may be detrimental to the species. There are indications that the low-frequency sound created by off-highway vehicles may trigger emergence cues, and result in emergence in

⁶¹ 2006 HMS Report, p. 9.

⁶² 2008 HMS Report, Table 5. *See also* 2010 HMS Report, Table 16.

⁶³ Kupferberg and Furey Tech Memo section 3.2.4

⁶⁴ California Department of Fish and Game, California Interagency Wildlife Task Group. 2000 [update]. California Wildlife Habitat Relationships version 8.1 personal computer program. Sacramento, California.

⁶⁵ Stebbins RC. 1985. A field guide to western reptiles and amphibians. Houghton Mifflin Co., Boston, MA.

⁶⁶ Baumberger, K. 2013. Uncovering a fossorial species: Home range and habitat preference of the western spadefoot, *Spea hammondi* (Anura: Pelobatidae), in Orange County protected areas (MS Thesis, California State University, Fullerton).

⁶⁷ Semlitsch, R. D. and J. R. Brodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. *Conservation Biology* 17(5):1219-1228.

⁶⁸ U.S. Fish and Wildlife Service. 1998. Vernal Pools of Southern California Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. pp. II-220 through II-235.

poor environmental conditions.⁶⁹ Dimmitt and Ruibal (1980) determined that spadefoot toads were extremely sensitive to such stimuli and would break dormancy and emerge from their burrows in response to these disturbances.⁷⁰ Disturbances that cause spadefoot toads to emerge at inappropriate times can result in detrimental effects such as mortality or reduced fitness.⁷¹

Third, in an effort to control dust, CSVRA has been applying a magnesium chloride solution to its dirt roads since 2006.⁷² This includes application of the magnesium chloride solution in the immediate vicinity of the spadefoot breeding sites. Amphibians are particularly sensitive to chloride solutions due to their permeable skin and because they are incapable of flushing chlorides out of their bodies. Early life stages (embryos and larvae) of anurans and caudates are susceptible to malformations and mortality when $MgCl_2$ is dissolved in breeding ponds.⁷³ Toads in particular are susceptible. Lewis (1999) tested the effects of various magnesium chloride concentrations on boreal toad (*Anaxyrus boreas boreas*) tadpoles. The tadpoles experienced 100% mortality when exposed to a 2% solution of magnesium chloride.⁷⁴ The solution that CSVRA applies to its roads contains 29% to 33% magnesium chloride.⁷⁵

By attracting western spadefoot to sites where they will be susceptible to heightened mortality (i.e., due to soil compaction, vehicle strikes, and toxicity) the CSVRA has potentially created an ecological “trap.”⁷⁶ Specifically, the CSVRA has created attractive breeding habitat in the riding area, but then failed to provide adequate protection for the spadefoots and their resulting young.

2.4.9 WESTERN POND TURTLE

The WHPP indicated western pond turtles had been observed in Corral Hollow Creek in the Alameda-Tesla unit. It further indicated that suitable habitat for the turtle was present in “Ponds 3, 5, and 12,” although it did not map or otherwise identify where these three ponds were located. Although the WHPP acknowledged the presence of pond turtles within the CSVRA, and that statewide populations have been declining, it provided no measures to ensure the

⁶⁹ Jennings MR, MP Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game.

⁷⁰ Dimmitt, M. A., and R. Ruibal. 1980. Environmental correlates of emergence in spadefoot toads (*Scaphiopus*). J. Herpetol. 14:21-29.

⁷¹ U.S. Fish and Wildlife Service. 1998. Vernal Pools of Southern California Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. pp. II-220 through II-235.

⁷² Elsholz C. 2012. Dust Suppressant Use and Alternatives at Carnegie State Vehicular Recreation Area. p. 2.

⁷³ Karraker, N. E., Gibbs, J. P., & Vonesh, J. R. 2008. Impacts of road deicing salt on the demography of vernal pool-breeding amphibians. Ecological Applications, 18(3), 724-734; Hopkins, G. R., French, S. S., & Brodie, E. D. (2013). Increased frequency and severity of developmental deformities in rough-skinned newt (*Taricha granulosa*) embryos exposed to road deicing salts ($NaCl$ & $MgCl_2$). *Environmental Pollution*, 173, 264-269.

⁷⁴ Lewis WM. 1999. Studies of Environmental Effects of Magnesium Chloride Deicer in Colorado. Colorado Department of Transportation Research Branch Report No. CDOT-DTD-R-99-10. pp. 21-27.

⁷⁵ Elsholz C. 2012. Dust Suppressant Use and Alternatives at Carnegie State Vehicular Recreation Area. p. 2.

⁷⁶ An ecological “trap” an area where an animal settles to breed because conditions at the time of settlement seem appropriate. However, either because natural conditions change (e.g., fire, drought), or humans change them (e.g., drive motorcycles through them), the animal has made a mistake and either dies or has reduced reproductive output. Thus the animal is, in essence, lured into what turns out to be poor-quality habitat. see Robertson, B. A., Rehage, J. S., and A. Sih. 2013. Ecological novelty and the emergence of evolutionary traps. Trends in ecology & evolution, 28: 552-560.

protection of pond turtles and their habitats.⁷⁷ This is especially significant because the western pond turtle was subsequently detected in Kiln Basin, which is located within the riding area adjacent to Kiln Road.⁷⁸

Turtles within the riding area have been exposed to numerous threats including road mortality, crushing of nests, illegal collection, and the loss and degradation of both aquatic and terrestrial habitats.⁷⁹ The CSVRA recognized the threats OHV activities posed to turtles; its 2010 HMS report stated: “[i]n general, all water bodies should be fenced in order to restrict OHV activity and protect these breeding locations. More specifically, Lower Juniper and Kiln basin have had special status species in the past and are currently unprotected and should be fenced.”⁸⁰ Incredibly, there is no mention of this issue in the 2011-2014 HMS report, even though a pond turtle was detected at Kiln Basin again in 2014, and even though the report acknowledged the species is now being considered for listing under the federal Endangered Species Act.⁸¹

2.4.10 BURROWING OWL

The WHPP states the following regarding the protection of burrowing owl resources at the CSVRA:

There are no known breeding records from the Carnegie SVRA, however, burrowing owls have been occasionally observed on Carnegie SVRA. Bi-annual raptor surveys will be conducted on state properties to ensure protection of active nesting and important foraging areas, and preconstruction surveys will occur prior to any ground disturbance in grassland habitats.

CSVRA was advised to conduct their bi-annual surveys in the winter and spring.⁸² Examination of the HMS reports reveals few instances in which CSVRA implemented these procedures. For example, winter surveys were not conducted in 2007 or 2008, or between 2012 and 2014. When surveys were conducted, they generally were limited to one or two days within small portions of the CSVRA, leaving the vast majority of the CSVRA not surveyed for the presence of owls.

Moreover, the surveys CSVRA conducted were not designed to detect burrowing owls. Burrowing owls can be difficult to detect due to their cryptic coloration, extensive use of

⁷⁷ WHPP, p. 10.

⁷⁸ 2010 HMS Report, Table 16. *See also* 2011-2014 HMS Report, p. 38.

⁷⁹ Jennings MR, MP Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game. *See also* Gibbs JP, G Shriver. 2002. Estimating the Effects of Road Mortality on Turtle Populations. *Conservation Biology* 16(6):1647-1652.

⁸⁰ 2010 HMS Report, p. 6.

⁸¹ 2011-2014 HMS Report, p. 38.

⁸² 2003 HMS Report, p. 7. *See also* Kutilek, M., H. Shellhammer, and W. Bros. 1991. Inventory, Wildlife Habitat Protection Program, and Monitoring Program for Carnegie State Vehicular Recreation Area, Tracy, CA. Prepared for CA Dept of Parks and Recreation Off-Highway Motor Vehicle Division, Contract No. 4-550-9035. San Jose State University, Biology Department. San Jose, CA. *See also* Meese RJ, GR Geupel, K Reeves, J Weigand. 2009. Scientific peer review and assessment of the California department of parks and recreation off-highway motor vehicle recreation division habitat monitoring system. California State Parks, OHV Division. p. 38.

burrows, and tendency to flush (fly away) when approached.⁸³ As a result, specialized surveys are required to detect their presence.⁸⁴ CSVRA has never conducted those specialized surveys. As a result, it is not surprising that burrowing owls have been detected only once during the annual HMS surveys (but incidentally detected at least twice).⁸⁵

According to the 2011-2014 HMS Report, two burrowing owls were detected within the OHV area during the spring 2014 surveys.⁸⁶ These surveys coincided with the peak of the breeding season (15 April through 15 July), when most burrowing owls have active nests (eggs or young).⁸⁷ Burrowing owl activity during the daytime is conspicuous and is centered around the burrow site(s).⁸⁸ Therefore, it is reasonable to infer that the burrowing owls detected during the 2014 surveys were near their burrow (nest) site(s). Additional winter sightings made in 2012 indicate that this species may be a year-round resident.

Vehicle collisions are a significant source of mortality because burrowing owls typically fly low to the ground.⁸⁹ In addition, vehicles may cause burrows to collapse, entombing owls. Despite these known threats, the CSVRA did not attempt to locate the burrow site(s), nor did they do anything to protect the burrowing owls from OHV activity.⁹⁰

CDFW's 2012 *Staff Report on Burrowing Owl Mitigation* concluded that: (a) four independent surveys are necessary to provide reliable information on the presence of burrowing owls; and (b) data from the four surveys is essential to avoiding, minimizing, and properly mitigating the impacts of a project.⁹¹ It is unclear whether CSVRA ever conducted pre-construction surveys prior to ground disturbance activities. Furthermore, although "take avoidance" (i.e., pre-construction) surveys for burrowing owls are important, they are not a substitute for the four "impact assessment" surveys required to assess impacts and formulate appropriate mitigation.⁹²

⁸³ Klute DS, LW Ayers, MT Green, WH Howe, SL Jones, JA Shaffer, SR Sheffield, TS Zimmerman. 2003. Status assessment and conservation plan for the western Burrowing Owl in the United States. Bio Tech Pub FWS/BTP-R6001-2003. Washington: US Fish and Wildlife Service.

⁸⁴ The California Burrowing Owl Consortium. 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines. 15 pp. See also California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. Available at: <<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843>>.

⁸⁵ 2011-2014 HMS Report. Tables 12, 36, and 37.

⁸⁶ 2011-2014 HMS Report. Table 12.

⁸⁷ See *Appendix A in:* California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation.

⁸⁸ See pages 164-165 *In:* Coulombe, H. N. 1971. Behavior and population ecology of the burrowing owl, *Speotyto cunicularia*, in the Imperial Valley of California. *The Condor* 73(2):162-176.

⁸⁹ Klute DS, LW Ayers, MT Green, WH Howe, SL Jones, JA Shaffer, SR Sheffield, TS Zimmerman. 2003. Status assessment and conservation plan for the western Burrowing Owl in the United States. Bio Tech Pub FWS/BTP-R6001-2003. Washington: US Fish and Wildlife Service. See also California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. Available at: <<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83843>>.

⁹⁰ 2011-2014 HMS Report.

⁹¹ See *Appendix D In:* California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation.

⁹² California Department of Fish and Game. 2012. Staff Report on Burrowing Owl Mitigation. Available at: <www.dfg.ca.gov/wildlife/nongame/docs/BUOWStaffReport.pdf>.

2.4.11 COOPER’S HAWK, GOLDEN EAGLE, NORTHERN HARRIER, AND PRAIRIE FALCON

In addition to the burrowing owl, the WHPP claimed bi-annual raptor surveys would be conducted for the Cooper’s hawk, golden eagle, northern harrier, and prairie falcon. However, focused raptor surveys have never been conducted, and the bird surveys that *have been* conducted were generally limited to one or two days within small portions of the CSVRA (leaving the vast majority of the CSVRA not surveyed).⁹³ This has precluded the CSVRA from being able to “ensure protection of active nesting and important foraging areas,” as stipulated in the WHPP.

2.5 FLAWED IMPLEMENTATION OF HABITAT MONITORING SYSTEM (2003-2009) AND HABITAT MONITORING SYSTEM II (2009 - PRESENT)

Under § 5090.35(d) the Division is required to “monitor the condition of soils and wildlife habitat in each state vehicular recreation area each year in order to determine whether the soil conservation standards and habitat protection programs are being met.”

Due to the numerous flaws with the WHPP and HMS, the authors of the 2009 peer review recommended that the OHMVR Division “design a second generation WHPP/HMS system that is expressly designed to meet the needs of the State Vehicular Recreation Areas in fulfilling the goals set forth in SB877 and subsequent legislation as well as legal obligations as described in state and federal statutes.” The peer reviewers then provided recommendations for the “second generation” WHPP/HMS system. The peer review concluded with recommendations specific to the existing CSVRA and proposed expansion area. In the subsequent subsections we provide evidence that the OHMVR Division has failed to implement the recommendations that are most relevant to detecting and mitigating OHV impacts. These failures undermine the validity of the assertions in the DEIR that OHV use does not pose significant threats to wildlife and that an adaptive management process based on monitoring is sufficient to provide mitigation for impacts.

2.5.1 GENERAL PEER REVIEW RECOMMENDATIONS IGNORED

1. *Adopt an Ecosystem Management approach, as recommended in the original site reports (Kutilek, Shellhammer, and Bros, 1991a-e), as a guiding framework for the next-generation HMS: management questions must guide the development and implementation of the HMS and the HMS must inform management in a positive feedback loop.*

The 2009 peer review highlighted the need for the second generation WHPP/HMS system to focus on answering questions of greatest management interest and need. The “questions of

⁹³ Locating Cooper’s hawk, golden eagle, northern harrier, and prairie falcon nest sites requires focused surveys and specialized techniques. For example, see: Pagel J. E., D. M. Whittington, and G. T. Allen. 2010. Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations. Division of Migratory Birds, United States Fish and Wildlife Service, Washington, D. C., USA.

interest” function as hypotheses that are derived from specific management goals and objectives. These hypotheses serve as the cornerstone of the adaptive management approach.⁹⁴ The 2009 peer review did not identify the specific “questions of interest” for each SVRA, but it provided examples of questions that may be of interest to SVRA staff:

- Is vegetation coverage declining through time as a result of OHV usage?
- Is plant species richness declining through time as a result of OHV usage? If so, in which vegetation types?
- How will we define success in efforts to restore degraded landscapes?
- What percentage, and which species, of birds that are expected to breed at each SVRA have been confirmed to do so?
- Does relative rate of trail use affect rates of habitat occupancy by vertebrate animals? Which species are most affected? Does the SVRA provide habitat for these species in non-riding areas?
- Have the bat species that may be expected to occur at SVRAs been confirmed to occur? Does OHV use affect bat use of appropriate habitats?

The PGP and DEIR do not identify the CSVRA’s “questions of interest.” To the best of our knowledge CSVRA has yet to resolve the few basic questions posed in the 2010 HMS report and has not utilized the examples above. For example with respect to bird sampling a simple question about sample size was posed in 2010. The authors stated: “[w]e analyzed the data (using a power analysis) and found the variance was too erratic and more sites were warranted. The pilot data is discussed in more detail in the next section. Although the power analysis indicated a larger number of sample sites per treatments, time and labor constraints limit the feasibility of such extensive sampling.” Note that the authors did not fulfill necessary sampling requirements to adequately monitor responses to impacts. It is not possible to discern what they did with the power analysis because they did not provide any of the necessary values that were used as input into the analysis, including alpha (P) and effect size (magnitude of difference). These are necessary components of any power analysis. Subsequent surveys in 2011 reflected an increase in sample size, and number of visits, but the effort was not sustained in later years and a complete power analysis was not included in subsequent reports.

2. *Replace the existing transect-based vegetation monitoring scheme with a scheme based on randomly-selected points on a grid of a quadrat or vegetation type.*

CSVRA made a start in 2010 by conducting point intercept sampling in Blue Oak Woodland and Riparian areas, but the only repeat sampling that has been reported since then is from 2013 in the Riparian zone. The same data were reported twice, but only in the 2013 and 2014 Storm Water Management Reports (i.e., not in the HMS reports). Subsequently the 2011-2014 HMS Report states there was a switch to aerial remote sensing techniques for vegetation monitoring, but that the data have not been examined.

⁹⁴ Meese RJ, GR Geupel, K Reeves, J Weigand. 2009. Scientific peer review and assessment of the California department of parks and recreation off-highway motor vehicle recreation division habitat monitoring system. California State Parks, OHV Division. pp. 23 through 25 and Figure 2.

3. *Include bats in mammal survey efforts.*

A single bat survey effort was not initiated until five years later (in 2014), and despite knowledge that Townsend's big-eared bat roosts could occur at the site. The CDFW has recommended the Townsend's big-eared bat be listed under the California Endangered Species Act.⁹⁵ Unfortunately, the majority of the survey effort at the CSVRA relied on a survey technique (acoustic monitoring) that is ineffective in identifying roosts and Townsend's big-eared bats.⁹⁶ Townsend's big-eared bats and other "whispering bats" emit low intensity calls that are difficult to detect with acoustic monitoring equipment.⁹⁷ In addition, Townsend's big-eared bats exhibit a high degree of intra-seasonal and yearly movement among roost sites.⁹⁸ Sherwin et al. (2003) examined 1,345 abandoned mines across Nevada and Utah for the presence of Townsend's big-eared bat roosts.⁹⁹ The investigators concluded that an average of four surveys were required before a mine could be eliminated (with 90% probability) as a maternity roost, and that a minimum of eight surveys were required before a site could be eliminated (with 90% probability) as a hibernation roost.¹⁰⁰ Moreover, the investigators reported:

our results clearly demonstrate that the likelihood of reliably identifying roosts (i.e., observing bats exiting a mine) using only external techniques in a single visit, is extremely low. In addition, signs of use are rarely detectable from the opening. Therefore, underground surveys should be a standard protocol.¹⁰¹

Indeed, the investigators did not detect Townsend's big-eared bats during their surveys, but when CSVRA's biologist entered the Tesla Mine site a month later she observed three bats presumed to be Townsend's big-eared bats. No additional surveys have been conducted.

4. *Measure vegetation and create an index of OHV use at all bird count and pit trap array locations to enhance the results and utility of the data collected. Collection of these additional data will allow future analyses of animal-habitat relationships, habitat suitability indices and spatial predictive models of species occurrence which will greatly increase the relevance of monitoring data to management. At a minimum, a vegetation 'relevé', as described in Ralph et al. (1993), page 38, should be conducted for each point count/pit trap location to characterize and document the vegetation matrix (= habitat) that surrounds these points.*

⁹⁵ California Department of Fish and Wildlife (CDFW). 2013 March. Evaluation of the Petition from the Center for Biological Diversity to List Townsend's Big-Eared Bat (*Corynorhinus townsendii*) as Threatened or Endangered Under the California Endangered Species Act. Report to the Fish and Game Commission. 29 pp.

⁹⁶ Sherwin RE, WL Gannon, JS Altenbach. 2003. Managing complex systems simply: understanding the inherent variation in the use of roosts by Townsend's big-eared bat. *Wildlife Society Bulletin* 31:62-72, at 70-71. See also Western Bat Working Group [web site]. 2007. Recommended Survey Methods Matrix. Available at: <http://www.wbwg.org/speciesinfo/survey_matrix/survey_matrix.html>.

⁹⁷ *Ibid.* See also Western Bat Working Group. 2005 (Update). Species Accounts. Available at: <http://www.wbwg.org/speciesinfo/species_accounts/vespertilionidae/coto.pdf>.

⁹⁸ Sherwin RE, WL Gannon, JS Altenbach. 2003. Managing complex systems simply: understanding the inherent variation in the use of roosts by Townsend's big-eared bat. *Wildlife Society Bulletin* 31:62-72.

⁹⁹ *Ibid.*

¹⁰⁰ *Ibid.*

¹⁰¹ *Ibid.*

Data to inform animal habitat relationships are exactly what is missing from the monitoring program. The point counts are stratified by vegetation type but there has been no vegetation ‘relevé’ or quantitative habitat assessment of at each point count. No pit trap arrays were established.

5. *The assessment of OHV trails, perhaps as described by McCreedy et al. (2007), should include the distance from the center of point count/pit trap locations and estimate trail density within a fixed radius.*

Distance to trails was not included in the bird point count data received from the CSVRA. Distance to trails was also not reported for the vegetation monitoring.

6. *Superintendents and environmental scientists, in consultation with maintenance staff, should collaborate on creating management plans that identify specific management needs and goals. The purpose(s) of species and habitat monitoring should be made explicit and related to stated management objectives.*

This recommendation has never been implemented.

7. *Conduct an “inventory of inventories”: require all SVRAs to document all existing data and reports and then accumulate these into a central repository, regardless of original sources (paper, word processor files, spreadsheets, annual, consultant, or other reports, user reports, etc.). All paper information, including data and reports of SVRA staff, the original HMS and WHPP documents, peer-reviewed publications, theses, and reports submitted by outside consultants should be digitized and deposited into a centralized electronic data repository. This repository is needed to archive (safeguard) existing information and to serve as a resource available to SVRA and Division personnel as well as qualified persons outside the Division who seek to answer a multitude of questions of management interest and to identify within and among-site trends.*

The document repository on the General Plan website did not include many key reports and inventories including the 2001 DEIR, the Ecosystems West report, the 2004 Draft HCP; and the original inventories by Kutilek et al. 1991, Wone and Beauchamp 1995, and Davidson and Trenham 1998. Friends of Tesla Park received the first three of these past reports only through repeated Public Records Act requests and follow up correspondence spanning two years. The latter three were never provided by State Parks, but were obtained from a personal request from S. Kupferberg to one of the authors, who had kept his own personal copies of these reports in his files. With regard to an electronic repository for more recently collected data, it was relatively easy for CSVRA staff to query the Microsoft Access database to generate Excel spreadsheets to share. However subsequent scrutiny of the data revealed a real need for Quality Assurance / Quality Control of the data. There were many errors such as HMS site numbers that did not make sense, species names that were out of date, misidentified species (e.g. some that are outside their natural range and unlikely to occur in Corral Hollow). Many of the HMS reports included in the on-line electronic repository did not include the data tables, maps and appendices, which contain vital information. These missing elements were only obtained after PRA requests and months of follow up correspondence.

8. *Develop a dedicated data management system consisting of a shared database with on-line data entry capability that includes: 1) the ability to generate geographic coordinates (as with an API to Google Maps®), 2) accumulate and store geo-referenced image files (digital photographs taken at known times and locations), 3) query data via pre-defined as well as user-defined queries, 4) analyze and visualize data via pre-defined tools (statistical tests, plots of abundance over time, etc.) and 5) output data via preformatted reports of species inventories as well as graphs of species abundance and percent coverage through time. Data reporting should look at among-year results and illustrate trends by fitting a line to the abundance data through time and automatically determine whether the slope of the fitted line > 0 (that is, automate the process of performing a linear regression to tell you whether abundance is increasing or decreasing through time) or document complex relationships.*

Trend analysis is completely lacking, there are no such graphs in any of the HMS reports. Fitting regression lines through abundance data plotted over time is not necessarily statistically appropriate because either the data do not meet the assumptions of linear regression or abundance data have simply not been collected for any animal group other than birds at CSVRA. The bird data are more likely to be suited to occupancy modeling techniques¹⁰²

2.5.2 CSVRA-SPECIFIC RECOMMENDATIONS IGNORED ESPECIALLY WITH REGARD TO VEGETATION MONITORING

The 2009 peer review listed 14 recommendations for the CSVRA.¹⁰³ Here we highlight a subset that are particularly relevant to the DEIR/PGP, and that have been ignored or only partially implemented. This illustrates either a lack of institutional will or an outright inability to comply with the Public Resource Code conservation mandates and CEQA requirements.

Lack of Adequate Control vs. Impact comparisons for vegetation

Recommendation 2 states: *“Original control quadrats that were later opened to OHV recreation suggest poor coordination or communication between environmental science staff and management. Sacrificing control plots is unfortunate and precludes attempts to establish a consistent time series. A second inefficiency was to exclude the original Kutilek control plots converted to OHV recreation sites from further study, as these plots could have been utilized by environmental scientists to gather important information with management applications relative to types of impacts from motorized recreation. Examples include effects of off-highway vehicles on habitat fragmentation, loss of vegetation cover, and rate of natural recovery of vegetation under recreation use. The specific start date for the opening of the control plots provided a known time from which to observe and measure change.”*

This situation in which control plots will be sacrificed is poised to repeat. The GP/DEIR fails to articulate plans regarding how to maintain the non-riding reference sites in the future if OHV use

¹⁰² Iknayan, K. J., M. W. Tingley, B. J. Furnas, and S. R. Beissinger. 2014. Detecting diversity: emerging methods to estimate species diversity. *Trends in ecology & evolution* 29(2): 97-106.

¹⁰³ Meese RJ, GR Geupel, K Reeves, J Weigand. 2009. Scientific peer review and assessment of the California department of parks and recreation off-highway motor vehicle recreation division habitat monitoring system. California State Parks, OHV Division. pp. 37 through 39.

expands into the Alameda-Tesla Parcel. The integrity of existing control sites scattered throughout the expansion area will be compromised. There is no delineation of exact locations for construction of trails, campgrounds, gathering facilities, parking lots, etc. with respect to locations of existing HMS plots. This lack of integration is in direct opposition to Recommendation #10: “*Integrate monitoring plan with new general plan being developed by consultant.*”

Unfortunately, the integrity of the control sites may have already been compromised because CSVRA terminated cattle grazing on the Tesla parcel in 2013 and on the Alameda parcel in 2014 (Section 5.1.1 of DEIR). For example, if the difference in vegetative cover between riding and control areas changes, the change could be due to the absence of the livestock grazing on control plots. Given the DEIR/GP’s reliance on future monitoring to detect impacts and conduct future mitigations, this lack of forethought regarding the integrity of the reference sites is a serious flaw in the plans to expand, and it illustrates a lack of consistency among planning documents.

Lack of Vegetation Monitoring

Recommendation #4 was more of a scolding than a recommendation; Meese et al. simply pointed out: “*no vegetation monitoring had been conducted.*” Since 2009, only two vegetation surveys have been reported: Table 15 in the 2010 HMS report (% cover in riparian and oak and % rilling in oak), and Table 16 in the most recent Storm Water Management (SWMP) reports¹⁰⁴ (% cover in riparian vegetation). No detailed vegetation monitoring data, as done by Kutilek et al. (1991), has been reported in the 5+ years since the peer review. SWMP Table 16 further flouts Recommendation #2 regarding proper control vs. impact comparisons. The table caption states that 66% of the OHV sample area for the riparian vegetation zone was, in fact, closed to riding. In effect, there were actually three categories of recreational use: control, past OHV use, and ongoing OHV use. The authors lumped the data from the past and ongoing OHV use plots into a single OHV category with no explanation in the text. So, instead of quantifying the rate of plant colonization after closure (as Meese et al. directed in Recommendation #11 to evaluate the riparian restoration), the authors potentially inflated the percent cover in OHV use plots by incorporating plots with recovering vegetation. This would mask the magnitude of differences in cover. Despite this muddling of the use categories, the contrast remains stark, with 37% of the area with bare soil in OHV use plots compared to 2% bare soil in control plots. The area of bare soil had increased since 2010 when it was 26%. This indicates that the recovery is slow, or non-existent. Bare soil in a riparian corridor is subject to erosion during high flow events and can contribute to dust and air pollution in the dry season. Furthermore the authors did not report variance so it is impossible to determine statistical significance values. No analysis or interpretation appears in the text, and there is no statement of what the eventual goal is. One presumes the goal is that vegetative cover and area of bare soil should be equivalent among control and riding plots, yet little progress is being made to reach that goal.

Lack of Sufficient Baseline Data

The OHMVR Division ignored the guidance of Meese et al’s recommendation #9b: “*Establish a baseline for subsequent comparison (pre- vs. post-use).*” Instead the PGP/DEIR defers much of the baseline data collection to pre-construction surveys. CSVRA has acknowledged one bout of

¹⁰⁴ SWMP reports for 2013 (p. 62) and 2014 (p. 61) have identical Table 16’s, both reporting 2013 data.

data collection, as occurs pre-construction, is not enough to establish baseline. This precludes the public and decision makers from understanding the full extent of Project impacts during the CEQA review process. Moreover, because the PGP/DEIR fail to establish a mechanism that ensures the scientific rigor of the pre-construction survey methods and data (e.g., a peer review), they enable the OHMVR Division to continue its practice of flawed data collection—a practice that the OHMVR Division itself has acknowledged (i.e., the Meese et al. peer review). This is significant, because without adequate data on baseline conditions, there will be no way to evaluate adverse effects of the Project, and thus no ability to implement effective adaptive management (which is the cornerstone of the proposed natural resource management strategy).¹⁰⁵

Most importantly, with regard to baseline data regarding vegetative cover, it appears that the point intercept transect methods for monitoring cover have been abandoned. The 2011-2014 HMS report states that a remote sensing technique using aerial surveys in which lasers are shot to the earth from an airplane, called LIDAR (Light Detection and Ranging), began in 2014. The report stated that none of the LIDAR data have been analyzed and vegetation cover models have not yet been formulated. A key step in utilizing the LIDAR data is being overlooked. To evaluate the accuracy of LIDAR vegetative cover estimates, there need to be simultaneous corresponding ground-truthing surveys to calibrate the LIDAR models,¹⁰⁶ yet these types of surveys have been abandoned. When surveys were undertaken there were only two vegetation types covered, while the 2004 Draft HCP identified 21 vegetation assemblages. So at best there is only ground truthing information for a subset of the mosaic of vegetation to be modeled with the LIDAR data. Again, CSVRA is taking one step forward in trying to apply a state of the art monitoring technique, but taking two-steps backward by flawed implementation and lack of analysis and meaningful interpretation.

2.6 CONCLUSION

The DEIR and General Plan defers any mitigation to the future, saying that the WHPP and HMS will detect any impacts and then adaptive management will solve the problems. Given the sloppy and inconsistent sampling and lack of meaningful data analysis detailed in this document, impacts are not likely to be detected in a timely manner. The PGP and DEIR do not provide any additional information to resolve this issue.

Sincerely,



Scott Cashen, M.S.
Senior Biologist



Sarah Kupferberg, Ph.D.
Ecologist

¹⁰⁵ See PGP, pp. 4-15 through -17.

¹⁰⁶ Wing, B. M., Ritchie, M. W., Boston, K., Cohen, W. B., Gitelman, A., & Olsen, M. J. 2012. Prediction of understory vegetation cover with airborne lidar in an interior ponderosa pine forest. *Remote Sensing of Environment*, 124, 730-741.

Feb. 3, 2016

To: OHMVR Commissioners
Christopher Conlin, Deputy Director
Dan Canfield, Planning Manager
California State Parks
Off Highway Motor Vehicle Recreation Division
1725 23rd Street, Suite 200
Sacramento, CA 95816
christopher.conlin@parks.ca.gov
Dan.Canfield@parks.ca.gov

California Department of Parks and Recreation
Off-Highway Motor Vehicle Recreation Division
c/o AECOM, Attn: Carnegie SVRA General Plan
2020 L Street, Suite 400
Sacramento, CA 95811

From: Sarah Kupferberg, Ph.D.
818 Mendocino Ave
Berkeley, CA 94707
skupferberg@gmail.com

Subject: Rebuttal to Draft Final Environmental Impact Report's Response to Comments on the
Carnegie State Vehicular Recreation Area General Plan Revision

Dear OHMVR Commissioners, Mr. Conlin, Mr. Canfield, and CSVRA General Plan Staff:

I, and my co-author Dr. Paula Furey, submitted a ***Technical Memorandum – An Independent Impact Analysis using Carnegie State Vehicular Recreation Area Habitat Monitoring System Data*** ('Tech Memo') as a detailed comment on the preliminary General Plan ('GP') and the Draft Environmental Impact Report that were prepared for the Carnegie State Vehicular Recreation Area ('CSVRA'). We established our professional credentials as experts in our respective fields of analyzing multi-species abundance data sets and conservation biology and submitted lists of our peer-reviewed publications. The Tech Memo was incorporated into the Draft Final Environmental Impact Report ('DFEIR') as letter O30e and addressed under comment O30-c19.

Because CSVRA directly linked the GP's and DEIR's biological resource impacts analysis and mitigation strategy to the CSVRA Habitat Monitoring System (HMS), we conducted analyses of HMS data. For birds we used data from 2010 to 2014, the period after the 2009 Peer Review by Meese, et al. until release of the DEIR, using statistical methods recommended by Meese and established by peer-reviewed journals in conservation¹. We also made comparisons to historic data². We

¹ Su, J. C., Debinski, D. M., Jakubauskas, M. E., and K. Kindscher. 2004. Beyond species richness: Community similarity as a measure of cross-taxon congruence for coarse-filter conservation. *Conservation Biology* 18:167-173.

² Kutilek, M., H. Shellhammer, and W. Bros. 1991. Inventory, Wildlife Habitat Protection Program, and Monitoring Program for Carnegie State Vehicular Recreation Area, Tracy, CA. Prepared for CA Dept of Parks

documented that OHV riding at CSVRA is associated with a shift in the species composition of the avian assemblages and declines in the numerical abundance of key indicator species for the health of oak woodlands and riparian habitats (e.g. six out of the seven Partners in Flight focal species for riparian habitats were more abundant in the control sites). In our expert opinions, population declines and shifts in community composition for these species will ensue if the expansion area is opened to OHV riding, even at a trails only level. We made this determination based on our observation that strong negative effects to these species are occurring at Carnegie in areas currently exposed to trails-only riding. We also documented that special status amphibians are in marked decline. In our expert opinions, the amphibian populations in the existing riding areas at Carnegie are not self-sustaining, and the robust populations in the Tesla expansion area, which could serve as sources for re-colonization, will be put at substantial risk of dipping below self-sustaining levels if the landscape is opened to OHV riding as occurs at Carnegie.

Below we highlight how these issues documented in the *Tech Memo* were not addressed in the DFEIR and remain un-resolved by the DFEIR responses to biological resources issues.

A. Master Response 1 asserts that the degree of specificity in an EIR should parallel the underlying activity being evaluated. Given that the plan, at the highest tier, is to subject the landscape to OHV use, the EIR must assess the overall impacts of the disturbances that will occur as a result of that OHV use. It is extremely rare to have side by side comparisons available so that the effects of a proposed change in land use on target organisms can be assessed. In this case we have two areas with similar topography, soils, precipitation, and vegetation types that differ only with regard to land use history, OHV riding vs. cattle grazing. To the extent the pronounced differences in abundance, species diversity, and vegetative cover we highlighted in our Tech Memo are not reported in the 'Existing Conditions' Chapter 2 of the DFEIR, the document fails to represent the influence OHV use contemplated in the GP will have on the ecosystem of the expansion area.

In the Tech Memo we also raised the issue that lack of specific delineation of locations for construction of trails, campgrounds, gathering facilities, parking lots, etc. means that the reader of the GP/DEIR cannot discern how the existing HMS control sites will be avoided. There is no response in the FEIR to this concern. The integrity of the control sites may have already been compromised because CSVRA terminated cattle grazing on the Tesla parcel in 2013 and on the Alameda parcel in 2014. If the difference in special status amphibian pond occupancy between riding and control areas narrows, the change could be due to the absence of the positive effects of livestock grazing on CRLF and CTS. An erroneous conclusion could be made that there were no longer differences due to OHV riding. Given the DEIR/GP's reliance on future monitoring to detect impacts and conduct future mitigations, this lack of forethought and specificity regarding the integrity of the reference sites is a serious flaw in the plans to expand.

B. Master Response 4 (Section 2.4.1) on special status herpetofauna does not refute the fact that existing conditions demonstrate the ineffectiveness of best management practices to avoid harming populations of conservation target species. CSVRA's own data illustrate that creation of trails and other facilities for OHV use *in toto* causes a substantial reduction in habitat for vertebrates with aquatic life stages and is causing populations of special status (and other) vertebrates to drop below self-sustaining levels:

and Recreation Off-Highway Motor Vehicle Division, Contract No. 4-550-9035. San Jose State University, Biology Department. San Jose, CA.

- Western Pond Turtles -- a single isolated locality in the riding area
- California Tiger Salamanders -- 5 times less frequently present in the shallow and sediment-filled basins of the OHV area compared to Expansion Area ponds. A mass mortality event of CTS was recorded in tables of the 2003 HMS report. In 2014 Save the Frogs! received pages of the 2003 HMS report that were not included in the version of the document available for public download on the CSVRA General Plan website's document library. These pages revealed that the mass mortality event had occurred.
- Western Toads -- were observed in most detention basins (historic data in Beauchamp and Wone 1995), but are now rare or absent in the OHV area, while still persisting in many control sites (HMS data 2011, 2012, 2014)
- Western aquatic garter snakes -- rely on amphibians as their primary prey source, not reported from any OHV site, although found in 9 control ponds
- Foothill Yellow-legged Frogs -- on the brink of extirpation; one principal cause of this population decline is the loss of suitably deep aquatic breeding habitat when stream channels fill with sediment. Vehicular disturbance of soils in landscapes such as CSVRA has been shown to increase sediment yield during rainfall events 10-25 times above background rates^{3,4,5}.

C. Response O30c-1: Deferring mitigation to the future is inadequate to protect sensitive resources. Because the GP does identify particular areas for development, the consequences of that plan should rightly be evaluated at this stage.

- State Parks believes that the guidelines proposed in the GP would avoid and minimize impacts on biological resources; yet no data or evidence is submitted to demonstrate that measures, such as consultation with permitting agencies, does indeed prevent substantial reductions in habitat and prevent populations of threatened species from dropping below self-sustaining levels. Consultation in the past has *not* lead to protection because CSVRA has a track record of broken promises and lack of follow-through with respect to measures recommended in connection with consultation. Although the USFWS has issued biological opinions for several projects that were to take place in the planning area, the biological opinions were predicated on the assumption that State Parks would prepare a Habitat Conservation Plan (HCP), as stipulated in the Wildlife Habitat Protection Plan. The lack of follow-through by State Parks after consultation is substantiated in an email message from the USFWS to State Parks, which stated:
"Currently State Parks is operating this park [CSVRA] without incidental take authorizations (outside of the sediment basins/ponds and one creek restoration) and is not in compliance with the Federal Endangered Species Act. The 2001 Wildlife Protection Plan on your website states that State Parks is working on a Habitat Conservation Plan (HCP). An HCP would provide an incidental take permit for listed species for the operation and use of the park. A biological opinion for the pond

³ Iverson, R.M., Hinckley, B.S., and Webb, R.M., 1981, Physical effects of vehicular disturbances on arid landscapes: Science 212, no. 4497: 915-917

⁴ Tuttle, M., and Griggs, G., 1985. Accelerated soil erosion at three State Vehicular Recreation Areas: central and southern California, in Erosion control: A challenge in our time, proceedings of the 16th annual International Erosion Control Association, Feb. 21-22, 1985, San Francisco, California: San Francisco, California, International Erosion Control Association, p. 105-115

⁵ Stillwater Sciences / Glen Leverich DEIR Letter O18

maintenance was also issued and analyzed in a specific manner because State Parks was working on the park wide HCP. State Parks is no longer working on the HCP.”⁶

- The results of poor follow-through after consultation, especially with respect to aquatic habitats, are the notable amphibian declines. For CRLF, only adults (and one juvenile), have been found in the OHV area since 2011⁷. Yet during the same time period, and in spite of the drought, CRLF breeding has been observed in 4 expansion area ponds. The lack of suitably deep ponds that can support reproduction is a result of excess sediment yield from the disturbed hill slopes.
- In the absence of reproduction, populations cannot sustain themselves. The potential sources for re-colonization and revitalization of the declining populations in the OHV area are in the expansion area. Yet the GP does not include provisions to ensure protected movement zones for frogs, either overland or along stream corridors, to reach the ponds which are essentially islands in a sea of OHV disturbance.
- Instead of protected corridors, the DFEIR preferred concept map shows yellow gathering, blue special event and purple practice areas, all within the floodplain of Corral Hollow Creek. If future consultation called for such corridors, what possibility would there be for setting aside the land if it was already slated for other uses in the General Plan? In light of the land use designations in the GP, it is legally required under CEQA to make provision now for management tools that will effectively ensure appropriate corridors.

D. Response 030c-2 asserts that HMS monitoring data were used to prepare the GP, but this is contradicted by fact. If HMS data were considered, high use areas, such as gathering areas, would not be placed where sensitive species are concentrated. For example:

- The Preferred Concept Map shows a gathering area fragmenting the connectivity of a cluster of high occupancy CRLF ponds. Development of facilities and roads would isolate the most robust breeding sub-populations of CRLF (i.e. ponds with 80 to 100% presence).
- The gathering overlay includes the area where Burrowing Owls occur. The assertion that HMS data informed planning is entirely disconnected from, and inconsistent with, changes made in the Biotic Resources Section 3.3 of the DFEIR. On p. 10-13, the underlined language was added “*Operational noise of OHVs and increased human activity may also result in nest abandonment if these activities occur near nest locations*”. On p. 10-14 new underlined language states “*If signs of burrowing owl use or active dens are detected during monitoring, consider active management strategies to encourage and preserve use of the site by this species.*” Despite these acknowledgements of the harmful effects of human activity, the GP gathering overlay is still planned for the exact location where this species was observed in 2102 and 2013 (cell D-5 in the Incidental Species Grid Map included in HMS reports).

E. Response 030c-5 (quoted below) does not resolve or refute the facts.

“The General Plan’s statement regarding the persistence of special-status herpetofauna, as cited in the comment, is appropriate and accurate”.

⁶ 15 July 2013 email from Kim Squires, USFWS, to Clinton Elsholz and Randy Caldera, California State Parks.

⁷ DeSilva, T. and A. Meisel. 2015. 2011-2014 Habitat Monitoring Systems Report CSVRA

- HMS data (Fig. 1) contradict this statement showing multi-year periods of absence in OHV areas by California Red-legged Frog (CRLF) and California Tiger Salamander (CTS), followed by presence. This pattern indicates a process of local extirpation followed by re-colonization from outside source locations such as the expansion area. This process is not self-sustaining and expansion of OHV use threatens the habitats that produce dispersing animals. If the source populations from the Tesla-Alameda area are eliminated the populations at Carnegie will eventually be completely extirpated, a violation of the mandate from the Public Resources Code 5090.35(c) to “sustain a viable species composition specific to each SVRA”.

“Breeding ponds for these species throughout California have varying levels of success in supporting breeding populations, based on various factors: the hydrology of a given pool, the amount of rainfall in a given year, and the distance of breeding pools to upland refugia habitat.”

- Of these factors, the OHV and control sites receive similar rainfall. The other two factors are directly and negatively influenced by OHV use. To name just a few examples, erosion from disturbed hillsides fills water bodies with sediment and makes the hydroperiod shorter so that water dries before larvae reach metamorphosis; quantity and quality of upland refugia are diminished by loss of vegetative cover and loss of ground squirrel burrows; connections to upland refugia are blocked by roads and trails. The DFEIR claims it need not evaluate ground squirrels because they are not a protected species, but they are the ecosystem engineer, creating shelter for several special status species and anticipated impacts on them cannot be ignored.

“Herpetofauna populations vary from year to year in both the original Carnegie SVRA and the expansion area.”

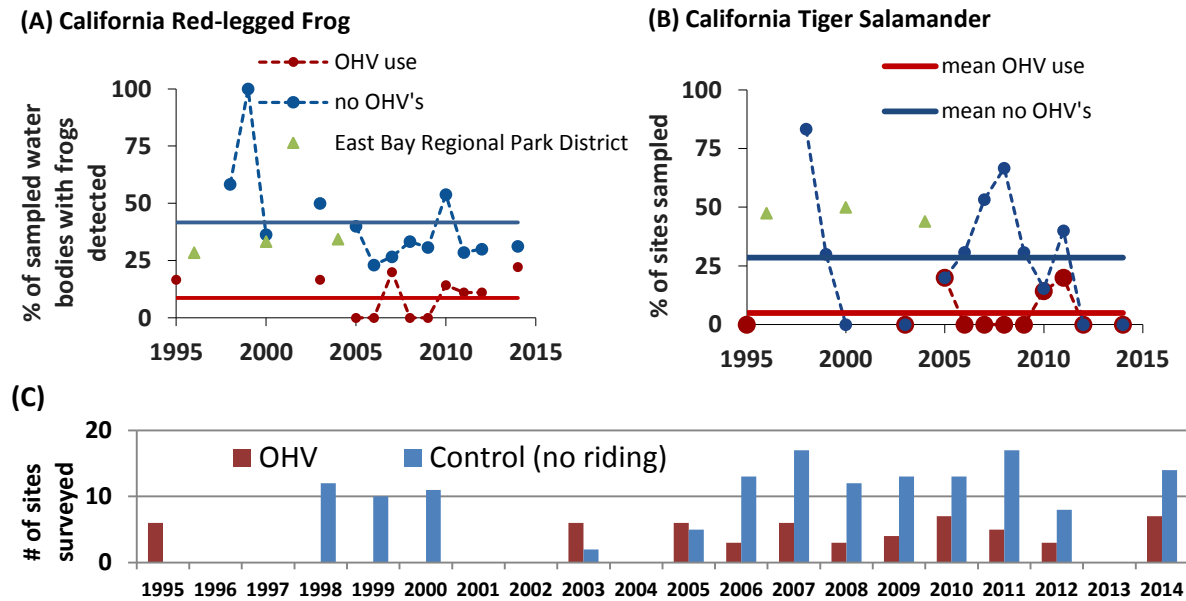
- Variability through time would be roughly equivalent between existing Carnegie and the Expansion Area if OHV use had no impact on herpetofauna. To the contrary, HMS data indicate lower mean rates of presence in OHV areas *and* greater variability (Fig. 1). The coefficients of variation (ratio of standard deviation to mean) for presence of CRLF and CTS are 1.7 and 1.8 times higher in the OHV areas than in non-riding areas.
 - **CRLF $CV_{OHV} = 86\%$ vs. $CV_{control} = 49\%$; CTS $CV_{OHV} = 174\%$ vs. $CV_{control} = 95\%$**
- Observations of species that have been monitored until they went extinct, have shown that low abundance combined with high variability, the situation in the OHV area, creates an ‘extinction vortex’ in which biological and physical processes (such as genetic deterioration and random environmental events like a drought) reinforce each other and drive a population out of existence ⁸.
- In comparison, the Tesla area amphibians are persisting because of the better habitat quality and the general principal that multiple and connected sub-populations are at less risk of extirpation than isolated populations cut off from sources of re-colonization⁹. Expansion of OHV use puts this resilience at risk by fragmenting the landscape.
- Roads, trails, and inhospitable habitats lacking vegetative cover or burrow refugia would interfere with the ability of the special status amphibians to reach their nursery habitats. The scientific literature shows that persistence is susceptible to fragmentation of habitat by

⁸ Fagan, W. F., and E. E. Holmes. 2006. Quantifying the extinction vortex. Ecology Letters 9: 51-60.

⁹ Hanski. I. 1999. Metapopulation ecology. Oxford University Press.

roads¹⁰. Because dispersal routes may be unexpected and through chaparral and oak woodlands as well as grassland¹¹, protecting specific corridors is not sufficient, the entire radius within the dispersal distance is needed.

Figure 1. Time series (dashed lines) and means (solid lines) of presence (A, B) and sampling effort (C) for special status amphibians at CSVRA. For context, data collected in the East Bay Regional Park District are plotted (n=179, 219, 186 ponds in 1996, 2000, and 2004).



“State Parks contracted with UC Davis biologists to inform long-term monitoring of habitats and special-status species in the active OHV recreation area to more accurately determine the long-term population trends of these special-status herpetofauna and other special-status species.”

- Contracting for a peer review and implementing the actions prescribed in the review are entirely different. The UC Davis review was released in 2009. Since then, CSVRA has published two HMS reports. Neither included statistical comparisons between riding and non-riding areas and neither included retrospective analyses to assess population trends. Because the sampling effort has been inconsistent (Fig. 1c), with skipped years and skipped sites, the statistical power to detect trends is low.
- Six years post-peer review, CSVRA still does not collect population level response variables for the special status species. Such variables would include reproductive population size, quantitative visual encounter surveys, age structure as indicated by size of animals, or survival measured by marking and recapturing animals.

¹⁰ D'Amore, A., V. Hemingway, and K. Wasson. 2010. Do a threatened native amphibian and its invasive congener differ in response to human alteration of the landscape? *Biological Invasions* 12: 145-154.

¹¹ Wang, I. J., Savage, W. K., and H.B. Shaffer. 2009. Landscape genetics and least-cost path analysis reveal unexpected dispersal routes in the California tiger salamander (*Ambystoma californiense*). *Molecular Ecology*, 18: 1365-1374.

F. Response 030c-16 asserts that distributed riding is the culprit with respect to harming the plant and animal communities and that the proposed trail-restricted riding will create only linear features and thus avoid impacts. However, the GP does not quantify what density of trails is the goal for development and provides no evidence that there is some threshold of trail density known to prevent erosion and other harms due to the effects of fragmentation, noise, soil compaction, etc. Because trails on slopes are configured in tight switchbacks, they are in reality more than linear features on hillslides. There is a body of scientific studies showing that roads and recreational trails are associated with declines of amphibians and reptiles^{12,13}, cause shifts in the avian community by attracting species tolerant of edge habitats¹⁴, and cause increases of corvids (crows, ravens, etc.) that are song-bird nest and chick predators¹⁵.

- The DFEIR claims that trail-only development with a 150 foot buffer around a water body would be sufficient to protect water quality, but there are no caps or limits on the density of trails, and no evidence showing that riders can be kept on trails. Trails-only areas in the existing OHV area have high densities of illegal trails and require extensive fencing to enforce trail usage. Fencing has its own negative consequences; it disrupts connectivity of habitats and impedes animal movement.
- The Water guidelines in the GP intended to decrease sediment yield are actually a hazard for amphibians. For example the detention basins serve as an ecological trap — attracting animals to sub-optimal habitats. Amphibians waste their reproductive output by ovipositing in ponds that dry before metamorphosis can occur. Culverts, and hardened stream crossings designed to reduce sedimentation also represent loss of habitat, e.g. spadefoot toads require loose sediment to burrow.
- Furthermore, the locations of CSVRA's point-count surveys of oak-woodland birds are in trails-only OHV areas (see Fig. 2 of 2011-2014 HMS report). Applying ordination techniques and Analysis of Similarity on CSVRA's data, we found a 50% dissimilarity between OHV and control sites ($R=0.40$, $p=0.001$)¹⁶ in species composition and relative abundances of the oak woodland bird assemblage. This highly significant result corresponds to lower abundances in OHV areas for 11 out of 16 indicator species identified by the Partners in Flight conservation program¹⁷, with some differences being particularly dramatic (Fig. 2). Species important to seed dispersal and tree regeneration such as Acorn Woodpeckers are 10 times more

¹² Andrews, K. M., J. W. Gibbons, D. M. Jochimsen, and J. Mitchell. 2008. Ecological effects of roads on amphibians and reptiles: a literature review. *Herpetological Conservation* 3:121-143.

¹³ Cosentino, B. J., D. M. Marsh, K. S. Jones, J. J. Apodaca, C. Bates, J. Beach, K. H. Beard et al. 2014. Citizen science reveals widespread negative effects of roads on amphibian distributions." *Biological Conservation* 180:31-38.

¹⁴ Hickman, S. 1990. Evidence of edge species attraction to nature trails within deciduous forest. *Natural Areas Journal* 10:3-5.

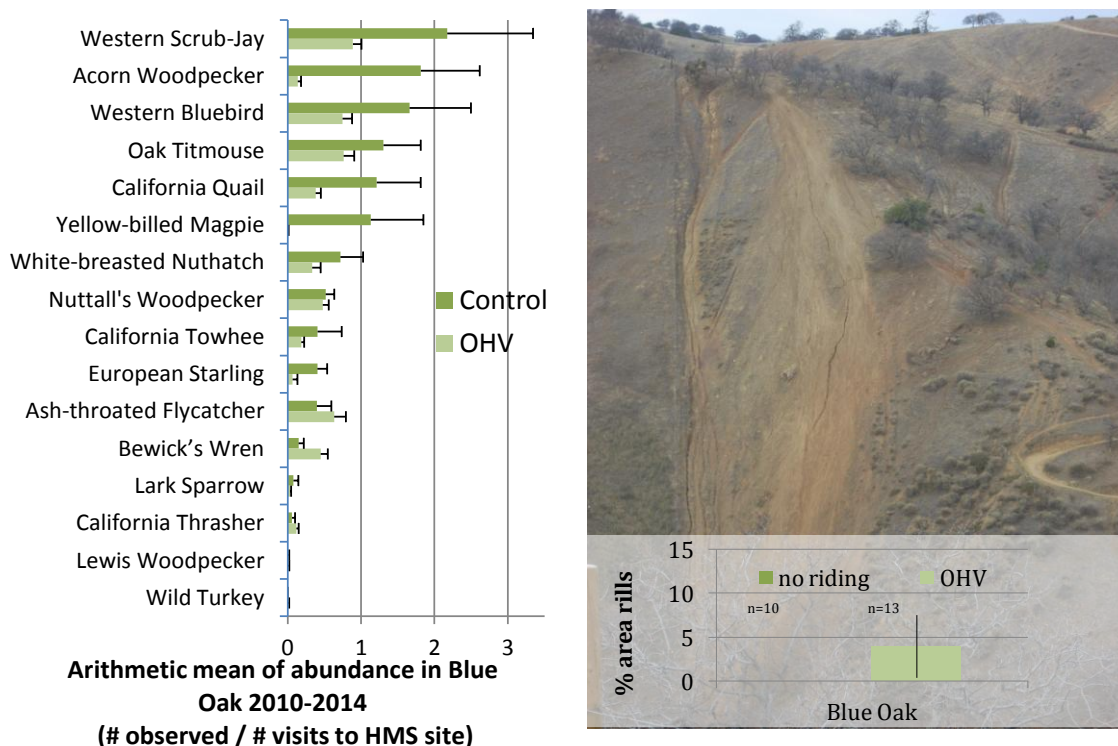
¹⁵ Walker, L. E., and J. M. Marzluff. 2015. Recreation changes the use of a wild landscape by corvids. *The Condor* 117:262-283.

¹⁶ The test statistic R in Analysis of Similarity equals 1 if ALL replicates within the control or the OHV area are more similar to each other than ANY replicates from different areas. R will equal zero under the null hypothesis, that there are no differences in community composition between control and OHV areas.

¹⁷ Zack, S., and California Partners in Flight. 2002. *The Oak Woodland Bird Conservation Plan: A Strategy for Protecting and Managing Oak Woodland Habitats and Associated Birds in California*. Stinson Beach, CA: Point Reyes Bird Observatory; 126 p. (<http://www.prbo.org/calpif/plans.html>).

abundant in non-riding compared to the OHV areas; Yellow Billed Magpies are entirely absent in the OHV area.

Figure 2. Mean (± 1 SE) abundance of indicator species (left) identified by Partners in Flight¹¹; rilling in trails-only OHV area in blue oak woodlands (right) compared to control transects (data from 2010, 2011-14 HMS reports).



- The numerically dominant bird was the Common Raven (*Corvus corax*). It contributed most heavily to defining the composition of the assemblage in OHV sites. Ravens were the most abundant species in CSVRA's surveys done from 2010–2014, yet twenty five years ago, ravens ranked 20th in control sites and 12th in OHV sites. This is significant because the Common Raven is an opportunistic and voracious predator that threatens the persistence of many rare species including turtles^{18,19}. Ravens can decimate breeding congregations of toads and frogs²⁰ and the special status amphibians at CSVRA are vulnerable. The Common Raven is rarely “common” in unaltered environments. However, artificial subsidies provided by humans (e.g., food, water, nesting and perch sites on fences, light poles, and buildings²¹) enable raven populations to explode. Ravens are routinely observed foraging at the open trash dumpsters at CSVRA.

¹⁸ Boarman, W. I., M. A. Patten, R. J. Camp, and S. J. Collis. 2010. Ecology of a population of subsidized predators: Common ravens in the central Mojave Desert, California. *J Arid Environments* 67:248-261.

¹⁹ Bui, T. D., J. M. Marzluff, and B. Bedrosian. 2010. Common Raven activity in relation to land use in western Wyoming: Implications for Greater Sage-Grouse reproductive success. *The Condor* 112:65–78.

²⁰ Olson, D.H. 1989. Predation on breeding western toads (*Bufo boreas*). *Copeia* 1989:391-397.

²¹ Scarpignato, A. L., and T. L. George. 2013. Space use by Common Ravens in Marbled Murrelet nesting habitat in northern California. *Journal of Field Ornithology*, 84:147-159.

- The DFEIR did not respond to the raven issue raised as an impact on the biological resources. The only response (p.7-57 to a neighboring rancher's letter) was that "*State Parks encourages the commenter to discuss ongoing concerns about trash... with SVRA management*". This does not resolve the deficiency of the GP and DFEIR with regard to raven control, inadequate planning for garbage handling, or the known propensity of raven populations to expand with increases in human recreational use of wildlands¹².

G. Response 030c-16 asserts that "*any area of the SVRA that is not meeting wildlife protection plan is addressed appropriately*" and that nesting birds are protected by various statutes. If this statement were true, the differences highlighted above and the other differences documented in our Tech Memo, such as the relative absence of Golden Eagles in riding areas, would not exist.

H. Response 030c-19 does not make sense. It states: "*While the wildlife habitat protection plan and associated habitat monitoring efforts are intended to evolve over time (NRM Guideline 1.4 and 2.4) with involvement from the academic community, the OHMVR Division disagrees with the commenter's assertion that this evolution equates to noncompliance with PRC requirements.*"

- The central point of the Tech Memo was that the needed revision of the HMS has *not* occurred and that the "*intent to evolve over time*" has not come to fruition. It is the *lack* of progress in analysis (along with too few resources being allocated to sampling) that equates to non-compliance with the PRC. Making sense of multi-species datasets to detect environmental impacts requires more sophisticated analytical tools than CSVRA has employed. The DFEIR is only able to claim that there is no impact of OHV use because the authors have not made control vs. impact comparisons using appropriate tools.
- The DFEIR did not respond to the issue we raised in the Tech Memo that the GP sacrifices the HMS control sites upon expansion.
- We stated clearly in the introduction to our Tech Memo that we were conducting the analyses the peer reviewers called for, but which CSVRA has failed to do:

Despite peer review guidance (Meese et al. 2009) to not over-rely on diversity indices, CSVRA continues to use these non-informative measures in an attempt to detect assemblage level effects of OHV use. A diversity index is a measure of the number of different organisms in conjunction with the absolute number of each individual organism. Because two locations with entirely different species could provide identical diversity indices, these metrics are insufficient for complying with the mandate of the Public Resources Code 5090.35(c) to "sustain a viable species composition specific to each SVRA". For example, there are routinely more bird species detected in control areas (11 more species in control than in riding area in 2011, 12 more in 2013, see Fig 3 of DeSilva and Meisel 2015), yet no significant differences in the diversity indices have been found. Furthermore, diversity indices and counts of species richness include non-native and pest species. Diversity indices do not assess population trends.

- Furthermore, Professor Michael Morrison, a wildlife scientist with 40 years of experience, concurred in his comment letter when he summarized "*Despite a 2009 critical review of the HMS system (Meese et al.), few meaningful changes were actually applied to the monitoring system. The HMS system and the resulting data cannot be used as justification for expanding the current recreational area.*"

Specifically with regard to birds Dr. Morrison went on to state:

Although the 2010 bird dataset was insufficient because of inadequate sampling, the trend indicated showed a negative impact in the OHV area (page 21): “In general, the control sites showed higher levels of species richness as compared to the OHV sites... OHV sites’ biodiversity was approximately 69 percent of the control sites.” Other non-parametric analysis techniques could be potentially resolve differences, but such analyses were not conducted once subsequent sampling was completed, and the 2011-2014 HMS report did not reflect any progress in resolving the insufficiencies.

- The statistical method employed in the Tech Memo, an ordination technique, is precisely the type of technique Dr. Morrison mentioned which can resolve differences is community composition between bird counts from OHV and control areas. The technique we used is “non-parametric” meaning that it makes few assumptions about the nature of the data. For example, the data do not need to have a normal distribution or have linear relationships among variables.
- Research on bird conservation in similar habitats in California has shown that to detect environmental trends attention should not focus exclusively on rare species but should instead cover a diverse suite of species that represent the range of variation in bird assemblage and that ordination is an appropriate statistical tool for that goal²². The DFEIR response was silent on this issue that CSVRA is not able to detect OHV impacts on birds, even when they have the data to do so.

I. Summary

The response to the *Tech Memo* in the DFEIR does not address the detailed evidence we presented, does not provide any alternative evidence or analysis, and does not resolve the issues raised. The lone DFEIR reply specific to the *Tech Memo* was that the HMS process is “evolving”. This is not a substantive or scientifically credible response. The other DFEIR responses do not refute the validity of our findings which were based on analysis of CSVRA’s own HMS data — OHV use in CSVRA is having a substantial adverse effect on the composition of avian and herpetofaunal communities and the occurrence of target species. The bird assemblages in each vegetation type of the existing OHV riding are less abundant than in control areas and more dominated by species benefitting from human subsidies of food and shelter. Several key indicator species of oak woodland ecosystem integrity, as well as the keystone avian predator, the Golden Eagle, were markedly less abundant, or completely absent where OHV riding occurs. The same negative impacts would be expected if the Alameda-Tesla expansion area is opened to OHV use, even if riding were ‘trails-only.’

In my opinion there is no credible scientific evidence or analysis that would support the DFEIR's determination that OHV expansion into the Tesla area will have no significant effects on these wildlife species. For that reason, the FEIR and GP should not be certified by the Commission.

Sincerely,



²² Chase, M. K., Kristan, W. B., Lynam, A. J., Price, M. V., and J. T. Rotenberry. 2000. Single species as indicators of species richness and composition in California coastal sage scrub birds and small mammals. *Conservation Biology* 14:474-487

Friends of Tesla Park

Technical Memorandum

An Independent Impact Analysis using Carnegie
State Vehicular Recreation Area Habitat
Monitoring System Data

Sarah J. Kupferberg, PhD, and Paula C. Fury, PhD

6/29/2015

Executive Summary

Differences in animal assemblages between the existing Carnegie State Vehicular Recreation Area and proposed Expansion Area can be used to predict impacts to biological resources from OHV recreation because the two properties, which share similar topography, elevations, soils, and habitat types, differ primarily in land use. Here we provide examples of the types of existing condition and impact analyses that should have been conducted, but were not included in the DEIR.

Birds: CSVRA's point-count data (collected 2010-2014) demonstrate that OHV impacts are especially severe on birds that use oak woodlands and riparian zones. This is exemplified by dissimilarity in species composition and relative abundances in the total bird assemblage and significantly lower abundances of key indicator species in OHV riding areas relative to controls (e.g. Acorn Woodpeckers are ten times more abundant in control oak woodlands). These differences are consistent with other studies depicting negative impacts of OHV use on birds. Comparisons to CSVRA's historic data (collected 1989-90) show that the Common Raven has begun to dominate the landscape. This is significant because ravens are voracious predators that can threaten the persistence of several rare species.

Aquatic Amphibians and Reptiles: HMS data indicate that special status species such as California Red-legged Frogs have 3 times higher annual presence rates in control water bodies; California Tiger Salamanders are 5 times more frequently present in Expansion Area ponds than in the generally more shallow and sediment filled basins of the OHV riding area. Comparison of historic data (collected 1995) to most recent HMS data (2011, 2012, 2014) shows that common species such as Western Toads which were observed in most detention basins are now rare or absent in the OHV area, but persist in the control sites. Western aquatic garter snakes, a species which capitalizes on the explosive breeding events of amphibians and relies on tadpoles and metamorphs as a primary prey source, were not reported from any OHV site, but were found in 9 control ponds. This pattern suggests that declines in amphibian presence have food-web consequences for consumers at higher trophic levels in OHV areas.

These results illustrate that the lead agency, State Parks, is not in compliance with their mandate from the Public Resources Code 5090.35(c) to "*sustain a viable species composition specific to each SVRA*". The altered landscape and anthropogenic environmental changes are associated with deletions and shifts in the composition of the species pool at CSVRA in the riding area relative to non-riding control areas. The DEIR cannot be certified because it fails to adequately describe this aspect of the present setting, and fails to recognize how the ongoing OHV impacts are predictive of future impacts in the planning area.

Table of Contents

1	Introduction	1
1.1	Counting the books while the library burns	1
2	Effects of OHV use on bird assemblages.....	3
2.1	Analytic approach	3
2.2	Results and interpretation	6
2.2.1	Changes in species composition since 1989-1990	7
2.2.2	Oak Woodland.....	11
2.2.3	Riparian	13
2.2.4	Special Status Species	14
2.3	Conclusions regarding birds.....	16
2.4	MDS Appendices.....	18
2.4.1	SIMPER analysis comparing Vehicular (v) riding sites vs Control (c).....	18
2.4.2	Vegetation Type = Blue Oak Woodland	21
2.4.3	Vegetation Type = Coastal Sage - Scrub	23
2.4.4	Vegetation Type = Riparian (mulefat and sycamore).....	26
2.4.5	Vegetation type = Grassland	28
2.5	Golden Eagle Map Description.....	31
	Effects of OHV use on Amphibians and Aquatic Reptiles.....	33
2.6	Approach to assess existing conditions and impacts not addressed in DEIR	33
2.7	Taxon specific results and interpretation.....	34
2.7.1	California Tiger Salamander (<i>Ambystoma californiense</i>) – CTS.....	34
2.7.2	California Red-legged frog (<i>Rana draytonii</i>) – CRLF.....	37
2.7.3	Western Pond turtle (<i>Emys marmorata</i>) – WPT	40
2.7.4	Western Spadefoot Toad (<i>Scaphiopus hammondi</i>).....	42
2.7.5	Foothill yellow-legged frog (<i>Rana boylei</i>) – FYLF	43
2.8	Conclusions regarding amphibians and aquatic reptile impacts	44
2.9	Amphibian related appendices.....	46
2.9.1	CRLF Map Description:.....	46
2.9.2	CTS Map Description:.....	47
3	Mammals	48
3.1	California Ground Squirrel	48

3.2	Tule Elk.....	48
4	Conclusion.....	49
4.1	The DEIR fails to disclose the value of the Alameda-Tesla Expansion Area as a Biodiversity Hotspot.....	49
4.2	Ongoing monitoring as a strategy for avoiding impacts to sensitive species is too vague to be considered an effective mitigation strategy.	51
5	Literature Cited	52
6	Statement of Author Qualifications	57

Table of Figures

Figure 1.	Map of point-count survey locations in Carnegie State Vehicular Recreation Area (Fig. 2, p. 11 in DeSilva and Meisel 2015).	4
Figure 2.	Year to year variation in the number of visits to Habitat Monitoring System (HMS) sites in relation to the independent Variables of Treatment (control (C) vs. OHV riding (V)) and Vegetation Type.....	5
Figure 3.	Two-dimensional multidimensional scaling (MDS) plot of bird abundances in point count surveys (2010-2014) at CSVRA. Each point represents the multiyear average of observations at an HMS site (n=115). Ordination based on Bray-Curtis similarities of fourth root transformed data. Points coded by vegetation type.	6
Figure 4.	Uncovered garbage dumpster near SRI road entrance at Carnegie SVRA and a Common Raven scavenging. (Photo credit C. Garmendi, 5/19/14).....	8
Figure 5.	Ordination of point-count bird abundances (2010-2014) from Blue Oak woodland at CSVRA. Each point represents the multiyear average of bird observations at an HMS site. (total n=30 sites; control = solid; vehicular recreation = open).....	11
Figure 6.	Mean (± 1 SE) abundance estimates for species (left) identified for monitoring by the Partners in Flight (Zack et al. 2002) and area with rilling conditions (right) in Blue Oak woodlands comparing OHV and non-riding sites.	12
Figure 7.	Differences in vegetated area between riding and control sites likely contribute to differences in avian assemblage (data replotted from Elsholz and Mynk 2010).	12
Figure 8.	Ordination of bird abundances (2010-2014) in riparian vegetation at CSVRA. Each point represents the multiyear mean of observations at an HMS site. (total n=21 sites; control=solid; vehicular recreation=open). Bottom plot zooms into the right area of top plot.....	13
Figure 9.	Partners in Flight riparian indicator species abundance across all vegetation types.	14

Figure 10. Golden Eagle observations at CSVRA during point count bird surveys.	14
Figure 11. Mean (± 1 SE) of Golden Eagle abundance as measured during point count surveys conducted between 2010 and 2014 at Carnegie SVRA. Sample sizes are number of HMS sites in each vegetation type.	15
Figure 12. Three Golden Eagle Territories on or adjacent to the expansion area at CSVRA.	15
Figure 13. Abundance of Birds on California Special Animals list	16
Figure 14. A two-dimensional non-metric multidimensional scaling plot of bird abundances in point count surveys (2010-2014) from Coastal Sage Scrub habitat at Carnegie State Vehicular Recreation Area. Ordination based on the Bray-Curtis similarities on fourth root transformed data. Each point represents the multiyear average of bird observations at an HMS site (total n=30). Points are coded by recreation status (control [c]= solid; vehicular recreation [v]= open).	23
Figure 15. Non-metric multidimensional scaling plot of bird abundances in point count surveys (2010-2014) from Grassland habitat at Carnegie State Vehicular Recreation Area. Ordination based on the Bray-Curtis similarities on fourth root transformed data. Each point represents the multiyear average of bird observations at an HMS site (total n=30). Points are coded by recreation status (control = solid; vehicular recreation = open).....	29
Figure 16. Unequal sampling effort across years.	34
Figure 17. Distribution of California Tiger Salamanders annual presence rate calculated from HMS data for control sites (1998-2014) and OHV riding areas (1995-2014) at Carnegie State Vehicular Recreation Area. Note, not all sites sampled every year.	35
Figure 18. Upland habitat buffer zones around CTS sites subsume almost entire planning area. See full map description and figure credits in Section 3.4.2.	36
Figure 19. Distribution of presence rates for CRLF at lentic sites at CSVRA.....	38
Figure 20. Protective buffers for upland habitat of California Red-legged Frogs drawn in concentric circles around locations from HMS and CNDDB sources. (Figure details and credits in Section 3.4.1)	40
Figure 21. OHV riding exclusion zone (yellow caution tape) around Spadefoot toad tadpole pool in 2015, and facilities built in proximity to occupied habitat all an order of magnitude closer than DEIR avoidance measure of 150'.....	43

1 INTRODUCTION

The Draft Environmental Impact Reports' statement that OHV use will have no significant impacts on the flora and fauna of the planning area is not supported by substantial evidence -- the assertion cannot be supported with facts. Data collected on site and other studies available in the scientific peer-reviewed literature contradict the conclusion of no potentially significant impacts.

The existing Carnegie SVRA (CSVRA) and the immediately adjacent Expansion Area are similar in many ways. Both properties have similar topography, elevations, soils, and habitat types. Indeed, 100 years ago it would have been challenging to distinguish the two properties. However, existing conditions for wildlife at the two properties are now very different. The differences are, for the most part, due to contrasting land management, ranching and cattle grazing vs. vehicular recreation.

1.1 COUNTING THE BOOKS WHILE THE LIBRARY BURNS

Surveys at Carnegie SVRA for aquatic amphibians and birds began decades ago (Beauchamp and Wone 1995, Kutilek et al. 1991). Since State Parks began releasing Habitat Monitoring System Reports in 2003, no comprehensive analyses to detect trends over time and patterns of species decline due to OHV use have been presented. Now in 2015, the DEIR continues the failure to make sense of the existing monitoring data. We have therefore undertaken an independent close inspection. Our analysis of CSVRA's bird counts (Section 2 of this memo) and aquatic survey data (Section 3) indicate that there are noteworthy and significant differences in the presence of wildlife between OHV riding areas and non-riding areas. Species noted as conservation targets because of their protected legal status are rare in the OHV riding yet common in the proposed Expansion Area: Golden Eagles have 5 times more sightings in the Expansion Area, with 3 breeding territories in or adjacent to the Expansion Area, and 0 territories in Carnegie; California Red-legged Frogs have 3 times higher annual presence rate in Expansion Area water bodies; and California Tiger Salamanders are 5 times more frequently present in Expansion Area ponds than in the generally more shallow and silted-in basins of the OHV riding area. Other species that function as indicators of ecological health are also markedly less abundant in the riding area than in the Expansion Area. For example, in oak woodlands, eleven out of sixteen indicator species identified by the Partners in Flight conservation program (Zack et al. 2002) are more abundant in non-riding areas, with some differences being dramatic (e.g., Acorn Woodpeckers are 10 times more abundant in non-riding oak woodlands compared to the OHV riding area). These differences demonstrate that adverse changes to wildlife populations have occurred in the existing CSVRA, and that

they will ensue if OHV use expands into the Expansion Area. For some taxa, such as the exclusively stream dwelling Foothill-yellow legged frog, the absence in the existing Carnegie and rarity in the Expansion Area suggest a strong possibility of losing the population entirely with further degradation of Corral Hollow Creek and de-vegetation of the riparian corridor.

Here we focus on the need for a comprehensive analysis of multi-species assemblages (such as that presented in section 2 for birds) to detect impacts. Despite peer review guidance (Meese et al. 2009) to not over-rely on diversity indices, CSVRA continues to use these non-informative measures in an attempt to detect assemblage level effects of OHV use. A diversity index is a measure of the number of different organisms in conjunction with the absolute number of each individual organism. Because two locations with entirely different species could provide identical diversity indices, these metrics are insufficient for complying with the mandate of the Public Resources Code 5090.35(c) to “*sustain a viable species composition specific to each SVRA*”. For example, there are routinely more bird species detected in control areas (11 more species in control than in riding area in 2011, 12 more in 2013, see Fig 3 of DeSilva and Meisel 2015), yet no significant differences in the diversity indices have been found. Furthermore, diversity indices and counts of species richness include non-native and pest species. Diversity indices don’t assess population trends. This means that analytic techniques able to evaluate similarities and differences in species composition are needed in conjunction with techniques that assess the viability of populations of taxa at risk of extirpation.

The lack of appropriate analysis indicates either a lack of resources, or a lack of institutional will, to implement conservation actions when adverse environmental impacts occur. Moreover, for many taxa it is not even possible to conduct independent analysis due to the lack of data in the HMS reports. The HMS reports often do not provide data (e.g. variances) fundamental to basic, descriptive statistics and no statistical comparisons. Perhaps more importantly, the HMS reports demonstrate that CSVRA has not attempted to evaluate the changes that have occurred with respect to plant and animal assemblages since surveys were first conducted at Carnegie in 1989 (Kutilek et al. 1991). There have been no evaluations of population trends through time making use of the historical data sets. The lack of progress toward appropriate analysis demonstrates non-compliance with the CSVRA Wildlife Habitat Protection Plan (WHHP) (Cull 2001), which states (p. 14) that “*potential impacts on both common and special-status species will be evaluated each year.*” This is important because without an understanding of the changes that have occurred, and the reason(s) those changes have occurred, the CSVRA is incapable of implementing remedial actions to conserve sensitive biological resources. If managers are incapable of managing sensitive biological resources within the existing OHV park, it is logical to assume they also are incapable of managing an OHV park that is three times larger.

2 EFFECTS OF OHV USE ON BIRD ASSEMBLAGES

2.1 ANALYTIC APPROACH

OHV use and control non-riding areas at Carnegie SVRA have been sampled using point count surveys during two periods, 25 years ago (Kutilek et al. 1991) and more recently from 2010-2014 (Elsholz and Mynk 2010, DeSilva and Meisel 2015) which includes the proposed Expansion Area. Thus the non-riding control sites between the two time periods are different; the historic data do not include the Expansion Area, but the OHV riding sites encompass the same area. In the intervening years a different sampling technique using transects was used, and data are not directly comparable. For the 2010-2014 period we used the full data set available: the total number (regardless of distance) of each species of bird seen or heard while an observer stood at one point for ten minutes. Data were received from a query of the CSVRA database conducted by Tara DeSilva on May 28, 2015, and given to Sarah Kupferberg as a follow up to a Public Records Act request made in February 2015. For details of site selection and sampling methodology, see Habitat Monitoring System (HMS) report for the period 2011-2014 (DeSilva and Meisel 2015). The map of point-count locations in the Expansion Area and in the existing CSVRA is reproduced below from the HMS report (Figure 1).

Research on conservation of bird biodiversity in California vegetation types has shown that attention should not focus exclusively on rare species but should instead focus on a diverse suite of species that represent the range of variation in bird assemblage. Ordination analyses that compare similarities and differences between assemblages have proven to be a useful approach (Chase et al. 2001, Su et al. 2004). Accordingly, we examined the differences in assemblages of birds using non-metric multidimensional scaling (MDS) ordination of Bray–Curtis similarities (Primer 6, v6.1.15; Primer-E Ltd., 2012). The Bray–Curtis measure is used to quantify the compositional similarity or difference between sets of objects. In this case there are 10 sets of bird counts, from 2 treatments (i.e. vehicle vs. control) x 5 vegetation types (Table inset of Figure 2). The purpose of MDS ordination is to provide a visual representation of the pattern of similarities within groups and dissimilarities among groups. MDS uses an iterative algorithm to reduce the multiple dimensions of similarity (among all the various bird species) down to two dimensions. The result is a plot with points either clustered or scattered. Points in close proximity correspond to sites with similar assemblages of birds and distant points correspond to sites with dissimilar assemblages. This technique is appropriate for the CSVRA bird data set because it makes few assumptions about the nature of the data. For example, the data do not need to have a normal distribution or have linear relationships among variables. Strength of MDS ordination is the ability to handle a

data set containing multiple sets of zero observations – as occurs with birds, only a subset of the full complement of species is observed at any given site.

Figure 1. Map of point-count survey locations in Carnegie State Vehicular Recreation Area (Fig. 2, p. 11 in DeSilva and Meisel 2015).

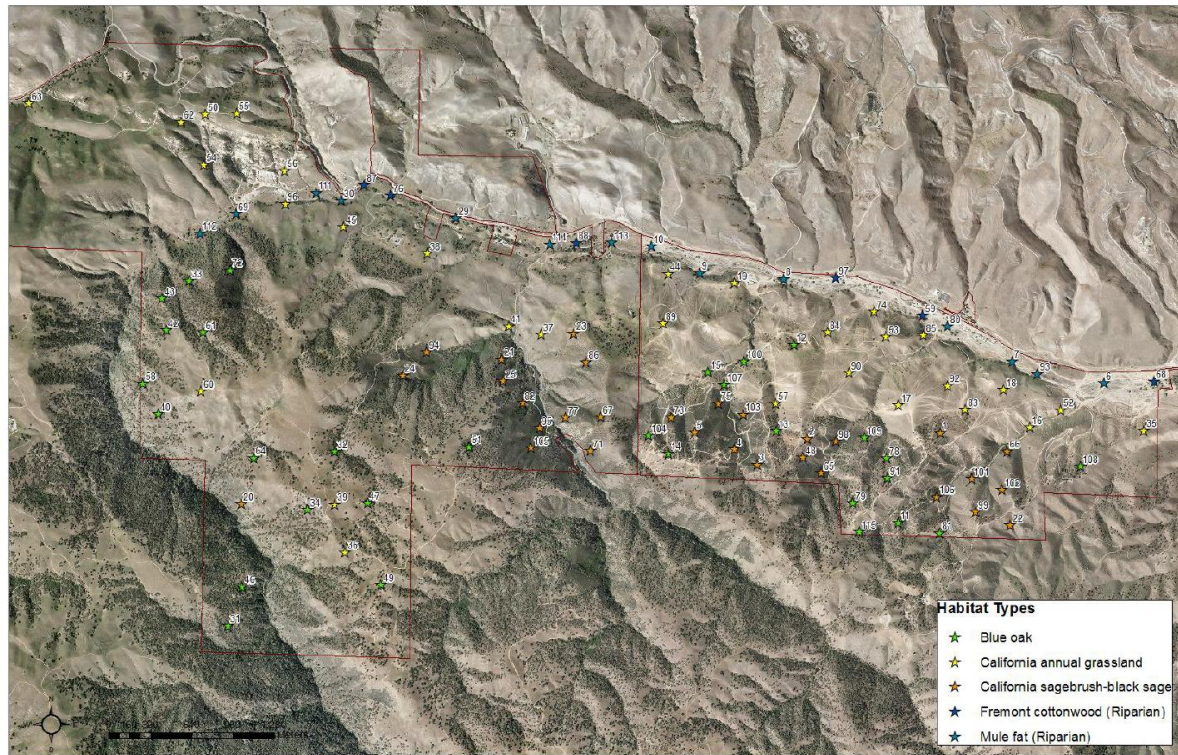
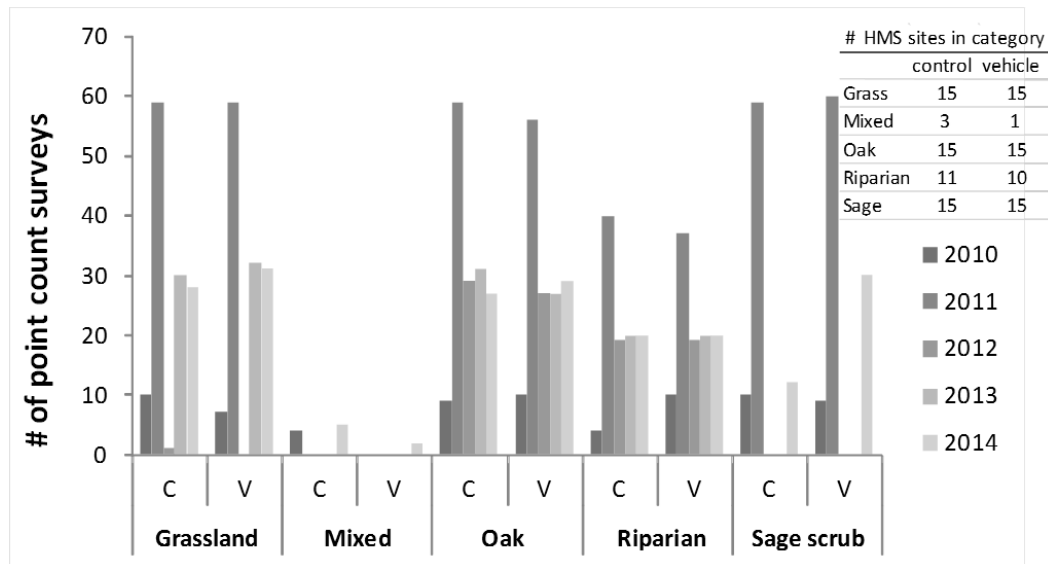


Figure 2. Map of HMS sites.

We treated each HMS site as a replicate rather than each point-count survey because not all HMS sites were visited twice a sampling period as planned (Figure 2). Also, repeated surveys at a given point cannot be considered independent. For each replicate we estimated abundance as the sum of the number of individuals of each species observed divided by the total number of visits to the given HMS site from 2010 to 2014. This estimate of abundance does not account for year to year variation in detectability due to: 1) the uneven and inconsistent levels of sampling effort (e.g. 2010 was a pilot study, and sage scrub and grassland vegetations not sampled some subsequent years); 2) observer change due to staff and volunteer turn-over; and 3) variation in the seasonal timing of surveys (winter surveys conducted in 2011). Despite the uncertainty associated with the flaws in CSVRA's execution of the Habitat Monitoring System, estimates of abundance can be useful (Nichols et al. 2009) and counts uncorrected for detectability often mirror corrected estimates (Thompson and La Sorte 2008). We transformed data by taking the fourth root of abundance to incorporate the contribution of less commonly observed taxa and discount the most common taxa. Although the analyses were on transformed data, we plotted

untransformed data in bar charts for ease of interpretation. A limitation of the ordination computational technique is that very infrequently observed taxa have to be excluded, so species with ≤ 3 individuals detected were removed from the data set. Some of these are protected status and rare species which may be especially vulnerable to OHV use, such as the Burrowing Owl.

Figure 2. Year to year variation in the number of visits to Habitat Monitoring System (HMS) sites in relation to the independent Variables of Treatment (control (C) vs. OHV riding (V)) and Vegetation Type.



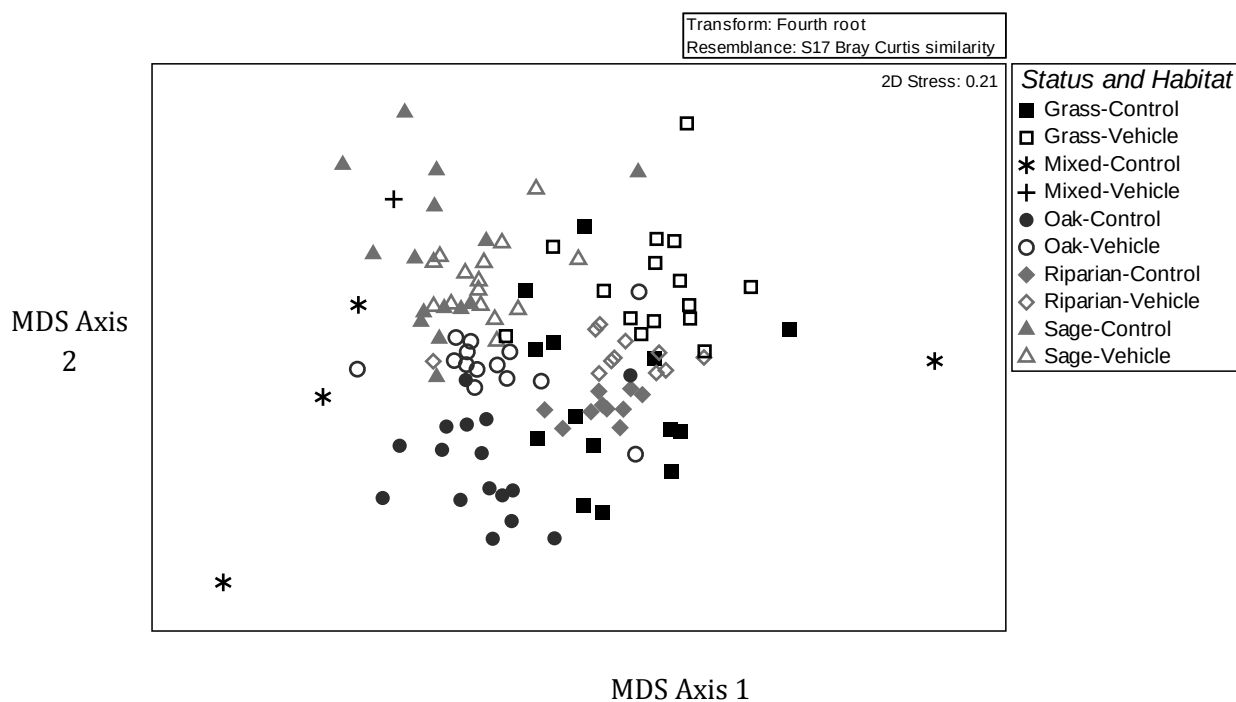
We examined points based on factors of recreational use status (control vs. OHV riding) and vegetation types (blue oak, grassland, sage scrub, riparian, and mixed). Analysis of similarity (ANOSIM) routines were derived from the similarity matrix to first determine if there were differences in the bird assemblage between OHV riding and control areas and then to assess differences among vegetation types. The ANOSIM R test statistic can range from 0 to 1¹, and the higher the value the greater the separation of bird assemblages. Because there were significant differences in bird assemblage among vegetation types, data were separated by vegetation for subsequent analyses comparing OHV to control sites. We used similarity percentage analyses (SIMPER) to determine which taxa contributed the most to similarities within groups and dissimilarities between OHV and control sites.

¹R will equal 1 if ALL replicates within a group (area) are more similar to each other than ANY replicates from

2.2 RESULTS AND INTERPRETATION

The bird assemblages in the riding and non-riding areas have distinctly different species compositions (Figure 3). In the MDS plot, sites (i.e. points) cluster by vegetation type, but are separated by recreation status. For example, the circles representing oak woodland sites are clustered relative to the other shapes (e.g. squares for grassland sites), but dark circles (control sites) are in a distinct cluster away from open circles (OHV sites). This means that there are significant shifts in the bird assemblage away from their natural state where OHV use occurs in the oak woodlands (see section 2.2.1). Overall divergence of the species composition and relative abundance of birds between control and OHV sites, as measured by the Bray-Curtis dissimilarity index, was 56.16% (ANOSIM Global R=0.24, $p=0.001$). To understand what this means in terms of significant impacts, one must examine the identity of species contributing to assemblage divergence and delve more deeply into the output (presented in full section 4.2 MDS Appendices beginning one page 18). Below we cover just some of the key concerns raised as an example of the kind of analysis that State Parks should be doing to responsibly conserve wildlife.

Figure 3. Two-dimensional multidimensional scaling (MDS) plot of bird abundances in point count surveys (2010-2014) at CSVRA. Each point represents the multiyear average of observations at an HMS site (n=115). Ordination based on Bray-Curtis similarities of fourth root transformed data. Points coded by vegetation type.



Divergence between pairs of vegetation groups (regardless of riding or control status) were also significant (ANOSIM Global $R = 0.54$, $p = 0.001$). This means that the effects of OHV use must be evaluated within the context of each vegetation type separately. We found the greatest differences, and highest degree of separation between control and OHV sites (as indicated by R values) in the blue oak and riparian vegetation types (Oak dissimilarity = 50%, $R = 0.40$, $p = 0.001$; Riparian dissimilarity = 43%, $R = 0.28$, $p = 0.001$). Grassland and coastal sage scrub also showed marked differences between control and OHV sites. Because the degree of separation, as noted by R values, was lower (grassland $R = 0.21$, $p = 0.001$; Coastal sage scrub $R = 0.11$, $p = 0.006$), and because these sites were sampled less consistently, we do not focus on them in detail.

2.2.1 CHANGES IN SPECIES COMPOSITION SINCE 1989-1990

Of the numerically dominant species, the Common Raven (*Corvus corax*) contributed most heavily to defining similarity within sites (Table 2.4-1). Ravens were the most abundant species in the period from 2010–2014, yet twenty five years ago, ravens ranked 20th in control sites and 12th in OHV sites (Table 2.2-1). The relative abundance of ravens is higher in the riding area, comprising 11% of birds counted compared to controls where they comprised 8% of sightings. This is significant because the Common Raven is a voracious predator that threatens the persistence of several rare species (Boarman et al. 2006, Bui et al. 2010). The Common Raven is rarely “common” in unaltered environments. However, artificial subsidies provided by humans (e.g., food, water, nesting and perch sites) enable raven populations to explode.

During visits to CSVRA, numerous ravens have been observed in the vicinity of uncovered garbage cans and at a dumpster (Figure 4). Thus, it is not surprising that CSVRA’s data indicate ravens have increased in OHV areas. Because ravens are opportunistic predators, it is reasonable to infer that they pose a threat to California tiger salamanders, California red-legged frogs, and other threatened and endangered species within CSVRA. Because ravens are easily seen and heard relative to other species, and the data required to correct for differences in detectability were not available, this result requires follow-up investigation as well as immediate conservation action. Unfortunately, the DEIR does not address. The PGP needs to describe current garbage management and future control if the SVRA expands by 3 times the size, with gathering and services areas in remote and relatively inaccessible sites. The DEIR needs to describe the adverse impacts caused by improper garbage maintenance procedures at CSVRA, include mitigation to correct existing impacts, and ensure no future impacts.

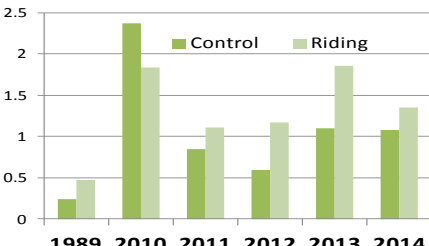
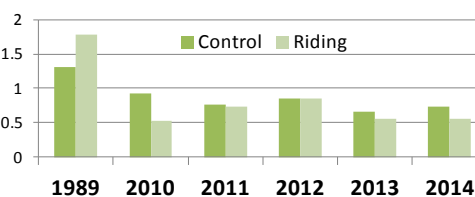
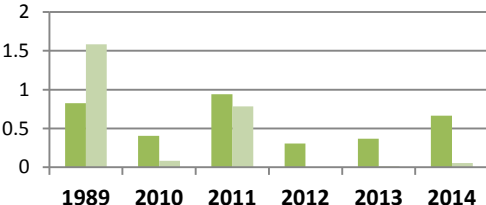
Figure 4. Uncovered garbage dumpster² near SRI road entrance at Carnegie SVRA and a Common Raven scavenging. (Photo credit C. Garamendi, 5/19/14)

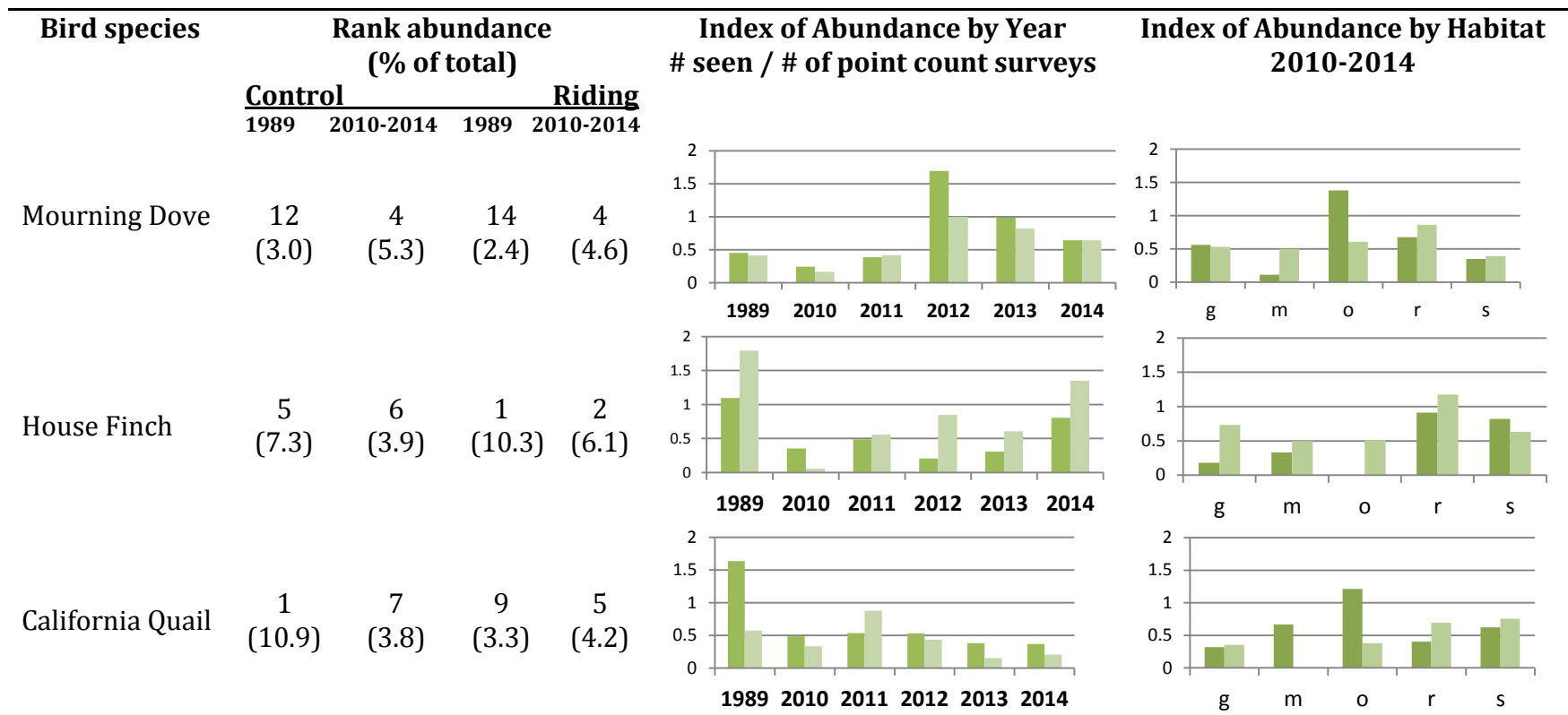


Western Meadowlark is another species which appears to have changed in relative abundance since 1989 (Table 2.2-1) and is also a top contributor to total dissimilarity (Table 2.4-1) between OHV and control sites. Meadowlarks are ground dwelling birds and may thus be particularly susceptible from disturbance from OHVs and loss of cover when grasses and forbs are trampled. At OHV sites, Meadowlarks have slipped from 3rd most abundant species to 12th place, while house finches came to numerically dominate at OHV sites after ravens. Dominance by house finches contributed the most to assemblage divergence between OHV and control sites, and the difference was greatest in the grasslands.

² C. Garamendi reports that CSVRA has a large dumpster placed near the SRI Road entrance. It is uncovered and has been since it was installed (≥ 10 years ago). Park users and SVRA staff on their routine garbage pick-up rounds dump loose and bagged garbage in it. When it gets too full, SVRA staff drives a heavy equipment loader from the maintenance station approx. 1.75 miles west to the dumpster to push down the garbage to try to prevent it from blowing away or to increase room for more garbage. Because there is no cover on the dumpster, the garbage, wildlife, and people who illegally enter the park at night, are attracted to the accessible garbage in the dumpster. Almost daily garbage is present on the ground having been pulled from, dumped by or blown out of the uncovered dumpster. Ravens are regularly present at the dumpster seeking the garbage.

Table 2.2-1. Historical comparisons of abundance observed in point count surveys conducted in 1989 (Kutilek et al. 1991) and 2010-2014 (Elsholz and Mynk 2010, DeSilva and Meisel 2015). Vegetation codes g=grassland, m=mixed, o=blue oak woodland, r = riparian mulefat or sycamore, s = coastal black sage scrub.

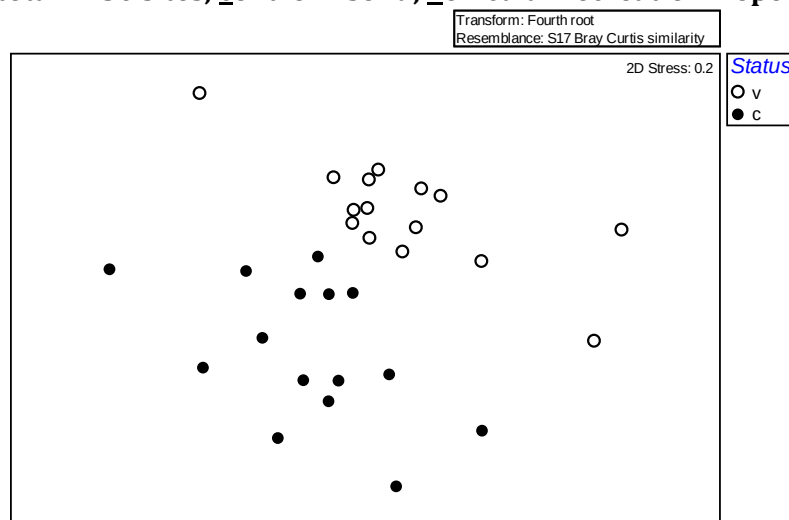
Bird species	Rank abundance (% of total)		Index of Abundance by Year # seen / # of point count surveys		Index of Abundance by Habitat 2010-2014
	<u>Control</u>		<u>Riding</u>		
	1989	2010-2014	1989	2010-2014	
Common Raven	20 (1.6)	1 (8.2)	12 (2.7)	1 (11.0)	
Western Scrub-jay	3 (8.8)	2 (6.2)	2 (10.3)	3 (5.4)	
Western Meadowlark	6 (5.5)	3 (5.5)	3 (9.1)	12 (2.9)	



2.2.2 OAK WOODLAND

The impact of OHV use on birds is most pronounced in the oak woodlands. The differences of the bird assemblage between control and riding sites are illustrated by the distinct separation of groups of points in the MDS³ plot (Figure 5, Table 2.4-4, Table 2.4-5, Table 2.4-6) as well as the abundances of Partners in Flight (PIF) oak woodland focal species (Figure 6, left). The PIF chose species that were good indicators for monitoring because “they are common and respond strongly and/or consistently to habitat attributes” (Zach et al. 2002). The list includes species which eat acorns, notably Western scrub jays and Yellow-billed magpies. These birds cache acorns individually in the ground and thus are important to the overall sustainability of the oak woodland because they facilitate regeneration of trees. When many of the acorns remain un-retrieved, they germinate. The focal species are also ecologically beneficial for other species. The decline of Acorn woodpeckers, for example, which are ten times less abundant at OHV sites, can have assemblage wide consequences. Because they actively excavate cavities, they create habitat for the other cavity nesting birds, their status is particularly important. The overall adverse impacts of OHV use on birds in Oak woodland are consistent with the HMS reports of more hillslope erosion and less vegetative cover in oak woodlands with riding (Figure 6 right, Figure 7).

Figure 5. Ordination² of point-count bird abundances (2010-2014) from Blue Oak woodland at CSVRA. Each point represents the multiyear average of bird observations at an HMS site. (total n=30 sites; control = solid; vehicular recreation = open).



³ Multi-Dimensional Scaling Ordination and Analysis of Similarity: Global Test Sample Statistic (Global R): 0.399. Significance level of sample statistic: P=0.001 Number of permutations: 999 (Random sample from 77558760). Number of permuted statistics greater than or equal to Global R: 0.

Figure 6. Mean (± 1 SE) abundance estimates for species (left) identified for monitoring by the Partners in Flight (Zack et al. 2002) and area with rilling conditions (right) in Blue Oak woodlands comparing OHV and non-riding sites.

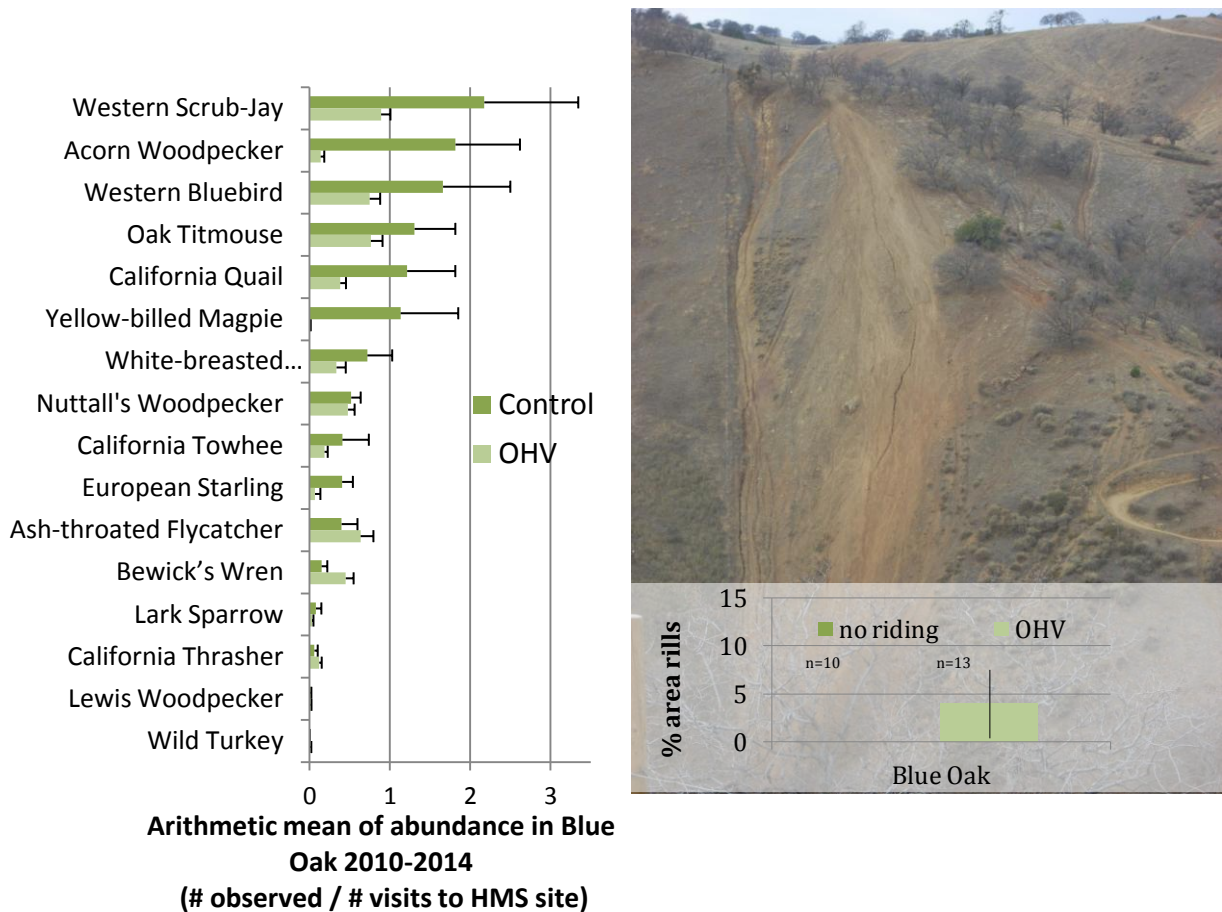
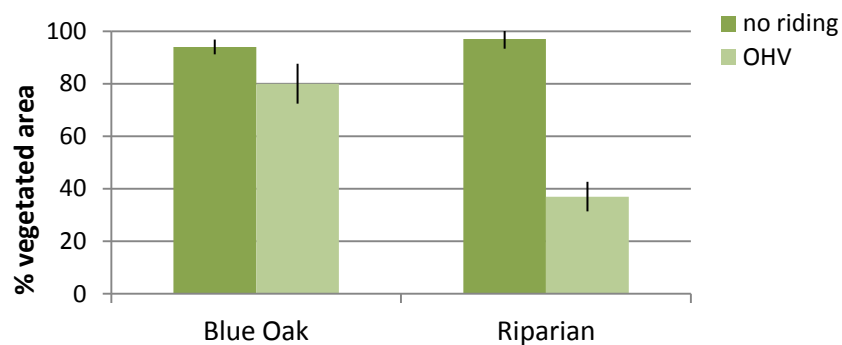


Figure 7. Differences in vegetated area between riding and control sites likely contribute to differences in avian assemblage (data replotted from Elsholz and Mynk 2010).



2.2.3 RIPARIAN

In the riparian zone, ordination reveals dissimilarity (Figure 8) in bird assemblages among most OHV and control sites. The difference was driven by the greater abundances of Western Meadowlarks, Red-winged Blackbirds, Brewer's Blackbirds in the control sites (Table 2.4-12). Six out of the seven Partners in Flight focal species for riparian habitats (Riparian Habitat Joint Venture 2004) were also more abundant in the control sites, however these birds were not strictly limited to the riparian zone and we have presented the results across all vegetation types (Figure 9).

Figure 8. Ordination of bird abundances (2010-2014) in riparian vegetation at CSVRA. Each point represents the multiyear mean of observations at an HMS site. (total n=21 sites; control=solid; vehicular recreation=open). Bottom plot zooms into the right area of top plot.

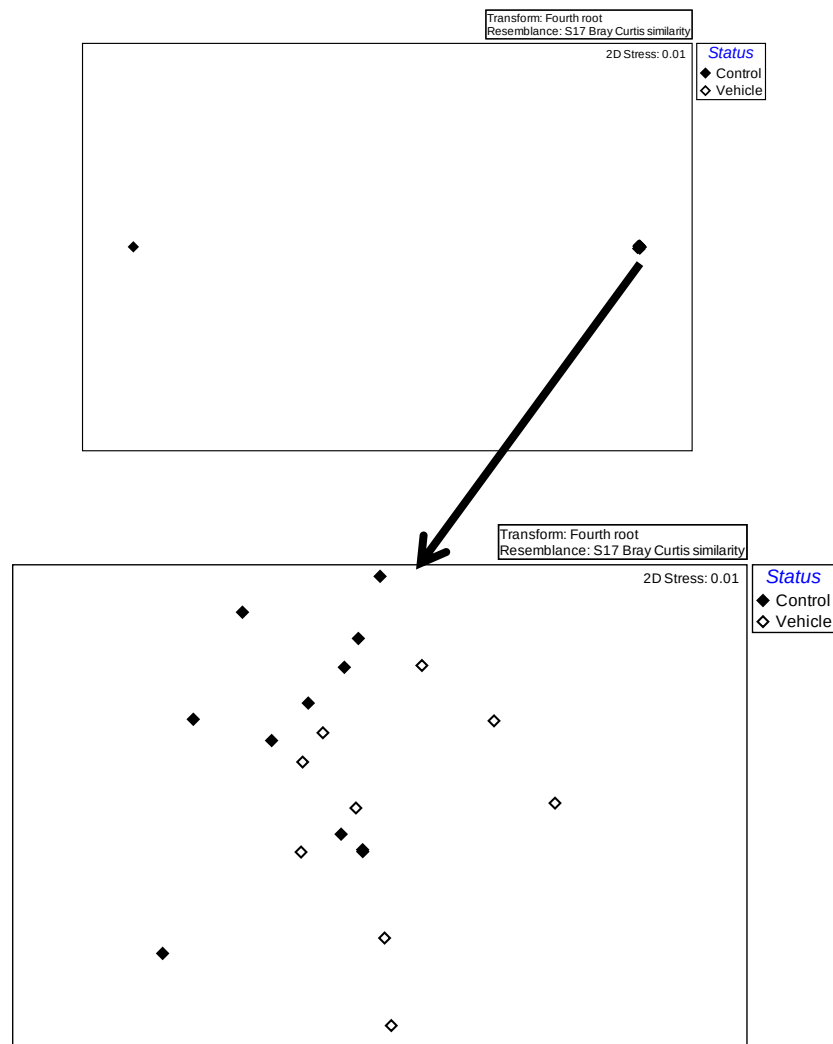
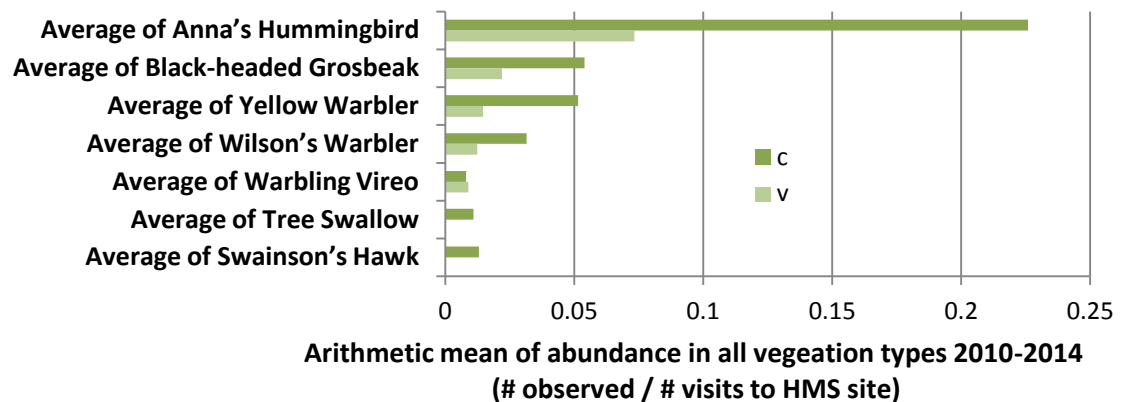


Figure 9. Partners in Flight riparian indicator species abundance across all vegetation types.



2.2.4 SPECIAL STATUS SPECIES

2.2.4.1 Golden Eagle

During point count surveys conducted from 2010 to 2014 by CSVRA staff, 54 Golden Eagle observations were made at control HMS sites, and 10 observations were made at point-count sites with OHV riding. The pattern was consistent across years (Figure 10) and across all vegetation types (Figure 11). The abundance data (calculated as the total number of eagles seen at a given HMS site during point count surveys divided by the total number of visits to that HMS site between 2010 and 2014), were not normally distributed and there were unequal variances among vegetation types and recreational use factors. Therefore a simple non-parametric comparison was conducted. The overall difference in abundance of Golden Eagles between riding and control point count surveys was highly significant (Mann-Whitney $U=2,251$, $p<0.001$; Chi-Square Approximation = 16.34, degrees of freedom=1; control $n=59$, riding=56 HMS sites). This concentration of sightings in control sites is consistent with an independent assessment of Golden Eagle territories made by T. Hunt (Figure 12, Section 2.5), showing no territories where OHV use occurs.

Figure 10. Golden Eagle observations at CSVRA during point count bird surveys.

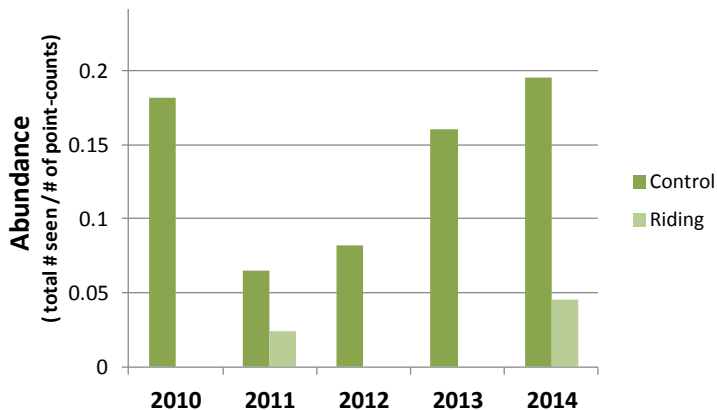


Figure 11. Mean (± 1 SE) of Golden Eagle abundance as measured during point count surveys conducted between 2010 and 2014 at Carnegie SVRA. Sample sizes are number of HMS sites in each vegetation type.

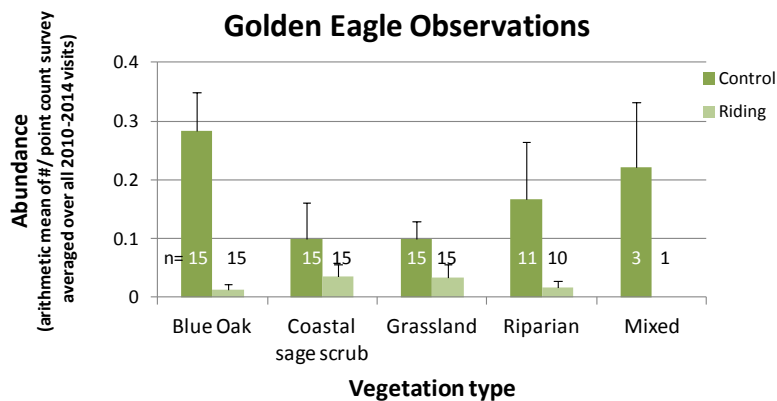
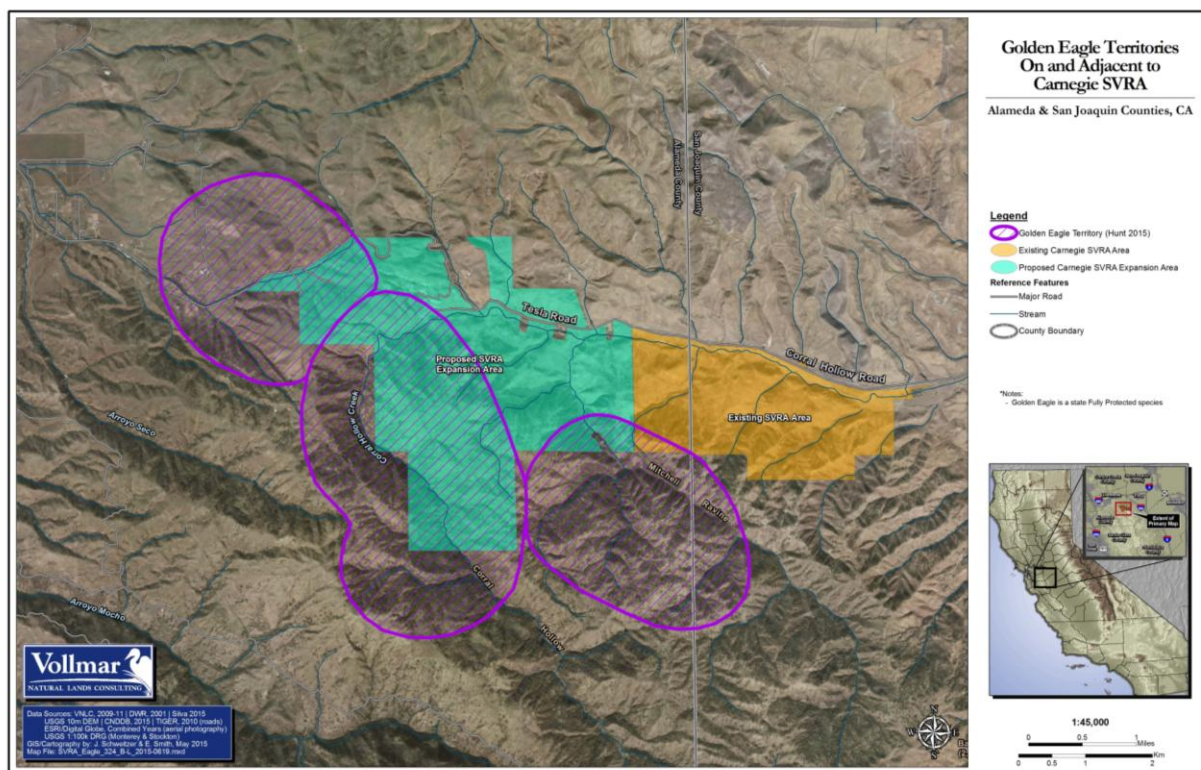


Figure 12. Three Golden Eagle Territories on or adjacent to the expansion area at CSVRA.

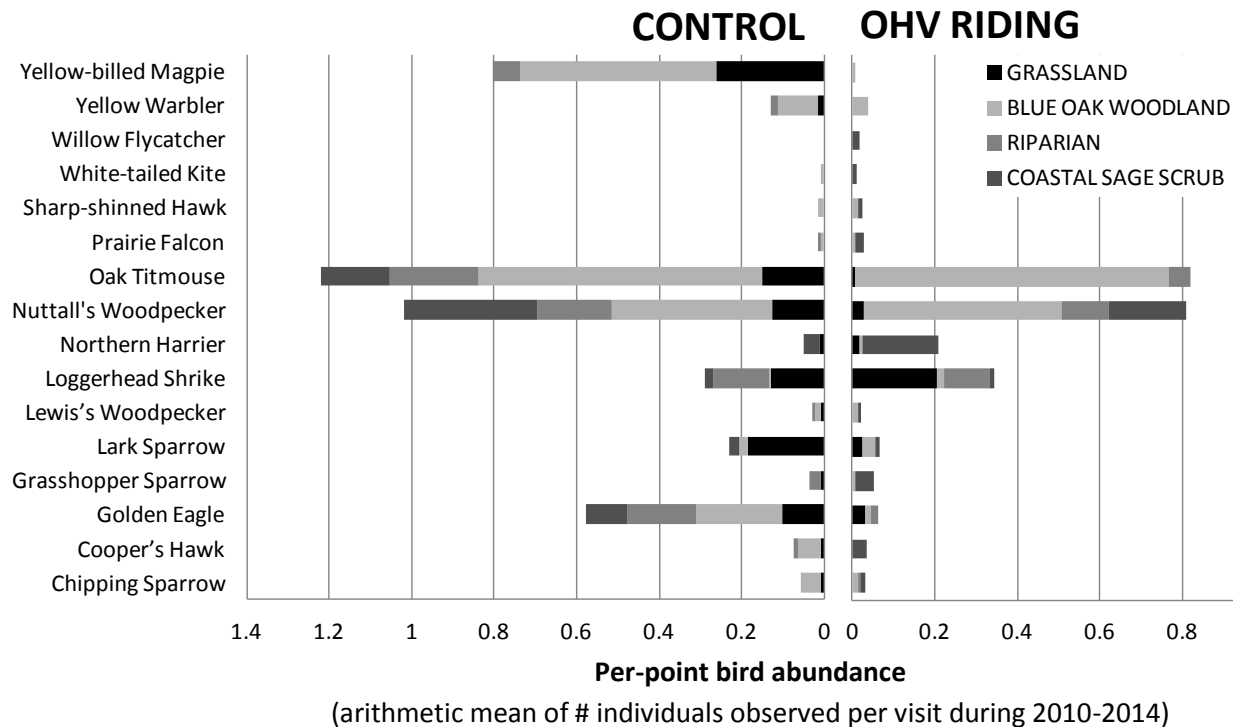


2.2.4.2 Birds on special animals list

Among the birds on CDFW's special animals list (Figure 13), the Oak Titmouse which was more abundant in control sites also figured prominently in contributing to overall dissimilarity with OHV sites (Table 2.4-1). Yellow-billed magpies which were virtually

absent in OHV sites, contributed heavily to the divergence from control oak woodlands. Lark sparrows, although more abundant in control grasslands than OHV grasslands were not prominent as descriptors of assemblage change with OHV use.

Figure 13. Abundance of Birds on California Special Animals list



2.3 CONCLUSIONS REGARDING BIRDS

The bird assemblage in the existing OHV riding areas has a significantly divergent species composition compared to control areas, especially in the oak woodlands. Abundances of several key indicator species were markedly lower where OHV riding occurs. This means that the DEIR has failed to adequately describe the present setting for the project. The DEIR has also failed to use the historical data collected by CSVRA which means that they have not evaluated the potential for adverse changes to bird assemblages over years of exposure to OHV use.

Ordination analyses do not explicitly examine the cause and effect mechanisms underlying the divergence in bird assemblage shown here. However there is a body of scientific literature on the disturbance factors influencing bird abundance. Of these, the DEIR fails to assess the potentially significant impacts of noise on birds (Barton and Holmes 2007). Recent field investigations of the impacts of noise pollution on birds have found a number of responses which could explain the differences in species composition and abundance. Some bird species avoid noisy areas, some show changes in reproductive

success and levels of stress hormones, while others make changes in vocal communications (Ortega 2012). The DEIR does not explore any other mechanistic reasons driving the differences between the riding area and the control area, such as the loss of vegetative cover which could influence food availability, predation risk, nest site availability etc.

Furthermore, the impact minimization measures and resource protection guidelines described in the DEIR/PGP cannot rely on the results of future monitoring based on CSVRA's track record.

- CSVRA has not demonstrated the capability of interpreting data and detecting impacts in a timely manner, much less mitigating them through adaptive management after the impact has occurred.
- Effective adaptive management relies on knowledge of mechanism, and the next step after the type of data visualization done here is to develop testable hypotheses regarding the processes underlying the observed patterns.
- As Meese et al. stated in their peer review of the HMS program “diversity indices provide no insights into causality, i.e. the underlying reasons for observed changes, and therefore we strongly recommend a parallel evaluation of quantitative results from field data separate from the values of Simpson’s Diversity Indices or other diversity indices.”

In the absence of known mechanisms of the observed impacts, there is no reason to believe that minimization and avoidance measures in the PGP could possibly be effective.

2.4 MDS APPENDICES

Analyses and numbers in all tables in these appendices **are based on fourth root transformed data**, *not* raw counts of birds. For all SIMPER tables: Av.Abund = average abundance; Av.Diss = Average dissimilarity, the Bray-Curtis metric; Diss/SD = the ratio of the average dissimilarity contribution (column 3) divided by the standard deviation of contributions across all pairs of samples making up the average; Contrib% = Contributing Percent – percent contribution to the total average dissimilarity; Cum% = cumulative percent.

2.4.1 SIMPER ANALYSIS COMPARING VEHICULAR (V) RIDING SITES VS CONTROL (C)

Table 2.4-1 Species contributing to dissimilarity across all vegetation types.

Groups Vehicle & Control: Average dissimilarity = 56.16%

Species	Group v Av.Abund	Group c Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
House Finch	0.78	0.36	1.63	1.35	2.91	2.91
Wrentit	0.48	0.41	1.46	1.06	2.60	5.50
Western Meadowlark	0.25	0.51	1.42	1.05	2.53	8.04
Bewick's Wren	0.64	0.53	1.33	1.15	2.37	10.41
Western Bluebird	0.50	0.42	1.30	1.18	2.31	12.72
Oak Titmouse	0.40	0.55	1.28	1.16	2.28	15.00
Cliff Swallow	0.47	0.12	1.25	1.04	2.23	17.23
Western Kingbird	0.47	0.26	1.23	1.10	2.19	19.43
European Starling	0.22	0.47	1.21	1.09	2.16	21.58
White-crowned Sparrow	0.42	0.17	1.15	1.00	2.04	23.63
Spotted Towhee	0.36	0.32	1.13	1.03	2.02	25.65
Nuttall's Woodpecker	0.45	0.57	1.13	1.13	2.01	27.66
California Towhee	0.50	0.39	1.12	1.15	2.00	29.65
Northern Flicker	0.20	0.48	1.10	1.20	1.96	31.61
Acorn Woodpecker	0.17	0.42	1.10	1.00	1.95	33.57
Turkey Vulture	0.59	0.57	1.07	1.08	1.90	35.47
White-breasted Nuthatch	0.24	0.39	1.06	1.07	1.89	37.37
Red-winged Blackbird	0.29	0.22	1.03	0.80	1.83	39.20
American Kestrel	0.40	0.52	1.02	1.12	1.82	41.02
Red-tailed Hawk	0.71	0.54	1.02	1.03	1.82	42.84
Anna's Hummingbird	0.33	0.35	1.01	1.09	1.81	44.65
California Thrasher	0.33	0.24	1.01	1.00	1.80	46.44
Ash-throated Flycatcher	0.69	0.52	1.00	1.01	1.77	48.22
Golden Eagle	0.10	0.35	0.98	0.93	1.75	49.97
Bullock's Oriole	0.30	0.23	0.96	0.97	1.72	51.69
Northern Mockingbird	0.31	0.22	0.95	0.99	1.70	53.38
Phainopepla	0.31	0.23	0.95	0.96	1.68	55.07
California Quail	0.73	0.73	0.94	0.98	1.67	56.73
Brewer's Blackbird	0.21	0.26	0.92	0.82	1.63	58.36
Golden-crowned Sparrow	0.28	0.20	0.90	0.86	1.59	59.96
Ruby-crowned Kinglet	0.27	0.24	0.87	0.98	1.55	61.50
Western Scrub-Jay	0.80	0.88	0.85	0.88	1.52	63.03
Loggerhead Shrike	0.24	0.20	0.82	0.88	1.45	64.48

Bushtit	0.21	0.17	0.81	0.74	1.45	65.93
Say's Phoebe	0.22	0.22	0.81	0.90	1.45	67.38
Yellow-rumped Warbler	0.15	0.24	0.76	0.84	1.35	68.72
Brown-headed Cowbird	0.19	0.21	0.75	0.86	1.34	70.06
Yellow-billed Magpie	0.01	0.28	0.72	0.67	1.28	71.34
Common Raven	1.02	0.94	0.70	0.92	1.25	72.59
Lesser Goldfinch	0.19	0.15	0.70	0.76	1.25	73.84
Killdeer	0.16	0.15	0.62	0.74	1.11	74.94
Mourning Dove	0.82	0.82	0.60	0.82	1.08	76.02
Dark-eyed Junco	0.09	0.16	0.56	0.59	0.99	77.01
Eurasian Collared-Dove	0.06	0.18	0.55	0.55	0.97	77.99
Black Phoebe	0.08	0.14	0.50	0.61	0.88	78.87
Lark Sparrow	0.09	0.12	0.49	0.56	0.88	79.75
Pacific-slope Flycatcher	0.12	0.10	0.49	0.61	0.87	80.62
Wilson's Warbler	0.12	0.10	0.46	0.62	0.82	81.44
Rock Wren	0.03	0.15	0.45	0.54	0.81	82.25
Black-headed Grosbeak	0.08	0.11	0.42	0.58	0.75	83.00
Rufous Hummingbird	0.08	0.08	0.39	0.47	0.70	83.70
Wild Turkey	0.10	0.08	0.38	0.51	0.68	84.38
humming bird sp.	0.10	0.07	0.37	0.57	0.67	85.04
Violet-green Swallow	0.05	0.11	0.35	0.52	0.63	85.67
American Goldfinch	0.10	0.04	0.35	0.45	0.62	86.29
Western Tanager	0.04	0.11	0.33	0.52	0.59	86.89
Yellow Warbler	0.06	0.09	0.33	0.49	0.59	87.48
Cassin's Kingbird	0.10	0.03	0.33	0.45	0.59	88.07
Savannah Sparrow	0.02	0.09	0.33	0.37	0.58	88.65
Lazuli Bunting	0.03	0.10	0.32	0.47	0.57	89.22
Orange-crowned Warbler	0.08	0.05	0.31	0.47	0.55	89.77
Steller's Jay	0.00	0.12	0.30	0.40	0.53	90.29

Table 2.4-2. Group Vehicle: Average similarity: 49.30%

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Common Raven	1.02	5.00	3.21	10.15	10.15
Mourning Dove	0.82	4.02	3.46	8.15	18.30
Western Scrub-Jay	0.80	3.41	2.03	6.92	25.22
House Finch	0.78	3.15	1.60	6.40	31.61
Red-tailed Hawk	0.71	3.12	1.86	6.33	37.94
California Quail	0.73	3.02	1.79	6.13	44.07
Ash-throated Flycatcher	0.69	2.97	1.94	6.02	50.09
Turkey Vulture	0.59	2.23	1.15	4.52	54.62
Bewick's Wren	0.64	2.16	1.04	4.38	59.00
California Towhee	0.50	1.46	0.85	2.96	61.96
Western Bluebird	0.50	1.46	0.80	2.96	64.91
Western Kingbird	0.47	1.24	0.66	2.51	67.43
American Kestrel	0.40	1.21	0.73	2.46	69.88
Nuttall's Woodpecker	0.45	1.21	0.72	2.45	72.34
Cliff Swallow	0.47	1.18	0.65	2.39	74.72
Wrentit	0.48	1.12	0.54	2.27	77.00
Oak Titmouse	0.40	0.86	0.55	1.74	78.74
White-crowned Sparrow	0.42	0.85	0.55	1.73	80.47
Anna's Hummingbird	0.33	0.77	0.56	1.55	82.02
Spotted Towhee	0.36	0.72	0.50	1.46	83.48
California Thrasher	0.33	0.70	0.50	1.41	84.89
Northern Mockingbird	0.31	0.59	0.46	1.20	86.10
Phainopepla	0.31	0.59	0.45	1.20	87.30
Bullock's Oriole	0.30	0.59	0.46	1.20	88.49

Ruby-crowned Kinglet	0.27	0.45	0.41	0.92	89.41
Loggerhead Shrike	0.24	0.41	0.36	0.84	90.24

Table 2.4-3 Group Control: Average similarity: 43.24%

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Common Raven	0.94	4.32	2.46	10.00	10.00
Western Scrub-Jay	0.88	3.75	2.14	8.67	18.67
Mourning Dove	0.82	3.62	2.35	8.38	27.04
California Quail	0.73	2.81	1.50	6.51	33.55
Nuttall's Woodpecker	0.57	1.90	1.10	4.40	37.95
Turkey Vulture	0.57	1.78	0.98	4.12	42.07
Red-tailed Hawk	0.54	1.77	0.95	4.09	46.17
American Kestrel	0.52	1.75	0.99	4.05	50.22
Ash-throated Flycatcher	0.52	1.61	0.99	3.73	53.94
Bewick's Wren	0.53	1.54	0.74	3.56	57.51
Oak Titmouse	0.55	1.50	0.83	3.46	60.97
Northern Flicker	0.48	1.34	0.84	3.11	64.08
Western Meadowlark	0.51	1.23	0.62	2.84	66.92
European Starling	0.47	0.93	0.60	2.15	69.07
Wrentit	0.41	0.93	0.44	2.15	71.21
California Towhee	0.39	0.89	0.64	2.06	73.27
White-breasted Nuthatch	0.39	0.85	0.59	1.96	75.23
Golden Eagle	0.35	0.81	0.50	1.88	77.11
Western Bluebird	0.42	0.78	0.53	1.81	78.92
Acorn Woodpecker	0.42	0.76	0.54	1.76	80.68
Anna's Hummingbird	0.35	0.68	0.53	1.57	82.25
Spotted Towhee	0.32	0.64	0.43	1.48	83.73
House Finch	0.36	0.59	0.45	1.38	85.10
California Thrasher	0.24	0.41	0.34	0.96	86.06
Ruby-crowned Kinglet	0.24	0.37	0.39	0.86	86.92
Western Kingbird	0.26	0.37	0.36	0.84	87.76
Yellow-billed Magpie	0.28	0.35	0.32	0.81	88.57
Say's Phoebe	0.22	0.34	0.34	0.78	89.35
Phainopepla	0.23	0.32	0.35	0.74	90.09

2.4.2 VEGETATION TYPE = BLUE OAK WOODLAND

Table 2.4-4. Bird species contributing to similarity within the OHV/ Blue Oak Woodland group of HMS sites. Average similarity: 58.37%.

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Oak Titmouse	0.90	4.00	5.51	6.85	6.85
Western Bluebird	0.89	3.91	5.21	6.71	13.56
Mourning Dove	0.86	3.90	4.91	6.69	20.24
Common Raven	0.93	3.86	2.34	6.61	26.86
Western Scrub-Jay	0.90	3.72	2.40	6.37	33.23
Ash-throated Flycatcher	0.84	3.63	4.82	6.22	39.44
Nuttall's Woodpecker	0.76	3.10	2.26	5.30	44.75
Bewick's Wren	0.73	2.93	2.12	5.01	49.76
House Finch	0.71	2.55	1.55	4.37	54.13
California Quail	0.68	2.54	1.58	4.35	58.49
Red-tailed Hawk	0.63	2.38	1.49	4.07	62.56
American Kestrel	0.58	2.04	1.25	3.50	66.06
Turkey Vulture	0.58	1.94	1.21	3.32	69.38
White-breasted Nuthatch	0.59	1.87	1.27	3.21	72.59
Wrentit	0.56	1.52	0.81	2.61	75.20
Phainopepla	0.49	1.51	1.01	2.59	77.80
California Towhee	0.48	1.39	0.85	2.39	80.18
Ruby-crowned Kinglet	0.47	1.29	0.85	2.22	82.40
California Thrasher	0.42	1.12	0.85	1.92	84.32
Spotted Towhee	0.42	0.99	0.71	1.70	86.02
Acorn Woodpecker	0.40	0.91	0.71	1.57	87.58
Northern Flicker	0.34	0.90	0.71	1.54	89.12
Anna's Hummingbird	0.32	0.62	0.49	1.06	90.18

Table 2.4-5. Group Oak Woodland Control: Average similarity: 55.23%

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Western Scrub-Jay	1.02	3.84	8.09	6.96	6.96
Oak Titmouse	0.97	3.84	7.47	6.95	13.91
Mourning Dove	0.98	3.84	6.50	6.95	20.86
Common Raven	0.99	3.76	5.90	6.81	27.67
White-breasted Nuthatch	0.84	3.43	5.96	6.21	33.88
Acorn Woodpecker	0.96	3.40	2.27	6.15	40.03
Nuttall's Woodpecker	0.81	3.31	7.36	5.99	46.02
Western Bluebird	0.91	3.10	2.19	5.60	51.62
Northern Flicker	0.76	2.68	2.33	4.85	56.48
California Quail	0.77	2.14	1.24	3.88	60.36
Golden Eagle	0.59	1.93	1.21	3.49	63.84
American Kestrel	0.57	1.90	1.26	3.45	67.29
European Starling	0.59	1.65	1.00	2.99	70.28
Yellow-billed Magpie	0.63	1.45	0.82	2.63	72.90
Ash-throated Flycatcher	0.54	1.37	1.02	2.48	75.38
Turkey Vulture	0.52	1.37	1.01	2.48	77.86
Yellow-rumped Warbler	0.49	1.33	0.84	2.41	80.27
Western Meadowlark	0.48	1.25	0.71	2.26	82.54
Red-tailed Hawk	0.43	1.03	0.70	1.87	84.41
Ruby-crowned Kinglet	0.44	0.95	0.71	1.72	86.12

Anna's Hummingbird	0.39	0.66	0.59	1.19	87.32
Phainopepla	0.35	0.56	0.49	1.01	88.33
Western Wood-Pewee	0.26	0.53	0.50	0.96	89.29
Bewick's Wren	0.32	0.50	0.49	0.91	90.20

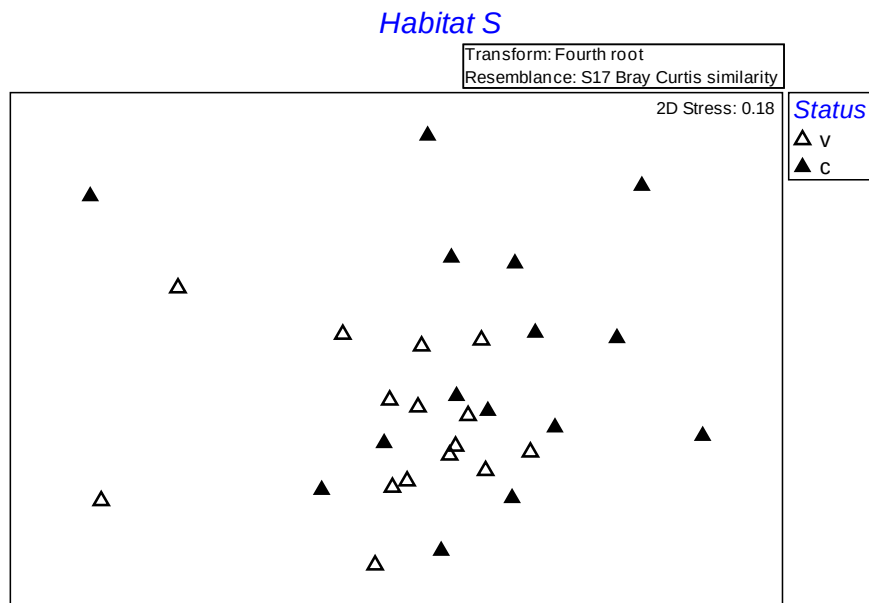
Table 2.4-6 Groups Oak Woodland Vehicle & Control: Average dissimilarity = 49.91%

Species	Group v Av.Abund	Group c Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
House Finch	0.71	0.04	1.60	1.96	3.21	3.21
Acorn Woodpecker	0.40	0.96	1.48	1.44	2.97	6.18
Yellow-billed Magpie	0.04	0.63	1.42	1.29	2.84	9.02
European Starling	0.07	0.59	1.35	1.52	2.71	11.73
Golden Eagle	0.07	0.59	1.30	1.66	2.61	14.34
Bewick's Wren	0.73	0.32	1.21	1.47	2.43	16.77
Wrentit	0.56	0.28	1.18	1.23	2.36	19.14
Western Meadowlark	0.04	0.48	1.14	1.18	2.29	21.43
Northern Flicker	0.34	0.76	1.08	1.35	2.16	23.58
California Towhee	0.48	0.35	1.02	1.24	2.05	25.63
Yellow-rumped Warbler	0.32	0.49	1.01	1.19	2.03	27.66
Ash-throated Flycatcher	0.84	0.54	1.01	1.18	2.03	29.69
California Quail	0.68	0.77	0.98	1.10	1.96	31.65
Phainopepla	0.49	0.35	0.96	1.20	1.93	33.59
Spotted Towhee	0.42	0.33	0.96	1.19	1.92	35.51
Anna's Hummingbird	0.32	0.39	0.94	1.15	1.89	37.40
California Thrasher	0.42	0.14	0.93	1.27	1.87	39.27
Ruby-crowned Kinglet	0.47	0.44	0.92	1.16	1.84	41.11
Red-tailed Hawk	0.63	0.43	0.91	1.17	1.82	42.93
Turkey Vulture	0.58	0.52	0.90	1.19	1.80	44.73
Golden-crowned Sparrow	0.30	0.25	0.88	0.93	1.77	46.50
White-crowned Sparrow	0.34	0.09	0.86	0.83	1.73	48.23
Dark-eyed Junco	0.19	0.28	0.84	0.91	1.69	49.92
Bushtit	0.33	0.11	0.83	0.96	1.66	51.58
White-breasted Nuthatch	0.59	0.84	0.79	1.00	1.58	53.16
Western Kingbird	0.30	0.07	0.77	0.83	1.53	54.69
American Kestrel	0.58	0.57	0.75	1.08	1.50	56.19
Western Bluebird	0.89	0.91	0.73	1.10	1.47	57.66
Cliff Swallow	0.32	0.04	0.73	0.91	1.45	59.11
Common Raven	0.93	0.99	0.70	1.01	1.40	60.51
Yellow Warbler	0.13	0.25	0.69	0.82	1.38	61.89
Western Tanager	0.12	0.26	0.69	0.90	1.37	63.26
Western Scrub-Jay	0.90	1.02	0.68	0.88	1.36	64.62
Pacific-slope Flycatcher	0.22	0.16	0.67	0.89	1.35	65.97
Bullock's Oriole	0.26	0.07	0.65	0.86	1.31	67.28
Western Wood-Pewee	0.04	0.26	0.64	0.93	1.29	68.56
Steller's Jay	0.00	0.29	0.64	0.79	1.28	69.85
Violet-green Swallow	0.10	0.22	0.61	0.78	1.23	71.07
Lesser Goldfinch	0.14	0.18	0.61	0.75	1.22	72.29
Cooper's Hawk	0.00	0.26	0.60	0.79	1.20	73.49
Black-headed Grosbeak	0.20	0.14	0.60	0.84	1.19	74.69
Wilson's Warbler	0.12	0.21	0.59	0.81	1.18	75.87
Northern Mockingbird	0.14	0.14	0.56	0.74	1.12	76.99

Chipping Sparrow	0.04	0.20	0.54	0.74	1.08	78.07
humming bird sp.	0.18	0.08	0.52	0.78	1.04	79.11
Orange-crowned Warbler	0.20	0.07	0.52	0.78	1.03	80.14
Lark Sparrow	0.15	0.11	0.51	0.71	1.03	81.17
Mourning Dove	0.86	0.98	0.50	1.07	0.99	82.16
Nuttall's Woodpecker	0.76	0.81	0.48	0.96	0.95	83.12
woodpecker sp	0.15	0.12	0.48	0.75	0.95	84.07
Oak Titmouse	0.90	0.97	0.46	1.14	0.92	84.99
Brown-headed Cowbird	0.11	0.13	0.46	0.68	0.92	85.91
Say's Phoebe	0.11	0.11	0.46	0.68	0.91	86.83
Warbling Vireo	0.15	0.08	0.43	0.70	0.85	87.68
warbler sp	0.04	0.12	0.34	0.56	0.68	88.36
Brewer's Blackbird	0.04	0.11	0.33	0.46	0.65	89.01
Lazuli Bunting	0.04	0.11	0.32	0.56	0.64	89.65
Sharp-shinned Hawk	0.08	0.07	0.31	0.54	0.63	90.28

2.4.3 VEGETATION TYPE = COASTAL SAGE - SCRUB

Figure 14. A two-dimensional non-metric multidimensional scaling plot of bird abundances in point count surveys (2010-2014) from Coastal Sage Scrub habitat at Carnegie State Vehicular Recreation Area. Ordination based on the Bray-Curtis similarities on fourth root transformed data. Each point represents the multiyear average of bird observations at an HMS site (total n=30). Points are coded by recreation status (control [c]= solid; vehicular recreation [v]= open).



ANOSIM

Global Test

Sample statistic (Global R): 0.105

Significance level of sample statistic: 0.6%

Number of permutations: 999 (Random sample from 77558760)

Number of permuted statistics greater than or equal to Global R: 5

SIMPER**Table 2.4-7 Group Scrub Vehicle: Average similarity: 59.40%**

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Common Raven	1.00	5.15	5.31	8.67	8.67
Wrentit	1.02	4.88	2.29	8.22	16.89
Western Scrub-Jay	0.92	4.54	7.64	7.64	24.54
California Quail	0.88	4.23	7.02	7.11	31.65
Mourning Dove	0.77	3.99	4.95	6.71	38.36
Bewick's Wren	0.90	3.84	1.60	6.46	44.82
House Finch	0.79	3.64	2.16	6.13	50.95
Red-tailed Hawk	0.68	3.23	2.11	5.44	56.39
Ash-throated Flycatcher	0.71	3.21	2.22	5.40	61.79
Spotted Towhee	0.75	3.05	1.52	5.14	66.93
California Thrasher	0.68	2.76	1.63	4.65	71.58
California Towhee	0.64	2.35	1.25	3.96	75.54
Anna's Hummingbird	0.56	2.04	1.28	3.43	78.97
Nuttall's Woodpecker	0.47	1.45	0.84	2.44	81.41
Ruby-crowned Kinglet	0.45	1.38	0.85	2.32	83.73
Turkey Vulture	0.46	1.23	0.71	2.08	85.81
White-crowned Sparrow	0.45	1.13	0.71	1.90	87.71
Oak Titmouse	0.40	0.97	0.59	1.64	89.35
Cliff Swallow	0.41	0.91	0.58	1.54	90.88

2.4-8 Group Scrub Control: Average similarity: 53.55%

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Wrentit	1.03	6.19	2.19	11.57	11.57
Common Raven	0.94	6.02	4.31	11.25	22.82
Bewick's Wren	0.98	5.77	2.13	10.78	33.60
Western Scrub-Jay	0.90	5.13	2.21	9.57	43.17
California Quail	0.81	4.56	2.24	8.52	51.70
Mourning Dove	0.71	4.04	2.19	7.54	59.24
Spotted Towhee	0.71	3.72	1.51	6.94	66.18
California Thrasher	0.61	3.05	1.22	5.70	71.88
Nuttall's Woodpecker	0.51	1.70	0.71	3.17	75.05
Red-tailed Hawk	0.48	1.62	0.69	3.03	78.08
Turkey Vulture	0.46	1.47	0.59	2.75	80.83
Ash-throated Flycatcher	0.47	1.46	0.71	2.73	83.56
Anna's Hummingbird	0.44	1.44	0.70	2.69	86.25
American Kestrel	0.44	1.39	0.71	2.60	88.85
California Towhee	0.39	1.01	0.59	1.88	90.73

Table 2.4-9. Groups Vehicle and Control: Average dissimilarity = 45.22%

Species	Group v Av.Abund	Group c Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
House Finch	0.79	0.33	2.11	1.56	4.66	4.66
California Towhee	0.64	0.39	1.38	1.19	3.06	7.72

Turkey Vulture	0.46	0.46	1.37	1.12	3.02	10.74
Nuttall's Woodpecker	0.47	0.51	1.32	1.19	2.92	13.66
White-crowned Sparrow	0.45	0.10	1.32	1.12	2.91	16.57
Ash-throated Flycatcher	0.71	0.47	1.29	1.11	2.85	19.42
Oak Titmouse	0.40	0.28	1.26	1.07	2.79	22.21
Red-tailed Hawk	0.68	0.48	1.25	1.19	2.77	24.98
Ruby-crowned Kinglet	0.45	0.18	1.23	1.22	2.73	27.71
Cliff Swallow	0.41	0.00	1.23	0.95	2.72	30.43
Western Bluebird	0.37	0.20	1.21	0.98	2.68	33.10
Anna's Hummingbird	0.56	0.44	1.18	1.13	2.60	35.70
American Kestrel	0.33	0.44	1.15	1.13	2.53	38.24
Rufous Hummingbird	0.29	0.25	1.09	0.96	2.42	40.66
Bushtit	0.21	0.28	1.08	0.86	2.38	43.03
Northern Flicker	0.21	0.34	1.07	1.03	2.37	45.41
Spotted Towhee	0.75	0.71	1.04	0.92	2.30	47.71
Bewick's Wren	0.90	0.98	1.03	0.76	2.27	49.98
Golden-crowned Sparrow	0.28	0.18	1.01	0.87	2.23	52.21
California Thrasher	0.68	0.61	0.99	0.93	2.19	54.40
Lesser Goldfinch	0.26	0.19	0.95	0.86	2.11	56.50
Wilson's Warbler	0.30	0.04	0.87	0.93	1.93	58.43
Phainopepla	0.22	0.13	0.87	0.74	1.92	60.35
White-breasted Nuthatch	0.18	0.18	0.84	0.79	1.85	62.20
Western Kingbird	0.20	0.13	0.79	0.75	1.75	63.95
Wrentit	1.02	1.03	0.78	0.66	1.72	65.67
Pacific-slope Flycatcher	0.22	0.08	0.75	0.77	1.66	67.33
California Quail	0.88	0.81	0.73	0.98	1.62	68.95
Golden Eagle	0.13	0.16	0.72	0.68	1.60	70.55
Western Scrub-Jay	0.92	0.90	0.72	0.91	1.59	72.14
Rock Wren	0.04	0.19	0.67	0.62	1.47	73.61
Dark-eyed Junco	0.14	0.12	0.62	0.62	1.38	74.99
Calliope Hummingbird	0.04	0.15	0.54	0.55	1.20	76.19
Mourning Dove	0.77	0.71	0.54	0.79	1.20	77.39
Yellow-rumped Warbler	0.12	0.09	0.54	0.62	1.19	78.58
American Goldfinch	0.09	0.08	0.52	0.45	1.16	79.73
Northern Mockingbird	0.19	0.00	0.52	0.59	1.15	80.88
Northern Harrier	0.04	0.13	0.51	0.55	1.14	82.02
Acorn Woodpecker	0.09	0.11	0.49	0.55	1.08	83.10
Canyon Wren	0.04	0.12	0.48	0.46	1.05	84.15
Common Raven	1.00	0.94	0.47	1.38	1.04	85.20
Lark Sparrow	0.10	0.05	0.45	0.47	1.00	86.20
Sage Sparrow	0.09	0.06	0.44	0.46	0.97	87.17
Orange-crowned Warbler	0.05	0.09	0.39	0.47	0.87	88.04
Bullock's Oriole	0.09	0.04	0.38	0.47	0.85	88.89
Lazuli Bunting	0.04	0.09	0.35	0.47	0.77	89.66
Fox Sparrow	0.09	0.04	0.33	0.47	0.72	90.38

2.4.4 VEGETATION TYPE = RIPARIAN (MULEFAT AND SYCAMORE)

ANOSIM

Global Test

Sample statistic (Global R): 0.278

Significance level of sample statistic: 0.1%

Number of permutations: 999 (Random sample from 352716)

Number of permuted statistics greater than or equal to Global R: 0

SIMPER

Table 2.4-10. Group Riparian Vehicle: Average similarity: 64.22%

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Common Raven	1.11	4.66	5.05	7.25	7.25
Red-tailed Hawk	0.92	3.92	6.62	6.10	13.35
House Finch	0.98	3.89	6.59	6.05	19.40
Mourning Dove	0.92	3.79	7.92	5.90	25.30
Western Kingbird	0.83	3.57	6.59	5.56	30.86
California Towhee	0.80	3.27	5.76	5.08	35.94
European Starling	0.78	3.24	6.72	5.05	40.99
California Quail	0.79	3.17	6.63	4.94	45.93
Ash-throated Flycatcher	0.70	2.91	8.77	4.54	50.47
Brown-headed Cowbird	0.70	2.90	5.05	4.52	54.99
Northern Mockingbird	0.72	2.70	1.79	4.20	59.19
Killdeer	0.65	2.36	1.89	3.68	62.87
Turkey Vulture	0.64	2.29	1.88	3.56	66.43
Western Scrub-Jay	0.66	2.12	1.25	3.29	69.72
Brewer's Blackbird	0.63	1.98	1.17	3.09	72.81
Red-winged Blackbird	0.70	1.66	0.88	2.58	75.39
Cliff Swallow	0.66	1.64	0.90	2.55	77.95
Bullock's Oriole	0.56	1.48	0.90	2.30	80.25
White-crowned Sparrow	0.62	1.42	0.90	2.21	82.45
Bewick's Wren	0.52	1.39	0.91	2.16	84.61
Western Bluebird	0.43	1.26	0.91	1.96	86.57
Loggerhead Shrike	0.43	1.24	0.91	1.93	88.51
Say's Phoebe	0.41	1.22	0.91	1.89	90.40

Table 2.4-11. Group Riparian Control: Average similarity: 55.68%

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Common Raven	0.99	3.56	3.01	6.40	6.40
Mourning Dove	0.89	3.34	3.38	5.99	12.39
Brewer's Blackbird	0.99	3.20	3.02	5.74	18.13
European Starling	0.97	2.91	2.03	5.23	23.36
Western Scrub-Jay	0.83	2.61	2.04	4.69	28.05
California Quail	0.72	2.19	1.89	3.94	31.99
Western Meadowlark	0.81	2.18	1.03	3.91	35.90
Turkey Vulture	0.70	2.07	2.05	3.71	39.61
Ash-throated Flycatcher	0.62	1.91	1.96	3.43	43.04
Bullock's Oriole	0.71	1.89	1.35	3.39	46.43
California Towhee	0.59	1.78	2.02	3.19	49.61

Eurasian Collared-Dove	0.66	1.75	1.22	3.14	52.76
Red-tailed Hawk	0.63	1.66	1.33	2.98	55.74
Western Kingbird	0.64	1.65	1.28	2.96	58.70
Oak Titmouse	0.57	1.59	1.34	2.86	61.56
Red-winged Blackbird	0.76	1.51	0.96	2.71	64.27
Nuttall's Woodpecker	0.55	1.49	1.33	2.67	66.94
Brown-headed Cowbird	0.55	1.45	1.31	2.61	69.55
House Finch	0.70	1.43	0.97	2.56	72.11
Bewick's Wren	0.53	1.23	0.99	2.22	74.33
American Kestrel	0.53	1.23	0.95	2.21	76.55
Killdeer	0.46	1.09	0.99	1.96	78.51
Anna's Hummingbird	0.47	1.06	0.99	1.91	80.42
White-crowned Sparrow	0.52	0.98	0.74	1.76	82.17
Northern Flicker	0.38	0.86	0.77	1.55	83.72
Acorn Woodpecker	0.41	0.85	0.78	1.52	85.24
Black Phoebe	0.41	0.84	0.77	1.51	86.76
Loggerhead Shrike	0.42	0.82	0.77	1.47	88.23
Northern Mockingbird	0.38	0.80	0.77	1.44	89.67
American Robin	0.45	0.63	0.59	1.13	90.79

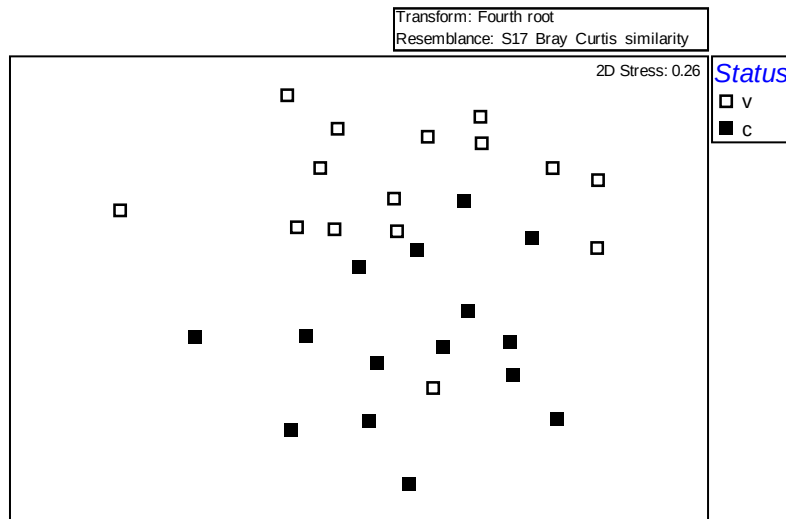
Table 2.4-12. Groups Riparian Vehicle & Control: Average dissimilarity = 43.43%

Species	Group v	Group c	Av.Diss	Diss/SD	Contrib%	Cum.%
	Av.Abund	Av.Abund				
Western Meadowlark	0.37	0.81	1.47	1.24	3.39	3.39
Red-winged Blackbird	0.70	0.76	1.33	1.20	3.06	6.45
Eurasian Collared-Dove	0.19	0.66	1.27	1.10	2.92	9.37
Cliff Swallow	0.66	0.31	1.19	1.20	2.75	12.12
White-crowned Sparrow	0.62	0.52	1.12	1.19	2.57	14.69
House Finch	0.98	0.70	1.09	1.07	2.52	17.21
Golden-crowned Sparrow	0.42	0.25	0.96	1.02	2.22	19.43
Brewer's Blackbird	0.63	0.99	0.96	1.19	2.21	21.64
Northern Mockingbird	0.72	0.38	0.96	1.19	2.20	23.84
Oak Titmouse	0.23	0.57	0.91	1.36	2.11	25.95
Bullock's Oriole	0.56	0.71	0.91	1.05	2.10	28.05
American Robin	0.00	0.45	0.90	0.97	2.07	30.13
Wild Turkey	0.37	0.23	0.88	1.02	2.03	32.16
American Kestrel	0.28	0.53	0.88	1.24	2.01	34.18
Black Phoebe	0.07	0.41	0.84	1.25	1.92	36.10
Western Bluebird	0.43	0.24	0.83	1.20	1.90	38.00
Bewick's Wren	0.52	0.53	0.82	1.04	1.89	39.89
Acorn Woodpecker	0.06	0.41	0.82	1.24	1.88	41.77
European Starling	0.78	0.97	0.79	1.13	1.82	43.59
Anna's Hummingbird	0.31	0.47	0.78	1.14	1.79	45.38
Yellow-rumped Warbler	0.15	0.37	0.77	1.12	1.78	47.16
Nuttall's Woodpecker	0.38	0.55	0.77	1.12	1.77	48.93
Red-tailed Hawk	0.92	0.63	0.76	0.78	1.75	50.68
Western Scrub-Jay	0.66	0.83	0.74	0.83	1.69	52.37
Phainopepla	0.29	0.24	0.72	0.99	1.67	54.04
Loggerhead Shrike	0.43	0.42	0.72	1.04	1.66	55.70
Killdeer	0.65	0.46	0.71	0.95	1.64	57.34
Northern Flicker	0.23	0.38	0.71	1.11	1.63	58.97

Golden Eagle	0.11	0.24	0.71	0.69	1.63	60.60
Say's Phoebe	0.41	0.34	0.70	1.06	1.62	62.22
Western Kingbird	0.83	0.64	0.68	0.81	1.56	63.78
Lesser Goldfinch	0.18	0.27	0.67	0.94	1.54	65.32
Barn Swallow	0.12	0.28	0.62	0.85	1.44	66.76
Turkey Vulture	0.64	0.70	0.60	0.85	1.38	68.13
Cassin's Kingbird	0.18	0.18	0.59	0.74	1.37	69.50
California Towhee	0.80	0.59	0.59	0.83	1.36	70.86
Brown-headed Cowbird	0.70	0.55	0.58	0.81	1.34	72.20
Ruby-crowned Kinglet	0.11	0.25	0.57	0.93	1.31	73.52
California Quail	0.79	0.72	0.57	0.75	1.31	74.83
American Goldfinch	0.23	0.10	0.55	0.86	1.26	76.09
Common Raven	1.11	0.99	0.53	1.32	1.21	77.30
swallow sps.	0.20	0.10	0.52	0.72	1.19	78.49
Northern Rough-winged Swallow	0.11	0.22	0.51	0.85	1.18	79.67
Savannah Sparrow	0.00	0.17	0.50	0.39	1.14	80.82
humming bird sp.	0.11	0.20	0.48	0.83	1.11	81.92
Bushtit	0.14	0.12	0.46	0.66	1.07	82.99
White-breasted Nuthatch	0.00	0.22	0.44	0.74	1.02	84.01
Spotted Towhee	0.16	0.10	0.44	0.65	1.02	85.03
Western Tanager	0.00	0.22	0.44	0.73	1.01	86.03
Ash-throated Flycatcher	0.70	0.62	0.41	0.65	0.95	86.98
Yellow-billed Magpie	0.00	0.19	0.41	0.60	0.95	87.93
Bank Swallow	0.05	0.18	0.39	0.68	0.90	88.83
Mourning Dove	0.92	0.89	0.35	1.10	0.80	89.63
Dark-eyed Junco	0.00	0.15	0.33	0.45	0.77	90.39

2.4.5 *VEGETATION TYPE = GRASSLAND*

Figure 15. Non-metric multidimensional scaling plot of bird abundances in point count surveys (2010-2014) from Grassland habitat at Carnegie State Vehicular Recreation Area. Ordination based on the Bray-Curtis similarities on fourth root transformed data. Each point represents the multiyear average of bird observations at an HMS site (total n=30). Points are coded by recreation status (control = solid; vehicular recreation = open).



Global Test

Sample statistic (Global R): 0.205

Significance level of sample statistic: 0.1%

Number of permutations: 999 (Random sample from 77558760)

Number of permuted statistics greater than or equal to Global R: 0

Table 2.4-13. Bird species contributing to similarity within the OHV group of grassland HMS sites Average similarity: 49.57%

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Common Raven	1.07	6.40	3.54	12.91	12.91
Mourning Dove	0.78	4.17	2.27	8.41	21.32
Red-tailed Hawk	0.75	3.83	2.16	7.72	29.05
Western Scrub-Jay	0.71	3.63	2.30	7.32	36.36
Turkey Vulture	0.67	3.43	1.45	6.92	43.28
Western Kingbird	0.69	2.93	1.24	5.92	49.20
California Quail	0.62	2.73	1.22	5.51	54.71
House Finch	0.69	2.62	1.00	5.28	59.99
Western Meadowlark	0.60	2.40	0.99	4.84	64.83
Cliff Swallow	0.61	2.11	0.83	4.25	69.08
Ash-throated Flycatcher	0.49	2.06	1.01	4.16	73.24
Loggerhead Shrike	0.47	1.77	0.82	3.56	76.80
American Kestrel	0.40	1.43	0.71	2.89	79.69
Red-winged Blackbird	0.54	1.27	0.59	2.57	82.25
Say's Phoebe	0.38	1.22	0.70	2.47	84.72

Northern Mockingbird	0.36	0.97	0.59	1.96	86.68
Bullock's Oriole	0.35	0.93	0.59	1.87	88.55
Western Bluebird	0.33	0.83	0.49	1.67	90.22

Table 2.4-14. Bird species contributing to similarity within the Control group of grassland HMS sites Average similarity: 49.90%

Species	Av.Abund	Av.Sim	Sim/SD	Contrib%	Cum.%
Common Raven	0.99	5.12	4.51	10.26	10.26
Mourning Dove	0.84	4.38	4.55	8.78	19.04
Western Meadowlark	0.89	4.31	2.03	8.64	27.68
Red-tailed Hawk	0.72	3.31	2.38	6.63	34.31
Western Scrub-Jay	0.74	3.05	1.58	6.11	40.42
American Kestrel	0.61	2.62	1.54	5.25	45.67
California Quail	0.64	2.59	1.56	5.20	50.87
Turkey Vulture	0.61	2.27	1.25	4.56	55.43
Ash-throated Flycatcher	0.52	2.08	1.22	4.18	59.61
European Starling	0.55	1.63	0.84	3.26	62.87
Say's Phoebe	0.46	1.57	0.83	3.14	66.01
Nuttall's Woodpecker	0.42	1.33	0.85	2.66	68.67
Northern Flicker	0.44	1.31	0.85	2.63	71.29
Northern Mockingbird	0.46	1.31	0.70	2.62	73.91
House Finch	0.43	1.21	0.71	2.42	76.33
Golden Eagle	0.34	0.92	0.58	1.84	78.17
Loggerhead Shrike	0.35	0.83	0.60	1.66	79.83
Western Kingbird	0.36	0.68	0.49	1.37	81.20
California Towhee	0.32	0.66	0.49	1.32	82.51
Oak Titmouse	0.33	0.65	0.50	1.30	83.81
Western Bluebird	0.36	0.64	0.49	1.29	85.10
White-breasted Nuthatch	0.31	0.63	0.49	1.26	86.36
Bewick's Wren	0.30	0.61	0.49	1.23	87.59
Yellow-billed Magpie	0.34	0.60	0.40	1.20	88.79
Savannah Sparrow	0.24	0.55	0.40	1.11	89.90
Lark Sparrow	0.30	0.50	0.39	1.01	90.91

Table 2.4-15. Groups Grassland Vehicle & Control: Average dissimilarity = 53.45%.

Species	Group v Av.Abund	Group c Av.Abund	Av.Diss	Diss/SD	Contrib%	Cum.%
Cliff Swallow	0.61	0.22	1.69	1.24	3.16	3.16
Western Kingbird	0.69	0.36	1.60	1.29	3.00	6.16
Red-winged Blackbird	0.54	0.29	1.56	1.14	2.92	9.08
Western Meadowlark	0.60	0.89	1.56	1.45	2.91	11.99
House Finch	0.69	0.43	1.55	1.26	2.90	14.89
European Starling	0.20	0.55	1.51	1.25	2.82	17.71
Northern Flicker	0.04	0.44	1.25	1.30	2.35	20.06
Northern Mockingbird	0.36	0.46	1.23	1.16	2.30	22.36
Western Bluebird	0.33	0.36	1.21	1.11	2.27	24.63
Loggerhead Shrike	0.47	0.35	1.19	1.12	2.23	26.86
Nuttall's Woodpecker	0.12	0.42	1.14	1.23	2.13	28.99

White-crowned Sparrow	0.37	0.11	1.12	0.91	2.10	31.08
Say's Phoebe	0.38	0.46	1.12	1.06	2.09	33.17
Bullock's Oriole	0.35	0.27	1.11	1.07	2.07	35.24
American Kestrel	0.40	0.61	1.10	1.11	2.05	37.29
Bewick's Wren	0.33	0.30	1.09	1.08	2.05	39.34
Golden Eagle	0.09	0.34	1.08	1.01	2.02	41.36
Turkey Vulture	0.67	0.61	1.06	1.07	1.99	43.35
California Quail	0.62	0.64	1.04	1.04	1.95	45.29
Yellow-billed Magpie	0.00	0.34	1.03	0.78	1.93	47.23
California Towhee	0.20	0.32	1.02	1.00	1.92	49.14
Phainopepla	0.24	0.26	1.01	0.96	1.89	51.04
Lark Sparrow	0.09	0.30	0.98	0.82	1.83	52.86
Western Scrub-Jay	0.71	0.74	0.97	0.97	1.81	54.67
Oak Titmouse	0.04	0.33	0.96	0.93	1.81	56.48
Brewer's Blackbird	0.27	0.15	0.95	0.89	1.77	58.25
White-breasted Nuthatch	0.08	0.31	0.94	0.94	1.76	60.01
Acorn Woodpecker	0.10	0.30	0.94	0.85	1.75	61.76
Ash-throated Flycatcher	0.49	0.52	0.92	1.00	1.72	63.49
Savannah Sparrow	0.06	0.24	0.88	0.84	1.64	65.13
Wrentit	0.13	0.21	0.81	0.76	1.52	66.65
Brown-headed Cowbird	0.08	0.26	0.81	0.86	1.52	68.17
Red-tailed Hawk	0.75	0.72	0.80	0.91	1.51	69.68
Killdeer	0.16	0.21	0.77	0.85	1.45	71.12
Golden-crowned Sparrow	0.16	0.17	0.76	0.76	1.42	72.55
California Thrasher	0.13	0.15	0.68	0.74	1.28	73.82
Black Phoebe	0.19	0.11	0.67	0.75	1.25	75.08
Anna's Hummingbird	0.16	0.12	0.65	0.75	1.21	76.29
Common Raven	1.07	0.99	0.65	1.22	1.21	77.50
Lesser Goldfinch	0.19	0.04	0.61	0.64	1.14	78.64
Mourning Dove	0.78	0.84	0.61	0.81	1.14	79.78
Rock Wren	0.05	0.16	0.60	0.65	1.13	80.91
Cassin's Kingbird	0.19	0.00	0.56	0.59	1.04	81.95
Violet-green Swallow	0.04	0.17	0.54	0.64	1.01	82.96
Eurasian Collared-Dove	0.04	0.14	0.53	0.52	0.99	83.95
Northern Rough-winged Swallow	0.07	0.12	0.48	0.47	0.90	84.85
Ruby-crowned Kinglet	0.00	0.16	0.47	0.59	0.88	85.72
Spotted Towhee	0.08	0.09	0.43	0.54	0.81	86.53
Mallard	0.08	0.09	0.43	0.54	0.80	87.33
humming bird sp.	0.12	0.04	0.42	0.55	0.78	88.11
Bushtit	0.09	0.06	0.41	0.47	0.76	88.87
Black-headed Grosbeak	0.08	0.08	0.39	0.54	0.73	89.60
Lazuli Bunting	0.04	0.10	0.36	0.45	0.68	90.28

2.5 GOLDEN EAGLE MAP DESCRIPTION

The "Golden Eagle Territories On and Adjacent to Carnegie SVRA" map figure depicts mapped Golden Eagle (GOEA, *Aquila chrysaetos*). These polygons represent foraging area used by GOEA around documented nest sites, as mapped by Terry Hunt in 2015. These territories overlap only a small fraction of the existing Carnegie SVRA, but the majority of

the proposed expansion area. This map was prepared using ArcGIS Version 10.1 in June 2015 by VNLC cartographers Jake Schweitzer and Eric Smith. Background and reference feature data was sourced from the California Protected Areas Database (park boundaries), US Geological Survey (10-meter DEMs, county and state boundaries), US Census Bureau (TIGER line shapefiles), California Department of Water Resources (stream line shapefiles), and Digital Globe via ESRI (aerial imagery).

EFFECTS OF OHV USE ON AMPHIBIANS AND AQUATIC REPTILES

2.6 APPROACH TO ASSESS EXISTING CONDITIONS AND IMPACTS NOT ADDRESSED IN DEIR

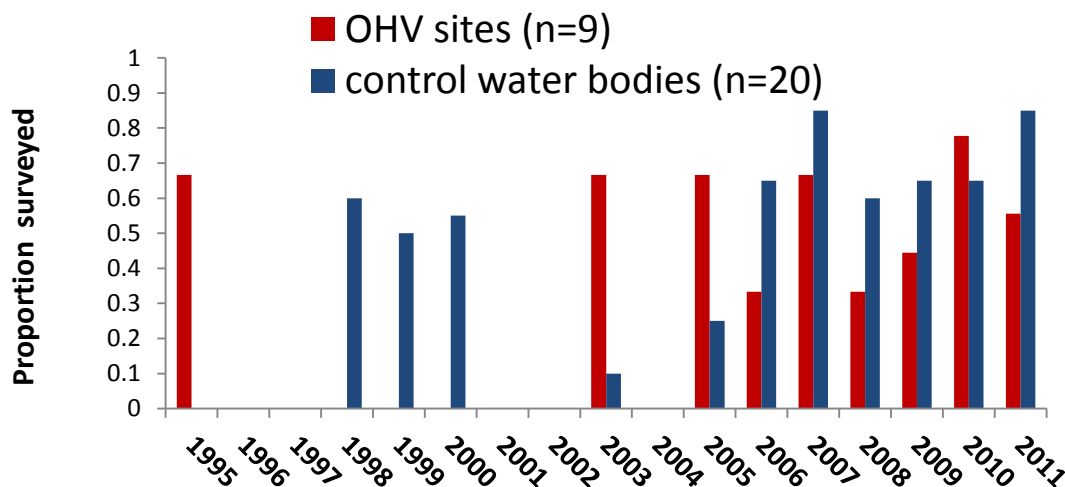
The DEIR's assertion of lack of significant impacts and no need for mitigate for adverse changes to amphibian and aquatic reptile populations with the expansion of OHV fails to provide adequate information for evaluating the impacts on these species in three ways:

- DEIR/PGP ignores a wealth of scientific studies documenting the importance of preserving upland habitat for population viability of the special status species present at the existing Carnegie SVRA and in the Expansion Area.
- Data collected in the Habitat Monitoring System indicate that special status taxa are more consistently present in control area water bodies than in riding areas. Our approach to substantiate the finding that there will be potentially adverse changes to populations of amphibians and reptiles is to re-analyze presence data collected by CSVRA staff.
- Proposed buffer zone mitigation distance is arbitrary and lacks scientific support. For each species we also review and summarize the literature regarding buffer zones needed to protect from upland habitat degradation and map these buffer zones around confirmed locations of California Tiger Salamander and California red-legged frogs.

We compiled data from all HMS reports released prior to the DEIR release as well as previous reports (Wone and Beauchamp 1995, Davidson and Trenham 1998); data sheets and Excel files obtained via PRA requests and direct requests to CSVRA staff. We attempted to cross-check data among reports, data sheets, and excel files, and communicated with CSVRA staff (Clint Elsholz and Tara DeSilva) to resolve inconsistencies and discrepancies. We also incorporated data from a recent HMS report released after the DEIR.

Sampling effort was uneven (Figure 16), in some years only controls were visited, other years only riding areas; some ponds may have only been assessed by walking around for 15 minutes, others extensively dip netted or seined. Names of ponds changed through the years so it was not clear what the total sample sizes were, and some sites have filled in with sediment or had vegetation encroachment and thus no longer exist as aquatic habitat. In spite of these flaws, a general pattern of significantly reduced presence in riding areas has emerged for several conservation target species.

Figure 16. Unequal sampling effort across years.

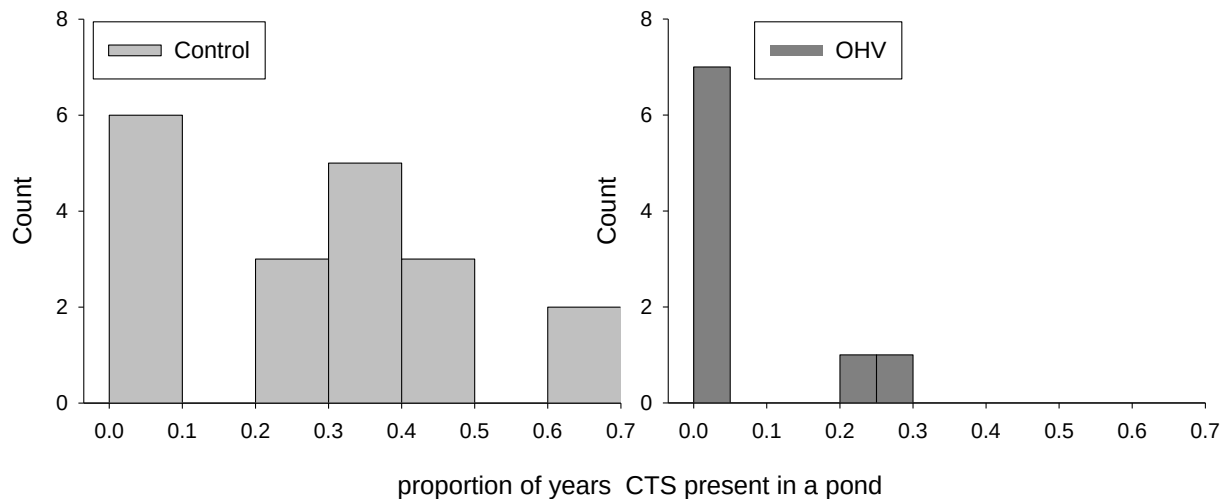


2.7 TAXON SPECIFIC RESULTS AND INTERPRETATION

2.7.1 CALIFORNIA TIGER SALAMANDER (*AMBYSTOMA CALIFORNIENSE*) – CTS

Occurrence data in DEIR is incomplete: Figures 3.3-1 and -2 in DEIR shows aquatic features and Figures 3.3-4 and -5 shows occurrence data, yet there are discrepancies with the surveys conducted by Davidson and Trenham (1998). CTS were present at what CSVRA calls Ravine Pond A. That location is not included in Figure 3.3-4. Also there is a pond called “Pond 12” on Davidson and Trenham’s map. The only pond which lines up is the pond called Mitchell Ravine Pond. If those are the same water body, then in the non-riding water bodies, CTS have been found at least once in 13 of 19 sites in the period 1998-2014. In contrast they have been found in 2 (perhaps 3, due to site name changes among reports) of 9 sites in the riding area (Figure 17). Based on data from the entire period of record and across all waterbodies, there is a five-fold difference in the overall mean (standard error) percent of years with CTS present at control sites = 27.7(5.2) vs riding sites=5.33(3.6). Because the data were not normally distributed, comparison was made using a Mann-Whitney rank sum test ($U = 36.0$; $P = 0.011$). When comparing just the subset of occupied sites, there is a smaller difference in how consistently CTS have been present. The mean (standard error) percent of years with CTS present in control sites = 40.4(4.0) vs. riding waterbodies=24.0 (4.0).

Figure 17. Distribution of California Tiger Salamanders annual presence rate calculated from HMS data for control sites (1998-2014) and OHV riding areas (1995-2014) at Carnegie State Vehicular Recreation Area. Note, not all sites sampled every year.



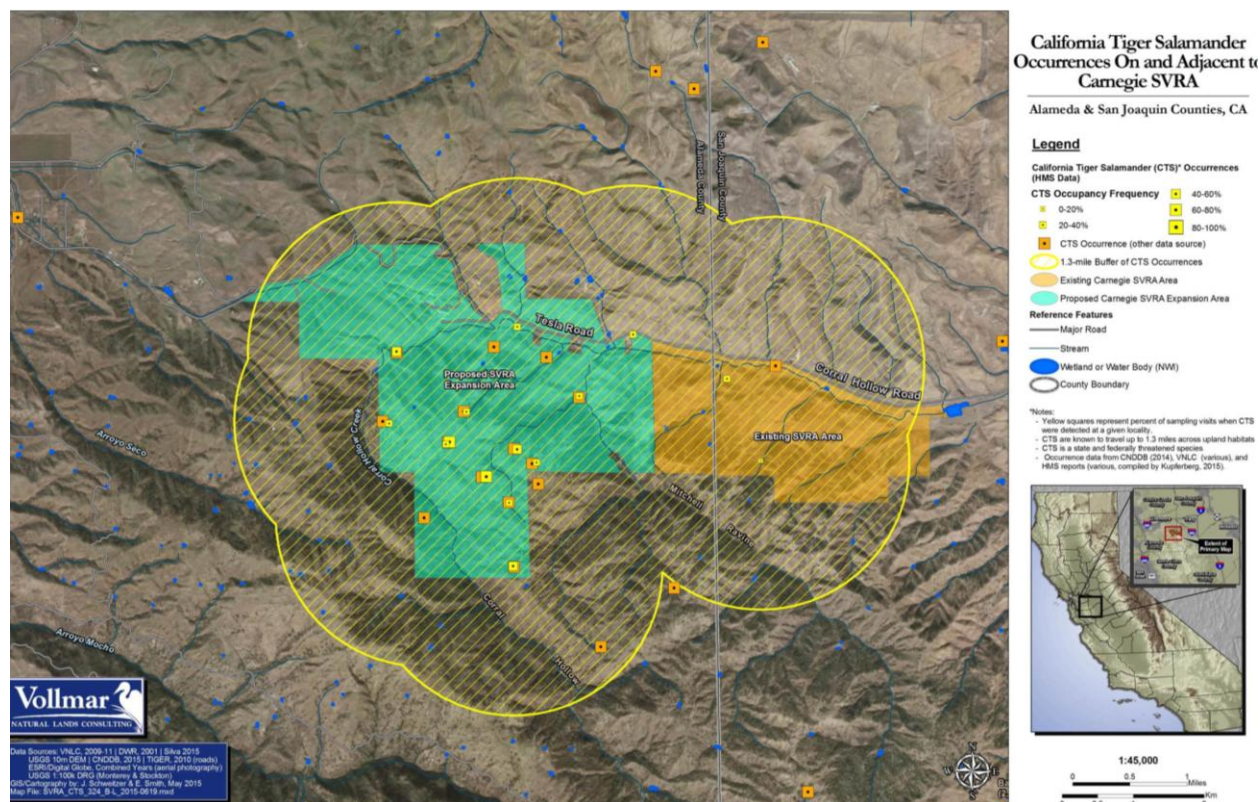
Impact Assessment in DEIR is Incomplete: The PGP/DEIR claims that avoiding facilities within 150 feet of occupied aquatic habitat is sufficient. The DEIR acknowledges that the species may use upland refugia within 1.5 miles of breeding sites, yet there is no planning to restrict OHV use in the uplands surrounding ponds and there is no analysis of the impact of a trail network on habitat fragmentation or the ability of salamanders to migrate to ponds.

In contrast, the scientific literature and CSVRA Habitat Management System (HMS) reports indicate that 150' is wholly inadequate to protect salamanders when they are dispersed in the uplands during their terrestrial phase of life. While distances of upland habitat that are protective will vary from site to site based on the vegetation type and the density of small mammal burrows, 150 feet is orders of magnitude too short a distance. Searcy and Shaffer (2011) estimated 95% of CTS with high reproductive value to the population (i.e. large body size, high survival rates) were within 1,867 m (1.16 mi) of breeding sites. Searcy et al. (2013) found that the distances required to protect 50%, 90%, and 95% of the *A. californiense* population (in a grassland habitat) were 556 m, 1486 m, and 1849 m from a pond's edge.

Another approach to assessing how large of an area is needed to protect dispersal corridors is to examine genetic relatedness among salamanders in an array of ponds. Wang et al. (2009) found that although ponds may be dominated by a specific genotype, there is genetic diversity indicating gene flow among ponds that are more distant than any of the

furthest movements documented in mark-recapture and drift fence studies. The genetic signal integrates those relatively infrequent, but very long distance, movements that maintain gene flow, as well as smaller incremental movements over several years. Therefore, to maintain long term population connectivity wide areas without dispersal impediments (such as road and trail crossings) are needed. When a dispersal distance of 1.3 miles is drawn around breeding ponds at Carnegie and the Expansion Area, the entire planning area is subsumed (Figure 18). The spatial pattern of ponds with high presence rates (large yellow squares in Figure 18) being clustered in the expansion area and ponds with low presence rate being scattered at a distance (small yellow squares in existing OHV area) illustrates the risk of isolation associated with OHV induced changes to the landscape.

Figure 18. Spatial clustering of consistently occupied ponds (large yellow squares) in the expansion area and upland habitat (yellow polygon) requiring protection around CTS sites subsume almost entire planning area. See full map description and figure credits in Section 3.4.2.



In addition to protecting uplands, the ponds themselves need protection from sedimentation and vegetation encroachment. The 2011-2014 HMS report documents that several vernal pools are no longer aquatic habitats, they have filled in via excessive hillslope erosion in the riding areas. The 2003 HMS report documented a mass mortality

event of CTS when a sediment detention basin that was being used by CTS went dry prior to metamorphosis. Ponds in the non-riding area that year remained wet at a similar point in time. By removing grazing from the Expansion Area and allowing riding, the same process will ensue with erosion from the trail networks and devegetated areas delivering sediment to the water bodies. The DEIR has not adequately described how the existing stock ponds currently function, especially with respect to hydroperiod, or how they are expected to function with the project. The soils and hydrology sections of the DEIR barely mentioned the existence of stock ponds. There is no analysis of how the loss of managed grazing as a rangeland management tool will eliminate benefits to CTS. Dense herbaceous vegetation may impede California tiger salamander dispersal to and from breeding ponds and over the long term may reduce ground squirrel populations (Bartolome et al. 2014).

2.7.2 CALIFORNIA RED-LEGGED FROG (RANA DRAYTONII) – CRLF

Occurrence data and impact assessments in DEIR are incomplete: Figures 3.3-1 and -2 in DEIR shows aquatic features and Figures 3.3-4 and -5 shows occurrence data. The DEIR however does not depict how consistently through time the frogs were observed. For the lentic water bodies, comparisons of the presence rate indicate that although there have been detections of CRLF within the riding area, the populations there are less robust than those in the Expansion Area. During HMS surveys conducted beginning 1995, CRLF have been found in 3 lentic locations in the riding area vs 13 sites in the Expansion Area. The greater rates of presence values (Table 3-2.1, Figure 19) at the non-riding control sites represents the greater number of continuously used sites in the Expansion Area which likely maintains the amphibian populations at the sites where the sub-population blinks in and out. The difference in presence rate between OHV ponds and control ponds is greater than would be expected by chance (Table 8). OHV related threats include:

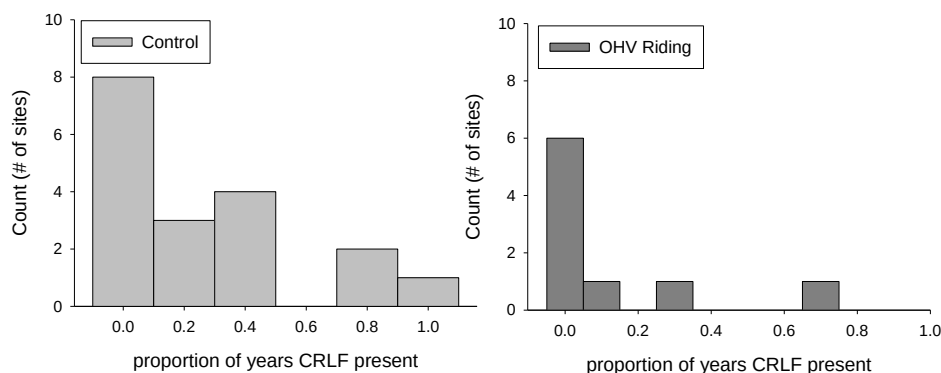
- **Loss of deep pond habitat with OHV use-** Water bodies in the riding area trap sediment from hillslope erosion. They do not remain wetted long enough for larvae to reach metamorphosis.
- **Loss of subterranean refugia** - Adult CTS and CRLF rely on ground squirrel burrow networks where they spend substantial periods of time. Soil compaction, physical disturbance, and noise from OHV use will likely decrease squirrel colonies.
- **Toxins-** Embryos and larvae are sensitive to the salt solutions ($MgCl_2$) sprayed on roads for dust control (Lewis 1999, Karraker et al. 2008, Hopkins et al. 2013).
- **Disruption of Connectivity-** Visual comparison of Figure 2-3 in the DEIR on page 2-13 to pond locations in HMS reports indicate that the cross-hatched gathering area which will include roads and possibly maintenance facilities will either surround or be immediately adjacent to two CRLF ponds, Old Pipe and Hidden Ponds. The gathering area will block the connectivity of those two

ponds with five others, Small, Large, Lucky Find, Lone Oak and Trough. Maintaining connectivity with Small pond is essential for the long term viability of the CRLF population because it likely serves as a source population. It is the only one of all the Expansion Area water bodies that has been consistently occupied (11 years present out of 11 years sampled). CRLF were present in Hidden Pond 8 out of 10 years sampled, and also likely serves as a source pond and connectivity around it should not be jeopardized.

Table 2.7-1. Average proportion of sampled years with California Red-legged frogs present in control and riding area lentic water bodies (creek excluded). Differences in average presence are statistically significant: Mann Whitney Rank Sum Test $U=48$, $p=0.04$.

Group	n	Site names	Median (years present/ yrs sampled)	Mean
Control	18	Hidden, Large, Lone Oak, Lucky Find, Mitchell Ravine, Mobile Home, North Parcel, Old Pipe, Ravine Corral, Ravine (a), Refrigerator, Sector Office, Shallow, Small, Tesla Stock, Tony's, Trough, Two-Story	0.307	0.32
OHV	9	Carroll Basin, Clear, CTS, Franciscan, Kiln Canyon Basin, Trans Am Basin, Tyson's, Lower Juniper, Lime Kiln	0.000	0.11

Figure 19. Distribution of presence rates for CRLF at lentic sites at CSVRA.



Upland Habitat Needed for Protection: The DEIR/GP guideline is to avoid placing facilities within 150 feet of occupied aquatic habitat, yet the DEIR acknowledges that the species may travel up to two miles from aquatic habitat. No guidelines for trail placement are given, and consideration of trail impacts is limited to the footprint of the trail only. No

consideration is given to the effects of fragmentation of the habitat, and no assessment of the risks of ponds filling due to increased sedimentation is made.

In contrast, the scientific literature shows consensus that buffer zones to protect the viability of CRLF populations should aim to provide connectivity among ponds because persistence of this species is susceptible to fragmentation of habitat by roads (D'Amore et al. 2010). CRLF spend substantial periods of time in the terrestrial environment in refugia such as ground squirrel burrows, in leaf litter, under shrubs, etc. (Bobzien and DiDonato 2007; D'Amore 2007; Tatarian 2008) and thus require protection from physical disturbance to the landscape, compaction of soils, and loss of underground burrow networks associated with OHV use. Recent diet analyses indicate the importance of terrestrially derived prey for CRLF (Bishop et al. 2014). Terrestrially derived prey comprised 87.3 percent of rainy season prey items and 91.3 percent of dry season prey in stomach contents. Stable carbon isotopes in frog tissue confirm that dominant prey items include a mix of terrestrial carnivores (e.g. spiders, beetles, wasps) and detritivores (e.g. worms, ants). Small frogs are largely insectivorous while large adult frogs can also consume other aquatic vertebrates in the wet season, and occasionally terrestrial vertebrates in the dry season (Hayes and Tennant 1985; Stebbins 2003; Bishop et al. 2014). Protection of uplands is thus important to provide physical habitat and abundant food resources for CRLF.

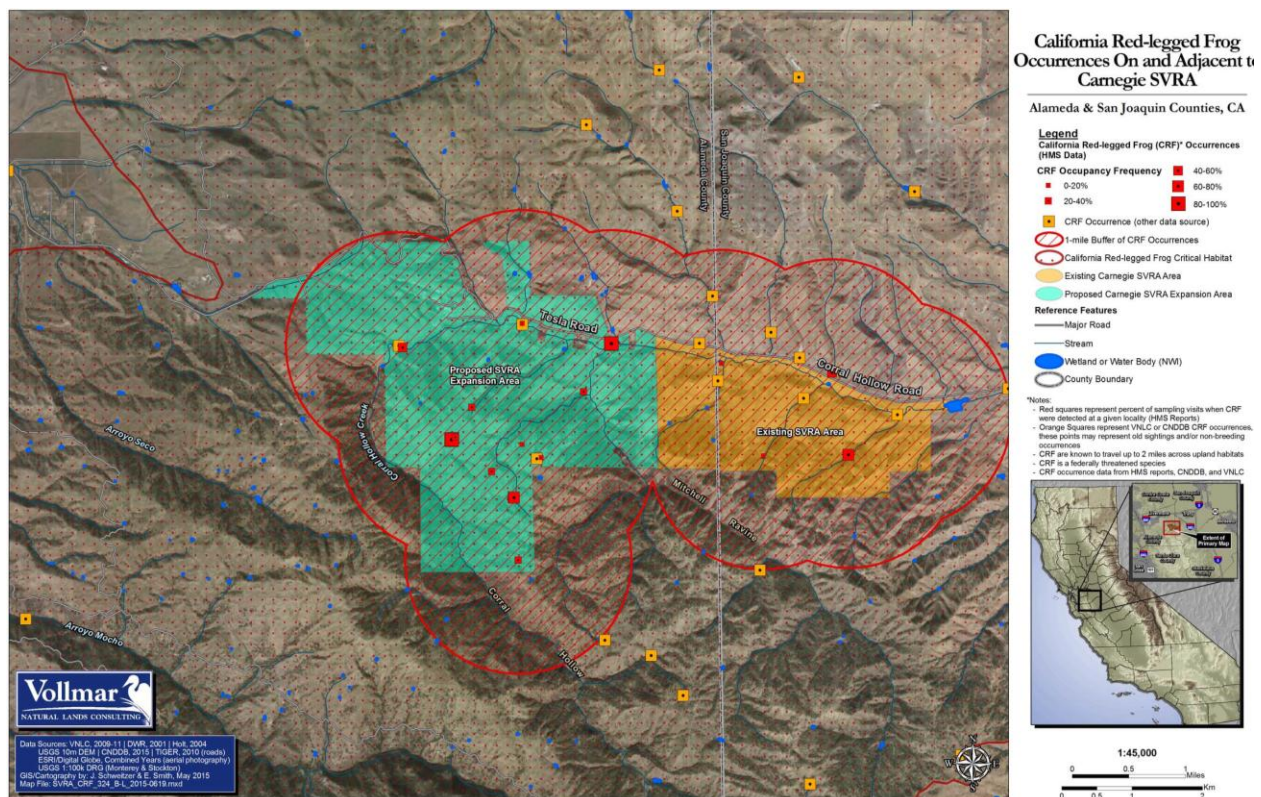
The USFWS (2010) has delineated a maximum protective buffer limit of 1 mile, with variable minimum distances around aquatic habitats to be determined by local known dispersal patterns which can be up to 2 miles (U.S. Fish and Wildlife Service 2002; Bulger et al. 2003). Movements may be along well-established corridors that provide specific sensory cues to guide movement (Stebbins 2003). However, other researchers (Bulger et al. 2003) have found that most long (>985 ft) distance migrating frogs travelling to and from breeding sites during the rainy season moved overland in relatively straight lines toward target sites. Frogs may leave breeding habitat at various times throughout the rainy season. In one radio-telemetry study in Marin County, 66 percent of female frogs and 25 percent of male frogs moved to non-breeding areas even when the breeding site retained water (Fellers and Kleeman 2007). Frogs may also leave breeding sites in the dry season to aestivate in upland refugia. For example, in Alameda Creek in September a radio-tagged male frog spent three weeks in a burrow 433 feet away from the water before returning to the stream channel (Bobzien and DiDonato 2007). D'Amore (2007) had one-third of all detections of radio-tracked CRLF come from inside ground squirrel burrows.

To illustrate the collective upland area that would protect frogs from ORV use and maintain connectivity for frogs at the various water bodies at CSVRA, Figure 20 maps a mile radius around CRLF sites. The map shows that the entire planning area is subsumed. Figure

20 also illustrates the spatial clustering of sites with consistent frog presence (large red squares) in the Expansion Area relative to sites in the OHV area (smaller red squares).

Because OHV use is mutually exclusive of cattle grazing, there are potentially significant impacts of ceasing grazing in the Expansion Area. Livestock grazing when practiced judiciously can promote native species diversity at the scale of the landscape. California red-legged frogs can benefit when grazing lowers the height of grassland vegetation. There is no assessment of how Beechey ground squirrels and the density of their burrows will change in the absence of cattle, and there is no assessment of their present abundance, so there will be no baseline for comparison.

Figure 20. Protective areas for upland habitat of California Red-legged Frogs drawn in concentric circles around locations from HMS and CNDDDB sources and clustering of consistently used sites (large red squares). Figure details and credits in Section 3.4.1.



2.7.3 WESTERN POND TURTLE (*EMYS MARMORATA*) – WPT

Occurrence data in DEIR is incomplete: Figures 3.3-1 and -2 in DEIR (shows aquatic features). Figures 3.3-4 and -5 shows occurrence data, but does not incorporate

information regarding the sampling history at the sites. In the OHV area, at the one isolated water body with turtle observations, presence rate = 0.25, 2 out of 8 years. In the Expansion Area, by contrast, turtles have been found in both lentic and lotic habitats. Presence rates ranged from 0.1 (1 of 10 yrs, Old Pipe Pond) to 0.42 (5 of 12 yrs sampled, Tesla Stock pond). The DEIR does not address the very small population size in the OHV area.

These data are too sparse to compare statistically, but it is a general principal of meta-population biology that multiple and connected sub-populations are at less risk of extirpation than an isolated population cut off from sources of re-colonization (Hanski 1999). Hence terrestrial buffers are needed around the streams, primarily Corral Hollow Creek, Mitchell Ravine, *and* the ponds to maintain connectivity and to protect turtles during the multiple periods/seasons when they may utilize upland habitat. Turtles do not necessarily follow stream corridors for movement nor do they select hillslopes with a particular aspect for overwintering (Pilliod et al. 2013), around occupied aquatic habitats rather than following topography. Thus protecting a subset of the surrounding area is inadequate.

DEIR/GP guideline buffer distance is inadequate. The plan to avoid siting facilities within 150 feet of aquatic habitat occupied by turtles is arbitrary, not based on science, and is not sufficient to maintain connectivity among the turtle sub-populations. Western pond turtles require a combination of aquatic and terrestrial habitats to complete their life cycle and display remarkable flexibility in their behavioral strategies to survive natural flood-drought cycles. They may make long-distance movements in response to habitat drying or flooding, and to nest. The DEIR acknowledges WPT may travel 1,568 feet (478 m) into upland habitats to lay eggs, but they also use terrestrial habitats at times other than the nesting season (May-July). By compiling data from several radio-telemetry studies in Central California, Pilliod et al. (2013) found that 97 percent of 71 river dwelling turtles with transmitters avoided winter flood disturbance and high spring runoff by traveling as far as 500 meters (1,640 feet) away from water. Although only 20 percent of pond dwellers migrate upland to overwinter, a large proportion of turtles use upland habitats for aestivation during drought when aquatic features dry down (Rathbun et al. 2002, Bondi and Marks 2013, Pilliod et al. 2013). Figure 2-3, the preferred concept map in the DEIR, shows a Limited Recreation Area buffer around Corral Hollow Creek, but the width is not equal on both banks and in some reaches appears as narrow as 250 feet, which is 15% of maximum known overland movement distance.

In addition to protection from direct mortality from vehicles striking turtles while they move terrestrially, nesting and overwintering habitats require protection. OHV use in grasslands, woodlands, and coastal sage scrub areas would degrade conditions via compaction and removal of leaf litter in the places where turtles would shelter. They use

the duff, or soil, usually where shrubs, rocks, logs, and ground squirrel burrows could provide moderate to high levels of cover (Reese and Welsh 1997, Davis 1998). The presence of a duff layer seems to be a general characteristic of overwintering habitat, and OHV use decreases plant cover (as shown in CSVRA's own Habitat Monitoring System reports, see Figure 7). Individual turtles may return to the same overwintering site over multiple years (Reese and Welsh 1997), or may change sites within one winter (Pilliod et al. 2013).

DEIR/GP does not consider Raven predation impacts on turtles. The Common Raven is a known threat and increasing in the area.

2.7.4 WESTERN SPADEFOOT TOAD (SCAPHIOPUS HAMMONDI)

Occurrence data and impacts: Figures 3.3-1 and -2 in DEIR (shows aquatic features). Figures 3.3-4 and -5 shows occurrence data, but does not show Spadefoot toads along Corral Hollow Creek. Since the first surveys in 1995 (Wone and Beauchamp 1995) there have been reports of them from the floodplain of Corral Hollow Creek near the "East Motocross Track", Upper Tyson's Pond (a.k.a Maintenance Pond and CTS Pond) and the northwestern area of the existing CSVRA. The whole length of Corral Hollow Creek should be considered occupied for spadefoot toads.

Insufficient Mitigation Buffers

The DEIR/GP recommends that facilities be avoided within 150 feet of occupied aquatic habitat, which is inconsistent with another DEIR statement that most individuals are found within 1,300 feet of breeding sites. Furthermore, the word 'avoid' is a suggestion, not a commitment to exclude facilities.

The scientific literature recommends that a buffer of 1,207 feet from suitable aquatic breeding habitat may provide protection for western spadefoot toads (Semlitsch and Brodie 2003). Radiotelemetry studies have documented movements up to 860 feet away from breeding pools within one rainy season (Baumberger 2013). In addition to providing protections from direct effects of running over burrows, compacting soils, and riding through pools when tadpoles are present, buffer zones need to protect toads from the low frequency vibrations of motorcycles and ATV's which can cause spadefoot toads to emerge at inappropriate (i.e. dry) times. Controlled experiments with adult toads have shown that motorcycle sounds cause them to break dormancy and emerge from burrows even though there had been no change in moisture (Dimmitt and Ruibal 1980; Brattstrom and Bondello 1983). This could be a costly mistake for an amphibian in a xeric environment with respect to losing water from its body. USFWS Vernal Pool Recovery Plan (2005), states (page III-16): "When choosing sites to protect essential habitat features such as breeding ponds, sufficient upland habitat for estivation, and dispersal corridors, it may be important

to consider the current and potential presence of objects or activities that create low-frequency noise. It also may be wise to protect additional habitat that can serve as a buffer against low-frequency noise around these essential habitat features”.

The California Department of Fish and Wildlife has recommended that at a 250 foot no disturbance buffer be established from the highwater mark of a vernal pool or wetland habitat used by spadefoot toads. CDFW also states that access, egress, and ground-disturbing activities should be sited to avoid vernal pool habitats (CDFW 2013). Because these pools can be located throughout the flood plain of Corral Hollow Creek, the buffer distance should be designated along the length of the creek in both directions away from the limits of bank-full discharge for the creek.

At present in the existing riding areas at CSVRA, not even a 150' barrier/buffer zone exists. Figure 21 depicts pools with spadefoot toad larvae present spring of 2015. Riding occurs at the wetted edge, or even through occupied habitat.

Figure 21. OHV riding exclusion zone (yellow caution tape) around Spadefoot toad tadpole pool in 2015.



2.7.5 Foothill Yellow-Legged Frog (*Rana boylei*) – FYLF

Occurrence data and impacts in DEIR vs. Scientific Literature: FYLF have been encountered twice in Corral Hollow Creek in the Expansion Area, in 2014 and in either 1998 or 2000 (Jones and Stokes EIR of 2000 and subsequent HMS reports have conflicting dates). The recent sighting during HMS surveys of a single juvenile in April 2014 was not included in the occurrence data in the DEIR. The juvenile was misidentified as an adult. By virtue of its size it had likely metamorphosed the previous fall. This indicates that there is likely a breeding site in the vicinity, yet no appropriately timed surveys is the rarest amphibian in the Expansion Area, were done to locate breeding sites that would require extra protection. For example, CSVRA hired consultants (TRA Environmental Consultants, Autumn Meisel) to

conduct a survey on Oct. 17, 2013, when Corral Hollow Creek was dry. Not surprisingly, no FYLF were detected. The EIR is inadequate with respect assessing present conditions and assessing impacts on this California Species of Special Concern.

The decline of FYLF in the planning area was documented in the 2004 CSVRA Draft HCP (p.6-13), which cited accounts of their prior abundance. One author (Kupferberg) also has personal observations from the mid-1990's of numerous FYLF tadpoles in Corral Hollow Creek on the Connolly Ranch. Despite admitting that FYLF could be affected by changes in water quality, the impacts from sediment transported from hillslope erosion during runoff events and deposited in Corral Hollow Creek are not assessed as an impact to FYLF in DEIR section 3.6.6. In fact, the total absence of FYLF from the riding area since HMS surveys have been done indicates this species has already been adversely affected. The most likely causes are sedimentation due hillslope erosion and sediment loading which destroys habitat by altering channel shape. Appropriate channel morphology is one of the most important habitat requirements of this species (Kupferberg 1996, Yarnell et al. 2010).

Based on the observations of how rare Foothill Yellow Legged Frogs have become in Corral Hollow Creek and the results of population projection models developed for this species in the neighboring Alameda Creek watershed (Kupferberg et al. 2009), FYLF is at extremely high risk of extirpation simply because of the small population size. There is little resiliency for a small population to accommodate further stressors.

The DEIR further asserts that NRM Guidelines 1.1, 1.2, and 1.3 in the GP are sufficient to avoid or minimize impacts and that since all of Corral Hollow Creek is within a Limited Recreation Area that FYLF will be protected. First, the width of the Limited Recreation Area (LRA) buffer zone along the creek varies. Second, tributaries are not included. Third, connectivity to seeps and other off channel water bodies cannot be assumed without more accurate mapping. The assertion that a narrow LRA is protective of FYLF ignores the scientific literature about movement and dispersal in this species. It has long been known that juveniles disperse away from natal streams and have been caught up to 600 feet away from a stream channel (Twitty et al. 1967). Figure 2-3, the preferred concept map, in the DEIR shows many locations where the width of the green LRA is as narrow as 150 feet on one side or the other of the creek. FYLF also utilize small tributaries (Bourque 2008, Gonsolin 2010) and seeps (Rombough 2006) and make long distance movements from hundreds to thousands of meters have been recorded in dendritic stream networks. Protection of a main channel without all the tributaries is wholly insufficient for FYLF.

2.8 CONCLUSIONS REGARDING AMPHIBIANS AND AQUATIC REPTILE IMPACTS

- **Persisting is not thriving.**

Although western pond turtles, spadefoot toads, CTS, and CRLF have “persisted” within the confines of the existing riding area, Western Aquatic Garter Snakes and Foothill Yellow Legged frogs have not. The HMS data indicate that the species which have persisted have hardly “thrived” in the presence of OHV use. California Red-legged Frogs have 3 times higher annual presence rates in control water bodies. Despite the recent drought, CRLF breeding has been observed in 4 expansion area ponds since 2011, yet only adults (and one juvenile), have been found in the OHV area in the same time period. No reproduction is occurring (DeSilva and Meisel 2015). Turtles are down to a single locality. California Tiger Salamanders are 5 times more frequently present in Expansion Area ponds than in the generally more shallow and sediment-filled basins of the OHV riding area. Comparison of historic data (collected 1995) to most recent HMS data (2011, 2012, 2014) shows that common species such as Western Toads which were observed in most detention basins are now rare or absent in the OHV area, but occur in many control sites. Western aquatic garter snakes, a species which capitalizes on the explosive breeding events of amphibians whose larvae and metamorphs are a primary prey source, were not reported from any OHV site, but were found in 9 control ponds. This pattern suggests that declines in amphibian presence have food-web consequences for consumers at higher trophic levels in OHV areas.

- **Inappropriate monitoring.**

Persistence is not an appropriate metric because it holds no predictive power, especially for species with long-lived adults. Appropriate response variables that could be used in forecasting population change would include abundance, and survival of new recruits to the population, age/size distribution, body condition, etc. The HMS system fails to collect the appropriate data, and the DEIR thus provides an incomplete picture of the state of amphibian and aquatic reptile populations, the impacts they have faced from OHV use, and lack of remediation by the Habitat Protection Program.

- **Inappropriate protections.**

Many of the aquatic amphibians and reptiles are terrestrial for substantial periods of time, and thus upland impacts of discrete construction activities followed by chronic OHV use pose a serious threat. Because these animals are highly cryptic, remaining underground or under cover for extended periods, direct mortality from any ground breaking activity, including construction, poses a potential impact. Wildlife Guideline 1.7 in the General Plan calls for implementation of measures such as preconstruction surveys to avoid direct and indirect OHV impacts on special-status amphibians in upland habitat, yet there is no

evidence provided that these measures are known to be protective. For example, it would be impossible to know where a Spadefoot Toad is prior to breaking ground unless the animal had been previously radio-tagged.

- **Sacrificing control sites upon expansion.**

A further inadequacy of the GP/DEIR is the failure to plan for locations that will serve as non-riding reference sites in the future if OHV use expands into the Expansion Area. The integrity of existing HMS control sites scattered throughout the Expansion Area will be compromised if OHV riding expands. The lack of delineation of exact locations for construction of trails, campgrounds, gathering facilities, parking lots, etc. means that the reader of the GP/DEIR cannot discern how the existing HMS control sites will be avoided. The integrity of the control sites may have already been compromised because CSVRA terminated cattle grazing on the Tesla parcel in 2013 and on the Alameda parcel in 2014 (Section 5.1.1 of DEIR). For example, if the difference in amphibian pond occupancy between riding and control areas narrows, the change could be due to the absence of the positive effects of livestock grazing on CRLF and CTS (Ford et al. 2013). An erroneous conclusion could be made that there were no longer differences due to OHV riding. Given the DEIR/GP's reliance on future monitoring to detect impacts and conduct future mitigations, this lack of forethought regarding the integrity of the reference sites is a serious flaw in the plans to expand.

In our opinion, the ongoing impacts of OHV riding have been significant and problematic for the long term survival of amphibian and aquatic reptiles. The data show that State Parks is not in compliance with their mandate from the Public Resources Code 5090.35(c) to "*sustain a viable species composition specific to each SVRA*".

2.9 AMPHIBIAN RELATED APPENDICES

2.9.1 CRLF MAP DESCRIPTION:

The "California Red-legged Frog Occurrences On and Adjacent to Carnegie SVRA" map figure depicts points showing documented occurrences of California red-legged frog (CRLF, *Rana draytonii*) from sources including Carnegie SVRA's HMS reports; Vollmar Natural Lands Consulting (VNLC); and the California Natural Diversity Database (CNDDB), which compiles occurrence data from many sources. The red square symbols on the map representing the HMS data have their size scaled to represent the frequency with which CRF have been documented at each pond. The orange square symbols representing CNDDB or VNLC data have not been scaled, as multi-year monitoring data for these points is not available. CNDDB points may be imprecise in location and may relate to historical

specimens, not current CRF breeding. The map also shows a 1-mile buffer around each CRF occurrence within Carnegie SVRA or the proposed Expansion Area. This buffer covers almost all of both parks. CRF are known to migrate as much as two miles from breeding ponds. US Fish and Wildlife Service (USFWS) Designated Critical Habitat polygons (sourced from USFWS website, 2015) for this species are also displayed; critical habitat covers the entirety of both parks. This map was prepared using ArcGIS Version 10.1 in June 2015 by VNLC cartographers Jake Schweitzer and Eric Smith. Background and reference feature data was sourced from the California Protected Areas Database (park boundaries), USFWS (National Wetland Inventory polygon shapefiles), US Geological Survey (10-meter DEMs, county and state boundaries), US Census Bureau (TIGER line shapefiles), California Department of Water Resources (stream line shapefiles), and Digital Globe via ESRI (aerial imagery).

2.9.2 CTS MAP DESCRIPTION:

The "California Tiger Salamander Occurrences On and Adjacent to Carnegie SVRA" map figure depicts points showing documented occurrences of California tiger salamander (CTS, *Ambystoma californiense*) from sources including Carnegie SVRA's HMS reports; Vollmar Natural Lands Consulting (VNLC); and the California Natural Diversity Database (CNDDDB), which compiles occurrence data from many sources. The yellow square symbols on the map representing the HMS data have their size scaled to represent the frequency with which CTS have been documented at each pond. The orange square symbols representing CNDDDB or VNLC data have not been scaled, as multi-year monitoring data for these points is not available. CNDDDB points may be imprecise in location and may relate to historical specimens, not current CTS breeding. The map also shows a 1.3-mile buffer around each CTS occurrence within Carnegie SVRA or the proposed Expansion Area. This buffer covers almost all of both parks. CTS spend most of their adult lives in grasslands away from ponds, and have been found as far as 1.3 miles from breeding ponds. This map was prepared using ArcGIS Version 10.1 in June 2015 by VNLC cartographers Jake Schweitzer and Eric Smith. Background and reference feature data was sourced from the California Protected Areas Database (park boundaries), USFWS (National Wetland Inventory polygon shapefiles), US Geological Survey (10-meter DEMs, county and state boundaries), US Census Bureau (TIGER line shapefiles), California Department of Water Resources (stream line shapefiles), and Digital Globe via ESRI (aerial imagery).

3 MAMMALS

Mammals, big and small, ignored. For some ecologically important mammal species, the relative distribution and abundance between OHV and non-OHV reference sites have not been evaluated quantitatively by the HMS system. Casual and incidental observations indicate however that there may be potentially significant impacts with expansion of OHV use that would have important repercussions in the ecosystem of Corral Hollow and the Expansion Area.

3.1 CALIFORNIA GROUND SQUIRREL

The California Ground Squirrel, has not been covered by the HMS program, but are known to be adversely affected by noise and anthropogenic disturbance (Rabin et al. 2006). These squirrels, which are encountered frequently during site visits to the Expansion Area but infrequently observed in the OHV area are a key prey resource for Golden Eagles. They also serve as ‘ecosystem engineers’ by digging tunnel networks subsequently used by special status birds, amphibians, and reptiles. All small mammal trapping done by the HMS program is done at night, yet California Ground Squirrels are a strictly diurnally active species.

3.2 TULE ELK

Another example of an ignored but important player in the ecosystem is the Tule Elk. Although the Tule Elk is California’s largest ungulate, and as such is both an important indicator species and an important herbivore, the HMS reports generated over the past 12 years provide no discussion of this species (although its presence can be confirmed by the “incidental observations” listed in the HMS reports). Historically, Tule Elk were abundant on both properties. However, spatial data (i.e. locations of Tule Elk sightings) received via Public Records Act requests demonstrate that Tule Elk continue to roam throughout the Expansion Area, but are absent from the existing CSVRA. There is no scientific explanation for this phenomenon other than OHV use, which is known to increase flight distance in elk (Vieira 2000). Moreover, these data indicate that if OHV moves into the Expansion Area, Tule Elk are likely to disappear. This in turn will cause a shift in the vegetation, as has been documented in elk exclosure manipulation experiments (Johnson and Cushman 2007). The cessation of cattle grazing will also have profound impacts on vegetation communities and plant species composition (Stahlheber and D’Antonio 2013). These consequences have not been disclosed or analyzed in the DEIR.

4 CONCLUSION

The GP/DEIR should not be approved or certified because the documents fail to recognize the impacts illustrated in the previous sections of this tech memo. These un-discussed impacts are ongoing and should have been included in the DEIR as part of the categorization of existing conditions at Carnegie.

4.1 THE DEIR FAILS TO DISCLOSE THE VALUE OF THE ALAMEDA-TESLA EXPANSION AREA AS A HOTSPOT WITHIN A BIODIVERSITY HOTSPOT

In addition to not recognizing how the impacts of OHV use will adversely affect vegetation and wildlife and disrupt critical habitat linkages, the DEIR fails to identify the overall importance of the Expansion Area as a biodiversity hotspot, i.e. a place with high species richness relative to surrounding areas (Howard et al. *in press*; The Nature Conservancy's Freshwater Conservation Blueprint⁴). The high conservation value of the Expansion Area derives from its location in the Corral Hollow watershed connecting different biogeographic regions within the California Floristic Province, one of 25 global hotspots for biodiversity (Meyers et al. 2000). Its value was recognized by California's earliest naturalists such as Joseph LeConte, Joseph Grinnell and John Muir (Beidleman 2006). The area has a long history of use for natural history research and education by the Museum of Vertebrate Zoology (MVZ) at the University of California at Berkeley, California State University at Hayward, and other local educational institutions and societies. In a letter⁵ to the Director of State Department of Parks and Recreation dated November 7, 1980, ten MVZ professors stated:

Because of its accessibility and unusual flora and fauna, Corral Hollow is an outstanding wildlife resource area for the people of the San Francisco Bay Area. It is located within an easy one day's trip. It is the northernmost major canyon in the arid portion of the Inner Southern Coast Range and many xeric species, including some represented in the California desert, reach their northern limit in the area. Some species recorded as extending farther north to the vicinity of the San Joaquin delta, have been severely affected by extensive development in the lowlands north of the canyon, thus Corral Hollow is, in effect, now the northern limit of established, viable populations. An example is the Glossy Snake, still found in the canyon, but evidently near extinction to the north. The arid land's biota is mixed with less dry-adapted forms providing a remarkable variety of wildlife.

⁴ Friends of Tesla Park Exhibit no. 21

⁵ See full letter in Friends of Tesla Park Exhibit no. 23.

Corral Hollow has long been known for its exceptionally high levels of biological diversity, forming the northern extent of the 'San Joaquin Desert' (Germano et al. 2011) and it is a crucial transition zone between these xeric habitats and the more mesic habitats of coastal California. These unique circumstances make it floristically unique. Bruce Baldwin, UC Berkeley professor and head of the Jepson Herbarium has stated recently:

The ecological integrity and natural diversity represented by the 3100 acre Tesla Property are too valuable to sacrifice to vehicular recreation, which would devastate the area. For example, the Tesla property harbors an unusual array of vegetation types, including rare assemblages such as desert-olive shrubland, and the habitat quality is particularly notable. Grasslands there are highly diverse in native forbs and native grasses, as is the understory of blue oak woodland. Much of California's grassland and blue oak woodland habitat is highly degraded by non-native plants, but that is not the situation on the Tesla property. It is no surprise that such habitat integrity and diversity is also reflected by the richness of native animal life there. Generations of botanists and zoologists have known this area for its unusually intact flora and fauna. Sacrificing such a resource for OHV play is ill-conceived in the extreme and would be a particularly conspicuous failure of public land stewardship.

The intact fauna is exemplified by the richness of reptiles including snakes (16 species), lizards (9 species), and California's one native turtle. Five of these reptiles are special-status species. This diversity is unparalleled in other nearby regions (Stebbins 2003).

The DEIR also fails to recognize the importance of the Expansion Area's unique biodiversity for educational purposes and the impacts of OHVs (e.g., noise and other disturbance) on nature observation. Sam McGinnis, professor emeritus from Cal State Hayward and co-author with Robert Stebbins of the Field Guide to Amphibians and Reptiles of California has noted:

"The uniqueness lies in the fact that this site is the northernmost large canyon of the Southern Inner Coast Range and as such contains a large number of "desert relics". Amphibians such as the Western Spadefoot Toad, reptiles like the Side-blotched lizard, Glossy Snake, and Black-headed snake, birds such as Phainopepla and Lesser Night Hawk, and mammals including the San Joaquin and California Pocket Mice, the Heerman Kangaroo Rat, and

the San Joaquin Kit Fox are either completely absent or in very low numbers in all other potential fieldtrip sites in our area. By taking a class to Corral Hollow we give them a “mini desert trip” within 40 minutes of campus...The great value of Corral Hollow to my university was partially diminished ... with the establishment of Carnegie Park for ORV use. The near continuous presence of ORVs in that area has completely eliminated its use by our faculty and students for instructional purposes except as a presentation of the most callous display of habitat destruction short of the bulldozer that we could find...The noise factor alone negates adjacent areas for instruction and study. On one hand, animals tend to avoid such areas of audio disturbance, while on the other, much of the location, identification, and study of vertebrates is accomplished as much with the ears of the observer as with the eyes.”

4.2 ONGOING MONITORING AS A STRATEGY FOR AVOIDING IMPACTS TO SENSITIVE SPECIES IS TOO VAGUE TO BE CONSIDERED AN EFFECTIVE MITIGATION STRATEGY.

The PGP and DEIR fail to disclose several important flaws of CSVRA’s Wildlife Habitat Protection Plan (WHPP) and HMS: (1) the numerous “data gaps”; (2) inability to detect patterns in the data that do exist and indicate OHV use has had a significant impact on natural resources; and (3) inability to implement adaptive management to protect biological resources. These deficiencies preclude the public and decision makers from an accurate understanding of existing conditions. More importantly, potentially significant impacts, such as those shown in this Tech Memo, will likely occur if OHV use and CSVRA’s management practices extend into the Expansion Area.

Based on our professional experience and given the tremendous wildlife resource value of the Expansion Area in the face of unavoidable impacts associated with OHV use, we conclude that the best outcome would be to designate the Expansion Area as a natural preserve. The Public Resources Code 5019.71 states that “natural preserves consist of *distinct areas of **outstanding natural or scientific significance** established within the boundaries of other state park system units.* The purpose of natural preserves shall be to preserve such features as rare or endangered plant and animal species and their supporting ecosystems ... or unique biogeographical patterns.” With a long list of special status plants and animals present and an unusual mix of xeric San Joaquin desert with mesic Coastal Hills species, these conditions are clearly met at the Expansion Area.

5 LITERATURE CITED

- Bartolome, J. W., B. H. Allen-Diaz, S. Barry, L. D. Ford, M. Hammond, P. Hopkinson, F. Ratcliff, S. Spiegel, and M. D. White. 2014. Grazing for biodiversity in Californian Mediterranean grasslands. *Rangeland Ecology & Management* 36: 36-43.
- Baldwin, B. 2015. Letter to Livermore Vice Mayor Laureen Taylor, sent via email May 16, 2015.
- Barton, D. C., and A. L. Holmes. 2007. Off-Highway vehicle trail impacts on breeding songbirds in northeastern California. *The Journal of Wildlife Management*. 71(5):1617-1620.
- Baumberger, K. 2013. Uncovering a fossorial species: Home range and habitat preference of the western spadefoot, *Spea hammondi* (Anura: Pelobatidae), in Orange County protected areas (MS Thesis, California State University, Fullerton).
- Beidleman, R. G. 2006. California Frontier Naturalists. University of California Press, Berkeley and Los Angeles, California.
- Bishop, M. R., R. C. Drewes, and V. T. Vredenburg. 2014. Food web linkages demonstrate importance of terrestrial prey for the threatened California Red-legged Frog. *Journal of Herpetology* 48: 137-143.
- Bobzien, S. and J. E. DiDonato. 2007. The status of the California tiger salamander (*Ambystoma californiense*), California red-legged frog (*Rana draytonii*), foothill yellow-legged frog (*Rana boylei*), and other aquatic herpetofauna in the East Bay Regional Park District, California. Annual report to US Fish and Wildlife Service.
- Bondi, C. A. and S. B. Marks. 2013. Differences in flow regime influence the seasonal migrations, body size, and body condition of western pond turtles (*Actinemys marmorata*) that inhabit perennial and intermittent riverine sites in northern California. *Copeia* 2013(1):142-153.
- Bourque, R. M. 2008. Spatial ecology of an inland population of the Foothill yellow-legged frog (*Rana boylei*) in Tehama County, California. MS Thesis, California State University, Humboldt. 93 pp.
- Brattstrom, B. H., and M. C. Bondello. 1983. Effects of off-road vehicle noise on desert vertebrates. In *Environmental effects of off-road vehicles*, pp. 167-206. Springer New York.
- Bulger, J. B., N. J. Scott Jr., and R. B. Seymour. 2003. Terrestrial activity and conservation of adult California red-legged frogs *Rana aurora draytonii* in coastal forests and grasslands. *Biological Conservation* 110(1): 85-95.

- California Department of Fish and Wildlife. 2013. San Joaquin River Restoration Program, Region 4. Appendix I Conservation Measures for Biological Resources that may be affected by Program-level Actions. Available url <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=73979> (accessed 6/3/2015).
- Chase, M. K., Kristan, W. B., Lynam, A. J., Price, M. V., and J. T. Rotenberry. 2000. Single species as indicators of species richness and composition in California coastal sage scrub birds and small mammals. *Conservation Biology* 14(2): 474-487.
- Cull, R. 2001. Carnegie State Vehicular Recreation Area Wildlife Habitat Protection Plan. 21pp. available url [http://carnegiegeneralplan.com/system/assets/29/original/carnegie_whpp_2001.pdf?1338498868] accessed 6/10/2015.
- D'Amore, A. J. 2007. Conservation of California red-legged frogs: distribution correlates, spatial dynamics and behavioral interactions with an invasive species. Ph.D. thesis, University of California, Santa Cruz. 154 pp.
- D'Amore, A., V. Hemingway, and K. Wasson. 2010. Do a threatened native amphibian and its invasive congener differ in response to human alteration of the landscape? *Biological Invasions* 12(1): 145-154.
- Davidson, C. and P. Trenham. 1998. Final Report Amphibian Surveys: Spring 1998. Carnegie State Vehicular Recreation Area. 21pp.
- Davis, C. J. 1998. Western Pond Turtle (*Clemmys marmorata pallid*) Winter Habitat Use and Behavior. Master's Thesis, San Jose State University, San Jose, CA. 74 p.
- DeSilva, T. and A. Meisel. 2015. 2011-2014 Habitat Monitoring Systems Report Carnegie State Vehicular Recreation Area.
- Dimmitt, M.A. and R. Ruibal. 1980. Environmental Correlates of Emergence in Spadefoot Toads 15 (*Scaphiopus*). *Journal of Herpetology* 14:21-29.
- Fellers, G. M., and P. M. Kleeman. 2007. California red-legged frog (*Rana draytonii*) movement and habitat use: implications for conservation. *Journal of Herpetology* 41:276-286.
- Ford, L. D., P. A. Van Hoorn, D. R. Rao, N. J. Scott, P. C. Trenham, and J. W. Bartolome. 2013. Managing rangelands to benefit California red-legged frogs and California tiger salamanders. Livermore, California: Alameda County Resource Conservation District. (67p.)
- Germano, D.J., G.B. Rathbun, L.R. Saslaw, B.L. Cypher, E.A. Cypher and L.M. Vredenburg. 2011. The San Joaquin desert of California: ecologically misunderstood and overlooked. *Natural Areas Journal* 31:138-147.
- Gonsolin T. E. 2010. Ecology of foothill yellow-legged frogs in upper Coyote Creek, Santa Clara County, CA. State University of California, San Jose. MS Thesis. 110 pp.
- Hanski. I. 1999. Metapopulation ecology. Oxford University Press.

- Hayes, M. P. and M. R. Tennant. 1985. Diet and feeding behavior of the California red-legged frog *Rana aurora draytonii* (Ranidae). The Southwestern Naturalist 30(4):601–605.
- Hopkins, G. R., French, S. S., & Brodie, E. D. 2013. Increased frequency and severity of developmental deformities in rough-skinned newt (*Taricha granulosa*) embryos exposed to road deicing salts (NaCl & MgCl₂). Environmental Pollution, 173: 264-269.
- Howard et al. *in press*. Patterns of Freshwater Species Richness, Endemism, and Vulnerability in California. PlosOne-D-15-04890. See map in Friends of Tesla Park Exhibit no. 21.
- Karraker, N. E., Gibbs, J. P., and J. R. Vonesh. 2008. Impacts of road deicing salt on the demography of vernal pool-breeding amphibians. Ecological Applications, 18(3): 724-734.
- Kupferberg, S. J. 1996. Hydrologic and geomorphic factors affecting conservation of the foothill yellow legged frog (*Rana boylei*). Ecological Applications 6:1332–1344.
- Kupferberg, S. J., A. J. Lind, and W. J. Palen. 2009. Pulsed flow effects on the Foothill yellow-legged frog (*Rana boylei*): Population modeling. Final Report. California Energy Commission, PIER. Publication number 500-09-02a. 80 pp. Available url [[http://www.fs.fed.us/psw/publications/lind/lind\(KupferbergCEC-500-2009-xxx\).pdf](http://www.fs.fed.us/psw/publications/lind/lind(KupferbergCEC-500-2009-xxx).pdf)] accessed 6/27/2015
- Kutilek, M., H. Shellhammer, and W. Bros. 1991. Inventory, Wildlife Habitat Protection Program, and Monitoring Program for Carnegie State Vehicular Recreation Area, Tracy, CA. Prepared for CA Dept of Parks and Recreation Off-Highway Motor Vehicle Division, Contract No. 4-550-9035. San Jose State University, Biology Department. San Jose, CA.
- Lewis W. M. 1999. Studies of Environmental Effects of Magnesium Chloride Deicer in Colorado. Colorado Department of Transportation Research Branch Report No. CDOT-DTD-R-99-10. pp. 21-27.
- Meese. R. J., G. R. Geupel, K. Reeves, and J. Weigand. 2009. Scientific peer review and assessment of the California Department of Parks and Recreation Off-Highway Motor Vehicle Recreation Division Habitat Monitoring System. Final Report. 41 pp.
- Myers, N., Mittermeier, R. A., Mittermeier, C. G., Da Fonseca, G. A., and J. Kent. 2000. Biodiversity hotspots for conservation priorities. Nature 403(6772): 853-858.
- Nichols, J. D., L. Thomas, and P. B. Conn. 2009. Inferences about landbird abundance from count data: recent advances and future directions. In: Modeling demographic processes in marked populations (D. L. Thomson, E. G. Cooch, and M. J. Conroy, eds.), pp. 201–235. Springer Science+Business Media, New York, NY.
- Ortega, C. 2012. Effects of noise pollution on birds: a brief review of our knowledge. Ornithological Monographs, 2012(74): 6-22.

- Pilliod, D. S., J. L. Welty, and R. Stafford. 2013. Terrestrial movement patterns of western pond turtles (*Actinemys marmorata*) in central California. *Herpetological Conservation and Biology* 8:207-221.
- Rabin, L.A., R. G. Coss, and D. H. Owingset 2006. The effects of wind turbines on antipredator behavior in California ground squirrels (*Spermophilus beecheyi*). *Biological Conservation* 131: 410–420.
- Rathbun, G. B., N. J. Scott, and T. G. Murphey. 2002. Terrestrial habitat use by Pacific pond turtles in a Mediterranean climate. *Southwestern Naturalist* 47(2):225–235.
- Reese, D. A. and H. H. Welsh, Jr. 1997. Use of terrestrial habitat by western pond turtles, *Clemmys marmorata*: implications for management. Pp. 352–357 In *Proceedings: Conservation, Restoration, and Management of Tortoises and Turtles – An International Conference*. J. Van Abbema (Ed.). New York Turtle and Tortoise Society, New York, New York.
- RHJV (Riparian Habitat Joint Venture). 2004. Version 2.0. The riparian bird conservation plan: a strategy for reversing the decline of riparian associated birds in California. California Partners in Flight. <http://www.prbo.org/calpif/pdfs/riparian.v-2.pdf>.
- Rombough, C. J. 2006. Wintering habitat use by juvenile foothill yellow-legged frogs (*Rana boylei*): the importance of seeps. *Northwestern Naturalist* 87: 159.
- Searcy, C. A. and H. B. Shaffer. 2011. Determining the migration distance of a vagile vernal pool specialist: How much land is required for conservation of California tiger salamanders? Pages 73-87 in D. G. Alexander and R. A. Schlising (Editors), *Research and recovery in vernal pool landscapes*. Studies from the Herbarium, Number 16. California State University, Chico, CA. Available url <https://www.eeb.ucla.edu/Faculty/Shaffer/pubs/SearcyHerbarium2011.pdf> (accessed 6/28/2015)
- Searcy, C. A., Gabbai-Saldate, E., and H. B Shaffer. 2013. Microhabitat use and migration distance of an endangered grassland amphibian. *Biological Conservation* 158:80-87.
- Semlitsch, R. D. and J. R. Brodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. *Conservation Biology* 17(5):1219-1228.
- Stebbins, R. C. 2003. *Western reptiles and amphibians*. Third Edition. Houghton Mifflin Company, New York, NY.
- Su, J. C., Debinski, D. M., Jakubauskas, M. E., and K. Kindscher. 2004. Beyond species richness: Community similarity as a measure of cross-taxon congruence for coarse-filter conservation. *Conservation Biology* 18(1): 167-173.
- Tatarián, P. J. 2008. Movement patterns of California red-legged frogs (*Rana draytonii*) in an inland California environment. *Herpetological Conservation and Biology* 3:155-169.

- Thompson, F., and F. La Sorte. 2008. Comparison of methods for estimating bird abundance and trends from historical count data. *Journal of Wildlife Management* 72: 1674–1682.
- Twitty, V., D. Grant, and O. Anderson. 1967. Amphibian orientation: An unexpected observation. *Science* 155: 352–353.
- U.S. Fish and Wildlife Service (USFWS). 2005. Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon. Portland, Oregon. xxvi +606 pages.
<http://www.fws.gov/endangered/recovery/index.html#plans>.
- United States Fish and Wildlife Service. 2002. Recovery plan for the California red-legged frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, OR.
- United States Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the California Red- Legged Frog. *Federal Register* 75(51): 12816-12959. Available URL accessed 6/13/2013 <http://www.gpo.gov/fdsys/search/citation.result.FR.action?federalRegister.volume=2010&federalRegister.page=12816&publication=FR>
- Vieira, M.E.P. 2000. Effects of early season hunter density and human disturbance on elk movement in the White River area, Colorado. M.S. Thesis. Fort Collins, CO: Colorado State University.
- Yarnell, S. M., A. J. Lind, and J. F. Mount. 2010. Dynamic flow modeling of riverine amphibian habitat with application to regulated flow management. *River Research and Applications* 28: 177–191.
- Wang, I. J., W. K. Savage, and H. B. Shaffer. 2009. Landscape genetics and least-cost path analysis reveal unexpected dispersal routes in the California tiger salamander (*Ambystoma californiense*). *Molecular Ecology* 18(7): 1365-1374.
- Zack, S., and California Partners in Flight (CalPIF). 2002. The Oak Woodland Bird Conservation Plan: A Strategy for Protecting and Managing Oak Woodland Habitats and Associated Birds in California. Stinson Beach, CA: Point Reyes Bird Observatory; 126 p. (see also <http://www.prbo.org/calpif/plans.html>).

6 STATEMENT OF AUTHOR QUALIFICATIONS

SARAH KUPFERBERG

Dr. Kupferberg has served as a volunteer technical advisor to Friends of Tesla Park and has toured the existing Carnegie SVRA and the Expansion Area. She works as an ecological consultant and also conducts independent research. She is affiliated with the Department of Integrative Biology at UC Berkeley as a Visiting Scholar. Example projects and a publication list can be found in her Vita (below). Her familiarity with the DEIR planning area began in the mid 1990's when she was a Ph.D. student doing research on Foothill Yellow-legged Frogs (FYLF). That work has extended into a career long interest in amphibian conservation.

SARAH KUPFERBERG, Ph.D.

Ecologist, Conservation Biologist

skupferberg@gmail.com

510-367-4546 (cell)

818 Mendocino Ave.

Berkeley, CA 94707

Ph.D., Integrative Biology, University of California, Berkeley 1996

B.S., Botany, Duke University, Durham, North Carolina 1984

Graduated magna cum laude and elected to Phi Beta Kappa

Dr. Kupferberg focuses on food web ecology, amphibian population biology, and conservation of aquatic ecosystems in California. She is trained in the design of ecological monitoring programs, experimental design, and data analysis of multi-species assemblages. She studies the effects of flow regulation by dams and diversions on physical and biotic conditions for wildlife. She conducts field research and does experiments in rivers with hydroelectric projects, drinking water reservoirs, and flood control projects. She reviews stream restoration plans and works with engineers to facilitate designs that work from both hydraulic and biologic perspectives. Dr. Kupferberg is presently a visiting scholar affiliated with the laboratory of Dr. Mary Power, UC Berkeley Dept. of Integrative Biology.

Ecologist with McBain & Assoc., Arcata, CA (2013-2014)

- For San Francisco Public Utilities Commission assessed amphibian and reptile issues, drafted Habitat Conservation Plan, conducted population monitoring and baseline studies for CEQA Mitigation Monitoring and Reporting Plan, developed ecological models, and evaluated alternate in-stream flow proposals for the Tuolumne River and Alamada Creek.

Ecologist with Questa Engineering Corp., Pt Richmond, CA (2001-2013)

- Developed ecological aspects of study plan to remove Benbow Dam on South Fork Eel River for California State Parks
- Designed stream restoration for California Red-legged frog habitat at Site 300.
- Analyzed benthic macroinvertebrate samples to assess impacts of roads, drilling, and water diversion in the Geysers geothermal area.

- Developed management plans to minimize impact of impoundments on native frogs.
- Conducted site assessments for *Rana draytonii* and *Rana boylei* on several N. California projects.

Research Assoc., Visiting Scholar, Dept of Integrative Biology, UC Berkeley (2008-2011, 2014-2015)

- Conducting long term (+20 yr) population monitoring of *R. boylei* (S. Fk. Eel River, Alameda Ck.)
- Completed California Energy Commission sponsored project on the downstream thermal effects of hydroelectric power generation on amphibians and algal food webs.
- Developed population viability analysis methods specific to *R. boylei*.

Consulting Ecologist for US Forest Service re FERC hydropower relicensing (2002-2006, 2013)

- Helped design flow studies, developed Federal Power Act section 4e conditions, reviewed draft license applications, and developed monitoring plans for several California rivers including: Pit, N. Fk. Feather, West Branch Feather, Butte Ck., Stanislaus, American, and Tule Rivers
- Drafted the sections of the USFS Conservation Assessment of *Rana boylei*.

Teaching and Presentations

- **California Department of Fish and Wildlife, Conservation Lecture Series.** Gave presentation on Foothill yellow legged frogs, Dec. 2014.
- **Joint Aquatic Sciences Meeting.** Special session, The Future of Aquatic Science. "From algal food web ecology to dam management: connecting the dots one tadpole at a time." May 2014
- **Friends of the Eel River Science Symposium.** Presentation comparing thermal conditions on Eel River below Scott Dam and free-flowing reaches of the South Fork Eel watershed, April 2012
- **Jasper Ridge Biological Preserve, Stanford University.** Brown-Bag Lecture Series presentation on importance of flow regime and thermal conditions to stream-breeding amphibians, Nov. 2011.
- **Geomorphic & Ecological Fundamentals for River Restoration.** Taught ecology section of short course organized by Matt Kondolf (UC Berkeley) at Sagehen Creek Field Station, Aug. 2009- 10
- **State Water Resources Control Board, Division of Water Rights.** Taught section in workshop: Effects of Water Diversion on Ecology and Geomorphology of Small Streams, April 2009
- **Upper Tuolumne River Stakeholder Meeting.** Presentation reviewing how competing demands for water (e.g. power generation, recreation, irrigation) affect riverine biota. Nov. 2008
- **University of California, Berkeley Graduate Student Instructor** 1991-1994
Department of Integrative Biology: Intro Biology and Ecology
Department of Geology and Geophysics: The Water Planet (intro to hydrology)
- **Yosemite National Institutes, Yosemite National Park and Golden Gate National Recreation Area, California** Naturalist / Instructor / Environmental Educator 1988-89.
- **Naturalists at Large, Santa Monica, California; Boojum Wilderness Institutes, San Diego, California; Venture West School of Outdoor Living, Walnut Creek, California.**
Instructor in Wilderness and Group Building Programs 1986-87
- **Sierra Institute, U.C. Santa Cruz Extension, Teaching Assistant**
Natural History and Ecology of the Sierra Nevada Summers 1986, 1987

Service

- Associate Editor for Herpetological Conservation and Biology
- Volunteer Technical Advisor for Friends of Tesla Park
- Board member for Save the Frogs!
- Mentor to high school seniors in AP Environmental Studies at College Prep School in Oakland

- Peer reviewer for Herpetological Conservation and Biology, Freshwater Biology, Oecologia, Copeia, Ecology, PLoS ONE, Alameda County Resource Conservation District publications

Membership in Professional Societies

- American Society of Ichthyologists and Herpetologists; Ecological Society of America; California Nevada Amphibians Populations Task Force

Publications

- Power, ME, SJ Kupferberg, SD Cooper, ML Deas. *In press*. California's River Ecosystems. *in* Ecosystems of California, H Mooney, E Zavaleta, eds. University of California Press, Berkeley.
- Furey, PC, SJ Kupferberg, AJ Lind. 2014. The perils of unpalatable periphyton: *Didymosphenia* and other mucilaginous stalked diatoms as food for tadpoles. *Diatom Research* 29:267–280.
- Catenazzi, A, SJ Kupferberg. 2013. The importance of thermal conditions to recruitment success in stream-breeding frog populations distributed across a productivity gradient. *Biological Conservation*. 168: 40–48.
- Kupferberg, SJ, A Catenazzi, ME Power. 2013. The importance of water temperature and algal assemblage for frog conservation in northern California rivers with hydroelectric projects. Final Report. California Energy Commission, PIER. 110pp.
- Kupferberg, SJ, C Addley, P Graf. 2012a. Water temperature effects on Foothill Yellow-legged Frog and Hardhead. Filed September 14, 2012 to the Federal Energy Regulatory Commission in Reply Comments of Placer County Water Agency on the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service Preliminary Recommendations of Measures under Federal Power Action § 10(j) and Preliminary Federal Power Action § 18 Fishway Prescriptions. Appendix A.
- Kupferberg, SJ, WJ Palen, AJ Lind, S Bobzien, A Catenazzi, J Drennan, ME Power. 2012b. Effects of altered flow regimes by dams on survival, population declines, and range-wide losses of California river-breeding frogs. *Conservation Biology* 26:513-524.
- Kupferberg, SJ, AJ Lind, V Thill, and S Yarnell. 2011. Water velocity tolerance in tadpoles of the foothill yellow-legged frog (*Rana boylei*): swimming performance, growth, and survival. *Copeia* 2011:141–152.
- Kupferberg, SJ, AJ Lind, S Yarnell, J Mount. 2009a. Pulsed flow effects on the foothill yellow-legged frog (*Rana boylei*): Integration of empirical, experimental and hydrodynamic modeling approaches. Final Report to the California Energy Commission, PIER. 194 pp. <http://animalscience.ucdavis.edu/PulsedFlow/Kupferberg%20500-09-002.pdf>
- Kupferberg, SJ, AJ Lind, and WJ Palen. 2009b. Pulsed flow effects on the foothill yellow-legged frog (*Rana boylei*): Population modeling. Final Report to the California Energy Commission, PIER. 80pp. <http://animalscience.ucdavis.edu/PulsedFlow/Kupferberg%20Sept2010.pdf>
- Kupferberg, SJ, A Catenazzi, K Lunde, AJ Lind, and WJ Palen. 2009c. Parasitic copepod (*Lerneae cyprinacea*) outbreaks in foothill yellow-legged frogs (*Rana boylei*) linked to unusually warm summers and amphibian malformations in northern California. *Copeia* 2009:529-537.
- Sanderson, SL, SJ Kupferberg. 1999. Development and evolution of aquatic larval feeding mechanisms. *in* The origin and evolution of larval forms, BK Hall, MH Wake, eds. Academic Press, London.
- Kupferberg, SJ. 1998. Predator mediated patch use by tadpoles (*Hyla regilla*): risk balancing or consequence of motionlessness? *Journal of Herpetology* 32:84-92.

- Kupferberg, SJ. 1997a. The role of larval diet in amphibian metamorphosis. *American Zoologist* 37:146-159.
- Kupferberg, SJ. 1997b. Bullfrog (*Rana catesbeiana*) invasion of a California river: the role of larval competition. *Ecology* 78:1736-1751.
- Kupferberg, SJ. 1997c. Facilitation of primary production by grazing: functionally important differences among species. *Freshwater Biology* 37:427-439.
- Kupferberg, SJ. 1996. Hydrologic and geomorphic factors affecting conservation of the foothill yellow legged frog (*Rana boylei*) *Ecological Applications* 6:1332-1344.
- Kupferberg, SJ, JC Marks, and ME Power. 1994. Variation in natural algal and detrital diets affects larval anuran life history traits. *Copeia* 1994: 446-457.
- Kupferberg, SJ. 1994. Exotic larval bullfrogs (*Rana catesbeiana*) as prey for native garter snakes: functional and conservation implications. *Herp Review* 25: 95-97.

Paula C. Furey

Dr. Furey, an ecologist at St. Catherine University, St. Paul, MN, has expertise and interests that span phycology (algae), distribution patterns of species, biodiversity, conservation biology, and global change. Example research projects and a publication list can be found in her Vita (below), many of which focus on the ecology of freshwaters. Her research in California includes, for example, examination of the impacts of stream condition on the species composition and function of algal assemblages among Sierra Nevada Rivers and the implications for the foothill yellow-legged frog tadpole. She also works with a collaborative research team in the Eel River Watershed on the role of algal assemblages as drivers and indicators of riverine ecosystem function at local, reach and watershed scales. For this memo Dr. Furey conducted the MDS analyses.

PAULA FUREY, Ph.D.

Ecologist, Freshwater Biologist

pcfurey@hotmail.com
419-308-7770 (cell)
Department of Biology,
St. Catherine University
St. Paul, MN 55105

Ph.D., Biology, Bowling Green State University, Ohio, 2008

M.Sc., Biology, University of Victoria, British Columbia, Canada, 2003

B.Sc., Biology, University of Victoria, British Columbia, Canada, 1997

Graduated with distinction with a Double Major in Biology & Environmental Studies.

Dr. Furey focuses on the freshwater ecology of lake and river ecosystems, especially algal assemblages. Her research centers on trying to understand what shapes and controls the structure and function of biotic communities and ecosystems, and on using ecology to find better ways to monitor, protect and predict changes in aquatic ecosystems. She is trained in working with distribution patterns of species and data analysis of multi-species assemblages. Her current field and experimental based research on ecology and climate change is conducted in a variety of freshwater systems (streams, rivers, lakes, and wetwalls) in California, Iceland, and Minnesota. Dr. Furey is currently an Assistant Professor in the Biology Department at St. Catherine University, St. Paul, MN.

Recent Collaborative Research

- Dr. J. Welter, St. Catherine University, 2011 – present: We are examining the spatial and temporal variation in factors that control abundance and activity of autotrophic nitrogen-fixers in river networks and the consequences for rates of nitrogen-fixation and the fate nitrogen. We also are examining primary producer ecology in geothermally active streams in Iceland.
- Dr. S. Kupferberg, University of California Berkeley & Dr. A. Lind USDA Forest Service -Pacific Southwest Research Station, 2010 – present: We are examining the Impacts of algal

- assemblage variation (including the invasive alga *Didymosphenia*) among Sierra Nevada rivers and the implications for the foothill yellow-legged frog tadpole.
- Dr. A. Catenazzi, Southern Illinois Univ. Carbondale, & Dr. R. Lowe, BGSU, 2009 – present: We are documenting and exploring the biodiversity and ecology of the algae of wet walls along an elevation gradient in Peru, including descriptions of new algal species.
 - Worked with a variety of research collaborators since 2008 on the ecology of the South Fork of Eel River., (such as Drs. M. Power, R. Lowe, Y. Vadeboncoer, Dr. Holomuzki, Dr. J. Welter). Some of my research projects, for example, focus on the examination of: algal assemblages (*Cladophora* and associated epiphytes) as drivers and indicators of riverine ecosystem function at local, reach and watershed scales; top-down controls on the structure and function of algal assemblages, aquatic midge-grazer interactions with algal nitrogen fixers

Consulting Ecologist:

- Valent Bio Sciences: Consulting (2013): Impact of phytoplankton abundance and composition on the effectiveness of a black fly larvicide

Teaching

- St. Catherine University:
 - Environmental Biology: co-taught with education faculty – part of the STEM program: lecture & labs; 2011–2015: 2013–2015 in hybrid format – Evening, Weekend, On-line Program
 - Environmental Biology: co-taught with education faculty – part of the STEM program: lecture & labs; 2015, Day Baccalaureate Program
 - Conservation and Biodiversity: lecture & lab; upper level. 2014.
 - Foundations in Biology I: Nature of Science, Evol. & Biodiv. – lecture & labs. 2012–2014.
 - Introductory Biology II: Plants, Evolution, Ecology – lecture & labs; 2012
- Bowling Green State University: Main & Firelands campuses & Lorain County Community College
 - Great Lakes Ecosystems – lecture; three classrooms connected by live video 2008

Outreach: Invited Workshops:

- Angelo Coast Range Reserve Algal Foray and Workshop: Co-organized and Instructed: Training of citizen scientists and graduate students on algal collection and identification, June 2013; June 2015
- St. Olaf College, MN: Trained students and principal investigator on algal collection and identification, Oct. 2011, June 2012

Presentations (since 2008; oral unless otherwise indicated)

- Furey, P.C.; J.R. Welter, D. Sander, T. Williamson, W. Cross. 2015. Algal assemblages as Changes in N₂-fixing algal species assemblages across a stream temperature gradient: Implications of warming for species composition and ecosystem function. **Society for Freshwater Science Conference**, Milwaukee, WI
- Furey, P.C.; J.R. Welter, A. Ahles, J. Goldschmidt, & D. Nelson. 2014. What do the algae say? Winter patterns in nitrogen-fixing algal assemblages in streams in the Hengill Region of Iceland. **Joint Aquatic Sciences Meeting**, Portland, OR

- Bouma-Gregson, K., R.L. Lowe, M.E. Power, P.C. Furey, J. Welter, and R.M. Kudela. 2014. Flow and climate thresholds for algal assemblages in a nitrogen poor river in a Mediterranean climate: tipping towards toxicity? **Joint Aquatic Sciences Meeting**, Portland, OR
- Furey, P.C., B. Wolfe, J.R. Welter, D.R. Sander, & B.D. Lawrence. 2013. Composition and abundance of nitrogen-fixing algal assemblages in nitrogen-limited streams along a geothermal gradient in the Hengill region of Iceland. **Society for Freshwater Science Conference**, Jacksonville, FL.
- Welter, J.R., D.R. Sander, B.D. Lawrence, P.C. Furey, & J.M. Hood. 2013. Effect of temperature on N₂ fixation rates and N₂ fixer species assemblages in streams in the Hengill Region of Iceland. **Society for Freshwater Science Conference**, Jacksonville, FL.
- Furey, P.C., S.J. Kupferberg, & A.J. Lind. 2013. Consequences of *Didymosphenia* and other stalked diatoms common downstream of hydropeaking dams as food for tadpoles. **International Didymosphenia Conference**, Providence, RI.
- Furey, P.C., R.L. Lowe, & A. Catenazzi. 2013. New and interesting aerophilic diatoms from the Peruvian Andes. **22nd North American Diatom Symposium**. Bar Harbor, ME. Poster
- Furey, P.C., S.J. Kupferberg, & A.J. Lind. 2012. The perils of unpalatable periphyton: *Didymosphenia* and other mucilaginous diatoms common downstream of hydropeaking dams as food for tadpoles. **Society for Freshwater Science**, Louisville, KY.
- Welter, J.R., P.C. Furey, M.E. Power, A.R. Bratt, B.L. Weigel, & J.A. Cormier. 2012. Interactive effect of floods and grazing on abundance, activity, and species composition of nitrogen fixers in a river network. **Society for Freshwater Science**, Louisville, KY.
- Furey, P.C., A.J. Rosendahl, J.R. Welter. 2011. Nutrient constraints on nitrogen-fixation and algal species assemblages in an N-limited northern California River. **North American Benthological Society**, Providence, RI.
- Welter, J.R., P. C. Furey, J.A. Cormier, A.J. Rosendahl, B.L. Weigel, & G.M. Wilkinson. 2011. Abiotic and biotic constraints on nitrogen fixation and producer species assemblages in an N-limited river ecosystem. **Ecological Society of America**, Austin, TX.
- Furey, P.C., S. Mayama, R.L. Lowe, & A. Catenazzi. 2011. *Frankophila wayqechae* sp. nov., a new diatom species from the Peruvian Andes. **21st North American Diatom Symposium**. Flathead Lake Biological Station, Polson, MT. Poster
- Algal assemblages as drivers of riverine ecosystem states: A tale of *Cladophora* and its epiphytes in an N-limited Northern California river. **St. Croix Watershed Research Station**. Oct. 2011. Invited Seminar
- Furey P.C., M.E. Power, R.L. Lowe, & A. Campbell-Craven. 2010 Ecological implications of tuft weaving midge (*Pseudochironomus richardsonii*) interactions with *Cladophora* dominated by different algal epiphyte assemblages. **Joint North American Benthological Society & American Society of Limnology and Oceanography**, Sante Fe, NM.
- Furey, P.C., M.E. Power, R.L. Lowe, J. Welter & M. Limm. 2010. Ecological significant patterns of algal phenology in a Mediterranean river system with a focus on N₂-fixing diatoms. **21st International Diatom Symposium**, St. Paul, MN. poster
- Brant, L.A., & P.C. Furey. 2010 Taxonomic considerations of *Eunotia serra* and related taxa. **21st International Diatom Symposium**, St. Paul, MN. poster.
- Furey, P.C., M.E. Power, R.L. Lowe, M. Limm, J.R. Welter, J. Sculley, & C. Ng. 2009. Algal assemblages as drivers and indicators of riverine ecosystem states: photogrammetric assessment

of ecologically significant variation at watershed scales. **North American Benthological Society**, Grand Rapids, MI.

- Furey, P.C., R.L. Lowe, & J.R. Johansen. 2009. New *Eunotia* taxa from the Great Smoky Mountains National Park. **20th North American Diatom Symposium**, Iowa Lakeside Lab, IA. poster
- Furey, P.C., R.L. Lowe, & J.R. Johansen. 2008. Biodiversity, microhabitat analysis, and new species of the acidophilic diatom *Eunotia* Ehrenberg in the Great Smoky Mountains National Park. **North American Benthological Society**, Salt Lake City, UT,
- Swiss, M.R., R.A. Bourbonniere, G.S. Bullerjahn, H.J. Carrick, N. D'Souza, P.C. Furey, R.M.L. McKay, N.E. Ostrom, M. Saxton, R.E.H. Smith, & S.W. Wilhelm. 2008. Winter assessment of microbial biomass and metabolism: February 2007 & 2008. **5th Biennial Conference: Lake Erie Millennium Network**, Univ. Windsor, Windsor, ON.
- Levkov, Z., D. Hlúbíková, A. Pavlov, P.C. Furey, R. Lowe & L. Ector. 2008. *Luticola goeppertiana* species complex. **20th International Diatom Symposium**, Dubrovnik, Croatia poster
- Charismatic microflora of the Great Smoky Mountains National Park. **Dept. of Biology, John Carroll University**, Feb. 2008. Invited Seminar

Service

- Saint Catherine University: Speaking Performance Working Group. 2015-present; Science Technology Engineering and Math (STEM) Committee: 2011– present; S-STEM Scholarship Committee, 2013-2015
- Water Environment Research: Surface-Associated Microbiota Lit. Review section leader, 2012 – present
- Society for Freshwater Science (previously N. Am. Benthological Soc - NABS): 2001–present: Literature Review Committee: Periphyton, 2011 – present; Session moderator and Student Presentation Judge, 2007–present; Diatom Taxonomy Workshop (with Kalina Manoylov), 2011; Long Range Planning Committee, 2008 – 2009: development of 5-year Strategic Plan.
- North American Diatom Symposium: 2005 – present: Live Auction Committee, 2005 – present
- Peer Review for: Academy Natural Sciences Philadelphia Proc.; Canadian J. of Freshwater Science; Diatom Research; Environmental Management; Hydrobiologia; J. of Applied Ecology; J. of Great Lakes Research; J. of Freshwater Science; J. of Lake and Reservoir Management; Oikos; Phycologia; Plant Ecology and Evolution; Phytotax; taxon pages in Diatoms of the United States. <<http://westerndiatoms.colorado.edu>>:
- Book Review: H. Lange-Bertalot, M. Båk & A. Witkowski. 2011. Diatoms of the European Inland Waters and Comparable Habitats: *Eunotia* and some related genera. H. Lange-Bertalot (Ed.). A.R.G. Gantner Verlag K.G., Vol. 6. 733 pp., 234 plates.
- Grant Review: Sea Grant Proposals, Oklahoma Water Resources Research Institute

Membership in Professional Societies

- American Society of Limnology and Oceanography; Ecological Society of America; International Society of Diatom Research; Society for Freshwater Science; Phycological Society of America.

Publications

Books:

Furey, P.C., R.L. Lowe, & J.R. Johansen. 2011. *Eunotia* (Bacillariophyta) of the Great Smoky Mountains National Park, USA. *Bibliotheca Diatomologica*. 56: 134 pp, 53 plates.

Online Publications: peer reviewed

Furey, P.C. 2012. Species: *Eunotia exigua*, *E. incisa*, *E. microcephala*, *E. naegeli*, *E. nymanniana*, *E. paludosa*, *E. rhomboidea*, *E. subherkiniensis*, *E. tenella*, *E. trinacria*. Peer reviewed taxon pages in Diatoms of the United States.

<<http://westerndiatoms.colorado.edu/taxa/genus/eunotia>>

Furey, P.C. 2010. Genus: *Eunotia*, and Species: *Eunotia areniverma*, *E. bilii*, *E. boomsma*, *E. canicula*, *E. cataractarum*, *E. enischna*, *E. horstii*, *E. kociolekii*, *E. macroglossa*, *E. montuosa*, *E. mydohaimasiae*, *E. obliquestriata*, *E. orthohedra*, *E. papilioforma*, *E. richbuttensis*, *E. rushforthii*. Peer reviewed taxon pages in Diatoms of the United States. <<http://westerndiatoms.colorado.edu/taxa/genus/eunotia>>

Journal Articles: Peer Reviewed

Furey, P.C. & A. Liess. 2015. Substratum-Associated Microbiota. Literature Review. Water Environment Research. In-press.

Furey, P.C. & A. Liess. 2014. Substratum-Associated Microbiota. Literature Review. Water Environment Research. 86(10): 1774–1831.

Furey, P.C., S.J. Kupferberg, & A.J. Lind. 2014. The perils of unpalatable periphyton: *Didymosphenia* and other mucilaginous stalked diatoms common downstream of hydropeaking dams as food for tadpoles. Diatom Research, Special Issue: *Didymosphenia* SI. 29(3) 267–280. DOI: 10.1080/0269249X.2014.924436.

Furey, P.C. & A. Liess. 2013. Substratum-Associated Microbiota. Literature Review. Water Environment Research. 85(10): 1786–1827.

Holomuzki, J.R., P.C. Furey, R.L. Lowe, & M.E. Power. 2013. Microdistributional variability of larval caddisflies in Mediterranean-climate streams in northern California. Western North American Naturalist. 73(3): 261–269.

Furey, P.C., S. Mayama, R.L. Lowe, & A. Catenazzi. 2012. *Frankophila wayqechae* sp. nov., a new aerophilic diatom species (Bacillariophyta) from the Peruvian Andes, South America. Diatom Research. 27: 165–175.

Furey, P.C., M.E. Power, R.L. Lowe, & A. Campbell-Craven. 2012. Midges, *Cladophora* and epiphytes: shifting interactions through succession. Freshwater Science. 31(1): 93–107.

Twiss, M.R., R.M.L. McKay, R.A. Bourbonniere, G.S. Bullerjahn, H.J. Carrick, R.E.H. Smith, J.G. Winter, N. D'Souza, P.C. Furey, A.R. Lashaway, M.A. Saxton, & S.W. Wilhelm. 2012. Diatoms abound in ice-covered Lake Erie: An investigation of offshore winter limnology in Lake Erie over the period 2007 to 2010. Journal of Great Lakes Research. 38(1): 18–30. *Highly cited paper award 2012 – among top 15 cited*

Brant, L. & P.C. Furey. 2011. Morphological variation in *Eunotia serra*, with a focus on the rimoportula. Diatom Research. 26(2): 221–226. DOI:10.1080/0269249X.2011.601326.

Furey, P.C., R.L. Lowe, & J.R. Johansen. 2009. Teratology in *Eunotia* taxa in the Great Smoky Mountains National Park, and description of *Eunotia macroglossa* sp. nov. Diatom Research. 24(2): 273–290.

Pavolv, A, T. Nakov, Z. Levkov, P.C. Furey, R.L. Lowe, & L. Ector. 2009. *Luticola grupcei* (Bacillariophyceae) - a new freshwater diatom from Mountain Baba (Macedonia) and Great Smoky Mountains National Park (U.S.A.): comparison with the type material of *L. goeppertiana* (Bleisch) D.G.Mann. Nova Hedwigia. 89: 147–164.

Power, M., R. Lowe, P.C. Furey, J. Welter, M. Limm, J. Finlay, C. Bode, S. Chang, M. Goodrich, & J. Sculley. 2009. Algal mats and insect emergence in rivers under Mediterranean climates: Towards photogrammetric surveillance. Freshwater Biology. 54(10): 2101–2115.

- Furey, P.C., R.L. Lowe, & J.R. Johansen. 2007. Wet wall algal community response to in-field nutrient manipulation in the Great Smoky Mountains National Park, U.S.A. *Algological Studies*. 125: 17–43.
- Lowe, R.L, P.C. Furey, J.R. Ress, & J.R. Johansen. 2007. Diatom distribution on wetwalls in the Great Smoky Mountains National Park. *Southeastern Naturalist*. 6 (Special Issue Number 1): 135–152.
- Johansen, J.R. , R.L. Lowe, S. Carty, K. Fučíková, C.E. Olsen, M.H. Fitzpatrick, J.R. Ress, & P.C. Furey. 2007. New algal species records for the Great Smoky Mountains National Park, U.S.A., with an annotated checklist of all reported algal species for the park. *South East Naturalist*, 6 (Special Issue Number 1): 99–134.
- Knapp, J.M., P.C. Furey, & R.L. Lowe. 2006. A comparison of the morphology and ultrastructure of the diatoms (Bacillariophyceae) *Discostella stelligera* (Cleve et Grunow) Houk et Klee and *Discostella elentarii* Alfinito et Tagliaventi from two New Zealand fiordland lakes. *New Zealand Journal of Marine and Freshwater Research*. 40: 429–438.
- Furey, P.C., R.N. Nordin, & A. Mazumder. 2006. Littoral benthic macroinvertebrates under contrasting drawdown in a reservoir and a natural lake. *Journal of the North American Benthological Society*. 25(1): 19–31.
- Furey, P.C., R.N. Nordin, & A. Mazumder. 2005. Water level drawdown affects physical and biogeochemical properties of littoral sediments. *Journal of Lake and Reservoir Management*. 20(4): 280–295.
- Furey, P.C. 2002. Cosmopolitan cyanobacteria. *American Biology Teacher*. 65(8):595–598.
- Furey, P.C. 2002. Exotic Aquatic: the culturing of native vs. exotic species: a dilemma. *American Biology Teacher*. 64(1): 36–39.