

UNIVERSITY OF CALIFORNIA, RIVERSIDE

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



SANTA BARBARA • SANTA CRUZ

KENNETH J. HALAMA
DEPARTMENT OF BIOLOGY
RIVERSIDE, CALIFORNIA 92521-0334
Telephone: (951) 657-3111
FAX: (951) 657-5443

RECEIVED
JAN 08 2009

Reserve Director
Motte Rimrock Reserve/ Emerson Oaks Reserve
Natural Reserve System
College of Natural and Agricultural Sciences

RIVERSIDE COUNTY
TRANSPORTATION COMMISSION

8 January 2009

Cathy Bechtel
Mid County Parkway Project Manager
Riverside County Transportation Commission
4080 Lemon Street, 3rd Floor
Riverside, CA 92502-2208

Re: Comments on the Mid-County Parkway Draft EIR

Dear Ms. Bechtel:

We have read the draft EIR for the proposed Mid County Parkway (MCP) Project and would like to comment on its content. We focus specifically on mitigation measures for potential impacts that Alternative 9 would impose on the Motte Rimrock Reserve. We previously addressed our concerns in a letter to the RCTC dated August 10, 2007. Rather than present these concerns again we have attached a copy of that letter to the current document and would like it included in the comments.

The Motte Rimrock Reserve is the only conservation area in western Riverside County devoted specifically to teaching and research. As stated in our 2007 letter we are gravely concerned that a freeway the size of the MCP located in such close proximity to the Motte Rimrock Reserve will inflict significant impacts to the biological resources located within its boundaries and reduce the Reserve's utility as a teaching and research facility. The MCP will pass within 100 feet (30.4 m) of the Reserve's northwest corner. While these impacts may not be considered direct impacts (i.e., habitat destruction) under CEQA they do pose threats that are every bit as damaging. We believe that the draft EIR does not adequately address the concerns we expressed previously.

Decreased Connectivity to Other Habitat Stands

Our primary concern with the placement of Alternative 9 is the resulting habitat fragmentation and loss of connectivity between the Motte Rimrock Reserve and other habitat stands located nearby. The Reserve occupies the southern half of a large stand of Riversidean coastal sage scrub and grassland approximately 1200 acres in extent. Currently this tract is almost completely surrounded by development. The MCP would cut this area of sage scrub habitat in half and severely reduce movement of organisms between the two fragments.

The draft EIR attempts to address the connectivity issue. As a mitigation measure for habitat fragmentation the draft EIR promotes the use of highway underpasses and habitat bridges in key areas including the area north of the Motte Rimrock Reserve. The use of underpasses and bridges to promote wildlife movement has been all the rage in the conservation biology as a means of maintaining the genetic integrity of fragmented populations. However, a recent study by Riley et al. (2006) conducted on coyote and bobcat populations separated by the 101 Freeway north of Los Angeles demonstrates the potential ineffectiveness of these measures. Riley et al. (2006) found that while individuals move from one side of a highway to the other the populations located on either side of the freeway are still genetically distinct from one another to a significant extent. These results indicate that very little gene flow is occurring even though animals were moving between the two areas. Riley et al. (2006) hypothesize that even though connectivity is maintained individuals that manage to cross the highway cannot successfully breed because territorial behavior by resident individuals acts as a barrier to successful reproduction. If the phenomenon described by Riley et al. (2006) is common then the use of underpasses and habitat bridges would not mitigate the impact of habitat fragmentation on wildlife populations to a level of less than significant under CEQA.

Fire Risk

Another concern that is inadequately addressed in the draft EIR is mitigation for the increased fire risk associated with the MCP. In the event of a wildfire the vegetation on the Reserve could be wiped out completely. The nitrogen compounds found in car exhaust promote the growth of exotic grasses that serve as fuel for wildfires. An enhanced fuel load coupled with the increased time for fire crew response increases the probability that the Reserve could experience repeated and damaging fires that could devastate the resident native flora and fauna. The EIR offers no mitigation measures for increased fire risk for Conservation Areas associated with exotic grasses, but defers to Section 6.4 of the MSHCP which only addresses brush management.

Car exhaust is a real threat and must be acknowledged. Dr. Edith Allen and colleagues have shown that nitrogen compounds from auto exhaust settle on soils and act as fertilizers that stimulate the growth of non-native vegetation (Fenn et al. 2003, Allen et al. 2004). In a study conducted in wildlands adjacent to the 280 freeway in northern California Dr. Stuart Weiss of the Creekside Center for Earth Observations demonstrated that impacts of nitrogen compounds (ammonia and nitrous oxide primarily) from car exhaust on natural communities extend up to 400 meters on either side of the highway right-of-way. These impacts include reduced native plant growth and enhanced growth of exotic grasses that promote fire (Dr. Stuart Weiss, personal communication). The draft EIR does not address mitigation measures for this potential problem, nor does it even address the problem.

Edge Effects

Even though the MCP does not directly impact the habitat on the Reserve its influence can extend for tens to hundreds of meters away from the boundary and well into the Reserve proper; this is known as the "edge effect." Edge effects result when natural habitat along a human-induced interface becomes degraded over time. The presence of an edge and its

associated effects reduces a reserve's functional area well below its full extent (Kelly and Rotenberry 1993).

The MCP will pass within 30 meters of the Reserve's northwest corner. The draft EIR states that edge effects to the Motte Reserve will be reduced by the inclusion of wildlife crossings (although those near the Reserve are mainly undercrossing culverts), the fact that no invasive plant species will be planted along the right-of-way, and the fact that no major interchanges will be located nearby. These mitigation measures trivialize the potential impact that other factors associated with the MCP will have on the Reserve. The draft EIR does not acknowledge the impact associated with or suggest mitigation for other edge effects associated with automobile exhaust and excessive light and noise. These impacts could significantly reduce the area of the Reserve utilized for teaching and research and could jeopardize any research projects that may be ongoing at the time.

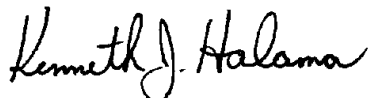
Light and Noise Pollution

The draft EIR states that the MCP will not have permanent lighting along the right-of-way, however the document does not address the impact that automobile lights would have on native fauna or offer up any mitigation for these impacts. The Draft EIR also states that no sound walls will be constructed adjacent to conservation areas. Given the current and proposed population growth in western Riverside County the volume of traffic flowing along the MCP when completed will undoubtedly be heavy and continuous. The artificial illumination created by automobile headlights at night and the constant drone of traffic during all hours of the day and night will likely have adverse effects on plant and animal wellbeing for those species located on adjacent habitat within the Reserve boundaries.

We agree that sound walls would further impede animal movement above and beyond the roadway, however both light and noise could have a significant impact on plant and animal populations. Both of these issues must be addressed in the EIR and satisfactory solutions found to deal with these problems.

We hope that you will give our concerns serious consideration. If you have any questions please contact me at (951) 657-3111 or by e-mail at kjhalama@ucr.edu.

Sincerely,



Kenneth J. Halama, Ph.D.
Director, Motte Rimrock Reserve
University of California Natural Reserve System

References

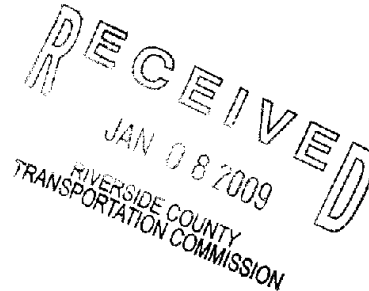
- Allen, E. B., A. G. Sirulnik, L. Egerton-Warburton, S. N. Kee, A. Bytnerowicz, P. E. Padgett, P. J. Temple, M. E. Fenn, M. Poth, and T. Meixner. 2005. Air Pollution and Vegetation Change in Southern California Coastal Sage Scrub: A Comparison with Chaparral and Coniferous Forest. PSW-GTR-195, USDA Forest Service.
- Fenn, M.E., Baron, J. S., Allen, E. B., Rueth, H. M., Nydick, K. R., Geiser, L, Bowman, W. D., Sickman, J. O., Meixner, T., and Johnson, D. W. 2003. Ecological effects of nitrogen deposition in the Western United States. *Bioscience* 53:404-420.
- Kelly, P.A., and J.T. Rotenberry. 1993. Buffer zones for ecological reserves in California: replacing guesswork with science. In: Keeler, J.E. (ed.) *Interface Between Ecology and Land Development in California*. Southern California Academy of Sciences, Los Angeles, CA. pp. 85-92.
- Riley, S.P.D., J.P. Pollinger, R.M. Sauvajot, E.C. York, C. Bromley, T.K. Fuller, and R.K. Wayne. 2006. A southern California freeway is a physical and social barrier to gene flow in carnivores. *Molecular Ecology* 15:1733-1741.



MOTTE RIMROCK RESERVE
EMERSON OAKS RESERVE
DEPARTMENT OF BIOLOGY
RIVERSIDE, CALIFORNIA 92521
VOICE: (951) 657-3111
FAX: (951) 657-5443

August 10, 2007

Cathy Bechtel
Mid County Parkway Project Manager
Riverside County Transportation Commission
4080 Lemon Street, 3rd Floor
Riverside, CA 92502-2208



Re: Objections to Proposed Significant and Irreversible Impacts to the Motte Rimrock Reserve, SKR Habitat and area within MSHCP

Dear Ms. Bechtel:

It has come to the attention of the University of California Natural Reserve System (NRS) that the grading limits for alignment Alternative 9 (Far South/Placentia Avenue) of the proposed Mid County Parkway (MCP) pass within several meters of the northwest boundary of the Motte Rimrock Reserve. We understand that the final decision on the location of the freeway's right-of-way has not been finalized, but we have been informed that Alternative 9 is receiving very serious consideration from Riverside County Transportation Commission (RCTC) officials. We are concerned that if Alternative 9 is chosen the close proximity of the MCP will threaten the Reserve's mission within the NRS, its role as a core reserve for the Stephens' Kangaroo Rat Habitat Conservation Plan (SKRHCP), and its role as a conservation area within the Western Riverside Multi-Species Habitat Conservation Plan (MSHCP).

The mission of the Natural Reserve System is to contribute to the understanding and wise management of the Earth and its natural systems by supporting university-level teaching, research, and public service at protected natural areas throughout California. The NRS is also a "Trustee Agency," a state agency defined by law as having jurisdiction over natural resources held in trust for the people of the State of California that may be affected by a project (California Public Resources Code, Section 15386). The NRS is one of only four Trustee Agencies in the state, along with the California Department of Fish and Game, the State Lands Commission, and the State Department of Parks and Recreation. None of these Trustee agencies represent the interests of the others, each represents the resources for which it is responsible. We are puzzled that, given the important role played by Trustee agencies, we were never provided notice of Alternative 9. The MCP proposal, and Alternative 9, came to our attention quite by accident.

The NRS implements its mission by preserving lands that harbor native habitats representative of the biological diversity found in California, and to provide teaching and

research opportunities on these lands. In this capacity the Motte Rimrock Reserve preserves Riversidean coastal sage scrub, a vegetation association unique to southern California and one that is disappearing across the region. In support of research, the Reserve has attracted faculty and students from educational institutions across the United States and Canada. Since 1987 over 300 researchers (faculty, postdoctoral students, graduate students, undergraduates, and field assistants) from 27 institutions representing 10 states and 2 provinces have conducted research at the Reserve. The number of user days accumulated by researchers from 1987-2006 totals 6078. Research activities have been reported in 70 scholarly publications and other documents since 1987, and 5 projects are currently on-going at the Motte. Lands preserved and managed by the Reserve also serve as a natural laboratory for educational ends, with 16 classes serving 2106 students in the last 20 years. In addition to current projects, the Motte has a high-profile future, having been identified as a possible participant in the National Ecological Observation Network (NEON) a two hundred million dollar project sponsored by the National Science Foundation that will monitor environmental parameters at selected sites across the continental United States.

As a participant in the SKRHCP, the Motte Rimrock Reserve is one of seven core reserves that harbor populations of the Stephens' kangaroo rat (SKR), a federally endangered species. In fact, much of what is known about the biology of the SKR resulted from research carried out on the Reserve by Dr. Mary Price and colleagues during the late 1980s and early 1990s. An endowment set up through the Riverside County Habitat Conservation Agency (RCHCA) provides funds to preserve and manage Stephens' kangaroo rat habitat. In the late 1990's the RCHCA transferred approximately 60 acres of SKR occupied land to the Reserve including APN 317-190-011 the parcel in closest proximity to the MCP Alternative 9 alignment.

Within the context of the MSHCP the Reserve encompasses a portion of the Motte-Rimrock Conservation Subunit (Subunit 1), a part of the Mead Valley Plan Area (Figure 1). The Motte-Rimrock Subunit extends from the northern city limits of Perris in the south to Cajalco Road in the north and from the vicinity of Harvill Ave in the east to the area near the Old Elsinore Road in the west (Figure 1). Twenty-one of the one hundred and forty-six MSHCP covered species have been documented to occupy the Reserve and surrounding habitat included within the seven criteria cells that comprise the Motte-Rimrock Subunit.

We are gravely concerned that a freeway the size of the MCP located in such close proximity to the Motte Rimrock Reserve as implemented through Alternative 9 will impose significant impacts to the biological resources located within its boundaries. These impacts have the potential to reduce or jeopardize the continued function of the Reserve as teaching and research facility. While these impacts may not be considered direct impacts (i.e., habitat destruction) under CEQA they do pose threats that are every bit as damaging. We have four main areas of concern:

I. Decreased Connectivity to Other Habitat Stands

Our primary concern with the placement of Alternative 9 is the resulting habitat fragmentation and loss of connectivity between the Motte Rimrock Reserve and other habitat stands located nearby. The Reserve occupies the southern half of a large stand of Riversidean coastal sage scrub and grassland approximately 1200 acres in extent. Currently this tract is

almost completely surrounded by development. The Western Riverside MSHCP designates this as the Motte-Rimrock Subunit (Subunit 1) and it is a candidate for conservation under the Plan (Dudek & Associates 2003) (Figure 1). The MCP would cut this area of sage scrub habitat in half and severely reduce movement of organisms between the two fragments.

The effects of habitat fragmentation on populations of plants and animals are well documented. First, reducing the size of populations through fragmentation increases the risk of inbreeding, a process that reduces the genetic diversity in populations and hinders their ability to adapt to changing environmental conditions (Ralls et al. 1986, Ellstrand and Elam 1992, Dixon et al. 2007). Second, limiting connectivity with other habitat stands further complicates inbreeding problems by severely restricting or completely blocking genetic exchange among populations. Unobstructed genetic exchange among populations is instrumental to offsetting the negative effects of inbreeding. Finally, and perhaps most significantly, small populations created by habitat fragmentation run an increased risk of local extinction through stochastic environmental events (Soule et al. 1992, Fahrig 2002). Even more important, the risk is non-linear: a small population half the size of another is *more* than twice as likely to become extinct through stochastic events. Such events are not imaginary; we are currently experiencing the most severe drought recorded in southern California, one that is occurring only a few years after the previous most severe drought recorded. The lack of food resources resulting from extremely low rainfall limits reproduction and increases mortality in a variety of species; indeed, during the previous severe drought most birds in coastal sage scrub forewent breeding. If reproduction remains limited and mortality remains high even for a few years of drought, then it is increasingly likely that populations of some species will go extinct within small habitat fragments. A large population size offers some prospect that at least a few individuals will survive through harsh times.

Fragmentation of the Motte-Rimrock Subunit has negative implications for all species on the Reserve. The species experiencing the greatest threat are those already at risk across the region: the federally endangered SKR and the federally threatened coastal California gnatcatcher (CAGN). The SKR is endemic to southern California and found exclusively in western Riverside County and extreme northern San Diego County. The remaining suitable habitat existing outside of the SKRHCP core reserves is dwindling as development within the region continues. In the future, SKR populations will be restricted to habitat located within and in close proximity to the core reserves. The same may be true for the CAGN. The uninterrupted exchange of individuals between regions of occupied habitat within the vicinity of the Motte Rimrock Reserve is important to the continued persistence for both the SKR and CAGN from population genetics as well as demographic perspectives. In addition to the SKR and the CAGN, the Reserve harbors nineteen other species covered by the MSHCP, many of which are state and/or federal species of concern. Several representative species covered by the MSHCP that may be commonly seen on the Reserve include: orange-throated whiptail lizard, San Diego coast horned lizard, red-diamond rattlesnake, Bell's sage sparrow, rufous-crowned sparrow, loggerhead shrike, bobcat, and coyote.

II. Edge Effects

While the MCP does not directly impact the habitat on the Reserve by overtly removing it, its influence can extend for tens to hundreds of meters away from the boundary and well into the Reserve proper; this is known as the “edge effect.” Edge effects result when natural habitat along a human-induced interface becomes degraded over time. Degradation results for a number of reasons: light and noise pollution, invasive plants and animals, artificial water regimes, and refuse/trash dumping. Thus, the presence of an edge and its associated effects reduces a reserve’s functional area well below its full extent (Kelly and Rotenberry 1993).

Moderate edge effects are already a management issue at the Motte Rimrock Reserve. Our staff spends an inordinate amount of time cleaning up material dumped within our boundaries along Lukens Lane, a road that borders the Reserve on the southwest. We also experience excessive dumping along our southern and eastern boundaries, both of which lie adjacent to roads and housing tracts. We are also required by the Riverside County Fire Department to clear away vegetation where our boundary passes near homes; this also removes native habitat. The proximity of the MCP to the Motte Reserve offers no buffer zone to offset the edge effect. Even considering its least destructive impact, the volume of traffic along the freeway would certainly increase the amount of trash well above that we are dealing with already.

The Riversidean sage scrub habitat located in the northern half of the Reserve and on the adjacent parcels represents some of the most intact stands of this habitat type found in west-central Riverside County. Its degradation would deal a severe blow to the quality of the habitat and to the Reserve’s mission to preserve and protect biological diversity. Once degraded the land offers no teaching or research opportunities. In addition to the impacts created by the freeway, we fear that the presence of the MCP would open up the area to development. This will not become an issue if the land surrounding the MCP in the vicinity of the Motte Rimrock Reserve remains within conservation under the MSHCP.

III. Increased Light Pollution

Another significant impact with the potential to negatively affect flora and fauna well inside the Reserve perimeter fence is artificial lighting. Given the current and proposed population growth in western Riverside County the volume of traffic flowing along the MCP when completed will undoubtedly be heavy and continuous. The artificial illumination created by overhead freeway lights and automobile headlights during nighttime hours will likely have adverse effects on animal behavior and plant physiology for those species located on adjacent habitat within the Reserve boundaries.

Artificial lighting has been shown to have detrimental effects on a broad range of taxa including plants, insects, birds, mammals, reptiles, and amphibians (Longcore and Rich 2004, Briggs 2006). For example, Perry and Fischer (2006) have linked a decline in the numbers of two nocturnal snakes in southern California, the California glossy snake and the western long-nosed snake, to an increase in light pollution. In areas where light pollution has increased, the snakes’ populations have declined significantly. Also declining is the snakes’ primary prey

species the Pacific pocket mouse. Perry and Fischer (2006) believe that the increased lighting elevates the risk of predation from other nocturnal hunters such as owls.

The Motte Rimrock Reserve is a core reserve in the SKRHCP and one organism with a high potential to be affected by artificial illumination is the federally endangered SKR. Studies show that kangaroo rats significantly alter their behavior during bright moonlit nights by selectively foraging closer to vegetation and avoiding more open microhabitats (Kotler 1984). As in the situation with the snakes, this change occurs presumably in response to an increased predation risk from crepuscular and nocturnal hunters. Experiments show that owls, a key predator on kangaroo rats, have greater success capturing kangaroo rats that forage in more open habitats (Kotler et al. 1988, 1991, Longland and Price 1991). Indeed, it is common practice among researchers working on kangaroo rats and other small mammals to time their trapping so as not to coincide with a full moon. The long-term effects of this altered behavior on kangaroo rat populations is not yet known, but limiting access to food and increasing the probability of attack from predators can only harm populations. The Western Riverside County Multi-Species Habitat Conservation Plan (Dudek & Associates 2003) recognizes light pollution from urbanization as a threat to the SKR.

IV. Increased Fire Risk


Despite the fact that 2005 was the second wettest year on record, southern California is experiencing severe drought conditions. Climatologists predict droughts may become more severe in the southwestern U.S. as global climate change progresses (IPCC 2007). Extended dry conditions open up grasslands and sage scrub vegetation to the risk of wildfires. The presence of the MCP increases this risk. The vegetation on the Reserve could be wiped out if, for example, a careless motorist tossed a lighted cigarette out their car window into the adjacent brush or grass. The volume of traffic on the MCP also increases the potential that the fires would become more frequent. At its closest point the MCP passes within a few meters of the northern fence; at its furthest point the freeway passes within a few hundred meters. This close proximity of the MCP to the Reserve does not provide sufficient time for fire crews to respond before a fire engulfed vegetation and research projects. Making the Reserve less vulnerable to fire from the freeway would require clearing a swath of Riversidean sage scrub vegetation along the northern fence line within the boundaries of the Reserve, further reducing the acreage of native habitat. A large section of the Reserve would become a buffer zone to protect the areas further south.

Another factor potentially affecting fire risk on the Motte Rimrock Reserve are nitrogen emissions in car exhaust. Dr. Edith Allen and colleagues have shown that nitrogen compounds from auto exhaust settle on soils and act as fertilizers that stimulate the growth of non-native vegetation (Fenn et al. 2003, Allen et al. 2004). The accumulation of dead plant material over time creates a fuel load that contributes significantly to the wildfire danger potential. The exhaust from automobile traffic associated with the MCP has the potential to boost the fuel load on land adjacent to the right-of-way including the Reserve. An enhanced fuel load coupled with the reduced time for fire crew response increases the probability that the Reserve could experience repeated and damaging fires that could devastate the resident native flora and fauna. Moreover, even in the absence of fire in the short-term, stimulation of non-native vegetation

creates an advantage that enables a number of exotic species to out-compete natives, thus further degrading habitat quality in the Reserve.

We hope that you will give our concerns serious consideration. We would like to meet with you to discuss these matters at greater length and discuss alternatives to eliminate these potential impacts. If you have any questions and would like to schedule a meeting, please contact me at (951) 657-3111 or by e-mail at kihalama@ucr.edu.

Sincerely,



Kenneth J. Halama, Ph.D.
Director, Motte Rimrock Reserve
University of California Natural Reserve System

cc: Marion Ashley, Riverside County Supervisor, District 5
Nita Bullock, Campus Physical Planner, UCR
Michele Coyle, Campus Counsel, UCR
Kelly Drumm, University Counsel, UC Office of the General Counsel
Mark Durham, Chief, South Coast Section, ACOE
Nassim Elias, Project Manager, CalTrans
Scott Dawson, Biologist, CDFG
Tom Mullen, Executive Director, RCA
Violet Nakayama, Coordinator, UC NRS
Marie Petry, Senior Environmental Planner, CalTrans
Scott Quinell, Biologist, CalTrans
John Rotenberry, Professor of Biology and Director UCR NRS
Doreen Stadtlander, Biologist, USFWS
Charlotte Strem, Coordinator Environmental Planning, UCOP
Carolyn Syms Luna, Executive Director, RCHCA

References

- Allen, E. B., A. G. Sirulnik, L. Egerton-Warburton, S. N. Kee, A. Bytnerowicz, P. E. Padgett, P. J. Temple, M. E. Fenn, M. Poth, and T. Meixner. 2005. Air Pollution and Vegetation Change in Southern California Coastal Sage Scrub: A Comparison with Chaparral and Coniferous Forest. PSW-GTR-195, USDA Forest Service.
- Briggs, W.R. 2006. Physiology of plant responses to artificial light. In: C. Rich and T. Longcore (eds). Ecological consequences of artificial night lighting. pp. 389-411.
- Dixon, J.D., M.K. Oli, M.C. Wootton, T.H. Eason, J.W. McCowen, and M.W. Cunningham. 2007. Genetic consequences of habitat fragmentation and loss: the case of the Florida black bear (*Ursus americanus floridanus*). Conservation Genetics 455-464.
- Dudeck & Associates. 2003. Western Riverside County Multi-Species Habitat Conservation Plan. Final MSHCP, County of Riverside, Riverside, California.
- Ellstrand N.C. and D.R. Elam. 1993. Population genetic consequences of small population size: implications for plant conservation. Annual Review of Ecology and Systematics 24:217-242.
- Fahrig, L. (2002). Effect of habitat fragmentation on the extinction threshold: A synthesis. Ecological Applications 12: 346-353.
- Fenn, M.E., Baron, J. S., Allen, E. B., Rueth, H. M., Nydick, K. R., Geiser, L, Bowman, W. D., Sickman, J. O., Meixner, T., and Johnson, D. W. 2003. Ecological effects of nitrogen deposition in the Western United States. Bioscience 53:404-420.
- Intergovernmental Panel on Climate Change (IPCC). 2007. Climate change 2007: The physical science basis. Summary for policymakers. IPCC Geneva, Switzerland
- Kelly, P.A., and J.T. Rotenberry. 1993. Buffer zones for ecological reserves in California: replacing guesswork with science. In: Keeler, J.E. (ed.) *Interface Between Ecology and Land Development in California*. Southern California Academy of Sciences, Los Angeles, CA. pp. 85-92.
- Kotler, B.P. 1984. Risk of predation and the structure of desert rodent communities. Ecology 65:689-701.
- Kotler, B.P., Brown, J.S., Smith, R.J. and Wirtz II, W.O. 1988. The effects of morphology and body size on rates of owl predation on desert rodents. Oikos, 53: 145-152.
- Kotler, B.P., J.S. Brown, and O. Hasson. 1991. Factors affecting gerbil foraging behavior and rates of owl predation. Ecology 72:2249-2260.
- Longcore, T. and C. Rich. 2004. Ecological light pollution. Frontiers in Ecology and the Environment. 2:191-198.
- Longland, W.S. and Price, M.V. 1991. Direct observations of owls and heteromyid rodents: can predation risk explain microhabitat use? Ecology, 72: 2261-2273.
- Perry, G. and R.N. Fisher. 2006. Night lights and reptiles: observed and potential effects. In: C. Rich and T. Longcore (eds). Ecological consequences of artificial night lighting. pp. 169-191.
- Ralls, K, P.H. Harvey, and A.M. Lyles. 1986. Inbreeding in natural populations of birds and mammals. In: Soule, M.E. (ed.) *Conservation Biology: The Science of Scarcity and Diversity*. Sinauer Associates, Sunderland, MA. pp. 35-56.
- Soule, M.E., A.C. Alberts, and D.T. Bolger. (1992). The effect of habitat fragmentation on chaparral plants and vertebrates. Oikos 63:39-47.
- U.S. Forest Service (USFS). 2003. Resource and Biological Assessment for Threatened and Endangered Plants and Animals – Old and Grand Prix Fires.

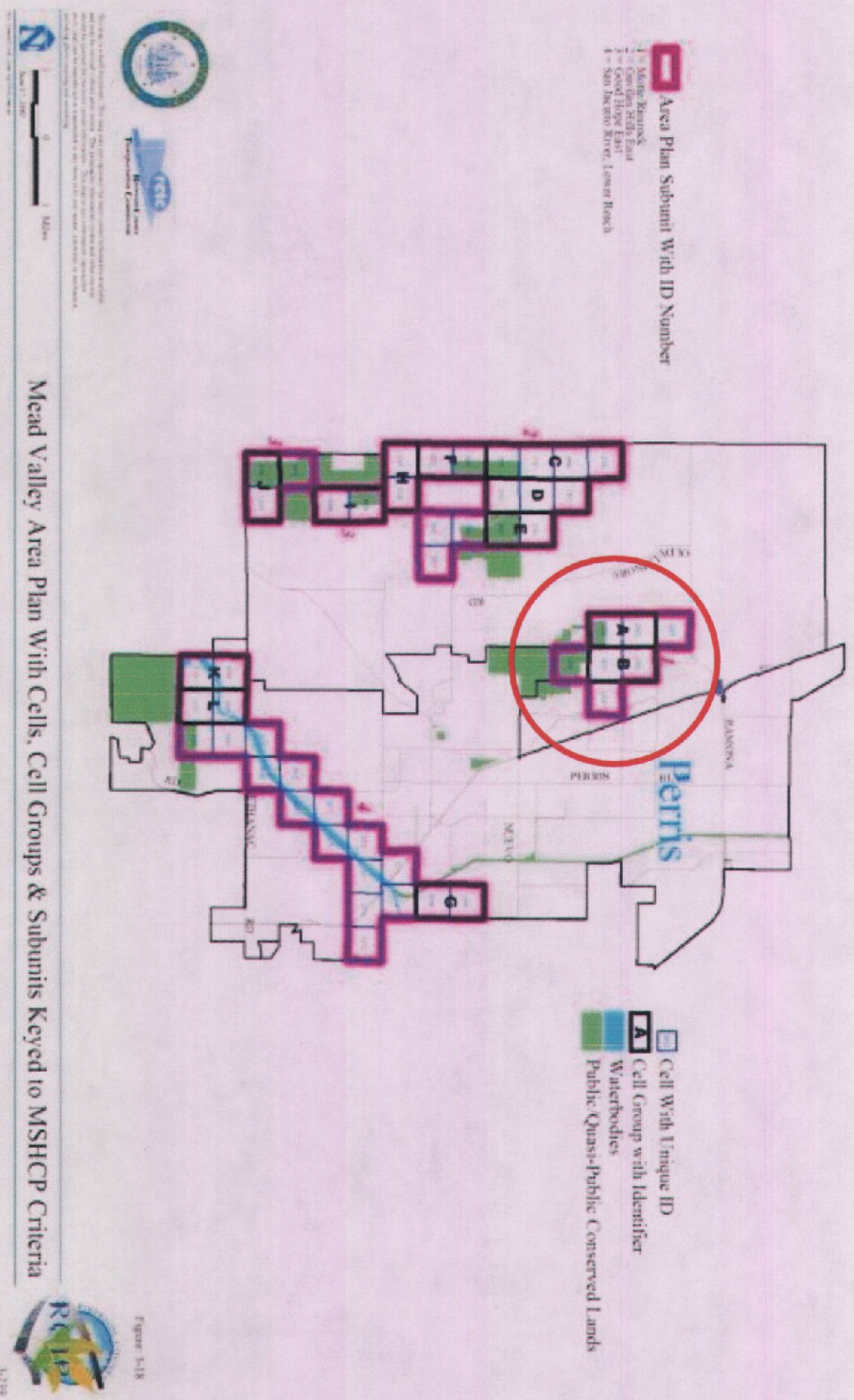


Figure 1. The Mote-Rimrock Subunit (circled) within the Mead Valley Plan Area of the Western Riverside Multi-Species Habitat Conservation Plan. Figure taken from Dudek & Associates (2003).