# 4 Private Individual Comments and Responses

**I-NC**

**From:** Nona Chiariello
**To:** Peir
**Cc:** Anthony Barnosky
**Subject:** Comments to Draft PEIR
**Date:** Tuesday, September 4, 2018 4:56:58 PM

Thank you for the opportunity to comment on the San Mateo County Mosquito and Vector Control District's Programmatic Environmental Impact Report (Draft PEIR) regarding an updated range of vector control activities.

I would like to offer several comments on the District's policies regarding rodenticides. I am specifically concerned with the effect of rodenticides on non-target species. My concerns are based on scientific reports and on observations at Jasper Ridge Biological Preserve.

Rodenticides are not used within Jasper Ridge Biological Preserve. Instead, for rodent problems within buildings, we use mechanical traps; to prevent rodents from nesting or chewing wires in vehicles, we raise the hoods when vehicles are parked. We find that these are easy, low-cost, effective ways to control rodent abundance and damage.

By using non-toxic methods to control rodent pests, Jasper Ridge helps protect a food web in which predators limit rodent populations naturally, safely, and effectively. Without natural predators, it is quite possible that traps and raised hoods would not be sufficient measures for us to control rodent pests within Jasper Ridge. The food web that we protect is an ecosystem service that benefits an area much larger than Jasper Ridge's 1200 acres, as avian and mammalian predators hunt beyond the perimeter of the preserve, reducing rodent populations in neighboring communities and open space.

1

However, the widespread benefit conferred by this food web also carries a vulnerability—if rodenticides are used in neighboring areas, even by licensed commercial pest control operators, those poisons can enter a food web far beyond the treated area.

The potential spread of rodenticide into and through a food web is under-recognized in the District's policy on rodenticides. A major premise in the District's policy is that Bromadiolone "causes rapid mortality of targeted rats" (section 4.5.4.4 of the Draft PEIR), implying that rodents will not become prey to secondary consumers because they will die wherever the baited poison is placed (e.g., sewers) or, if placed near homes, the rodents will return to their nest and die. Reports in the scientific literature, however, indicate that the "days-to-death" average 5 days for Norway rats (1) and can be up to 15 days for roof rats (2). This is to be expected, because even though Second Generation Anticoagulant Rodenticides (SGARs) kill with a single dose, they have a delayed effect.

2

The consequence of the delayed mortality is that rodents can 1) consume more than one dose, building up super-toxic levels, and 2) move around before they die. Both of these aspects increase the potential exposure of non-target predators to rodenticide. In addition, there is evidence that rodents are in some areas showing resistance to SGARs, again increasing the possibility of them consuming multiple doses, which will put predators at even greater risk. The risk is proportional to the amount of Bromadiolone being used, which in the County is substantial: 5 different products, one of which was applied at a rate of >1,000 lbs per year, or roughly 5 lbs of active ingredient (Section 4.5.4.4).

3

A second aspect of the Draft PEIR that warrants re-examination is that table 5-13 (and its duplicate, table 6-13), indicates that 5 rodenticides designated by * are "under consideration for future use." I initially interpreted this as meaning that those particular rodenticides are not being used currently, but one of them, Difethialone, is described as being used by two Districts (section 4.5.6.4) and another, Cholecalciferol, is described as being used by one District (section 4.5.7.5). It would be very helpful to have an explanation of whether the County is in fact expanding the number of poisons it will utilize, and why.

4

I-NC

Thank you for your consideration of these comments. I support and encourage the District to adopt and promote the safest, most-effective, and most humane methods of controlling rodent pests. 4

References cited: 5

1. Witmer GW and Mouton RS. 2014. Improving invasive house mice control and eradication strategies via more effective rodenticides. USDA National Wildlife Research Center – Staff Publications. 1786. https://digitalcommons.unl.edu/icwdm_usdanwrc/1786/
2. Garg N and Singla N. 2014. Toxicity of second generation anticoagulant Bromadiolone against Rattus rattus: individual and sec specific variations. Cibtech Journal of Zoology 3.2: 43-48. https://pdfs.semanticscholar.org/7b01/912551daf38227cf649ac5bb544f3b129f2b.pdf

Sincerely,

Nona Chiariello, PhD
Staff Scientist
Jasper Ridge Biological Preserve
Stanford University
4001 Sand Hill Road
Woodside, CA 94062

**Comment Letter I-NC**

**Chiariello, Nona, PhD.**
**Jasper Ridge Biological Preserve**
**Stanford University**

**September 4, 2018**

## *Response 1*

The commenter explains that rodenticides are not used within the Jasper Ridge Biological Preserve and states that nontoxic methods are used to protect a food web in which predators limit rodent populations naturally, safely, and effectively. These predators benefit an area larger than the 1,200 acres in the preserve, and they hunt beyond the perimeter of the preserve.

The District recognizes the importance of avian and mammalian predators, especially in the control of rodents. The limited use of rodenticides by the District is performed because individual cities have identified areas with excessive rodent issues, and the District applies rodenticides as part of an IPM approach in those areas (PEIR, Section 2.3.5.3). When the applicator is a third party pest control operator (PCO), the District serves as a quality control component to ensure best management practices are followed.

The District's rodent control program operates in heavily residential areas that contain very few predatory birds and no foxes, mountain lions, or other predators. If predatory animals are present, the technician will select a bait with a lower risk of secondary poisoning (e.g., bromethalin or diphacinone). Bait is secured within a tamper-proof bait station and secured within 100 feet of a man-made structure subject to product label limitations and restrictions designated in the California Code of Regulations (Title 3. Food and Agriculture, Sections 11456,11502,12781,14005, and 14102). During inspection periods, dead rodents are disposed of when encountered (PEIR Section 5.2.7.1.4). District personnel educate District residents on rodenticide alternatives such as proper sanitation and exclusion. In circumstances where rodenticides are appropriate, the District will help determine the best product for that location.

The use of anti-coagulant rodenticide (AR) products is widespread in both urban and rural areas where rodents (rats and mice) are a problem, often with little concern about the possibility of secondary poisoning to nontarget predatory mammals and birds (hawks and foxes). The District conducts rodent control methods that reduce the hazards to nontarget wildlife based on USEPA's most current and relevant guidance (USEPA 2008) and strict BMPs.

The District's proposed use of rodenticides is discussed in the PEIR in Sections 2.3.5.3 and 6.2.7.4. While numerous strategies are used by the District to minimize the potential for secondary poisoning (to nontarget predators), the potential impact to the population of a predator of concern is likely insufficient to result in a significant reduction in the population numbers. As stated in the PEIR Section 6.2.7.4.1 Anticoagulants:

> "In summary, the aboveground use of these second-generation rodenticides has the potential to harm individual rodents as intended. If nontarget individuals consume the dead rodents as prey items, there is a potential for the loss of a nontarget individual but the infrequent loss of one or even a few individuals in urban areas does not substantially affect the size, distribution, and/or viability of populations. Special-status or native species are not generally affected, however, because the rodenticides are not used in wildlife refuges or habitat conservation areas where these species are known or likely to occur.
>
> "Products containing second-generation active ingredients are no longer available to the general public. These products remain available to professional pest control personnel, and are or would be used by the District with strict adherence to product label requirements, application and safety guidelines, and District BMPs (especially BMPs H15 and H16). Following the recommended guidance and BMPs can ensure their safe use for controlling and eradicating nuisance rodent populations. Experience with these products, USEPA guidance support provide proven techniques to minimize the potential for

> exposure to nontarget species. Some recommendations include the use of tamper-proof bait stations; securing bait stations at deployment locations to prevent disruption and/or removal by wildlife; and proper education of citizens, including residents, about the potential risk to pets, wildlife, and children." (p. 6-48)

The precise impact on populations of predators by the purposeful use of pesticides, including rodenticides, is difficult to determine and accurately quantify. In fact, predator populations fluctuate over time and are affected by many different contributing factors. It is not possible to definitively link use of vector control products by the District (at levels established by the USEPA and according to additional District BMPs) to a long-term predator decline or one that would adversely impact the predator population of interest. It is well known in population biology that every population can adequately respond to and recover from a loss of even large numbers of individuals based on their intrinsic reproductive capabilities and vigor. Populations with very short reproductive gestation periods (many birds and small mammals) will recover much faster than populations with long reproductive cycles (large mammals and some large birds) (Andrewartha 1972). In fact, there are many current theories about exactly how many individuals in a population can be lost before the likelihood of significant impact or extinction may occur. Some experts suggest the total population of animals with very short reproductive cycles (gestation times) can lose as much as 30 percent of the population and still experience complete recovery to pre-stress numbers (Emlen 1989; Emlen et al. 2003). In the case of bird and mammal predators, although this hypothetical large level of loss of individuals is far beyond any likely level of exposure to District use of rodenticides, the remaining number of individuals would still be adequate to replenish the population to pre-exposure levels (Fleeger et al. 2003; Mitra et al. 2011). The greatest factor causing adverse impacts on populations is loss of habitat caused by expanding residential and industrial (human) use of wildlife habitat. This additional explanation has been added to the PEIR text in Section 6.2.2.2 Assumptions (page 6-24) as noted in Section 5.4.2 of the Final PEIR.

## *Response 2*

The commenter is concerned that rodenticide use in neighboring areas can enter a food web "far beyond the treated area," that the spread of rodenticide into and through a food web is under-recognized by the District due to the delayed effect of SGARs and secondary consumers of the dead rodents.

The District recognizes the importance of protecting both terrestrial and aquatic ecosystems and strives to minimize environmental impacts through the application of IPM principles as described in its IMVMP Plan. In many cases, the District is able to implement alternative methods, which reduce the need for SGARs. Indeed, in its role managing the countywide rodent control program, administered by PCOs, the District has overseen a reduction of over 6,000 baiting sites since 2008. However, in some cases, baiting is still an effective and appropriate part of an IPM approach to public health rodent control.

Much of the unintended harm that can arise from SGAR use can be avoided by strict adherence to the type of BMPs that the District employs as part of their IMVMP. The IMVMP employs BMPs that are consistent with established scientific methods intended to prevent exposure of nontargets to SGARS: A study focusing on the secondary poisoning effects to raptors from SGAR use found that the appropriate use of BMPs was the most important factor in preventing non-target SGAR exposures, concluding, "We recommend that management efforts to reduce exposure of nontargets to SGARs may be more successful if they focus on improving mode of use rather than on reducing the absolute amount of bait used" (Shore et al. 2006). A summary of this study is provided as Attachment A following Response 5.

The District's approach minimizes the potential for a poisoned rodent to enter areas of concern. Bromadiolone is also effective when moisture and food competition exist. The District educates city officials of the proactive role they should play in an IPM abatement program. Sanitary sewers are closed systems. Therefore, poisoned individuals tend to expire in the sewers and not represent prey for secondary consumers in the terrestrial environment (see Appendix B, Section 4.5.5.5). This below ground use minimizes the potential for a poisoned rodent to enter areas of concern for predator species.

The issue put forth by the commenter is that predators can move far from their home to forage, and that implies that there is an opportunity for predatory wildlife to wander to a location where SGARs are being used. Although the District uses no chemical rodenticides in the location cited by the commenter, the claim is that predatory wildlife that live in the area can be exposed by consuming baited rodents at distant locations. Although predatory birds (hawks, etc.) and mammals (fox, coyote, etc.) can move to other areas, they generally remain within their useable habitat and foraging areas. The potential for movement to other sites by wildlife to forage is generally limited to distances of fractions to a few miles (USEPA 1993a, 1993b).

SGARs are now only registered for use by licensed pest control applicators (PCOs). The higher potential toxicity compared to FGARs may result in a larger body dose that could be transferred to predators. These are complex food web issues that are dependent on potential identified predators in a region and the documented toxicity of the bait consumed. Based on an extensive review of case studies and documented field information, the USEPA produced a comprehensive study of relative rodenticide risks to nontargets, which acknowledges the risk of secondary poisoning from SGARs (USEPA 2004). The District considers all of these factors when selecting and using the application of any rodenticide for vector control.

## *Response 3*

The commenter is concerned with the consequence of delayed mortality and pesticide resistance to SGARs and is concerned about the quantities of rodenticides reported being used in the County.

See Response 2 above.

The District would like to clarify usage rates of bromadiolone documented in the PEIR. The commenter refers to PEIR Appendix B, Section 4.5.4.4 to conclude that >1,000 lbs of bromadiolone (5 lbs of AI) was used in San Mateo County per year. This is a misreading of the information in this section of Appendix B. As described in the Executive Summary of Appendix B (page 1-1), nine northern California vector control districts submitted pesticide use records as part of a collaborative effort to develop the Ecological and Human Health Assessment Report . The tables in Appendix B that quantify pesticide use by district include applications made both by the San Mateo Mosquito and Vector Control District (in San Mateo County) and by other vector control districts in areas outside of San Mateo County. The San Mateo County pesticide use tables in Appendix B for (Tables A41 – A44) report no bromadiolone usage by the District in this time period (Summer 2011- Spring 2012). All bromadiolone usage recorded in these tables were applications made by Contra Costa County or Napa County.

For information on reported pesticide use specifically in San Mateo County, please see PEIR Chapter 13, Cumulative Impacts, Section 13.4, Ecological Health. Table 13-1 identifies pesticide use by all users (including sources apart from vector control) in San Mateo County, based on pounds of active ingredient (AI). This data is provided by the California Department of Pesticide Regulation, and it includes AIs for all pesticides used or proposed for future use by the District. Reported use countywide of bromadiolone varied from a low of 0.5 pound of AI in 2006 to a high of 0.57 pound of AI in 2016. Use of this rodenticide was higher in Santa Clara County (where Jasper Ridge is also located). Bromadiolone use specifically by the District is reported in Table 13-2, but the amount is recorded as units of total product applied, not pounds of AI. Usage of bromadiolone is reported in this table for 2012, 2014, and 2016.

## *Response 4*

The comment requests that the District explain whether it is in fact expanding the number of rodenticides it will use. The comment notes that difethialone and cholecalciferol are already being used by other districts, but that they are included in Table 5-13 as being “under consideration for future use.”

While difethialone and cholecalciferol have been applied by other vector control districts as noted in Appendix B (Tables A12-A14), and by non-District applicators within San Mateo County as documented in Chapter 13 (Table 13-1), these active ingredients have not been used by and are not in current use by the San Mateo County Mosquito and Vector Control District. There are no current plans to expand the type of

rodenticides or active ingredients used by SMCMVCD. However, the District is considering what rodenticides could be reasonably necessary to protect the health and safety of Service Area residents. As the registration status of various products and AI's change over time, as well as the state of the science regarding various types of rodenticide AI's, it may be necessary to change products (formulations) or active ingredients (AI's) due to causes internal or external to the District's IMVMP. A product may go off the market or new research could render it unattractive to use. In the same way, new and often more environmentally friendly formulations for existing AI's are constantly being developed, and the District would like to retain the option to use these products if they prove to be a more appropriate fit into our IPM program.

## *Response 5*

The comment provides two references to support comments above.

The references are noted, and the decision-makers may consider them and the author's comments. These two studies were reviewed herein and included in Attachment A, Additional Literature Review. They do not affect the impact conclusions in the PEIR.

## *References*

**The following references are in addition to the PEIR references contained in Chapter 17 of the Draft PEIR or its appendices:**

Emlen, J.M. 1989. Hazard assessment review, terrestrial population models for ecological risk assessment: a state-of-the-art review. Environmental Toxicology and Chemistry 8: 831-42.

Fleeger. J.W. K.R. Carman, and R.M. Nisbet. 2003. Indirect effects of contaminants in aquatic ecosystems. Sci Total Environ. Dec 30;317(1-3):207-33. Cited in Shore et al. 2006.

Garg, N., and N. Singla. 2104. Toxicity of second-generation anticoagulant bromadiolone against Rattus rattus: individual and sex specific variations. Available at: https://pdfs.semanticscholar.org/7b01/912551daf38227cf649ac5bb544f3b129f2b.pdf.

Shore R.F., H.M Malcom, D. McLennan, A. Turk, L.A. Walker, C.L. Wienburg, and A.J. Burn. 2006. *Did foot-and-mouth disease-control operations affect rodenticide exposure in raptors?* J. Wildl Manage 70: 588-93.

United States Environmental Protection Agency (USEPA). 1993a. Wildlife Exposure Factors Handbook Volume I. EPA/600/R-93/187a. December. Washington, DC: Office of Research and Development.

United States Environmental Protection Agency (USEPA). 1993b. Wildlife Exposure Factors Handbook Volume II: Appendix. EPA/600/R-93/187. December. Washington, DC: Office of Research and Development.

United States Environmental Protection Agency (USEPA). 2004. 2004. Potential Risks of Nine Rodenticides to Birds and Nontarget Mammals: a Comparative Approach. Prepared by W. Erickson and D Urban. Office of Prevention, Pesticides and Toxic Substances.

United States Environmental Protection Agency (USEPA). 2008. Restrictions on Rodenticide Products. Available at: https://www.epa.gov/rodenticides/restrictions-rodenticide-products.

Witmer, G.W., and R.S. Moulton. 2014. Improving Invasive House Mice Control and Eradication Strategies via More Effective Rodenticides. USDA APHIS Wildlife Services, National Wildlife Research Center, Fort Collins, CO.

**The following references were in Draft PEIR Chapter 17 or its appendices:**

Andrewartha, H.G. 1972. Introduction to the Study of Animal Populations. 2nd edition. University of Chicago Press.

Emlen, J.M., D.C. Freeman, M.D. Kirchhoff, C.L. Alados, J. Escos, and J.J. Dudaa. 2003. Fitting population models from field data. *Ecological Modelling* 162:119–143.

Mitra, A., C. Chatterjee, and F.B. Mandal. 2011. Synthetic chemical pesticides and their effects on birds. *Research Journal of Environmental Toxicology* 5(2):81-96.

This Page Intentionally Left Blank

## *Attachment A – Additional Literature Review*

This Page Intentionally Left Blank

**Garg, N., and N. Singla. 2104. Toxicity of Second Generation Anticoagulant Bromadiolone against *Rattus*: Individual and Sex Specific Variations. Available at http://www.cibtech.org/cjz.htm 2014 Vol. 3 (2) May-August, pp.43-48/Garg and Singla.**

"Present study reports individual as well as sex specific variations in response towards toxicity of cereal based formulation of 0.005% bromadiolone bait in R. rattus. Calculated sex specific LD50 values can be used in further studies to distinguish resistant and susceptible individuals of R. rattus to bromadiolone toxicity."

This study reports the efficacy of bromadiolone using a standard LD50 laboratory test that uses a monitored mortality vs chemical dose introduced using an oral route (syringe containing SGAR at varied concentrations). It is an evaluation of the rodenticide effects to rats in India. These results are similar to other available laboratory results on rodenticide effects to rats. Observed mortalities were not clearly related to dose and the days to death varied substantially. The message here is that for the SGAR bromadiolone, the sensitivity to the chemical varies across doses and even between the sexes of the study rats. Differences in efficacy may be due to individual sensitivities. This report does not provide substantially new information about SGARs or the relation to predation potential.

**Shore R.F., H.M. Malcom, D. McLennan, A. Turk, L.A. Walker, C.I. Wienburg, and A. J. Burn. 2006. Did foot-and-mouth disease-control operations affect rodenticide exposure in raptors? *J. Wildl Manage* 70: 588-93.**

Shore et al. (2006) report that difenacoum and other SGARs are used extensively for pest control in Britain and has an unintentional negative effect on a range of nontarget avian and mammalian predators and scavengers. They further report that this exposure is thought to be secondary, caused by predators feeding on contaminated rodents. However, it has been argued that the levels of exposure and mortality in predators could increase if there was greater SGAR use (and associated increased numbers of rodents with SGAR residues), or if there were dietary shifts by predators toward eating more poisoned rodents. However, the conclusion from this study was that the high use of difenacoum (or any other SGAR) while combatting FMD was not associated with any detectable increase in SGAR exposure in barn owls and buzzards. In fact, the authors reported difenacoum exposure in barn owls was significantly lower, not higher, in FMD-affected counties than elsewhere. This result is contrary to the expected hypothesis and may be the result of the inability to accurately link the dose of difenacoum taken up by the predators or lack of use of these prey items for other reasons.

**Witmer, G.W., and R.S. Moulton. 2014. Improving Invasive House Mice Control and Eradication Strategies via More Effective Rodenticides. USDA APHIS Wildlife Services, National Wildlife Research Center, Fort Collins, CO.**

This study was designed to evaluate the efficacy of 11 rodenticides on both wild caught and house mice and Norway rats. The metrics evaluated was the bait consumption (attractiveness), days to death and mortality rate using both a 3-day and 7-day exposure for mice and a 3-day exposure for Norway rats. The efficacy (mortality) of the FGARs was very low (less than 20%), while the SGARs exhibited a higher efficacy (40-100% for house mice). Warfarin exhibited no mortalities to wild mice. Of the SGARs evaluated, the days to death was much lower (@ 2 – 2.5 days). Results suggest that the FGARs are considerably less effective than SGARs, as expected, but that an extended exposure time for house mice can increase the efficacy. Although this study provides some interesting comparisons of FGAR and SGAR efficacy, it does not markedly alter what is generally known about these rodenticides. It provides information about the dietary acceptance of each product and supports the concept that the potential for predatory uptake can be minimized by chemical used and presentation methods. There is no discussion by the authors of risk/benefit about the potential impact to predators.

This Page Intentionally Left Blank