UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

April 11, 2011

Dr. Elizabeth Flint
Pacific Reefs National Wildlife Refuge Complex
300 Ala Moana Blvd., Room 5-231
Honolulu, HI 96850

Subject: Draft Environmental Impact Statement (DEIS), Palmyra Atoll National Wildlife Refuge Rat Eradication Project (CEQ # 20110049)

Dear Ms. Flint:

The U.S. Environmental Protection Agency (EPA) has reviewed the above-referenced document pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act. Our detailed comments are enclosed.

The Fish and Wildlife Service (FWS) proposes to eradicate non-native black (roof) rats on Palmyra Atoll National Wildlife Refuge to help restore this important center of biodiversity and species abundance in the Central Pacific. It evaluates four alternatives: aerial broadcast of the rodenticide brodifacoum (Alternative B), aerial broadcast of the rodenticide brodifacoum with the addition of bird capture to avoid poisoning (Alternative C), bait stations using brodifacoum (Alternative D) and No Action (Alternative A). The DEIS does not identify a preferred alternative.

We note that the use of the rodenticide diphacinone was not evaluated as a NEPA alternative in the DEIS. Diphacinone is less persistent and virtually non-toxic to birds when compared to brodifacoum (Appendix H, p. 13). The rationale for dismissing diphacinone from further analysis did not demonstrate that it was an unreasonable alternative[1], and without this analysis, the decision-maker and the public are deprived of valuable information regarding its comparative impacts and efficacy. The DEIS does retain apparently less feasible alternatives for full NEPA analysis. This, coupled with a description in Appendix A that describes the action as imminent (taking place in June of 2011 and consisting of an aerial broadcast of brodifacoum) seem to imply that the decision has already been made. NEPA requires that environmental

[1] Under NEPA, reasonable alternatives are those that are practical or feasible from a technical and economic perspective and that are based on common sense (Council on Environmental Quality's 40 Most Asked Questions about NEPA, # 2a)

information be available to public officials and citizens before decisions are made (40 CFR 1500.1(b)), and that EISs serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made (40 CFR 1502.2(g)).

Despite the apparent preference for aerial broadcast of brodifacoum, the DEIS does not identify a preferred alternative(s). Therefore, pursuant to EPA's *Policy and Procedures for the Review of Federal Actions Impacting the Environment*, we must rate each of the alternatives listed in the DEIS. We have rated Alternative A (No Action) as Environmental Concerns – Insufficient Information (EC-2) (see enclosed "Summary of Rating Definitions"). The DEIS describes the impacts that rats are having on island ecosystems in general, and the likely effects on the Palmyra ecosystem in particular. It documents the benefits of rat eradications worldwide as well as the expected biodiversity benefits to Palmyra. Specific rat impacts on biological resources are largely speculative for most species; however, and additional information is needed to fully document and predict how no action will affect population trends. This rating also considers the concerns identified below regarding the aerial broadcast alternatives, to which the No Action alternative is compared.

We have rated Alternative B (aerial broadcast of brodifacoum) and Alternative C (Alternative B with added bird capture to avoid poisoning) as Environmental Objections - Insufficient Information (EO-2). We are concerned that proceeding with these alternatives, without sufficient consideration of a less-toxic and less-persistent rodenticide, would set a precedent for future eradication projects that collectively could result in significant impacts to non-target species. In addition, the DEIS, as written, does not provide sufficient assurances that all contingencies have been planned for to avoid mistakes made during previous rat eradications on Palmyra and elsewhere. Alternatives B and C would deposit tremendous quantities of bait on Palmyra that would go into alternative food chains. This may be justified for a potential long-term benefit to shorebirds; however, if such quantities would be used, it is important that the project be designed to ensure the best possibility of success, lest impacts to non-target species occur without the benefit of a complete eradication.

While there is ample evidence of pre-operation research and planning, the DEIS does not demonstrate how the causes of a previous rat eradication failure on Palmyra (ineffective management structure, staff and volunteers with no expertise in rat eradication, poor communication between the involved parties, and an inadequate budget) will be avoided for the proposed project. It also is not clear that the project has incorporated lessons learned from the high non-target mortality from the Rat Island aerial eradication, the causes of which are attributed, in part, to the upward adjustment of bait application rates during the operation, disposal of extra or contingency bait by application, and poor communication. Our objections also pertain to insufficient post-treatment monitoring proposed for Alternatives B and C, and a scope of the biosecurity plan that does not appear commensurate with the high risk of rat repopulation identified. Regarding Alternative C, the bird capture component does not appear feasible and was not recommended by bird experts who were consulted on the matter, some of whom described it as difficult if not impossible. Capture and retention would be very labor and

resource intensive, and would stress and cause death, injury, and suffering to birds. The DEIS does not provide any indication that capture and retention would provide a substantial benefit.

We have rated Alternative D (bait stations using Brodifacoum) as Environmental Concerns – Insufficient Information (EC-2). Although this alternative would result in far fewer impacts to non-target species, our rating reflects the potentially lower probability of success, considering the increased likelihood that not all rats present would be exposed to bait, the lack of information regarding its feasibility, the availability of bait stations, and manpower and funding requirements. There is also insufficient information regarding the difficulty of installing bait stations on islands with unexploded ordnance. If additional information is provided to address these concerns and the alternative can be established as feasible, we would have no objections to this alternative.

EPA appreciates the opportunity to review this DEIS. When the Final EIS is released for public review, please send one copy to the address above (mail code: CED-2). If you have any questions, please contact me at (415) 972-3521, or contact Karen Vitulano, the lead reviewer for this project, at 415-947-4178 or vitulano.karen@epa.gov.

Sincerely,

/s/

Enrique Manzanilla, Director
Communities and Ecosystems Division

Enclosure: Summary of EPA Rating Definitions
EPA's Detailed Comments

cc: William W. Jacobs, Registration Division, EPA HQ, Office of Pesticide Programs
Jennifer Gaines, Registration Division, EPA HQ, Office of Pesticide Programs
Patti TenBrook, EPA Region 9 Pesticides Office

Alternatives Analysis

The rationale for the limited scope of the alternatives analysis in the DEIS is unclear. The very high toxicity, persistence in animal tissues, and risk of primary poisoning to shorebirds from using brodifacoum is well known (p. 108, 109), as is the high secondary exposure from eating crabs or other animals that have been exposed, yet use of the much less toxic diphacinone rodenticide bait was not brought forward as a NEPA alternative for evaluation. This omission is especially confusing considering that the alternatives that were brought forward for full NEPA analysis appear to either have significant barriers to feasibility, or lack information to determine feasibility. Finally, the criteria for eliminating alternatives in the DEIS do not appear to be consistently applied. See below.

Elimination of Diphacinone

Factors for screening alternatives

Diphacinone, the other bait product besides brodifacoum that is registered with EPA for conservation-based rodent eradications on islands, has a low toxicity to birds when compared with brodifacoum (p. 18), yet was dismissed from detailed analysis in the DEIS. The DEIS identifies the factors used in this decision as:

1. the toxicity of the product
2. the efficacy of the product (including palatability)
3. the extremely dense vegetation at Palmyra inhibiting distribution of the product
4. Palmyra's series of large and small islands that challenge dispersal of product and the feasibility of applying product to required concentrations and replicates,
5. the safety of personnel in applying product, including consideration of unknown but documented unexploded ordnance in the atoll, and
6. the inordinately dense population of land crabs, their extreme ability to penetrate enclosures, and their voracity of consumption.

Discussion of these factors does not seem to support removal of this alternative from study. The toxicity of the product, in relation to non-target species at least, would favor diphacinone. Considering that the stated project purpose and need is to deliver toxicant in a way that "minimizes harm to the ecosystem" (p. 24), it is not clear how this factor would eliminate diphacinone alternatives.

The discussion on page 17 does not address bait palatability. As the palatability study performed in 2010 found both brodifacoum and diphacinone to be highly palatable in comparison to commonly available food items (Appendix F, p. 39), this factor does not support elimination of diphacinone alternatives. The palatability and general suitability of anticoagulant rodenticide bait formulations for use in specific situations is governed more by the nature of the "inert" components of the bait than by the specific anticoagulant used.

The dense vegetation at Palmyra would inhibit distribution of any bait product. Since cost effectiveness or funding limitations are not discussed, this factor does not explain dismissal of diphacinone alternatives. The feasibility of applying product to required concentrations and replicates is not discussed in the DEIS for diphacinone. Since diphacinone has been used successfully in rat eradications, it is not clear how this factor was evaluated. The safety of personnel from unexploded ordnance while installing bait stations would be a factor in any bait station alternative, and would require initial clearing or marking regardless of the bait used or refill frequency. Consequently, this factor would not preclude use of diphacinone nor distinguish it in a significant manner from brodifacoum regarding safety such that all options involving diphacinone would have to be eliminated.

Bait Efficacy

Bait efficacy appears to be the most important factor considering the objective is to eradicate rats. The DEIS discusses risks associated with using diphacinone, especially in relation to the perceived need for rats to feed on it multiple times in order to be be killed (whereas, with brodifacoum, a rat would be more likely than with diphacinone to consume a lethal amount of bait in one night's feeding). However, these are probabilities rather than hard-and-fast rules as the DEIS seems to imply. Some rats could ingest enough diphacinone bait in one night to cause mortality, while reluctant feeders on a brodifacoum bait might need several nights of opportunity before they consume a lethal dose. With any anticoagulant, the time to death from the onset of bait ingestion follows a similar course. The animals feed and behave normally for several days and then gradually weaken and die. Even rats that have consumed a lethal dose during the first night of feeding will ingest more bait until the symptoms of anticoagulant poisoning set in. It is not clear, then, that twice as many rounds of treatment, or twice as much bait, would be needed for a diphacinone project vs. a brodifacoum project.

The DEIS states that the Fish and Wildlife Service (FWS) does not have enough information on the efficacy of diphacinone within Palmyra's rat eradication environment to proceed with analysis of this bait (p. 17). Diphacinone has been used successfully in 10 island rodent eradications. Substantially more experience has occurred using brodifacoum (197 successful applications, p. 31), with almost half using bait stations alone, and 29% using aerial broadcast primarily[2]. The DEIS concludes that additional successful rat eradications using diphacinone would be needed (p. 18), but it is unclear what number would be sufficient to allow for full analysis as a NEPA alternative. Some criteria should be established and discussed to elaborate on this conclusion.

[2] There is some confusion regarding these numbers – 29% of the 197 applications would translate to 57 successful aerial applications, but the DEIS also states that compressed cereal products containing brodifacoum 25 ppm have been used to successfully eradicate rats from at least 5 islands using aerial broadcast as the primary technique (p. 31, line 30)

We note that the report *The Rat Island Rat Eradication Project: A Critical Evaluation of Nontarget Mortality* (herein Rat Island critical evaluation) prepared by the Ornithological Council concluded that "the basic operating principle [for rat eradications] should be to always use the lower-risk bait unless there is strong justification to do otherwise". The report concludes that "the track record of brodifacoum alone is not a sufficient basis to justify the choice of brodifacoum" (p. 69). It also concludes that the island restoration community has not made sufficient efforts to develop successful methodology for the use of diphacinone (p. 35).

The DEIS' apparent bias toward use of brodifacoum is likely attributable to the fact that most successful eradications, to date, involved use of brodifacoum; however, CEQ's NEPA regulations require agencies to "rigorously explore and objectively evaluate all reasonable alternatives" (40 CFR 1502.14a), and the DEIS has not demonstrated that an alternative involving use of diphacinone is unreasonable. The claim that, prior to 2004, diphacinone had not proven "to be an effective tool for eradication of rats from tropical islands" (p. 17) is incorrect, since the Buck Island eradication was successful. The DEIS highlights the failure of diphacinone on Lehua (p. 17, 21) without discussing the fact that the failure could well have resulted from the need to keep bait well back from the shoreline, in response to a requirement imposed by the State of Hawaii. This use limitation is mentioned on page 22, but text there does not address whether brodifacoum might also have failed if subjected to the same limitations. Additionally, as discussed above, the inference that more treatment and more bait would be needed for diphacinone vs. brodifacoum applications is not fully supported.

Resistence to rodenticides was not discussed in the efficacy evaluation that eliminated diphacinone as a NEPA alternative. Appendix C notes that feeding trials with captive rats suggested that there is some tolerance or resistence to brodifacoum in the rat population on Palmyra. The inference that absence of brodifacoum use on Palmyra for 6 years means "that it is highly likely that any rats that supported rodenticide resistance have been selected against and are no longer present in the population" (p. 25) is not fully supported. Individual rats alive in 2005 almost certainly have died, but they have reproduced and probably passed any resistance-conferring alleles on to some of their descendents. Rather than its complete disappearance, one might predict reversion to a low frequency for a somewhat disadvantageous (relatively low affinity for Vitamin K) allele in the absence of selective pressure favoring it. Alleles conferring resistance to anticoagulants seem to have been present in murid rodent populations well before warfarin was discovered and first used as a rodenticide. Consequently, they were available for selection when anticoagulant rodenticides first came into use and did not disappear from rodent populations despite no obvious selective pressure favoring them until the advent of anticoagulant rodenticides.

The DEIS states that the decision to not evaluate a diphacinone alternative also stems from a collaborative report that followed the 2004 rat eradication feasibility study conducted at Palmyra (Howard et al 2004) (p. 17); however, there was no discussion of diphacinone in that report, presented in Appendix C. The limited consideration of diphacinone in that study was based on

preliminary results with two bait preparations, rather than consideration of other existing and possible diphacinone formulations. What did emerge from that research effort was a recommendation for development of a new brodifacoum formulation – one that would withstand the elements on Palmyra better than did the bait used in the Anacapa Island project.

Aerial broadcast as screening factor

Suitability for aerial broadcast appears to be used as a screening factor, but this is not identified as such nor is it consistently applied. For example, in the discussion on page 21 dismissing a diphacinone alternative, the DEIS states that a strategy for aerial application of diphacinone "has not been extensively tested" (p. 21). Similarly, one of the reasons given for eliminating use of other toxicants is the lack of EPA registration for aerial broadcast (p. 23). The purpose and need does not establish aerial application as a condition for the action; indeed, a bait station alternative using brodifacoum was brought forward for analysis. If aerial application is deemed necessary for an alternative to be considered feasible, this should have been identified in the purpose and need statement and applied to the screening of all potential alternatives. The FEIS should explain how and why aerial broadcast suitability was factored into the assessment of rodenticide alternatives.

Feasibility of Alternatives

Alternative C

The elimination of a diphacinone alternative is especially confusing considering that the other two alternatives that were brought forward for full NEPA analysis have questionable feasibility. Alternative C is comprised of Alternative B (brodifacoum aerial application) with additional mitigation of risk for shorebirds that could be poisoned by bait broadcast. This alternative proposes to capture and hold shorebirds prior to and during the period when they would be at risk of lethal exposure to rodenticide. We commend the good intentions of this alternative; however, there is no indication in the DEIS that successful capture of shorebirds -- primarily bristle-thigh curlews (BTCU) and Pacific golden plovers (PGPL) -- would be expected. Shorebird experts maintain that it would be very difficult to capture BTCU (p. 58), and capturing birds and holding them for the required period[3] (until land crabs consumed by the birds have low

[3] The DEIS does not identify the required period of time, requiring the reader to attempt to calculate it. Our estimate: to allow for two applications 10-14 days apart, 10 days for all phases of bait application (including trees overhanging water) associated with the second round of treatment to be completed, 7 days for disappearance of nearly all bait after the second application, and reductions in residues in terrestrial crabs and other invertebrates would take an additional 2+ weeks at least. The minimum holding period would have to extend >3 weeks beyond the date of the completion of the last component of second treatment round on any island. Measured from the date of first application, a semi-conservative calculation would put the minimum holding period at ~7 weeks, plus any holding time prior to the initiation of bait applications. With bait stations being used in the camp area, there would be extended potential for secondary exposure to curlews that congregate on the runway (which is close to the camp area).

brodifacoum residue levels) presents risk of injury, deterioration in body condition, death, behavior changes, and disease outbreak (p. 56). Appendix F documents several unsuccessful attempts to capture BTCU on the runway at Palmyra (App. F p. 36). The study in Appendix H indicates this capture is feasible, but it is not clear how this was determined or defined. Almost all of the BTCU expert opinions in its appendix clearly indicate that such an effort would be difficult, if not impossible, with one expert stating, "catching and holding the birds seems to me like a very labor intensive and resource intensive way to achieve the ultimate goal" (App. H, p. 28).

Alternative D

It is not clear whether FWS believes this alternative is feasible. Because of the rat's small range, due to its use of tree canopies and abundant year round food sources, a large number of bait stations would be needed. The DEIS estimates that 1,862 bait stations[4] plus an additional 20% would be used for Alternative D, and that every 3rd palm tree would be baited, presumably by launching bait filled sacks or "bolas" into them, 4 times (DEIS p. 60, Appendix G). An evaluation of effort was included for the alternatives and revealed that Alternative D would be four times more effort intensive (2,475 person-days versus 616 or 684 person-days for Alternatives B and C respectively). Because no information regarding funding for the project was included, it is unclear whether this substantially larger effort would render the alternative infeasible. Additionally, the presence of unexploded ordnance on Quail and Barren islands would require clearance or marking by qualified personnel (p. 60). No further information is provided, and it is not clear if these qualified personnel were included in the person-hours determination in Table 2.4, nor whether this aspect of the project would present insurmountable logistical difficulties. Because a lack of manpower contributed to previous eradication failures, the availability of the workforce for the alternatives should be discussed, as should any funding limitations.

The availability of the bait stations is also unclear. The DEIS references development of a bait station by U.S. Department of Agriculture - Animal and Plant Health Inspection Service - Wildlife Services (p. 29) that would be used for Palmyra, but its availability is not discussed. Elsewhere, the DEIS references bait stations being "purchased" (p. 59), and it is unclear whether these stations would be available for purchase in the quantities needed or if they would have to be constructed by project personnel or modified by them so as to be rendered crab-resistant and otherwise suitable for use on Palmyra.

Cost considerations, objective decision-making

In the discussion on page 21 dismissing a diphacinone alternative, the DEIS describes aerial broadcast of brodifacoum as more cost-effective and effort efficient. These criteria were not identified as factors to be considered in screening potential alternatives. In fact, the DEIS states

[4] Appendix C, p. 27 states that over 15,000 bait stations would be needed

that an integrated pest management approach would be used for the project (p. 14) and cites to the Department of Interior's and FWS's integrated pest management policies. These policies clearly state that cost is not the primary consideration for pest management approach[5]. We understand this is an eradication effort and not simply pest management, but it is unclear how the alternatives are using the IPM approach as stated in the DEIS.

Information regarding costs and the funding available for the project would be helpful in interpreting information in the document. NEPA does not require a cost-benefit analysis, but the Council on Environmental Quality (CEQ) Regulations implementing the National Environmental Policy Act (NEPA) state that an environmental impact statement should at least indicate those considerations, including factors not related to environmental quality, which are likely to be relevant and important to a decision (40 CFR 1502.23).

The monitoring plan in Appendix A describes the action as imminent (taking place in June 2011) and consisting of an aerial broadcast of brodifacoum (Appendix A, p. 1). CEQ's Regulations state that NEPA procedures must ensure that environmental information is available to public officials and citizens before decisions are made (40 CFR 1500.1(b)), and that Environmental Impact Statements shall serve as the means of assessing the environmental impact of proposed agency actions, rather than justifying decisions already made (40 CFR 1502.2(g)). Additionally, the CEQ regulations include a provision in 40 CFR 1506.5(c) that addresses objectivity for any contractors involved in the preparation of the NEPA document, including a lack of financial or other interest in the outcome of the project. Because Island Conservation will be the implementing entity for the project, FWS should ensure that their substantial involvement and contribution of information is incorporated into the document in a way that meets the letter and spirit of 40 CFR 1506.5(c).

> *Recommendations:* The alternatives analysis in the FEIS should clearly identify the criteria used in screening potential alternatives to determine which would be brought forward and evaluated in the NEPA document, and these criteria should be consistently applied to all potential alternatives. An objective evaluation of diphacinone alternatives, in a side-by-side comparison, would be helpful to the public and the decision-maker and is recommended.
>
> Discuss and define feasibility and how it was assessed for the alternatives. Include cost data, which are likely to be relevant and important to the decision, so that an evaluation of the person-hours and mitigation proposals can be made.

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[5] From DOI Directive 517 DM 1: "While management costs are important, they are not the primary deciding factor in selecting a management approach". From FWS's 569 FW 1: 1.7 How does the Service choose which pest management methods to use? We choose pest management methods by considering the following *in this order of importance*: A. Human safety, B. Environmental integrity, C. Effectiveness, and D. Cost.

Project Features Common to All Action Alternatives

The DEIS identifies reasons why a previous rat eradication effort failed on Palmyra. Reasons include an ineffective management structure, use of volunteers and other staff with no expertise in rat eradication, poor communication between the involved parties, and an inadequate budget to complete the eradication. The lack of monitoring and communication plan led to poor data feedback to management and technical support, which contributed to a failed eradication (Appendix C, p. 15).

Although it is clear that far more initial research and planning has preceded the project being proposed now than was the case for the 2001-2003 effort, the project description in the DEIS does not clearly identify how these errors will be avoided in this project. The DEIS does identify adaptive management as a feature common to all alternatives (p. 24) and adaptive management could help address monitoring and communication issues; however, the adaptive management discussion is a presentation of the concept only, with no development of a plan specific to the project. Because avoiding the deficiencies identified above is crucial to project success, it is important that this project element be more fully developed[6].

> *Recommendation:* In Section 2.4 – Features Common to All Action Alternatives, include a discussion of the management structure for project implementation, and the staff who would be involved, including their expertise in rat eradications. Include a communication plan as an appendix to the FEIS. Discuss budget concerns or limitations. This information is relevant to environment impacts and should be included. FWS may choose to include this information in an adaptive management plan. If so, we recommend it be appended to the FEIS.

Bait Application Rate

The DEIS does not identify a preferred alternative; however, we are aware that Alternative B is preferred by the project partners. Alternative B would consist of two rounds of aerial application of brodifacoum, 10-14 days apart, at ≤90 kilograms/hectare (kg/ha) (approximately 80 pounds (lbs)/acre) per treatment, supplemented by hand-broadcast applications and bait station applications in certain locations, and arboreal applications of bait to trees that overhang the marine environment. The proposed maximum rate for broadcast application is five times the maximum rate indicated on the current label for the product (EPA Reg. No. 56228-36) that is intended to be used in the project. The DEIS indicates that the proposed bait application rate is

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[6] The report *Modernizing NEPA Implementation* (the NEPA Task Force report to the Council on Environmental Quality, 2003) suggests that the extent of the discussion of adaptive management in a NEPA document depends on its importance to the proposed action and the impacts being considered. When adaptive management is being used to adjust to unanticipated impacts of project implementation, the extent and detail of the adaptive management action would likely be extensive.

necessitated by the intense and rapid removal of bait by nontarget terrestrial organisms, chiefly 5 species of crabs. Without use of treatment rates of $\leq$ 90 kg/ha, the DEIS finds that insufficient amounts of bait would be left by crabs to permit rats access to bait for a sufficient period of time (4 days post application) to ensure an opportunity for each rat to ingest a lethal amount of the rodenticide brodifacoum, which is present in the bait pellets at a concentration of 0.0025% or 25 parts per million (ppm).

A specific sowing (broadcast application) rate is not established. The product label has instructions for determining the application rates. It states "The primary method of determining application rate should be calculated on data from onboard bait metering software and GPS flight path data [area treated (acres or ha) and total bait applied (lbs or kg)]. Where feasible, ground truthing should occur to verify application rate." Any proposed increase in maximum rates above current limits set by the label for EPA Reg. No. 56228-36 must be accepted, under the provisions of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) as amended, by EPA's Office of Pesticide Programs through amendment of the label for that registered product or by some other applicable authorized mechanism.

The DEIS states that, for the project to be successful, an application rate greater than 36 kg/ha would be required (p. 39). There is a substantial difference between 36 kg/ha and 90 kg/ha. In at least one place (p. 47), FWS allows that the second application would be lower than the first ("to account for the reduction in bait consumers – rats that died from the first bait application"). The first treatment would go on at $\leq$90 kg/ha, while the second would be at $\geq$60 kg/ha. However, this information is at odds with text on pages 35-39, specifically the conclusion on p. 38 that "the bait application rate for the second broadcast should be as high as the first".

According to the full report for the 2005 visit, the "small juvenile, weanling rat" found alive 8 days after treatment on Whippoorwill Island may or may not have been the "similar sized rat" (Buckelew, et al, 2005) found ("in the same nest") to be "clearly lethargic" and dispatched 2 days later. The fact that one, or a few rats survived an initial hand-broadcast of 25 ppm brodifacoum bait at 95 kg/ha does not, by itself support a second broadcast at the same rate. All evidence assembled thus far indicates that the first broadcast would take most of the rats, even if made at a rate much lower than 90 kg/ha. The highest reported projections for bait take by crabs are well below 90 kg/ha.

The first paragraph on page 39 is not clear, but seems to indicate that making more bait available attracts more crabs, meaning that bait availability might be more important than crab density in determining how much of the applied bait is taken by crabs and how much remains for other organisms, including rats. The argument for making two applications at the same rate is, basically, that such a negligible percentage of what is applied would go to rats that the high rate is driven almost entirely by the need to have some bait not be eaten by crabs. The calculations discussed in Howald, et al, (2004) of potential bait take by crabs, especially the upper limits of it, should be discussed in this EIS, including how this information could inform bait application rates.

As the first planned application at ≤90 kg/ha would kill nearly all, if not all, of the resident rats, virtually all of the bait applied in the second planned application at up to the same maximum rate (leaving aside the issue of overlapping helicopter swaths) would be available for consumption by nontarget species. Results from Home Island (Wegman, et al, 2008) indicate that neither treatment at 36 kg/ha resulted in much, if any, bait remaining after 3 days. It does not automatically follow that increasing the application rate to ~90 kg/ha (~2½ times 36 kg/ha) also would result in no bait being left after 3 days. In the 2008 "biomarker" trials, all types of potential primary consumers of bait that were examined showed evidence of the fluorescent dye; and those treatments were at 10%, 20% and 40% of the maximum rate contemplated for use. It seems fairly certain that less bait would be needed in a second round of treatment to reach all individuals in the residual rat population, but it also would be difficult to determine where and at what densities rats remained on the various islands and various areas on those islands, especially without significant activity monitoring between applications.. We understand the proposal to use enough bait for it to be present for 4 days (p. 47) when anything short of full eradication means failure; but that approach would require putting out tremendous quantities of bait that would go into alternative food chains.

> *Recommendation:* The FEIS should clearly present the aerial application rates for both the first and second applications. EPA recommends that the second application rate be lower than the first unless between-treatment monitoring of other evidence indicates the presence of significant rat activity in a particular area. Once rates are established, they should be adhered to during the operation, and changes only made according to a clear protocol. The miscommunications and errors made during the Rat Island eradication, during which Island Conservation applied bait at a rate significantly deviating from the target application rate, should be avoided. Changes to baiting rates in the field should be thoroughly documented. In no case may the limits on application rate established by the label for the product used in the project be exceeded, with some allowances for swath overlap (as covered by the labeling). As recommended in the Rat Island critical evaluation, planning should occur for contingencies that are reasonably foreseeable. For each contingency, that evaluation recommends developing a structured decision-making tool that provides much more detail than did Island Conservation's Rat Island risk and contingency plan. Specifically, "A structured decision-making tool for application of bait other than as planned would require a written assessment of the amount of bait already on the ground, a comparison to the approved label rate and target rates, a written assessment of the additional bait to be applied, a calculation of the total amount of bait that would be applied, and the increase in the potential risk to nontarget species".

Contingency Bait

The DEIS does not reveal whether there will be additional or "contingency" bait for use to replace bait that spoiled or spilled and to fill gaps in coverage from aerial applications, nor does it discuss the disposition of excess bait. A major error that occurred with the Rat Island eradication, according to the Rat Island critical evaluation, was that all the contingency bait was

applied to avoid costs of disposal or returning excess bait to the manufacturer. Failures in communication also contributed.

> *Recommendation:* The FEIS should disclose how excess bait will be disposed (or shipped off-island) and whether funding for bait disposal will be included in the project, and should include clear directions for proper excess bait disposal in a communication plan. As mentioned above, decisions regarding disposal of bait should be clearly outlined in a structured decision-making tool.

Post-treatment Monitoring

The DEIS does not document sufficient post-treatment monitoring. "Passive observation by field station staff" (p. 25) would not, as asserted, "be a very effective post-eradication monitoring method". It might indeed detect "a remnant rat population … within 1 year of the eradication effort"; but that would be much too late for any remedial action to influence the outcome of the project. Even planned post-treatment monitoring 4-6 weeks after aerial application (p. 24) would be too late for localized remedial baiting. Monitoring rat activity between treatments would inform adjustment of the application rate for the second aerial broadcast. Monitoring shortly after the second round of baiting might detect residual rat activity which, if localized, might be eliminated via intense additional control activities. Additionally, the areas where bait stations are used, and zones bordering those areas, should be monitored intensively for any signs of rat activity during and for months after the broadcast baiting period, to avoid any rat migration into aerially treated areas to become founders of a rebounding rat population.

> *Recommendation:* The FEIS should document a more appropriate post-treatment monitoring plan. EPA recommends monitoring between aerial treatments and shortly after the 2nd round of baiting. Frequent monitoring should occur in bait station areas.

Biosecurity Plan

The DEIS states that the risk of rat reintroduction is high because Palmyra Atoll is a remote refuge and scientific research station that is maintained through periodic shipments of supplies including consumable and bulk goods, as well as personnel via regular airplane and annual barge service from Honolulu (p. 29). The biosecurity plan included in Appendix B does not appear as comprehensive as is needed for a high reintroduction risk. J.C. Russell, et al[7] recommend that biosecurity plans include quarantine, surveillance, and contingency response components. It is also not clear who would implement the different components.

> *Recommendation:* We strongly recommend that the biosecurity plan be as comprehensive as possible. We recommend that it include quarantine, surveillance, and

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[7] Russell, J.C. et al. 2008. *Review of rat invasion biology, Implications for island biosecurity*. New Zealand Department of Conservation. Available: http://www.stat.auckland.ac.nz/~jrussell/files/papers/sfc286.pdf

contingency components, and provide references and/or discussion that demonstrate that the plan has thoroughly considered which, of the proven biosecurity approaches available, will work best for Palmyra. The FEIS should also identify who would implement the biosecurity actions, whether their implementation is dependent on funding, and if so, any expectancy of funding deficiencies.

Manpower and logistical concerns

The planned use of "bolo" baiting would not coincide with broadcast baiting but rather would start after 3 days of broadcast-baiting and go on for 7 days, with the first round of bolo baiting ending the day before the second round of broadcast baiting might begin (p. 47). With an estimated 3,546 overhanging palms on the atoll (p. 53), project personnel would have to treat 500 palms/day, which works out to approximately 50 palms/hour (1.2 minutes per palm) if personnel are able to devote 10 person-hours/day to this activity alone. At approximately 6° north latitude, Palmyra's photoperiod varies little over the course of a year. In June and July, there might be 12½ hours between sunrise and sunset, with little usable dusk-and-dawn time outside of that period. Clearly, significant rain events, which happen often there, would further restrict the time available for baiting overhanging palms. This means that several crews would have to be devoted to palm baiting. Non-overhanging palms and other trees in hand-baited and bait-station treated areas would also have to be treated, apparently, but such activities might be concurrent with helicopter broadcasts.

It appears that only 4-5 people would be available for hand-broadcast baiting. That could be a problem in the event of helicopter equipment failure or exhaustion of helicopter fuel (p. 46).

It is not clear that the "Person-Days" of "effort" calculations for the aerial application options in Table 2.4 account for hand-broadcasting, baiting trees that overhang water, and bait station establishment and maintenance in the camp area. Those days may have been included in the 460 "Person-Days" indicated for "Aerial broadcast – 25W" (p. 62).

> *Recommendation*: The FEIS should devote more analysis to logistics and manpower needs of the alternatives, especially since effective canopy baiting is crucial to the success of the project. (See also comment below regarding reducing palms prior to eradication). As recommended above, define and discuss feasibility in relation to the alternatives, and whether sufficient funding is available to meet manpower and all logistical needs.

Restricted Use Pesticide (RUP) Certification

The DEIS does not indicate a clear understanding of EPA's certification requirements for use of Restricted Use Pesticides (RUPs). The DEIS states that "all bait application activities will be conducted under the supervision of a Pesticide Applicator certified by the EPA" (p. 25), and that "the product may only be applied by Certified Pesticide Applicators (a certification for Palmyra generally provided by the State or Territory in which the bait is to be applied) or persons under their direct supervision" (p. 30). These statements are not correct.

RUP certification is required under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) for the Palmyra Rat Eradication. However, EPA would not certify applicator(s) for this project. EPA certifies applicators only under very limited circumstances where there is a federal certification and training (C&T) plan in place per 40 CFR 171. This application is not covered by any currently existing federal plans. Since Palmyra does not fall under the jurisdiction of any state or tribe, there is no state or tribal certification plan that would legally cover applicators for this project.

FWS does not have a plan for certifying applicators for this project. Given the scope and huge quantities of restricted use pesticides used for the rat eradication projects (of which Palmyra is only one), FWS should develop and submit to EPA, for approval, its own certification plan that would cover these applications. We note that, even if FWS did have an EPA-approved certification plan, it would only cover FWS employees, and not contractors (even in an "under-the supervision-of" situation described at 171.2(a)(28).

To be in compliance with FIFRA, no RUPs should be applied; however, in this circumstance, EPA's Office of Pesticide Programs suggests that it would be minimally acceptable for the applicator to be certified as a commercial applicator in an appropriate category by the State of Hawaii. Charles Nagamine, a University of Hawaii Extension agent, suggested that either Category 2 (Forest Pest Control) or Category 7c (General Pest Control) would be appropriate. Please consult with Mr. Nagamine (Phone: 808-956-6007). (Certification by other Pacific Islands such as Guam, CNMI, and American Samoa should not be pursued as their certification programs are not finalized).

> *Recommendation:* Correct the statements regarding RUP certification in the FEIS. The FEIS should document if and how responsible parties are following the record keeping requirements for sale and use of RUP's, including the company selling them and the applicator who is using them. Ensuring that all of the restricted use pesticides are accounted for could be a homeland security issue, especially in the quantities being proposed.

Pesticide Information and Corrections

The name, registrant, and registration number of the product intended to be used on Palmyra are misidentified on page 29 and elsewhere. The product's name is "brodifacoum-25W Conservation", without a trademark symbol. The registrant is the Animal and Plant Health Inspection Service (APHIS), USDA. The registration number is 56228-36. See the product's label (e.g., on page 48 of Appendix F).

The discussion of first and second-generation anticoagulants on p. 30 is not completely accurate. The "generation" designations for anticoagulants are not strictly "according to when they were first developed as rodenticides" although they relate indirectly to their toxicity. Another "first-generation" type of anticoagulant could be developed this year, if anyone were interested in

doing so. The term "first generation anticoagulants" was introduced to contrast anticoagulants that were not effective against rodents with genetic resistance to them with anticoagulants that could kill resistant individuals (Dubock and Kaukeinen, 1978). The chemistries that became known as "second-generation anticoagulants" - a term apparently first used in print by Marsh, Howard, and Jackson (1980) - were developed through a search for rodenticides (Hadler and Shadbolt, 1975, cited in DEIS) that would be effective against individual commensal rodents that are resistant to warfarin, pindone, diphacinone, chlorophacinone, and other "first-generation" anticoagulants. See also Jackson and Ashton (1992 – cited in the DEIS). Why the "second-generation" anticoagulants can kill warfarin-resistant individuals (greater affinity for the "Vitamin-K receptor") was fully characterized after the compounds were put into use as rodenticides. The so-called "single-feeding" effect attributed to brodifacoum (Dubock and Kaukeinen, 1978) and other second-generation anticoagulants results from this greater affinity, but is dependent upon the amount of the compound that is ingested on the first day of exposure to it. The amount of anticoagulant ingested on the first day of exposure is determined by the rodent's willingness to consider the bait as a food item; the concentration of the rodenticide in the bait; the palatability of the bait to the rodent; and, in a control situation, the amount of bait available to the rodent. The last of these is an issue on Palmyra due to documented competition for bait with other terrestrial animals, chiefly crabs.

This discussion on page 30 concludes that "any rodenticide can be effectively used to eradicate an entire rodent population if all individuals within the population consume enough bait over an appropriate amount of time." This sentence does not address the possibility of resistant individuals within the population. It has been shown with captive animals that Norway rats genetically resistant to warfarin eventually can be killed by warfarin if consumption continues for many days. It is doubtful, however, whether that would occur in practice before such rodents were able to reproduce and before the baiting program was stopped.

The product (EPA Reg. No. 56228-36) under consideration for the Palmyra project is not labeled for use for "agricultural operations" or "professional pest control operations", apart from conservation uses, as started on page 32 of the DEIS. EPA did not *decide* to make 56228-36 a restricted use pesticide after a period of registration without such designation, as the paragraph implies. Rather, the product was proposed by its applicant to be a restricted use pesticide.

There is reference to "EPA –approved label instructions" in Section 2.4.4 (pp. 24-25) that do not currently exist. As noted above, the existing label for EPA Reg. No. 56228-36 would have to be amended or Palmyra-specific application directions would have to be authorized via another provision of FIFRA.

> *Recommendation:* The information provided above should be used to make the necessary corrections in the FEIS.

Mitigation Measures

Reducing Coconut Palms Prior to Eradication

The coconut palms appear to be especially problematic for the eradication. Not only do they require special baiting methods into canopies, requiring additional manpower, but, as the DEIS indicates, the coconut endosperm was the only food item that scored higher than the bait products in the palatability trials. This suggests that coconut palm reduction may be beneficial to the eradication by reducing the amount of naturally available food that could distract rats from consuming the bait pellets (Appendix F, p. 39).

In its discussion of brodifacoum resistance seen in an eradication trial, the DEIS notes that Vitamin K, which is an antidote to brodifacoum, is contained in coconut fruit. Additionally, to avoid bait drift into the marine environment, the project must hand bait coconut palms that overhang the water if aerial broadcast is selected. Removing coconut palms that extend 100% over the lagoon and ocean would minimize risk of impacting water resources with rodenticide. Removing coconut palms near the marine environment could also benefit green turtles, since one hypothesis for lack of nesting on Palmyra is the extreme abundance of coconut palms close to the beach where turtles might otherwise attempt to dig nesting pits (p. 78).

The DEIS indicates that coconut palm removal is a potential future action (p. 149). It also states that rat eradication is the first step in a series of restoration efforts because it is relatively simple and fast and provides the framework to initiate the palm removal stage of the restoration process (p. 10). The DEIS does not make clear why conducting the rat eradication first is most beneficial (for example, how it sets the framework for the palm removal). Coordinating the timing of the palm removal to precede the rat eradication should be strongly considered, if it would substantially increase the success of the eradication.

> *Recommendation:* As a mitigation measure, the FEIS should discuss the feasibility and benefits of reducing the number of coconut palms on the island prior to the eradication, especially those that extend over the marine environment or are likely to present the greatest problems for the rat eradication. The FEIS should discuss the extent that conducting the palm removal first would increase the effectiveness of the rat eradication effort, and how impacts of the action would change as a result.

Timing of Shorebird Migration

The most important mitigation measure identified is the timing of the eradication to coincide with the period when the least number of migratory shorebirds are present. The DEIS estimates this time to be June and July, when many adult shorebirds return to breeding grounds in the Arctic (p. 28).

Because this is the primary mitigation measure for impacts to shorebirds, it is important that migration timing be confirmed. Shorebirds are affected by the weather (Appendix H discusses the lack of migration of the Sooty Tern from the 2009-2010 El Nino Southern Oscillation) and

peak migration dates may vary from year to year. In addition, there is already compelling evidence that birds have been affected by recent climate change, including earlier breeding; changes in timing of migration, etc.[8]. The DEIS does not discuss the effects of climate change on Palmyra's resident shorebirds nor how potential effects could impact the project design.

> *Recommendation:* To improve the effectiveness of this mitigation measure, consider conducting shorebird surveys prior to the eradication to confirm that a low number of shorebirds are present, as predicted in the DEIS. Discuss possible climate change effects on the project in the FEIS.

Mitigation Measures Committed to as Part of the Project

Mitigation measures are mentioned in the DEIS and appendices but it is not clear which will be adopted for the project or incorporated as components of the proposed action. CEQ recently released guidance to federal departments and agencies on the appropriate use of mitigation and monitoring in NEPA documents[9]. In this guidance, CEQ makes clear that mitigation commitments should be carefully specified in terms of measurable performance standards or expected results, so as to establish clear performance expectations. CEQ also states that agencies should not commit to mitigation measures considered in an EIS absent authority or expectation of resources to ensure that mitigation is performed.

> *Recommendation:* Project mitigation measures should be explicitly identified in the FEIS and included in FWS's Record of Decision. A discussion of the effectiveness/expected results of these measures should be included. FWS should discuss funding and indicate whether the resources are available to ensure implementation of proposed mitigation measures, as well as the party responsible for implementation. If an adaptive management plan will be developed, identify mitigation measures that would apply in the event that initial mitigation commitments are not implemented or effective.
>
> The following were identified in the DEIS as possible mitigation measures:
>
> - Assessing the weather conditions and prohibiting bait broadcast if rainfall is forecast (Appendix H, p. 12). More detail about effectiveness and implementation of this measure should be included in the FEIS.
> - Securing a tarp over the drinking water catchment to prevent aerially broadcast bait from entering the drinking water supply (p. 96). We recommend adding to this measure that the tarp would be inspected (or reinstalled if it was removed) prior to a second aerial application.

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[8] Crick, H. Q. P. (2004), The impact of climate change on birds. Ibis, 146: 48–56. doi: 10.1111/j.1474-919X.2004.00327.x

[9] http://ceq.hss.doe.gov/current_developments/docs/Mitigation_and_Monitoring_Guidance_14Jan2011.pdf

- Dying the bait blue to make pellets less attractive to birds. We believe the conclusion that blue dye used in EPA Reg. No. 56228-36 would make pellets less attractive to birds is overdrawn. The degree of repellency would depend upon the shade of blue and the perceptions and food habits of each bird species. Birds that eat fruits or some types of insects might not be predisposed against eating blue things. It is not clear to what extent the factors affecting eat/don't-eat decisions for the types of birds that occur on Palmyra have been studied.
- Capture and treatment of all sick and moribund shorebirds found during and directly after the eradication, and treatment with Vitamin K, an antidote to anticoagulants (p. 26). The planned collection and Vitamin-K treatments of sick or moribund shorebirds should be evaluated for feasibility and effectiveness in the FEIS. Treatments would likely have to be extensive if experiences with various mammals (including humans) are predictive of what would be needed to save birds.

Impact Assessment

Impacts to Biological Resources

Potentially significant impacts from bait station use not considered
For Alternative D (bait station alternative), the DEIS indicates that, while mortality risk from toxicants is high for some birds (BTCU, Pacific golden plover, ruddy turnstones, laughing and Granklin's gulls, Northern shoveler and Northern pintail duck), the exposure risk is low (p. 136-139). This does not fully consider the fact that the bait would be present in the atoll environment for approximately 2 years, which would offer long-term secondary pathway toxicity opportunities.

The aerial broadcast alternatives would also use bait stations; specifically, on Cooper Island on or near the runway and in the camp area, where Nature Conservancy staff and researchers and project personnel reside and where the drinking water and waste treatment facilities are located. A discussion of the efficacy of bait stations should be included. It appears possible that bait stations might not expose all rats due to some individuals not entering bait stations, especially as the units would have to be elevated and otherwise crab-proofed.

In addition, even for the aerial broadcast alternatives, baiting in the areas mentioned above would have to continue for approximately 2 years, and any rats residing in that area that were not taken during the same period of time when broadcast bait was present on the island could emigrate into previously treated areas and become founders of a rebounding rat population on Cooper Island and, eventually, the rest of the atoll.

> *Recommendation:* The above impacts should be included in the impact assessment in the FEIS. The issue of preventing rats in the bait station areas of the aerially broadcast alternatives repopulating aerially eradicated areas should be addressed in the project design.

Impacts to Reptiles

Two rounds of baiting (10 days each, including canopy follow-ups) are planned. As residues would be retained in prey for some time, the suggestion that geckos would only be vulnerable to brodifacoum for 4-7 days (p. 114) underestimates the likely duration.

The DEIS states that the two species of gecko at Palmyra may be at risk of secondary exposure to rodenticide through the consumption of invertebrates that had previously consumed bait, however, it concludes that none of the 50 geckos sampled during the 2008 biomarker study showed any sign of primary or secondary exposure to bait (p. 116). This is not sufficient basis for this conclusion. As pyranine, a biomarker agent, does not appear to be systemic as afluorescent dye, its absence from geckos in the 2008 biomarker trial does not predict non-exposure to brodifacoum. Invertebrates would retain the rodenticide differently than they would pyranine.

> *Recommendation:* The above impacts should be included in the impact assessment in the FEIS. Capturing, holding, and maintaining individuals of the native gecko species should be considered as a mitigation measure.

Impacts to Soils and Water Resources

The DEIS references the rat eradication on Anacapa island to support its conclusion that the aerial alternatives would not have a noticeable effect on soil contamination (p. 98). For the Anacapa Island project, however, bait was not applied at the rate planned for the Palmyra project (two applications at ≤ 90-kg/ha). Consequently, a low likelihood of contaminated soil samples for Palmyra does not necessarily follow from the results on Anacapa. The data from Alifano and Wegmann (2010) came from isolated pellets rather than baits applied according to how they are planned to be used at Palmyra.

The worst-case calculations presented for impacts to water resources (p. 97) are not based upon the proposed application rate of up to 90 kg/ha (~80 lbs/acre), which is 5 times the maximum rate currently indicated on the label for EPA Reg. No. 56228-36 for the first island-wide broadcast application and 10 times the maximum rate indicated for the second broadcast application.

> *Recommendation:* Reevaluate impacts to soils and water resources from the aerial broadcast alternatives using the quantity of bait expected to be applied for the project. If the active ingredient infiltrates vertically into soils, the Alifano and Wegmann (2010) data likely would overestimate the extent of island-wide contamination, although it is possible that material might congregate in some lower areas due to surface flow resulting from heavy rain events. Due to the composition of the islands, however, puddles tend to be short-lived, even after extensive heavy rains.
>
> For impacts from the bait stations (which are part of all action alternatives), these discussions should note the possibility of bait stations becoming damaged or being

dumped, either of which could result in a concentration of several ounces or more of bait at one spot. Describing the bait stations as being "durable enough to stay in place for 2 years and prevent crabs from entering or destroying them" is fine in theory, but realistic assumptions would expect some error. It also is not clear that a specific design of bait station has been selected for use in this project.

Errors in the Document

The following were identified as errors occurring in the document. EPA recommends that these errors be corrected for the FEIS:

- Page 35, last paragraph, running over to page 36. The characterization that detection of shore birds was consistently higher post-treatment than pre-treatment for the 2005 mini-eradication effort is not consistent with the narrative in, nor "Figure 10" of, the report by Buckelew, et al (2005).
- Page 38, "Figure 2.1". The numbers illustrated in this figure are not consistent with those shown in "Fig. 5" in the Wegmann, et al (2008) report. The narrative on page 37 of the draft EIS is more accurately reflected by Fig. 5" of Wegmann, et al (2008), than by "Figure 2.1" on page 38 of the draft EIS.
- Page 39, bottom paragraph. The first line of this paragraph should be corrected factually as well as grammatically.
- Page 45, first "Rationale" paragraph. The number (332) given here for "successfully reported island eradication efforts world wide" differs from the number (278) cited from the same reference on page 31. At least one of those numbers must be wrong. The correct number, if known, should be used. "Brodifacoum-25" is not one "specific product". This paragraph itself acknowledges the existence of a "Brodifacoum-25D" and a "Brodifacoum-25W".
- Page 50, Table 2.5, and relevant discussions on page 51. The result on Whippoorwill Island is reported as having been "Successful" despite the finding of one or more live rats 8 and 10 days after bait application. All of the localized rat eradication efforts on Palmyra in 2005 would be judged as "Failed" if the standard index of no signs of rat activity for 2 years following treatment were applied. Although reinvasion from very nearby untreated islands might have been the cause of the reappearance of rats on those islands, the standard for successful eradication should be greater than obtaining zero scores for various activity measures shortly after treatment. By the latter standard, the brodifacoum/Bromethalin trials on Palmyra Atoll in 2001-2003 probably would have been judged "Successful", at least for some of the islands; and the same would have held for some islands in the diphacinone work in the Bay of Islands, Adak, AK, 2003-2004. The 2008 trials on Palmyra involved placebo baits which, presumably, did not directly kill any rats. The "Failed" status is visited upon them because one or more rats live-trapped post-treatment showed no evidence of the Pyranine "biomarker", and some others were marked only to a degree like the captive roof rats that were fed only one placebo

bait pellet. The two failures for Polynesian rats (*R. exulans*) might have resulted in part through use of a bait moiety that was less than optimal for controlling that species. The 25W bait was not accepted especially well by captive Polynesian rats in trials conducted on Wake Atoll in 2007.

- Page 63, "Table 2.7". "Canopy baiting" is mentioned as one of the "Secondary bait delivery methods" that would be used for "AlternativeD" [sic] (bait stations), but not for the aerial application options which the narrative to the draft EIS indicates would be supplemented by baiting trees that overhang water.
- Page 107, second full paragraph. Whether a single "dose" of brodifacoum would be lethal would depend upon the amount received, through ingestion in this case. The LD_{50} is not really a "threshold", as some individuals would be expected to die after receiving lower dosages.
- Page 145, "Alternative A – No Action" paragraph. Under this alternative, there would not be an eradication effort. Therefore, signs (or "sings", line 17) would not have to be posted.
- Page 31, first full paragraph. The last sentence of the first paragraph under "Brodifacoum-25W™ bait product" does not follow from the rest of the paragraph. It appears that 14 (7%) of 197 successful eradications using brodifacoum as the "primary rodenticide" were effected using "aerial broadcast supplemented with hand-broadcast" but that technique would have been less "commonly used" than bait stations (47% or ~93 instances), aerial-broadcast alone (29% or ~57 instances), or hand-broadcast (21% or ~41 instances).

Minor comments / discrepancies

- In approaches dismissed, the DEIS identifies fertility control (p. 17) and discusses oral contraceptives. We are aware that research is being conducted towards the development of chemical sterilants that could offer a less toxic alternative to rodenticides. FWS should monitor this development for possible future use.
- On p. 103, the DEIS says that successful turtle nesting attempts have not been recorded on Palmyra; but, on p. 83, it says that green turtle nesting has been documented at least twice at Palmyra, primarily on the northwest side of Cooper island.
- The DEIS states that informal Sect 7 consultation will be conducted "for any case deemed necessary by the FWS" (p. 101). The FEIS should indicate whether informal consultation has occurred.
- Appendix C pp. 14 and 37 indicate that 2 cats and a dog (and a cat on a boat) were present in 2004. State whether these animals are still present and how they will avoid poisoning.
- Pages 152-188. Pages bearing these numbers are missing from the copy of the draft EIS that was reviewed; but, seemingly, with no loss of intended text. Subsection "5.1" appears on page 151; and subsection "5.2" appears on page 189
- Some references to appendices in the draft EIS are by number (eg. p, 17), but the

appendices are lettered (e.g., "A") rather than numbered.

- Page 63, line 23 and p. 68 line 9. To preserve its presumably intended meaning, the word (?) "ratpredation" should be replaced by "predation by rats" (here and elsewhere). "Ratpredation" also could mean "predation on rats".
- Table 3.3 has no headings
- There were many typos in the document. A few are:
  - On p. 60, Alternative E should read Alternative D
  - On p. 145, the word "signs" should replace "sings" in lines 25, 33 and 39
  - On p. 150, the last sentences of paragraphs "4.6.1.5" and "4.6.1.6" should correspond to the correct alternative (C and D)

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