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January ##, 2024

Office of Pesticide Programs
Environmental Protection Agency, (28221T)
1200 Pennsylvania Ave., NW
Washington, DC 20460-0001

Re: Draft Biological Evaluation, Effects Determinations, and Mitigation Strategy for Federally Listed and Proposed Endangered and Threatened Species and Designated and Proposed Critical Habitats for 11 Rodenticides [EPA-HQ-OPP-2023-0567]

Dear Madam/Sir,

These comments are submitted on behalf of Beyond Pesticides. Founded in 1981 as a national, grassroots, membership organization that represents community-based organizations and a range of people seeking to bridge the interests of consumers, farmers, and farmworkers, Beyond Pesticides advances improved protections from pesticides and alternative pest management strategies that eliminate a reliance on pesticides. Our membership and network span the 50 states and the world.

The Draft Biological Evaluation (BE) presented is intended to be a comprehensive review and analysis of all currently registered uses of 11 rodenticides, all currently submitted toxicity and environmental fate data, all exposure routes, and incorporates current label language to assess potential effects from the use of these rodenticides. However, Animal and Plant Health Inspection Service (APHIS) island eradication projects that currently employ special use rodenticide labels including Diphacinone®-50 Conservation (EPA Reg. No. 56228-35), Brodifacoum®-25W Conservation (EPA Reg. No. 56228-36), and Brodifacoum®-25D Conservation (EPA Reg. No. 56228-37) to eradicate or control invasive rodents on certain islands are not included in this nationwide draft BE and rodenticide mitigation strategy because EPA expects APHIS will independently conduct ESA consultation with USFWS and NMFS and will present its completed biological opinion to EPA before any of these projects are added to their labels. The 11 rodenticides include chlorophacinone, diphacinone and its sodium salt, warfarin and its sodium salt, brodifacoum, bromadiolone, difenacoum, difethialone, bromethalin, cholecalciferol, strychnine, and zinc phosphide. This analysis builds upon prior Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) based risk assessments[1,2,3,4,5] and analyses for three pilot listed species described in the 4 Proposed Interim Decisions (PIDs) associated with the registration review of these 11 rodenticides in 2022. [6,7,8,9,10] In the proposed Interim Registration Review Decisions for these rodenticides, the agency made no final endangered species finding nor human health or environmental safety findings associated with the Endocrine Disruptor Screening Program. The agency's final registration review decision for these rodenticides will be dependent upon a complete nationwide Endangered Species Act (ESA) §7(a)(2) effects determination for these pesticides and, as appropriate, initiation of ESA §7(a)(2) consultations with the Services (Fish and Wildlife Service and National Marine Fisheries Service) when EPA has determined a listed species is likely to be adversely affected. In addition to the agency's ESA assessment and the necessary consultation with the Services, a final EDSP FFDCA § 408(p) determination will also be needed.

The BE considered 1,784 listed species and 904 critical habitats (CHs) in its assessment. Of these, EPA determined 208 vertebrate species may be affected (MA). From those MA species, EPA then determined that 72 species were not likely to be adversely affected (NLAA) by any of the 11 rodenticides for various reasons due to differential toxicity and exposure profiles. EPA then made refined (i.e., chemical/use specific) species determinations for the remaining 136 MA species (i.e., those not initially determined to be NE or NLAA) by considering use (bait station, broadcast, or burrow application) and the type of effects of each particular rodenticide.

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1 USEPA. 2020a. Seven Anticoagulant Rodenticides: Draft Ecological Risk Assessment for Registration Review. Office of Pesticide Programs. Environmental Fate and Effects Division. March 17, 2020. DP 453282.

2 USEPA. 2020b. Bromethalin: Draft Ecological Risk Assessment for Registration Review. Office of Pesticide Programs. Environmental Fate and Effects Division. March 31, 2020. DP 456755.

3 USEPA. 2020c. Cholecalciferol: Draft Ecological Risk Assessment for Registration Review. Office of Pesticide Programs. Environmental Fate and Effects Division. March 31, 2020. DP 456480.

4 USEPA. 2020d. Strychnine: Draft Ecological Risk Assessment for Registration Review. Office of Pesticide Programs. Environmental Fate and Effects Division. June 23,2020. DP 453652.

5 USEPA. 2020e. Zinc Phosphide: Draft Ecological Risk Assessment for Registration Review. Office of Pesticide Programs. Environmental Fate and Effects Division. June 24, 2020. DP 455987.

6 USEPA. 2022a. Proposed Interim Registration Review Decision for Seven Anticoagulant Rodenticides. Case Numbers 2100, 2205, 0011, 2755, 2760, 7630, and 7603. November 2022. Docket Number: EPA-HQ-OPP-2017-0750-0034.

7 USEPA. 2022b. Bromethalin and Cholecalciferol Proposed Interim Registration Review Decision. Case Numbers 2765 and 7600. Docket Number: EPA-HQ-OPP-2016-0139.

8 USEPA. 2022c. Proposed Interim Registration Review Decision for Strychnine. Case Number 3133. November 2022. Docket Number: EPA-HQ-OPP-2015-0754.

9 USEPA. 2022d. Proposed Interim Registration Review Decision for Zinc Phosphide. Case Number 0026. November 2022. Docket Number: EPA-HQ-OPP-2016-0140.

10 USEPA. 2022e. Rodenticides: Draft Effects Determinations and Evaluation of Proposed Mitigations Intended to Avoid Jeopardizing Three Federally Listed Endangered and Threatened Species and Avoid Adversely Modifying One Designated Critical Habitat. DP Barcode: 464678.

These were then parsed as to likely to be adversely affected (LAA) but predicted to not pose future jeopardy and those LAA and predicted to likely pose future jeopardy. Of the 904 CH considered in this BE of the 11 rodenticides EPA determined that 857 of the CH are NE (all plants, invertebrates, and fish and some mammals, birds, reptiles, and amphibians). A total of 47 species CH, all vertebrates, were determined to be MA and of those, 9 were determined to be NLAA and 38 remaining were determined to be LAA.

In summary, EPA predicted the potential likelihood of future jeopardy for only 73 of the 136 MA species and the potential likelihood of future adverse modification (AM) for only 4 of the 38 LAA CHs. Potential jeopardy is predicted for 24 mammal species for bait station use, 31 for burrow use, and 35 for broadcast applications. For birds, EPA predicted jeopardy for 6 species from bait station use, one for burrow use, and 30 for broadcast applications. For reptiles, EPA predicted jeopardy for just 4 species from bait station use, and just one species for broadcast applications. EPA made NE determinations for all aquatic and terrestrial plants, aquatic and terrestrial invertebrates, and aquatic vertebrates for which no direct effects or effects on prey, pollination, habitat or dispersal (PPHD) are expected from the use of the 11 rodenticides. EPA made NE determinations for all species under the jurisdiction of NMFS because no consequences relevant to direct toxicity of these species or their PPHD are expected by EPA from the use of these rodenticides.

In the previous FIFRA-based risk assessments for the 11 rodenticides EPA concluded that rodenticides do not pose a concern to non-target taxa via drift or runoff, as they are used primarily in bait stations, applied within burrows, or in granular form via broadcast. EPA erroneously concluded that the application of these pesticides by incorporation into baits essentially eliminates off-site transport via runoff or drift and thus this eliminates runoff and drift exposure concerns. EPA made no effect (NE) determinations for all freshwater and marine fish, aquatic mammals, aquatic amphibians, aquatic reptiles, and aquatic invertebrates. EPA based the NE determinations for aquatic animals because exposure is not reasonably certain to occur because the application sites of rodenticides (bait stations and burrows on terrestrial sites) and the formulations of the bait (granules, treated grains) are unlikely used near aquatic habitats. Also, pesticide labels generally require that pesticides not be applied to water or below the mean high-water mark in tidal areas unless specifically intended for aquatic use. Of the use patterns, only broadcast use is subject to exposure to the weather, and this is limited to a few agricultural crops, and to rodenticides that are either immobile or non-persistent, making potential exposure discountable. Therefore, EPA did not consider aquatic organisms at risk in this draft BE.

We disagree with the categorical NE determinations by EPA for all aquatic vertebrates including those under the jurisdiction of NMFS. Anticoagulant rodenticides (ARs), contrary to the agency's assertions, can be transported to the aquatic environment (freshwater and marine). Recent findings of ARs in raw and treated wastewater, sewage sludge, estuarine sediments, suspended particulate matter, and liver tissue of sampled fish demonstrate that the aquatic environment experiences a greater risk of anticoagulant rodenticide exposure than previously thought.[11] One anticoagulant rodenticide, brodifacoum, revealed an enduring persistence ($\geq$ 3 years) in a marine environment after broadcast treatment in an island eradication project.[12] Monitoring studies have also demonstrated that second-generation ARs bioaccumulate in fish liver under environmentally realistic conditions and exposure scenarios.[13,14] Island eradication programs also provide for increased drift and runoff potential due to the broader treatment area and amplified application rates. Fish sampled after broadcast applications of AR bait pellets during monitored island eradication operations (Palmyra Atoll and Lehua Island, Hawaii) were found to have consumed treated pellets.[15,16] The fish as well as other animals that consumed the bait were killed. Secondary poisoning in listed fish and aquatic reptiles is similarly possible from ingesting poisoned animals. Some invertebrates (e.g., insects, mollusks, and annelid worms) can consume poisoned baits and transfer the poison via food web to various susceptible vertebrate fauna.[17,18] Target and non-target small mammals that have consumed poisoned baits will not always stay sedentary or find concealment, many will roam openly and often seek water. Those that become moribund or die in sewers, culverts, drainage ditches, or similar can be swept into riparian zones or directly into water bodies (streams, rivers, lakes, tidal basins, estuaries) where they can be consumed by aquatic predators and scavengers. Though not typically a major food item, an opportunistic encounter and ingestion of a poisoned and sickened rodent could prove fatal to aquatic vertebrate species. Mice have been variously reported to be consumed by listed species such as

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[12] Siers, S.R., Shiels, A.B., Volker, S.F., Rex, K. and Pitt, W.C., 2020. Brodifacoum residues in fish three years after an island-wide rat eradication attempt in the tropical Pacific. Management of Biological Invasions. Volume 11, Issue 1: 105–121

[13] Kotthoff, M., Rüdel, H., Jürling, H., Severin, K., Hennecke, S., Friesen, A. and Koschorreck, J., 2019. First evidence of anticoagulant rodenticides in fish and suspended particulate matter: spatial and temporal distribution in German freshwater aquatic systems. *Environmental Science and Pollution Research*, *26*, pp.7315-7325.

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[16] Siers, S.R., Foster, D.K., Niebuhr, C.N., Leinbach, I., Shiels, A.B. and Volker, S.F., 2018. Monitoring diphacinone residues after an eradication of Polynesian rats from Lehua Island, Hawaii. *Unpublished Final Report QA-2802. USDA, APHIS, WS, National Wildlife Research Center, Hilo, USA*.

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[18] Alomar, H., Chabert, A., Coeurdassier, M., Vey, D. and Berny, P., 2018. Accumulation of anticoagulant rodenticides (chlorophacinone, bromadiolone and brodifacoum) in a non-target invertebrate, the slug, Deroceras reticulatum. *Science of the Total Environment*, *610*, pp.576-582. Slug

alligator snapping turtle[19], bull trout[20], Atlantic salmon, and steelhead trout.[21] These four listed species should be added to the MA and likelihood of potential jeopardy list to be considered by the Services (USFWS and NMFS) in the required formal consultation. Additionally, marine mammals may be at serious risk from existing and planned island eradication projects [refer to Appendix] and should be considered in a revised BE.

In conclusion, the draft BE is unsatisfactory and must be revised before proceeding to formal ESA §7(a)(2) consultations with the Services (Fish and Wildlife Service and National Marine Fisheries Service). The flawed draft BE erroneously disregards potential aquatic exposure and fails to identify additional listed species [alligator snapping turtle, bull trout, Atlantic salmon, steelhead trout] that may be adversely affected. Aquatic animals, including fish are exposed, as previously discussed, through primary routes in the consumption of bait pellets/grains that may be washed or transported into waters from broadcast application or improperly disposed bait stations. Secondary routes are also possible from consuming invertebrates or small mammals that have ingested poisoned bait and moved into their habitat. However, EPA lacks dietary toxicity data for fish and cannot confidently assess the extent of risk from this route of exposure. It is necessary that the agency seeks additional toxicity data from registrants to better evaluate rodenticide toxicity from dietary exposures of fish. In addition to lacking dietary toxicity data for rodenticides, the agency also lacks reproduction and chronic (life cycle) toxicity data on aquatic vertebrates. Since this draft BE is intended to be a comprehensive review and analysis of all currently registered uses of 11 rodenticides, the island eradication programs special use labels should also be considered in the rodenticide BE and not dependent on expected APHIS ESA consultations.

Respectfully,

Leslie W. Touart, Ph.D.
Senior Science and Policy Analyst

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[20] Stewart, D.B., Mochnacz, N.J., Sawatzky, C.D., Carmichael, T.J. and Reist, J.D., 2007. Fish diets and food webs in the Northwest Territories: bull trout (Salvelinus confluentus). *Canadian Manuscript Report of Fisheries and Aquatic Sciences*, *2800*.
[21] Purnell, R. 2011. Mastering the Morrish Mouse. *Fly Fisherman* June 30.

APPENDIX

UNIVERSITY OF HAWAI'I AT MĀNOA
College of Tropical Agriculture and Human Resources
Department of Molecular Biosciences and Bioengineering

November 28, 2023

Eradication Programs Eliminating Invasives and their Predators and Scavengers!

Summary

- Eradication programs for mice and Polynesian Rats are planned for the Farallon Islands, Midway and Wake Island.
- Brodifacoum, a potent, persistent and bioaccumulative anticoagulant poison is the toxicant.
- Brodifacoum residues have been detected in almost all fish that were collected following treatment of Palmyra, and trace levels were found in 10 percent of the fish after treatment of Wake.
- Brodifacoum residues in fish caught at Wake increased from trace levels to detectable residues over 3 years.
- Diphacinone is a greater threat of secondary poisoning to mammals than brodifacoum.
- Strandings of whales, some hemorrhaging, occurred within 60 days following anticoagulant bombardment.
- Unusual mass strandings of hemorrhaging dolphins occurred in San Diego and Hawaii years after anticoagulant bombardment.
- There is very little known about the fate of anticoagulant residues in the oceans.

Introduction

Two proposed mice eradication projects using anticoagulant poisons are very alarming. The eradication of mice from Midway authorizes the use of up 214 pounds per acre of poisonous bait per acre.[1] The Farallon Islands project was conditionally approved by the California Coastal Commission on December 16, 2021. The amount discussed at the Coastal Commission hearing was two applications of sixteen pounds per acre. [2]

A third project, to eradicate Polynesian rats from Wake Island, is also being planned. EPA approved the use of up to 136 pounds of bait per acre in December 2021.[3] Eradication of Polynesian rats in 2012 failed, and the Air Force closed the area to fishing for 942 days (consistent with New Zealand restrictions[4]) because trace levels of brodifacoum were found in fish.[5] A second study was conducted 3 years following the treatment. Residues of brodifacoum were detected in fish caught in an "intermittently land locked pond" on Wake Island.[6]

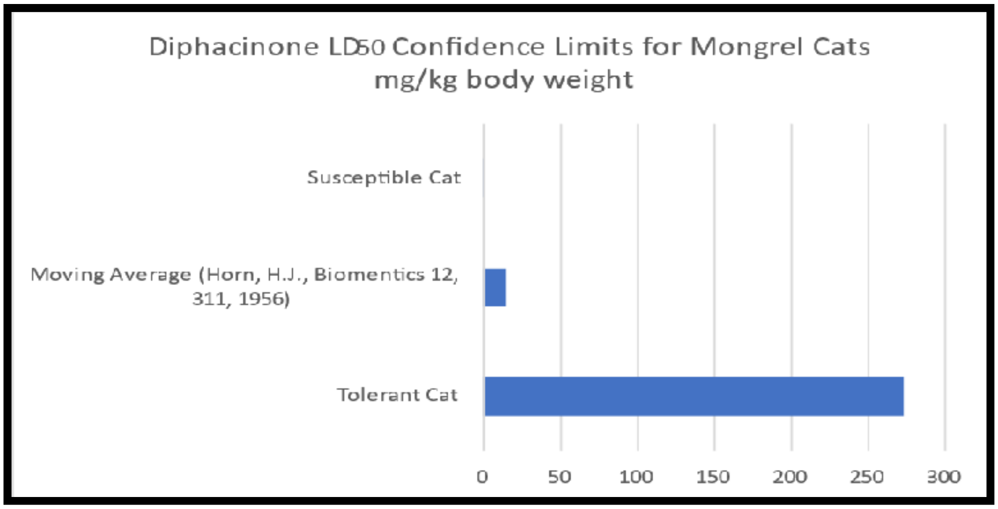
The preferred alternative for these invasive species eradication projects is to bombard these islands with a poison that contains anticoagulants until a target or non-target animal eats a toxic dose and bleeds or experiences some other lethal effect. Application is made to every possible target pest habitat at least two to three times (including intertidal areas). Mice are difficult to control. They develop "bait shyness", so the Farallon Islands will likely be bombarded with a dose similar to the dose proposed for use on Midway. The eradication methodology has been promoted and used by Island Conservation, a "conservation" non-profit with success killing animals on islands throughout the world.

Anticoagulants are multiple dose poisons and have a delayed toxicity so animals do not associate eating the bait with illness. Some second-generation anticoagulants such as brodifacoum can kill after a single feeding. Almost all the toxicity tests were for LD_{50}, the dose that kills half of the test animals under controlled laboratory conditions. The dose is the single variable tested. Chronic testing is long and expensive. **All doses of anticoagulants caused harm** (usually to females) so manufacturers have not conducted chronic tests and rely on the argument that there is no exposure. Exposure through food sources is certain.

Discussion

Toxicity

One measure of toxicity is the lethal dose for half of the test animals (LD_{50}). The LD_{50} for diphacinone for cats is 14.7 milligrams per kilogram; but cats were killed at lower doses and survived higher doses. The following chart shows the range between susceptible and tolerant cats. This study dated April 15, 1957 reported that the range of toxicity demonstrated the insidious nature of diphacinone.



There is also a wide range between susceptible and tolerant species. One of the most susceptible species to anticoagulants is the vampire bat. Cattle were injected with diphacinone and vampire bats were controlled.[7] Cows are herbivores and have vitamin K (the anticoagulant antidote), which could explain their tolerance.

Exposure

It has been assumed that baits degrade quickly in the sea, which is false. Much of the bait is consumed by fish. Fish sampled prior to, during or after poison drops had consumed bait pellets[9,10]. Studies at Palmyra Atoll showed that fish and other animals that consumed the bait were killed. The authors concluded that "Primary, secondary, tertiary and even further long term exposure of both terrestrial and aquatic organisms that are contaminated with the toxicant should be considered in all eradication operations, and therefore an understanding of the local food web is essential prior to broadcasting toxic bait."

Two studies of fish at Wake Island **funded by the Air Force, not Island Conservation, Blue Planet or other advocates** detected brodifacoum residues. The first, showed traces of brodifacoum in 10% of fish. Three years later brodifacoum was detected in 1 of 8 bluefin trevally, and 4 of 4 blacktail snapper. "How long these residues persist in the environment, affecting the marine food web, and to what extent they persist in fish that are caught by Wake Island residents for sport and consumption, is uncertain."[6] The U.S. Environmental Protection Agency required ecosystems studies before initiation of an eradication program on Midway.[8]

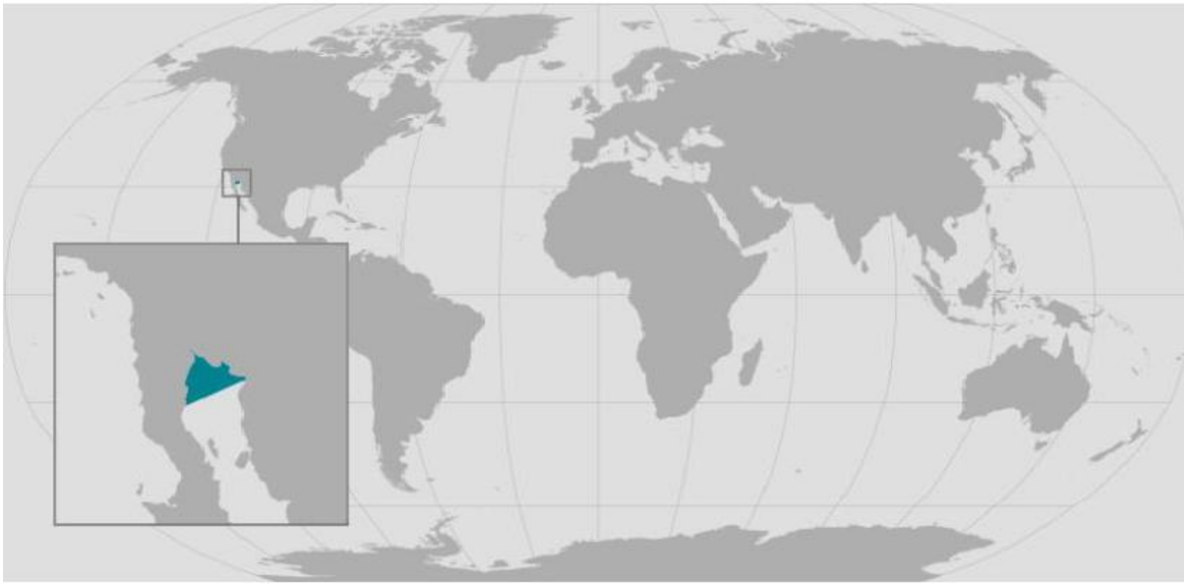
It has been assumed that poisoned rodents retreat to their safe havens (sewers, crevices, hiding spaces in homes and businesses) to die. Some do hide, but others wander in open areas seeking out sources of water to quench their thirst, where they may be plucked by a predator. Rodents dying in sewers will be swept downstream to be consumed by scavengers.

Chemical properties suggest that some anticoagulants accumulate in fat. Brodifacoum is similar to DDT in it's potential to accumulate in fat.[11] Animals (predators and scavengers) high in the food chain including killer and false killer whales, albatrosses, birds of prey, and vultures are very likely to be exposed to poison by consuming poisoned dead, sluggish, intoxicated prey. Brodifacoum persistence in liver tissue (half-life) is estimated to be 100-300 days. Marine predators and scavengers may migrate hundreds or thousands of miles. Animals intoxicated or killed by anticoagulants may be consumed. More toxicant would be stored in the liver of the predator or scavenger.

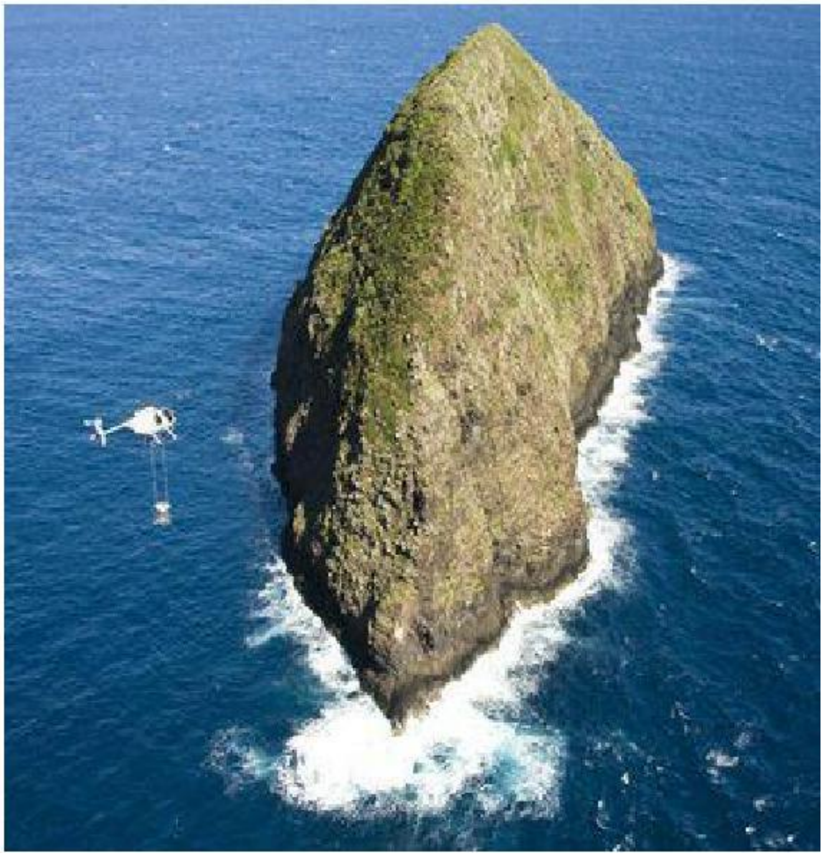
Coincidental Kills Following Anticoagulant Use

The predators and scavengers with the lowest reproduction rate (fecundity) are at great risk of perishing. Consider the fate of the vaquitas, the most endangered species on the planet. The Island Conservation database show that rats were eradicated from three islands (San Jorge Este, San Jorge Medio and San Jorge Oeste) in the Gulf of California (within the critical habitat for the vaquitas) in 2002.[12] Vaquitas declined from around 600 to about 200 individuals between 1997 (the year of the first complete survey) to 2008. Was the only cause of this decline legal fishing?[13] A very unfortunate coincidence that the legal fishing kills of vaquitas and rat poison treatment occurred during the same period. The map shows the critical habitat for the vaquitas.

Vaquita Critical Habitat



Mokapu Island

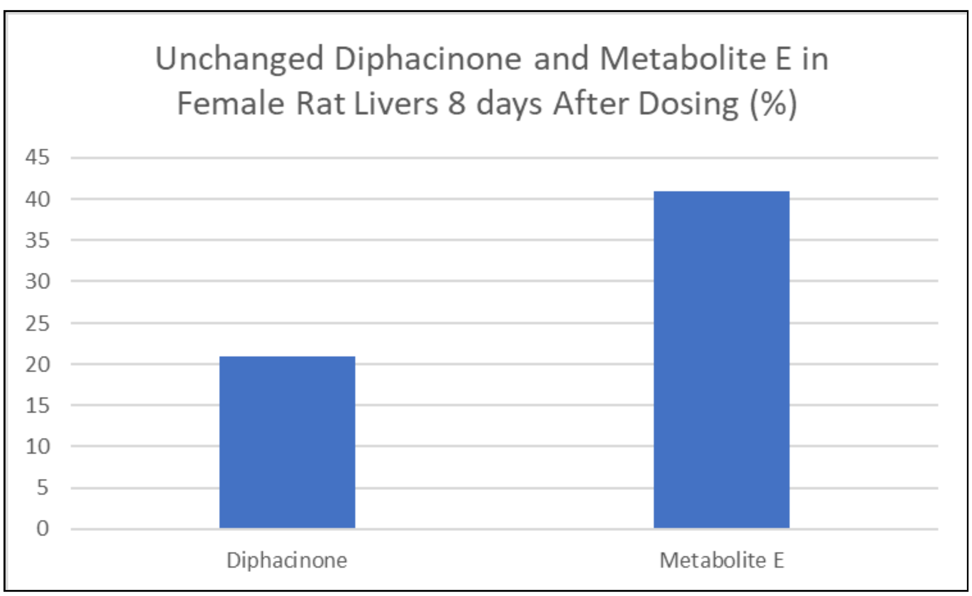


Mokapu Island Coincidental Kill of Juvenile Humpback

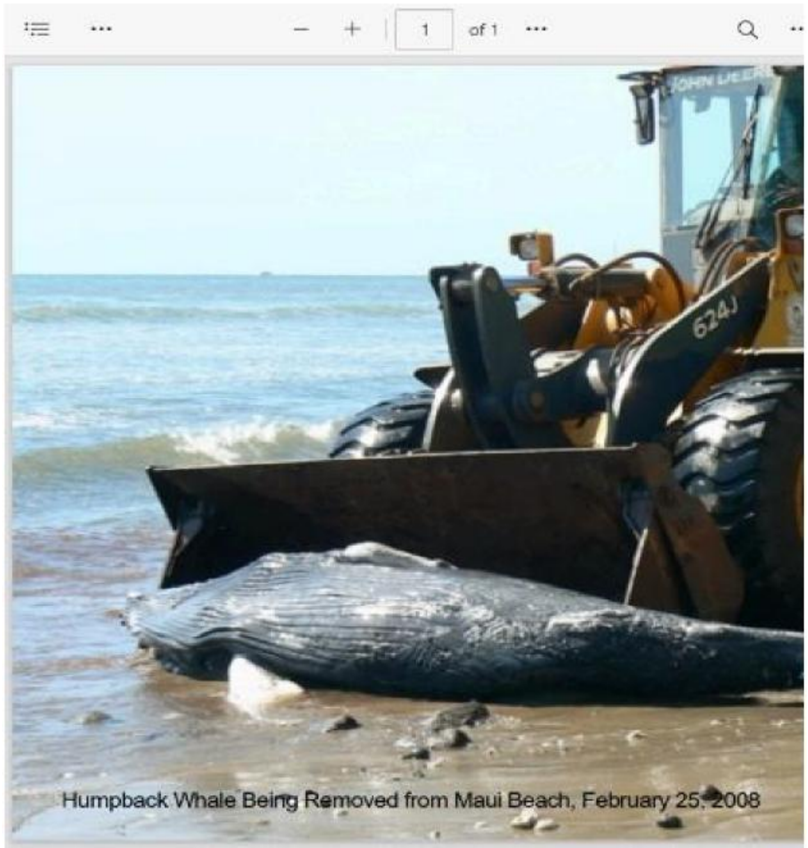
Mokapu Island is a small, steep island near the Kalaupapa Peninsula, Molokai. There was evidence of rat presence on Mokapu, and it was treated with diphacinone bait. Thirteen (13) days following completion of the project a humpback whale estimated to be less than 5 weeks old stranded on a Maui beach near Lahaina.

There has been little research on the impact on marine animals even though anticoagulants are very potent secondary poisons. Anticoagulants accumulate in fat and whales milk contains about 40 percent fat.

There is one quick test for anticoagulants. Measuring the time blood takes to clot is an indicator of anticoagulant activity. Chemical confirmation requires large sample sizes, specialized equipment, and methods to identify anticoagulants of concern. Methods for most metabolites have not been developed. The graph below shows twice the amount of a metabolite compared to unchanged diphacinone in rat livers after 8 days.[14]

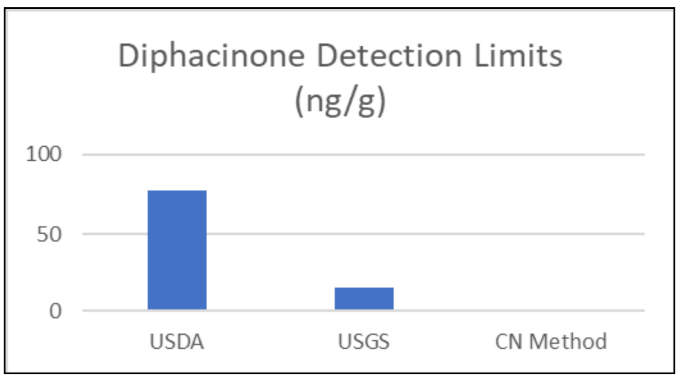


The stranding of the juvenile humpback[15] less than 100 miles from the site of anticoagulant use provided a unique opportunity to collect samples. Samples were collected and analyzed by government labs.[16] The letter providing results of analyses also advised NOAA that no exposure was possible. The Fish and Wildlife Services did not report or perhaps even know about the observation of feeding in March, 1989.[17]



Humpback Whale Being Removed from Maui Beach, February 25, 2008

Other samples were collected too, including seawater, soils, and limpets. Methods used by USDA and NOAA to test the liver of the humpback whale that stranded following the treatment of Mokapu for diphacinone had high limits of detection for diphacinone (77 ppb for USDA-National Wildlife Research Center and 15 ppb for NOAA-Columbia Environmental Research Center). No diphacinone was detected. In comparison to a published method that can detect 0.3 nanograms[18], the USDA-NWRC method was 256 times less precise. The failure to detect toxicant is not surprising because fish were filleted before testing. Anticoagulants are not likely to be detected in seawater or soils unless a pellet was collected.



All reports of analyses for diphacinone in biological systems had the following or similar caveat: "**All samples with diphacinone** concentrations less the LOD [limit of detection] did not have peaks that matched the retention times or spectra of diphacinone standards."[19]

Could it be metabolite E?

Coincidental Bleeding Following Lehua Treatments

Bleeding, a symptom of anticoagulant poisoning, has been observed in marine mammals after poison projects. Two projects were to kill Polynesian rats on Lehua Island. The pilot whale below was part of a group that stranded on October 13, 2017, at Kalapaki Beach, Kauai, about six weeks following a series of rat poison drops to Lehua Island near Niihau.[20]

Following a poison drop in January 2009 there was a coincidental fish kill and Humpback Whale stranding on Niihau.

Pilot Whale Stranding at Kalapaki on October 13, 2017

Following Poisoning Lehua in Early January 2009, Juvenile Humpback Whale Stranded on Niihau on January 17, 2009

Uncommon Stranding Events

The U.S. Navy issued a Southern California Stranding Response Plan for Hawaii-Southern California Training and Testing (HSTT) Study Area in November 2013

Page 11 of the Stranding Response Plan defines Uncommon Stranding Event (USE) as a stranding event that takes place during a military training exercise and involves any one of the following:

- Two or more individuals of any cetacean species (i.e., could be two different species, but not including mother/calf pairs, unless of species of concern listed in next bullet) found live on shore or dead-on shore or dead floating in the water within a two-day period and within 10 miles of one another.
- A single individual or mother/calf pair of any of the following marine mammals of concern: Guadalupe fur seals, beaked whales of any species, Kogia sp., short-finned pilot whales, humpback whales, sperm whales, blue whales, fin whales, or sei whales
- A group of 2 or more cetaceans of any species exhibiting indicators of distress.[22]

Hemorrhaging is not a usual symptom in mass strandings. Necropsies of three Fraser Dolphins stranding in Hawaii in December 2021 showed hemorrhage.

The necropsy summary for the Fraser Dolphins provided information concerning an uncommon stranding of three common bottlenose dolphins that occurred on October 21, 2015 in San Diego, California. All showed hemorrhage. Did anticoagulants contribute to this uncommon stranding? There is no definitive cause for any of the coincidences above.

Conclusion

There is evidence including spatial, temporal, visual hemorrhagic symptoms, and tests for brodifacoum in fish at Wake Island and Palmyra that coincide with anticoagulant use. Definitive cause of death could not be determined. Are these really coincidences? This question deserves an answer before more projects drop more anticoagulant poisons on islands are authorized!

Many fish died after the eradication attempt on Lehua in January 2009 and were swept to the Niihau shoreline. The veterinarian working with the Hawaii

Department of Agriculture, Aquaculture Program's advice was to secure the services of a veterinarian with a Fish Practice Specialty from the American Board Veterinarian Practitioners to necropsy the fish. Washington State University had such a veterinarian. The veterinarian was contacted and was sent photos of some of the fish collected. The veterinarian declined to conduct a necropsy because of the advanced state of decomposition of the fish. Licensed veterinarians must be available and equipped with the resources to determine cause of death.

The U.S. Fish and Wildlife Services, their cooperators and contractors are using public funds, to advance alarming and very destructive eradication projects. studies and information that demonstrates alarming risks to predators and scavengers with low fecundity.

There is a record of two pesticide enforcement actions, one in Alaska and one in Hawaii for Island Conservation and its State and Federal cooperators for failure to comply with conditions that would result in reducing secondary poisoning (collecting and burying carcasses). There is also the record of National Wildlife Research Center study verifying that there are residues of brodifacoum in fish 3 years following its use on Wake Island. Are Island Conservation, Blue Planet, the National Wildlife Research Center and others paid with invasive species eradication funds capable of an unbiased study? The funding available for monitoring these projects is not enough to study the complexity of the food web.

"Silent Spring" focused on pest control/eradication practices in the United States at that time that were having unintended, long-term consequences on wildlife and people. These programs, founded on governments' "good intentions" to use science to control our environment, were flawed in that they failed to recognize that intervention in natural, evolutionary processes may bring dire consequences that cannot be reversed for decades.

"The credibility of the witness is of first importance. The professional biologist on the scene is certainly best qualified to discover and interpret wildlife loss....Yet it is the control men in state and federal governments - and of course the chemical manufacturers - who steadfastly deny facts reported by the biologist and declare they see little harm to wildlife. Like the priest and the Levite in the biblical story, they choose to pass by on the other side and see nothing. Even if we charitably explain their denials as due to the shortsightedness of the specialist and the man

with an interest this does not mean that we must accept them as qualified witnesses.

The best way to form our own judgment is to look at some of the major control programs and learn, from observers familiar with the ways of wildlife, and unbiased in favor of chemicals just what has happened in the wake of a rain of poison falling from the skies and into the world of wildlife."

"Through ignorance, greed and negligence, government has allowed poisonous and biologically potent chemicals" to fall "indiscriminately into the hands of persons largely or wholly ignorant of their potentials for harm". When the public protested, it was "fed little tranquilizing pills of half-truth" by a government that refused to take responsibility or acknowledge evidence of damage."[21]

Rachel Carson would not have peace if she remained silent, nor will I. Support treatment and care, not killing.

Robert Boesch
Visiting Colleague
Honolulu, Hawaii
Retired Pesticide Regulator
EPA Region 9 and the Hawaii Department of Agriculture

References

Many of the references cited are not accessible on the internet and will be provided upon request

1. US EPA, Pesticide Product Label, BRODIFACOUM-25D CONSERVATION,11/10/2021
2. Video: California Coastal Commission- Dec. 16, 2021, 8 a.m. CAL-SPAN (Rate of application discussion begins at 10 hours.)
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