Edward T. McTiernan, Esq.
General Counsel
Department of Environmental Conservation
625 Broadway
Albany, NY 12233-0001
ogc@gw.dec.state.ny.us

PETITION TO THE NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION TO REGULATE SECOND GENERATION ANTICOAGULANT RODENTICIDES AS RESTRICTED USE PESTICIDES

The Central Park red-tailed hawk Lima, mate of Pale Male, died February 2012 due to non-target poisoning from second generation anticoagulant rodenticides. Photo courtesy of Jeremy Seto.[i]

PETITIONERS

CENTER FOR BIOLOGICAL DIVERSITY
AMERICAN BIRD CONSERVANCY
CORNELL LAB OF ORNITHOLOGY
EARTHJUSTICE
NEW YORK CITY AUDUBON
RAPTORS ARE THE SOLUTION

PETITION FOR DECLARATORY RULING PURSUANT TO 6 NYCRR PART 619

July 28, 2014

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I. Executive Summary

The Center for Biological Diversity, American Bird Conservancy, Cornell Lab of Ornithology, Earthjustice, New York City Audubon, and Raptors Are The Solution submit this Petition for a Declaratory Ruling pursuant to 6 NYCRR Parts 619.1(a)(1) and (2) requesting that the New York State Department of Environmental Conservation ("DEC") (i) determine the applicability of the criteria for classification as a restricted use pesticide set forth in N.Y. Envtl. Conserv. Law § 33-0101(42) and 6 NYCRR § 326.1(w) to all second generation anticoagulant rodenticides ("SGARs"), including brodifacoum, bromadiolone, difenacoum, and difethialone; and (ii) take regulatory action pursuant to Article 33 of the New York Environmental Conservation Law and 6 NYCRR Part 326 to classify all SGARs as restricted use pesticides and add them to the list of pesticides that may not be distributed, sold, purchased, possessed, or used for any purpose in New York State. 6 NYCRR § 326.2(c).

There is overwhelming evidence that the use of SGARs is dramatically impacting humans, pets, and non-target wildlife in the state of New York through direct mortality and longer term chronic effects. SGARs have resulted in the deaths of at least thirty-one different wildlife species from over 225 lethal poisoning incidents in New York.[1] Pets, such as cats and dogs, have died from SGAR poisoning in New York [2] and the Environmental Protection Agency ("EPA") estimates that, conservatively, at least sixteen severe pet poisonings occur nationwide annually from rodenticides. In New York City alone, approximately 4250 rodenticide poisoning incidents occurred from 2000-2010, with seventy-nine percent of rodenticide poisonings occurring in children under six years of age.[3] Nationwide, an average of 17,000 human exposures to rodenticides occur each year, with eighty-five percent of these exposures occurring to children less than six years of age.[4]

These facts demonstrate that SGARs persist and bioaccumulate in the environment, creating a risk of harm in non-target organisms, and are so hazardous that restrictions are in the public interest, and thus meet the criteria for classification as restricted use pesticides. N.Y. Envtl. Conserv. Law § 33-0101(42). The continued unrestricted use of SGARs in New York also impacts wildlife protected under both New York and federal wildlife protection laws,

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[1] Exhibit A: Compilation of New York SGAR Mortality Incidents.

[2] Ex. A: Compilation of New York SGAR Mortality Incidents.

[3] NYCDHMH 2011, New York City Department of Health and Mental Hygiene, *Letter from M. Merlino to EPA Re: Notice of Intent to Cancel Twenty Homeowner Rodenticide Bait Products* (November 18, 2011).

[4] EPA Draft NOI 2011, U.S. Environmental Protection Agency, *Draft Notice of Intent to Cancel and Notice of Denial of Registrations for Certain Rodenticide Bait Products* (November 2, 2011) at 18.

including the New York Endangered Species Act, the federal Migratory Bird Treaty Act, and the federal Bald and Golden Eagle Protection Act.

As discussed in detail below, there are effective and affordable alternatives to SGARs. The wide variety of safe and effective rodent control alternatives available means that any practical or economic impacts of eliminating the use of SGARs in New York would be minimal. The significant threats to humans and wildlife posed by SGARs and the availability of viable rodenticide alternatives led the U.S. Environmental Protection Agency ("EPA") and the state of California to restrict sales for residential consumers.

This petition presents data, including SGAR mortality incident reports from New York collected by DEC and EPA,[5] demonstrating that the harms to non-target species can only be addressed by classifying SGARs as restricted use pesticides and banning their use. We therefore petition DEC to issue a declaratory ruling pursuant to 6 NYCRR Part 619 that the data and facts regarding SGARs meet the statutory and regulatory criteria for classification as restricted pesticides. We further petition DEC to take action to issue a regulatory prohibition on SGARs as a restricted use pesticide (6 NYCRR § 326.2(c)) to preserve the health and safety of New York's citizens and environment.

II. Petitioners

The coalition of Petitioners listed below are organizations and individuals concerned about the ongoing harm to public health and the environment from SGARs. They have been working individually and collectively to educate the public about the harm of SGARs and the alternatives to SGARs. Additionally, they have worked to study and identify the impacts of SGARs on the environment and human health. They are greatly concerned that the continued registration of SGARs will continue to put people, pets, and wildlife at risk.

The Center for Biological Diversity ("Center") is a national, nonprofit conservation organization that has offices across the United States, including in New York. The Center has more than 775,000 members and supporters dedicated to the preservation, protection, and restoration of biodiversity and ecosystems throughout the world. The Center works to insure the long-term health and viability of animal and plant species across the United States and elsewhere, and to protect the habitat these species need to survive. The Center's Pesticides Reduction Campaign aims to secure programmatic changes in the pesticide and

[5] Ex. A: Compilation of New York SGAR Mortality Incidents.

rodenticide registration process to prevent toxic pesticides from contaminating fish and wildlife habitats and provides analysis and education regarding pesticide threats to humans, endangered species, and other wildlife.

The American Bird Conservancy ("ABC") is a not-for-profit organization, whose mission is to conserve native birds and their habitats throughout the Americas. ABC works to safeguard the rarest bird species, restore bird habitats, and reduce threats to key species. The organization has been actively involved in a campaign to restrict the use of rodenticides, and as part of its campaign, has contributed to scholarly publications on rodenticide risks, developed a monitoring system for avian pesticide exposures, and has worked with other like-minded organizations to raise awareness regarding rodenticides risks.

The Cornell Lab of Ornithology is a world leader in the study, appreciation, and conservation of birds. The Cornell Lab of Ornithology uses scientific excellence and technological innovation to advance the understanding of nature and to engage people of all ages in learning about birds and protecting the planet. The Cornell Lab of Ornithology is a unit of Cornell University and has faculty on staff and access to world-class resources. Founded in 1915, the Cornell Lab is a nonprofit organization supported by 78,000 friends and members, 200,000 citizen-science participants, and 12 million bird enthusiasts who visit the Cornell Lab of Ornithology online at All About Birds.

Earthjustice is a national not-for-profit environmental law firm that provides legal representation for environmental and community groups, local governments, Indian nations, and others on a wide range of environmental and natural resource issues. Earthjustice is supported by members throughout the United States, including New York State, and is a leading advocate for protection of human health and wildlife.

New York City Audubon champions nature in the city's five boroughs through a combination of engaging and entertaining programs and innovative conservation campaigns. NYC Audubon is an independent non-profit organization affiliated with the National Audubon Society. Through its efforts, NYC Audubon protects many species of birds living in the 30,000 acres of wetlands, forests, and grasslands of New York City.

Raptors Are The Solution ("RATS") educates people about the ecological role of raptors and the enormous danger to raptors and all wildlife, as well as pets and children, from the widespread use and availability of rat poisons. RATS partners with other nonprofits, agencies, scientists, cities, and others to work toward eliminating toxic rodenticides from the food web. We want to see all anticoagulant and other poisonous rodenticides taken off

the market and no longer used by pest control companies due to their dangers to children, pets, and wildlife. RATS is a project of Earth Island Institute, rated a Four Star Charity by Charity Navigator.

The representative for the petitioners may be contacted via the following information:

Center for Biological Diversity
351 California St.
Suite 600
San Francisco, CA 94104
Attn: Jonathan Evans
Tel: (415) 436-9682 x318
Email: jevans@biologicaldiversity.org

A. Related Proceedings and Interested Parties

DEC's regulations require the inclusion of a "reference to any pending administrative or judicial proceeding involving the same or similar set of facts, including the names and addresses of any other persons whose interests are reasonably likely to be affected by the ruling." 6 NYCRR § 619.1(c)(4). Section IV of this Petition includes references to past administrative and judicial proceedings. Petitioners are unaware of any pending proceedings. The following are other interested entities that may be affected by the ruling:

Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
202-564-4700

Eric Schaaf
Director, Office of General Counsel
US EPA Region 2
290 Broadway
New York, New York 10007-1866
Schaaf.eric@Epa.gov

III. Factual Background

A. Rodenticides Generally

Rodenticides are designed to kill small mammal pests such as rats, mice, gophers, ground squirrels, and prairie dogs. However, rodenticides' lethal effects on target pests cause qualitatively the same results on non-target mammals and birds, pets, and humans, including children. Rodenticide poisons affect animals through direct ingestion of bait or

through consumption of other poisoned animals. Human poisoning occurs through direct ingestion of bait.

There are three general categories of rodenticides: non-anticoagulants, first generation anticoagulant rodenticides ("FGARs"), and second generation anticoagulant rodenticides ("SGARs").

Non-anticoagulant rodenticides currently used in the United States include bromethalin, cholecalciferol, zinc phosphide, and strychnine. Each of these works in a different way. Bromethalin, registered with the EPA since 1984, causes the cells of the central nervous system to swell, putting pressure on the brain and causing paralysis and death.[6] Bromethalin is considered a single-dose rodenticide. Cholecalciferol, also known as Vitamin D, works when rodents eat several doses of the poison, which leads to an overabundance of calcium in the blood and overwhelms the body's ability to regulate the central nervous system, muscles, gastrointestinal tract, cardiovascular system, and the kidneys.[7] Zinc phosphide turns into toxic phosphine gas in the presence of water and acid in the stomach and causes the body's cells to die.[8] Strychnine, the oldest of these commonly used rodenticides, affects the cells in the spinal cord, causing severe muscle spasms that lead to breathing paralysis and death.[9] Currently, strychnine can only be used below ground, and products with more than 0.5% strychnine can only be sold to certified professional applicators.[10]

Anticoagulant rodenticides, FGARs and SGARs, work by stopping the liver from recycling vitamin K to make blood clotting enzymes. This causes uncontrolled bleeding throughout the body. Because of the metabolic processes involved in the impacts to vitamin K recycling and the decrease in blood clotting factors there is a lag time between ingestion and death.[11] The chemicals are likely to be additive in their effect,[12] and can be treated with vitamin K.[13]

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[6] Roder 2010, J.D. Roder. *Veterinary Toxicology* at 84, 106-108, 123, Butterworth Heinemann: Boston (2001).
[7] Rumbeiha 2006, W. K. Rumbeiha, *Cholecalciferol* at 629-642, Small Animal Toxicology, 2nd ed.; Peterson, M. E.; Talcott, P. A., Eds.; Elsevier Saunders: St. Louis, MO (2006).
[8] Albretsen 2004, J.C. Albretsen, *Zinc Phosphide* at 456-459, Clinical Veterinary Toxicology; Plumlee, K. H., Ed.; Mosby, Inc.: St. Louis, MO (2004).
[9] Talcott 2006, P.A. Talcott, *Strychnine* at 1076-1082, Small Animal Toxicology, 2nd ed.; Peterson, M. E.; Talcott, P. A., Eds.; Elsevier Saunders: St. Louis, MO (2006).
[10] EPA 1996, U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances, Office of Pesticide Programs, *R.E.D Facts Strychnine*, U.S. Government Printing Office (1996).
[11] DPR 2013, California Department of Pesticide Regulation, *Memorandum: Second Generation Anticoagulant Rodenticide Assessment (White Paper)* (June 27, 2013).
[12] Gabriel 2012, Mourad W. Gabriel et al., *Anticoagulant Rodenticides on our Public and Community Lands: Spatial Distribution of Exposure and Poisoning of a Rare Forest Carnivore* (July 13, 2012); Riley 2007, Seth P.D.

FGARs—chlorophacinone, diphacinone, and warfarin—were developed and marketed beginning in 1950. FGARs generally require that an animal eat multiple doses of the bait over several days, and were the first anticoagulant rodenticides used widely in the US.[14] FGARs require consecutive days of intake to accumulate a lethal dose, and if the animal survives or does not like the taste or effects, it may develop bait shyness.[15] If an animal that consumes an anticoagulant rodenticide is eaten by a predator, the predator can become affected by the rodenticide.[16] However, the ability of FGARs to bioaccumulate in target and non-target animals is considered low relative to SGARs.[17] The half-life (the amount of time it takes a substance to reduce its concentration by half) of most first generation anticoagulants in both target and non-target wildlife is generally hours to days, compared to the half-lives of second generation anticoagulants which are generally weeks to months.[18]

SGARs were developed in response to perceived resistance to the FGAR warfarin in target rodents, SGARs, including brodifacoum, bromadiolone, difethialone, and difenacoum, are single-dose anticoagulants that can deliver a lethal level of toxin in one feeding, with death resulting five to seven days later.[19] Because it takes several days for the rodent to die, animals often eat multiple doses, allowing for super-lethal concentrations of the rodenticide to accumulate in their bodies. SGARs become established in the animal's liver, with liver half-lives of four months to a year.[20] If an animal that consumes an SGAR is eaten by a

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Riley et al., *Anticoagulant Exposure and Notoedric Mange in Bobcats and Mountain Lions in Urban Southern California*, 71 J. Wildlife Mgmt. 1874 (2007).

[13] Merck 2012, Merck Sharp & Dohme Corp., Frederick W. Oehme, DVM, PhD, *Anticoagulant Rodenticides (Warfarin and Congeners)*, The Merck Veterinary Manual (2012) available at http://www.merckmanuals.com/vet/toxicology/rodenticide_poisoning/anticoagulant_rodenticides_warfarin_and_congeners.html

[14] EPA RED 1998, U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances, Office of Pesticide Programs, *Reregistration Eligibility Decision (RED) Rodenticide cluster*, U.S. Government Printing Office (1998) available at http://www.epa.gov/oppsrrd1/reregistration/REDs/2100red.pdf

[15] DPR 2013.

[16] Townsend 1984, Townsend, M. G., P. J. Bunyan, E. M. Odam, P. I. Stanley, and H. P. Wardall, *Assessment of the Secondary Poisoning Hazard of Warfarin to Least Weasels*, Journal of Wildlife Management, Vol. 48 (1984).

[17] Eason & Ogilvie 2009, Eason, C.T., and S. Ogilvie, *A Re-Evaluation of Potential Rodenticides for Aerial Control of Rodents*, Research & Development Series 312, New Zealand Department of Conservation, Wellington (2009).

[18] DPR 2013.

[19] EPA 2008, U.S. Environmental Protection Agency, *Risk Mitigation Decision for Ten Rodenticides* (May 28, 2008) available at http://www.regulations.gov/#!documentDetail;D=EPA-HQ-OPP-2006-0955-0764

[20] DPR 2013.

predator, the predator can become affected by the rodenticide.[21] Because of their long half-lives, SGARs bioaccumulate in non-target wildlife.[22]

Table 1. Half-life (in days) of a single dose of rodenticides in the blood and liver of rats[1, 2].

Class of Rodenticide	Rodenticide	Dose (mg ai/kg)	Half-life (in days) in Blood	Half-life (in days) in Liver
Second Generation Anticoagulant Rodenticides	Brodifacoum	0.02 to 0.35	6.5 to 91.7[7]	113.5[3] to 350
	Bromadiolone	0.2 to 3.0	1.0 to 2.4	170 to 318
	Difenacoum[4]	1.2	NA	118
	Difethialone	0.5	2.3	126
First Generation Anticoagulant Rodenticides	Chlorophacinone	4 to 5	0.4	Less than 2
	Diphacinone	0.32	NA	Between 2 and 3[1, 3]
	Warfarin	NA[9], 1[3]	0.7 to 1.2[1]	7[1] to 26.2[3]
Non-anticoagulant Rodenticides[2]	Bromethalin[5]	NA[9]	5.5	NA
	Cholecalciferol[6]	NA[9]	1	~19[8]

1 Data summarized from Erickson and Urban, 2004, except where noted.
2. Data is not available for zinc phosphide, so it is not included on the chart.
3. Fisher et al, 2003.
4. U.S. EPA, 2007.
5. Spaulding and Spannring, 1988.
6. Marrow, 2001.
7. Vandenbroucke et al, 2008.
8. Body half-life (instead of liver half-life).
9. NA is defined as Not Available.

[23]

While there is evidence that certain populations of rats and mice may have developed resistance to FGARs such as warfarin[24], it is unclear to what extent this resistance hinders the effectiveness of FGARs. As the EPA noted in its 2008 Risk Mitigation Decision ("RMD"), it is unclear whether resistance exists and to what extent it presents a problem because there have been no systemic studies of FGAR resistance in the United States for nearly thirty years.[25] Furthermore, "resistance" to a rodenticide could mean that as few as five percent of the population is resistant, which could be handled with a combination of rodent control

[21] DPR 2013.
[22] Annex I-Norway 2007, Annex I-Norway, Directive 98/8/EC Concerning the Placing Biocidal Products on the Market, Assessment report: Difethialone-Product Type 14 (2007).
[23] DPR 2013.
[24] *See* Kaukeinen & Rampaud 1986, Dale E. Kaukeinen & Michael Rampaud, *A Review of Brodifacoum Efficacy in the U.S. and Worldwide*, Proceedings of the Twelfth Vertebrate Pest Conference (Mar. 1, 1986) available at http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1034&context=vpc12 (discussing studies on warfarin-resistant rodents and how brodifacoum may be effective against these populations).
[25] EPA 2008, at 23.

measures.[26] Thus, it is unclear that SGARs are actually more effective than FGARs, and if so, how much more effective they are.

B. The Impacts of SGARs on the Public & Non-Target Organisms

Because of their acute toxicity, SGARs have a high risk of severe unintended poisoning for children, pets, and wildlife. After evaluating many lines of evidence, EPA concluded that SGARs "have greater potential to adversely affect non-target wildlife, especially birds, than the first-generation anticoagulants."[27]

1. Exposure to the Public & Children

SGARs pose unreasonably high risks to children. Even a small amount of SGARs ingested by a child can lead to health risks. According to EPA's safety level calculations, the estimated child exposure from taking just one five-gram bite of rodenticide bait greatly exceeds possible safe levels.[28] Exposures to rodenticides have been pervasive across the United States. Between 1999 and 2009, the American Association of Poison Control Centers received reports of an average of 17,000 human exposures to rodenticide each year, with eighty-five percent of these exposures occurring to children less than six years of age.[29] Those exposures led to poisonings and necessitated medical treatments. Between 1999 and 2003, an average of 3617 cases per year were treated in a health care facility, and an average of seventeen cases per year were treated in an Intensive Care Unit.[30] EPA's statements in its 2013 d-Con Cancellation Notice suggest that benefits of rodenticides must be greater if the rodenticide presents risks to children.[31]

Unintentional exposures to rodenticides are a frequent and pervasive problem in New York. Ingestion of rodenticides is one of the primary reasons for calls to the New York Poison Control Center each year, with 593 calls in 2010 due to ingestion of pesticides and

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[26] Chiri 2006, Angel Chiri, U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, *Memorandum: Analysis of Rodenticide Bait Use* at 15 (January 23, 2006).
[27] EPA 2008, at 8.
[28] EPA Draft NOI 2011.
[29] EPA Draft NOI 2011, at 18.
[30] EPA 2008, at 7.
[31] EPA NOI 2013, U.S. Environmental Protection Agency, *Notice of Intent to Cancel Registrations of, and Notice of Denial of Applications for, Certain Rodenticide Bait Products* at 8125 (February 5, 2013) available at www.gpo.gov/fdsys/pkg/FR-2013-02-05/pdf/2013-02500.pdf

rodenticides.[32] New York City alone reported approximately 4250 rodenticide poisoning incidents, which accounted for one third of the overall poisoning reports for the 2000-2010 time period.[33] New York's children are especially at risk; seventy-nine percent of rodenticide exposures in New York City between 2000-2010 were to children under the age of six.[34] During a similar period eighty-two New York City residents were admitted to hospitals because of rodenticide poisonings, and fifty-seven percent of those cases were children under the age of six.[35]

Rodenticide exposure in children is also a social and environmental justice concern. Although rodenticide exposure poses a risk to children in all ethnic communities, minority and disadvantaged communities are disproportionately affected. Of children hospitalized for rodenticide poisoning, fifty-seven percent were African American, twenty-six percent were Latino, and sixty-two percent were Medicaid enrollees.[36]

2. Exposure to Pets

SGARS pose a very high risk of accidental ingestion by pets and domestic animals because they are applied in and around homes, farms, and other areas with domestic animals. Between 1999 and 2009, data indicates that rodenticides caused about 160 severe (death or major health effect) domestic animal incidents each year, which the EPA believes is a significant underestimate.[37] For example, in 2012 a California farmer's golden retriever was found dead with confirmed brodifacoum poisoning after a pest control company applied the SGAR around the orchard to control rats.[38] Data from New York has also demonstrated several cases of pet poisoning from SGAR exposure, including bromadiolone poisoning of a German shepherd in 1986[39] and the death of another canine from brodifacoum in 2001.[40] Cats are also susceptible to SGAR toxicity, with a domestic cat death from bromadiolone

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[32] NYCDHMH 2013, New York City Department of Health and Mental Hygiene, *Top Reasons for Calls to Poison Control Center for Children Under Five* (2010) available at http://www.nyc.gov/html/doh/html/environmental/poison-home-kids.shtml.
[33] NYCDHMH 2011, New York City Department of Health and Mental Hygiene, Letter from M. Merlino to EPA Re: Notice of Intent to Cancel Twenty Homeowner Rodenticide Bait Products (November 18, 2011).
[34] NYCDHMH 2011.
[35] NYCDHMH 2011.
[36] NYCDHMH 2013; Hotz 2004, Robert Lee Hotz. Collateral Damage in the War on Rats, L.A. Times Online (November 14, 2004) available at http://articles.latimes.com/2004/nov/14/nation/na-rats14. .
[37] EPA Draft NOI 2011, at 23.
[38] EPA Mortality Incidents 2013, U.S. Environmental Protection Agency, *Compilation of Rodenticide Wildlife Mortality Incidents Reported Between 1972-2012* (January 29, 2013).
[39] The dog found and consumed brodifacoum baits placed around melon patch. Ex. A.
[40] Dog killed from a neighbor placing brodifacoum poison to kill cats that got in her garage. Ex. A.

reported in 1998[41] and brodifacoum baits placed around a motel killing another cat in 2000.[42] Although pets can be poisoned by ingesting most forms of rodenticides, FGARs are metabolized more rapidly and are less acutely toxic than SGARs.[43] In addition, treating pets poisoned by SGARs is more difficult and expensive, with pets requiring care from a veterinarian for a longer period of time.[44]

3. Exposure to Wildlife

Single-dose anticoagulants like SGARs pose a greater risk of secondary poisoning and indirect mortality to animals, particularly wildlife, that eat poisoned rodents. A rodent that consumes a SGAR will not immediately succumb to a lethal hemorrhage and may return to feed on SGAR bait over a several day period. If a rodent continues to eat the SGAR after it consumes a toxic dose during the first day, it can build a more-than-lethal dose in its body before the clotting factors run out and the rodent dies. Predators that then eat poisoned rodents may ingest a toxic dose far beyond the amount needed to kill the rodent and be lethally poisoned from just one feeding on an SGAR-poisoned rodent.

a. Nationwide

EPA found that there is widespread wildlife exposure to anticoagulant rodenticides wherever rodenticides are being used.[45] EPA has found that many taxa of non-target animals have been exposed to rodenticides, including strict carnivores such as mountain lions, bobcats, hawks, and owls; omnivores such as coyotes, foxes, skunks, and raccoons; and granivores and herbivores such as squirrels and deer. EPA's ecological incident report documents anticoagulant residues in forty-four different non-target species: twenty-seven avian species and seventeen mammalian species.[46]

A 2011 analytical study investigated anticoagulant rodenticide ("AR") poisoning in four predatory avian species: red-tailed hawks (*Buteo jamaicensis*), barred owls (*Strix varia*), eastern screech owls (*Megascops asio*), and great horned owls (*Bubo virginianus*).[47] Eighty-

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[41] Ex. A: Compilation of New York SGAR Mortality Incidents.
[42] Ex. A: Compilation of New York SGAR Mortality Incidents.
[43] Safe Rodent Control Risks 2012, Safe Rodent Control Resource Center ("SRCRC"), *Risks to Pets* (2012) available at http://saferodentcontrol.org/site/risk-for-pets/.
[44] Safe Rodent Control Risks 2012.
[45] EPA 2008, at 8.
[46] EPA 2008, at 8.
[47] Murray 2011, Maureen Murray, *Anticoagulant Rodenticide Exposure and Toxicosis in Four Species of Birds of Prey Presented to a Wildlife Clinic in Massachusetts, 2006-2010*, 42 J. Zoo Wildlife Med. 88 (2011).

six percent of the 161 birds tested had anticoagulant rodenticides in the liver.[48] Ninety-nine percent of birds testing positive for anticoagulant rodenticides had detectable levels of the SGAR brodifacoum in their systems due to bioaccumulation from secondary consumption.[49]

Predatory birds and mammals that feed on dead, exposed or poisoned rodents are especially vulnerable to secondary poisoning from SGARs. In an assessment of primary poisoning risks to birds, EPA found that a bird weighing 1000 grams would need less than one day of feeding on brodifacoum bait (SGAR) to reach a lethal dose, but it would need more than a year of feeding on diphacinone (FGAR) to reach the same dosage level.[50] For secondary poisoning, EPA found that a 1000-gram bird would need to consume two brodifacoum-poisoned mice to reach a lethal dose, whereas it would need to consume 1200 diphacinone-poisoned mice to reach a lethal dose.[51] Later, the agency stated that, "[m]ore than 300 documented wildlife incidents attest to exposure of birds and nontarget mammals, including endangered species, to some rodenticides, especially brodifacoum (244 incidents)."[52] Although wildlife deaths from poisoning go largely unreported, between 1971 and 2011, the EPA found that brodifacoum was by far the greatest contributor to wildlife mortality—causing 267 incidents out of a total of 311.[53] In contrast, the FGARs bromethalin and warfarin were implicated in only one and eight incidents, respectively.[54]

SGARs also have a much greater ability to bioaccumulate in non-target animals. With half lives of up to 350 days, SGARs remain in the body much longer than FGARs.[55] During multiple feedings of target rodents, SGARs bioaccumulate in the rodent's body—specifically, in the animal's liver and lungs. Predators that eat poisoned rodents may ingest a toxic dose in small amounts over a long period of time because of the cumulative body burden of SGARs. Even if a rodent is exposed to a SGAR indoors, "the movement of rodents to areas outside buildings between the time of [SGAR] ingestion and death [and] preferential selection of anticoagulant-incapacitated prey by predators"[56] ensures that the SGAR is

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[48] Murray 2011.
[49] Murray 2011.
[50] EPA Draft NOI 2011, at 27 (chart detailing the relative risks of rodenticides to birds).
[51] EPA Draft NOI 2011, at 27.
[52] EPA 2004, U.S. Environmental Protection Agency, *Potential Risks of Nine Rodenticides to Birds and Nontarget Mammals: a Comparative Approach* at iii (July 2004).
[53] EPA Draft NOI 2011, at 48.
[54] EPA Draft NOI 2011, at 48.
[55] DPR 2013, at 4.
[56] USFWS 2005, U.S. Department of the Interior, Fish & Wildlife Service, *Comments on EPA's Comparative Approach* at 3 (2005).

distributed into the ecosystem well-beyond the source of the poison, no matter how contained its application.

b. New York

In New York, the threat to wildlife from SGARs is particularly acute. Between 1989 and 2013, SGARs were responsible for or major contributors to the documented deaths of at least fifty red-tailed hawks, thirty-six great-horned owls, twelve screech owls, seven cooper's hawks, three golden eagles, three red-shouldered hawks, one sharp-shinned hawk, nineteen crows, forty-seven squirrels, seven deer, six foxes, two coyotes, one saw-whet owl, and one fisher, among others.[57] As evidenced by these reported SGAR-induced fatalities, raptors and other birds of prey such as owls and eagles in New York are particularly susceptible to poisoning. During a study conducted by DEC between 1998 and 2001, forty-nine percent of raptor necropsies showed detectable levels of anticoagulant rodenticides, with the SGAR brodifacoum present in eighty-four percent of these cases.[58]

Recently, rodenticide poisoning of raptors in New York has received a great deal of public and media attention, following the SGAR-attributed deaths of several red-tailed hawks in and around parks in New York City.[59] Four of these hawks, often-viewed and popular with local residents and birdwatchers, were found dead between the months of February and March 2012. In three of the four hawks, full necropsies showed that the birds' deaths were due to SGAR-related spontaneous hemorrhaging.[60] For the fourth, a female, the official cause of death was ruled as shock secondary to a prolapsed oviduct, but the examining wildlife pathologist concluded that levels of SGARs present in the bird (0.127 ppm difethialone; 0.068 ppm bromadiolone; 0.046 ppm brodifacoum) were well within the range of levels found in raptors killed by anticoagulant-facilitated hemorrhage, and "could have

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[57] Ex. A: Compilation of New York SGAR Mortality Incidents.
[58] Stone 2003, W. B. Stone, J. C. Okoniewski, J. R. Stedelin, Anticoagulant Rodenticides and Raptors: Recent Findings from New York, 1998-2001 (2003) available at http://www.dec.ny.gov/docs/wildlife_pdf/rodenticides03.pdf.
[59] Barron 2012, James Barron, New York Times, In Mystery of Hawk Deaths, Rat Poison Emerges (April 11, 2012) available at http://www.nytimes.com/2012/04/12/nyregion/rat-poison-is-found-in-bodies-of-3-dead-hawks.html; Hutchinson 2012, Bill Hutchinson, New York Daily News, *Celebrity hawk Pale Male's mate died from ingesting rat poison* (April 10, 2012) available at http://www.nydailynews.com/new-york/celebrity-hawk-pale-male-mate-died-ingesting-rat-poison-article-1.1059495.
[60] *See* Okoniewski 2012, Joe Okoniewski, Wildlife Health Unit, New York State Department of Environmental Conservation, *Case Reports* (March 2012) available at http://www.dec.ny.gov/docs/wildlife_pdf/nycrthreports0412.pdf.

permitted rapid hemorrhage from blood vessels damaged by the [oviduct] prolapsed, leading to shock."[61]

c. Sublethal Impacts

Even if exposed wildlife survive after anticoagulant rodenticide intoxication, the animal may still suffer disruptions in vital physiological processes that can eventually lead to death. Exposure to anticoagulants may act synergistically with natural environmental stressors to increase susceptibility to naturally occurring diseases, such as mange in bobcats and mountain lions.[62] Birds and mammals have exhibited heart damage following exposure to brodifacoum.[63] SGARs impact vitamin K biochemistry, which can result in liver damage, disruptions of physiological processes leading to osteoporosis, or calcium remobilization and deposition in the circulatory system.[64]

Sub-lethal doses of the SGAR brodifacoum have also caused abortions and reduced lambing rates in sheep,[65] as well as mortality to embryos.[66] Multiple studies have shown that even sub-lethal doses can cause clotting abnormalities, biochemical abnormalities (including glucose and liver function markers), and physiological abnormalities (including statistically significant decreased body weight, increased liver size, increased heart size, and increased kidney size), which could or did cause mortality in the laboratory setting.[67]

IV. Legal Background

A. Declaratory Rulings

The DEC regulations provide that "[t]he department may, on petition, issue a declaratory ruling with respect to: (1) the applicability to any person, property or state of facts of any

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[61] Okoniewski 2012.
[62] Riley 2007.
[63] Rahmy 1993, Tarek R. Rahmy, *Myocardial Alterations in Animals Intoxicated With an Anticoagulant Rodenticide*, 12C J. Egypt. Ger. Soc. Zool. 87 (1993).
[64] Knopper 2007, L. D. Knopper et al., *Bone Density and Breaking Strength in UK Raptors Exposed to Second Generation Anticoagulant Rodenticides*, 78 Bull Envtl. Contamination Toxicology 249 (2007).
[65] Godfrey 1985, M. E. R. Godfrey, *Non-Target and Secondary Poisoning Hazards of "Second Generation" Anticoagulants*, 173 Acta Zoologica Fennica, 209 (1985).
[66] Laas 1985, F. J. Laas et al., *Retention of Brodifacoum in Sheep Tissues and Excretion in Faeces*, 28 N.Z. J. Agric. Res. 357 (1985); Godfrey 1989, M. E. R. Godfrey et al., *Preliminary Dosing Trials of a New Anticoagulant, Brodifacoum, as a Toxicant for the Rabbit,* Oryctolagus Cimiculus, 8 N.Z. J. Exper. Agric. 1 (1989); Munday 2003, J. S. Munday et al., *Brodifacoum Toxicosis in Two Neonatal Puppies*, 40 Vet Pathol. 216 (2003).
[67] DPR 2013.

regulation or statute which the department enforces; and (2) whether any action by the department should be taken pursuant to a regulation." 6 NYCRR § 619.1(a).

In order to be considered complete, the petition for a declaratory ruling must contain:

> (1) the name and address of the petitioner and a statement of the nature of the petitioner's interest in the matter; (2) a full and carefully detailed description of all relevant facts and circumstances, including a clear and concise statement of the controversy or uncertainty that is the subject of the petition and the need, or good cause, for the issuance of the declaratory ruling; (3) copies of all relevant documents and supporting materials; (4) reference to any pending administrative or judicial proceeding involving the same or similar set of facts, including the names and addresses of any other persons whose interests are reasonable likely to be affected by the ruling; and (5) citation to all relevant statutory and regulatory provisions.

Id. § 619.1(c).

The regulations further provide that, within ten business days of receipt of a petition, DEC must mail notice to the petitioner that either "(1) the petition is complete for purposes of review; (2) the petition is incomplete because of the lack of certain specified information needed to render a ruling; or (3) the petition contains sufficient information, but the general counsel is availing the public of the opportunity for comment." *Id.* § 619.1(d).

Within thirty days of the receipt of a complete petition for a declaratory ruling, pursuant to section 619.1(a)(1) and within sixty days of the receipt of a complete petition for a declaratory ruling pursuant to section 619.1(a)(2), DEC must issue either a ruling or written notification that a ruling will not be issued and a statement of the reasons therefore. *Id.* § 619.2.

B. New York Department of Environmental Conservation

New York law, recognizing that pesticides "may injure health, property and wildlife," requires that "all persons [using pesticides in the state] be required to register or obtain permits before engaging in such activities." N.Y. Envtl. Conserv. Law § 33-0301. In New York, DEC is responsible for "regulat[ing] the use, storage and disposal of pesticides and other chemicals which may be harmful to man, animals, plant life, or natural resources." N.Y. Envtl. Conserv. Law § 3-0301(1)(j).

Every pesticide product used, distributed, or sold in New York "shall first be registered with the commissioner" of DEC, in addition to being federally registered. 6 NYCRR § 326.14. After an applicant submits a completed application to the commissioner, the commissioner initiates a review of the data and evaluates the pesticide's potential to cause adverse impacts to human health and the environment. *Id.* § 326.23(c). Similar to the risk-benefit analysis conducted by EPA under the Federal Insecticide Fungicide and Rodenticide Act, the commissioner "will weigh the potential for human health and ecological risks against the potential benefits that could accrue from the use of the product when making a decision whether or not to approve the registration." *Id.* "The commissioner may place any conditions on the registration of any product that are deemed necessary to prevent damage or injury to health, property and wildlife." *Id.* § 326.23(e). Such conditions may include the submission of additional data, restricted use classification, reporting requirements, or any other necessary conditions. *Id.* § 326.23(e). Pesticide registrations must be renewed every two years with the office of the commissioner. N.Y. Envtl. Conserv. Law § 33-0701.

When the harmful effects of a pesticide are determined to be hazardous it may be designated as a restricted use pesticide. Products qualify as a "restricted use pesticide" when:

> a.) A pesticide or one of its elements persists or bioaccumulates in the environment, and creates a risk of harm in non-target organisms; or
> b.) A pesticide is so hazardous to man or other forms of life that restrictions on it are in the public interest.

N.Y. Envtl. Conserv. Law § 33-0101(42). DEC has wide discretion in determining conditions for restricted use pesticides. N.Y. Envtl. Conserv. Law § 33-0303(d) (A restricted use pesticide is "subject to whatever conditions or limitations which the commissioner deems appropriate to fully protect the public interest."). These conditions include the requirement to obtain a permit prior to use, use only under certain conditions, or complete prohibitions on use. *See* 6 NYCRR § 326.2. DEC is also afforded wide discretion to exempt pesticides from restrictions or the registration requirement when an emergency exists affecting public health or the environment. 6 NYCRR § 326.2(e); 6 NYCRR § 326.26; 7 U.S.C. § 136p.

In addition to registering and monitoring all pesticides and rodenticides in New York, the commissioner of DEC has the authority to cancel a pesticide registration "whenever it does not appear that the article or its labeling or other material required to be submitted complies" with the requirements of New York's pesticide laws. N.Y. Envtl. Conserv. Law § 33-0713. Pending full cancellation of a pesticide that does not meet the requirements of

this chapter, the commissioner may "suspend the registration of a pesticide immediately when he finds that such action is necessary to prevent an imminent hazard to the public or any other non-target organism." N.Y. Envtl. Conserv. Law § 33-0719. This regulatory authority provides DEC with discretion to enact more stringent requirements for products that pose unreasonable risks to the environment and public health.

C. Related Actions by EPA

The Federal Insecticide, Fungicide, and Rodenticide Act ("FIFRA") requires EPA to regulate pesticides, such as rodenticides, to protect human health and preserve the environment. 7 U.S.C. §§ 136 *et. seq.* In order to register a pesticide for sales and use in the U.S., a registrant must demonstrate, among other requirements, that the pesticide does not cause "unreasonable adverse effects on the environment." 7 U.S.C. § 136a(c)(5)(C). FIFRA defines an "unreasonable adverse effect on the environment" as "unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of any pesticide." 7 U.S.C. § 136(bb). Thus, the EPA applies a risk-benefit balancing test and may only register a pesticide if it finds that the risks associated with the use of a pesticide are justified by the benefits of such use. In order to remain registered, a pesticide must continue to meet this risk-benefit standard, which the EPA may reassess at any time.[68]

1. EPA's Reregistration and Cancellation of Rodenticide Products

EPA has been engaged in the review of the hazards of SGARs for over twenty five years.[69] After a lengthy review EPA determined that rodenticide baits sold to residential consumers must be packaged in a bait station designed to prevent children, domestic animals, and non-target wildlife from being able to come into contact with bait.[70] EPA also found that rodenticides containing SGARs pose significant risks to wildlife and the environment, and that residential consumers should not use SGAR products.[71] However, EPA still allowed

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[68] *See* EPA 2010, U.S. Environmental Protection Agency, *Re: World Wildlife Fund Petition to the Environmental Protection Agency for Suspension of Rozol Prairie Dog Bait dated June 5, 2009* at 3 (November 1 6, 2010) (describing EPA's duty to find that the benefits outweigh the risks of registered pesticides).
[69] For a detailed description of EPA's process of evaluation and attempts to restrict the use of hazardous rodenticide products see EPA NOI 2013, at 5-12, available at www.gpo.gov/fdsys/pkg/FR-2013-02-05/pdf/2013-02500.pdf.
[70] EPA 2008.
[71] EPA 2008.

widespread use of rodenticides by agricultural users and pest control operators if they are sold in bulk sizes. [72]

EPA cancelled the registration of twelve d-CON rodenticide products and denied applications for registration of two new products when the manufacturer did not conform to a decision for label restrictions or voluntary changes.[73] EPA later reached a settlement with rodenticide manufacturer Reckitt Benckiser that to phase out all remaining sales of SGARs to residential consumers by March 31, 2015.[74]

D. Related Actions by the California Department of Pesticide Regulation

Before a new pesticide may be offered for sale in California, it must first be registered both by the U.S. Environmental Protection Agency and by the California Department of Pesticide Regulation ("Cal DPR"). *See* 7 U.S.C. § 136a(a); Ca. Food & Agr. Code § 12811. Pesticides that pose a greater risk to public health or the environment are categorized as restricted materials, which also includes restricted use pesticides under FIFRA. Cal DPR is required to develop a list of restricted materials that pose dangers or hazards to the following:

a) Public health;
b) Pesticide handlers and field workers;
c) Domestic animals, including honey bees, or to crops from direct application or drift;
d) Streams, lakes, or wildlife sanctuaries from direct application or drift;
e) Fish, wild birds, or other wildlife resulting from persistent residues in the soil that could result in contamination of the air, waterways, estuaries, or lakes; and
f) Subsequent crops through persistent soil residues.

Cal. Food & Agr. Code § 14004.5; 3 Cal. Code Regs. § 6400. Those pesticides that are determined to be "injurious to the environment or to any person, animal, crop, or other property" are subject to special regulation as restricted materials. Cal. Food & Agr. Code § 14005. Restricted materials can only be possessed or used by, or under the direct

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[72] EPA 2008.
[73] EPA NOI 2013.
[74] *See e.g.* EPA 2014, U.S. Environmental Protection, *Agency Filings and Orders in Active FIFRA Section 6 Proceedings* (2014) available at http://www.epa.gov/oalj/filings-section6.htm; EPA Cancellation 2014, *Canceling Some d-CON Mouse and Rat Control Products,* available at http://www2.epa.gov/rodenticides/canceling-some-d-con-mouse-and-rat-control-products.

supervision of, a certified private applicator or a certified commercial applicator. Cal. Food & Agr. Code § 14015.

1. California's Classification of SGARs as Restricted Materials

In response to a request from the California Department of Fish and Wildlife ("CDFW") to restrict the use of SGARs, Cal DPR produced a comprehensive peer reviewed report regarding SGAR exposure to non-target wildlife based on wildlife incident and mortality data between 1995 and 2011, and analyzed it together with land use data, and rodenticide use and sales data.[75] The report found that exposure to SGARs was widespread: over thirty-five different species tested positive for rodenticide exposure; seventy-three percent of wildlife tested had ingested at least one SGAR; and seventy-five percent had been exposed to one or more rodenticides.[76] Based on the hazards to non-target wildlife, Cal DPR issued regulations to make SGARs restricted materials.[77]

This designation restricted use to certified private applicators or certified commercial applicators and prohibited use by the general public. Cal. Food & Agr. Code § 14015. Cal DPR also expanded the uses by private applicators in order to allow uses by agricultural operators, such as producers of livestock, poultry or fish,[78] and limited the use of SGARs beyond a fifty foot radius from structures. 3 Cal. Code Regs. § 6471.

E. Laws Protecting Wildlife from Pesticide Poisoning

1. New York Wildlife Protection Laws

New York provides for heightened protection for wildlife species it determines are endangered or, threatened. *See* 6 NYCRR § 182.2(e), (g), (u), (y) (defining listing criteria for endangered and threatened species); N.Y. Envtl. Conserv. Law § 11-0305(15) (providing DEC with the authority to conserve rare plants, animals, and ecological communities).

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[75] DPR 2013.
[76] DPR 2013, at 10-11.
[77] 3 Cal. Code Regs § 6400; *See generally* DPR SGARs 2014, California Department of Pesticide Regulation, *Designating Brodifacoum, Bromadiolone, Difenacoum, and Difethialone (Second Generation Anticoagulant Rodenticide Products) as Restricted Materials*, Final Text of Regulation (March 18, 2014) available at http://www.cdpr.ca.gov/docs/legbills/rulepkgs/13-002/13-002.htm
[78] 3 Cal. Code Regs § 6000; DPR Statement 2014, California Department of Pesticide Regulation, *Initial Statement of Reasons and Public Report* (2013) available at www.cdpr.ca.gov/docs/legbills/rulepkgs/13-002/statement.pdf

Under New York's endangered species law, individuals, businesses, and state agencies are prohibited from "engag[ing] in any activity that is likely to result in a take of any species listed as endangered or threatened," unless such activity is exempt or authorized by an incidental take permit. 6 NYCRR § 182.8(a). DEC defines "take" as "the pursuing, shooting, hunting, killing, capturing, trapping, snaring and netting of any species listed as endangered or threatened . . . and all lesser acts such as disturbing, harrying or worrying." 6 NYCRR § 182.2(x). These "lesser acts" include harassing, harming, maiming, wounding or collecting any species listed as endangered or threatened and any adverse modification of habitat of a listed species, 6 NYCRR § 182.2(l). DEC requires an incidental take permit for any activity that is "likely to result in the take . . . of any species listed as endangered or threatened." 6 NYCRR § 182.11. The permit must include an endangered or threatened species mitigation plan, which must ensure a net conservation benefit to the impacted species. 6 NYCRR § 182.11(a), (d). Without such a permit, any take of state threatened and endangered species is prohibited.

2. Migratory Bird Treaty Act

The Migratory Bird Treaty Act ("MBTA") protects over 800 species of birds that migrate across the United States and its territories, including red-tailed hawks, peregrine falcons, owls, and numerous other raptors affected by SGARs in New York. 16 U.S.C. §§ 703 *et seq*.; 50 C.F.R. § 10.13. Specifically, the MBTA states:

> [E]xcept as permitted by regulations . . . it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell . . . any migratory bird, any part, nest, or egg of any such bird, or any product.

16 U.S.C. § 703(a). FWS has defined "take" broadly under the MBTA to include acts that "pursue, hunt, shoot, wound, kill, trap, capture, or collect," or to attempt any of these activities. 50 C.F.R. § 10.12.

Both intentional and unintentional killing or taking of migratory birds is prohibited under the MBTA. *See United States v. Moon Lake Electric Ass'n, Inc.*, 45 F. Supp. 2d 1070, 1073-74 (D. Colo. 1999) (stating that MBTA not limited to intentionally harmful activities directed against migratory birds, such as hunting and poaching). The plain language of the MBTA gives the Fish and Wildlife Service authority to regulate the indirect or unintentional take of migratory birds. *See, e.g.*, *North Slope Borough v. Andrus*, 486 F. Supp. 332, 362 (D.D.C. 1980) (citing section 703 to prohibit the killing of migratory birds "even if the killing was

not intentional"). The MBTA also prohibits the poisoning of migratory birds through the application of pesticides that kill covered species even when there is no intent to kill those species. *United States v Corbin Farm Serv.*, 444 F. Supp. 510. 532, 536 (E.D. Cal. 1978), *aff'd*, 578 F.2d 259 (9th Cir. 1978); *United States v. FMC Corp.*, 572 F.2d 902, 908 (2d Cir. 1978).

3. Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act ("BGEPA") creates criminal and civil penalties for the knowing take or, possession of, and commerce in, bald or golden eagles. 16 U.S.C. § 668(a)-(b). "Take," under the BGEPA, includes poisoning, wounding, killing, molesting, or disturbing bald or golden eagles. *Id.*§ 668c. Disturbing is defined as behavior that agitates or bothers a bald or golden eagle to a degree that "causes, or is likely to cause . . . (1) injury to an eagle, (2) a decrease in its productivity . . . or (3) nest abandonment." 50 C.F.R. § 22.3. If an actor is "'conscious from . . . knowledge of surrounding circumstances and conditions that [the actor's] conduct will naturally and probably result in injury' to a protected" bald or golden eagle, the BGEPA applies. *Moon Lake Elec. Ass'n.,* 45 F. Supp. 2d at 1074 (quoting S. REP. NO. 92-1159, at 5 (1972)).

V. Basis for Relief Requested

The evidence is clear that SGARs persist and bioaccumulate in the environment, creating a risk to people, pets, and wildlife, and a hazard to the public interest. SGARs also pose threats to species protected under state and federal wildlife protection laws. Poisonings and deaths of humans, pets, and non-target wildlife in New York due to SGARs have been well documented. Consequently, SGAR's meet the statutory and regulatory criteria for classification as restricted use pesticides, and Petitioners request a declaratory ruling that those criteria apply to SGARs. Petitioners also request that DEC take regulatory action to add SGARs to the list of restricted use pesticides that cannot be distributed, sold, purchased, possessed or used for any purpose in New York, codified at 6 NYCRR section 326.2(c).

A. The Statutory and Regulatory Criteria for Restricted Use Pesticides Apply to SGARs

SGARs meet New York's statutory and regulatory criteria classification as restricted use pesticides, and we petition DEC to take regulatory action to add SGARs to this list of strictly-controlled pesticides. A restricted use pesticide is defined as one:

a. Which (1) either (a) persists in the environment, or (b) accumulates as either the pesticide per se, a pesticide metabolite, or a pesticide degradation product in plant or animal tissue or product, and is not excreted or eliminated within a reasonable period of time, and which may be transferred to other forms of life; and (2) which by virtue of such persistence or accumulation creates a present or future risk of harmful effects on any organism other than the target organisms; or

b. Which the commissioner finds is so hazardous to man or other forms of life that restrictions on its sale, purchase, use, or possession are in the public interest.

N.Y. Envtl. Conserv. Law § 33-0101(42). If the commissioner chooses to include a pesticide on this list, the restricted use pesticide may be permitted "subject to whatever conditions or limitations which the commissioner deems appropriate to fully protect the public interest." N.Y. Envtl. Conserv. Law § 33-0303(d).

Included in this statutorily-granted power is the commissioner's ability to ban outright the distribution, sale, and use of products containing a specific pesticide, even if this ban would effectively result in the cancellation of registration for all pesticides that include this specific ingredient. *Chem. Specialties Mfrs. Ass'n v. Jorling*, 197 A.D.2d 314, 318 (N.Y. App. Div. 1994), *aff'd*, 85 N.Y.2d 382 (N.Y. 1995). Indeed, "[t]he Commissioner is given the broad authority to determine which pesticides are subject to restriction and to limit or condition the usage of such pesticides." *Id.*at 318 (citations omitted). Within these available restrictions, "the legislative history clearly indicates [the] intent to authorize a complete ban on the use of dangerous pesticides under certain circumstances." *Chem. Specialties Mfrs. Ass'n v. Jorling*, 85 N.Y.2d at 390.

1. SGARs Persist in the Environment, Accumulate and Persist in Wildlife, and Are Transferred to Other Forms of Life

SGARs meet the criteria for restricted use pesticides because they persist in the environment, are not eliminated within a reasonable period of time, and are transferred to other forms of life. N.Y. Envtl. Conserv. Law § 33-0101(42)(a)(1)(a)-(b). As discussed in Section III of this Petition, SGARs, unlike their first-generation counterparts, bioaccumulate and present a risk to non-target species long after their initial ingestion by a target pest. By remaining in an animal's body much longer than FGARs, SGARs are much more likely to cause secondary poisoning in any predator species that consumes a poisoned rodent.

The unacceptable effects of SGARs' accumulation in the environment are well-documented in New York. The long-term persistence of brodifacoum, one of the most widely used

SGARs, is particularly well reported. As noted above, a DEC study showed that of the forty-nine percent of New York raptor necropsies that showed detectable levels of rodenticides, brodifacoum was present in eighty-four percent of these cases.[79] The U.S. Fish and Wildlife Service has concluded that brodifacoum "clearly finds its way into the natural food chain."[80] This widespread environmental exposure is true for brodifacoum and other SGARs applied in any manner. Even if a rodent is exposed to a SGAR indoors, "the movement of rodents to areas outside buildings between the time of [SGAR] ingestion and death [and] preferential selection of anticoagulant-incapacitated prey by predators"[81] ensures that the SGAR is distributed into the ecosystem well-beyond the source of the poison, no matter how contained its application.

2. SGARs Create a Present & Future Risk of Harm to Non-Target Organisms

Because of their persistence in the environment, SGARs create a present and future risk of harmful effects to other non-target organisms, the second criterion for classification as a restricted use pesticide. N.Y. Envtl. Conserv. Law § 33-0101(42)(a)(2). As discussed in Section III, the accumulation of SGARs in the environment has been directly responsible for ongoing lethal and sub-lethal harm to non-target organisms, including people, in New York. New York City alone reported approximately 4250 rodenticide poisoning incidents over a ten year period with disproportionate impacts to children, minorities, and lower income families.[82] Between 1989 and 2013, SGARs caused or contributed to the deaths of over thirty-three different non-target species, and, at least, 225 non-target animals in New York.[83] The presence of SGARs in the environment has also caused the death of at least four domestic animals within the state.[84] This harm to non-target species is persistent and ongoing. The most recent data available demonstrates no reductions in non-target deaths in recent years, and at least nineteen of these wildlife poisonings occurred between 2012 and 2013 alone.[85]

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[79] Stone 2003.
[80] USFWS 2005, at 3.
[81] USFWS 2005, at 3.
[82] NYCDHMH 2011; Hotz 2004.
[83] Ex. A: Compilation of New York SGAR Mortality Incidents.
[84] Ex. A: Compilation of New York SGAR Mortality Incidents.
[85] Ex. A: Compilation of New York SGAR Mortality Incidents.

Because SGARs persist and accumulate in the environment and create a present and future risk of harm to non-target organisms, they display the acute toxicity and indiscriminate harmful effects that warrant classification as restricted use pesticides.

3. Prohibition of SGARs is in the Public Interest

Additionally, SGARs meet the separate criterion that their use in New York is "so hazardous to man or other forms of life that restrictions on its sale, purchase, use, or possession are in the public interest." N.Y. Envtl. Conserv. Law § 33-0101(42)(b). As discussed above, rodenticide use causes hundreds of unintentional human exposures each year, which results in poisonings that send residents to hospitals for treatment and particularly harm children and disadvantaged communities.[86] SGAR poisoning has also resulted in the deaths of pets and a range of non-target wildlife in New York.[87] Given the availability of feasible, cost effective alternatives to SGARs to address rodent infestations (as discussed in subection 4 below) it is in the public interest to classify SGARs as a restricted use pesticide.

DEC's ability to categorize SGARs as restricted use pesticides follows precedent from sister states. In March of 2014, California adopted a regulation that makes all SGARs restricted materials.[88] This decision also bans a subset of harmful d-CON products that have also been subject to cancellation by the EPA, removing those products from retail store shelves and out of reach to the general consumer. These new restrictions follow growing public concern over the indiscriminate harm that SGARs cause to non-target wildlife, and Cal DPR's recognition that exposure and toxicity to wildlife from SGARs is a statewide ecological problem. California's recent restriction provides an example of the flexibility states can employ to take simple and sensible measures to significantly reduce unintended exposure to non-target wildlife, children, and pets.

4. SGARs Should Be Prohibited Because There Are Reasonable Alternatives

New York's pesticide laws provide that DEC must refuse to permit the use of a restricted pesticide "if there is a reasonable, less dangerous alternative available, capable of performing the task required." *Chem. Specialties Mfrs. Ass'n,* 85 N.Y.2d at 390. This policy derives from New York's requirement that the risks of using a rodenticide be justified by the

[86] NYCDHMH 2011.
[87] Ex. A: Compilation of New York SGAR Mortality Incidents.
[88] 3 Cal. Code Regs § 6400; *See generally* DPR Statement 2014.

benefits of such use. 6 NYCRR § 326.23(c) ("The commissioner will weigh the potential for human health and ecological risks against the potential benefits that could accrue from the use of the product when making a decision whether or not to approve the registration."). If there is a reasonable and less dangerous alternative that can be used in place of a restricted use pesticide, there is little if any benefit to continuing to permit the more dangerous class of pesticide.

As described in detail in the Appendix, there are currently numerous alternatives to SGARs that are both accessible and affordable for consumer and professional use in New York. These alternatives are chemical and mechanical based, cost effective, and, most importantly, are not unduly harmful to humans or the environment. These alternatives include habitat modification and mechanical trapping, non-anticoagulant rodenticide application, and the use of less-harmful first-generation anticoagulant rodenticides.[89] At present, the risks of SGARs to human and ecological health outweigh the benefits of their use, due to their exceptionally high toxicity and persistent evidence that SGARs are more likely to harm humans and the environment than other methods of rodent control. There is also no markedly increased effectiveness of SGARs over other, less-harmful forms of rodenticide, which are capable of successfully controlling pests without the high risks of harm to humans and non-target species. Indeed, all currently licensed rodenticides have met EPA's efficacy standards, so both SGAR and non-SGAR chemical rodenticides are considered effective at rodent control.[90]

B. The Use of SGARs Impacts Wildlife Protected by New York's Wildlife Protection Laws

The pervasive nature of SGARs in the environment and food chain continues to lead to lethal and sub-lethal harm to species that are protected by New York wildlife laws and regulations. Specifically, rodenticides have caused or contributed to the deaths of several golden eagles in New York[91], which are listed as endangered species in New York and are protected from "take" under state law. 6 NYCRR § 182.5(a).

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[89] *See* Appendix: Alternatives to Second Generation Anticoagulant Rodenticides.
[90] *See* Jacobs 2011, William W. Jacobs, U.S. Environmental Protection Agency, *Efficacy Issues Regarding Control of Commensal Rodents in the U.S. Using Registered Rodenticides* at 7-9 (Oct. 31, 2011).
[91] In 1996 a Golden Eagle was found dead in a State Park area. Following a necropsy that showed congested lungs and areas of hemorrhage as well as brodifacoum residues of 0.03 ppm, its cause of death was ruled as SGAR poisoning. Ex. A. In 1997, a Golden Eagle died from primary intoxication due to lead in the liver, but wildlife pathologists determined that the 0.016 ppm brodifacoum also detected contributed to its hemorrhagic lungs and death. Ex. A. In 1998, a Golden Eagle died from brodifacoum (0.06 ppm) and bromadiolone (0.24 ppm) poisoning. Ex. A.

Additionally, SGARs have caused the deaths of several of New York's "species of special concern," including sharp-shinned hawks,[92] cooper's hawks,[93] and red-shouldered hawks.[94] These species, while not yet listed as threatened or endangered, still warrant close attention and consideration because of documented concerns for their welfare and an ongoing risk of endangerment. *See* 6 NYCRR § 182.2(u).

C. The Use of SGARs in New York Impacts Wildlife Protected Under Federal Law

SGARs have resulted in the ongoing "take" in New York of avian species protected by the MBTA, which establishes liability for the poisoning of migratory birds with pesticides even when there is no intent to kill those species. *See United States v. Corbin Farm Serv.*, 444 F. Supp. 510, 532, 536 (E.D. Cal. 1978), *aff'd*, 578 F.2d 259 (9th Cir. 1978); *United States v. FMC Corp.*, 572 F.2d 902, 908 (2d Cir. 1978). Between 1989 and 2013, SGARs were responsible for the deaths of over 130 MBTA-protected raptor and corvid species in New York. [95] These deaths violate the MBTA's prohibition on poisoning of migratory birds with pesticides.

The overt act of applying SGARs throughout New York is the proximate cause of the deaths of innumerable numbers of migratory birds each year. Proximate cause is an important feature of the MBTA, and "liability would attach where the injury 'might be reasonably anticipated or foreseen as a natural consequence of the wrongful act.'" *United States v. Apollo Energies, Inc.*, 611 F.3d 679, 690 (10th Cir. 2010) (citing *United States v. Moon Lake Elec. Ass'n, Inc.*, 45 F. Supp. 2d 1070, 1085 (D. Colo. 1999)); *see also United States v. Citgo Petroleum Corp.*, 893 F. Supp. 2d 841, 848 (S.D. Tex. 2012). The highly toxic effects of SGARs are well known and well documented, and it is foreseeable that the act of applying these rodenticides for use in the environment will lead to harm to migratory birds.

The BGEPA, while requiring a higher degree of intent than the MBTA, still turns on the knowledge that a defendant *should have*. As evidenced by the court's decision in *Moon Lake*, this can include preventative or precautionary measures that should have been taken based

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[92] In 2000, a sharp-shinned hawk was seen incapacitated in a warehouse and then found dead 3 days later. The intestines and kidneys were black with hemorrhage, and analysis of the liver detected brodifacoum residues at 0.17 ppm. Ex. A.

[93] Between 2001 and 2005, six Cooper's hawks were killed in New York, all by the SGAR brodifacoum. Ex. A.

[94] In 2002, two red-shouldered hawks were found dead, both from brodifacoum poisoning. In 2013, a red-shouldered hawk was discovered dead in Manhattan, the cause of death was poisoning by the SGAR difethialone. Ex. A.

[95] Ex. A: Compilation of New York SGAR Mortality Incidents.

on the available information. 45 F. Supp. 2d at 1070 (electric company potentially liable for take of eagles because it should have know its measures to protect eagles from electrocution on power lines were inadequate). The BGEPA also encompasses harm by poisoning. 16 U.S.C. § 668c. The documented deaths of golden eagles in New York due to SGARs and the ongoing SGAR poisoning of avian species in the state with similar diets means that applicators and regulatory agencies should know of SGARs' ability to kill golden eagles. SGARs have a history of killing federally protected wildlife like eagles and other migratory birds and continued applications lead to violations of the MBTA and BGEPA.

D. DEC Retains Flexibility to use SGARs in Emergency Circumstances

In the unlikely event that reasonable cost-effective alternatives are not effective in controlling an exceptional infestation, DEC is still allowed broad discretion to use restricted pesticides in emergency circumstances. 6 NYCRR § 326.2(e). State and Federal law also permit the DEC discretion to permit the use of unregistered pesticides that have been cancelled in emergency situations. 6 NYCRR § 326.26; 7 U.S.C. § 136p. DEC retains the discretion to address emergency uses to benefit public health, endangered or threatened species, or the environment (40 C.F.R. § 166.2(a)(2),(c)) such as the following:

> A public health official makes a finding that a significant public health hazard exists, there is demonstrated resistance to first generation anticoagulant rodenticides, and other, less-toxic measures have been implemented, including sanitation and trapping, but have proven ineffective; or
>
> Federal or state wildlife officials determine that use of use SGARs is necessary to control non-native, invasive species, and other, less-toxic measures are unlikely to be effective.

E. Existing Regulations are Inadequate to Protect People & the Environment

Additional restrictions on the availability and use of SGARs are necessary because existing laws and regulations fail to protect the public, pets, and wildlife from unintentional rodenticide poisoning. As described above, use of SGARs results in a range of negative impacts on public health and the environment. These dangers are occurring despite the existing laws and regulations requiring protections from the hazards of pesticides (7 U.S.C. § 136a, N.Y. Envtl. Conserv. Law § 3-0301), or laws protecting wildlife from poisoning, killing, or wounding (16 U.S.C. § 703, 16 U.S.C. 668, 6 NYCRR § 182.2). Therefore, it is clear that the existing regulations are inadequate to protect people and the environment from SGARs.

Despite EPA's cancellation order for sales of SGARs to residential consumers the products are still available for sale through at least March 31, 2015.[96] During this time SGARs deemed to pose unreasonable risks inconsistent with FIFRA can still be sold. This continued regulatory uncertainly, in part, led California to pose additional restrictions on SGARs.[97]

Once EPA's d-CON cancellation order goes into effect SGARs will still pose a threat to human health and the environment because SGARs will still be in widespread use. As EPA noted in support of its cancellation proceeding:

> The scope of this action is very narrow. Commercial, agricultural and professional users (including public health officials, pest control operators (PCOs), and other occupational applicators) are not affected because they are not significant users of the products identified in the NOIC and will continue to have access to the same types of rodenticide products.[98]

SGARs will still be available to anyone purchasing them in bulk in agricultural supply stores and will also be widely used by commercial applicators. Recognizing the threats of widespread use by non-commercial applicators California prohibited the use and sales to non-licensed professionals by making SGARs restricted materials.[99] Products containing SGARs as active ingredients comprise as much as 80% of rodenticide sales to professional applicators.[100]

Even with additional regulations by the EPA and Cal DPR, SGARs will still pose unreasonable adverse effects on the environment and public health. SGARs will still be able to bioaccumulate because of their long half-lives in organisms.[101] The ability of SGARs to bioaccumulate from the target organism to upper level predators will continue to cause exposure and mortality for a range of wildlife species that eat commensal rodents and rodents targeted with SGARs including, but not limited to, hawks, owls, eagles, foxes, coyotes, bobcats, cougars, and bears. SGARs will also be directly consumed by non-target

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[96] EPA Cancellation 2014.
[97] DPR Statement 2014.
[98] EPA Statement 2013, *Statement of Reasons and Factual Basis for Notice Intent to Cancel Registrations of, and Notice of Denial of Applications for Certain Rodenticide Bait Products* (January 29, 2013) available at http://www.epa.gov/oalj/filings/Reckitt_13-03-14_EPA_StatementOfReasonsNOIC.pdf at 15.
[99] DPR Notice 2013, California Department of Pesticide Regulation, Notice of Proposed Regulatory Action available at www.cdpr.ca.gov/docs/legbills/rulepkgs/13-002/notice.pdf
[100] Chiri 2006, at 11.
[101] DPR 2013, at 3.

organisms including pets and humans. Greater restrictions on use and exposure are in the public interest and necessary to eliminate the unreasonable adverse effects of SGARs.

VI. Conclusion

Numerous lines of evidence have established that SGARs cause unreasonable adverse effects on people, pets, and non-target wildlife. The high risks of SGARs outweigh their benefits relative to non-chemical rodent control methods, FGARs, and non-anticoagulants. The use of SGARs has demonstrably caused the "take" of protected species, in violation of New York State endangered and threatened species laws and in violation of the Migratory Bird Treaty Act and other federal wildlife-protection statutes.

For the reasons listed above, we petition DEC to issue a declaratory ruling pursuant to 6 NYCRR Part 619.1(a)(1) that SGARs meet the statutory and regulatory criteria for classification as restricted pesticides. N.Y. Envtl. Conserv. Law §§ 33-0101(42), 33-0303(3)(d). We further petition DEC pursuant to 6 NYCRR Part 619.1(a)(2) to take regulatory action to classify SGARs as restricted use pesticides and add them to the list of pesticides that may not be distributed, sold, purchased, possessed, or used for any purpose in New York State. 6 NYCRR § 326.2(c).

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Appendix:
Alternatives to Second Generation Anticoagulant Rodenticides

There are numerous alternatives to Second Generation Anticoagulant Rodenticides ("SGARs") that are both accessible and affordable for consumer and professional use. These alternatives are chemical and mechanical based and, most importantly, are not harmful to humans or the environment. Indeed, Integrated Pest Management and habitat modification are necessary components of a long term rodent control strategy. The simple application of rodenticides will not address the underlying problems that attracted the rodent infestation.

A. Non-Chemical Rodent Control

***Habitat modification*:**[102] Non-chemical, community-wide measures are often essential to curing rodent infestations and, importantly, preventing them from occurring in the first place. Simply making changes in human habitation can significantly aid in rodent control. Rodents thrive around humans when we provide them with easy access to food, water, and shelter. Taking these provisions away from them will decrease the likelihood of infestation. Sanitation, exclusion, and proofing are all non-chemical means of combating rodent infestations. "Sanitation" means denying rodents access to food, water, and shelter. This can be accomplished by keeping all food and garbage picked up regularly and stored in rodent-proof containers and pantries. Rodent nesting and shelters can be limited by thinning dense vegetation and removing piles of debris and clutter. "Exclusion" means prohibiting rodents from entering buildings. This can be accomplished by sealing probable points of entry with wire mesh or other materials. "Proofing" is a means of designing structures in a manner that prevents rodent entry.

***Trapping*:** Snap traps, electronic traps, and live-catching traps can effectively control rodent infestations. In addition, traps, unlike poisons, give the applicator clear confirmation that a rodent was captured or killed. Snap traps have a spring mechanism that breaks a rodent's neck when it tries to take bait attached to the trap. Electronic traps are battery-operated and deliver an electric shock that quickly kills rodents. Live traps work by enticing a rodent with bait and trapping it in a container. Many live traps have space to hold multiple rodents. These traps require consumers to find a location to release the rodents. Although by far the most humane option for rodent control, live traps should be used with caution because the Centers for Disease Control warns that captured rats or

[102] *See* Chiri 2006, at 12 (describing habitat modification as a means of rodent control).

mice may urinate and increase the risk of spreading disease.[103] Traps are preferred over rodenticides because, depending on the size and type of infestation, trapping can provide for quicker eradication and avoid the problem of dying or dead rats in public areas or inside walls where it is not easy to get rid of the smell of decay. They are also relatively inexpensive and can be reused.

An Audubon Society article even suggests a homemade device it calls the "better mouse trap," where a bucket, soup can, metal rod, and some peanut butter make a device that, according to one of the organization's members, killed 37 mice between Labor Day and Thanksgiving.[104]

B. Non-Anticoagulant Chemical Alternatives[105]

***Bromethalin*:** Initially registered in 1984, bromethalin is a neurotoxin that kills its rodent victims within one to two days after a single day's feeding. Along with zinc phosphide, bromethalin is considered one of the fastest-acting rodenticides. It blocks nerve impulse transmission, causing paralysis of the central nervous system and respiratory arrest. It is currently registered for the control of commensal rodents in and around homes, industrial and commercial buildings, inside transport and cargo vehicles, and in related port or terminal buildings. Bromethalin may be a better alternative to SGARs because its fast-acting nature makes it much less likely to cause secondary poisoning of non-target species.

***Zinc phosphide*:** First registered in 1947, zinc phosphide is an acute poison that kills target rodents after a single feeding, within one or two days. This makes it one of the fastest-acting rodenticides. Its garlic-like smell may attract certain rodents but repel many non-

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[103] Safe Rodent Control Strategies 2012, Safe Rodent Control Resource Center ("SRCRC"), *Rodent Control Strategies* (2012) available at http://saferodentcontrol.org/site/rodent-control/. Safe Rodent Control also warns against using glue traps because the adhesive used to trap rodents can also trap birds, small animals, lizards, and even pets. These traps also cause undue suffering to captured rodents.

[104] Williams 2013, Ted Williams, *Poisons Used to Kill Rodents Have Safer Alternatives*, Audubon Magazine Online (Jan-Feb 2013) available at http://www.audubonmagazine.org/articles/conservation/poisons-used-kill-rodents-have-safer-alternatives?page=4 (according to the article, the trap is made by "tak[ing] a metal rod, run it through holes drilled in the center of both lids of an emptied tin soup can so the can becomes a spinning drum. Fasten both ends of the rod to the top of a plastic bucket via drilled holes. Coat the can with peanut butter, and fill the bucket with water and a shot of liquid soap (to break the surface tension and thus facilitate quicker, more humane drowning). Mice and rats jump onto the can, and it spins them into the water.").

[105] UC Ag & Nat. Res. 2011, University of California Agriculture & Natural Resources, *Pests of Homes, Structures, People, and Pets: House Mouse*, UC Integrated Pest Management Online (Revised October 2011) available at: http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7483.html#MANAGEMENT.

target species, which could limit primary poisoning of non-target wildlife. Zinc phosphide kills rodents by reacting with moisture in the gastrointestinal tract to form lethal phosphine gas. Zinc phosphide is the most commonly used rodenticide for agricultural purposes. All above-ground uses of zinc phosphide to control field rodents are classified as restricted use. Zinc phosphide may be a better alternative to SGARs because its fast-acting nature means it is less likely to cause secondary poisoning of non-target species.

***Cholecalciferol*:** Also known as Vitamin D3, cholecalciferol kills its victims by causing calcium from the bone matrix to enter the blood plasma, which leads to death from hypercalcemia within two to several days after ingestion of a lethal dose. It was first registered in 1984, and is currently registered for the same uses as for bromethalin. Cholecalciferol may be a better alternative to SGARs because its quicker speed of kill may limit the potential for secondary poisoning. It is also less toxic in small amounts.

C. First Generation Anticoagulant Rodenticides

The FGARs chlorophacinone, and diphacinone are registered for use in the United States and New York.[106] FGARs are a safer alternative to SGARs because they are generally less toxic and have shorter half-lives, thus limiting their exposure time in the environment. Rodents must consume several feedings worth of FGARs before they obtain a lethal dose. This makes both primary and secondary poisoning of non-target species less lethal. Furthermore, though both FGARs and SGARs can be treated with vitamin K1, accidental FGAR poisoning is typically easier to treat due to FGARs' lower toxicity.

While there is evidence that certain populations of rats and mice have developed resistance to FGARs such as warfarin[107], the question as to what degree resistance hinders the effectiveness of FGARs is unclear. As the EPA noted in its 2008 Risk Mitigation Decision ("RMD"), it is unclear whether resistance exists and to what extent it presents a problem because there have been no systemic studies of FGAR resistance in the United States for nearly 30 years.[108]

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[106] *E.g*. d-CON Bait Station Kills Mice (EPA Reg. # 3282-102), Rat and Mouse Killer with Diphacinone (EPA Reg. # 61282-41)

[107] *See* Kaukeinen & Rampaud 1986 (discussing studies on warfarin-resistant rodents and how brodifacoum may be effective against these populations).

[108] EPA 2008, at 23.

An analysis from 1980 indicates that Norway rat populations in which resistance exceeded 5% have been documented in 16 U.S. cities.[109] However, even if there is some documented resistance, it does not mean that a method is ineffective. It is possible to fight resistance by alternating periods of anticoagulant baiting with periods of no anticoagulant exposure, especially when used in conjunction with sanitation measures.[110] It may also help to use multiple methods of rodent control in combination, such as eliminating the majority of a rat population with rodenticides and the remaining resistant members with non-rodenticide control methods such as traps. Lastly, EPA has stated that "[a]lthough there is some evidence that in some situations first generation anticoagulants may be less effective against house mice than brodifacoum and difethialone, first generation anticoagulant products nevertheless demonstrate sufficient effectiveness to control target pests."[111]

***Warfarin*:** Warfarin is the first anticoagulant rodenticide, initially registered in 1950. It has a much shorter half-life than brodifacoum, which makes long-term bioaccumulation less likely.[112] Like all FGARs, warfarin must be ingested over several days to administer a lethal dose. Warfarin may be a better alternative to SGARs because of its decreased chance of causing both primary and secondary poisoning of non-target wildlife and because treating accidental warfarin poisoning may be quicker than treating accidental SGAR poisoning.

***Diphacinone*:** Diphacinone was first registered in 1960 and usually multiple feedings are required to kill rodents. It has a low primary poisoning risk to birds and mammals, and a moderate and high secondary poisoning risk to birds and mammals, respectively.

***Chlorophacinone*:** Chlorophacinone was first registered in 1971. Although it may kill some rodents after a single feeding, usually multiple feedings are required. Death occurs within three to ten days. It has a low primary poisoning risk to birds and mammals, and a low and high secondary poisoning risk to birds and mammals, respectively.

As this discussion illustrates, there are numerous other means of controlling rodent populations. Most of these methods are far less toxic and risky than SGARs but are nearly as effective and economically viable. In the long run, these alternatives might even prove more effective than SGARs, because they do not eliminate the mammals and birds that help to naturally keep rodent populations in check.

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[109] Chiri 2006, at 15 (citing Frantz & Padula, 1980).
[110] Chiri 2006, at 15 (citing Frantz & Padula, 1980; Frantz & Madigan, 1998).
[111] EPA Draft NOI 2011, at 61.
[112] DPR 2013, at 3.

[i] Photo courtesy of Jeremy Soto (James Castle) via Creative Commons with some rights reserved (https://creativecommons.org/licenses/by-nc-sa/2.0/). This photo has been cropped.

In March 20012, Lima was diagnosed by a necropsy with "[f]atal hemorrhage related to exposure to the anticoagulant rodenticides, principally bromadiolone." She also showed exposure to other second generation anticoagulant rodenticides, including brodifacoum and difethialone. New York State Department of Environmental Conservation-Wildlife Health Unit, Case Report, WHU No.: 120095 (March 27, 2012) available at: http://www.dec.ny.gov/docs/wildlife_pdf/nycrthreports0412.pdf (last accessed May 2, 2014).