From:	Murray, Maureen E
To:	Russell Wasem
Cc:	Mastrota, Nicholas; Miller, Robert; Parsons, Laura; Housenger, Justin; Anderson, Brian
Subject:	RE: rodenticide data
Date:	Tuesday, May 07, 2013 2:30:51 PM
Attachments:	Murray rodenticide data.xlsx Murray AR map.png

Hello Rusty,

Here is the newest bird of prey rodenticide screening data I have. My goal in collecting these data originally had been to see if I could detect a change in what these birds were exposed to following the risk mitigation measures. Of course, given the non-compliance issue, the data don't truly reflect the effectiveness or consequences of the RMD, but I hope they may be of some use. Although this data set is small, it's probably safe to say that there's still a lot of brodifacoum out there.

An excel spreadsheet is attached. The abbreviations used for the species of birds in the spreadsheet are: RTHA: red-tailed hawk, EASO: eastern screech owl, BDOW: barred owl. Birds in which I diagnosed the cause of death as rodenticide poisoning are highlighted in bold. Also attached is a map showing the locations where the birds were recovered at the city/town level.

Below I have addressed each of your questions individually. Please let me know if there is anything that requires further clarification or if there are other questions I can address.

Maureen

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(1) Identification and concentration of the chemical(s):
See spreadsheet.

(2) Location and condition of the animal when found:
See spreadsheet. All cities and towns are in Massachusetts. Most birds were presented to Tufts Wildlife Clinic alive (with exceptions noted as "dead on arrival"). Whether the bird died or was euthanized, along with the reason for death or euthanasia are noted in the spreadsheet.

The attached map shows the locations where the birds were recovered at the city/town level (not exact location within the city/town) to give a general idea of where the samples are from.

(3) Any general information regarding exposure if known -Any evidence that any bird consumed a house mouse, Norway rat or roof rat (irrespective of whether the rodent might have been carrying rodenticides)?
All birds in this data set, except one, had no stomach contents present at the time of necropsy, so unfortunately I cannot address this question. The one bird that did have prey in its gizzard at the time of death was a red-tailed hawk in which I diagnosed the cause of death as anticoagulant rodenticide poisoning. This bird had a snake in its gizzard. This is noted in the spreadsheet.

(4) Information on the chemical screen methods used to identify the chemical (what chemicals were screened - FGARs or bromethalin?)
I screened for FGARs (including chlorophacinone and diphacinone) and SGARs as well as for bromethalin. I did not detect FGARs or bromethalin. Liver tissue was tested for FGARs/SGARs. The tissue tested for bromethalin is noted in the spreadsheet. The toxicologist with whom I worked (Dr. Bob

Poppenga at California Animal Health and Food Safety lab at UC Davis) had suggested fat as the best tissue to screen for bromethalin. Some birds were too emaciated to obtain fat, so in these birds brain was screened. The samples for bromethalin testing were protected from light. Specific details on methodology I can obtain from Dr. Poppenga if you need them.

I should note that although I did not detect FGARs or bromethalin, I do not know how widely used these products are in this area at this point. So whether these negative findings reflect a lack of use (given that consumers can still purchase brodifacoum products) or provide support for FGARs and bromethalin potentially posing less risk to birds of prey cannot be determined without continued testing once FGARs and bromethalin are the only products on the consumer market. Also, I am waiting for histopathology results on one bird that had unusual neurologic signs to rule out evidence of bromethalin toxicosis in spite of the negative lab result.

(5) Methods for identifying the poisoned animals (chance encounters, animals brought to clinic , etc)
-Did you test all animals you were presented? If no, what was the decision process for determining which animals were analyzed?

The methods were identical to those used in my 2011 study. In summary, I chose to sample 4 species of birds of prey commonly seen at the Tufts Wildlife Clinic (red-tailed hawks, barred owls, great horned owls, eastern screech owls). These are the same 4 species in the 2011 study, which I chose to screen again with the aim of comparing pre- and post- 2011 data in the same 4 species. The birds were all brought to the Clinic because they were injured or ill. I sampled all birds of these species that died or were euthanized due to their injury or illness, so I sampled regardless of the presence of signs of rodenticide poisoning. In the recent data, there are no great horned owls represented because none died or were euthanized at the Clinic during the sampling period. The total number of birds was dictated entirely by available funds. (Funding was from a grant through a private organization, the Animal Welfare Institute.)

(6) Did the species distribution seem consistent with the local large raptor population? Were any species notably over- or under-represented?
As noted above, I chose to focus on 4 species commonly seen at the Tufts Wildlife Clinic, of which 3 are represented in these data. All 3 species were highly exposed to SGARs, with 18/20 birds positive.

(7)How did 2012-2013 compare to 2006-2011? Does she see any differences over time w/r/t AIs, species, etc.?
The 2012-2013 data set is small—only 20 birds compared to 161 birds for 2006-2010. Keeping this in mind, the new data shows continued high exposure to SGARs (86% of total birds in 2006-2010; 90% of total birds in 2012-2013). In both data sets, all species tested show high exposure. In the new data, brodifacoum was present in all positive birds.

One difference I see is in the numbers of birds with exposure to multiple SGARs in the new data. In the 2006-2010 data, 136/139 positive birds had residues of brodifacoum only. One bird had residues of bromadiolone only. Just two birds had residues of both brodifacoum and difethialone. However, in the new data 7/18 positive birds have residues of 2 or more SGARs (details in spreadsheet).

In looking at the location information in relation to birds with residues of multiple SGARs, those with multiple residues tend to be from more urban areas (around Boston, also Lynn and Lowell which are urban areas, and Foxboro which is the location of the stadium where the New England Patriots play). Those with residues of brodifacoum only are predominantly from suburbs west of Boston. The two negative birds are from towns around the Quabbin Reservoir (the water supply for the city of Boston), which is a less developed area.

My presumption is that the exposure in the western suburbs is from homeowner use; however, whether this use reflects homeowners still using store-bought products containing brodifacoum or homeowners employing licensed applicators using brodifacoum cannot be determined.

From: Russell Wasem [Wasem.Russell@epa.gov]
Sent: Wednesday, May 01, 2013 9:00 AM
To: Murray, Maureen E

Cc: Mastrota, Nicholas; Miller, Robert; Parsons, Laura; Housenger, Justin; Anderson, Brian
Subject: RE: rodenticide data

Good Morning Dr. Murray,

We greatly appreciate your offer. After conferring with the team on your offer, so much was requested I am tempted to ask for everything. I was also told you can email the incident information directly to my colleagues that manage the EIIS system (Those cc'ed, minus Laura and Brian).

Specifically if you are able and willing to provide, we are interested in the following additional information:

(1) Identification and concentration of the chemical(s)

(2) Location and condition of the animal when found

(3) Any general information regarding exposure if known -Any evidence that any bird consumed a house mouse, Norway rat or roof rat (irrespective of whether the rodent might have been carrying rodenticides)?

(4) Information on the chemical screen methods used to identify the chemical (what chemicals were screened - FGARs or bromethalin?)

(5) Methods for identifying the poisoned animals (chance encounters, animals brought to clinic , etc). -Did you test all animals you were presented? If no, what was the decision process for determining which animals were analyzed?

(6) Did the species distribution seem consistent with the local large raptor population? Were any species notably over- or under-represented?

(7) How did 2012-2013 compare to 2006-2011? Does she see any differences over time w/r/t AIs, species, etc.?

Regards,
Rusty

540-846-5828

-----Original Message-----
From: Murray, Maureen E [mailto:Maureen.Murray@tufts.edu]
Sent: Tuesday, April 30, 2013 2:30 PM
To: Russell Wasem
Subject: rodenticide data

Hello Mr. Wasem,

I was a member of the 2011 FIFRA SAP on rodenticides. I have a limited amount of new data I collected as a follow up to my 2011 study on anticoagulant rodenticides in birds of prey (Murray, M. Anticoagulant rodenticide exposure and toxicosis in four species of birds of prey presented to a wildlife clinic in Massachusetts, 2006-2010. J Zoo Wildl Med. 2011;42(1):88-97). In summary, I tested 20 raptors between Oct 2012 and Feb 2013; 18 (90%) were positive for SGARs; 3 (15%) died from SGAR toxicosis. I'm wondering, since it will be a while before I can publish, if it would be useful to supply this data directly to you? I am happy to send you additional details (SGARs identified and concentrations) if this would be of interest. Otherwise I will submit the information through the incident reporting system.

Regards,