INTERIM REPORT ON THE ENVIRONMENTAL RISK ADVISORY COMMITTEE STUDY OF PESTICIDES AND LOBSTERS

From
The Maine Board of Pesticides Control

To

The Joint Standing Committee on
Agriculture, Conservation and Forestry
127th Maine State Legislature

January, 2015

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INTERIM REPORT ON THE ENVIRONMENTAL RISK ADVISORY COMMITTEE STUDY OF PESTICIDES AND LOBSTERS

SECTION I: INTRODUCTION

In February 2014, the Maine Board of Pesticides Control (BPC) acknowledged there were multiple indicators suggesting that a careful and methodical analysis of the potential threats of pesticide use to Maine's lobster fishery would be both timely and appropriate. Consequently, the BPC voted to convene an Environmental Risk Advisory Committee (ERAC) to "examine whether current pesticide residues have the potential to affect the lobster industry in Maine directly or via impact on other marine organisms." Maine's Joint Standing Committee on Agriculture, Conservation and Forestry, in a letter to the BPC, supported the formation and purpose of the ERAC and requested reports in January 2015 and January 2017. This report is in response to the Committee's request.

SECTION II: BACKGROUND

The BPC has regulatory oversight responsibility covering the use and distribution of pesticides in the State of Maine. As part of its responsibilities, the BPC monitors emerging scientific research on pesticides and their potential effects. One area of recent research that the BPC staff has been tracking is the presence, accumulation and potential impacts of synthetic pyrethroid insecticides in aquatic sediments.

Based on research conducted in other states, the BPC determined there would be value in conducting in-state sediment sampling as one way of evaluating the applicability of national research. Consequently, over a three-year period, between 2008 and 2010, the BPC staff collected sediment samples from a small number of streambeds in the greater Portland area. The samples were analyzed at the University of Maine for common synthetic pyrethroid insecticides. The project provided evidence that this class of insecticides was likely present in Maine's aquatic sediments.

In January of 2014, a bill was introduced into the Maine Legislature that sought to prohibit the use of two insecticides commonly used for mosquito control in many states: methoprene and resmethrin. LD 1678 was based on a similar bill from Connecticut that was intended to protect the local lobster fishery from potential adverse effects. The BPC and the Maine Department of Agriculture, Conservation and Forestry both opposed LD 1678 for a variety of reasons:

- The Connecticut bill was based on research that is no longer considered valid.
- There is currently no compelling evidence that these two insecticides pose unreasonable threats to Maine's lobster fishery.
- At this time, use of both methoprene and resmethrin in Maine is largely limited to relatively small amounts in flea and tick control products for pets.
- Unlike many states where governmental mosquito control programs are well established, Maine does not currently use, nor has it historically used, either insecticide targeted by LD 1678 for mosquito control. However, given that mosquito-borne diseases are on the rise in Maine, it would be prudent to keep control options available should a mosquito-borne disease emergency arise.

- Methoprene fills a potential niche for controlling mosquito larvae in circumstances in which the preferred biological larvicides are ineffective. Any use of methoprene in Maine could be carefully managed to minimize any risks to the marine environment.
- Methoprene has a low mammalian toxicity, degrades rapidly in sunlight, is metabolized rapidly in soil, and does not leach.

- Banning products without a careful assessment of what is likely to replace them often results in substitution with higher risk products.
- There are other insecticides that are commonly used in Maine which are more likely to be present in the marine environment where juvenile lobsters are present.
- The public interest would be better served by a systematic assessment of whether pesticides may pose a threat to Maine's lobster fishery.

Maine's Joint Standing Committee on Agriculture, Conservation and Forestry held a public hearing and work session on LD 1678 and voted the bill out of committee as ought-not-to-pass. The Committee agreed that there was insufficient scientific basis for banning two mosquito insecticides not currently used in Maine and preferred the recommended path of assessing the broader question about whether pesticides—in general—present a risk to the fishery. Consequently, the Committee chairs wrote to the BPC agreeing with the formation of an ERAC and asking the BPC to report on its progress in January of 2015 and 2017.

SECTION III: ENVIRONMENTAL RISK ADVISORY COMMITTEE AND LITERATURE REVIEWS

The BPC has convened an ERAC on multiple occasions over the last 25 years to evaluate environmental concerns specific to Maine. ERAC membership varies according to the issue at hand, with in-state expertise selected based on the nature of the particular concern. The most recent ERAC looked at the risks associated with browntail moth spraying along the Maine coast and also focused on the potential impacts to the lobster fishery.

At its February 21, 2014 meeting, the Board approved the formation of an ERAC composed of scientists from the Department of Marine Resources, the Department of Environmental Protection, the University of Maine system, and is assisted by the BPC staff. The ERAC met on April 18, 2014 and agreed on a plan to collect marine sediments from the edge of the intertidal zone and submit those samples for analysis.

At the same time, the BPC staff embarked on a process to review all of the pesticide active ingredients used in the state to determine which are the top priorities in relation to lobsters. First, use patterns were researched to determine which active ingredients might have the potential to reach marine sediments and thereby expose developing lobsters to pesticide residues. This review generated a list of approximately 725 pesticide active ingredients, which were then grouped based on modes of action and their toxic effects on the biological pathways found in aquatic and sediment dwelling species. Using an environmental fate assessment based on EPA data, the list was further refined to only those active ingredients likely to be found in sediment. Active ingredients given further consideration were those with both a high toxicity to aquatic and sediment dwelling species and a likelihood to persist in sediment. The staff then worked with certified laboratories to determine which of those active ingredients could be identified using existing screening methods. This assessment produced the

following list of priority compounds for analysis: pyrethrins, synthetic pyrethroids (including resmethrin), methoprene and fipronil. If other compounds of concern are identified, they will be evaluated at a later time.

The BPC is currently working with a non-profit contractor as well as the Muskie School of Public Health at the University of Maine System to conduct literature reviews for all active ingredients of concern. The literature reviews will provide the most current and scientifically defensible information available to better evaluate potential risks from pesticide use to Maine's lobster fishery.

SECTION IV: 2014 MARINE SEDIMENT SAMPLING PROJECT

The BPC ERAC recommended that the BPC staff, in consultation with the Department of Marine Resources, collect marine sediment samples near the outer edge of the intertidal zone and submit those samples for pesticide analysis. The BPC then sought laboratories with the appropriate expertise.

Pesticide residue analysis—especially in sediments—is a complicated and expensive proposition because:

- There are nearly 1,000 different pesticide active ingredients;
- Most pesticide active ingredients are large, complex organic molecules;
- Sediments are also composed—in part—of large, complex organic molecules; and
- There is not a lot of demand for pesticide residue analysis.

As a result, there are very few qualified laboratories. Two laboratories were selected for this work based on their experience, analyte coverage and method sensitivity: the Montana State Analytical Laboratory and the Southwest Research Institute.

The BPC calculated that the budget allowed for 20 sediment sampling sites. Sites were selected based on:

- Proximity to inlets that drain developed and agricultural areas near the coast;
- The presence of fine-grained sediments; and
- Distribution covering all the major watersheds.

Sediment sampling was delayed in 2014 due to complications identifying competent laboratories and getting contracts approved. Samples were collected between August 27 and September 10, 2014 and shipped to the two contract laboratories.

The Montana Analytical Laboratory, which ran the more sensitive analysis for pyrethroids, detected bifenthrin (a synthetic pyrethroid) at 11 of the 20 sample sites and cypermethrin (another synthetic pyrethroid) at one site. Southwest Research Institute reported no detections. Neither methoprene nor resmethrin—the targets of LD 1678—were detected. Complete results are shown in Appendix III. These data are preliminary and are not appropriate for a risk assessment process pending verification and correction for organic carbon content of the sediment.

The focus of the ongoing literature review is to assess whether the presence of bifenthrin and/or cypermethrin in intertidal marine sediments at the reported levels poses a risk to the lobster. However,

nothing in the Environmental Protection Agency's current pesticide registration documents suggests that an unreasonable risk to aquatic invertebrates exists.

SECTION V: NEXT STEPS

During 2015—to the extent that resources allow—the BPC plans to continue its assessment of the potential impacts of pesticides on the lobster resource as follows:

- The ERAC will reconvene to evaluate the 2014 methods and and make recommendations for 2015.
- Sediment sampling will likely be repeated with possible improvements/adjustments based on lessons learned from the 2014 sampling and recommendations made by the ERAC.
- Storm water samples will be collected from the same approximate locations as the sediment samples and analyzed at the Montana Analytical Laboratory using their Universal Water Screen which tests for at least 96 commonly applied pesticides.
- The scientific literature review will continue, with priority given to compounds detected in the sampling program. Bifenthrin and cypermethrin will now become the highest priority compounds for review. The purpose of the literature review is to evaluate whether compounds detected pose a potential threat to the lobster fishery.
- Additional sampling may occur based on available funds and recommendations made by the ERAC.

When results are available from the 2015 sampling and literature review activities, the ERAC will meet again and determine whether additional inquiry is warranted. ERAC findings and any potential recommendations will be presented to the full BPC for consideration. The BPC will then determine whether any remedial actions are appropriate. A follow-up report detailing the BPC findings will be submitted to the Joint Standing Committee on Agriculture, Conservation and Forestry in January of 2017.

APPENDIX I

State of Maine
ONE HUNDRED AND TWENTY-SIXTH LEGISLATURE
COMMITTEE ON AGRICULTURE, CONSERVATION AND FORESTRY

March 18, 2014

Henry Jennings, Director, Board of Pesticides Control
Department of Agriculture, Conservation and Forestry
28 State House Station
Augusta, ME 04333-0028

Dear Mr. Jennings,

Earlier this session, the Joint Standing Committee on Agriculture, Conservation and Forestry (ACF) voted unanimously "ought not to pass" on the above referenced bill. LD 1678 proposed to prohibit the use of methoprene and resmethrin, two chemicals used for mosquito control, in any body of water that drains into the Gulf of Maine or on land from which runoff could enter into any such waterway. While the ACF Committee did not agree with the proposed course of this legislation, we commend the sponsor for bringing this issue forward.

In written testimony, the sponsor of LD 1678, Representative Kumiega, expressed concerned about the negative impact methoprene and resmethrin may have on lobster populations. According to the University of Maine's Lobster Institute, Maine is the nation's largest lobster producer – bringing in over three-quarters of the nation's catch. The total impact of Maine's lobster industry on the state economy is approximately $1.7 billion.

It is our understanding that the Board of Pesticides Control (BPC) has volunteered to convene an Environmental Risk Advisory Committee (ERAC) to look at all pesticides and assess potential adverse impacts of pesticide use on the state's lobster resource. We also understand that BPC, in collaboration with the Department of Marine Resources (DMR), will begin identifying high priority areas for sampling to identify which pesticides are most prevalent in the marine environment.

We respectfully request that BPC provide the ACF Committee an interim report by January 2015 and a final report by January 2017 on the work of the ERAC and on the results of BPC and DMR sampling efforts. Thank you for your efforts on this important issue.

Sincerely,

Sen. Eloise A. Vitelli, Senate Chair

Rep. James F. Dill, House Chair

Cc: Members, Joint Standing Committee on Agriculture, Conservation and Forestry
Members, Joint Standing Committee on Marine Resources
Hon. Walter Whitcomb, Commissioner, DACF
Patrick C. Keliher, Commissioner, DMR
Representative Walter Kumiega

APPENDIX II: ENVIRONMENTAL RISK ADVISORY COMMITTEE MEMBERS

Chair
Curtis C. Bohlen, Ph.D
Board of Pesticides Control Member
Director, Casco Bay Estuary Partnership
University of Southern Maine, Muskie School of Public Service

Environmental Toxicologist
John Wise, Ph.D
Wise Laboratory CIAET
University of Southern Maine

Terrestrial Entomologist
James Dill, Ph.D, IPM Entomologist
University of Maine Cooperative Extension, Pest Management Office

Lobster Biologist
Carl Wilson
Department of Marine Resources, Marine Fisheries Laboratory

Expert on Lobster Development and Mosquito Insecticides
Michael N. Horst, Ph.D
Mercer University, Macon Georgia

Marine Biologist
Kohl Kanwit, Public Health Bureau Director
Department of Marine Resources

Expert on Pyrethroid Residues in Sediment and Pyrethroid Analytical Chemistry
Lawrence LeBlanc, Ph.D
University of Maine, School of Marine Sciences

Aquatic Entomologist
Leon Tsomides
Maine Department of Environmental Protection, Land and Water Quality

Marine Biologist
Jim Stahlnecker
Maine Department of Environmental Protection, Land and Water Quality

APPENDIX III 2014 Marine Sediment Sampling Results

Montana Analytical Laboratory Results

Table 1. Montana Analytical Laboratory results of analyses of intertidal sediment, collected August 27 to September 10, 2014. (RL = reporting limit, ND = non-detect).

Map Key	Site	Analyte														
		Allethrin (RL=0.20 ppb)	Bifenthrin (RL=0.045 ppb)	cis-Permethrin (RL=0.20 ppb)	Cyfluthrin (RL=0.20 ppb)	Cyhalothrin, total (RL=0.27 ppb)	Cypermethrin (RL=0.20 ppb)	Deltamethrin (RL=0.40 ppb)	Fenpropathrin (RL=0.20 ppb)	Fenvalerate (RL=0.13 ppb)	Phenothrin (RL=2.0 ppb)	PBO (RL=2.0 ppb)	Prallethrin (RL=0.20 ppb)	Resmethrin (RL=2.0 ppb)	Tetramethrin (RL=0.14 ppb)	trans-Permethrin (RL=0.20 ppb)
1	Kittery	ND	0.088	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2	Ogunquit	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
3	Biddeford	ND	0.76	ND	ND	ND	5.0	ND	ND	ND	ND	ND	ND	ND	ND	ND
4	S. Portland	ND	1.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
5	Portland	ND	0.32	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
6	Yarmouth	ND	0.56	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7	Freeport	ND (RL=0.45)*	0.091	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
8	Brunswick	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9	Bath	ND	0.054	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
9	Bath (duplicate)	ND	0.066	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
10	Boothbay Harbor	ND (RL=0.45)*	0.26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
11	Belfast	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
12	Rockland	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
13	Camden	ND	0.060	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
14	Ellsworth	ND (RL=0.45)*	0.42	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
15	Blue Hill	ND	0.26	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
16	Milbridge	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
17	Addison	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
18	Jonesboro	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
19	East Machias	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
20	Cobscook Bay SP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

* Higher reporting limits are due to interference in analyses caused by chemical composition of sediment samples.

Southwest Research Institute Results

Table 2. Southwest Research Institute results of analyses of intertidal sediment, collected between August 27 and September 10, 2014. Reporting limits for the pyrethrins and pyrethroids varied by sample site (0.081-0.20 ppb) due to interference caused by the chemical composition of the sediments. Prallethrin was not reported (NR) due to inability to obtain a valid analysis.
(ND = non-detect, NR = not reported)

Map Key	Site	Analyte														
		Allethrin, Total	Bifenthrin	cis-Permethrin	Cyfluthrin, Total	Cyhalothrin, Total	Cypermethrin, Total	Deltamethrin, Total	Fenpropathrin	Fenvalerate	Phenothrin	PBO	Prallethrin	Resmethrin	Tetramethrin	trans-Permethrin
1	Kittery	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
2	Ogunquit	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
3	Biddeford	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
4	S. Portland	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
5	Portland	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
6	Yarmouth	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
7	Freeport	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
8	Brunswick	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
9	Bath	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
9	Bath (duplicate)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
10	Boothbay Harbor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
11	Belfast	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
12	Rockland	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
13	Camden	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
14	Ellsworth	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
15	Blue Hill	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
16	Milbridge	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
17	Addison	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
18	Jonesboro	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
19	East Machias	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND
20	Cobscook Bay SP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND

Southwest Research Institute Results continued

Table 3. Southwest Research Institute results of analyses of intertidal sediment, collected between August 27 and September 10, 2014. Reporting limits for the pyrethrins and pyrethroids varied by sample site (0.081-0.20 ppb) due to interference caused by the chemical composition of the sediments. Imiprothrin and pyrethrum were not reported (NR) due to inability to obtain a valid analysis. (ND = non-detect, NR = not reported)

Map Key	Site	Analyte										
		Etofenprox	lambda-Cyhalothrin	Imiprothrin*	Pyrethrum*	tau-Fluvalinate , Total	Tefluthrin	Methoprene	Fipronil	Fipronil desulfinyl	Fipronil sulfide	Fipronil sulfone
1	Kittery	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
2	Ogunquit	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
3	Biddeford	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
4	S. Portland	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
5	Portland	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
6	Yarmouth	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
7	Freeport	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
8	Brunswick	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
9	Bath	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
9	Bath (duplicate)	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
10	Boothbay Harbor	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
11	Belfast	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
12	Rockland	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
13	Camden	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
14	Ellsworth	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
15	Blue Hill	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
16	Milbridge	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
17	Addison	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
18	Jonesboro	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
19	East Machias	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND
20	Cobscook Bay SP	ND	ND	NR	NR	ND	ND	ND	ND	ND	ND	ND

Map 1. 2014 Marine Sediment Sampling Sites