Summary of

Mosquito Control for the 21st Century Task Force Comments

Comments have been lightly edited for spelling, grammar, clarity. Comments are organized by the most relevant section of the report, with overarching or general comments first. Comments are listed in the order they were received.

Includes comments received from task force members by September 17, 2021.

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General Comments:

Russ Hopping

Overall, the report could do a better job at distinguishing between nuisance control versus control for human health.

Heidi Ricci

[footnote 1: Note: The report abbreviates the task force as MCTF, but the full title is important, as the legislature specifically formed the task force to bring this antiquated program into the Twenty-First Century. Therefore I use the acronym MC21CTF.]

The report includes a compilation of available information about mosquito control programs and practices in Massachusetts, and identifies significant gaps in that need to be addressed. These include gaps in record keeping and analysis, discrepancies between best available industry standards and science vs. actual practice, and lack of information about the impacts of mosquito control practices on human health and the environment. It confirms that significant reforms are needed to bring the program into the 21st Century. It also confirms that the program is fragmented and inconsistent. The focus for reform should be on protecting human health and the environment, based on science and with systems established to monitor efficacy and cost-effectiveness. The rights individuals and communities to avoid undesired exposures to toxic chemicals must also be respected.

The report concluded that there is no quantifiable data available on the effectiveness of mosquito control as currently practiced (p.184), as well as significant gaps in science and an inability of the consultant to conduct a quantifiable analysis of the impacts of mosquito control pesticides on human health (p.138) or on the environment and ecological health (p.301). Despite this, Section 8 of the report attempts to create a model of potential mosquito-borne disease impacts that would be associated with curtailing or discontinuing current practices. This model lacks scientific rigor and is based on fundamentally flawed assumptions. It should not be given any weight in considering recommendations for the future of the program.

Title and Introduction: The report is entitled “Mosquito Control Task Force Report,” but it was not produced by the task force. It would more correctly be entitled something like “Consultant Report to the MC21CTF.” The introductory paragraphs at the beginning of the report do not accurately characterize the process by which it was produced. This introduction correctly states that the Act calls for the task for to commission an independent expert study. However, the task force actually had a limited role and the production of the report was coordinated between the consultant and the agencies directly. The MC21CTF provided input to EEA on the scope for the Request for Proposals that was issued through the State’s procurement system, and reviewed the sole bid that was received in relation to the bid criteria. The task force had no opportunity to review and provide feedback on report drafts, although the state agencies did. It is unclear whether this internal agency review also included opportunities for the mosquito districts to review and provide comments on the draft report. In any case, the report is not a product of the MC21CTF, and the task force did not “commission” the study as stated in the introduction.

Ecotoxicology and Human Health Expertise and Assessment: The MC21CTF voted to approve the bid, on the condition that EEA would negotiate with ERG to ensure that the necessary expertise on ecotoxicology and human health effects of pesticides would be included on the consultant team. When the report was presented to the task force on 9/2/21, the task force was informed that those additions to the team had not occurred as originally planned, but that ERG had attempted to cover these subjects through consultation with other, unidentified experts. The lack of this expertise on the consultant team is, unfortunately, reflected in those portions of the report.

Ecotoxicology and Human Health Expertise and Assessment: The MC21CTF voted to approve the bid, on the condition that EEA would negotiate with ERG to ensure that the necessary expertise on ecotoxicology and human health effects of pesticides would be included on the consultant team. When the report was presented to the task force on 9/2/21, the task force was informed that those additions to the team had not occurred as originally planned, but that ERG had attempted to cover these subjects through consultation with other, unidentified experts. The lack of this expertise on the consultant team is, unfortunately, reflected in those portions of the report.

The RFP included:

• *Research, analyze, and report on the quantifiable impact of chemical-based mosquito control aerial and ground-based spraying in Massachusetts.* o *When determining quantifiable impacts, report must account for, but is not limited to: Public health; Human health; Medical; Agricultural land including organic farms, Farm animals; Apiaries; Commerce; Recreation; Tourism; Drinking water sources including groundwater and surface water, and with consideration of established exclusion buffer zones around active public water system reservoirs and/or inlets during aerial spraying events; Ecological health including aquatic ecosystems; Native wildlife species including, but not limited to, birds, invertebrates (e.g. bees, odonates, lepidoptera, beetles, sensitive aquatic invertebrates), fish, and other pollinators and mosquito predators.* [*footnote 2: Request for Proposals: Mosquito Control Task Force Study. The Executive Office of Energy and Environmental Affairs seeks applicants to conduct a study that evaluate the Massachusetts mosquito control process. BD-21-1042-ENV-ENV01-58054. ENV 21 POL 03*]

The report, in Sections 4, acknowledged that there is literature indicating potential human health impacts of mosquito control pesticides that are still under study by the EPA and others. Section 4 also summaries toxicity categorization of mosquito control pesticides, Sections 4 and 8 note that the pyrethroid pesticides in particular are highly toxic to a wide range of organisms. These include pollinators like bees (including hundreds of species of native bees), beetles, flies, and moths, as well as fish and aquatic invertebrates. They are also highly toxic to other beneficial organisms like parasitic wasps and tachnid flies that keep agricultural and forestry pests in check. But there have been few studies on the ecological effects of these pesticides, so little is understood about the impacts, particularly of repeated exposures from routine roadside mosquito spraying operations alone or in combination with other pesticide applications that occur. Table 5-8 in Section 4 indicates no wildlife endocrine or ecotoxicological concerns reported by government agencies for most of the pesticides used in mosquito control. Absence

of data does not mean absence of impact. This should be noted in the corrections/errata section of comments on the report.

Government agencies are not the only source of scientific information on these aspects of the scoped review. There is a good deal of evidence of impacts and the need for further studies in several of the references cited in the report, but that information is not well summarized in the report. Further commentary on this is provided in the Comments section below.

There has been a persistent failure by Massachusetts to study the ecological and human health impacts of mosquito control practices, despite many requests over the past several decades by many organizations and individuals.

Comments on Report 1: Arbovirus History in MA (pg. 2-28)

Sam Telford

Page 15, Table 3-1: P=0.00 chi square 45.04 yates correction df 1 between 2004-2011 and 2012-2020

Page 19, Table 3-3: chi square with yates correction 360.3, P=0.00 between sampling periods

Comments on Report 2: Existing Mosquito Control Policy Structure and its Effectiveness, Challenges Experienced (pg. 29-81)

Helen Poynton

Page 59, regarding statement "Constituents often raise concerns about pesticide use in their communities, and some think an MCD's sole activity is pesticide spraying. Respondents expressed frustration about this perception." - The truth is that MCDs spend more of their budgets on larval and adult mosquito control than any other budget item (Figure 3-3, with some MCDs spending more than half their budget on control activities)– so it's not surprising that it is the case.

Russ Hopping

This report clearly identifies the current decision-making process for controlling mosquitoes in Massachusetts is confusing and is not evidenced-based as little data has been presented. Both decision-making and the transparency of this process need to be improved. Furthermore, while interesting, interviews are subjective, and the Commonwealth should seek a more objective process for evaluating the effectiveness of the current decision-making process and use this as a means of monitoring and communicating actual outcomes of mosquito control. I feel strongly the report should highlight this important point.

OMWM (Report 2 and 5). The Report highlights OMWM as an effective strategy to reduce mosquito habitat. While this may be true, I think it is important to point out that OMWM can be highly deleterious to salt marsh. If the specific OMWN design retains standing water within the marsh it can artificially raise and maintain marsh ground water. If the elevation of ground water is at or near the surface it facilitates marsh subsidence by creating water-logged conditions that stress marsh vegetation and unless corrected can result in vegetation die of and mash collapse as plants die and biomass is lost. While the report correctly identifies this practice is seldom used in Massachusetts anymore, it is a practice that should not be used in salt marsh unless carefully designed to avoid raising ground water. Nature-based efforts to restore the salt marsh hydrology, such as ditch remediation should be invested in instead of OMWM. Having both training and funding from the state and federal level that allow the MCDs to assist in these nature-based restoration efforts would go a long way in creating resilient salt marsh with less mosquito breeding habitat in the Commonwealth.

Comments on Report 3: Opt-outs and Exclusions (pg. 82-106)

Russ Hopping

The opt-out option is progressive and allows residents a choice in being exposed to pesticides and managing for pesticide-free habitats.

Heidi Ricci

Opt Outs

Municipalities and landowners should be able to opt-out from pesticide treatments they do not want, while having access to services such as surveillance, education, and ecologically based source control.

The current system for landowner opt outs is cumbersome and should be streamlined, including an easy electronic method for annual renewal.

Opt-outs for organic farms should not be limited to certified organic farms. Mass Audubon's Drumlin Farm employs sustainable farming practices that exceed organic standards, but the farm has not undergone the certification process. Income from crops at Drumlin Farm exceed $450,000 annually and sales to customers including farmers markets, restaurants, and our Community Supported Agriculture members would be jeopardized if the farm were forced to endure pesticide spraying.

Comments on Report 4: Chemical Composition and Toxicity of Pesticides Used in Ground and Aerial Spraying in MA (pg. 107-174)

Helen Poynton

Page 118, Table 4-2. - Arial spraying of 14,104 gallons on 3,009,831 acres results in 1.68 g d-Pehnothrin/ acre (0.74 lbs d-phenthrin/gal = 335.7g). This would result in 41.5 ng/cm2. Comparing this to the LC50 for *Hyalella azteca* (9.4 ng/L) there is potential for toxicity to aquatic organisms to occur.

Page 126, Table 5-9. - Is it possible to get the area or volumes of the water bodies where the insecticide was sprayed?

Page 146, Table 5-9, suggestion for correction: Why was Hyalella azteca not included in this table with much lower LC50 than the value reported for crustaceans? 96-h LC50 for d-phenothrin is 0.0093 ppb (ug/L) or 9.3 ng/L, according to EPA's OPP Pesticide Ecotoxicity Database: https://ecotox.ipmcenters.org/details.cfm?recordID=33378 *[ERG response: ERG has reviewed this source which is a secondary source utilizing EPA's ECOTOX database. ERG did not find this value in the ECOTOX database itself.]*

Page 156, Resistance screening - Half of the MCDs report doing some level of resistance screening as part of their surveillance activities. Can the task force get more details about how the resistance screening is done and what the results are?

Page 170-173, Tables B-3 through B-6 - many of the values for aerial spraying (0.0025 a.i./A) are less than the average amount for d-phenothrin in MA: 0.0037 lb a.i./acres (based on amounts in Table 4-1 and 4-2). Therefore, the amounts sprayed in MA are likely to exceed RQ for fish and invertebrates.

Priscilla Matton

One correction is found on page 128 in Table 4-7 under Coco Bear oil. Central MA MCD has never used Coco Bear oil in their district. *[Note: ERG concurs with this correction and it has been added to the list of errata.]*

Sam Telford

Page 157, note on the quoted statement "*Any reduction in population is expected to be temporary, lasting no more than 2 weeks."* – This is because of the emergence of new broods that are developing in water at the time the adults are being impacted. "Temporary" is perhaps not the right term. New broods may or may not become risky, that would depend on whether there are viremic animals around when they seek their first bloodmeal.

Page 157, note on the quoted statement "*Mosquito surveillance and weather pattern data are essential in helping to determine need and timing for aerial spray interventions"* – Weather greatly impacts the efficacy of aerial (and ground based) spraying…which is why there is little advance notice of spray operations. The decision for planes to leave is sometimes made a few hours before takeoff. So advance notice to stakeholders can only be made in very general terms, e.g., "we will be spraying sometime this week, depending on weather"

Page 157, note on the statement "The available data show that the total reduction in the number of mosquitoes can range significantly—from 20 to 89 percent—after aerial spraying with pyrethroid compounds. But this reduction is expected to be temporary." – It is not the reduction of the entire mosquito population that is the goal, it is removal of older mosquitoes that have had the chance to take a bloodmeal and thus be infected. Newly emerged mosquitoes have no immediate implications for risk… we don't care if spray kills the new ones because they are not infected and thus pose no risk. Aerial spraying is intended to kill virus-containing mosquitoes (demonstrated to be present by surveillance)… those that pose immediate risk… and only indirectly impact future risk by reducing a new generation of mosquitoes that might become infected. A big gap in demonstrating the efficacy of aerial spraying as an intervention is a way to efficiently assess mosquito age structure.

Page 159, note on the statement "Ultimately, pesticides must be used with caution and consideration to the tradeoffs—for example, the need to remove mosquitoes active at nuisance levels versus the ecological risk that may occur as a result of the application" – Aerial spraying is a different game than truck mounted spraying. This section should be careful to make that distinction. It is also not clear whether there is merit in distinguishing between "nuisance" and public health applications. After all, it is very likely that the majority of EEE cases get infected in their own backyards. Backyard mosquitoes are erroneously thought of as nuisance. The main nuisance species in July in most people's yards is C. perturbans… which we think of as the main candidate for EEE vector.

Russ Hopping

While the report does capture readily available data on pesticide toxicity and risk, primarily from the EPA which per the Report has significant gaps in its evaluation of pesticides, the report would be more powerful if it had captured primary literature that could fill in these gaps, specifically where studies were based on similar products and active ingredients used by the State for controlling mosquitoes. The state should seek to supplement the Report finding with primary literature review and where studies are lacking fund and conduct these studies.

Comments on Report 5: Integrated Pest Management and Non-chemical Mosquito Controls (pg. 175-232)

Priscilla Matton

Multiple places in the document but specifically pg 239 Table 3-1 sections on chemical and adult control. Under Current Practices it states that "No information was identified on how MCDs and municipalities not part of MCDs "decide which larvicide/adulticide to use". This is a false statement- all products are reviewed by the MOU between MA Fish and Wildlife and MDAR. All products that are reviewed by this MOU are the products that MCDs are using. We currently don't use products that have not been approved for use in this document. This review by MA Fish and Wildlife was not mentioned in the ERG report.

Sam Telford

Note on section 7.4.4 (Bats), page 220 – There is no evidence that bats have any impact on mosquito populations; they are opportunistic feeders and bats prefer better energy sources such as moths. Promoting bat populations around homes is not a good thing: the majority of rabies exposures in the U.S. are due to bats.

Heidi Ricci

Lack of Efficacy and Noncompliance with IPM Standards

The report confirms that there is no centralized system for tracking the activities of the mosquito districts. Data on mosquito populations, positive disease detections, breeding source locations, and mosquito control services conducted (education, source reduction, larviciding, adulticiding) cannot be correlated to each other or to the locations of the rare occurrences of EEE or WNV is humans or other animals. Therefore it is not possible to determine the efficacy of their operations. The districts claim to employ Integrated Pest Management (IPM), but the lack of a systematic approach indicates it is not a science-based IPM system.

"While all 11 MCDs, along with other state agencies, participate in larval and adult mosquito surveillance efforts, there is a lack of detailed reporting on their specific IPM activities. Expenditures for each component of IPM are presented in Sections 3.1.2.1 and 3.1.2.2. To date, quantitative assessments of IPM's efficacy at reducing mosquito populations in Massachusetts (both nuisance and vector mosquitoes) and the human health risks from vector mosquitoes have not been undertaken (EEA, personal communication, July 2021)." p. 184

See also Table 3-1 on pp. 238-240. Several aspects of IPM standards recommended by the American Mosquito Control Association are not followed.

Practices vary across districts. Cape Cod has a relatively sophisticated and rigorous approach, and works extensively with local officials including conservation commissions on water management in both salt marshes and fresh water settings. Some of these practices can be ecologically beneficial, e.g. helping to reduce the impacts of sea level rise on salt marshes and enhancing fish access to salt marshes and freshwater wetlands. This district rarely uses adulticides and only in conjunction with positive mosquitoes and high risk of disease in specific locations. While we do not endorse all of these practices (e.g. Bti for nuisance control due to literature data on ecological effects), the overall direction the program should be heading is one that is more ecologically based and data driven.

Some of the districts routinely spray adulticides from trucks even when there is no evidence of mosquito-borne disease. This appears to be contrary to the pesticide labels, e.g. this from the Duet label:

This product is highly toxic to bees exposed to direct treatment on blooming crops or weeds. Do not apply to or allow drift onto blooming crops or weeds when bees are foraging in the treatment area, except when applications are made to prevent or control a threat to public and/or animal health determined by a state, tribal or local health or vector control agency on the basis of documented evidence of disease causing agents in vector mosquitoes or the occurrence of mosquito-borne disease in animal or human populations. [Footnote 3: https://www.clarke.com/filebin/productpdf/duet.pdf]

The report also notes this label requirement, and suggests that applicators should be informed when blooming plants are present in their areas. Anyone with a basic understanding of Massachusetts ecosystems knows that blooming plants are widely occurring across the state from early spring through the first hard frosts in the fall. Many plants that commonly grow along roadsides and in yards and meadows produce blooms that attract pollinators. According to Table 5-6, the half-life of pyrethroid pesticides carrying this label warning range from 2.1 to 6.7 days. Therefore, any roadside spraying that is occurring absent any evidence of presence of mosquito-borne disease in the vicinity appears to be a violation of the label.

Ecologically Based Mosquito Management

The sections on stormwater management and on dam removals and culvert upgrades are not complete. Piped stormwater systems with catch basins create prime habitat for the mosquitoes that carry WNV. Rain gardens and bioswales do not create mosquito habitat if properly built and maintained. More cooperative efforts should be put into updating municipal rules for stormwater management to emphasize Low Impact Development techniques that do not create mosquito habitat.

Dam removals and culvert upgrades not only remove ponded stagnant water – they allow fish and eels to get into headwaters. Restoring eel[7] access to headwater wooded swamps could reduce the mosquitoes that amplify EEE [Footnote 7: https://www.youtube.com/watch?v=GpPpBwZ_s8A]. Those mosquitoes breed in “crypts” under tree roots in swamps. Even aerial Bti can’t reach those crypts, but eels can.

Comments on Report 6: Best Practices to Maximize Impact of Pesticide Use on Mosquito Populations and Minimize Non-Target Impacts of Mosquito Pesticides (pg. 233-253)

Sam Telford

Note on section 4.2.1: Spray Notification Location, Precision, and Timing, page 245 – It should be noted that MCPs are limited to the hours between dusk and dawn to apply pesticide to reduce impact on pollinators, which are mainly diurnal. These limitations are not in place for commercial applicators or homeowners who apply on their own. There should be some quantitative comparison in this report of how much pesticide is applied by commercial applicators (e.g., Mosquito Joe) and homeowners for diverse purposed, relative to that applied by MCPs for truck based spraying and that applied by plane for EEE suppression.

Heidi Ricci

The analyses of impacts of pesticides on vulnerable populations, pollinators, and ecological health are incomplete.

Beyond the label requirements, the pyrethroid pesticides are also highly toxic to thousands of native beneficial species Many of native pollinators rest at night on plants in the field (e.g. wild bees, beetles). Moths fly at night and are likely to be directly exposed to spray. Available literature also indicates concerns about potential impacts to vertebrates including fish, birds, and amphibians [Footnote 4: E. Török et al, Unmeasured Side Effects Of Mosquito Control On Biodiversity, European Journal of Ecology, 6.1 (71-76), 2020]

Parasitic wasps and flies that keep agricultural and forest pests[5] in check are highly vulnerable to these pesticides as well but are not addressed in the report. [Footnote 5: https://www.umass.edu/archivenewsoffice/article/parasitic-flies-control-invasive-winter-moths-be-released-may-9-wellesley-umass-amherst]

The analysis of impacts to bats is unscientific. It says impacts on bats are unlikely because mosquitoes are a small part of their food supply – but the pesticides are toxic to many of the other flying insects that bats eat too. There is a lawsuit in Vermont on the risks of mosquito control pesticides to endangered bats [Footnote 6: https://www.burlingtonfreepress.com/story/news/2021/08/17/environmental-groups-sue-vermont-agency-failing-protect-bats/8161620002/]. Similar conclusions on fish and birds are also flawed.

The report cites several studies and literature review summary reports on human health and ecological impacts of mosquito control pesticides, including both larvicides and pesticides. See, for example these:

Mazzacano, C., & Black, S. H. (2013). *Ecologically Sound Mosquito Management in Wetlands: An Overview of Mosquito Control Practices, the Risks, Benefits, and Nontarget Impacts, and Recommendations on Effective Practices that Control Mosquitoes, Reduce Pesticide Use, and Protect Wetlands*. The Xerces Society for Invertebrate Conservation.

Utah Physicians for a Healthy Environment. (2019). *Mosquito Pesticide Spraying*. Retrieved June 22, 2021 from https://www.uphe.org/priority-issues/mosquito-pesticide-spraying/

City of Boulder. (2018). *Review of the Scientific Literature for Impacts of Bacillus thuringiensis sub-species israelensis (Bti) for Mosquito Control*.

The inclusion of these sources and brief summaries of some of the findings are useful. However, we had expected a more rigorous review of this topic in relation to actual practices in Massachusetts. The lack of data on what practices are actually being applied and where, combined with the limited time available to the consultant and lack of ecological expertise on the consultant team resulted in a cursory review that did not fulfill the intention of this portion of the law on the comprehensive study.

Comments on Report 7: Massachusetts Drinking Water Regulations Related to Pesticide Application (pg. 254-269)

Helen Poynton

Page 265, suggestion for additional information that could be added to report to clarify the significance of the levels detected - According to the MassDEP report 2020c, sumithrin was detected in "non-public water system waters" at levels 12-41 ng/L (Table 1 from MassDEP report). Although these values are below aquatic life benchmarks*, but they are above the acute toxicity levels for some aquatic invertebrates (e.g., H. azteca: 9.4 ng/L; mysid shrimp: 25 ng/L). Note that the limit of detection (10 ng/L) is > the LC50 value for H. azteca. *Aquatic benchmarks for sumithrin for invertebrates are Acute: 2.2 ug/L and chronic: 0.47 ug/L – these are not based on the lowest toxicity values in a standard test according to OPP's own database.

Sam Telford

Note on section 4 (Review of Pesticide Monitoring Data), page 266 – There should be some data presented on how much home use pesticide with PBO is applied here in Mass, at the very least a list of products in Home Depot that contain PBO

Note on page 267, statement "Such a system would be a significant undertaking in order to be inclusive all types of pesticides applicators—the SRB, all MCDs, and all 10,000 licensed applicators." – This figure needs to be stated in one of the earlier chapters of this report, in a discussion of sources of pesticides that overlap in their use by MCPs, SRB/DPH aerial sprays, agricultural uses, and homeowners. Public health use of pesticides is what fraction of the total likely pesticide use in Mass?

Comments on Report 8: Impact of Mosquitoes, Mosquitoes as Disease Vectors, And Mosquito Control Measures (pg. 270-309)

Helen Poynton

Page 285 - I have a lot of concern about how this model may be used. I can see MCDs, regulators, and even pesticide manufacturers pointing to this model as justification for spraying; however, I do not think it is robust enough to be used for that purpose.

- Because of a lack of data, ERG was not able to include any IPM measures except for mosquito control measures using insecticides, despite the potential for other non-insecticide programs to be very effective (predators, p. 220; public education campaigns, p. 200, open marsh water management (OMWM), p. 215). The "no control" scenario suggests an increase of 1.5-3 times more disease cases, but if other control measures are put into place instead of insecticide spraying, these numbers may never be realized.
- The effectiveness of spraying was based on the number of mosquitos detected in traps after spraying. However, this is not same as measuring the amount of cases of a disease. It is quite possible that there is not a direct/linear relationship between number of total mosquitos and the number of disease cases.
- "Most respondents [of the ERG survey, chapter 2] indicated that it was difficult to rank the effectiveness of control of disease carrying mosquitoes, citing difficulties with proving the effectiveness of aerial spraying and other control measures and how these activities impact case rates of EEE and WNV" (p. 58) I think this statement highlights some of the limitations on defining the effectiveness of spraying. More research is clearly needed to define how effective spraying is for controlling these diseases.

Page 302 (section 2.4.1) - In the report about mosquito impact to predators, the major missing piece is that the insecticides used for spraying are not specific to mosquitos. For example, if bats primary diet is insects, these insecticides are going to impact populations of many types of insects, and many more of them will be prey items for bats. The same is true of insectivorous fish. The other piece missing is the potential for bioaccumulation and trophic transfer of insecticide residues from insects that were sprayed (and may not have died) and the predators (e.g., bats, fish, spiders).

Page 303 (section 2.4.2) - Biotransformation in fish, some of the biotransformation products of pyrethroid insecticides are endocrine disruptors in fish. "Pyrethroid metabolites have greater endocrine activity than their parent structures..." (Brander et al., 2016, *Environ. Sci. Technol.* 2016, 50, 17, 8977–8992)

Sam Telford

Note on page 275, statement "detectable levels of pesticides used for mosquito control in Massachusetts have been found in honey bees." – There are many sources of these pesticides (homeowner, agriculture, commercial applicators) besides public health use. This needs to be stated. Why do you think that any detected residues are from state-sponsored mosquito control?

Note on page 275, statement "some chemicals used in mosquito control could have indirect impacts on avian species in Massachusetts." – Same comment, it is not correct to attribute all pesticide use to state sponsored mosquito control.

Note on page 278, Table 2-1, Ecosystem health: "Mosquitoes are a food source for several bat and fish species in the Commonwealth" – There is no evidence whatever for this. Where is your primary reference? Not a review, actual study.

Note on page 291, section 2.1.2, Impact of Mosquito Control on Public Health: "Table 2-8 presents the active ingredients in the pesticides used by MCDs and the SRB for mosquito control

in the past five years…" – The assumption is made that MCP and SRB use is the sole source of pesticide. This is false. This needs discussion in this report.

Note on page 292, statement "Nuisance levels of biting mosquitoes and outbreaks of mosquito-borne illness impact Massachusetts in different ways. Vector mosquitoes infect individuals." – How do you distinguish a vector from a nuisance? The main nuisance in people's backyards in July and August is C. perturbans. This mosquito is the best candidate for EEE vector. It is very likely that any generalist mosquito can serve as a vector for EEE. There is no such things as a good mosquito bite.

Note on page 297, statement "ERG began this analysis by interviewing a pollinator expert on approaches to quantifying the impacts of pesticides on agriculture and pollinators and conducting a literature review." – It should be noted that agriculture itself uses pesticides. How can you distinguish public health use of pesticide from that by agriculture itself?

Page 302, statement "These results show that mosquitoes constitute a relatively small proportion of the diets of the bats most commonly found in Massachusetts. Thus, available evidence does not indicate that mosquito control has a major effect on bats via the impact on mosquito populations." – This needs to be reflected in text of previous chapters which imply that bats are affected by mosquito control activities. Wouldn't winter moth caterpillar suppression affect the availability of winter moths (likely preferable to mosquitoes as prey) for bat consumption?

Russ Hopping

Given there is no data on the efficacy of spraying and a reduction in human health risks the model developed by ERG to evaluate potential symptomatic infections under various controls is an imperfect model at best. This is not an evidenced-based model and the science and presumptions behind it need to be thoroughly assessed by knowledgeable third-party scientists for validity before the Report is made fully available with all public comments. Information from such an evaluation would be highly useful for the subcommittees as they conduct their tasks.

Heidi Ricci

Effects of Reducing or Eliminating Mosquito Control

The modeling of projected WNV and EEE cases if mosquito control was discontinued is deeply flawed. Section 8 of the report uses information on the range of percentages of mosquitoes temporarily eliminated by larviciding or adulticiding, then uses that as a proxy for reduction in number of cases of EEE or WNV. There is no basis for this proxy assumption. Reducing mosquitoes by, for example, 50% does not necessarily reduce the number of disease cases by 50%. Other factors such as whether or not people take precautions to prevent exposure to mosquito bites may have more of an effect on outcomes. Since these diseases are extremely rare (0.3 cases per million people per year for EEE, 1.6 for WNV), and mosquito populations are so large and prevalent, even reducing the mosquito population by 50% still means there are millions of mosquitoes present. The Department of Public Health's Arbovirus Surveillance and Response Plan emphasizes that personal protection measures are the first line of defense, and must always be taken even after aerial or ground spraying has taken place.

Comments on Report 9: Climate Change Impacts to Mosquito Populations and Mosquito-Borne Diseases (pg. 310-324)

No comments from Task Force members were received for this section of the report.