BERKSHIRE ENVIRONMENTAL ACTION TEAM
20 Chapel St. Pittsfield, MA 01201 ● thebeatnews.org
413-464-9402 ● team@thebeatnews.org

Protecting the environment for wildlife in support of the natural world that sustains us all.

June 30, 2022

Ann Lowery, Assistant Commissioner, MassDEP Bureau of Policy & Planning
One Winter Street
Boston, MA 02108

via email

Re: Glyphosate Scientific Review, Phase 1 Report

Dear Massachusetts Glyphosate Commission,

Please accept the following comments from the Berkshire Environmental Action Team, Inc. (BEAT). BEAT's mission is to protect the environment for wildlife in support of the natural world that sustains us all.

BEAT believes that the stakeholders outlined in the Section 4.0 Key Stakeholders to Consult do not represent a broad enough stakeholder group. The stakeholders listed are related to environmental health, farming, and forestry. They are missing any nonprofits relating to human health, environmental justice, and farming justice. These could include:

1. New England Environmental Justice Research Network
2. Farmworker Justice
3. Toxics Action Center/Community Action Works
4. Massachusetts Public Health Association
5. Green Newton
6. Alternatives for Community and Environment

Section 2.2 Glyphosate Uses in Massachusetts fails to include the fact that the Massachusetts Department of Conservation and Recreation is now using glyphosate pre- and post-harvest to kill NATIVE vegetation they deem unnecessary, despite the multitude of safe and effective alternatives. The commission should investigate the potential harms to our ecosystem and evaluate alternatives to this unnecessary practice.

"Inert" ingredients
It is imperative that the Commission investigate the synergistic effects of applying multiple pesticides including their "inert" ingredients. Inert is a term used to mean an ingredient that does not contribute to the intended effect of the product. This does not mean the "inert" ingredients are non-toxic.

We must determine the extent to which glyphosate is contributing to biodiversity loss. According to the IPBES Global Assessment Report on Biodiversity and Ecosystem Services Report, "Nature is declining globally at rates unprecedented in human history — and the rate of species extinctions is accelerating, with grave impacts on people around the world now likely." The use of glyphosate specifically has been linked to the loss of key pollinators such as monarchs in this study by Monarch Watch.

Overall, BEAT strongly supports non-chemical alternatives such as mechanical, physical, and biological methods over any herbicides.

Thank you for considering our comments.

Sincerely,

Regina Fink

Regina Fink, Program Associate

Lucas Forman, Program Associate

Jane Winn, Executive Director

Via email: Ann.Lowery@mass.gov
Ann Lowery, Assistant Commissioner
MassDEP Bureau of Policy & Planning
One Winter Street
Boston, MA 02108

June 30, 2022

Dillon Gabbert

Bayer U.S. LLC
Crop Science
Regulatory Engagement

800 N. Lindbergh Blvd.
St. Louis, MO 63167

Tel. +1 919 549 3993
dillon.gabbert@bayer.com

www.bayer.com

RE: Glyphosate Scientific Review Phase 1 Report

Dear Assistant Commissioner Lowery:

Thank you for the opportunity to provide formal comments and feedback on the Glyphosate Scientific Review Phase 1 Report prepared for the Massachusetts Glyphosate Commission (hereinafter, Commission). This initial report is important to establishing the scope of research required to fully understand the safety studies and extensive research completed on this important herbicide.

Bayer is a registrant of glyphosate-based products in the US, Massachusetts and globally; and stands fully behind our glyphosate-based products, which have been used safely and successfully around the world for more than 40 years. Bayer supports the Commission's goal to contribute to the wealth of research on one of the most thoroughly studied products of its kind.

The following observations are provided by Bayer to support the efforts of the Commission, Eastern Research Group, Inc., and the Massachusetts Department of Agricultural Resources.

GENERAL COMMENTS:

1.1. The Phase 1 Report misidentifies 2017 as the year IARC reached its conclusions. IARC's working group met in 2015 and issued its findings later that year. Stating the correct year will provide readers with important context regarding the subsequent reviews by WHO/FAO JMPR, EFSA, ECHA, EPA, Canada, S. Korea, Japan, Australia, New Zealand, Brazil, etc. that reached the opposite conclusion of IARC.

1.2. Usage statistics for Massachusetts are presented as total tonnage applied per crop type in the Phase 1 Report, but there is no indication what application rates were actually used, or whether application rate would be considered in the review.

1.3. To give a complete picture of use to inform on the proposed approach by the Phase 1 Report, all use types should be considered. Usage data are available from different sources (such as information from growers and applicators, as well as databases such as the Kynetec database).

1.4. Related to alternatives: the Phase 1 Report is not clear as to whether the list of alternatives is every herbicide registered in MA or a subset. Future work will need to consider cropping systems, resistance management, and use patterns in addition to activity spectra.

1.5. The Phase 1 Report states that 'most documents of interest' on EPAs Glyphosate Registration Review docket will be reviewed and later states that 'review of every docket entry is beyond scope of the project' but does not clearly define criteria of 'documents of interest'.

1.6. When discussing genetically modified crops and glyphosate, it's appropriate to describe them as herbicide-tolerant (instead of resistant). Crops are produced to tolerate application of herbicides.

HUMAN HEALTH COMMENTS:

2.1. Bayer would like to understand how ERG will determine which peer-reviewed publications are reliable. EPA conducts such an analysis of peer-reviewed publications to avoid relying on poorly conducted studies. Assessing data quality and reliability for each study/publication is a critical consideration in conducting scientific review and weight of evidence assessment.

2.2. Regarding the National Toxicology Program (NTP) research, the Phase 1 Report mentions genotoxicity screening studies, but not the NTP research on oxidative stress. Bayer encourages the ERG to request these data/reports from the NTP.

2.3. The list of global reviews is incomplete and does not consistently mention the European Chemicals Agency (ECHA) two recent classification decisions in 2017 and 2022, reaffirming that classification in the EU for glyphosate is not carcinogenic, not genotoxic, not toxic to reproduction and not an endocrine disruptor.

2.4. Discussion of OEHHA does not mention that OEHHA concluded glyphosate does not cause cancer or that Proposition 65 listing is solely the result of IARC and not a new review. Indeed, a previous OEHHA technical review of glyphosate data in 2007 concluded that glyphosate was not carcinogenic and established a lifetime acceptable daily dose (ADD; estimated maximum daily dose which can be consumed by humans for an entire lifetime without toxic effects) based on a non-cancer endpoint.

ENVIRONMENTAL IMPACT COMMENTS:

3.1. The Phase 1 Report proposes to consider direct and indirect / sub-lethal effects on aquatic and terrestrial species which includes endangered species. Indirect effects on pollinators and monarchs are to be considered based on effects on dependent habitat. The actual effect on those species identified as potentially being ‘Likely to be Adversely Affected’ (LAA) in the Biological Evaluation, is not yet known and will be determined during consultation with the Fish and Wildlife Service (FWS) and the National Marine Fisheries Service (NMFS), where the population status of the individual taxa

are considered in detail and the potential for effects on those taxa will be determined.

3.2. The Phase 1 Report inaccurately states that amongst other documents, the Interim Registration Review Decision: Case Number 0178 (EPA, 2020) will be reviewed - highlighting that Interim Decision document incorporates relatively recent methodology for evaluating risk to honeybees, monarch butterflies, and other pollinators. For clarification purposes, the Interim Decision (EPA, 2020) makes reference to a harmonized Guidance for Assessing Pesticide Risk to Bees published by the agency in 2014. This document identifies several laboratories, semi-field and field tests or trials with honeybees that may be necessary to fully evaluate risks to bees. There are no recent methodologies for evaluating the risk of a pesticide to the monarch butterfly. The Interim Decision (EPA, 2020) does make reference to an indirect effects risk assessment that is related to the monarch, where the effects of spray drift onto common milkweed (critical food resource for monarchs) were assessed.

3.3. The Phase 1 Report states that the Final National Level Listed Species Biological Evaluation for Glyphosate (EPA, 2021) and the Preliminary Ecological Risk Assessment of Glyphosate and its Salts (EPA, 2015) will be reviewed. It should be noted that during the public commenting period for both of the Ecological risk assessment and the Biological evaluation, multiple inconsistencies and inaccuracies were identified. Therefore, when these documents are reviewed, the comments from the registrants that relate to data accuracy should be considered. As an example: Some of the effects and exposure models and approaches used in the Preliminary Ecological Risk Assessment (EPA, 2015) are no longer used in risk assessment such as GENEEC. Data generated using older models should be considered with caution as the data generated does not reflect that achieved using current models.

3.4. Section 3.2 states that in the EU – exposure and effects of glyphosate is jointly being assessed by EFSA (European Food Standards Association) and ECHA (European Chemicals Agency).

- In fact – in the EU, EFSA have been mandated by the European Commission (EC) to prepare a scientific conclusion report on the peer review of the pesticide active substance glyphosate, to

be considered by the European Commission for the re-inclusion of glyphosate onto Annex I of the Plant Protection Products Regulation (EC) No.1107/2009.

- EFSA will use the scientific evaluation of glyphosate conducted by EU MS countries, namely Hungary, Sweden, France and the Netherlands, (collectively known as the Assessment Group for Glyphosate (AGG)) to prepare Renewal Assessment Report (RAR).
- The RAR is not yet finalized. The dRAR has been extensively reviewed by EU member states, industry and by the general public. Comments on the dRAR have also been made by EFSA as part of the formal commenting process relating to the Annex I process.
- Extensive additional data have been prepared and submitted to the AGG by the Notifiers (the Glyphosate Renewal Group (GRG)) to address questions raised during the commenting process by various stakeholders including EFSA. This part of the process is referred to as the 'EFSA stop-of-the-clock'.
- Data submitted during the EFSA stop-of-the-clock have not yet been evaluated at EU level and are not readily available in the public domain.
- The final RAR will include final positions on the active substance and the representative formulation based on all the submitted data including those data very recently submitted during the EFSA stop-of-the-clock part of the Annex I process.
- Therefore, it is the final RAR and not the dRAR (as identified in the Phase 1 Report) that will be the most scientifically valid and relevant document for consideration in the scientific Review.
- As part of the Annex I renewal process, the GRG were required to evaluate publicly available scientific literature from the 10 years prior to the date of the dossier being submitted. During the commenting period on the dRAR, the period of time to be covered by the review was extended to cover all literature that was associated with the previous Annex I listing. The literature review performed to support the Annex I dossier submission extends to before 2000 .

3.5. It is noted in the Phase 1 Report, that the ability of ERG to review all literature is to be re-assessed, but it is unclear how these publicly available literature are to be reviewed for relevance as no methodology to achieve this was presented. The literature review conducted for the EU dossier submission was performed using rigorous evaluation criteria published by EFSA (2011) **https://doi.org/10.2903/j.efsa.2011.2092**

PRECEDENTIAL JUDICIAL DECISIONS:

4.1. Bayer does not agree that the existence of, or results from, legal cases brought in the tort system should be relevant to an expert regulatory assessment. That is particularly true when plaintiffs are allowed to present lay juries with unreliable science such as study findings that were not statistically significant and study findings that did not control for exposure to other pesticides, as has been the case in litigation concerning glyphosate. Instead, the most reliable indicator of the safety of glyphosate are not juries, but expert regulators across the world (juries of scientists) – who rigorously oversee public health and the safety of pesticides – and have looked at the full body of science over 40 years. Those regulators, including the U.S. EPA, European Chemicals Agency, and many others continue to conclude consistently that glyphosate is safe for use as directed and is not carcinogenic.

4.2. Even assuming the results of legal cases in the tort system are pertinent, Bayer is not clear from the Phase 1 Report which cases have been identified or their purported significance. The numbers of decisions cited do not correspond to any particular set of legal decisions that Bayer is aware of. In any case, to the extent that litigation results are considered, Monsanto recently prevailed in the most recent trial involving glyphosate (Johnson v. Monsanto in Jackson County, Oregon), which was the fourth consecutive trial win for the company following trial wins in Clark v. Monsanto (Los Angeles, CA), Stephens v. Monsanto (San Bernardino, CA), and Shelton v. Monsanto (Jackson County, MO). As a result of these defense verdicts, Monsanto has prevailed in the majority of glyphosate personal injury cases that have been tried to verdict.

KEY STAKEHOLDERS

5.1. The Phase 1 Report identified Mr. Liam Condon as “President of Bayer Crop Science”, which is no longer accurate. Mr. Rodrigo Santos has replaced Mr. Condon as member of the Board of Management of Bayer AG and Head of Bayer Crop Science. However, please direct all inquiries to Dr. Jackie Applegate, President of North America Crop Science c/o Mr. Dillon Gabbert, State Regulatory Engagement (dillon.gabbert@bayer.com).

5.2. Bayer would like to recommend the following stakeholder for consultation during the proposed scientific review:

- Dr. David Eastmond: Department of Cell Biology & Neuroscience at the University of California in Riverside

5.3. To further support the Commissions scientific review, and in accordance with Bayer’s Transparency Initiative, Bayer would like to provide any necessary technical consultation related to: relevant scientific assessments, relevant research, information on glyphosate uses, and glyphosate-related issues of greatest interest. For more information on Bayer’s Transparency Initiative please visit: https://www.bayer.com/en/agriculture/transparency-crop-science.

Sincerely,

Dillon Gabbert

Dillon Gabbert
Bayer Crop Science

MASSACHUSETTS FARM BUREAU FEDERATION, INC.

"The Voice of Agriculture"

Address: 249 Lakeside Ave, Marlborough, MA 01752-4503 • Phone (508) 481-4766 • Fax (508) 481-4768
www.MFBF.net • info@mfbf.net

June 2, 2022

Glyphosate Commission
Massachusetts Department of Environmental Protection
1 Winter St, Boston, MA 02108

Dear Chairman Suuberg and Commission Members,

I write today on behalf of the Massachusetts Farm Bureau Federation and our partners to express concern over the operation and structure of the Glyphosate Commission.

While well-intentioned, the enabling legislation did not outline any process for public input. As a result, there has been some confusion and growing concern about the way the Commission has been moving forward relative to:

a) Stakeholder input and engagement - how do stakeholders participate? Will there be a public hearing on the draft final report?
b) The ability of stakeholders to submit pertinent data.

With regard to submission of data, we are aware that Ed Stockman of NOFA sent in information that was distributed to Commission members. It seems inappropriate for this to be occurring absent an opportunity for all stakeholders to have the same ability. For example, many of us would like to inform the Commission of the recent finding by the European Chemicals Agency (linked). There are other equally relevant documents that many of us wish to share.

In conclusion, the ability of stakeholders to share documents with the Commission does not seem consistent or constructive. I have attached a list of stakeholders who have an interest in the proceedings of the Commission and opportunities to participate and would greatly appreciate you keeping them apprised going forward.

T. Nicolas John
Director of Government & Public
Massachusetts Farm Bureau Federation

From: Nick John
To: Lowery, Ann (DEP)
Subject: Re: Fourth meeting of the Massachusetts Glyphosate Commission
Date: Tuesday, June 14, 2022 8:55:52 AM

Ann,

Good morning and I hope you are well! Is there a process by which we could submit info/ testimony?

Best,

Nick

On Mon, Jun 13, 2022 at 5:49 PM Lowery, Ann (DEP) <ann.lowery@mass.gov> wrote:

> Good afternoon.
>
> You are receiving this message because you signed up for news about the work of the Massachusetts Glyphosate Commission. The next meeting of the Commission will take place on June 17, 2022 at 3 p.m. on Zoom. Additional information, including the agenda and directions on how to join the meeting, is available at the Commission website here:
>
> https://www.mass.gov/service-details/glyphosate-commission
>
> I have also attached the June 17, 2022 meeting notice to this message for your convenience.
>
> Please let me know if you have any questions. – Ann
>
> *Ann Lowery*
>
> *MassDEP, Assistant Commissioner*
>
> *Bureau of Planning and Evaluation*
>
> *Ann.Lowery@mass.gov*
>
> *cell: 617-645-9710*

> *(she, her)*

BOSTON COLLEGE

Philip J. Landrigan, MD, MSc, FAAP
Director, Program for Global Public Health and the Common Good
Director, Global Observatory on Planetary Health
Schiller Institute for Integrated Science and Society

July 1, 2022

Ms. Ann Lowery
Massachusetts Department of Agricultural Resources
ann.lowery@mass.gov.

Comments on glyphosate phase 1 report

Dear Ms. Lowery,

Thank you for having invited comments on the Phase 1 report of the Glyphosate Scientific review undertaken by Eastern Research Group (ERG) for the Glyphosate Commission convened by Massachusetts Department of Agricultural Resources (MDAR). Apologies for being one day late.

My comments are as follows:

1. I second Dr. Regina Larocque's strong request that the Glyphosate Commission must include sufficient input from stakeholders with expertise in human health, including a representative of the Massachusetts Chapter of the American Academy of Pediatrics and a representative of the Massachusetts Medical Society Committee on Environmental and Occupational Health. These additions are essential given the widespread exposure of our population, to glyphosate, and the substantial and growing evidence of glyphosate's hazards to human health including its association with Non-Hodgkin Lymphoma. Glyphosate exposure is an issue of clear relevance to public health and the Commission must therefore embody the necessary expertise.

2. I second Dr. Regina Larocque's strong request that the Glyphosate Commission must be provided sufficient resources by the Commonwealth of Massachusetts to digitize the annual reports on pesticide applications that pesticide applicators must make to MDAR.

It is inconceivable to me that in 2022 these reports exist only in paper form. It is essential that they be keypunched and entered into a database so that the Glyphosate Commission can undertake a proper analysis of crop uses, time trends and geographic patterns of glyphosate application in Massachusetts.

3. In Section 3.1.1 of the report, "*Recent and Ongoing Assessments Published by Recognized Authorities*", it will be essential that the Commission not give equal weight to all of these assessments. Specifically, the assessment undertaken by the International Agency for Research on Cancer (IARC) operated under strict rules of Conflict of Interest and was specifically designed to exclude influence by industries with vested economic interests in the outcome the deliberations. Therefore the IARC report must be given much more weight in the Commission's deliberations than the reports of the European Food Safety Authority (EFSA) and the Food and Agriculture Organization, which did not include such safeguards.

Thank you for your consideration.

Sincerely,

Philip J. Landrigan, MD

From: Larocque, Regina C.,MD, MPH
To: Lowery, Ann (DEP)
Cc: Larocque, Regina C.,MD, MPH
Subject: comments on glyphosate phase 1 report
Date: Friday, July 1, 2022 8:06:08 AM

Dear Ms. Lowery,

I am writing to provide input on the phase 1 report of the Glyphosate Commission. I apologize for being one day late in sending these comments.

I am a physician-scientist and Associate Professor of Medicine at Harvard Medical School.

I request the following adjustments to the plans for the scientific assessment of glyphosate:

1. The commission's plan does not include sufficient input from stakeholders with expertise on human health. I specifically suggest the following local experts and groups be added to Section 4.0 Key Stakeholders to Consult:

   Dr. Phil Landrigan
   Director, Global Public Health Program and Global Pollution Observatory, Boston College
   https://www.bc.edu/bc-web/schools/mcas/departments/biology/people/faculty-directory/Phil-Landrigan.html

   Dr. Carmen Messerlian
   Director of the Scientific Early Life Environmental Health & Development (SEED) Program, Harvard School of Public Health
   https://www.hsph.harvard.edu/carmen-messerlian/

   A representative of the Massachusetts Medical Society Committee on Environmental and Occupational Health
   https://www.massmed.org/Governance-and-Leadership/Committees,-Task-Forces-and-Sections/Committee-on-Environmental-and-Occupational-Health-Meeting-Minutes/

   A representative of the Massachusetts chapter of the American Academy of Pediatrics

2. The report mentions that the "ERG Team searched for estimates of glyphosate usage quantities for the various non-agricultural uses noted above, but no reports were identified that include this information. ERG is aware that licensed applicators must submit annual reports on pesticide applications to MDAR, and glyphosate usage quantities for certain applications can be derived from information in these reports. However, the applicators' annual reports are only available in paper form…***ERG will assess whether the reports can be reviewed with available project resources***."

The review of these data is fundamental to the mission of the Glyphosate Commission. **These data must be compiled as part of the work of the Glyphosate Commission, without exception.**

Thank you for considering my comments. I would appreciate the favor of a reply.

Regards,

Regina LaRocque, MD MPH FIDSA
Global Enterics Laboratory
Division of Infectious Diseases
Massachusetts General Hospital
Jackson Building Room 520
55 Fruit Street
Boston, MA 02114
(617) 643-5557

May 6, 2022

Via email: Martin.Suuberg@mass.gov
Martin Suuberg, Commissioner
Massachusetts Department of Environmental Protection (DEP)
One Winter Street
Boston, MA 02108

Re: MA Glyphosate Commission

Dear Commissioner Suuberg:

I write regarding the MA Glyphosate Commission's scientific review of glyphosate. Bayer is a registrant of glyphosate-based products in the US, Massachusetts and globally; and supports the Commonwealth's goal of reviewing the potential impacts of glyphosate and glyphosate alternatives on the environment and public health.

My understanding is the scientific review of glyphosate will generate an initial, then final Report. The Report(s) will then inform an Individual Review by the MDAR under their authority. I write to inquire how the registrant community, stakeholders and/or user groups may participate in the scientific review phase of the process. Will there be an opportunity to provide information to the scientific review phase and/or provide comment on the initial and final Report?

Thank you for the opportunity to pose this question regarding participation in the process.

Sincerely,

Kimberly OBrien

Kimberly OBrien
Government Affairs

cc: Ann Lowery, Asst. Commissioner, MassDEP Ann.Lowery@mass.gov
John Lebeaux, Commissioner, MDAR, John.Lebeaux@mass.gov

//////////////////

May 6, 2022

Kimberly OBrien

Bayer U.S. LLC
Crop Science
Government Affairs

800 N. Lindbergh Blvd.
St. Louis, MO 63167

Tel. +1 617 655 3689
kimberly.obrien@bayer.com

www.bayer.com

Glyphosate Scientific Review
Phase 1 Report

Prepared for:

Massachusetts Department of Agricultural Resources

251 Causeway Street #500

Boston, MA 02114

Prepared by:

Eastern Research Group, Inc.

110 Hartwell Avenue

Lexington, MA 02421

June 6, 2022

CONTENTS

1.0 Introduction

In 2021, the Massachusetts legislature enacted the Acts of 2021. Chapter 24 of this legislation established budgets for many state government activities, including the formation of a commission charged with conducting "a scientific review of the potential impacts of glyphosate and its most common alternative herbicides on the environment and public health" (Commonwealth of Massachusetts, 2021).

The legislation further states that: "…the pesticide subcommittee established under section 3A of chapter 132B of the General Laws shall use said scientific review as part of an individual review conducted under 333 C.M.R. 8.03 to determine whether current uses of glyphosate pose unreasonable adverse effects to the environment, and whether current registered uses of glyphosate should be altered or suspended" (Commonwealth of Massachusetts, 2021).

Pursuant to the Acts, the Glyphosate Commission was formed, and the Commission opted to use contractor support to conduct the glyphosate scientific review. The Massachusetts Department of Agricultural Resources (MDAR), on behalf of the Glyphosate Commission, issued a Request for Quotes to seek contractor support for this project. After an open bidding process, MDAR issued a contract to Eastern Research Group, Inc. (ERG) to conduct the scientific review of glyphosate and its alternatives. The review is to consider uses, restrictions, public health impacts, and environmental impacts of glyphosate. The results of the review will be presented to the Glyphosate Commission and then submitted to the joint Committee of Environment, Natural Resources and Agriculture.

MDAR split the glyphosate scientific review project into two phases. In Phase One, MDAR tasked ERG with identifying all resources to consider for the scientific review, and ERG will then review those resources in Phase Two. ERG, with assistance from its subcontractor Tetra Tech, Inc., prepared this Phase One report, which is organized into the following sections. The list quotes text from the scope of work from this project's original Request for Quotes.

- Section 2.0 presents "a summary of available information on the use of glyphosate in the Commonwealth and key herbicide agent alternatives," including available information on "use restrictions and requirements to minimize impacts."
- Section 3.0 lists "key assessments (e.g., recent assessments by recognized authorities including, for example, the U.S. Environmental Protection Agency; peer reviewed publications; precedential judicial decisions), of the potential public health and environmental impacts of glyphosate and its alternatives." This section presents the requested information separately for glyphosate's public health impacts (Section 3.1) and environmental impacts (Section 3.2) and impacts of glyphosate alternatives (Section 3.3).
- Section 4.0 lists "key stakeholders to be consulted" by ERG and Tetra Tech as part of the broader glyphosate scientific review.
- Section 5.0 lists the references cited throughout this report.
- Section 6.0 provides a list of abbreviations.

ERG anticipates that the Glyphosate Commission (and potentially other stakeholders) will review and comment on this Phase One report. Those comments might include recommendations for additional resources to include in this report. After receiving all feedback on the current version, ERG will prepare and submit a final Phase One report.

Once MDAR authorizes ERG to proceed with Phase Two, ERG and Tetra Tech will begin compiling, researching, and synthesizing information from the resources identified in this Phase One report. That work will culminate with ERG submitting the Phase Two report, which will include a scientific review of human health and ecological impacts of glyphosate and selected alternatives.

2.0 Summary of Available Information on Uses of Glyphosate and Alternatives

This section presents background information on glyphosate (Section 2.1); summarizes categories of glyphosate uses in the Commonwealth and, where data are available, the quantities of glyphosate used (Section 2.2); and identifies glyphosate alternatives that have been reported in the literature and the subset of herbicide alternatives that will be evaluated in Phase Two (Section 2.3).

During Phase Two of this project, the ERG Team will contact key stakeholders on glyphosate use in Massachusetts (see Section 4.0). Through those stakeholder contacts, ERG will seek additional Massachusetts-specific input on glyphosate uses, glyphosate usage quantities, and glyphosate alternatives.

2.1 Background Information on Glyphosate

Glyphosate is a synthetic, non-selective systemic herbicide that controls a wide variety of plants including grasses, annuals, perennials, and woody plants. Since it is non-selective and acts systemically, it has been frequently used in commercial farming, transportation right of ways (such as highway borders and railways), residential applications, and for habitat management. Both nationally and in Massachusetts, glyphosate usage has increased dramatically over the past 30 years (Benbrook, 2016 and references therein). The increase is due at least in part to the availability of commonly produced crops (e.g., corn, soybeans) genetically modified to be resistant to glyphosate. As a result, at farms that grow glyphosate-resistant crops, a wide variety of weeds can be controlled using glyphosate without harming crop production.

Glyphosate is the active ingredient in many herbicide formulations that have been registered by the U.S. Environmental Protection Agency (EPA) and approved by Massachusetts authorities for use in the Commonwealth. ERG searched the Massachusetts Pesticide Product Registration Information website (Kelly Solutions, 2022) for details on the herbicides that contain glyphosate or glyphosate salts (e.g., ammonium glyphosate, potassium glyphosate, the isopropylamine salt of glyphosate). As of May 1, 2022, the database includes records for ten active ingredients for glyphosate or glyphosate compounds, and these records pertain to 156 unique EPA registration numbers. The glyphosate concentrations across these 156 herbicides range from 0.14 percent to 95.2 percent, with a median active ingredient concentration of 41 percent. Like other herbicide active ingredients, manufacturers formulate a mixture of glyphosate and other ingredients, such as carriers, solvents, and surfactants, to maintain efficient application and maximum effectiveness. While manufacturers must disclose the identities and concentrations of active ingredients on product labels, no such requirement applies for other ingredients.

The Kelly Solutions database also includes information on weeds controlled by the various products, sites where the herbicides may be used, and links to the EPA stamped labels for the products. The specific weeds controlled by the registered glyphosate-containing herbicides vary. Many glyphosate-containing herbicides registered in Massachusetts include more than 100 weeds that the products control—and some registered herbicides list more than 300 weeds that are controlled. The sites to which the products can be applied also vary. Some registrations list only one site where products may be applied (e.g., some products are only used in corn fields) but others list more than 500 sites.

The EPA-accepted product labels include extensive information about the herbicides, and most labels reviewed were at least 50 pages long. These labels have information on application methods and rates, formulation details, precautionary statements, steps to prevent resistance, and other topics. Glyphosate products are applied to target areas using a variety of mechanical devices, including hand-held or backpack sprayers and other methods. The most appropriate application method depends on the size of the target area, the density of plant pests, concerns about impacts to surrounding areas, and other factors. The EPA-accepted labels provide further details on application methods for individual products. In most cases, labels warn users not to apply glyphosate-containing herbicides directly to water and outline steps users should take to prevent contamination of water resources; however, some glyphosate-containing herbicides can be used to control emergent aquatic weeds in certain circumstances.

2.2 Glyphosate Uses in Massachusetts

As noted previously, the Massachusetts Pesticide Product Registration Information website lists the approved uses of every glyphosate-containing herbicide registered in the Commonwealth, and these lists include hundreds of entries. Based on this information, most glyphosate uses in Massachusetts fall under the following categories:

- Weed control for row crops (e.g., corn, soybeans, alfalfa)
- Weed control in orchards (e.g., apples)
- Weed control at nurseries

- Control of problematic plants (e.g., dodder, dewberries) in cranberry farming (UMass, 2008)
- Control of nuisance plants in and along transportation rights of way (e.g., highways, railways)
- Residential and commercial landscape management to control weeds and unwanted plants
- Aquatic weed control as a restricted use herbicide in MassDEP-permitted applications
- Habitat management for wildlife and unique ecosystems to control invasive plant species

The ERG Team also sought data on the amounts of glyphosate-containing herbicides used in Massachusetts for different purposes, but quantitative usage information was only available for row crop applications. Specifically, the most recent agricultural herbicide usage data reported by the United States Geological Survey (Wieben, 2021) indicates the following glyphosate usage quantities in 2019 for row crops in Massachusetts:

- 5,381 kg for corn
- 520 kg for fruits and vegetables
- 78 kg for soybeans
- 77 kg for orchards
- 51 kg for alfalfa

The ERG Team searched for estimates of glyphosate usage quantities for the various non-agricultural uses noted above, but no reports were identified that include this information. ERG is aware that licensed applicators must submit annual reports on pesticide applications to MDAR, and glyphosate usage quantities for certain applications can be derived from information in these reports. However, the applicators' annual reports are only available in paper form and must be reviewed individually to estimate statewide usages. In Phase Two, ERG will assess whether the reports can be reviewed with available project resources. Note that the licensed applicators' annual reports do not account for glyphosate applied by non-licensed users (e.g., homeowners who use Roundup).

2.3 Glyphosate Alternatives

This contract's scope of work calls for the ERG Team to not only summarize available information on glyphosate uses in the Commonwealth, but also to summarize use of "key herbicide agent alternatives." ERG interprets this requirement as referring to chemical alternatives to glyphosate, but for completeness, ERG initially searched for a broader range of glyphosate alternatives.

ERG first identified resources that identify glyphosate alternatives. These include, but are not limited to: a University of Massachusetts (UMass) Extension Turf Program website on glyphosate alternatives (UMass CAFE, 2020); an herbicide alternatives research study that UMass researchers conducted for the Massachusetts Executive Office of Transportation (Barker and Prostak, 2008; 2009); the latest Massachusetts Department of Transportation (MassDOT) Vegetation Management Plan (MassDOT, 2021); a North Carolina State University Extension website on glyphosate alternatives for landscapers (Neal and Senesac, 2022); a technical committee report on glyphosate alternatives for vegetation management in the Los Angeles area (Chiotti et al., 2010); and multiple weed control manuals issued by various state agencies nationwide.

These resources group glyphosate alternatives into multiple categories. For purposes of this project, ERG will consider four categories of alternatives. The list below demonstrates the range of alternatives that are currently available, without consideration for what alternatives are most viable for specific uses in the Commonwealth. Whether a given alternative is feasible will depend on the use, and preferred alternatives might vary between farmers, organic farmers, orchard owners, roadside applicators, nursery owners, habitat managers, landscapers, and homeowners. The feasibility of alternatives and preferred application methods will depend on other factors, like target species, desired effectiveness, potential environmental impacts, area of application, site access, applicable regulations and restrictions, and cost.

Phase Two will consider the following four categories of alternatives. ERG will seek stakeholder input (see Section 4.0) on preferred alternatives in Massachusetts.

- Chemical methods are use of chemical herbicides. A wide range of chemical formulations available is available, as discussed below.
- Mechanical methods include use of mechanical devices to control weeds. Examples include tilling soils, mowing weeds, burning weeds, or killing them with steam (with or without foam).
- Physical methods are options for controlling weeds manually, whether by removing weeds from the soil (e.g., hand-picking weeds, hoeing weeds) or by applying materials to suppress weed growth (e.g., mulch, weed mats).
- Biological methods include use of other organisms to remove weeds or inhibit their growth. These include use of herbivores (e.g., sheep, goats, cattle) to consume weeds and use of other plants (e.g., clover) to compete with weeds.

The ERG Team will consider multiple chemical methods in Phase Two. The chemical herbicide alternatives exhibit a range of properties relevant to weed control (e.g., systemic vs. contact herbicides; selective vs. non-selective herbicides; pre-emergent vs. post-emergent herbicides) and may require multiple applications to achieve the desired effectiveness. The Phase Two evaluation will consider two groups of chemical methods as alternatives:

- EPA-registered herbicides. The resources that the ERG Team reviewed (Barker and Prostak, 2008; 2009; Chiotti et al., 2010; MassDOT, 2021; Neal and Senesac, 2022; UMass CAFE, 2020) list EPA-registered herbicide products that researchers have proposed or investigated as glyphosate alternatives for certain uses. Table 1 lists the alternative active ingredients for selected products. These alternatives contain various active ingredients, including both synthetic chemicals and substances derived from natural sources. Note: Just because Table 1 lists potential alternatives does not mean they have been demonstrated to serve as effective glyphosate substitutes in Massachusetts or elsewhere.

Table 1. Potential Chemical Herbicide Alternatives to Be Considered in Phase Two

Active Ingredient [a]	Number of Unique Pesticide Registrations Containing Active Ingredient in Massachusetts	Concentration Range of Active Ingredient in Products Registered in Massachusetts
2,4-D	47	0.146% – 38.87%
Aminopyralid compounds [b]	6	2.22% – 71.01%
Caprylic acid	14	0.099% – 47%
Chlorsulfuron	6	15% – 75%
Clethodim	19	12.6% – 26.4%
Clopyralid compounds [b]	21	0.071% – 60%
Diquat compounds [b]	44	0.04% – 37.3%
Dithiopyr	82	0.08% – 40%
Fluazifop-P-butyl	22	0.06% – 24.5%
Glufosinate compounds [b]	29	0.36% – 45.9%
Imazapyr compounds [b]	44	0.16% – 63.2%
Imazethapyr compounds [b]	12	1.38% – 50.2%
Indaziflam	13	0.0061% – 24.3%
Isoxaben	14	0.0008% – 93.5%
d-Limonene	9	1% – 70%
Metsulfuron compounds [b]	20	0.75% – 60%
Oryzalin	9	1% – 41%
Pelargonic acid	23	2% – 57%
Pendimethalin	37	0.81% – 39%
Prodiamine	69	0.2% – 65%
Sethoxydim	7	13% – 18%
Simazine	9	41.9% – 90%

Active Ingredient [a]	Number of Unique Pesticide Registrations Containing Active Ingredient in Massachusetts	Concentration Range of Active Ingredient in Products Registered in Massachusetts
Sulfometuron methyl	8	6.5% – 75%
Triclopyr compounds [b]	84	0.084% – 83.9%

Notes:
Data compiled from queries of the Massachusetts Pesticide Product Registration Information website (Kelly Solutions, 2022).
[a] Certain formulations have multiple active ingredients, which may include glyphosate.
[b] Where active ingredients are in multiple chemical forms, Table 1 collapses the various active ingredients into one entry labeled with "compounds." For example, Table 1 lists the multiple salts of aminopyralid as "aminopyralid compounds."

In Phase Two of the project, the ERG Team will narrow the list of alternative chemical options based on input from the Glyphosate Commission and from stakeholders (see Section 4.0). The ERG Team will ask stakeholders about current and prospective uses of chemical herbicide alternatives, including input on any viable alternatives not listed in Table 1 or elsewhere in this report; whether alternatives are better suited for specific uses (e.g., commercial agriculture, organic farming, roadside weed control, nurseries, residential landscaping); and information on alternatives' effectiveness.

- Minimum risk pesticides. The other chemical alternatives to glyphosate-containing products are those that meet the criteria for "minimum risk pesticides" and therefore EPA does not register them under the Federal Insecticide, Fungicide, and Rodenticide Act. To be eligible for this designation, the products must contain active ingredients and inert ingredients from lists of substances developed by EPA (EPA, 2015a; 2016) and meet additional criteria for labeling, health claims, and other factors. Examples of active ingredients for "minimum risk pesticides" include citric acid, clove oil, coconut oil, corn gluten meal, garlic oil, and lauryl sulfate (EPA, 2015a). Formulations containing acetic acid at concentrations up to 8 percent are also eligible to be "minimum risk pesticides," provide the other applicability criteria are met.

3.0 Key Assessments to Review

This section presents a list of "key assessments" that the ERG team proposes reviewing. Consistent with the contract scope of work, we consider "key assessments" to include (1) recent assessments published by selected government agencies and international bodies, (2) peer-reviewed publications in scientific journals, and (3) precedential judicial decisions. The ERG team compiled the list of assessments and relevant publications from a diverse set of resources, including state and federal government agencies, agencies from selected foreign countries, international bodies, non-governmental organizations, databases of judicial decisions, and the peer-reviewed literature.

This section identifies "key assessments" that the ERG team will review on glyphosate's human health impacts (see Section 3.1) and glyphosate's ecological impacts (see Section 3.2) and assessments on the most common alternative herbicides (see Section 3.3). After receiving approval to proceed to Phase Two, the ERG team will review the assessments listed throughout this section and relevant supporting documents, which may include interim assessments, final determinations, and responses to comments. In Phase Two, the ERG Team will acknowledge which findings pertain to technical grade glyphosate separately from findings that pertain to commercial formulations that contain glyphosate and other substances (adjuvants), to the extent this information is available.

It is important to note that the state of the science of glyphosate's human health and environmental impacts continues to evolve. The following sub-sections include provisions to account for recently completed studies and for key assessments expected to be issued later this year.

3.1 Assessments of Glyphosate's Human Health Impacts

This section identifies the "key assessments" that the ERG team will consider on glyphosate's human health impacts.

3.1.1 Recent and Ongoing Assessments Published by Recognized Authorities

The ERG team proposes reviewing and summarizing the following publications in Phase Two, considering a range of cancer and non-cancer human health impacts. Importantly, the Phase Two review will consider the fact that the various assessments have different scopes, reviewed different sets of literature (i.e., the assessments were completed in different years), and followed different methodologies. These differences will factor into the ERG Team's synthesis of information on human health impacts.

The list is organized into three categories of authors. For purposes of this project, an assessment was considered either a publication that comprehensively reviews the literature on glyphosate toxicity and reaches conclusions on carcinogenicity, non-cancer toxicity, or both or an ongoing significant research study of glyphosate toxicity in humans.

Assessments Issued by Federal and State Authorities in the United States

- EPA first registered glyphosate as a pesticide in 1974 and has periodically reassessed health risks since. The ERG team will review multiple documents posted to the EPA Glyphosate Registration Review docket. These documents include the most recent Interim Registration Review Decision to continue to list glyphosate (EPA, 2020a) and the accompanying Draft Human Health Risk Assessment (EPA, 2018a); EPA's responses to comments (EPA, 2019; 2020b; 2020c); and other relevant supporting documents (EPA 2018b; 2018c). Note that the ERG Team will not review every entry in the EPA docket, because the docket contains more than 14,000 entries.
- Congress mandated the Agency for Toxic Substances and Disease Registry (ATSDR) to develop toxicological profiles for hazardous substances found at Superfund sites. ATSDR has prepared more than 180 toxicological profiles, including its Toxicological Profile for Glyphosate (ATSDR, 2020). The profile considered peer-reviewed literature published through September 2017.
- The National Toxicology Program (NTP) falls within the U.S. Department of Health and Human Services. NTP has previously issued cancer classifications for selected hazardous substances and the program's Report on Carcinogens is a widely cited resource for evidence of carcinogenicity. Although NTP has not yet classified glyphosate for carcinogenicity, the program is currently researching the toxicity of glyphosate and selected glyphosate formulations. NTP has released limited results from *in vitro* and genetic toxicity tests and may issue additional publications in 2022 (NTP, 2022).
- The U.S. Forest Service (USFS) within the U.S. Department of Agriculture (USDA) has a mission to "sustain the health, diversity, and productivity of the Nation's forests and grasslands." In support of that mission, USFS has evaluated the toxicity of various herbicides, including a 2011 contractor report that presented a human health and ecological risk assessment of glyphosate (USFS, 2011). A 2003 contractor report addressed the same topic (USFS, 2003).
- The Agricultural Health Study is an ongoing prospective epidemiological study that is examining adverse health effects among pesticide applicators and their spouses. The National Cancer Institute and the National Institute of Environmental Health Studies fund this study, which has included collaboration from EPA and the National Institute for Occupational Safety and Health. Westat, a government contractor, has been coordinating the study. Although the study is not specific to glyphosate, the investigators have published journal articles on relationships between cancer incidence and glyphosate use (Androtti et al., 2018; De Roos et al., 2005).
- California's Office of Environmental Health Hazard Assessment (OEHHA) sets "No Significant Risk Levels" (NSRLs) for toxic substances regulated under the state's Safe Drinking Water and Toxic Enforcement Act of 1986 (i.e., Proposition 65). In July 2017, OEHHA issued an Initial Statement of Reasons for glyphosate that proposed an NSRL for glyphosate based on cancer outcomes observed in laboratory animals. The state has also proposed changes to the wording of warnings on glyphosate-containing products used in

California. A final rulemaking on the updated warnings has not been issued, and the public comment period for that initiative ended earlier this month (CalEPA, 2022).

Assessments Issued by International Bodies (e.g., European Union and World Health Organization)

- The International Agency for Research on Cancer (IARC) is the agency within the World Health Organization that, among other functions, issues monographs to classify toxic substances by human carcinogenic potential. In 2017, IARC issued a monograph evaluating carcinogenicity for five pesticides and herbicides, including glyphosate. The monograph concludes that glyphosate is "probably carcinogenic to humans" (IARC, 2017).
- Other European Union agencies have completed assessments of glyphosate toxicity. In 2015, for example, the European Food Safety Authority (EFSA) completed an assessment that, among other findings, concluded that glyphosate is "unlikely to pose a carcinogenic hazard to humans" (EFSA, 2015). The European Union has approved the use of glyphosate, but that approval expires in December 2022. Another glyphosate assessment is currently being conducted by the Assessment Group on Glyphosate (AGG). In 2021, the AGG submitted both a draft Renewal Assessment Report (more than 10,000 pages) and an update to EFSA (AGG, 2021). The final Renewal Assessment Report, which will include final conclusions on human health impacts, is expected to be released in late 2022 or 2023.
- In May 2016, the Food and Agriculture Organization of the United Nations and the Core Assessment Group on Pesticide Residues of the World Health Organization (WHO) convened a panel to evaluate human health risks of consuming food products that contain pesticide residues; and a summary report was issued later in the year. This evaluation considered health risks for three pesticides, including glyphosate. The panel found that long-term exposures to glyphosate residues in food are "unlikely to present a human health concern" and that short-term exposures are "unlikely to present a risk to consumers" (FAO/WHO, 2016).

Assessments Issued by Selected Foreign Governments (Outside the European Union)

- In Canada, the Pest Management Regulatory Agency (PMRA) of Health Canada authorizes uses of pesticides. In 2017, PMRA re-authorized use of glyphosate and published an assessment that considered cancer risk and potential health impacts associated with dietary exposures, occupational exposures, and household uses. An advocacy group sued the agency regarding the re-authorization decision; and in February 2022, a Federal Court of Appeal in Canada issued a ruling that directed the PMRA to reconsider certain procedural aspects of the re-authorization. The court decision did not change the glyphosate authorization, however. In Phase Two, ERG will investigate whether PMRA has issued new assessment documents on glyphosate human health impacts, given the implications of the recent court decision.
- In 2016, the Food Safety Commission of Japan completed a human health risk assessment of different commercial grades of glyphosate. The complete assessment report is only available in Japanese, but ERG will review the summary of conclusions, which is written in English (FSCJ, 2016). The human health risk assessment considered a range of cancer and non-cancer outcomes and derived an acceptable daily intake for glyphosate.
- The Australian Pesticide and Veterinary Medicines Authority (APVMA) has multiple mandates, including regulation of the use of pesticides in Australia. In 2016, APVMA issued a regulatory position paper that found no "scientific grounds for placing glyphosate and products containing glyphosate under formal reconsideration," based both on human health and ecological considerations (APVMA, 2016).

3.1.2 Peer-reviewed Publications

The major assessments reviewed in the previous section were completed in different years, and they considered peer-reviewed literature issued up through different cutoff dates (e.g., the ATSDR 2020 Toxicological Profile is based on a literature search completed in September 2017). These assessments therefore do not consider findings from research published after the corresponding literature search cutoff dates. This is an important disconnect because scientists worldwide continue to study human health impacts associated with glyphosate exposure, and highly relevant publications have become available in recent years on glyphosate genotoxicity (e.g., Benbrook et

al., 2019), cancer (e.g., Leon et al., 2019; Zhang et al., 2019; Boffetta et al., 2021), reproductive effects (e.g., Mohammadi et al., 2021), and various other health outcomes.

To ensure this project's scientific review is complete and current, the ERG Team will perform a literature search to identify recent peer-reviewed publications on glyphosate's human health impacts. ERG will prepare a literature search methodology memorandum for review by the Glyphosate Commission before executing the search. We anticipate conducting this task using the PubMed search engine and focusing on the most recent 5 years of publications (2018-2022). Key words for the search will include terms related to the herbicide (e.g., glyphosate, Roundup), the various health outcomes under consideration (e.g., cancer, genotoxicity, reproductive toxicity, developmental toxicity, endocrine disruption), and others (e.g., epidemiology). ERG will select the key words in an iterative fashion, using approaches ERG has previously applied in literature review projects and considering key words that EPA used in a recent glyphosate literature search (EPA, 2018d).

Upon executing the search, ERG will compile potentially relevant publications in a reference management system (either EndNote or RefWorks), remove duplicate entries, and remove entries for publications not written in English. The next step will be reviewing the references' titles and abstracts for relevance, after which ERG will have a final list of the recent literature of relevance to glyphosate human health impacts. ERG will then obtain the publications that passed the initial title and abstract screening and again review publications for relevance. ERG then intends to review every publication that passed the different tiers of screening. However, should this search identify an unexpectedly substantial number of potentially relevant publications, ERG will discuss with the Glyphosate Commission options for synthesizing the literature within the bounds of the project budget (e.g., focusing on review articles and meta-analyses, focusing on health endpoints of greatest interest).

3.1.3 Precedential Judicial Decisions

To identify precedential judicial decisions, an attorney with ERG executed a search of a case law database using the Casetext Research software platform. The Casetext database includes cases for which a judicial order has been issued. This includes federal and state case law, with all 50 states considered. A judicial order could mean that a court or judicial officer issued a decision or that an order was issued after two parties reached agreement. Not all filed claims result in judicial orders. Selected details of the initial Casetext searches follow:

- Searching on "glyphosate" without a date range yielded 255 cases filed in state and federal courts, but no case law from Massachusetts state court. Of the cases identified, 108 were filed in the last 5 years. EPA was a party in five of the cases.
- Over the last 5 years, 49 glyphosate tort law cases were identified, most of which focused on cancer outcomes (particularly lymphoma); and 39 glyphosate regulatory law cases were identified. The two most litigated issues in the tort law cases include the causes of action on product liability and negligence. Upon initial review, the product liability cases are rooted in what information should be included in product labels and whether plaintiffs were properly warned about carcinogens, ecological concerns, and other issues. The negligence claims are centered around plaintiffs' ability to show that the products containing glyphosate are the actual cause of their health effects.
- 19 cases were identified that addressed ecological issues but did not address lymphoma. These cases related to product liability, the Endangered Species Act, and the Plant Protection Act.
- Ongoing legal proceeding pertain to EPA's January 2020 interim registration review decision to continue to register various forms of glyphosate as a pesticide. Multiple parties, including the Natural Resources Defense Council, the Rural Coalition, the National Family Farm Coalition, the Center for Biological Diversity, and the Pesticide Action Network, sued EPA over its interim decision. In May 2021, EPA submitted a filing to the U.S. Court of Appeals that sought permission to revise previously issued glyphosate assessment documents—but did not propose changing the glyphosate registration status.

In Phase Two, ERG will synthesize information in the 49 tort law cases referenced above and the status of the legal challenges to EPA's interim registration review decision. Further, recognizing that precedential cases on glyphosate are a changing landscape, ERG intends to conduct a more thorough legal review of all cases for relevance during

Phase Two. ERG seeks input from Glyphosate Commission members on whether any subset of court decisions are of greatest interest for the Phase Two review.

3.2 Assessments of Glyphosate's Environmental Impacts

This section identifies the "key assessments" that the ERG team will consider on environmental impacts of glyphosate and glyphosate formulations. The content is organized into the three types of "key assessments" included in this contract's scope of work. Assessments that reported on both human health and environmental impacts are listed both below and in Section 3.1.

The ERG Team will consider a range of environmental impacts when reviewing publications listed in this section. These impacts include direct toxicity effects on non-target aquatic and terrestrial species due to contact with glyphosate, especially for species that may be rare or endangered in Massachusetts; sublethal effects on aquatic and terrestrial biota such as behavioral effects that may have ecological significance on particular species populations; indirect effects on pollinators (e.g., honeybees, monarch butterflies) due to potential habitat impacts; and indirect effects on other aquatic and terrestrial biota due to potential impacts on their habitats. The ERG Team will consider the various glyphosate-related environmental impacts that have been studied as well as the uncertainties associated with the assessments and their underlying publications.

As with the key assessments of human health impacts, the key assessments presented below were prepared to address different issues, employed different methodologies, and drew from different subsets of the peer-reviewed literature. The ERG Team will account for and explain these differences when preparing the Phase Two report.

3.2.1 Recent and Ongoing Assessments Published by Recognized Authorities

The ERG team proposes reviewing and summarizing the following assessments conducted by recognized authorities in Phase Two of the contract. The list is organized into three categories of authors.

Assessments Issued by Federal and State Authorities in the United States

- As noted previously, EPA originally registered glyphosate as a pesticide and has since reassessed the use as part of the statutorily mandated 15-year review cycle. The ERG team will review multiple documents that EPA and its contractors prepared (or reviewed) on glyphosate environmental risks, and most documents of interest are posted to the EPA Glyphosate Registration Review docket. These documents include but are not limited to: the "Final National Level Listed Species Biological Evaluation for Glyphosate" (EPA, 2021); the "Interim Registration Review Decision: Case Number 0178" (EPA, 2020a), which incorporates a relatively recent methodology for evaluating risks to honeybees, monarch butterflies, and other pollinators; and the 2015 "Preliminary Ecological Risk Assessment in Support of the Registration Review of Glyphosate and Its Salts" (EPA, 2015b). The ERG team will also review selected additional material posted to EPA's docket, but as noted previously, a review of every docket entry is beyond the scope of this project.
- The ERG Team will review multiple publications issued by the USFS, including the 2003 and 2011 human health and ecological risk assessment cited in Section 3.1 (USGS, 2003; 2011), articles in the peer-reviewed literature authored or co-authored by USFS and USDA scientists (e.g., Busse et al., 2001; Linz et al., 1999), and selected earlier profiles of glyphosate environmental impacts (e.g., USFS, 1997).
- The ERG Team will consult with MDAR for publicly available assessments that Massachusetts agencies have issued on glyphosate's environmental impacts, beyond the updated summary fact sheet that MDAR has already issued (MDAR, 2022).

Assessments Issued by International Bodies and Agencies of Selected Foreign Countries

- In the European Union, glyphosate is currently being reevaluated for ecological effects and risk and this reevaluation is expected to be completed in late 2022 or 2023. EFSA and the European Chemical Agency are jointly reassessing glyphosate exposure and effects. Thus far, a working group has prepared a draft Renewal Assessment Report (dRAR), and that draft is currently being reviewed and will eventually be made public along with any modifications to the assessment. The ERG Team will review all available

information on the ongoing EFSA work, including: the Authority's summary of the dRAR (AGG, 2021); the Authority's evaluation of glyphosate residues in animal feed and potential impacts to animal health (EFSA, 2018); and the Authority's evaluation of glyphosate's endocrine disruption potential (EFSA, 2017).

- Recognizing that EFSA (and its AGG) has published more extensively on glyphosate's environmental impacts than other foreign government agencies, the ERG Team's review of assessments issued by international bodies will be limited to the EFSA publications. As the only exception, the ERG Team will also consider findings the Australian regulatory position paper on glyphosate, as that specifically addressed ecological impacts (APVMA, 2016).

Assessments Issued by Selected Non-Governmental Organizations (NGOs)

- In 2020, the Forest Stewardship Council (FSC), an NGO that advocates for forest management, issued environmental and social risk assessment guidance. The guidance includes appendixes that present information on six specific pesticides. The ERG Team will consider the contents of Appendix 1, which addresses glyphosate (FSC, 2020).
- In 2017, two organizations in Europe—Générations Futures and the Pesticide Action Network—issued a joint publication that, among other things, critiqued the literature search conducted by authors of a previous EFSA Renewal Assessment Report (GF and PAN, 2017). The report argued that the literature search should have been more inclusive of publications that reported various glyphosate-related impacts.
- In 2019, the Natural Resources Defense Council (NRDC) published a report raising concern about 10 species in the United States that are imperiled by pesticide use, and some of the concern centered on reported glyphosate impacts (NRDC, 2019).
- Massachusetts-based NGOs have developed websites that raise additional environmental impact concerns about glyphosate, such as the potential to contribute to development of glyphosate-resistant strains of weeds ("super weeds") that may then be difficult to control (NOFA/Mass, 2018). This NGO publication will be reviewed in Phase Two, along with others that are identified during the Glyphosate Commission's review of this Phase One report.

3.2.2 Peer-reviewed Publications

In recent decades, hundreds of peer-reviewed journal articles have reported on glyphosate contamination in the environment, exposures to this contamination, and specific biological effects. Conducting a systematic review of the entire history of glyphosate-related journal articles is outside the scope of this work. However, as part of its ongoing support for EPA's glyphosate review, ERG's subcontractor (Tetra Tech) has conducted extensive literature reviews of the evidence of glyphosate's environmental impacts.

Through that effort, ERG's subcontractor is familiar with the literature that addresses glyphosate's environmental impacts broadly (e.g., Ghandi et al., 2021; Gill et al., 2018; Maggi et al., 2020; Meftaul et al., 2020) as well as literature on glyphosate's impacts to specific receptors and species, including water fleas (Marek et al., 2013), rice fish (Smith et al., 2019), earthworms (Stellin et al., 2018), and phytoplankton (Wang et al., 2016). The citations presented in the previous sentence are only intended to show examples of relevant peer-reviewed literature and not to suggest that this is the universe of relevant publications. The Phase Two work will be based on our understanding of the overall body of literature, which was considered in the development of EPA's recent "Final National Level Listed Species Biological Evaluation for Glyphosate" (EPA, 2021). This review will consider the various types of environmental impacts listed at the beginning of this section, as well as strengths, limitations, and uncertainties associated with characterizing the impacts.

To ensure the Phase Two research is complete and current, Tetra Tech will assess the need for conducting a supplemental literature search. Whether this is necessary will depend on multiple factors, most notably on whether EFSA issues its final Renewal Assessment Report during Phase Two—and what date range of scientific publications were considered. The ERG Team will inform the Glyphosate Commission if a supplemental literature search will be conducted in Phase Two on glyphosate environmental impacts. If one is to be performed, the ERG Team will share with the Glyphosate Commission the search parameters (e.g., the search engine, the time frame of publications, and the search keywords).

3.2.3 Precedential Judicial Decisions

Certain aspects of the EPA pesticide registration process have faced legal challenges, with resolution to the most relevant challenge still pending. As noted previously, in 2020, NRDC and other parties filed suit against EPA to challenge multiple aspects of the proposed glyphosate registration, with part of the case centering on ensuring adequate protection of threatened and endangered species. While this litigation is still pending, the ERG Team is aware of recent efforts EPA has taken to ensure that its "pesticide program will meet its endangered species obligations" as documented in a publication that EPA issued just last month (EPA, 2022).

Additional precedential judicial decisions relevant to environmental impacts might be identified as ERG completes its review of case law at the beginning of Phase Two.

3.3 Assessments of Glyphosate Alternatives

For selected glyphosate alternatives, the Phase Two report will provide information on uses, effectiveness, and impacts on human health and the environment. The report will address the four categories of options listed in Section 2.3, and provide more detailed information on selected EPA-registered chemical herbicide alternatives. The Phase Two report will consider assessments published for "minimum risk pesticides" that may serve as glyphosate alternatives; however, these alternatives might have limited published information on health and environmental impacts due to their "minimum risk" designation from EPA.

For the chemical herbicide alternatives reviewed in Phase Two, the ERG Team will consider the following two information sources for human health and environmental assessments:

- The ERG Team will conduct substance-specific searches on EPA's Pesticide Chemical Search website (https://ordspub.epa.gov/ords/pesticides/f?p=chemicalsearch:1). For most substances listed in Table 1 of this report, this website provides links to documents with some combination of the following information: regulatory status, Reregistration Eligibility Decision (RED) documents, draft and final human health and ecological risk assessments, Endangered Species Act litigation, environmental fate and transport information, and regulatory dockets (which can include links to additional references).
- The ERG Team will also conduct substance-specific searches for human health and ecological risk assessments conducted by the USFS. These will be identified via searching the USFS Pesticide-Use Risk Assessments and Worksheets website (https://www.fs.fed.us/foresthealth/protecting-forest/integrated-pest-management/pesticide-management/pesticide-risk-assessments.shtml).

Project resources do not allow for more comprehensive searches of assessments for every alternative.

4.0 Key Stakeholders to Consult

This project's scope of work calls for ERG to "consult with stakeholder groups on data and information collection." In Phase One, ERG was only required to identify the stakeholder groups who will be contacted, but those groups will not be contacted until Phase Two. The ERG Team intends to contact stakeholders in Phase Two for the following reasons:

- To identify any relevant scientific assessments on glyphosate's human health and environmental impacts, beyond those identified in Sections 3.1 and 3.2.
- To ask questions about relevant research in progress and pending assessments.
- To seek information on glyphosate uses in Massachusetts, the amounts of different glyphosate-containing formulations used, and experiences with using glyphosate alternatives.
- To understand glyphosate-related issues of greatest interest.

Based on these information needs, the ERG Team identified four categories of stakeholder groups to contact. Those categories are listed below, along with the stakeholders within each category whom ERG proposes contacting. ERG presented an initial list of proposed stakeholder contacts (and the rationale for selecting them) during the Glyphosate Commission meeting held on May 23, 2022. During ERG's presentation, Commission

members and meeting participants recommended additional stakeholders to consider contacting. The ERG Team included those recommendations in the following list.

The ERG Team will contact the following stakeholders in Phase Two, to the extent that project resources will allow. The list includes initial points of contact for each stakeholder. The list is organized into four categories; within each category, the stakeholders are listed in alphabetical order, by the last names of the points of contact. The individuals listed below may refer ERG to other members or designees of their respective organizations. Individual stakeholder discussions will be limited to not longer than 1 hour.

Scientific Leads of Selected Glyphosate Assessments

- Dr. Aaron Blair, NCI, Chair for the 2017 IARC monograph
- Dr. Laura Beane Freeman, NCI, Principal Investigator for the Agricultural Health Study
- Dr. James Hetrick, EPA, Senior Advisor for the 2015 preliminary ecological risk assessment
- Dr. Hana Pohl, ATSDR, Lead for the 2020 Toxicological Profile for Glyphosate

Massachusetts Pesticide Board Subcommittee Members

- Michael Moore, chairperson, Massachusetts Department of Public Health
- Richard Berman, public member of the Pesticide Board Subcommittee
- Margret Cooke, Acting Commissioner, Massachusetts Department of Public Health
- John Lebeaux, Commissioner, MDAR
- Jim Montgomery, Commissioner, Massachusetts Department of Conservation and Recreation

Selected Non-Government Organizations (Alphabetical Order by Last Name of Contact)

- Diane Butt, Board of Directors, Massachusetts Christmas Tree Association
- Liam Condon, President, Bayer Crop Science Division
- Janet Domenitz, Executive Director, MASSPIRG
- John Judge, President and Chief Executive Office, The Trustees of Reservations
- Robb Johnson, Executive Director, Massachusetts Land Trust Coalition
- Karen Kerr, President, Massachusetts Association of Landscape Professionals
- Jocelyn Langer, Executive Director, Northeast Organic Farming Association, Massachusetts Chapter
- Rie Macchiarolo, President, Ecological Landscape Alliance
- Doak Marasco, President, International Society of Arboriculture, New England Chapter
- Peter Mezitt, President, Massachusetts Nursery and Landscape Association
- Kristin O'Brien, Coordinator, Sudbury-Assabet-Concord Cooperative Invasive Species Management Area
- Margaret O'Gorman, President, Wildlife Habitat Council
- David O'Neill, President, Massachusetts Audubon Society
- Joe Szczechowizc, President, Massachusetts Association of Lawn Care Professionals
- Steve Seymour, Executive Director, GreenCAPE
- Warren Shaw, President, Massachusetts Farm Bureau Federation
- Mark Smith, President, Grow Native Massachusetts
- Ed Stockman, Co-Founder, Regeneration Massachusetts
- Steve Ward, President, Cape Cod Cranberry Growers' Association
- Kate Wilson, President, North American Invasive Species Management Association

Selected Contacts from State Government Agencies and Universities in Massachusetts

- George Batchelor, Supervisor of Landscape Design, Massachusetts Department of Transportation
- Brian Hawthorne, Habitat Program Manager, MassWildlife
- Dr. Randall Prostak, Extension Weed Specialist, University of Massachusetts Extension
- Nancy Putnam, Director of Ecology, Massachusetts Department of Conservation and Recreation
- Eve Schlüter, Assistant Director, Massachusetts Natural Heritage and Endangered Species Program

The ERG Team plans to update the previous list based on comments received on this report. The ERG Team will also revisit project resources before contacting stakeholders, because the current budget might not allow for contacting every stakeholder on this list. During Phase Two, the ERG Team will contact as many randomly selected individuals from the previous list as project resources will allow. This project's Phase Two report will document that selection process, if it needs to be applied.

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6.0 Abbreviations Used in the Report

AGG Assessment Group on Glyphosate

APVMA Australian Pesticide and Veterinary Medicines Authority

ATSDR Agency for Toxic Substances and Disease Registry

dRAR draft Renewal Assessment Report

ECHA European Chemicals Agency

EFSA European Food Safety Authority

EPA U.S. Environmental Protection Agency

ERG Eastern Research Group, Inc.

FSC Forest Stewardship Council

IARC International Agency for Research on Cancer

MDAR Massachusetts Department of Agricultural Resources

NGO non-governmental organization

NRDC Natural Resources Defense Council

NSRL No Significant Risk Level

NTP National Toxicology Program

OEHHA (California's) Office of Environmental Health Hazard Assessment

PMRA (Canada's) Pest Management Regulatory Agency

RED Reregistration Eligibility Decision

UMass University of Massachusetts

USDA U.S. Department of Agriculture

WHO World Health Organization

From:	Clint Richmond
To:	Lowery, Ann (DEP)
Cc:	deb.pasternak@sierraclub.org
Subject:	Re: Glyphosate Commission: Phase 1 Report available for comment until June 30, 2022
Date:	Thursday, June 23, 2022 3:35:22 PM

Dear Ms. Lowery:
This is not a formal comment, but I wanted to see if a couple organizations that I am involved with could be consider stakeholders:

1) The new Conservationist Pesticide Advisory Council, which represents environmental/conservation groups and experts and advises the Pesticide Committee. I am its chair. You may contact us via Taryn at MDAR.

2) The Mass. Sierra Club, we have been active on pesticides, especially fluorinated pesticides, of which some substitutes mentioned in the Phase 1 report (sec. 2.3) are such as Dithiopyr, Fluazifop-P-butyl, both of which meet the OECD definition of PFAS. We are opposed to the continued use of fluorinated pesticides as a class for example, and will be submitted formal comment on that aspect of the glyphosate investigation. We oppose even pesticides with a single fluorine such as Indaziflam, since the fluorine chemistry used in them and associated risks are basically the same as that for PFAS. One question I have is will the substitutes that are listed as compound classes be enumerated, since several of them could be fluorinated as well? Having a complete list will help with developing our formal comments.

As an aside, since I and the Sierra Club worked with them, GreenCAPE is a small group that may no longer be operating following the tragic passing of one of its leaders, Sue Phelan, who was the wife of Steve Seymour.

We look forward to the Commission process.

Sincerely,
Clint Richmond, member of the Executive Committee, Mass. Sierra Club.
clint@massachusetts.sierraclub.org

-----Original Message-----
From: Lowery, Ann (DEP) <ann.lowery@mass.gov>
To: Lowery, Ann (DEP) <ann.lowery@state.ma.us>
Cc: Suuberg, Martin (DEP) <martin.suuberg@state.ma.us>; Locke, Paul (DEP) <paul.locke@state.ma.us>; Smith, C.Mark (DEP) <c.mark.smith@state.ma.us>; LaScola, Taryn (AGR) <taryn.lascola@state.ma.us>; Bouchard, Alisha (AGR) <alisha.bouchard@state.ma.us>
Sent: Thu, Jun 23, 2022 9:41 am
Subject: Glyphosate Commission: Phase 1 Report available for comment until June 30, 2022

Greetings. You are receiving this message because you signed up to receive updates about the work of the Massachusetts Glyphosate Commission.

The Draft Phase 1 Report can be found on the Commission Website here:
https://www.mass.gov/service-details/glyphosate-commission

At its June 17, 2022 meeting the Commission decided to receive public input on the report until June

30, 2022. Please send any comments to me at Ann.Lowery@mass.gov by June 30th. Please note that comments submitted will be shared with the Commission members and will be posted on the Commission website.

Thank you for your continued interest the in the work of the Commission. – Ann

Ann Lowery
MassDEP, Assistant Commissioner
Bureau of Planning and Evaluation
Ann.Lowery@mass.gov
cell: 617-645-9710
(she, her)

From: Ed Stockman
To: Lowery, Ann (DEP)
Subject: RE: Glyphosate Commission Update
Date: Wednesday, April 20, 2022 10:08:58 AM
Attachments: Glyphosate Human Health.docx
Glyphos ...Environ.docx
Glyphosate Food.docx

Hello Ann,

Please find attached information concerning glyphosate. As an agrobiologist and farmer, I've been compiling data about glyphosate for several years. Much of the information on the attached sheets references published glyphosate research with links to the research.

The research contained within the attachments is essential to a comprehensive review of glyphosate and may help facilitate the process. Please forward this information to anyone who is interested but especially to the Commission's glyphosate consultants at Eastern Research Group (ERG).

Thank you for your assistance.

Be well,

Ed

Ed Stockman
Cofounder Regeneration Massachusetts
ed@regeneration-mass.org

Regeneration Massachusetts is a statewide organization dedicated to raising consumer awareness about the healthy, carbon-capturing soils associated with regenerative organic agriculture and the critical role they play in human nutrition and in mitigating climate change. Follow us on facebook at https://www.facebook.com/marighttoknowgmos/

From: Lowery, Ann (DEP) [mailto:ann.lowery@state.ma.us]
Sent: Wednesday, March 2, 2022 9:42 AM
To: Ed Stockman
Subject: RE: Glyphosate Commission Update

Hello Mr. Stockman.

Yes that item in the agenda refers to the Commission's effort to secure consultant services to

complete its legislative task. The request for proposals is located on the commission's website.

I hope you are able to attend the meeting next week for the discussion. – Ann

Ann Lowery
MassDEP, Assistant Commissioner
Bureau of Planning and Evaluation
Ann.Lowery@mass.gov
cell: 617-645-9710
(she, her)

From: Ed Stockman <edstockman@verizon.net>
Sent: Tuesday, March 1, 2022 7:53 PM
To: Lowery, Ann (DEP) <ann.lowery@mass.gov>
Subject: RE: Glyphosate Commission Update

Hello Ann,

Does item #3 (Update on procurement efforts) in the meeting agenda refer to securing a firm to review glyphosate research. If not, has a firm been hired and who was selected?

Thank you,

Ed Stockman
Cofounder Regeneration Massachusetts
ed@regeneration-mass.org

Regeneration Massachusetts is a statewide organization dedicated to raising consumer awareness about the healthy, carbon-capturing soils associated with regenerative organic agriculture and the critical role they play in human nutrition and in mitigating climate change. Follow us on facebook at https://www.facebook.com/marighttoknowgmos/

From: Lowery, Ann (DEP) [mailto:ann.lowery@mass.gov]
Sent: Tuesday, March 1, 2022 2:45 PM
To: Lowery, Ann (DEP)

Cc: Suuberg, Martin (DEP)
Subject: Glyphosate Commission Update

Greetings.

The next meeting of the Massachusetts Glyphosate Commission has been scheduled for March 8, 2022 at 4pm. Additional information, including directions on how to join the meeting, is available at the Commission website here:

https://www.mass.gov/service-details/glyphosate-commission

I have also attached the March 8, 2022 meeting notice for your convenience to this message. Please let me know if you have any questions. – Ann

Ann Lowery
MassDEP, Assistant Commissioner
Bureau of Planning and Evaluation
Ann.Lowery@mass.gov
cell: 617-645-9710
(she, her)

Glyphosate (Roundup) Information Sheet – Food

Where is Glyphosate Banned?
https://www.baumhedlundlaw.com/toxic-tort-law/monsanto-roundup-lawsuit/where-is-glyphosate-banned/

Mass Dept. Of Ag Resources Glyphosate Info Sheet – references very outdated – no recent research
https://www.mass.gov/files/documents/2016/08/xh/glyphosate-2011.pdf

What's the connection between glyphosate and genetically modified crops?
https://detoxproject.org/glyphosate/whats-the-connection-between-glyphosate-and-genetically-modified-crops/

US glyphosate use by year and crop
https://water.usgs.gov/nawqa/pnsp/usage/maps/show_map.php?year=2014&map=GLYPHOSATE&hilo=L&disp=Glyphosate

Glyphosate – Unsafe on any plate – food testing
https://s3.amazonaws.com/media.fooddemocracynow.org/images/FDN_Glyphosate_FoodTesting_Report_p2016.pdf

Glyphosate in orange juice
https://d3n8a8pro7vhmx.cloudfront.net/yesmaam/pages/7804/attachments/original/1539208204/Orange_Juice_2018_results_MAA.pdf?1539208204

Glyphosate: pesticide tolerances
https://www.federalregister.gov/documents/2011/05/11/2011-11205/glyphosate-pesticide-tolerance

EWG - Breakfast with glyphosate – Children's health initiative
https://www.ewg.org/childrenshealth/glyphosateincereal/

Glyphosate in school food – Center for Environmental Health
https://www.ceh.org/news-events/press-releases/content/new-report-toxic-weed-killer-menu-k-12-schools-across-country/

FDA – Questions and answer on glyphosate
https://www.fda.gov/food/foodborneillnesscontaminants/pesticides/ucm583713.htm

FDA - Pesticide Residue Monitoring Program Fiscal Year 2016 Pesticide Report
https://www.fda.gov/downloads/Food/FoodborneIllnessContaminants/Pesticides/UCM618373.pdf

An FDA scientist finds traces of weed killer in many common foods
https://www.pri.org/stories/2018-06-02/fda-scientist-finds-traces-weed-killer-many-common-foods

Weedkiller found in wide range of breakfast foods aimed at children
https://www.theguardian.com/environment/2018/aug/16/weedkiller-cereal-monsanto-roundup-childrens-food

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Compiled by: Ed Stockman, M.S. agrobiologist
Cofounder Regeneration Massachusetts

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Compiled by: Ed Stockman, M.S. agrobiologist
Cofounder Regeneration Massachusetts
edstockman@verizon.net
ed@regeneration-mass.org

Regeneration Massachusetts is a statewide organization dedicated to educating consumers about healthy soils and the critical role they play in human nutrition and in mitigating climate change. Follow us on facebook at www.regeneration-mass.org.

Glyphosate (Roundup) Information Sheet – Environmental Health

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https://www.nature.com/articles/srep05634

Glyphosate Interactions with Physiology, Nutrition, and Diseases of Plants: Threat to Sustainability
https://www.ars.usda.gov/ARSUserFiles/50701000/cswq-0426-yamada.pdf

Effects of the Herbicide Glyphosate on Honey Bee Sensory and Cognitive Abilities: Individual Impairments with Implications for the Hive
https://www.mdpi.com/2075-4450/10/10/354

Effects of a commercially formulated glyphosate solutions at recommended concentrations on honeybee (Apis mellifera L.) behaviours
https://www.nature.com/articles/s41598-020-80445-4?mc_cid=35a41c801a&mc_eid=0c4ba00c3e

Pesticides in the real world: The consequences of GMO-based intensive agriculture on native amphibians
https://www.sciencedirect.com/science/article/pii/S0006320719309905

Draft National Level Listed Species Biological Evaluation for Glyphosate (endangered species)
https://www.epa.gov/endangered-species/draft-national-level-listed-species-biological-evaluation-glyphosate#executive-summary

Glyphosate likely harms nearly all endangered species
https://cen.acs.org/environment/pesticides/Glyphosate-likely-harms-nearly-endangered/98/web/2020/11?fbclid=IwAR1YUZwULExEfq_25UQDvJxz1CwhgIoUR6Yo2EsHDnS98_wr8ZfzkeSCTIw

Herbicide selection promotes antibiotic resistance in soil microbiomes
https://academic.oup.com/mbe/advance-article/doi/10.1093/molbev/msab029/6133234

Maine Considers Ban on Aerial Herbicide Spraying in Forestry
https://www.usnews.com/news/best-states/maine/articles/2021-03-03/maine-considers-ban-on-aerial-herbicide-spraying-in-forestry

Glyphosate-Based Herbicides Alter the Reproductive Morphology of Rosa acicularis (Prickly Rose)
https://www.frontiersin.org/articles/10.3389/fpls.2021.698202/full

Herbicide Selection Promotes Antibiotic Resistance in Soil Microbiomes
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8136491/pdf/msab029.pdf?mc_cid=3d37a8ede1&mc_eid=0c4ba00c3e

Indirect Effects of the Herbicide Glyphosate on Plant, Animal and Human Health Through its Effects on Microbial Communities
https://www.frontiersin.org/articles/10.3389/fenvs.2021.763917/full

Compiled by: Ed Stockman, M.S. agrobiologist
Cofounder Regeneration Massachusetts
edstockman@verizon.net

From: Ed Stockman
To: Lowery, Ann (DEP); Lowery, Ann (DEP)
Cc: Suuberg, Martin (DEP); Locke, Paul (DEP)
Subject: RE: Fourth meeting of the Massachusetts Glyphosate Commission
Date: Friday, June 17, 2022 10:09:51 AM

Hello Ann - Will the human and environmental health impacts associated with the metabolites and impurities of glyphosate be reviewed in Phase 2?

Thank you,

Ed Stockman
Cofounder Regeneration Massachusetts
ed@regeneration-mass.org

Regeneration Massachusetts is a statewide organization dedicated to raising consumer awareness about the healthy, carbon-capturing soils associated with regenerative organic agriculture and the critical role they play in human nutrition and in mitigating climate change. Follow us on facebook at https://www.facebook.com/marighttoknowgmos/

From: Lowery, Ann (DEP) [mailto:ann.lowery@mass.gov]
Sent: Monday, June 13, 2022 5:48 PM
To: Lowery, Ann (DEP)
Cc: Suuberg, Martin (DEP); Locke, Paul (DEP)
Subject: Fourth meeting of the Massachusetts Glyphosate Commission

Good afternoon.

You are receiving this message because you signed up for news about the work of the Massachusetts Glyphosate Commission. The next meeting of the Commission will take place on June 17, 2022 at 3 p.m. on Zoom. Additional information, including the agenda and directions on how to join the meeting, is available at the Commission website here:

https://www.mass.gov/service-details/glyphosate-commission

I have also attached the June 17, 2022 meeting notice to this message for your convenience.

Please let me know if you have any questions. – Ann

Ann Lowery

MassDEP, Assistant Commissioner
Bureau of Planning and Evaluation
Ann.Lowery@mass.gov
cell: 617-645-9710
(she, her)

From: Ed Stockman
To: Lowery, Ann (DEP)
Subject: Comment Glyphosate Commission Report Phase 1
Date: Monday, June 27, 2022 9:43:45 AM

Hello Ann:

A comprehensive literature review of glyphosate needs to include AMPA, 1-Aminomethylphosphonic acid. AMPA is a primary metabolite of glyphosate. It is also toxic. Its direct connection to glyphosate degradation makes it an important candidate for inclusion in a glyphosate literature search focusing on the human and environmental impacts of glyphosate. If not included in the Phase 1 Report then its impacts to human and environmental health needs to be researched and included, in conjunction with glyphosate, in phase 2.

Thank you for the opportunity to comment on the Phase 1 report prepared for the Mass Glyphosate Commission.

Regards,

Ed Stockman
Regeneration Massachusetts
ed@regeneration-mass.org,

From: Donald Sutherland
To: Lowery, Ann (DEP)
Subject: Sutherland Comments on the Glyphosate Scientific Review Phase 1 Report
Date: Wednesday, June 29, 2022 1:57:41 PM

Dear Ann Lowery,

The Glyphosate Scientific Review Phase 1 Report does not review the health threat from the aggregate dietary exposure to the prenatal, infant, child population from the unregulated food glyphosate tolerance residue levels under the federal Food Quality Protection Act (FQPA) 10 fold child safety tolerance mandate for glyphosate.

https://www.mass.gov/doc/glyphosate-scientific-review-phase-1-june-6-2022/download

https://www.epa.gov/laws-regulations/summary-federal-food-drug-and-cosmetic-act

https://www.epa.gov/pesticide-tolerances

https://www.epa.gov/sites/default/files/2015-07/documents/apps-10x-sf-for-cra.pdf

https://www.epa.gov/laws-regulations/summary-food-quality-protection-act

A 2020 peer reviewed science study of the EPA registered child safety tolerance residue levels for the most commonly used agricultural pesticides including glyphosate, and 2-4D showed the EPA failed to apply the FQPA child (10X)safety factor.

https://ehjournal.biomedcentral.com/articles/10.1186/s12940-020-0571-6

The Massachusetts Pesticide Board acknowledges the EPA food safety residue tolerance levels for **Chlorpyrifos, Glyphosate, 2-4D**, and other commonly used agricultural pesticides had failed to apply the FQPA (10X) child safety factor, and reduced the child safety factor to (1X) for prenatal, infant, child protection for Chlorpyrifos, Glyphosate, 2-4D, and other commonly used agricultural pesticides.

The MDAR Pesticide Board and Subcommittee currently has the Parkinson's toxic pesticide **Paraquat** registered without the FQPA 10 fold child safety residue tolerance, and the agricultural community is promoting the use of **Paraquat** to complement or replace

glyphosate.

https://beyondpesticides.org/dailynewsblog/2021/08/biden-epa-reapproves-paraquat-with-weaker-protections-than-trump-administration-proposed/

It took a lawsuit from Massachusetts Attorney General Maura Healy, five other state attorney generals, and a coalition of environmental, farm, and health organizations to ban the commonly used Chlorpyrifos toxic pesticide, that child epidemiological evidence shows it causes neurological damage, including autism and learning impairment, to children.
https://earthjustice.org/brief/2021/chlorpyrifos-ban-pesticide-industry-pressure-epa

https://www.mass.gov/news/ag-healey-sues-epa-for-failing-to-protect-children-and-the-public-from-known-toxic-pesticide

In April 2021 the Ninth Circuit Court ruled that the Environmental Protection Agency (EPA) registered organophosate pesticide Chlorpyrifos was not safe at any tolerance residue level on food. And after decades of exposing the most vulnerable population, children, to the harm of Chlorpyrifos despite the science proving neurological harm, the EPA banned the pesticide in August.
https://earthjustice.org/sites/default/files/files/chlorpyrifos_9th_circuit_4-29-21.pdf
https://www.epa.gov/ingredients-used-pesticide-products/chlorpyrifos
https://www.nytimes.com/2021/08/18/climate/pesticides-epa-chlorpyrifos.html

In Massachusetts, Chlorpyrifos was registered along with the other EPA approved 34,000 pesticide products from 600 toxic chemicals, thru the state's Pesticide Board under the Massachusetts Department of Agricultural Resources (MDAR).
https://www.mass.gov/service-details/pesticide-regulations-in-massachusetts

The public was told, Chlorpyrifos, like Glyphosate, and all of the registered pesticides by the MDAR Pesticide Board, are safe if there is "a reasonable certainty of no harm" if used as directed. Food pesticide residue tolerance levels are set by the EPA with agrochemical manufacturers data under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), the Food, Drug and Cosmetic Act (FFDCA), and amended by the child safety provisions of the federal Food Quality Protection Act (FQPA).
https://www.epa.gov/laws-regulations/summary-federal-food-drug-and-cosmetic-act
https://www.epa.gov/pesticide-tolerances
https://www.epa.gov/sites/default/files/2015-07/documents/apps-10x-sf-for-cra.pdf
https://www.epa.gov/laws-regulations/summary-food-quality-protection-act

"In applying the FQPA safety factor provision, EPA's Office of Pesticide Programs (OPP) must either retain the default (10X) FQPA safety factor or assign a different FQPA safety factor based on reliable data showing such factor is safe. If adequate data are available for a

given pesticide active ingredient, the FQPA factor can be different than the default tenfold (10X) value and be in compliance with the FQPA," says MDAR Hotze Wijnja, an Environmental Chemist on the Pesticide Board.

At the 12/14/21 Massachusetts Joint Committee on Environment, Natural Resources and Agriculture Pesticide Reform hearing regional child health authorities cited the current child endangerment by the MDAR Pesticide Program registration of glyphosate and other toxic pesticides.
https://malegislature.gov/Events/Hearings/Detail/4126

1:53:30 Dr. Brita Lundberg, chair of the Board of Greater Boston Physicians Physicians for Social Responsibility

2:01:03 Serona Soroka, legal fellow Conservation Law Foundation

1:52:00 Dr. Regina Larocque Mass General Hospital and associate professor at Harvard Medical School

And in addition, Linda Birnbaum, Ph.D., D.A.B.T., A.T.S
Scientist Emeritus (Retired)
Former Director, National Institute of Environmental Health Sciences
and National Toxicology Program, e-mail: birnbaumls@niehs.nih.gov
email: birnbaum.tox@outlook.com
personal email: birnbaum.tox@outlook.com

states:

"From my personal viewpoint, I believe that glyphosate is a human health problem. I am supportive of the International Agency on Cancer Research determination that it is a probable human carcinogen.

And EPA's Office of Pesticide Protection needs a complete overhaul."

Stay safe,
Donald Sutherland
Hopkinton, Ma
Long Life Farm
http://www.longlifefarm.com
774-248-0053

References:

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https://www.ewg.org/sites/default/files/testimony/AAP%20EWG%20Chlorpyrifos%20Letter.pdf

https://publications.aap.org/pediatrics/article/130/6/e1757/30399/Pesticide-Exposure-in-Children

Application of the Food Quality Protection Act children's health safety factor in the U.S. EPA pesticide risk assessments

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https://www.nytimes.com/2018/08/24/business/epa-pesticides-studies-epidemiology.html?action=click&module=Top%20Stories&pgtype=Homepage

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https://pubmed.ncbi.nlm.nih.gov/31324402/

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https://pubmed.ncbi.nlm.nih.gov/29843725/

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Linda Birnbaum
https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.2004814

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Yu-Han Chiu
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Xindi (Cindy) Hu
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Phillippe Grandjean
https://www.hsph.harvard.edu/news/hsph-in-the-news/chlorpyrifos-safety-human-health/

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Organic diet studies showing the public their body's current pesticide residue levels and how they were reduced after an organic diet

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https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1367841/

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Organic diet intervention significantly reduces urinary glyphosate levels in U.S. children and adults

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Regulating toxic chemicals for public and environmental health

https://theintercept.com/2021/06/30/epa-pesticides-exposure-opp/

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https://pubmed.ncbi.nlm.nih.gov/33812205/

Massachusetts Attorney General Maura Healey's 2018 Chlorpyrifos lawsuit

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