Response to Public Comments Received on

Draft Biological Evaluations for

Atrazine, Simazine, Propazine, and Glyphosate

November 12, 2021

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1 Introduction

In March 2020, EPA released the Revised Method for National Level Listed Species Biological Evaluations (BEs) of Conventional Pesticides. EPA used the Revised Method to conduct the draft BEs for atrazine, simazine, and propazine (generally referenced as the triazines), as well as glyphosate. On November 5, 2020, EPA released the draft BEs for the triazines for public comment. On November 25, 2020, EPA released the draft BE for glyphosate for public comment. In January 2021, the only propazine registrant requested to voluntarily cancel its remaining product registrations. On June 8, 2021, EPA issued a final cancellation order for propazine, which terminated the last propazine products registered in the United States (86 FR 30460 - 30461). Therefore, EPA did not complete the BE for this active ingredient. Additionally, EPA did not respond to comments received on propazine.

The sections below summarize the comments received during the public comment period, as well as EPA's responses to these public comments. Comments and responses are organized into sections, including those on models and tools and general methodology and comments specific to each chemical.

This response to comment document also includes several attachments, separate from this document. **Attachment 1** provides more details on the review of toxicity data for the three herbicides. **Attachment 2** contains results of additional MAGtool analyses conducted, and **Attachment 3** contains the MAGtool files and detailed analysis results in a zip file. **Attachment 4** contains results of corrected aquatic modeling runs for glyphosate, representing a subset of the aquatic modeling.

Approximately 870 comments that pertained to the draft biological evaluation for glyphosate were submitted, including 11 requests for extensions of the public comment period. Additionally, six mass mail campaigns submitted a total of approximately 110,000 signatures. Approximately 100 comments were received that pertained to the draft biological evaluations for the triazines, including five requests for extension of the commenting period. Additionally, four mass mail campaigns submitted a total of approximately 3,880 signatures. For both glyphosate and the triazines, comments were submitted by various stakeholders, including: US Department of Agriculture (USDA), state departments of agriculture, pesticide applicators, pesticide registrants or registrant groups/affiliates, grower groups or affiliates, environmental non-governmental organizations, other non-goverrnmental organizations, and unaffiliated individuals. A list of all commenters is provided in **Appendix A** (note that individual commenters are not listed individually). As many of the comments had similar themes and subjects, the responses below are often grouped by common subject area, rather than individual commenters.

A common theme throughout the comments was that EPA should do more to evaluate risks to listed species based on what is commonly occurring on the landscape (*e.g.,* the use of typical application rates, common agricultural practices, and updated spray drift technologies) and consider risks associated with individual uses. EPA has considered some of these practices in its weight of evidence analysis. EPA evaluated, according to the uses on the labels, whether an individual of a listed species may be affected according to the maximum label rates and method of application, even if the majority of the applications could result in lower exposures (*e.g.,* application rate, technology). In turn, the action area is then determined based on the full spatial footprint of the labeled uses. When determining the likelihood of adverse effects to an individual and the strength of the evidence supporting risk conclusions, EPA considers the labeled uses in the context of available usage data and common agronomic practices as well as alternative assumptions regarding toxicity and potential exposure.

In regard to addressing public comments and initiating consultation with the Services under Section 7, EPA carefully considered the comments to determine if any updates to the BEs were necessary. In many cases the information or data submitted in the comments is expected to have little bearing on the likelihood of impacting one individual, considering the conservative nature of the NE/LAA/NLAA determinations. Early in the consultation, we plan to identify species that may need additional data refinements to be used when considering mitigation options. Where we received public comments and/or data that are useful for these purposes, we will consider the information at that time. EPA did perform a limited reanalysis with the MAGtool for a subset of species for atrazine, using an updated version of the MAGtool (v2.3.1) and incorporating some additional refinements, including atrazine specific spray drift parameters and consideration of other toxicity endpoints. These results are described in **Attachment 2**.

EPA will work with the Services during consultation to update any analyses that are needed to determine if the Action would likely rise to the level of jeopardy of a species or adverse modification of the critical habitat.

2 Summary of comments related to Revised Methods, Tools and Methodology

EPA received many comments that were not specific to the BEs (*e.g.,* on the Revised Method, on Biological Opinions, programmatic consultation). Many of these comments have been addressed in previous RTC documents and can be referenced for further information[1]. EPA provides responses to some of those comments again here for emphasis.

Comment: EPA should undertake substantial efforts to refine the methodology and reduce the "compounding conservatism" and use of "worst case scenarios." EPA should consider other weight of evidence frameworks and use actual data instead of less accurate modeling and employ the "reasonably certain to occur" standard. The Agency needs to better communicate uncertainty in the analysis associated with conservative assumptions made in the analysis.

EPA Response: *As previously discussed, many comments on the methodology and perceived conservatism of the methodology have been addressed in previous RTC documents*[2]*. EPA's responsibility in meeting its obligations to make effects determinations under the ESA as the action agency is to evaluate if an individual of a listed species may be affected. As a result, the process must be protective and evaluate circumstances where the maximum potential exposure could occur. EPA has also considered a number of lines of evidence (usage data, typical rates and application methods, exposure for treated areas versus offsite transport, species-specific information, etc.) in its evaluation.*

Regarding the "reasonably certain to occur" standard, when conducting effects determinations, EPA made conservative assumptions to address identified uncertainties to ensure protection of the assessed species. The influences of those conservative assumptions are considered as part of the MAGtool analysis, where alternative parameters are selected and estimates of the likelihood of individual effects

[1] Available at: https://www3.epa.gov/pesticides/nas/revised/response-to-public-comments.pdf
[2] Abid.

are calculated based on these alternative parameters. The alternative analysis considered more typical usage data, including typical application methods and practices, as well as other toxicity endpoints. EPA believes that this approach is consistent with the current "reasonably certain to occur" standard. If both the conservative and alternative assumptions arrive at the conclusion that one or more individuals of a listed species may be impacted, there is a greater degree of confidence in the LAA determination. If there is a difference in conclusions when using conservative and less conservative assumptions, EPA has less evidence to support the LAA determination; however, there is still the potential for impacts to an individual under some circumstances.

The "worst-case" scenario, as referred to in comments, utilized the maximum PCT and upper distribution of acres, and includes many factors that refine the screening level approach, such as:

- *Basing the EECs on a variety of dietary items or a species-preferred dietary item in the terrestrial environment,*
- *Applying on/off field assumptions about the species,*
- *Using application methods that are associated with the most likely type of application (ground vs aerial) instead of the most conservative method,*
- *In the probabilistic analysis, basing EECs on a distribution of values*
    - *For terrestrial exposure, based on the mean Kenaga and standard deviation*
    - *For aquatic exposure, based on consideration of a range of daily EECs from multiple scenarios, varying curve numbers and varying applications dates*

Based on these refinements, the WoE is not a "worst-case" analysis.

Regarding uncertainty in the analyses, detailed descriptions of these uncertainties and how they are addressed was provided in the response to public comments on the revised methods[3]. Additional revisions to the language of the executive summary have been included in the final BE to more plainly describe the BE and the significance of an LAA call at Step 2 compared to the finding of jeopardy or adverse modification in the Biological Opinion. EPA will continue to explore ways to better communicate uncertainties in the analysis, and how these uncertainties impact the ability to discern if the Action will jeopardize the species or cause adverse modification to the critical habitat.

Comment: Several commenters questioned the conservative nature of the endpoints used in the BE and criteria used for study evaluation. Specific detailed comments were provided regarding some specific endpoints.

EPA Response: *Extensive discussion on the methodology for selecting endpoints and responses to comments on these methods have been previously published.[4] In the previous BEs, EPA utilized the most sensitive scientifically valid and reliable endpoints. When evaluating unpublished studies submitted by registrants, EPA utilized the standard test guidelines that were most representative of the studies (e.g., OCSPP 850 test guidelines, OECD test guidelines). For studies available in the scientific literature (identified using the ECOTOX database), EPA used its open literature guidance[5]. As part of the weight of*

[3] Available at: https://www3.epa.gov/pesticides/nas/revised/response-to-public-comments.pdf
[4] Abid.
[5] Available online at: https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/evaluation-guidelines-ecological-toxicity-data-open

evidence, EPA also considered alternative endpoints, which represent less conservative assumptions. This alternative analysis was used to evaluate the impact of using the most sensitive endpoints in the risk analysis.

EPA agrees that the thresholds are conservative representations of the available data. Values selected as thresholds represent the most sensitive available data. Therefore, the threshold is expected to be more conservative than the broader range of toxicity within a taxa – it is meant to be a protective value. Also, HC_{05} values determined from species sensitivity distributions (SSDs) were used to determine acute thresholds. SSDs are composed of all available acute toxicity data for a given taxa, and thus reflect a wide range of toxicity. For acute toxicity data, EPA also uses the LC_{50}/LD_{50} data and associated slope to account for variability among individuals. Some factors could overstate exposure or toxicity; however, there are also environmental factors and stressors that increase the vulnerability and sensitivity of species to toxic effects to pesticides in natural environments.

Regarding impacts to prey, pollination, habitat and dispersal (PPHD), EPA agrees that several conservative assumptions are made related to exposure of PPHD and that an effect to PPHD will lead to an impact to an individual of a listed species. EPA utilizes a conservative endpoint (e.g., HC_{05} or most sensitive tested species) to represent potential impacts on an individual of a listed species due to declines in PPHD. EPA agrees that it is relevant to consider endpoints that represent a mid-point of sensitivities among tested species within a taxon. Since the relationship is unknown between the most sensitive tested species responses and those of species representing PPHD of listed species, EPA determined that a conservative approach was appropriate. It is unknown if the most sensitive tested species are really conservative when considering the large number of untested species. As stated above, to evaluate the impact of EPA's assumptions regarding use of the most sensitive endpoint, EPA considered other endpoints in an alternative analysis. The purpose of this analysis was to evaluate whether EPA's conservative assumptions influenced the effects determination for a given species.

*Regarding study quality comments raised about specific chemicals and endpoints, these comments are addressed in **Attachment 1**, which also includes any updates to endpoints made based on these comments. Some of these endpints are also considered in the additional MAGtool runs for atrazine, described in **Attachment 2**.*

Comment: There is a lack of transparency as well as potential errors in the Magnitude of Effect Tool (MAGtool).

EPA Response: *Errors identified in these comments have been corrected and updated in the current version of the MAGtool (provided in **Attachment 3**). The changes are not anticipated to significantly impact the effects determinations (demonstrated in **Attachment 2**) or preclude initiation of the consultation process with the Services, where additional considerations regarding tools may be taken into account.*

Both the User's guide for the MAGtool as well as the Revised Method provided with the draft BEs include discussions about the assumptions that were made and how the lines of evidence are applied in the BEs. The MAGtool was developed in Excel and uses visual basic to provide transparency in how assumptions were applied. In order to keep the tool at a manageable size, some data are copied and pasted without the links to where they were derived. However, as the code is developed using visual basic, a user can evaluate where the data are coming from by stepping through the code. Like most tools, the MAGtool

was initially built for functionality, for use in BEs. As methods are revised and updated, tools will be refined and upgraded as necessary and EPA will continue to work with the Services to explore the utility of the MAGtool outputs to best inform the Biological Opinions.

Comment: Documentation provided with the Plant Assessment Tool (PAT) does not correspond to the version of PAT seemingly used in the draft Atrazine BE. EPA provides a copy of a document titled: Plant Assessment Tool (PAT) Version 1.0. User's Guide and Technical Manual for Estimating Pesticide Exposure to Terrestrial, Wetland, and Aquatic Plants in EPA's Listed Species Biological Evaluations (EPA, 2020c). However, the Plant Assessment Tool (PAT) Read Me file and Python code (pat v2.py) suggest that the PAT model is version 2.0. Commenters also noted the Terrestrial Plant Exposure Zone (T-PEZ) conceptual model failed to account for variability in the fractions of sheet flow and channelized flow impacting the T-PEZ, over-estimating the amount of pesticide captured within the exposure zone. A significant bug was identified in the PAT model code. The bug causes instability and significant errors in the calculation of spray drift deposition across the T-PEZ when buffer distances of greater than zero are provided as an input to the model. The Wetland Plant Exposure Zone (W-PEZ) conceptual model should only consider terrestrial EECs when the water table is less than 0.5 cm and only consider aquatic EECs when the water table is greater than or equal to 0.5 cm. PAT and especially the terrestrial module should go through a Scienctific Advisory Panel (SAP) review. In addition, the scientific community and all stakeholders should get the opportunity to review and test PAT before it is being used in Biological Evaluation supported by the EPA. Conference/workshop presentations are wholly inadequate to validate the scientific integrity of a new model.

EPA Response: *With regards to comment on the User Guide, this is an oversight on EPA's part. The document was originally designed to describe both the Excel version of PAT (version 1.0) and the Python version of PAT (version 2.0). The document is applicable to the version used for ESA purposes, which is PAT version 2.0. The document will be updated accordingly. While a commentor described the use of the PAT model to generate results for the MAGtool v2.2 as "a complex and time consuming effort", all of the input files and pieces required to run the PWC, PAT, and the PAT postprocessor were provided with the release of the draft BE.*

The Plant Assessment Tool (PAT) is a replacement for EPA's TerrPlant model and employs mechanistic representations of fate (e.g., degradation) and transport (e.g., runoff), using data that are typically available for pesticides, to model runoff and spray drift exposure to terrestrial and wetland environments. For terrestrial plants, runoff and erosion are modeled using PRZM and spray drift is modeled using AgDRIFT deposition values. The model uses a mixing cell approach to represent water within the active root zone area of soil, and accounts for flow through the terrestrial plant exposure zone (T-PEZ) caused by both treated field runoff and direct precipitation onto the T-PEZ. Pesticide losses from the T-PEZ occur from transport (i.e., washout and infiltration below the active root zone) and degradation. The conceptual model for the T-PEZ receiving runoff is simplistic, assuming the runoff that is evenly distributed across the T-PEZ. EPA will consider specific improvements provided by the stakeholders (consideration of slope, surface roughness, flow path length, the fraction of flow entering the T-PEZ as sheet flow, etc.) in future revisions of the tool.

It is unclear what error the commenters are referring to when evaluating spray drift for the T-PEZ. Below is a table that depicts spray drift fractions for the first 11 m of the T-PEZ, looking at different application methods and buffer zones, comparing values derived using AgDRIFT and those derived in PAT. While the values are not always exact matches, the deposition fractions are close to those generated using AgDRIFT and do not show the severe wavering that is portrayed in the comments.

Ground Application, Very fine to fine drop size, high boom, 90th percentile						
	Buffer = 0 m		*Buffer = 5 m*		*Buffer = 10 m*	
	AgDRIFT	*PAT*	*AgDRIFT*	*PAT*	*AgDRIFT*	*PAT*
Distance (m)	*Fraction*	*Fraction*	*Fraction*	*Fraction*	*Fraction*	*Fraction*
0-1	*0.7783*	*0.7783*	*0.1534*	*0.1493*	*0.0735*	*0.0735*
1-2	*0.4607*	*0.4607*	*0.1236*	*0.1236*	*0.0673*	*0.0668*
2-3	*0.3153*	*0.3153*	*0.1079*	*0.1061*	*0.0612*	*0.0612*
3-4	*0.2313*	*0.2313*	*0.0922*	*0.0923*	*0.0568*	*0.0565*
4-5	*0.1832*	*0.1832*	*0.0829*	*0.082*	*0.0525*	*0.0525*
5-6	*0.1534*	*0.1493*	*0.0735*	*0.0735*	*0.0493*	*0.0491*
6-7	*0.1236*	*0.1236*	*0.0673*	*0.0668*	*0.046*	*0.0461*
7-8	*0.1079*	*0.1061*	*0.0612*	*0.0612*	*0.0435*	*0.0434*
8-9	*0.0922*	*0.0923*	*0.0568*	*0.0565*	*0.041*	*0.0411*
9-10	*0.0829*	*0.082*	*0.0525*	*0.0525*	*0.039*	*0.039*
10-11	*0.0735*	*0.0735*	*0.0493*	*0.0491*	*0.037*	*0.037*
	Ground Application, Very fine to fine drop size, high boom, 90th percentile				*Aerial, Fine to medium drop size*	
	Buffer = 4.57 m		*Buffer = 10.1 m*		*Buffer = 45.72 m*	
	AgDRIFT	*PAT*	*AgDRIFT*	*PAT*	*AgDRIFT*	*PAT*
Distance (m)	*Fraction*	*Fraction*	*Fraction*	*Fraction*	*Fraction*	*Fraction*
0-1	*0.1662*	*0.1639*	*0.0729*	*0.0728*	*0.0621*	*0.0621*
1-2	*0.1364*	*0.1326*	*0.0667*	*0.0662*	*0.0611*	*0.0611*
2-3	*0.1147*	*0.1136*	*0.0607*	*0.0607*	*0.0601*	*0.0601*
3-4	*0.099*	*0.0973*	*0.0564*	*0.0561*	*0.059*	*0.059*
4-5	*0.0869*	*0.0864*	*0.0522*	*0.0522*	*0.0578*	*0.0578*
5-6	*0.0775*	*0.0767*	*0.0489*	*0.0488*	*0.0564*	*0.0564*
6-7	*0.07*	*0.0697*	*0.0458*	*0.0458*	*0.0548*	*0.0549*
7-8	*0.0638*	*0.0634*	*0.0433*	*0.0432*	*0.0533*	*0.0532*
8-9	*0.0587*	*0.0585*	*0.0408*	*0.0408*	*0.0517*	*0.0517*
9-10	*0.0544*	*0.0541*	*0.0388*	*0.0387*	*0.0504*	*0.0503*
10-11	*0.0507*	*0.0506*	*0.0368*	*0.0368*	*0.0492*	*0.0491*

The W-PEZ is meant to assess terrestrial and aquatic plants that can exist in wetland environments. Both types of plants can exist in a wetland, regardless of the depth of the wetland. The comparison of terrestrial plant endpoints in the wetland occurs regardless of the depth of the wetland because there are submerged and emergent rooted wetland species of plants and many of them are not dependent on

the depth (wetland depths) or presence of surface water (i.e., the wetland can dry out and the plants will still survive). Whereas aquatic plants require there to be some water available, EPA determined that any depth less than 0.5 cm was not sufficient to maintain a stable or growing population of aquatic plants.

PAT has been through internal peer and QA/QC review in EPA. EPA will take under consideration external review options for PAT.

Comment: Insufficient time to review the draft BE, considering the complexity and volumes of material, and at times did not have adequate or sufficient information to fully evaluate the information.

EPA Response: *An extension for the comment review period from the original period of 60 days, was requested and approved by EPA, extending the comment period to a total of 105 days. EPA has also provided additional public meetings on the Revised Method. As discussed in the beginning of the document, after initiation of consultation with the Services, EPA plans to continue a dialogue to further refine the analyses to determine where pesticide use may rise to the level of causing jeopardy to a species or adverse modification of critical habitat.*

Comment: EPA needs to consult on all species listed under the ESA, including newly listed species, experimental populations, candidate and proposed species.

EPA Response: *EPA will continue to work with the Services regarding the most appropriate species list to use during the consultation process, including those species that are proposed for listing or candidates and experimental populations. Proposed and candidate species and experimental populations are included in case they are formally listed between the time when the BE is completed and the biological opinion is developed. EPA clearly makes separate calls for each of the listed species, so, it is possible to distinguish determinations for endangered threatened species from those that are proposed and candidates and experimental populations. Because the specific species that are considered listed changes over time, EPA identifies a "cutoff date" for the list of species that are considered in the BE.*

Comment: The National Agricultural Aviation Association (NAAA) commented that the Tier 1 model in AgDRIFT and associated assumptions should not be used to assess the risk of drift from aerial applications of atrazine or other pesticides. NAAA provided details and proposed the use of the Tier 3 AgDRIFT model.

EPA Response: *AgDRIFT is the currently approved model for evaluating potential spray drift from a pesticide application. The agency appreciates the additional suggestions provided by NAAA for revising the AgDRIFT modeling inputs and continues to work with industry to update and improve modeling methods to better reflect typical application practices. At the recent December 2020 Center of Excellence in Regulatory Science in Agriculture (CERSA) workshop, EPA, NAAA, and other stakeholders discussed these potential refinements for AgDRIFT modeling. EPA is currently reviewing these suggestions and will consider whether they are appropriate for future risk assessments. It is important to note that modeling for a national-level assessment is first conducted using maximum application rates, limitations, and instructions listed on pesticide labels. In the absence of specific use directions and application restrictions implemented across all product labels, default assumptions (based on empirical data) are used.*

Comment: EPA should use the most up-to-date, best scientific and commercial data available for listed species ranges, including using data from NatureServe for species attribute data. Species attribute data should be used to better inform where the species might be in relation to use sites and precise species ranges limited to habitat factors.

EPA Response: *EPA relies on the Services (who are the species experts) when identifying the species location data. Species location data for both the range and designated critical habitats are managed by the Services and made publicly available on their websites. As this species location information is updated and/or refined it will be incorporated into the BE process.*

Comment: Spatial analysis tools provided by EPA include a series of scripts and documentation to enable stakeholders to generate pesticide "Use Site" (UDL) information, and then perform co-occurrence analysis with the species range or critical habitat data layers. These layers should be more readily available to the public.

EPA Response: *Due to the complexity of sharing the large spatial dataset used in the BE, EPA only provides the tools and documentation used to generate the spatial data. EPA will continue to explore ways to efficiently make the spatial data and analysis available, without regeneration.*

Comment: The use of maximum labeled application rates to make may affect calls and grouping crops into UDLs may obscure the use of these application rates. The use of typical application rates should be used more significantly in the LAA/NLAA calls and an effort should be made to incorporate such rates for nonagricultural uses.

EPA Response: *EPA has previously responded to comments regarding the use of labeled application rates vs. typical application rates in the methodology*[6]*. As stated above, EPA's objective is to evaluate, according to the labels, whether an individual of a listed species may be affected. As such, EPA evaluates all uses on the labels at the maximum label rates and method of application that are specified on the label, even if the majority of the applications may be made using scenarios (e.g., application rate, technology) that could result in lower exposures. The action area represents the full spatial footprint of the labeled uses. EPA has included in its analysis results when typical application rates are used and other less conservative assumptions, and will work with the Services on the continued use of these analyses when determining whether the pesticide use will lead to jeopardy of a species or adverse modification of critical habitat.*

Regarding the UDL crop grouping, the USDA NASS (2013-2017) accuracy assessments show that, on a state-by-state basis, the Cropland Data layer (CDL) is relatively accurate (90% or greater) for states that are major producers of major commodity crops. These crops such as corn, soybeans, wheat, and cotton are grown over extensive contiguous areas, and USDA has independent data for training and quality assurance analysis. However, as indicated on the USDA error matrices for the CDL, the high frequency of error for other crops suggests that CDL may not be suitable for representing non-commodity minor crops. To address this, EPA aggregates minor crops into broader crop groupings to reduce the likelihood that EPA misses significant areas of a species' range that could overlap with labeled use sites. EPA considers all application rates that may be associated with the use sites in any of the UDL groupings, and will

[6] Available at: https://www3.epa.gov/pesticides/nas/revised/response-to-public-comments.pdf

continue to work with the Services on the best method for making assumptions about application rates and possible EECs for these areas, based on the range of uses within a particular UDL.

EPA continues to look for ways to improve usage data for non-agricultural uses, including better refinement of the spatial footprint as well as reliable information on typical application rates. Additionally, EPA appreciates the individual species analyses conducted by USDA and will use them as we continue to move forward with tool and data refinements during consultation with the Services.

Comment: USDA noted "...USDA encourages EPA to consider available state-level usage data, such as from the National Agricultural Statistics Service (NASS), Agricultural Market Research Data (AMRD), the California Pesticide Information Portal Pesticide Use Reporting (CalPUR) database, and other data from individual states whenever possible to more accurately determine likely exposure to listed species and critical habitat. Note that a statistical sampling of application sites in each state or region may be appropriate for determining the range of application methods and rates without the need for surveying all possible application sites. USDA's concerns are especially acute for non-surveyed use sites, as available data on the typical usage of pesticides is only available for major row and specialty crops (including grains, legumes, vegetables, and fruits). Typical usage data is unavailable for other use sites, including turfgrass, pastures, Conservation Reserve Program (CRP) acreage, forests, and similar non-agricultural use sites. For these sites, EPA – in the absence of available typical usage data – essentially relied on maximum label use information for all exposure modeling, resulting in exposure estimates (and risks to species and critical habitats) for these use sites that are much higher than what would occur given realistic application assumptions."

EPA Response: *EPA strives to utilize the best available data. Currently, EPA does use available state-level usage data to help determine likely exposure to listed species and critical habitat. However, state-level and often national-level usage data for non-agricultural usage sites and non-surveyed crops are not available, as they are for major row and specialty crops. In the absence of usage data, we have relied upon maximum label use information to avoid underestimating exposure. We welcome reliable information on unsurveyed crops or surveyed crops in unsurveyed states that might be used to inform more realistic application assumptions.*

Comment: USDA noted "... while USDA often relies on the same high quality data, we would encourage EPA (as well as the Services) to consider that there are other equally reliable sources of average application rate data."

EPA Response: *EPA agrees that USDA NASS, states, and other sources may have high quality application rate data. EPA relied on agricultural usage data from Kynetec USA because those data are surveyed and reported annually. Furthermore, the nationwide usage estimates are provided in that single data set at the state level, at least for the states with the highest acreage of each crop.*

For atrazine and simazine, EPA used the most recent 5 years of available Kynetec data (2013-2017) to obtain the average application rates for most of the crops – a 5-year span of time. USDA's analysis used the most recent 5 reported years of NASS data (2005, 2010, 2014, 2016, and 2018). That period represents a much wider span of time – 13 years. This could contribute greatly to the differences observed in average application rates for reasons beyond grower decision. For example, the 2005 and 2010 usage data almost certainly include reported usage for products with higher label application rates

than current products due to where atrazine and simazine were in the reregistration process. Nevertheless, EPA agrees that it is important to consider usage data from multiple sources and at different scales to ensure that application parameters, such as application rate are adequately characterized.

Comments: USDA noted "One pattern apparent in the data reported in Table 5 is that there is no predicted mortality for any plant species, which is somewhat counter-intuitive given that as herbicides... " USDA also noted that some of these endpoints may be associated with relatively low impacts to growth and "there is substantial uncertainty with the degree to which these growth effects on test species will translate to mortality of sensitive individual endangered plants in the wild, and moreover, with the degree to which these adverse effects on individual plants will translate to broader population and community-level effects...."

EPA Response: *EPA appreciates this observation from the analysis, although it is it is more accurate to say that mortality as an endpoint for plants was not assessed, rather than not predicted. EPA instead relied on the endpoints related to growth, as captured in the standard test guidelines, as noted by USDA. Uncertainty around the overall impact to the overall community based on these effect levels likely becomes a more significant issue when predicting community or population level effects, rather than that to an individual.*

Comment: Up-to-date data should be used that overlap data was from January 2019 and since then 3 species have been delisted [Borax Lake chub (June 11, 2020; 85 FR 35574), Gray wolf (November 3, 2020; 85 FR 69778), and the Least tern (January 13, 2021; 86 FR 2564)]. There are a significant number of range maps have also been refined or otherwise changed since January 2019.

EPA Response: *EPA is currently using listed species information developed by the Services. EPA is also using spatial data (i.e., ranges and designated critical habitats) provided by the Services. The data sources are routinely reviewed and updates and are incorporated when they become available and it is feasible. But due to the evolving nature of the data, once a specific assessment is started new data is not typically incorporated into the BE. However, this information can be considered by the Services during consultation.*

3 Summary of comments specific to the Triazine BEs

3.1 General

Comment: EPA did not consider the March 2020 assessment MRID 51052901 titled "Perspectives on the Assessment of Risk to Listed Species from the Use of Atrazine in the USA".

EPA Response: *EPA has reviewed the March 2020 assessment and will transmit some of the concepts from this assessment to the Services for consideration.*

Comments: Commenters were supportive of the atrazine and simazine technical registrants' proposals to voluntarily prohibit use in Hawaii and other territories, delete certain uses and impose new buffers to protect listed species. EPA must finalize label restrictions and ensure that canceled uses or geographical restrictions are not re-registered in the future. There was agreement with many of the LAA calls from some commenters and disagreement from others.

EPA Response: *EPA issued a notice of receipt of the registrants' requests to delete certain uses and cancel certain products containing atrazine and simazine on June 23, 2021, and a final cancellation/use deletion order on November 1, 2021. EPA will complete the review and approval of product labels reflecting the requested amendments by November 12, 2021. Technical product will contain language to ensure that any future end-use products formulated from the technical products must contain the technical registrants' requested endangered species restrictions. In addition, amended atrazine and simazine labels will contain a link to EPA's Endangered Species Bulletins LiveTwo! Program so that any necessary geographically-specific mitigation identified during consultation with the Services can readily be implemented. Amended product labels can be viewed on EPA's Pesticide Product Label System (see https://www.epa.gov/pesticide-labels/pesticide-product-label-system-ppls-more-information).*

Comment: Aerial applications were often selected for modeling purposes for atrazine uses, despite usage data suggesting very few acres are treated aerially. The droplet distribution size should be used that adequately captures what is specified on the label. All label changes that were proposed for atrazine should be followed.

EPA Response: *As stated above, EPA evaluated, according to the labels, whether an individual of a listed species may be affected. As such, EPA evaluated all uses on the labels for atrazine and simazine at the maximum label rates and method of application that are specified on the label, even if the majority of the applications may be made using scenarios (e.g., application rate, technology) that could result in lower exposures. EPA assumed ground applications for all uses in the alternative analysis and varied the use of aerial or ground applications for each use in the Step 2 analysis, depending on the interpretation of available usage data for the UDL, or the lack thereof. As EPA initiates consultation with the Services, EPA will work with the Services to consider using only ground applications in their analysis when evaluating if pesticide use will result in jeopardy to a species or adverse modification of critical habitat. Although EPA believes all proposed label changes at the time of the draft BE were incorporated into the analysis, EPA will continue to work with the Services to ensure all correct droplet size distributions, particularly using the recently reevaluated drift study, available buffers and any other label changes are accounted for in the consultation process. This will ensure the most relevant and up to date information is applied in any analyses conducted to determine jeopardy or adverse modification and any associated mitigation recommendations that are incorporated into their BiOp.*

Comment: USDA commented **"**Some of the proposed voluntary modifications were accounted for by EPA in the exposure scenarios that were used for the atrazine BE (i.e., label-off all atrazine uses in Hawaii and the U.S. Territories (i.e., American Samoa, Guam, North Mariana Islands, Puerto Rico, and the U.S. Virgin Islands); removal of the roadside use site; removal of conifer uses from Christmas tree, timber, and all forestry uses on labels), but some do not appear to have been, including:

• Removal of Conservation Reserve Program (CRP) uses (i.e., the 'CRP' UDL) from all product labels;

• Restriction of fallow uses (represented by several UDLs) to specific states. While the BE does appear to incorporate restriction of fallow to certain scenarios (i.e., wheat-corn-fallow, wheat-fallow-wheat, and wheat-sorghum-fallow), there is uncertainty as to whether the overlap analysis in the atrazine BE accounts for the restriction of these three fallow scenarios to the following states: wheat-corn-fallow in

CO, KS, ND, NE, SD & WY; wheat-fallow-wheat in CO, KS, ND,NE, SD & WY; and, wheat-sorghum-fallow in AR, CO, GA, IL, KS, LA, MS, MO, NE, NM, NC, OK, SD & TX"

EPA Response: *In the draft atrazine BE, the CRP UDL includes an SLN 24(c) registration in IA. The decision to include this SLN was based both on the described uses on the label (24(c) reg. number: IA970001) and the registrant's commitment letter. However, upon further evaluation and discussion with the registrant, the EPA determined it was more appropriate to completely remove the CRP UDL from the analysis. In addition to the CRP UDL changes, the Right of Way (ROW; SLN in OK only) was also removed. In the draft atrazine BE, ROW was included based on labels (24(c) reg. numbers: OK920007, OK920008). After consideration of public comments, the Action Area was regenerated and the CRP and ROW UDLs have been removed.*

In the draft atrazine BE the fallow layers were limited to only certain crops and locations per the agreements. The overlap analysis in the draft atrazine BE accounts all the restrictions specified (wheat-corn-fallow - CO, KS, ND, NE, SD, and WY; wheat-sorghum-fallow - AR, CO, GA, IL, KS, LA, MS, MO, NE, NM, NC, OK, SD, TX; wheat-fallow-wheat - CO, KS, ND, NE, SD, and WY). For wheat-fallow-wheat a few additional SLNs were include in OK (excluding panhandle, OK); ID panhandle and OR based on the labels.

Comment: The best available data should be used to spatially delineate non-crop pesticide uses; CRP UDL overestimates this area and EPA should use data from FESTF for the turf layer.

EPA Response: *When selecting data sources to use to create its UDLs, EPA prefers to use publicly available national level datasets; however, EPA may use proprietary data if appropriate publicly available data are not available. By using existing datasets, EPA leverages the expertise of other agencies and organizations, rather than becoming a 'data maker.' Generally, the selected datasets follow national standards for the creation of spatial data and, in the case of remotely sensed data, include accuracy assessments. Accuracy assessments provide a measure of correctness for the data layer.*

Both CRP and Turf layers were developed using USDA's Cropland Data Layer (CDL), and then refined to California counties that reported alley cropping practices based on the Census of Agriculture.

In the draft atrazine BE, the CRP is spatially represented using all cultivated land as identified in USDA's CDL, and the Pasture UDL. However the recent BEs only include all cultivated land as identified in USDA's CDL to develop CRPs. For atrazine, the CRP layer is limited to Iowa only based on the label and commitment letters received from the registrant. After consideration of public comments, the Action Area was regenerated for atrazine and the CRP was completely removed.

Turf layers are captured in the USDA Cropland Data Layer and included in the Other Crops UDL. For atrazine and simazine, this layer is geographically restricted to the warm season grass boundary, based on the label. The warm season turf grass species are typically grown in the warm season region and the transition zone region of the United States. The USDA defines these zones known as Plant Hardiness Zones (PHZ) based on long term temperature data. It was assumed that Warm Season Grasses are grown in approximately Zone 8 to 11, and transition grasses are grown in approximately Zone 6 to 7. The USDA PHZ 6-11 were combined into a single boundary that was used to refine the range of where atrazine and simazine could be used on warm season grass.

Additional supporting information was provided from an industry group about where simazine is applied to turf on golf courses. This information generally corresponded to USDA zones PHZ6-11.

3.2 Fate

Comment: EPA's use of modeled exposure data overstates potential exposure levels in aquatic habitats and monitoring data should be used to characterize potential risk beyond screening-level modeling. The summary of the monitoring data that is presented in the BE has errors and does not reflect EPA's previous effort to remove erroneous data from the database. Specific values questioned included those for the Water Quality Portal Monitoring data summary (Table 3-1), for HUC-07, HUC-08, HUC-10, and HUC-11. These values were excluded from the AEMD, according to the commenter, because the "STEWARDS Database [was] not included" in AEMD (HUC-07), the concentration was suspected to be high (HUC-08), "tribal land samples are generally not very reliable" (HUC-10), and "KAWNATION samples are unreliable" (HUC-11).

EPA Response: *EPA's use of modeled exposure data is based on a conservative approach, predicting aquatic concentrations based on maximum label rates. EPA uses PWC modeling to predict 1-in-15 year values, thereby providing a conservative prediction of aquatic pesticide concentrations based on maximum label rates.*

While monitoring data are useful in supporting model-derived aquatic pesticide concentrations in a weight of evidence approach, monitoring data is not targeted to measure aquatic pesticide concentrations in response to a specific application rate or timing, and therefore cannot be used to predict aquatic pesticide concentrations associated with specific labeled rates and applications.

As described in the 2016 registration review preliminary risk assessment (PRA), "A quality assurance check was conducted on reported atrazine concentrations above 500 µg/L. These high concentrations were found in the STORET database from a few reporting units such as The KAW Nation, The SAC and FOX Nations, MN state monitoring program, and the LA Department of Environmental Quality. These concentrations, in most cases, are reported in ng/L rather than µg/L (Email Communication from Francine Hackett for KAW Nation on 6/19/2015; and, Lisa Montgomery for SAC and FOX Nation of Missouri in Kansas and Nebraska on 6/18/2015)." In brief, some values were accidentally reported in ng/L rather than µg/L in the WQP. In the BE, EPA mistakenly reported that the highest value from HUC-11 was 3020 µg/L atrazine; however, this sample actually had 3.02 µg/L atrazine. Additional analysis would be needed to determine the maximum reported value from HUC-11. To the extent this information is needed to address jeopardy or adverse modification determinations, EPA will work with the Services during consultation. Other samples from tribal lands were not excluded from the monitoring data presented in the BE nor were their units adjusted (HUC-10).

The EPA was able to confirm an observed concentration of 20,000 ug/L in the LA Department of Environmental Quality (HUC-08), according to the 2016 PRA. Finally, data from the STEWARDS database was included in this analysis of monitoring data (HUC-07).

While the summary of monitoring data presented in the BE contains errors previously corrected in the 2016 PRA, additional discrepancies exist between the monitoring data presented in the BE and the atrazine ecological monitoring database (AEMD) submitted by Syngenta. While the EPA acknowledges

the improvement in the data compared to what is available publicly, EPA also expresses concerns with how Syngenta developed the atrazine ecological monitoring database (AEMD). For example, the QA/QC of the AEMD is described by Syngenta, but is not entirely reproducible as some sites were judged to be duplicates at the analyst's discretion (DP 442673).

Comment: The Washington State Department of Agriculture provided data collected by the state. These data included crop mapping, usage of pesticides and surface water monitoring.

EPA Response: *The Washington State surface water monitoring data will be provided during the consultation process with the Services to the extent this information is needed to address jeopardy or adverse modification determinations. Unfortunately, the chemical usage data provided by WSDA were not collected in a manner that allowed for their incorporation into the BE in a quantitative manner. At this stage in the consultation process, the priority is to leverage national, and publicly available spatial datasets. In circumstances where additional refinement is warranted, incorporation of other data, such as the state crop data, may allow for greater precision and refinement of assessments later in the process, such as during Step 3 (i.e., the Biological Opinions).*

3.3 Toxicity

Comment: Many of the ecological endpoints employed in the draft BE did not incorporate the best available science and the input received in comments on the 2016 preliminary ecological risk assessment. More emphasis should be placed on distinctions based on study relevance, quality, and rigor. Other metholodology should be considered for conducting a weight of evidence analysis, such as EPA's own 2016 guidance.

EPA Response: *As stated above, EPA plans to discuss comments on the toxicity data and variability in this data more fully with the Services during consultation to assist them in making jeopardy and adverse modification determinations based on the pesticide use. EPA did reevaluate several of the endpoints based on comments and updated these endpoints accordingly. Details of this analysis and updated endpoints are provided in* ***Attachment 1****. Previous RTC documents have extensively discussed methodology used in the Weight of Evidence framework applied for the BEs. EPA's 2016 guidance document contains principles that are applied in the BEs, but is not directly translatable to the methods used for endangered species assessments. Study reviews and other relevant toxicity data is provided to the Services for consideration in the Biological Opinion.*

Comment: EPA failed to incorporate a recent, higher-tier drift bioassay study conducted specifically with atrazine (MRID 50683101; Brain et al., 2019).

EPA Response: *EPA reconsidered this study based on additional information received from the registrant after the release of the draft BEs and will be discussed further with the Services during consultation. The study was applied in the additional MAGtool runs completed. Results of these runs and the MAGtool files are provided in* ***Attachments 2 and 3****, respectively.*

Comment: One commentor noted that, according to Appendix 2-3 of the Biological Evaluation, atrazine's effects characterization was based on only two studies.

EPA Response: *This is a misunderstanding of the data presented in Appendix 2-3. EPA based the effects characterization on a number of studies which are discussed in Chapter 2 and further discussed in the appendices associated with the Chapter, including the spreadsheet of all ECOTOX toxicity data and descriptions of Species Sensitivity Distributions used in the assessment.*

Comment: Some commenters noted that EPA should consider additivity, synergy and cumulative effects of other stressors, including chemicals and non-chemicals. This includes chemicals in formulations, tank mixtures and the environment and water quality.

EPA response: *EPA's BEs focus on assessing potential effects of the assessed pesticide active ingredient. EFED's historical process for evaluating pesticide ecological risks has relied on toxicity information from studies conducted with single active ingredients based on the lack of information on pesticide interactions and the expectation that they are rare. When considering the impacts of a pesticide active ingredient on assessed species, the Services consider other stressors on the species.*

3.4 Usage

Comment: EPA received comments from over 30 grower groups regarding the importance of the triazine herbicides for weed control.

EPA Response: *EPA acknowledges that triazine herbicides can be used to provide preemergence and postemergence control of weeds and are some of the least expensive herbicides available. EPA also acknowledges that atrazine is the one of the primary herbicides used to control glyphosate-resistant weeds in many circumstances.*

Comment: WSSA provided letters on current triazine use patterns (primarily atrazine) and the importance of triazines in integrated weed management plans from some leading weed science experts.

EPA Response: *EPA agrees with the need to adjust the Agency's approach to more accurately incorporate use and usage information to reduce the level of compounding conservatism to the extent that readily available data allow. EPA includes analyses based on less than maximum inputs that reflect more common agronomic practices and less conservative assumptions regarding the sensitivity of species to toxicological effects of a pesticide. The degree to which these assumptions are more broadly applicable across the landscape and labeled uses varies. The BEs identify species and designated critical habitats that may be adversely affected and those that are not likely to be adversely affected. EPA's BEs are at the individual level, meaning EPA makes an LAA determination if a single individual of a species may be adversely affected. Consideration of possible impacts to individuals in the context of a species' population can be considered in the Biological Opinions*

Comment: The Washington State Department of Agriculture provided a link to the Pesticide Usage Data Collection Program.

EPA Response: *EPA appreciates the sharing of the 2010-2020 atrazine and simazine usage summaries for Washington State based on data from the Pesticide Usage Data Collection Program. The single years of usage data that were submitted for a number of crops by WSDA provide confirmation of the levels of usage that EPA reported for these crops in Washington state.*

4 Summary of comments related to the Glyphosate BE

4.1 General

Comment: The EPA received numerous comments from individuals and non-profit organizations requesting a ban on glyphosate. Additionally, EPA received comments from six mass mail campaigns, with a collective total of 109,556 signatures (not evaluated for uniqueness).

Response: *The BE is a scientific document that provides a risk assessment focused on potential risks to endangered species, following the procedures outlined in the revised methods. Where comments brought up substantive scientific concerns with the BE, those concerns are addressed in comments below or in* ***Attachment 1****. Decisions regarding the overall registration of glyphosate are beyond the scope of the BE.*

Comment: Multiple commenters brought up the importance of evaluating the toxicity of full formulations as well as the active ingredient and expressed concern about effects on human health. Some of these comments included references to open literature studies.

Response: *EPA recognizes the importance of understanding formulation, active ingredient, and degradate toxicity, and includes discussion of these topics in Chapter 2 of the BE. For evaluating open literature containing relevant toxicity information (identified using the ECOTOX database), EPA used its open literature guidance.[7] The EPA welcomes additional information that is scientifically sound and relevant to risk assessment. Effects to human health are beyond the scope of the BE, which is focused on potential effects on endangered species.*

Comment: The BE did not incorporate mitigations identified as necessary in the glyphosate Interim Decision (ID).

EPA Response: *The glyphosate ID identified mitigations that were determined to be necessary under FIFRA. However, the identified mitigations have not been incorporated into labels and are therefore not considered in the BE. As stated above, EPA's objective is to evaluate, according to the labels, whether an individual of a listed species may be affected. In addition to label language, EPA would also incorporate mitigations into the risk assessment when those mitigations are identified in a commitment letter from the appropriate registrants. When mitigations from the registration review process or other regulatory processes are incorporated into labels during consultation, then EPA will work with the Services to describe the potential impacts of those mitigations to listed species as appropriate.*

Comment: Commenters assert that the PCT estimates are overly conservative and inconsistent with the exposure modeling. Commenters recommend refining PCTs to account for variable use patterns, timing of applications, and further refinement of the UDLs. Specific examples cited include the use of maximum PCT, a 2.5% constraint on minimum PCT, and overestimates in the footprint of specific UDLs.

[7] Available online at: https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/evaluation-guidelines-ecological-toxicity-data-open

Commenters noted that the best available data should be used to spatially delineate non-crop pesticide uses; CRP UDL overestimates this area.

EPA Response: *Similar comments regarding PCT estimates are addressed in previous responses to comments[8]. When data are incomplete or not available, conservative assumptions are appropriate for an initial screening step. EPA used maximum application rates to derive initial exposure estimates in order to be protective of listed species. In Step 2, the MAGtool uses typical rates, along with scaling factors to look at other application dates and hydrologic conditions, to evaluate risks at other than maximum application rates. If EPA continues to find risks when considering these alternative, less conservative assumptions , then EPA is more confident in a Likely to Adversely Affect determination.*

When selecting data sources to create its UDLs, EPA prefers to use publicly available national level datasets; however, EPA may use proprietary data if appropriate publicly available data are not available. By using existing datasets, EPA leverages the expertise of other agencies and organizations, rather than becoming a 'data maker'. Generally, the selected datasets follow national standards for the creation of spatial data and, in the case of remotely sensed data, include accuracy assessments. Accuracy assessments provide a measure of correctness for the data layer. The CRP layer was developed using USDA's Cropland Data Layer (CDL).

4.2 Fate

Comment: In Chapter 3 Table 3-2 the reported KF and 1/n values for 'Batch Equilibrium' associated with study MRID# 00108192, from the study report are incorrect. They should be as follows.

K_F (mL/g)	*1/n*
90	0.90
70	0.94
62	0.95
22	0.78
175	1.0

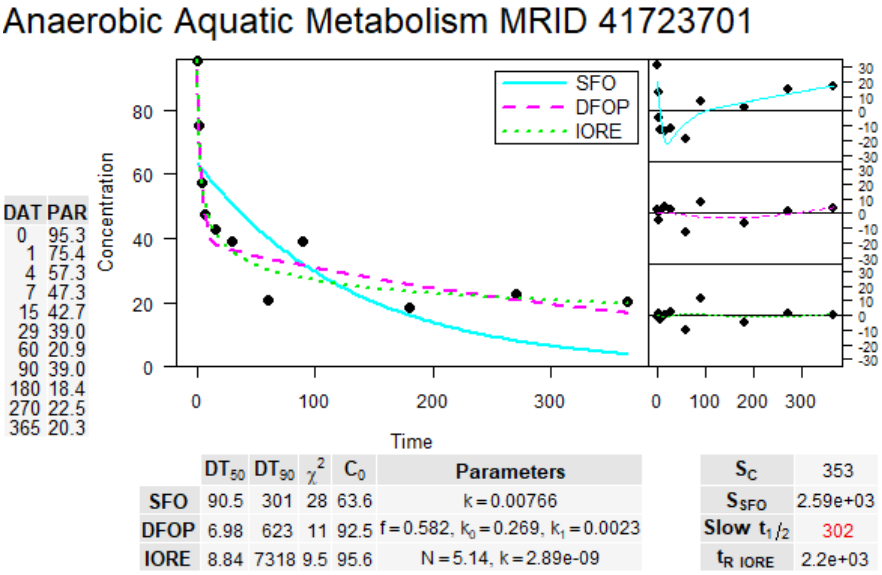
EPA Response: The Kf and 1/n values are correct but are not paired correctly (bold highlights in table below) in Table 3-2 of the BE. The values are consistent with what was reported in the PRA (USEPA, 2015). The inaccurate pairing in the risk assessment table has no impact on aquatic modeling and the conclusions of the assessment.

Soil System	**Kf mL/g**	**1/n**
Silty clay loam	62	**0.90**
Silt	90	**0.94**
Sandy loam	70	**0.95**
Sandy loam	22	0.78
Sediment	175	1.0

[8] https://www.epa.gov/endangered-species/final-national-level-listed-species-biological-evaluation-carbaryl

Comment: In Chapter 3, new fit curves are available for the anaerobic aquatic metabolism and aerobic soil metabolism half-life values, yet they do not appear to have been considered in the Draft BE. As stated in the table associated with MRID# 42372502 (anaerobic aquatic metabolism), which was an addendum to MRID# 41723701, the anaerobic aquatic metabolism half-life is 8.1 days. The aerobic soil metabolism half-life values of 1.1 and 0.6 days for sandy loam and silt loam soils, respectively, per MRID# 42372501.

EPA Response: *MRID 42372502 is an addendum to MRID 41723701 an anerobic aquatic metabolism study. The addendum contained storage stability information. Re-evaluation of the original study (MRID 41723701) data revealed a biphasic transformation as illustrated in the image below. Following the NAFTA kinetic guidance a representative half-life was obtained of 302 days using the DFOP model. This is slower than the value reported in the BE of 208 days.*



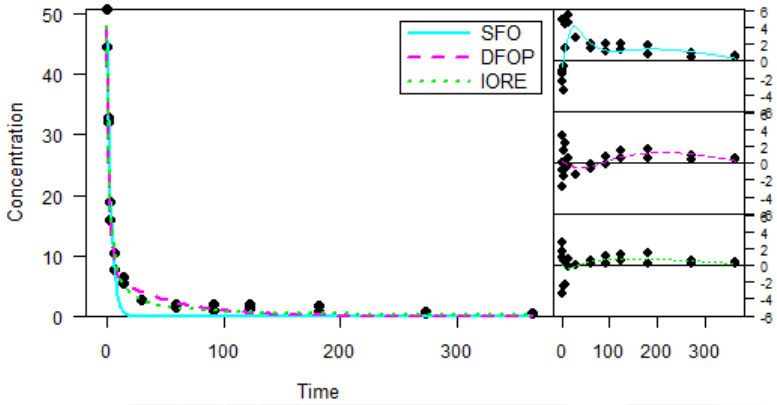
Roughly 58% of the applied radioactity transforms with a half-life value of 2 days while the rest of the material transforms much slower with a half-life value of 302 days noted above.

The model input value used in the BE is 208 days based on the 90th percentile confidence on the mean of three values – 208 (MRID 41723701), 203 (MRID 42372502) and 199 days (44125718). Updating the input parameter based on reevaluation of the data from MRID 41723701 results in a model input value of 298 days [302 (MRID 41723701), 203 (MRID 42372502) and 199 days (44125718)].

MRID 42372501 is an addendum to MRID 41742901, an aerobic soil metabolism study. The addendum contained storage stability information. Re-evaluation of the original study (MRD 41742901) data revealed a biphasic transformation as illustrated in the image below. Following the NAFTA kinetic guidance a representative half-life was obtained of 5.1 days for Kickapoo sandy loam soil using the IORE model and 3.3 days for Dupo silt loam soil using the IORE model. These are slower than the value reported in the BE of 1.8 and 2.6 days, respectively.

MRID 41742901 Kickapoo

DAT	PAR
0	50.6
0	44.5
1	32.8
1	32.0
3	18.9
3	15.9
7	10.6
7	7.70
14	5.40
14	6.40
30	2.80
30	2.80
60	1.60
60	2.10
92	2.00
92	1.10
123	2.10
123	1.30
182	1.90
182	0.800
273	0.900
273	0.500
364	0.500
364	0.600

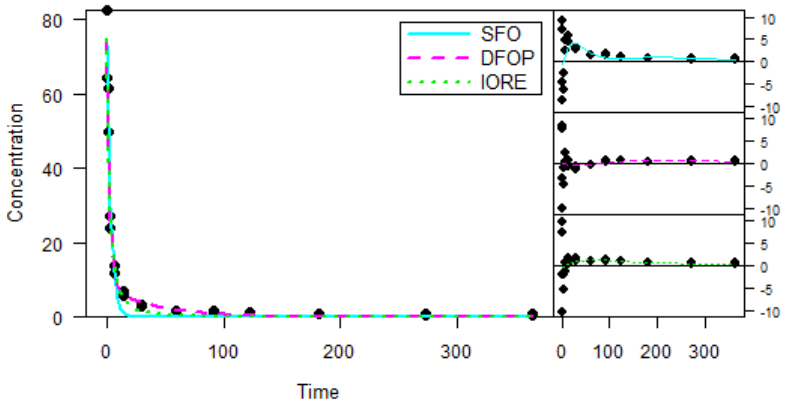


	DT_{50}	DT_{90}	χ^2	C_0	Parameters
SFO	2.44	8.1	18	45.7	k = 0.284
DFOP	1.97	23.2	6.2	47.3	f = 0.839, k_0 = 0.451, k_1 = 0.0204
IORE	1.86	16.8	5.8	47.9	N = 2, k = 0.0111

S_C	46.4
S_{SFO}	159
Slow $t_1/_2$	34
$t_{R\ IORE}$	5.05

MRID 41742901 Dupo

DAT	PAR
0	64.3
0	82.2
1	49.7
1	61.5
3	27.3
3	23.9
7	13.9
7	11.7
14	7.00
14	5.60
30	2.70
30	3.30
60	1.50
60	1.50
92	1.70
92	1.40
123	1.10
123	1.30
182	0.700
182	0.700
273	0.800
273	0.600
364	0.400
364	0.700



	DT_{50}	DT_{90}	χ^2	C_0	Parameters
SFO	2.33	7.75	13	73	k = 0.297
DFOP	2.09	10.6	7.7	74.3	f = 0.889, k_0 = 0.388, k_1 = 0.0247
IORE	2.07	10.9	9.8	74.6	N = 1.51, k = 0.0446

S_C	351
S_{SFO}	394
Slow $t_1/_2$	28.1
$t_{R\ IORE}$	3.28

About 90-95% of the applied radioactity transforms with a half-life value of roughly 2 days while the rest of the material transforms much slower.

The model input value used in the BE is 29 days based on the 90th percentile confidence on the mean of three values – 1.8, 2.0, 2.6, 5.5[9], 7.5, 13.6[9], 19.4[9], 77.1[9]. Updating the input parameter based on reevaluation of the data from MRID 41723701 results in a model input value of 29 days [1.8, 2.0, 2.6, 5.5[10], 7.5, 13.6[9], 19.4[9], 77.1][9]

There is no impact on the EECs if the new fit curves are considered.

[9] Half-lives corrected from 20 °C to 25 °C using Q10 temperature correction equation.
[10] Half-lives corrected from 20 °C to 25 °C using Q10 temperature correction equation.

Comment: Typographical errors were noted in Appendix 3-1, where reference was made to atrazine instead of glyphosate.

EPA Response: *Reference should have been made to glyphosate. This error has no impact on the outcome of the assessment.*

Comment: The spray drift parameters used in the BE do not reflect the spray drift language included in the ID.

EPA Response: *Spray drift parameters used in the BE reflect the current spray drift language, since the drift information in the ID is not final.*

Comment: The soil photolysis half-life associated with MRID# 44320645 was reported as 5.4 days in EPA's PRA document, yet Table 3-2 in the Glyphosate Draft BE states this as 'stable'. This value is considered relevant to the discussion of the foliar dissipation half-lives and is relevant to the exposure modelling.

EPA Response: *Page 21 of the PRA (USEPA, 2015) notes soil photolysis as stable, referring to MRID 44320645 noting that the degradation in the dark control was equal to that in the irradiated samples. This is consistent with what is reported in the glyphosate BE Table 3-2. Using stable as an input to the aquatic modeling is still supported by EPA, and the assessment conclusions remain the same.*

Soil Photolysis Half-life	Stable (for at least 30 days)	Degradation in dark control was equal to that in irradiated samples	44320645

Comment: The terrestrial field dissipation half-life values for AMPA from GA and CA are switched. The values from the report (MRID# 42765001) are GA = 896 and CA = 958 days. The MRID# 42607501 is an interim report whereas the MRID above (#42765001) is the final report.

EPA Response: *EPA acknowledges this potential inconsistency. However, this has no impact on aquatic modeling and the conclusions of the assessment.*

Comment: On the non-ag air 4 and 7 input tab of Appendix 3-1, the wrong sorption coefficient has been used. This should read 175.

EPA Response: *This has been updated and the updated summary of EECs are provided in RTC Attachment 4. Previously reported values ranged from 64.23 to 3,133 µg/L. The updated values range from 47.73 to 234.5 µg/L. While this is a substantial reduction in the EECs, the concentrations remain high. Based solely on this update, the risk assessment conclusions are not expected to change. EPA will work with the Services during consulation to ensure updated EECs, if needed, are available to the Services for their consideration when determining the potential for jeopardy or adverse modification.*

Comment: The vapour pressure stated in the Appendix 3-1 is incorrect and should be revised, as stated in the public comments on the PRA (EPA, 2018). In addition, the columns in this Appendix relating to Henry's Law constant are incomplete.

EPA Response: *The vapor pressure at 25 ^{o}C was noted as a typographical error in the drinking water assessment from the Registration Review of Glyphosate (pg. 15). The vapor pressure is reported as 9.75E-8. The BE used 9.75 E-10. The Heat of Henry is only used in in some specific PWC situations and are not applicable for the ESA scenario runs. As such, this is not expected to impact the results of the BE.*

4.3 Toxicity

Comment: Many of the ecological endpoints employed in the draft BE did not incorporate the best available science. Commenters requested clarification on the quality and relevance criteria for open literature studies used as endpoints. Specific endpoints questioned include mammalian, avian, terrestrial invertebrates, aquatic phase amphibians, freshwater aquatic invertebrates, aquatic vertebrates, aquatic plants, and terrestrial plant toxicity.

EPA response: *EPA plans to discuss comments and considerations on the toxicity data and variability in this data more fully during consultation with the Services during consultation to assist them in making jeopardy and adverse modification determinations based on pesticide use. EPA evaluates open literature according to the published guidance[11]. EPA did reevaluate several of the endpoints based on comments and updated these endpoints accordingly. Details of this analysis and updated endpoints are provided in* ***Attachment 1****.*

4.4 Usage

Comment: The 40 lb a.e./A residential application rate is intended for residential applications and should not be considered relevant for some of the non-agricultural use scenarios to which that rate was applied in the BE. Additionally, commenters objected to the use of a "per acre" equivalent rate being used to assess risk and suggested that treatment areas beyond a limited spot treatment are unrealistic in practice for residential uses.

EPA Response: *For the glyphosate BE, EPA referred to the glyphosate master use summary table, which incorporates information from the Joint Glyphosate Task Force (JGTF) Use Matrix and provides additional salient details. The residential application rate is used in the exposure modeling to estimate an upper-bound EEC to which a single individual of a species may be exposed. Because label rates are given in terms of a small area (i.e. the amount to apply to 150 sq. ft.), a unit conversion was performed to present residential label rates in lb a.e./A for use in the assessment, resulting in a rate of 40 lb a.e./A. This unit conversion agrees with the rate provided in the JGTF use matrix. The unit conversion is carried out to provide comparable inputs for the relevant exposure models, which are set up for application rate inputs on a "per acre" basis. EPA's use of a "per acre" unit in risk assessments should not be construed as an*

[11] Available online at: https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/evaluation-guidelines-ecological-toxicity-data-open

assumption regarding treatment area, as the estimated treatment area in the BE does not depend on the units used to describe the application rate.

As stated previously, the BE assesses risks to listed species based on the applications permitted on the label. Residential treatment areas are not restricted on the label to a specific size or number of treatments. The EPA's understanding is that uses permitted by the label include a variety of non-agricultural applications in which total vegetation control may be desired over areas considerably greater than 150 sq. ft. (e.g. uses in parks/recreation areas, parking lots, vacant lots, total lawn replacement, etc.).

It should be noted that the assessment of risk to terrestrial mammals makes the conservative assumption that all dietary items are treated or contaminated with the pesticide. As used in the BE, this assumption is intended to be protective of risk to a single individual of a listed species, including those with a small foraging range or whose dietary items are concentrated within the treated area. Dietary assumptions are then refined later in the assessment.

Comment: Commenters assert that glyphosate is not used to control submerged aquatic vegetation and is not applied directly to surface waters, only through application directly to emergent aquatic plant leaf surfaces. Commenters assert that the aquatic UDL is overly conservative because it encompasses the entire contiguous US (CONUS) and is also not restricted to waters with emergent vegetation.

EPA Response: *EPA acknowledges that glyphosate is applied to emergent aquatic vegetation. Glyphosate is expected to enter the water body as a result of application to emergent aquatic plants, including via spray through the plants and post-treatment senescence of treated foliage. Refining the footprint of aquatic glyphosate exposure to those areas with documented emergent vegetation is not feasible. Those data are not available and would be expected to be of limited utility due to intrinsic uncertainty and variability in mapping such a labile condition at a national scale.*

Comment: The maximum single aerial application rate for Roundup Ready (RR) sugar beets is 3.75 lb a.e./A for pre-emergent stages. However, for over the top applications to RR sugar beets, the maximum single aerial application rate is 1.125 lb a.e./A. This is not reflected in the modelling presented in the Draft BE for this crop.

EPA Response: *Sugar beets is modeled as 'Other Row Crops,' where aerial applications were noted as 3@ 1.55 lb a.e./A (7 day).*

Crops	Application	Maximum Single Application (lbs. a.e./A)	Maximum Total Crop Application (lbs. a.e./A)	Restrictions
Aloe vera; Bamboo shoots; Globe artichoke; Okra; Peanut; Sugarbeet	• Chemical Fallow • Preplant Fallow Beds • Preplant • At-Planting • Preemergence	3.75	6.0	• Do not harvest or feed vegetation from an area for 8 weeks following application. • When applied prior to transplanting or direct-seeding crops into plastic mulch, remove residues of this product from the plastic with a single 0.5-inch application of water, either by natural rainfall or irrigation, prior to planting, ensuring that the wash water flushes off the plastic mulch and does not enter transplant holes, and wait a minimum of 21 days between residue removal and transplanting.
Aloe vera; Asparagus; Bamboo shoots; Globe artichoke; Okra; Peanut; Pineapple; Sugarbeet	• Hooded Sprayer in Row Middles • Shielded Sprayer in Row Middles • Wiper Application in Row Middles	3.75	6.0	• Allow a minimum of 14 days between application and harvest.
Aloe vera; Asparagus; Bamboo shoots; Globe artichoke; Okra; Peanut; Pineapple; Sugarbeet	• Post-Harvest	3.75	6.0	• Do not harvest or feed vegetation from an area for 8 weeks following broadcast application. • Application must be made a minimum of 30 days prior to the planting of any crop not listed on this label.

Comment: For applications made to Roundup Ready crops via ground applications, the JGTF Use Matrix states a maximum single application rate of 3.75 lb a.e./A. The maximum application rate per crop cycle ranges between 4.5 and 6.0 lb a.e./A. For all agricultural crop uses (both traited and non-traited), a worst-case application rate of 8.0 lb a.e./A has been modelled in the BE which is incorrect.

EPA Response: *EPA agrees that the maximum application rate per crop cycle ranges between 4.5 and 6.0 lb a.e./A for most agricultural crop uses of glyphosate; however, some agricultural crops use of glyphosate are allowed at rates up to 8 lb a.e./A including the JGTF Glyphosate Master Reference Label (Sept 23, 2019) and the JGTF use matrix. As such, most agricultural crop uses were not modeled at a worst-case application rate of 8.0 lb a.e./A. The only agricultural uses modeled at 8.0 lb a.e./A are: citrus, grapes, orchards, other crop, other tree, Christmas. The 'other row crop' scenario covers a number of uses including: hops, sunflower, peanut, and sugarbeet. The JGTF use matrix notes hops applications of glyphosate at up to 8.0 lb a.e./A (e.g., 4787-23). Therefore, the assessment includes results for both a maximum yearly rate of 6 lb a.e./A and 8.0 lb a.e./A.*

Comment: For agricultural turf (grass/turfgrass seed and sod production), exposure modelling in the Draft BE used an application rate of 8.0 lb a.e./A. As previously stated in the public comments to the PRA for glyphosate, the number of applications per crop cycle and per year ranges between 3 and 8, or apply as required. Where 8 applications are permitted, the maximum single application rate is 0.77 lb a.e./A. The use of the 8.0 lb a.e./A rate for these uses is incorrect. The number of applications, in all instances, is dictated by the crop stage (e.g., prior to planting / transplanting, established grasses, established rye grasses (for creating rows) and also for established glyphosate tolerant grasses).

EPA Response: *The 8.0 lb a.e./A application rate used in modeling was used for bahiagrass; bermudagrass; bluegrass; brome; fescue; guinea grass; kikuyu grass; orchardgrass; pangola grass; ryegrass; timothy; wheatgrass and any grass (gramineae family) except corn, sorghum, sugarcane and any other cereal and grain crops included on the label as listed on the JGTF Use Matrix. These are listed as pasture grasses on the JGTF Glyphosate Master Reference Label (Sept 23, 2019). Furthermore, turfgrass is also listed in non-crop vegetation management at 8.0 lb a.e./A. This is modeled using the impervious scenario because of the other uses permitted. Together these application scenarios provide the range of potential exposure concentrations from turf-like grasses listed on the label.*

The JGTF Use Matrix and the Use Summary Table also report that applications up to 6 lb a.e./A are permitted for grass seed and sod production. The results for alfalfa (i.e., covered by the PWC grassland/rangeland scenario) at 6.0 lb a.e/A per year would cover the applications of glyphosate permitted on the JGTF Use Matrix for grass seed and sod production (i.e., PWC grassland/rangeland scenario).

Comment: For use in pastures, the maximum single application rate is 0.45 lb a.e./A and the maximum application rate per crop cycle and per year is 2.25 lb a.e./A per the JGTF Use Matrix table and as previously stated in the comments to EPA's PRA for glyphosate. Therefore, use of the 8.0 lb a.e./A application rate for this use is incorrect in this scenario as well.

EPA Response: *This comment overlooks some labeled pasture applications listed in the JGTF Use Matrix table with the 8.0 lb a.e./A rate including: preplant, preemergence, postemergence broadcast application – pasture renovation, spot application wiper application (over pasture grass). The results for alfalfa at 6.0 lb a.e/A per year would cover these pasture applications of glyphosate noted on the JGTF Glyphosate Master Reference Label (Sept 23, 2019). As mentioned in the previous response, the 8.0 lb a.e./A application rate used in modeling was used for bahiagrass; bermudagrass; bluegrass; brome; fescue; guinea grass; kikuyu grass; orchardgrass; pangola grass; ryegrass; timothy; wheatgrass and any*

grass (gramineae family) except corn, sorghum, sugarcane and any other cereal and grain crops included on the label as listed on the JGTF.

Furthermore, due to the number of glyphosate uses, EPA focused on modeling maximum application rates based on use site. For this reason, the postemergence broadcast application – dormant pasture weed control, the use scenario specifically referenced in this comment was not modeled because it would be covered by the application scenario with higher rates.

Comment: The California Invasive Plant Council requests greater refinement in examining usage patterns for natural lands stewardship, and offers to provide details of typical glyphosate use scenarios.

EPA Response: *EPA recognizes that glyphosate is used for stewardship of natural lands. Data on glyphosate usage in natural lands stewardship would be welcome, as it would help the Agency better understand these use scenarios.*

Comment: There is a disconnect between the usage described in the SUUM (total lbs of a.e. applied annually) and the UDLs listed as impacting the highest number of species.

EPA Response: *EPA acknowledged uncertainty in non-agricultural use and usage data, and discussed this uncertainty in the BE. The relative ranking of UDL impacts represents the number of times that any one use impacts a species, which is largely driven by the spatial extent of usage (i.e. the footprint) rather than the total number of pounds applied. For any given species, the impact based on one UDL or another will vary, regardless of the total pounds applied nationally and is reflected in the individual outputs provided for each species in Appendix 4-9. The strength of evidence in any given call includes weighting the uncertainty associated with usage on non-agricultural use sites.*

Comment: Comments were received from a number of trade groups, state departments of agriculture, state departments of transportation, university faculty, and non-profit groups that supported the continued registration of glyphosate and touted the importance if glyphosate and the benefits of the chemical.

EPA Response: *Data on usage for these sites can be sparse and the comments provided help the Agency better understand how glyphosate is used and the opportunities that may exist to better model the way that glyphosate is being used in these scenarios. Furthermore, although beyond the scope of the BE, these comments can be used in the future to identify mitigation measures that are likely to have the least impact on growers.*

Appendix A. Submitters of public comments

This appendix lists the submitters of public comments on the draft BEs for atrazine, simazine, and glyphosate. This list excludes the submissions that requested extensions of the public comment period.

Triazines
Individual citizens

County, State, and Federal Governments:

1. United States Department of Agriculture
2. Washington State Department of Agriculture
3. National Association of State Departments of Agriculture (NASDA)

Environmental and other Non-Governmental Organizations:

1. Center for Biological Diversity
2. Beyond Pesticides
3. Committee For A Constructive Tomorrow (CFACT)

Pesticide Registrants or Registrant Groups, Affiliates and Consultants:
CAL MAR Consulting Services, Inc.
CropLife America (CLA)
Eckstein Agronomics, LLC
FIFRA Endangered Species Task Force (FESTF)
Intrinsik Ltd
Pesticide Policy Coalition (PPC)
Stanley Crop Service
Syngenta Crop Protection, LLC
Triazine Network

Grower Groups, Pesticide Applicators or Affiliates

1. Agricultural Retailers Association (ARA)
2. Almond Board of California
3. California Citrus Quality Council (CCQC)
4. Colorado Sorghum Association (CSA), New Mexico Sorghum Association (NMSA) and Oklahoma Sorghum Association (OSA)
5. Florida Fruit and Vegetable Association (FFVA)
6. Georgia Agribusiness Council (GAC)
7. Illinois Corn Growers Association (ICGA)
8. Illinois Fertilizer & Chemical Association (IFCA)
9. Iowa Corn Growers Association (ICGA)
10. Kansas Corn Growers Association (KCGA)
11. Kansas Grain and Feed Association, Kansas Agribusiness Retailers Association
12. Kansas Grain Sorghum Producers Association (KGSPA)
13. Kentucky Corn Growers Association
14. Michigan Corn Growers Association
15. Midwest Food Products Association (MWFPA)
16. Minnesota Corn Growers Association (MCGA)
17. Missouri Corn Growers Association
18. National Agricultural Aviation Association (NAAA)
19. National Alliance of Independent Crop Consultants (NAICC)
20. National Corn Growers Association (NCGA)
21. National Sorghum Producers (NSP)

22. Nebraska Sorghum Producers Association (NSPA)
23. New York Corn & Soybean Growers Association
24. Ohio Corn & Wheat Growers Association (OCWGA)
25. Oregonians for Food & Shelter
26. Prairieland Ag LLC
27. South Dakota Agri-Business Association
28. South Dakota Corn Growers Association
29. Southern Crop Production Association (SCPA)
30. Texas Corn Producers Association (TCPA)
31. Texas Grain Sorghum Association (TGSA)
32. Triazine Network
33. Washington State Potato Commission (WSPC)
34. Wisconsin Corn Growers Association (WCGA)
35. Wisconsin Soybean Association (WSA)

Farm Bureaus:

1. American Farm Bureau Federation (AFBF)
2. Arizona Farm Bureau Federation
3. Georgia Farm Bureau (GFB)
4. Iowa Farm Bureau Federation
5. Kansas Farm Bureau (KFB)
6. Kentucky Farm Bureau (KFB)
7. Louisiana Farm Bureau Federation, Inc.
8. Louisiana Farm Bureau Federation, Inc.
9. Michigan Farm Bureau
10. Missouri Farm Bureau (MOFB)
11. New York Farm Bureau (NYFB)
12. Ohio Farm Bureau Federation (OFBF)
13. Oklahoma Farm Bureau (OKFB)
14. Wisconsin Farm Bureau Federation (WFBF)

Academic researchers/research organizations

1. Hawaii Agriculture Research Center (HARC)
2. Weed Science Society of America (WSSA)

Glyphosate

Individual citizens

1. ~820 individual comments, >99% requesting ban on glyphosate
2. Six mass mail campaigns (total signatures ~110,000), requesting ban on glyphosate

County, State, and Federal Governments:

1. Mississippi Department of Transporation (MDOT)

Environmental and other Non-Governmental Organizations:

1. Alliance of Nurses for Healthy Environments (ANHE)
2. Aquatic Ecosystem Restoration Foundation (AERF)
3. Beyond Pesticides
4. Beyond Toxics et al.
5. California Invasive Plant Council (Cal-IPC)
6. Center for Biological Diversity
7. Center for Food Safety
8. Moms Across America

9. Occupy the World Food Prize
10. Pro-Life
11. Transition Express, Inc.

Pesticide Registrants or Registrant Groups, Affiliates and Consultants:

1. Bayer CropScience LP
2. Bayer U.S. Crop Science
3. CropLife America (CLA)
4. FIFRA Endangered Species Task Force (FESTF)
5. Joint Glyphosate Task Force, LLC (JGTF)
6. Responsible Industry for a Sound Environment (RISE)