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RE: EPA's Draft Fungicide Strategy to Reduce Exposure of Federally Listed Endangered and Threatened Species and Designated Critical Habitats from the Use of Conventional Agricultural Fungicides; Docket ID: EPA-HQ-OPP-2026-2973.

The National Agricultural Aviation Association (NAAA) appreciates the opportunity to comment on EPA's Draft Fungicide Strategy.

U.S. Aerial Application Industry Background

NAAA represents the interests of the 1,560 aerial application industry owner/operators and 2,028 non-operator agricultural pilots throughout the United States licensed as commercial applicators that use aircraft to enhance the production of food, fiber and bio-energy; protect forestry; protect waterways and ranchland from invasive species; and provide services to agencies and homeowner groups for the control of mosquitoes and other health-threatening pests.

Within agriculture and other pest control situations, manned aerial application is an important method for applying pesticides, because it permits large areas to be covered rapidly and is by far the fastest application method of crop inputs, when it matters most. More than any other application method, manned aerial application capitalizes on the often limited windows of suitable spraying weather and allows for timely treatment of pests while they are in critical developmental stages, often over terrain that is too wet or otherwise inaccessible for terrestrial applications. It also treats above the crop canopy, thereby not disrupting the crop and damaging it. Aerial application has greater productivity, accuracy, speed, and is unobtrusive to the crop compared to ground application[1]. Although the average aerial application company is comprised of only six employees and two aircraft, as an industry these small businesses treat nearly 127 million acres of U.S. cropland each season, which is about 28% of all cropland used for crop production in the U.S. In addition to the cropland acres, aerial applicators annually apply to 5.1 million acres of forest land, 7.9 million acres of pasture and rangeland, and 4.8 million acres for mosquito control and other public health concerns.

While there are alternatives to making aerial applications of pesticides, aerial application has several advantages. In addition to the speed and timeliness advantage aerial application has over

[1] Kováčik, L., and A. Novák, 2020. "Comparison of Aerial Application vs. Ground Application." *Transportation Research Procedia* 44 (2020) 264–270.

other forms of application, there is also a yield difference. Driving a ground sprayer through a standing crop results in a significant yield loss. Research from Purdue University[2] found that yield loss from ground sprayer wheel tracks varied from 1.3% to 4.9% depending on boom width. While this study was conducted in soybeans, similar results could be expected in other crops as well. Data from a Texas A&M University economics study[3] and the 2019 NAAA industry survey[4] were used to calculate that the aerial application industry is directly responsible for the production of 1.69 billion bushels of corn, 199 million bushels of wheat, 548 million pounds of cotton, 295 million bushels of soybeans, and 3.33 billion pounds of rice annually that would be lost every year without the aerial application of pesticides. The value in additional crop yield that the aerial application industry brings to farmers, input suppliers, processors, and agricultural transportation and storage industries for corn, wheat, cotton, soybean, and rice production in the U.S. is estimated to be about $37 billion[5].

Research summarized by the University of Minnesota[6] describes how soil compaction from ground rigs can negatively affect crop yields due to nitrogen loss, reduced potassium availability, inhibition of root respiration due to reduced soil aeration, decreased water infiltration and storage, and decreased root growth. Aerial application offers the only means of applying a crop protection product when the ground is wet and when time is crucial during a pest outbreak. A study on the application efficacy of fungicides on corn applied by ground, aerial, and chemigation applications[7] further demonstrates that aerial application exceeds ground and chemigation application methods in terms of yield response. The aerial application of crop protection products results in greater harvest yields of crops. This in turn results in less land being used for agricultural production, preserving more wetlands for natural water filtration, forest ecosystems for carbon sequestration and habitat for threatened and endangered species.

The Texas A&M[5] study revealed that the total area of cropland needed to replace the yield lost if aerial application was not available for corn, wheat, soybean, cotton, and rice production is 27.4 million acres, an area roughly the size of Tennessee. Aerial applicators seed 3.8 million acres of cover crops annually[5]. This means that aerial applicators are responsible for helping to sequester 1.9 million metric tons of CO_2 equivalent annually, which, according to the EPA, would be the equivalent of removing approximately 412,000 cars with carbon-combustion engines from the roads each year.

The aerial application industry is also actively involved in education and research efforts to improve the accuracy and safety of aerial applications. The National Agricultural Aviation Research and Education Foundation (NAAREF) is a non-profit organization dedicated to

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[2] Hanna, S., S. Conley, J. Santini, and G. Shaner. 2007. "Managing Fungicide Applications in Soybean." Purdue University Extension Soybean Production Systems SPS-103-W. https://www.extension.purdue.edu/extmedia/sps/sps-103-w.pdf

[3] Dharmasena, S. 2020. "How Much is the Aerial Application Industry Worth in the United States?" Research presented at the 2020 Ag Aviation Expo, Savannah, GA. https://www.agaviation.org/education/aerial-application-technology-research-sessions/

[4] National Agricultural Aviation Association. May 2019. "2019 NAAA Aerial Application Industry Survey: Operators." https://www.agaviation.org/wp-content/uploads/2024/04/NAAA-2019-Operator-Survey.pdf

[5] Dharmasena, S. 2021. "Value of the Agricultural Aerial Application Industry in the United States" Research presented at the 2021 Ag Aviation Expo, Savannah, GA. https://www.agaviation.org/education/aerial-application-technology-research-sessions/

[6] University of Minnesota. "Soil Compaction." Accessed April 29, 2021. https://extension.umn.edu/soil-management-and-health/soil-compaction

[7] Thomas, D. 2009. Unpublished research results submitted to EPA. https://www.agaviation.org/wp-content/uploads/2023/06/2009-Fungicide-Efficacy-Results.pdf

promoting research, technology transfer and advanced education among aerial applicators, allied industries, government agencies and academic institutions. NAAREF's Professional Aerial Applicators' Support System (PAASS) program is a four-hour course offered annually at all state and regional agricultural aviation association conventions. The curriculum is brand new every year and a minimum of one hour of PAASS is focused on environmental professionalism. This ensures aerial applicators are kept up to date on the latest information related to making accurate applications and drift mitigation. Nozzle selection, buffer zones, inversions, precision application technology, dissection of real-life drift incidents, and proper spray boom setup are some of the environmental professionalism topics that have been covered in PAASS.

Five years after PAASS became part of the aerial application annual curriculum in 1999, there was a 26% drop in drift incidents according to the Association of American Pest Control Officials' drift surveys. In addition, ag aircraft accidents have also significantly declined. From 1999 to 2010, the accident rate per 100,000 hours flown dropped by 21.6% compared to pre-PAASS accident rates. From 2011 to 2019, the accident rate dropped even more—30.8%—compared to pre-PAASS accident rates. Each year, we continue to see a drop in our accident rate since pre-PAASS days, but now it declines more incrementally. While aviation safety is the domain of the FAA and not the EPA, the reduction in accidents proves PAASS has had, and continues to have, a significant positive impact on the aerial application industry.

Another NAAREF program is Operation SAFE (Self-regulating Application & Flight Efficiency). The primary component of Operation SAFE is a fly-in clinic. At a SAFE fly-in, aerial applicators have their aircraft calibrated and application patterns (both liquid and dry) measured and evaluated for accuracy and uniformity. Spray droplet size is also measured at a fly-in to ensure the agricultural aircraft is creating the droplet size required by the labels for products to be applied by the aircraft. Many of the concepts used to mitigate the risk of drift from agricultural aircraft have originated from ideas first tested at Operation SAFE fly-ins.

NAAA has created a professional certification program for the aerial application industry named Certified Aerial Applicator (CAA). To be certified under CAA, aerial applicators must take the PAASS program annually and Operation SAFE biennially, in addition to belonging as a member to their state/regional agricultural aviation association and the NAAA. CAA professionals are also required to take and be tested on additional aviation safety and environmental stewardship curriculum offered on-line through a learning management system software managed by NAAA. The purpose of CAA is to enhance professionalism in the aerial application industry as our statistics show that those who participate in our educational programs are safer from both an aviation and environmental perspective.

Comments

NAAA continues to support the use wind-directional buffers to protect ESA listed species and critical habitat from potential drift of fungicides, as described in the herbicide and insecticide strategies and referred to in the draft fungicide strategy. NAAA strongly feels all buffers proposed on all labels, whether they be for FIFRA or ESA obligations, be wind directional.

Science has consistently indicated that drift only moves downwind[8,9,10]. NAAA has routinely recommended all buffer zones for aerial applications of all pesticides be wind directional in numerous comments submitted to the EPA throughout the years.

Wind-directional-based buffers zones will minimize impact to growers because these areas can still be treated by aerial applicators when the wind is blowing away from protected areas. The buffers will also fully protect listed species and critical habitat from spray drift because they will be implemented when the wind direction is towards the protected site. They provide a win-win solution that balances the needs for optimum agricultural production and protection of endangered species.

Aerial applicators are already experienced with using wind-directional buffers and are equipped with the technology needed to implement them to protect endangered species and other sensitive areas. Agricultural aircraft have smokers, an onboard meteorological measurement system, or both. These devices provide immediate and onsite wind direction measurement, so if wind speed or direction does change during the application, they can respond immediately. Both smokers and onboard meteorological measurement systems can also provide critical information on air stability and the presence of an inversion. An onboard meteorological measurement system can directly measure temperature. As an aerial applicator descends into the target field, they can determine if the temperature increases or decreases as they get closer to the ground. If the temperature cools as they descend, they know there's an inversion present. A smoker offers a visual indicator of an inversion. If the smoke rises as it spreads out, that is a sign of a normal temperature profile with the warmest air at the surface pushing the smoke upward. If the smoke hangs at the same altitude it was released, that's a sign that an inversion is present and vertical mixing of the air is minimal.

NAAA continues to support the baseline drift mitigation measures from the herbicide and insecticide strategies of no applications in wind speeds higher than 15 mph, no applications during an inversion, boom length and swath displacement restrictions, and a maximum release height. NAAA also continues to support the current list of mitigation measures as well as the proposed percent reduction in buffer distance for each measure. NAAA does request that the extremely coarse and ultra coarse droplet size distributions be added to the list of mitigation measures, with a corresponding percentage buffer zone distance reduction calculated using EPA's methodology. Using small-orifice straight steam nozzles at higher pressures, even high-speed turbine powered ag aircraft can create an extremely coarse droplet size. Slower speed fixed-wing aircraft and helicopters can create ultra coarse droplet size distributions. The table below shows an example of each situation, using USDA-ARS Aerial Application Research Technology Unit's (AATRU) aerial spray nozzle models[11]. While these setups may not yet be

[8] Kirk, I.W., M.E. Teske, H.W. Thistle. 2002. "What About Upwind Buffer Zones for Aerial Applications?" *Journal of Agricultural Safety and Health* 8(3): 333-336.
[9] Teske, M.E., S.L. Bird, D.M. Esterly, S.L. Ray, S.G. Perry. 2003. "A User's Guide for AgDRIFT ® 2.0.07: A Tiered Approach for the Assessment of Spray Drift of Pesticides." https://usermanual.wiki/Pdf/AgDriftusermanualpubFes2003.1946090729.pdf
[10] Butts, T.R., B.K. Fritz, K.B. Kouame, J.K. Norsworthy, L.T. Barber, W.J. Ross, G.M. Lorenz, B.C. Thrash, N.R. Bateman, J.J. Adamczyk. 2022. "Herbicide spray drift from ground and aerial applications: Implications for potential pollinator foraging sources." Scientific Reports (2022) 12:18017. https://doi.org/10.1038/s41598-022-22916-4
[11] USDA ARS Aerial Application Technology Research Unit. Aerial Spray Nozzle Models. https://www.ars.usda.gov/plains-area/college-station-tx/southern-plains-agricultural-research-center/aerial-application-technology-research/docs/a-models/

common in the aerial application industry, allowing the use of such nozzle types and operating parameters to count towards buffer zone reduction may encourage more aerial applicators to adopt setups on their aircraft capable of producing these larger droplet size spectrums.

Aerial Platform	Nozzle	Orifice Size	Deflector Angle	Pressure	Airspeed	DSC
High-speed Airplane	CAS LF-5 Straight Stream	0.067	0	70	140	Extremely Coarse
Low-speed Airplane	CP11TT Straight Stream	6	0	40	100	Ultra Coarse
Helicopter	Steel Disc Core Straight Stream	4	0	40	70	Ultra Coarse

NAAA requests that the aerial buffer zone reductions for using a 50% boom length be extended to include helicopters as well. In a letter sent to EPA in 2023[12], NAAA detailed the reduction in drift achieved by reducing the boom length to 50% for airplanes. To support this same concept for helicopters, NAAA ran several scenarios in Tier 3 in AgDRIFT. The 2023 letter to EPA used parameter settings NAAA referred to as "NAAA 3", based on our 2020 letter to EPA[13]. For the examples shown in the table below, NAAA switched to EPA's updated recommended default input parameters in Tier 3 AgDRIFT, as detailed in the Ecological Mitigation Support Document 2.0 (referred to as EPA's Tier 3 in the table). Parameters that were adjusted for these examples outside of EPA's updated default parameters are denoted in the columns. Drift was assessed using the fraction of material applied at 200 feet downwind value in the terrestrial assessment. While reductions in drift for helicopters are not as substantial as with airplanes, there is clearly a reduction in drift when helicopter boom length is reduced to 50% of rotor diameter. NAAA asks EPA to consider allowing buffer zone reductions for helicopters using a 50% boom, perhaps with buffer reduction percentages calculated specifically for helicopters.

Aircraft	Wind speed (mph)	Swath Width (ft)	Flight lines	Swath Dis.	Boom Length	Frac. Applied @ 200 ft	% reduction from EPA's Tier 3
AT-802A	10	80	15	0.5	75%	0.0290	--
AT-802A	10	60	20	0.5	50%	0.0122	58%
AT-802A	15	60	20	0.75	50%	0.0144	50%
206B JetRanger III	10	55	22	0.5	90%	0.0282	3%
206B JetRanger III	10	40	30	0.5	50%	0.0188	35%
206B JetRanger III	15	40	30	0.75	50%	0.0213	27%

Regarding the two AgDRIFT aerial application parameters EPA chose not to update in the Ecological Mitigation Support Document 2.0, boom/nozzle drop and surface roughness, NAAA is currently in the process in collecting industry boom/nozzle drop data through our industry wide survey. NAAA is working with AATRU to determine how to best collect and analyze surface roughness data to find a value that's reflective of having a crop present yet be conservative enough to account for varying crop types, heights, and densities to be used in place of the bare ground assumption.

On another buffer zone related subject, NAAA would like to see EPA apply the same spray drift mitigation procedures used for the herbicide, insecticide, and fungicide strategies to aquatic buffer zones. Since this is a separate subject, NAAA has addressed the issue in an additional letter that has been submitted to the draft fungicide strategy docket along with these comments.

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[12] NAAA letter to EPA, June 29, 2023. https://www.agaviation.org/20230627-letter-to-epa-drift-mitigations/
[13] NAAA letter to EPA, June 29, 2020. https://www.agaviation.org/20200629-naaa-to-epa-agdrift-tier-3

NAAA supports the use of oil emulsion drift reduction adjuvants for aerial applications of herbicides, insecticides, and fungicides. We do suggest EPA consider allowing lower use rates of oil emulsion herbicides for aerial applications. Research cited by EPA in their ecological support mitigation document[14] used rates much lower than 2.5% v/v; these lower rates provided some reductions in fine spray droplets as measured by %<100 microns among the various treatment combinations. Perhaps instead of making the required use rate part of the mitigation options, EPA instead requires that all drift reduction adjuvants used for aerial applications be mixed at a rate consistent with their product labeling. As none of the guar gum wind tunnel data submitted by CPDA included aerial nozzle types and airspeeds, NAAA understands why EPA could not assign a buffer zone reduction percentage for using guar gum drift reduction adjuvants with aerial applications. NAAA is working with AATRU to conduct aerial wind tunnel trials to measure the impact guar gums have on the droplet size for aerial applications at both typical airplane and helicopter speeds with commonly used nozzle types.

EPA's use of the Tier 3 AgDRIFT model, which is for aerial applications only, to assess the drift reduction benefits of adjuvants is further evidence that the AGDISP model (AgDRIFT is a modified version of AGDISP) needs to be recoded using a modern computer programming language to create a publicly available open-source program. The AGDISP Modernization Project[15] is well underway with this task, and once completed, additional spray platforms such as drones and ground sprayers and drift mitigation technologies like nozzles and drift reduction adjuvants can be added to the updated model.

Having a modernized AGDISP with options to model drift from all application platforms will help prevent misguided comparisons of spray drift between spray application platforms. NAAA has provided an example of such a comparison in a separate letter submitted to the draft fungicide strategy docket along with these comments.

NAAA continues to support the use of managed areas that count towards the total required buffer distance as well as EPA's work towards refining PULAs to more accurately reflect the precise location of listed species and critical habitat. NAAA is concerned with the potential overall complexity aerial applicators will face with a complex label that contains some mitigations, while directing applicators to BLT for other mitigations. NAAA urges EPA to ensure BLT is as streamlined, easy to use, and responsive as possible. The vast majority of aerial application businesses use ag aviation operations software to coordinate all aspects of their operation. The software tracks, among other parameters, the field location (coordinates for GPS), customer, crop, pests, products, use rates, acres, applicator, application date and time, GPA, EPA registration numbers, REI, required PPE, and weather. Aerial applicators need this software to be able to access the BLT system, load the PULA's if the targeted field location falls within one, and output the mitigations directly to the work orders. NAAA strongly supports software such as AcreBlitz[16] that can perform these vital tasks. Such software will be essential, especially during rapidly evolving pest outbreaks, when an operation may receive hundreds of work orders with no advance notice for fields that all need immediate applications. Some applications, particularly herbicides, can be planned for well in advance of application. Unplanned fungicide and

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[14] Henry, R., B. Fritz, W. Hoffmann, and G. Kruger. 2015. An Evaluation of Three Drift Reduction Adjuvants for Aerial Application of Pesticides. GSTF Journal on Agricultural Engineering. 2(1):39-48.

[15] https://www.agaviation.org/wp-content/uploads/2026/07/AGDISP-Modernization_Project_Summary-Final-1.pdf

[16] https://acreblitz.com

insecticide applications to fight an unexpected pest leave no time for advance planning. Checking for PULAs and loading mitigations from bulletins will have to be automated in these situations.

NAAA strongly supports the use of fungicide usage data to identify acres that are treated with fungicide to better identify areas where mitigations may be needed. NAAA is concerned about the potential impact mitigations to protect on-field listed vertebrates from foliar fungicide applications may have on protecting crops from plant diseases. Like other pests, fungal pathogens can quickly infest a field and cause substantial damage, reducing yield or in some cases killing off the crop entirely. An outright prohibition of a fungicide application on a field to protect an on-field vertebrate could result in a grower being forced to abandon crop production on the field or switch to a less profitable crop. Application rate reductions could lead to pathogens developing resistance to the fungicide. Timing restrictions may be the best option, but it could still be devastating to crop production if the restriction lasts for several days in a row. NAAA professes to have no expertise in the ecology of the 11 listed vertebrates detailed in the draft fungicide strategy, but it seems unlikely that many of these species spend an entire 24-hour period in the field. Bats are known to be nocturnal so limiting applications to daylight hours may be a viable mitigation option. Similarly, NAAA suspects the bird species do not spend all day in the same field. NAAA supports EPA's plan to limit the geographic areas requiring mitigations for on-field vertebrates and urges EPA to also limit any proposed temporal mitigations as much as possible.

Conclusion

NAAA supports the continued use of wind-directional buffers with buffer distance reductions when drift mitigation options are used to protect endangered species and critical habitat from potential drift associated with the aerial application of fungicides. NAAA also supports the option for aerial applicators to use oil emulsion herbicides for herbicides, insecticides, and fungicides, and will work to gather data to document the impact guar gums have on the spray droplet size for aerial applications. NAAA appreciates EPA using fungicide usage data to assist in determining where mitigations will be needed but is concerned on-field vertebrate mitigation options could hamper a grower's ability to produce crops on their fields.

Thank you for this opportunity to comment.

Sincerely,

Scott Bretthauer

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