STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION AND FORESTRY
BOARD OF PESTICIDES CONTROL
28 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

BOARD OF PESTICIDES CONTROL

April 7, 2023

9:00 AM Board Meeting

MINUTES

Adams, Bohlen, Carlton, Ianni, Jemison, Lajoie

1. Introductions of Board and Staff

   - The Board, Assistant Attorney General Randlett, and Staff introduced themselves

2. Minutes of the February 24, 2023 and March 15, 2023 Board Meetings

   Presentation By: Megan Patterson
   Action Needed: Amend and/or approve

   - **Jemison/Carlton: Moved and seconded to approve the minutes of the February 24, 2023 Board meeting as amended**
   - **In Favor: Unanimous**

   - **Carlton/Jemison: Moved and seconded to approve the minutes of the March 15, 2023 Board meeting as amended**
   - **In Favor: Unanimous**

3. Review of the Board Budget

   In early 2017, the Board reviewed the budget with the goal of identifying potential resources that could be allocated to Board priorities. At that time the Board requested ongoing annual updates on the status of the Pesticide Control Fund.

   Presentation By: Megan Patterson, Director

   Action Needed: Provide guidance to the staff on Board budget priorities

   - Patterson reviewed the summary of the budget with the Board. Most of the money for the program is spent on salaries and fringe. The budget synopsis covered all expenses from

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March 2023 projected through June 2023. The projections were based on ten years of data which is usually fairly accurate but this year was a massive departure from normal so it made it more difficult to predict. The program received approximately $155,000 in applicator fees, $1.67 million in registration fees, and $378,000 from the program partnership grant from EPA which runs on the federal fiscal year. Patterson stated that this funding was needed to sustain the program through December. There are also legislative transfers that the Board is responsible for which include $200k to UMaine extension and approximately a $238,000 DICAP transfer which is assessed as a percentage of each dollar and is used by the department to fund multiple things like administrative staff, technology needs and other expenses.

- Adams asked when the calculation was made for DICAP and on what dollar amount. He asked if the amount was 1.125%.
- Patterson said the amount changes every year and she thought it was assessed monthly. She said she could give them additional information on that. Patterson went on to explain expenses and that they were a little lower than normal this year and projected through to the end of the year would be approximately $1.7 million. The Board needs to have a minimum of $200,000 in December to cover all costs. Patterson explained the positions in BPC and the five positions the BPC funds in the plant health division. She stated that there was an effort to move those positions back to general fund monies but that did not seem to have been successful.
- Adams stated that he assumed the Board had the right to decide what they funded and did not fund. He suggested creating a subcommittee to work on a multiple-year projection for the budget.
- Patterson stated that the Board had capacity to think about the way they assess fees and that engaging a subcommittee and inviting folks that are directly affected by the fees would be beneficial. She noted that the majority of revenue came from product registration.
- Adams stated that he would like to see the worst case scenario. There may be difficult decisions that need to be made on what does and does not get funded in the coming year.
- Patterson replied that staff could certainly provide that.
- Adams stated they are preparing for a meeting with the ACF committee. They had a previous meeting with the committee and discussed fiscal impact and requested general fund monies but it did not seem to get consideration. He added that the Board needed an understanding of how bad it could get so that Board members could bring that to the upcoming discussion.
- Patterson said staff could provide them with historical financial information to see how that compares with the current budget.
- Adams said that they needed to get an idea of what the asks would be before they came in.
- Bohlen noted that what the Board was funding was not where the majority of dollars are. It was salaries that were the issue and at some point the discussion needed to focus on people and which people the Board could afford to support with a lot less money. He said

that these different pools of money had different levels of flexibility and he did not understand those relationships.

- Patterson said that in the past the Board had met with Aimee Carlton, the Business Operations Manager for the Department, and she would be able to explain the intricacies of the budget in greater detail.
- Adams asked for Board members that would be willing to serve on a subcommittee to dig into the budget.
- Bohlen said he would be happy to be part of the team.
- Patterson said if the whole Board was interested in meeting with Carlton and the folks over at the Commissioner's office staff could set it up so that would occur after a Board meeting.
- Jemison said that he would be happy to be a part of this as well but he usually recuses himself from voting on the budget due to any conflict about the money that goes to UMaine Extension.
- Adams asked Patterson to come up with a plan to discuss the budget He added that for purposes of the upcoming ACF meeting he wanted to get as much accurate information as possible and hoped the meeting would happen before the end of April. Adams suggested possibly scheduling a budget workshop after the next regular meeting.

4. <u>Review and Discussion of Potential Rulemaking Topics</u>

At its January 11, 2023, meeting, the Board expressed interest in initiating rulemaking to incorporate existing Board policy and other potential rulemaking topics. At the February 24, 2023, meeting, staff provided a list of rulemaking ideas identified by Board members and staff. At the March 15, 2023 meeting the Board engaged in further discussion about prioritizing rulemaking concepts, but did not vote to move to rulemaking. The staff will present a summary of the March discussion, additional information on some rulemaking concepts, and a timetable of possible hearing dates for Board consideration.

Presentation By: Karla Boyd, Policy and Regulations Specialist

Action Needed: Discuss rulemaking concepts and possibly vote to schedule a hearing

- Boyd stated that there were four rulemaking initiatives that the Board had indicated they were interested in moving forward with. She added that they needed to have an official vote on which to proceed with.
- Adams said at the last meeting there was discussion to move forward with topics two, four, seven and nine but the Board didn't take a formal vote.
- Patterson stated that on the bright side that gave the Board time to have discussion about the text. She added that Chapter 41 had some draft language for the Board's consideration.

- There was Board discussion about consent agreements and some unique options for making them more meaningful. There was a discussion of possible license revocation for infractions. Adams stated that he would be in support of a second offense suspension.

- The Board discussed language changes for rulemaking on Chapter 41. Patterson stated that Section D(I)(a) made it so that *Bt* growers did not have to keep a map showing crop location. Additionally, there was no longer a discreet refuge. Growers are using refuge in a bag. Patterson stated that the change in Section D(I)(c) may not be necessary. She noted that in Section E(I)(a) the proposed language would change the rule to expand the requirement to all plant-incorporated protectants. Patterson stated that it might be better to consider a *Bt* corn certificate rather than a license.

- Bohlen stated he did not have enough information on which way to move forward and would like to keep both the licensure and certificate option open.

- Adams asked if having an applicator license would fulfill this requirement and that obtaining a license gives them a much broader base of knowledge. He suggested maybe adding a caveat that individuals do not need to undergo recertification if they are licensed.

- Jemison stated that would work as long as the individuals received the initial training the first time.

- Adams said it would be ideal if there was a portion of the core manual that covered *Bt* corn or GMOs.

- There was discussion about changing the *Bt* corn wording to plant-incorporated protectant.

- Patterson noted that in Section E(c)(1)&(2) the edits may not be necessary.

- Boyd pointed out that the changes to this rule would be major substantive and would need to go in front of the ACF committee.

- The Board decided to wait to vote to enter rulemaking at the next scheduled meeting formally. Adams stated that he did not see an urgency to move forward today because it would not have an impact on spring planting.

5. <u>Staff Memo on Proposed Water Quality Monitoring Related to Aerial</u>

Executive Order 41 FY 20/21 directed the Board to develop a surface water quality monitoring effort to focus on the aerial application of herbicides in forestry to be conducted in 2022. In an effort to be responsive to this request and to accommodate what was a changing timeline for the completion of the EO request, staff conducted a small preliminary surface water quality monitoring pilot study in 2021. Staff proposed an expanded monitoring project for completion in 2022, but in the absence of additional funding chose to develop standard operating procedures and scout potential sampling sites. At the December 2, 2022, meeting staff provided an update on the progress on and challenges to completing the EO 41 water quality monitoring project. Following the completion of preliminary field assessments, staff propose a modified water quality monitoring project to be completed in 2023.

Presentation By: Pam Bryer, PhD, Pesticides Toxicologist

Action Needed: Review/discuss the project proposal; approve/disapprove the project proposal

- Bryer brought this proposal forward a couple of meetings ago. The BPC was asked by the Governor's office to undertake water quality monitoring around areas with aerial forestry applications to assess off-target movement of pesticides. This monitoring was not completed in 2022 because it was not funded. Bryer explained how the monitoring would be conducted. She said this proposal was for a two-pronged approach, assessing drift during an application and also over time including after rain events. She stated that the project would require a lot of coordination with landowners. This study evaluates the current setbacks from water and if they are sufficient.
- Ianni asked if other states with similar topography, stream prevalence and tree species had conducted any similar studies.
- Gary Fish, Maine State Horticulturalist, stated that it might be advantageous to contact Bob Wagner who conducted significant work in Ontario in the 1990s on this topic.

6. Staff Memo on Clarification of Distribution

Chapter 20, Section 1(D) of the Maine pesticide rules, permits retailers and end users of pesticides no longer registered in Maine to continue to sell and use those items provided they were properly registered when obtained, and such distribution and use is not prohibited by FIFRA or other Federal law. Recent inquiries have highlighted confusion as to who qualifies as a retailer, and what "obtained" means when selling and using products that are no longer registered. Staff proposes clarifications of the rule for consideration by the Board.

Presentation By: Mary Tomlinson, Registrar and Water Quality Specialist

Action Needed: Discuss the memo; approve/disapprove adoption by interim policy

- Tomlinson explained the issues with the past renewal season She said that staff had received calls from companies with products that were not renewed asking if they could distribute product into the State. The companies also asked what the rules were if the product was already purchased but not yet shipped. Questions were posed about the definition of a retailer. Tomlinson said that Chapter 20 reads that retailers and end users of pesticides no longer registered in Maine may continue to sell and use those products provided they were properly registered when obtained and such distribution and use is not prohibited by FIFRA or other federal law. She asked the Board for clarification on what obtain means in this context and what entities would qualify for this. Tomlinson stated that staff surmised the rule was likely written to reduce the number of unregistered pesticides in Maine.
- Tomlinson suggested for clarification purposes to define a retailer as a store or warehouse in Maine that sells directly to the end user. If the company does not have a storefront or warehouse in the state, it would not be considered a retailer. A company with a warehouse out of state that is storing unregistered products for distribution into Maine would not be allowed to send the product.

- The Board discussed this issue and agreed product needed to physically be in Maine to fit the intent of Chapter 20. There was also discussion about putting this policy into rule sometime in the future to make it enforceable.
    - **Carlton/Bohlen: Moved and seconded to incorporate the memo into policy**
    - **In Favor: Unanimous**

7. <u>Staff Memo on Potential Cancellation of Special Local Need (SLN), Section 24(c) Registrations</u>

For a Special Local Need (SLN), Section 24(c) registration to be approved and remain active through its registration period, the EPA Section 3 pesticide product on which the SLN is based must maintain current registration in Maine. In addition, the SLN application must also be submitted through the registration portal with the payment of the annual renewal fee.
To date, seven SLNs are in jeopardy of cancellation either because they were never submitted through the registration portal and have not paid the renewal fees or because the product was not renewed for 2023.

Presentation By: Mary Tomlinson, Registrar and Water Quality Specialist

Action Needed: Informational only

- Tomlinson explained she was bringing forward this memo for informational purposes. There were multiple SLNs that were canceled or not renewed. Some of the products were in the process of renewal.
- Adams stated that an SLN was essentially worthless if the product was not registered. Lajoie agreed. The Board thanked Tomlinson for bringing this information forward.

8. <u>Staff Memo on Possible Addition of Elongate Hemlock Scale to the Board's Policy on *Approved Invasive Invertebrate Pests On Ornamental Vegetation In Outdoor Residential Landscapes For Neonicotinoids Exemption*</u>

Staff have received a request to add the Elongate Hemlock Scale to the Board's existing policy on the use of neonicotinoids for the management of invasive invertebrate pests in outdoor residential landscapes.

Presentation By: John Pietroski, Manager of Pesticide Programs

Action Needed: Discuss the memo; approve/disapprove amendment of the interim policy

- Pietroski told the Board that staff received a request from an applicator in midcoast Maine to add Elongate Hemlock Scale (EHS), to the neonicotinoid policy that included three other invasive species.

- There was a discussion about the type of application and the extent of the infestation.

- Gary Fish commented that EHS was an emerging invasive that was often found paired together with HWA. He added that it was established in New Hampshire and was infesting hemlocks in the forest. Fish stated that it was not a state or federally-regulated pest.

- Adams asked about alternative treatments for EHS.
- Pietroski responded that from the reading he had done alternate treatments appeared to be horticultural oils or insecticidal soaps.
- Jeff Gillis, from Well Tree, Inc, stated that he saw EHS most often as a solitary infestation and it was commonly on fir trees. He brought in bagged samples he showed to Board members.
- There was discussion about working with nursery stock to keep invasives out.
- Gillis commented that even during a nursery inspection there would really be no way of seeing EHS if it is in the crawler stage until it had developed its waxy coating.
- The Board discussed the original logic of creating the specialized list of invasives. It was intended for invasives where the species was between the moments of initial spread and before it became established. They were unsure if this species was in that space or too far along.
- Mike Parisio, of Maine Forest Service, said he could not say for sure but he thought he could safely say entire eradication was out of the question. He added that treatment may be appropriate on a local level. Parisio shared a document showing current known areas where EHS had been identified.
- Fish spoke to the difficulty of using horticultural sprays and oils which would require fine spray and a greater ability to drift. He added that oils could cause more damage to beneficials than a systemic injection.
- Adams stated that the whole point of the rule was to stop using these products in residential areas.
- Patterson mentioned the emergency use policy.
- The Board requested Gillis apply for a variance through the emergency use policy.

9. Consideration of Consent Agreement with BD Grass & Sons, Blaine, Maine

On June 3, 1998, the Board amended its Enforcement Protocol to authorize staff to work with the Attorney General and negotiate consent agreements in advance on matters not involving substantial threats to the environment or public health. This procedure was designed for cases where there is no dispute of material facts or law, and the violator admits to the violation and acknowledges a willingness to pay a fine to resolve the matter. This case involved failure to notify the Board of a spray incident.

Presentation By: Alex Peacock, Manager of Compliance

Action Needed: Review and/or approve

- **Lajoie/Carlton: Moved and seconded to approve the consent agreement as written**
- **In Favor: Unanimous**

10. Consideration of Consent Agreement with Mosquito Deleto, Sandown, New Hampshire

On June 3, 1998, the Board amended its Enforcement Protocol to authorize staff to work with the Attorney General and negotiate consent agreements in advance on matters not involving substantial threats to the environment or public health. This procedure was designed for cases where there is no dispute of material facts or law, and the violator admits to the violation and acknowledges a willingness to pay a fine to resolve the matter. This case involved an unlicensed applicator, failure to maintain pesticide application records, and failure to post applications.

Presentation By: Alex Peacock, Manager of Compliance

Action Needed: Review and/or approve

- Peacock stated that the original penalty was for $10,000 but it was revised to $1,500 with a ten-year no violation clause to bring the consent agreement to a close.
- Ianni stated that there did not seem to be a rational reason for dropping the fine that much.
    - **Carlton/Lajoie: Moved and seconded to approve the consent agreement as written**
    - **In Favor: Adams, Carlton, Lajoie**
    - **Against: Ianni, Jemison**

11. Other Old and New Business

a. Update on 2023 pesticide product registration

- Patterson stated that the BPC was still missing about 2,680 registrations compared to last year. There were a few large companies and some smaller ones that had not submitted renewals.

b. Variance Permit for CMR01-26 Chapter 29, Maine Department of Transportation

c. Variance Permit for CMR01-26 Chapter 29, RWC, Inc.

d. Letter from Maine Organic Farmers and Gardeners Association (MOFGA) regarding recently collected pesticide product registration related affidavits and confidentiality

e. Possible bill on use and sales reporting

f. Update on container barrier treatments

g. Other?

12. Schedule of Future Meetings

- Adams said to hold open April 28 as a meeting date if the Board received instruction from the ACF Committee by April 17. If the Board had not heard from the committee by then, staff could send out a statement that the meeting is off.
- Three Board members stated they could not meet at the end of April.
- June 9 and July 21 were the next two scheduled meeting dates.

13. Adjourn

- **Lajoie/Carlton: Moved and seconded to adjourn at 12:05 PM**
- **In Favor: Unanimous**

BOARD OF PESTICIDES CONTROL - SUMMARY
014-01A-0287-01 CASH REPORT

		CURRENT FISCAL YEAR 2023 (BY MONTH)												
		Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Estimated 6/1/2023	Estimated FY2023
	BALANCE FORWARD	**2,082,379.14**	**1,961,483.09**	**1,791,676.81**	**1,600,234.14**	**1,485,352.18**	**1,550,435.22**	**2,252,212.39**	**2,263,611.00**	**2,198,410.10**	**2,316,927.54**	**2,207,009.73**	**1,872,012.70**	
Revenues:														
1407	REG INSECT & FUNGICIDES	19,200.00	11,520.00	10,560.00	11,360.00	185,120.00	812,640.00	180,960.00	92,800.00	291,040.00	41,600.00	35,040.00	17,120.00	**1,708,960.00**
1448	SPECIAL LICENSES & LEASES	8,320.00	5,420.00	4,240.02	6,970.00	17,440.00	35,030.00	19,980.00	10,675.00	12,680.01	13,345.00	9,855.00	10,490.00	**154,445.03**
2690	RECOVERED COST	-	-	-	100.00	-	-	-	-	-	-	-	-	**100.00**
2953	ADJ OF ALL OTHER BALANCE FWD	185.12	-	-	-	-	-	-	-	-	-	-	-	**185.12**
2968	REG TRANSFER UNALLOCATED	-	-	-	-	(25,000.00)	-	-	-	-	-	-	-	**(25,000.00)**
2978	DICAP TRANSFER	(20,232.63)	(18,120.06)	(23,805.51)	(25,752.19)	(15,182.77)	(13,736.53)	(18,652.64)	(24,122.07)	(20,404.72)	(22,354.38)	(20,116.00)	(22,553.43)	**(245,032.93)**
2979	TRANSFER FOR INDIRECT COST	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2981	LEGIS TRANSFER OF REVENUE	-	-	-	-	-	-	-	-	-	-	(200,000.00)	-	**(200,000.00)**
	TOTAL REVENUES	**7,472.49**	**(1,180.06)**	**(9,005.49)**	**(7,322.19)**	**162,377.23**	**833,933.47**	**182,287.36**	**79,352.93**	**283,315.29**	**32,590.62**	**(175,221.00)**	**5,056.57**	**1,393,657.22**
Expenditures:														
	TOTAL SALARY & FRINGE	106,230.83	146,365.74	111,969.71	90,301.17	90,578.65	103,403.68	151,460.23	102,324.81	103,190.21	126,676.39	102,524.31	104,289.97	**1,339,315.70**
40	PROF. SERVICES, NOT BY STATE	3,049.60	6,522.76	5,278.26	6,142.82	7,282.39	4,149.77	5,860.14	6,387.40	5,154.96	5,294.73	6,380.25	5,591.19	**67,094.27**
42	TRAVEL EXPENSES, IN STATE	192.00	29.55	47.57	18.99	25.53	-	47.27	503.44	200.56	11.30	30.86	-	**1,107.07**
43	TRAVEL EXPENSES, OUT OF STATE	-	-	-	1,644.01	828.68	104.00	-	(1,062.64)	1,753.03	-	1,334.64	1,552.00	**6,153.72**
46	RENTS	-	1,111.71	2,869.30	194.24	70.18	2,495.92	2,544.80	862.23	793.15	856.82	1,196.56	1,196.56	**14,191.47**
48	INSURANCE	-	3,483.00	150.00	-	-	-	4.61	174.00	-	-	-	-	**3,811.61**
49	GENERAL OPERATIONS	671.83	900.44	793.02	306.18	1,199.01	3,239.25	423.54	15,807.34	4,195.51	1,040.50	17,579.60	5,000.00	**51,156.22**
50	EMPLOYEE TRAINING	-	-	-	-	131.34	-	-	-	-	-	-	-	**131.34**
51	COMMODITIES - FOOD	-	-	-	-	59.87	-	-	-	-	36.36	37.52	50.00	**183.75**
53	TECHNOLOGY	10,435.49	-	49,934.18	-	(9,014.51)	10,520.95	-	10,435.49	33,332.05	-	20,501.27	10,250.00	**136,394.92**
55	EQUIPMENT AND TECHNOLOGY	220.62	243.27	523.86	245.80	219.88	416.32	329.51	110.08	355.31	135.52	718.33	500.00	**4,018.50**
56	OFFICE & OTHER SUPPLIES	-	46.98	115.40	2,365.23	195.85	20.97	143.67	489.30	54.41	55.01	52.87	100.00	**3,639.69**
64	GRANTS TO PUB AND PRIV ORGNS	-	-	-	-	-	-	-	-	6,432.00	-	-	-	**6,432.00**
82	ADMINISTRATIVE CHARGES AND FEE	-	(20.00)	-	-	(20.00)	-	-	-	-	-	-	-	**(40.00)**
85	TRANSFERS	7,568.17	9,942.77	10,755.88	6,341.33	5,737.32	7,790.62	10,074.98	8,522.38	9,336.66	8,401.80	9,419.82	8,052.39	**101,944.11**
90	CHARGES TO ASSETS AND LIAB.	-	-	-	-	-	14.82	-	-	-	-	-	-	**14.82**
	TOTAL EXPENDITURES	**128,368.54**	**168,626.22**	**182,437.18**	**107,559.77**	**97,294.19**	**132,156.30**	**170,888.75**	**144,553.83**	**164,797.85**	**142,508.43**	**159,776.03**	**136,582.11**	**1,735,549.19**
	CURRENT CASH BALANCE	**1,961,483.09**	**1,791,676.81**	**1,600,234.14**	**1,485,352.18**	**1,550,435.22**	**2,252,212.39**	**2,263,611.00**	**2,198,410.10**	**2,316,927.54**	**2,207,009.73**	**1,872,012.70**	**1,740,487.17**	**1,740,487.17**

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JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

Memorandum

To: Board of Pesticides Control
From: Pamela J. Bryer, Ph.D. | Pesticides Toxicologist
Subject: Update on Federal and State Actions on Fluorinated Pesticide Containers

June 9, 2023

Summary:
This memo summarizes the results of staff reaching out to the EPA for updates on container fluorination actions at the federal level. Staff have also outlined existing federal and Maine rules to clarify what is allowed in pesticide products as of spring 2023.

Updates from EPA:
At the annual Association of American Pesticide Control Officials meeting in March 2023, EPA presented recent PFAS regulatory achievements and developments of note:

- EPA announced it would soon release a review of the Lasee et al. 2022 paper. On May 30^{th,} 2023 that review was released. Lasee et al. found high concentrations of PFOS in several (six out of ten) insecticides. In their paper, it was notable they found PFAS that did not correspond to the same individual types of PFAS found in previous container contamination studies. Additionally, the concentrations they found were significantly higher in concentration. For its review, EPA tested pesticides from the same containers used in the Lasee et al. paper and found no detections of any PFAS. In the accompanying press release, EPA describes the differences in methodology that lead to differences in results. Briefly, pesticide products are challenging to analyze due to the high concentration of chemicals in the product mixture. Lasee et al. used a method involving dilution to avoid matrix interference, while EPA used a different sample clean-up process. EPA's memo points to the sample prep steps leading to this difference in results. EPA also states that their methodology was 2,500 times more likely to detect compounds.
- EPA's Fort Mead Laboratory is set to release a new analytical method appropriate for analyzing PFAS in pesticides. (Related note: at the state level,

there has been recent discussion about what method should be used for PFAS determinations. The standard PFAS analytical method, Method 537.1, has been inconsistent with results between different animal product types. There may be a shift in the standard methodology to an alternate method that is less likely to return false positive results.)

- EPA's TSCA program has received nine Significant New Use Notification (SNUN) related to containers (not specifically pesticide containers). EPA requires manufacturers whose fluorinated containers leach PFAS to notify the agency via the SNUN process. EPA sued Inhance Technologies for not notifying the agency about PFAS that had migrated from containers. Inhance Technologies is the company that produced the original plastic containers of Anvil 10+10, a mosquito adulticide commonly used in aerial spray programs.
- EPA is working on a system that should allow public access to 6(a)(2) reports, also called "Incident Reports." Manufacturers are required to send EPA incident reports when the company becomes aware of any of a number of problems with their products, including contamination issues. Companies are required under FIFRA to report to EPA within 30 days following the discovery of PFAS contamination in their pesticide products. It is unclear what this public-facing 6(a)(2) reporting will look like because portions of 6(a)(2) reports are protected health information while others are confidential business information. The system is expected to be live within the federal fiscal year.
- EPA is categorizing PFAS into groups to streamline the next regulatory steps of data call-ins and generating new standards. There is a challenge in generalizing across all individual PFAS when this chemical group has over 14,000 unique structures. EPA is currently working with 70 PFAS groupings and indicated that the number may increase.
- EPA recognizes four pesticide active ingredients and two inerts as PFAS (as of June 2023).

EPA PFAS Active Ingredients	EPA PFAS Inert Ingredients
Broflanilide (insecticide)	1,1,1,2-Tetrafluoroethane
Pyrifluquinazon aka PQZ (insecticide)	1,3,3,3-Tetrafluoroprop-1-ene
Tetraconazole (fungicide)	
Hexaflumuron (insecticide)	

Status of pesticide container fluorination in Maine:

PFAS are not an allowable contaminant in pesticide products at both the state and federal levels. The following infographic points to specific pieces of law where these protections are found.

Statewide, PFAS are currently still allowed for use as a liner in containers and specifically in food contact surfaces; that practice will be ended in Maine as part of the intentional use ban taking effect in 2030.

Fluorination of containers, as commonly used on high-density polyethylene (HDPE) pesticide containers, is still allowed. Some fluorinated containers have been linked to the presence of PFAS in pesticide products. Different fluorination processes are said to change the amount of PFAS generated during container use, with an industry group saying no PFAS are generated with some methods. Vitale et al. 2022 conducted research funded through IPack-Chem Ltd that demonstrated no detectable concentrations of PFAS following in-mold fluorination of HDPE containers.

References

Lasee, Steven, Kaylin McDermett, Naveen Kumar, Jennifer Guelfo, Paxton Payton, Zhao Yang, Todd A. Anderson. Targeted analysis and Total Oxidizable Precursor assay of several insecticides for PFAS. Journal of Hazardous Materials Letters Volume 3, November 2022. https://doi.org/10.1016/j.hazl.2022.100067

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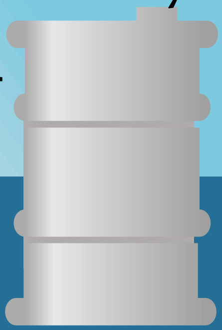
Pesticide Product Contamination



Contamination of pesticide products is prohibited by federal and state law.

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) ensures consumer protections for pesticide products and mandates that the products contain exactly what was approved when they were registered with EPA, no more and no less. The entire product ingredient list is reviewed by EPA prior to allowing a pesticide product on the market.

Federal: 7 U.S.C. 136(j) (FIFRA Section 12(a)(1)(c))
Establishes as an unlawful act: composition that differs at the time of distribution or sale from its composition as described … with its registration

Federal: 7 U.S.C. 136(d) (FIFRA Section 6(a)(2)) & 12(a)(1)(c)
Requires registrants to report impurities and prohibits composition of the product that differs from that registered with the Agency

Federal: 40 CFR § 159.179(b)
As per its current PFAS-Packaging website EPA states, "EPA considers any level of PFAS to be potentially toxicologically significant ."

Federal: 40 CFR § 159.155(a)(5)
Information about impurities must be received by EPA no later than the 30th calendar day after the registrant first possesses or knows of the information

Federal: 40 CFR § 158.167
Requires all impurities of toxicological significance to be reported and accepted as part of product registration

Federal: EPA PR Notice 96-8
Establishes certain allowable contaminants of pesticide products by other pesticide active ingredients within established concentrations

Federal: 7 U.S.C. §136v(b) Authority of States:
(b) Such State shall not impose… any requirements for labeling or packaging in addition to or different from… this subchapter **Relevant Definition 40 CFR 152.3** Packaging means… the immediate container… in which the pesticide is contained for distribution, sale, consumption, use, or storage

Maine: 7 MRSA §606, sub-§1
1. Unlawful distribution. A person may not distribute in the State any of the following: …
H. A pesticide that has been contaminated by perfluoroalkyl and polyfluoroalkyl substances

Maine: 7 MRSA §606, sub-§2 2. Unlawful alteration, misuse, divulging of formulas, transportation, disposal and noncompliance.
A person may not:…
H. Use or cause to be used any pesticide container inconsistent with rules for pesticide containers adopted by the board.

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
BOARD OF PESTICIDES CONTROL
28 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

Memorandum

To: Board of Pesticides Control

From: John Pietroski| Manager of Pesticide Programs | Maine Board of Pesticides Control

Subject: Balsam Woolly Adelgid

Date: June 9, 2023

Staff received a request to add Balsam Wooly Adelgid (BWA) to the policy on "Approved Invasive Invertebrate Pests On Ornamental Vegetation In Outdoor Residential Landscapes For Neonicotinoids Exemption." BWA is an invasive insect introduced into the United States around 1900.

The BPC was contacted by a commercial applicator who previously used neonicotinoids to treat BWA. The addition of BWA to the above policy would allow applicators to use neonicotinoids for the purpose of managing BWA in outdoor ornamental vegetation in residential landscapes. Pests not listed on the above policy may not be managed through the application of neonicotinoids in residential landscapes unless an emergency use permit is obtained from the Board.

According to the U.S. Department of Agriculture, *In Europe, host trees are relatively insensitive to attack and the insect is not considered a significant forest pest. In North America, however, it has caused significant damage and mortality to true firs (Abies spp.) in both eastern and western forests. In some localities, firs are slowly being eliminated from the ecosystem and adelgid populations continue to spread to previously uninfested areas.*

MEGAN PATTERSON, DIRECTOR
90 BLOSSOM LANE, DEERING BUILDING

PHONE: (207) 287-2731
WWW.THINKFIRSTSPRAYLAST.ORG

The Maine Forest Service reports, *The balsam woolly adelgid (BWA), (Adelges piceae) (Ratz.) has been very abundant in the last several years in Maine and feeding activity by this pest has resulted in serious injury to or death of large volumes of balsam fir. BWA is an introduced pest of true firs that has spread throughout the southern half of the State. Entire stands of mature balsam as well as understory fir have been killed in many areas of the state and salvage operations are planned. While the heaviest damage has occurred within 30 miles of the coast, damage may also be seen as far north as southern Aroostook, northern Penobscot and southern Piscataquis counties. While balsam woolly adelgid is frequently limited by cold winter temperatures, the mild winters of the 1990's and early 2000's allowed this pest to attain damaging levels.*

The BPC currently has three invasive insects as part of this policy:
Asian long-horned beetle (*Anoplophora labripennis*)
Emerald ash borer (*Agrilus planipennis*)
Hemlock woolly adelgid (*Adelges tsugae*)

MEGAN PATTERSON, DIRECTOR
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DEPARTMENT OF Agriculture Conservation & Forestry

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Proposed Administrative Consent Agreement
Background Summary

Subject: Davey Tree Expert Company
298 New Portland Road
Gorham, ME 04038

Date of Incident(s): September 15, 2022

Background Narrative: On September 15, 2022, Christopher Everest, a licensed applicator for the Davey Tree Expert Company applied Safari 20 SG Insecticide, EPA Reg. No. 86203-11-59639, to three shrubs located on the property of 32 Rivers Edge Drive in Kennebunk. This application was to have been made at 34 Rivers Edge Drive in Kennebunk. Mr. Everest failed to confirm his location prior to making the application. The company did have a positive property identification system in place that consisted of a numbered tag located at the customer's property. The applicator failed to use the property identification system prior to commencing the application.

Summary of Violations: CMR 01-026 Chapter 20 Section 6(D)2: No person may apply a pesticide to a property of another unless prior authorization for the pesticide application has been obtained from the owner, manager or legal occupant of that property. The term "legal occupant" includes tenants of rented property.

Rationale for Settlement: The Davey Tree Expert Company did not have the property owners' authorization to apply a pesticide to their property. The applicator failed to positively identify the application location.

Attachments: Proposed Consent Agreement

APR 27 2023

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION AND FORESTRY
BOARD OF PESTICIDES CONTROL

CK# 1923222
CK Amt: $1000.00
Date: 4-21-23

Davey Tree Expert Company	)	ADMINISTRATIVE CONSENT
298 New Portland Road	)	AGREEMENT
Gorham, Maine 04038	)	AND
	)	FINDINGS OF FACT

This Agreement by and between Davey Tree Expert Company (hereinafter referred to as the "Company") and the State of Maine Board of Pesticides Control (hereinafter referred to as the "Board") is entered into pursuant to 22 M.R.S. §1471-M (2)(D) and in accordance with the Enforcement Protocol amended by the Board on December 13, 2013.

The parties to this Agreement agree as follows:

1. That the Company provides tree care and landscaping services with branch office across North America, including Gorham, Maine. Pest management and pesticide applications are part of the services the Company provides to Maine customers.

2. That on September 15, 2022, Christopher Everest, a licensed applicator and employee of the Company, applied Safari 20 SG, EPA Reg. No. 86203-11-59639, to three shrubs located on the property of 32 Rivers Edge Drive in Kennebunk, Maine.

3. That the legal occupant and owner of 32 Rivers Edge Drive is Thomas Frechette.

4. That Frechette neither requested nor authorized the pesticide application described in paragraph two.

5. That the applicator had incorrectly read the work order related to the application described in paragraph two and mistakenly treated the wrong property. The application was supposed to be made at 34 Rivers Edge Drive, Kennebunk.

6. That the applicator failed to verify that they were at the correct property prior to making the application described in paragraph two.

7. That CMR 01-026, Chapter 20, Section 6 (D) (2) prohibits the application of pesticides to the property of another unless prior authorization has been received from the owner, manager or legal occupant.

8. That prior authorization had not been received for the pesticide application described in paragraph two.

9. That the circumstances described in the agreement constitute a violation of CMR 01-026, Chapter 20, Section 6 (D) (2).

10. That the Company expressly waive:

    A. Notice of or opportunity for hearing;

    B. Any and all further procedural steps before the Board; and

    C. The making of any further findings of fact before the Board.

11. That this Agreement shall not become effective unless and until the Board accepts it.

12. That in consideration for the release by the Board of the cause of action which the Board has against the Company resulting from the violations referred to in paragraphs nine, the Company agree to pay a penalty to the State of Maine in the sum of $1,000.00. (Please make checks payable to Treasurer, State of Maine).

IN WITNESS WHEREOF, the parties have executed this Agreement of two pages.

DAVEY TREE EXPERTS COMPANY

By: [signature] Date: 4-17-23

Type or Print Name: Michael A. Vency, Environmental Programs

BOARD OF PESTICIDES CONTROL

By: ______________________ Date: ______________

Megan Patterson, Director

APPROVED:

By: ______________________ Date: ______________

Mark Randlett, Assistant Attorney General

Proposed Administrative Consent Agreement
Background Summary

Subject: Osmose Utilities Services, Inc.
635 Highway 74 South
Peachtree, Georgia 30269

Date of Incident(s): July 30, 2021/ October 6, 2021

Background Narrative: On July 30, 2021an employee of Osmose Utilities Services, Inc. was traveling on I-95 when they were involved in an accident near mile marker 129, Waterville/Fairfield. The vehicle rolled over jettisoning 541 cannisters of MITC-FUME, EPA Reg. No. 69850-1, along the side of the highway. MITC-FUME is a restricted use pesticide due to high acute toxicity that is used to treat utility poles for wood decay. On October 6, 2021 a contractor for the Maine DOT was conducting mechanical vegetation management with an articulating mower near the accident site and pierced several of the pressurized MITC-FUME cannisters. The equipment operator was exposed to the pesticide and had symptoms of burning eyes and headache and received medical attention.

Summary of Violations:

1. That pursuant to 7 MRS section 606(2)(D), it is unlawful to handle or transport pesticides in a manner as to endanger human beings or the environment.

2. That pursuant to CMR 01-026, Chapter 20, Section 3(A) of the Board's rules, unused pesticides must be maintained so as to prevent unauthorized use, mishandling or loss; and so as to prevent contamination of the environment and risk to public health.

3. That pursuant to CMR 01-026, Chapter 50, Section 2 (C), any pesticide handling activity which causes a pesticide release which may result in a threat to human health is a reportable spray incident.

Rationale for Settlement: Osmose Utilities Services, Inc. failed to respond to the original incident and account for missing fumigant cannisters. This resulted in an exposure to a pesticide with high acute toxicity. Osmose Utilities Services, Inc. did not report the incident and exposure to the BPC.

Attachments: Proposed Consent Agreement

MAY 19 2023

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION AND FORESTRY
BOARD OF PESTICIDES CONTROL

CK# 401786
Date: 5-11-23
Amt $4500.00

Osmose Utilities Services, Inc.	)	ADMINISTRATIVE CONSENT
635 Highway 74 South	)	AGREEMENT
Peachtree, Georgia 30269	)	AND
	)	FINDINGS OF FACT

This Agreement by and between Osmose Utilities Services, Inc. (hereinafter referred to as the "Company") and the State of Maine Board of Pesticides Control (hereinafter referred to as the "Board") is entered into pursuant to 22 M.R.S. §1471-M (2)(D) and in accordance with the Enforcement Protocol amended by the Board on December 13, 2013.

The Board alleges as follows:

1. That the Company provides services related to the maintenance of the electrical transmission grid.

2. That the Company is licensed by the Board as a Spray Contracting Firm to provide remedial treatments to wooden utility poles when the initial preservation treatment is no longer effective.

3. That on July 30, 2021, Justin Bulley, a Company employee, was traveling north in a Company vehicle on Interstate 95 in Maine when he was involved in an accident near Mile 129. The vehicle rolled over and the contents of the vehicle were jettisoned, including an unknown number of pressurized cannisters of MITC-FUME, EPA Reg. No. 69850-1. MITC-FUME contains 97% Methylisothiocyanate and is classified as a Restricted Use Pesticide due to its high acute toxicity.

4. That the cannisters described in paragraph three were distributed along the side of the Interstate in an area of tall grass, making location of all the cannisters difficult.

5. That first responders on the scene of accident recovered as many cannisters as they could reasonably locate.

6. That on October 6, 2021, a contractor for the Maine Department of Transportation (MDOT) was conducting mechanical vegetation management with an articulating mower attached to an excavator on Interstate 95 in the general area of the July 30, 2021, accident.

7. That during the mowing operation, the mower pierced multiple pressurized cannisters of MITC-FUME, releasing the contents of the cannisters.

8. That the operator of the excavator was exposed to Methylisothiocyanate and experienced symptoms including burning eyes and a headache. MDOT personnel instructed the excavator operator to cease work for the day and to be evaluated by medical professionals.

9. That the MITC-FUME label contains precautionary statements including, "Fatal if inhaled or absorbed through the skin. Corrosive. Causes irreversible eye damage and skin burns.".

10. That MDOT personnel responding to the October 6, 2021, incident contacted the Company to inform it that additional pressurized cannisters of MITC-FUME were present in the tall grass adjacent to Interstate 95, and that the Company would need to recover all additional cannisters present, or a Hazardous Waste Contractor would be engaged for cleanup and recovery purposes.

11. That a Company employee arrived at the scene and attempted to clear the site of any remaining cannisters and/or debris from punctured cannisters.

12. That MDOT personnel arrived at the site of incident early the following morning—on October 7, 2021—to ensure that all cannisters and debris had been removed prior to resuming mowing operations at the site.

13. That on the morning of October 7, 2021, MDOT personnel immediately discovered additional cannisters of MITC-FUME in the vicinity of the previous day's incident.

14. That MDOT personnel again contacted the Company to inform it that additional cannisters were still present at the accident site. Company employee Daniel Lacey responded to the scene and determined that it would be necessary to purchase a metal detector in order to adequately ensure that the site was cleared of additional pressurized cannisters.

15. That during recovery efforts on October 6 and 7, 2021, Company employees recovered fifteen cases containing eighteen cannisters each, and 271 individual cannisters of MITC-FUME from the accident site, for a total of 541 cannisters.

16. That the Company utilizes an inventory tracking system that maintains specific data per vehicle and employee.

17. That following the July 30, 2021, accident, the Company could have determined that a substantial number of pressurized cannisters were still unaccounted for.

18. That the Company's actions allowed 541 cannisters of MITC-FUME to remain unattended on the side of the Interstate for 68 days.

19. That the Company's actions resulted in the October 6, 2021, incident in which the excavator operator was exposed to MITC-FUME.

20. That the Company failed to exercise reasonable and adequate care to recover the MITC-FUME cannisters following the July 30, 2021, accident.

21. That the high acute toxicity of MITC-FUME cannisters left unattended on the side of Interstate 95 for nine weeks presented unacceptable risks to humans and the environment.

22. That pursuant to 7 MRS § 606 (2)(D), it is unlawful to handle or transport pesticides in a manner as to endanger human beings or the environment.

23. That Justin Bulley's statements to the State Police indicated he was very fatigued from many hours of driving from out-of-state, and that he became distracted by trying to adjust the radio, leading to the crash.

24. That the circumstances described in this agreement, including the standard of care exercised by the driver of Company vehicle that crashed, constitute handling and transporting pesticides in a manner as to endanger human beings or their environment in violation of 7 MRS § 606 (2)(D).

25. That pursuant to CMR 01-026, Chapter 20, Section 3(A) of the Board's rules, unused pesticides must be maintained so as to prevent unauthorized use, mishandling or loss; and so as to prevent contamination of the environment and risk to public health.

26. That the circumstances described in this agreement constitutes failure to maintain unused pesticides so as to prevent unauthorized use, mishandling or loss; and so as to prevent contamination of the environment and risk to public health, in violation of CMR 01-026, Chapter 20, Section 3 (A).

27. That the Company did not notify the Board to report the pesticide exposure suffered by the MDOT contractor that was a result of the accidental discharge caused by the piercing of MITC-FUME canisters during mowing operations along the side of the Interstate.

28. That pursuant to CMR 01-026, Chapter 50, Section 2 (C), any pesticide handling activity which causes a pesticide release which may result in a threat to human health is a reportable spray incident.

29. That the pesticide exposure suffered by the MDOT contractor was the result of mishandling by the Company of the MITC-FUME canisters that were distributed along the side of the Interstate due to the accident described in paragraph 3 above.

30. That the circumstances described in paragraphs 27 to 29 constitute a failure to report an incident of human exposure to pesticide in violation of CMR 01-026, Chapter 50, Section 2 (C).

The Board believes that the facts alleged in paragraphs one through thirty constitute violations of 7 MRS § 606 (2)(D), CMR 01-026, Chapter 20, Section 3 (A) and CMR 01-026, Chapter 50, Section 2 (C).

While the Company does not admit the alleged violations, and while they dispute the facts alleged by the Board in paragraphs one through thirty above, they agree to enter into this Consent Agreement for the purpose of resolving the alleged violation.

By entering into this Consent Agreement, the Company expressly waives:

A. Notice of or opportunity for hearing;

B. Any and all further procedural steps before the Board; and

C. The making of any further findings of fact before the Board.

That this Agreement shall not become effective unless and until the Board accepts it.

Wherefore, in consideration for the release by the Board of the cause of action which the Board has against the Company resulting from the alleged violations referred to in paragraphs twenty-four, twenty-six and thirty the Company agrees to pay a penalty to the State of Maine in the sum of $4,500.00. (Please make checks payable to Treasurer, State of Maine).

IN WITNESS WHEREOF, the parties have executed this Agreement of three pages.

●SMOSE UTILITIES SERVICES, INC.

By: ______________________ Date: 5/9/23

Type or Print Name: John B. Rigney

BOARD OF PESTICIDES CONTROL

By: ______________________ Date: ______________
Megan Patterson, Director

APPROVED:

By: ______________________ Date: ______________
Mark Randlett, Assistant Attorney General

Proposed Administrative Consent Agreement
Background Summary

Subject: Charles Crapps
Cannabis Culture
280 Capen Rd.
Gardiner, ME 04345

Date of Incident(s): April 15, 2021

Background Narrative: In April 2021 Board staff were contacted about pesticides being applied to medical marijuana at a cultivation site in Gardiner and that excess unused pesticides were improperly disposed of by dumping them out the doors of the facility. On May 7, 2021, two Board inspectors conducted a joint inspection with OMP personnel at the Grower's cultivation site. The inspection revealed that Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) and Flying Skull Plant Products, Nuke'Em, Insecticide & Fungicide (EPA Section 25(b) exempt product) had been applied to the Grower's marijuana plants on multiple occasions in 2021. These applications were conducted without proper pesticide applicator licensing and proper worker training as required by the Worker Protection Standard. A composite soil sample was taken from the exterior of the cultivation site at 280 Capen Road in Gardener. The lab results for this sample revealed the presence of Myclobutanil at 1.6 ppm. Myclobutanil is the active ingredient in Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845).

Summary of Violations: 22 M.R.S.A. § 1471-D(2-D) requires Board certification of private applicators using general-use pesticides to produce plants or plant products intended for human consumption, where the person applying the pesticides or the employer of the person applying the pesticides derives $1,000 or more in annual gross income from the sale of those commodities.

7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B) and 22 M.R.S.A § 1471-D(8)(F) prohibit the use of a pesticide inconsistent with its label.

The Grower did not comply with any of the requirements of 40 CFR, Part 170 (WPS).

The use of pesticides in the production of medical marijuana, as described in this agreement, was potentially harmful to the public health, in violation of 22 M.R.S. § 1471-D (8)(C).

Rationale for Settlement: In 2021 Cannabis Culture was cultivating a consumable commodity and making pesticide applications without proper licensing. Multiple label violations including application to unlisted site and improper disposal occurred. Non-compliance with the Worker Protection Standard was also cited.

Attachments: Proposed Consent Agreement

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION, AND FORESTRY
BOARD OF PESTICIDES CONTROL

Charles Crapps Cannabis Culture 280 Capen Road Gardiner, Maine 04345	))))	ADMINISTRATIVE CONSENT AGREEMENT AND FINDINGS OF FACT

This Agreement, by and between Charles Crapps, doing business as Cannabis Culture (hereinafter called the "Grower") and the State of Maine Board of Pesticides Control (hereinafter called the "Board"), is entered into pursuant to 22 M.R.S.A. §1471-M (2)(D) and in accordance with the Enforcement Protocol amended by the Board on December 13, 2013.

The parties to this Agreement agree as follows:

1. That the Grower owns and operates a medical marijuana cultivation site at 280 Capen Road in Gardiner, Maine.

2. That on April 15, 2021, the Board received a phone call from a concerned citizen who alleged that a pesticide was being applied to the medical marijuana being grown at the Cannabis Culture medical marijuana cultivation site in Gardiner and that excess pesticide was improperly disposed of at this location by dumping it out the door.

3. That in response to the call the Board received in paragraph two, Board staff contacted the Office of Marijuana Policy (OMP), within the Department of Administrative and Financial Services (DAFS), which is the agency responsible for the licensing of medical marijuana facilities in the State of Maine. Details of the complaint were transmitted to the OMP.

4. That on May 3, 2021, two Board inspectors conducted a joint inspection with OMP personnel at the Grower's cultivation site and interviewed William Cunningham.

5. That on May 7, 2021, two Board inspectors conducted a joint inspection with OMP personnel at the Grower's cultivation site and interviewed Charles Crapps.

6. That on May 10, 2021, a Board inspector conducted a second inspection with William Cunningham in which pesticide application records, developed by Cunningham subsequent to the May 3, 2021, inspection, were reviewed and the pesticide application practices were documented in detail by the inspector.

7. That during the inspections described in paragraphs four and five, Board staff confirmed that there were two separate grow rooms located at 280 Capen Road in Gardiner, Maine. Grow Room 1 was leased and operated by William Cunningham. Grow Room 2 was operated by the building owner, Charles Crapps.

8. That during the inspection described in paragraph five, Board staff documented five pesticides at the Capen Road cultivation site: Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845); Growth Technology, CloneX Rooting Gel (EPA registration # 79664-1); ZeroTol 2.0 Broad Spectrum Algaecide/Bactericide/Fungicide (EPA registration # 70299-12); SaniDate 5.0 Sanitizer/Disinfectant (EPA registration # 70299-19); and Flying Skull Plant Products, Nuke'Em, Insecticide & Fungicide (EPA registration 25(b) exempt).

9. That during the inspection described in paragraph five, a Board inspector took photographs of the areas directly outside of the two entry doors used to access Grow Rooms 1 and 2. Said photographs document discoloration directly outside of the doors.

10. That during the inspection described in paragraph five, a composite soil sample was taken from the exterior of the cultivation site at 280 Capen Road in Gardener. The lab results for this sample revealed the presence of Myclobutanil at 1.6 ppm. Myclobutanil is the active ingredient in Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845).

11. That during the inspection described in paragraph six with William Cunningham at the Grower's Gardiner cultivation site, Cunningham stated that Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) and Flying Skull Plant Products, Nuke'Em, Insecticide & Fungicide (EPA Section 25(b) exempt product) had been applied to the Grower's marijuana plants on multiple occasions during 2021.

12. That the Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) label is specific about the sites (plants) on which the product may be used. The product may be applied to variety of landscape plants and several fruits and vegetables. The product label does not contain any language that would allow its use on medical marijuana, such as a reference specific to use on marijuana plants, or language containing broad statements about use on any plant or foliage.

13. That Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) is limited by the product labeling to outdoor, home use only.

14. That the 2021 applications of Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) on the Grower's marijuana plants were inconsistent with the product label, insomuch as the product was used indoors, it was applied for non-home purposes, and it was applied to plants not specified on the product label.

15. That 7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B) and 22 M.R.S.A § 1471-D(8)(F) prohibit the use of a pesticide inconsistent with its label.

16. That the circumstances described in paragraphs one through fifteen constitute multiple violations of 7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B), and 22 M.R.S.A. § 1471-D(8)(F).

17. That the circumstances described in paragraphs two, nine and ten show that Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) was disposed of outdoors, or otherwise allowed to contaminate the area directly in front of the grow room doors.

18. That allowing excess or residual spray mix to contaminate the area outside the grow room doors at 280 Capen Road in Gardiner, Maine is:

    a. inconsistent with the labeling for Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) in violation of 7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B) and 22 M.R.S.A § 1471-D(8)(F); and

    b. use of a pesticide in a careless, negligent, or faulty manner in violation of 22 M.R.S.A. §1471-D (8)(C).

19. That the circumstances described in paragraphs nineteen and twenty—if factual—are inconsistent with the product labeling.

20. That the circumstances described in paragraphs nineteen, twenty and twenty-one—if factual—are multiple violations of 7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B), and 22 M.R.S.A. § 1471-D(8)(F).

21. That 22 M.R.S.A. § 1471-D(2-D) requires Board certification of private applicators using general-use pesticides to produce plants or plant products intended for human consumption, where the person applying the pesticides or the employer of the person applying the pesticides derives $1,000 or more in annual gross income from the sale of those commodities.

22. That no one employed by the Grower was certified in compliance with 22 M.R.S.A. § 1471-D(2-D) during 2021.

23. That the circumstances described in paragraphs twenty-one and twenty-two constitute a violation of 22 M.R.S.A. § 1471-D(2-D).

24. That the Grower raises a commercial agricultural crop at an indoor cultivation site possessing pesticides bearing language requiring conformance with the federal Worker Protection Standard, 40 CFR, Part 170 (WPS).

25. That the Grower employs one or more workers and handlers as defined under 40 CFR, Part 170.3 to assist in the production of the crops described in paragraph one.

26. That the circumstances described in paragraphs twenty-four and twenty-five subject the Grower to the provision of the federal Worker Protection Standard, 40 CFR, Part 170 (WPS).

27. That the Grower did not comply with any of the requirements of 40 CFR, Part 170 (WPS).

28. That the circumstances described in paragraphs twenty-four, twenty-five, twenty-six and twenty-seven constitute multiple violations of the federal Worker Protection Standard, 40 CFR, Part 170 (WPS).

29. The Board finds that the use of pesticides in the production of medical marijuana, as described in this agreement, was potentially harmful to the public health, in violation of 22 M.R.S. § 1471-D (8)(C).

30. That the Board has regulatory authority over the activities described herein.

31. That the Grower expressly waives:

    a. Notice of or opportunity for hearing;

    b. Any and all further procedural steps before the Board; and

    c. The making of any further findings of fact before the Board.

32. That this Agreement shall not become effective unless and until the Board accepts it.

33. That, in consideration for the release by the Board of the causes of action which the Board has against the Grower resulting from the violations referred to in paragraphs sixteen, eighteen, twenty, twenty-three, twenty-eight, and twenty-nine, the Grower agrees to pay to the State of Maine a penalty in the amount of $6,000.00. Payments will be made in monthly installments of $450.00 per month. Payments are due on the first of the month starting on July 1, 2023, through August 1, 2024. The final payment of $150.00 will be due on September 1, 2024. All payments must be by check, made payable to the Treasurer, State of Maine.

IN WITNESS WHEREOF, the parties have executed this Agreement of three pages.

CANNABIS CULTURE

By: ______________________ Date: 5/30/23

Charles Crapps, Owner and Operator

BOARD OF PESTICIDES CONTROL

By: ______________________ Date: 5/30/2023
John Pietroski, Acting Director

APPROVED

By: ______________________ Date: ____________
Mark Randlett, Assistant Attorney General

Proposed Administrative Consent Agreement
Background Summary

Subject: William Cunningham
Cunningham Cultivation
280 Capen Rd.
Gardiner, ME 04345

Date of Incident(s): April 15, 2021

Background Narrative: In April 2021 Board staff were contacted about pesticides being applied to medical marijuana at a cultivation site in Gardiner and that excess unused pesticides were improperly disposed of by dumping them out the doors of the facility. On May 7, 2021, two Board inspectors conducted a joint inspection with OMP personnel at the Grower's cultivation site. The inspection revealed that Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) and Flying Skull Plant Products, Nuke'Em, Insecticide & Fungicide (EPA Section 25(b) exempt product) had been applied to the Grower's marijuana plants on multiple occasions in 2021. These applications were conducted without proper pesticide applicator licensing. A composite soil sample was taken from the exterior of the cultivation site at 280 Capen Road in Gardener. The lab results for this sample revealed the presence of Myclobutanil at 1.6 ppm. Myclobutanil is the active ingredient in Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845).

Summary of Violations: 22 M.R.S.A. § 1471-D(2-D) requires Board certification of private applicators using general-use pesticides to produce plants or plant products intended for human consumption, where the person applying the pesticides or the employer of the person applying the pesticides derives $1,000 or more in annual gross income from the sale of those commodities.

7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B) and 22 M.R.S.A § 1471-D(8)(F) prohibit the use of a pesticide inconsistent with its label.

The use of pesticides in the production of medical marijuana, as described in this agreement, was potentially harmful to the public health, in violation of 22 M.R.S. § 1471-D (8)(C).

Rationale for Settlement: In 2021 Cunningham Cultivation was cultivating a consumable commodity and making pesticide applications without proper licensing. Multiple label violations including application to unlisted site and improper disposal occurred.

Attachments: Proposed Consent Agreement

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION, AND FORESTRY
BOARD OF PESTICIDES CONTROL

William Cunningham Cunningham Cultivation 280 Capen Road Gardiner, Maine 04345	))))	ADMINISTRATIVE CONSENT AGREEMENT AND FINDINGS OF FACT

This Agreement, by and between William Cunningham, doing business as Cunningham Cultivation (hereinafter called the "Grower") and the State of Maine Board of Pesticides Control (hereinafter called the "Board"), is entered into pursuant to 22 M.R.S.A. §1471-M (2)(D) and in accordance with the Enforcement Protocol amended by the Board on December 13, 2013.

The parties to this Agreement agree as follows:

1. That the Grower operates a medical marijuana cultivation site at 280 Capen Road in Gardiner, Maine.

2. That on April 15, 2021, the Board received a phone call from a concerned citizen who alleged that a pesticide was being applied to the medical marijuana being grown at the Cannabis Culture medical marijuana cultivation site in Gardiner and that excess pesticide was improperly disposed of at this location by dumping it out the door.

3. That in response to the call the Board received in paragraph two, Board staff contacted the Office of Marijuana Policy (OMP), within the Department of Administrative and Financial Services (DAFS), which is the agency responsible for the licensing of medical marijuana facilities in the State of Maine. Details of the complaint were transmitted to the OMP.

4. That on May 3, 2021, two Board inspectors conducted a joint inspection with OMP personnel at the Grower's cultivation site and interviewed the Grower.

5. That on May 7, 2021, two Board inspectors conducted a joint inspection with OMP personnel at the 280 Capen Road facility and interviewed Charles Crapps, owner of the building in which the Grower's growing area is located.

6. That on May 10, 2021, a Board inspector conducted a second inspection with the Grower in which pesticide application records, developed by the Grower subsequent to the May 3, 2021, inspection, were reviewed and the pesticide application practices were documented in detail by the inspector.

7. That during the inspections described in paragraphs four and five, Board staff confirmed that there were two separate grow rooms located at 280 Capen Road in Gardiner, Maine. Grow Room 1 was leased and operated by the Grower. Grow Room 2 was operated by the building owner, Charles Crapps.

8. That during the inspection described in paragraph five, Board staff documented five pesticides at the Capen Road cultivation site: Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845); Growth Technology, CloneX Rooting Gel (EPA registration # 79664-1); ZeroTol 2.0 Broad Spectrum Algaecide/Bactericide/Fungicide (EPA registration # 70299-12); SaniDate 5.0 Sanitizer/Disinfectant (EPA registration # 70299-19); and Flying Skull Plant Products, Nuke'Em, Insecticide & Fungicide (EPA registration 25(b) exempt).

9. That during the inspection described in paragraph five, a Board inspector took photographs of the areas directly outside of the two entry doors used to access Grow Rooms 1 and 2. Said photographs document discoloration directly outside of the doors.

10. That during the inspection described in paragraph five, a composite soil sample was taken from the exterior of the cultivation site at 280 Capen Road in Gardener. The lab results for this sample revealed the presence of Myclobutanil at 1.6 ppm. Myclobutanil is the active ingredient in Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845).

11. That during the inspection described in paragraph six, the Grower acknowledged that Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) and Flying Skull Plant Products, Nuke'Em, Insecticide & Fungicide (EPA Section 25(b) exempt product) were applied to the Grower's marijuana plants on multiple occasions during 2021.

12. That the Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) label is specific about the sites (plants) on which the product may be used. The product may be applied to variety of landscape plants and several fruits and vegetables. The product label does not contain any language that would allow its use on medical marijuana, such as a reference specific to use on marijuana plants, or language containing broad statements about use on any plant or foliage.

13. That Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) is limited by the product labeling to outdoor, home use only.

14. That the 2021 applications of Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) on the Grower's marijuana plants were inconsistent with the product label because the product was used indoors, it was applied for non-home purposes, and it was applied to plants for which its use was not authorized by the product label.

15. That 7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B) and 22 M.R.S.A § 1471-D(8)(F) prohibit the use of a pesticide inconsistent with its label.

16. That the circumstances described in paragraphs one through fifteen constitute multiple violations of 7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B), and 22 M.R.S.A. § 1471-D(8)(F).

17. That the circumstances described in paragraphs two, nine and ten constitute evidence that Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) was disposed of outdoors, or otherwise allowed to contaminate the area directly in front of the grow room doors.

18. That allowing excess or residual spray mix to contaminate the area outside the grow room doors at 280 Capen Road in Gardiner, Maine is:

    a. inconsistent with the labeling for Spectracide Immunox Multi-Purpose Fungicide Spray Concentrate (EPA registration # 9688-123-8845) in violation of 7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B) and 22 M.R.S.A § 1471-D(8)(F), and;

    b. use of a pesticide in a careless, negligent, or faulty manner in violation of 22 M.R.S.A. §1471-D (8)(C).

19. That the circumstances described in paragraphs seventeen and eighteen—if factual—are inconsistent with the product labeling.

20. That the circumstances described in paragraphs seventeen, eighteen and nineteen—if factual—would be considered multiple violations of 7 U.S.C. § 136j (a)(2)(G), 7 M.R.S.A. § 606 (2)(B), and 22 M.R.S.A. § 1471-D(8)(F).

21. That 22 M.R.S.A. § 1471-D(2-D) requires Board certification of private applicators using general-use pesticides to produce plants or plant products intended for human consumption, where the person applying the pesticides or the employer of the person applying the pesticides derives $1,000 or more in annual gross income from the sale of those commodities.

22. That no one employed by the Grower was certified in compliance with 22 M.R.S.A. § 1471-D(2-D) during 2021.

23. That the circumstances described in paragraphs twenty-one and twenty-two constitute a violation of 22 M.R.S.A. § 1471-D(2-D).

24. That CMR 01-026, Chapter 50 Section 1 A, requires commercial agricultural producers to maintain pesticide application records.

25. That the William Cunningham developed records incorporated into a Pesticide Applicator Logbook covering applications made to the Grower's cannabis plants in 2021 that were not completed at the time of applications, but produced after the May 3, 2021 inspection by the Board inspectors,

26. That failure to maintain pesticide applicator records in a timely fashion constitutes multiple violations of CMR 01-026, Chapter 50 Section 1 A.

27. The Board finds that the use of pesticides in the production of medical marijuana, as described in this agreement, was potentially harmful to the public health, in violation of 22 M.R.S. § 1471-D (8)(C).

28. That the Board has regulatory authority over the activities described herein.

29. That the Grower expressly waives:

    a. Notice of or opportunity for hearing;

    b. Any and all further procedural steps before the Board; and

    c. The making of any further findings of fact before the Board.

30. That this Agreement shall not become effective unless and until the Board accepts it.

31. That, in consideration for the release by the Board of the causes of action which the Board has against the Grower resulting from the violations referred to in paragraphs sixteen, eighteen, twenty-two, twenty-five, twenty-eight, twenty-nine, the Grower agrees to pay to the State of Maine a penalty in the amount of $4000.00. Payments will be made in monthly installments of $500.00 per month. Payments are due on the first of the month starting on July 1, 2023, and the last payment will be due on February 1, 2024. All payments must be by check, made payable to the Treasurer, State of Maine.

IN WITNESS WHEREOF, the parties have executed this Agreement of three pages.

CUNNINGHAM CULTIVATION

By: ______________________ Date: 5/30/2023

William Cunningham, Owner and Operator

BOARD OF PESTICIDES CONTROL

By: ______________________ Date: 5/30/2023

John Pietroski, Acting Director

APPROVED

By: ______________________ Date: ____________

Mark Randlett, Assistant Attorney General

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
BOARD OF PESTICIDES CONTROL
28 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

Date: March 30, 2023
To: Board of Pesticides Control Members
From: Mary Tomlinson | Pesticides Registrar
Subject: Clarification of Distribution

Background:

Maine pesticide rules permit products no longer registered in Maine to continue to be distributed with certain restrictions. Chapter 20, Section 1(D) states:

> "Retailers and end users of pesticides no longer registered in Maine may continue to sell and use those items provided they were properly registered when obtained and such distribution and use is not prohibited by FIFRA or other Federal law."

Recent inquiries have highlighted confusion as to who qualifies as a retailer, and what does "obtained" mean when selling and using products that are no longer registered. Does an out of state company warehousing product already purchased, but stored out of state until the end user needs it, qualify as a retailer? Does "obtained" mean in "possession of" the product by the retailer or end user or does it include "purchased" when registered, but not delivered until after cancellation?

The intent of Chapter 20 is to reduce the amount of unregistered pesticides in Maine that may result in improper disposal causing increased risk to humans and environmental contamination. By permitting retailers and ends users continued sales and use of pesticides no longer registered in Maine, the risk of improper disposal and associated costs of disposal of obsolete pesticides is reduced. Limiting who can sell these pesticides reduces stockpiling by distributors who sell to retailers. Chapter 20 may also reduce dumping of unregistered pesticides into the channels of trade by companies outside of Maine.

The following are clarifications of the language in Chapter 20, Section 1(D):

1. A retailer is a store or warehouse in Maine that sells direct to the end user, not to another retailer or other dealer in the state. Unless a company has a storefront or a warehouse located in Maine and sells directly to the end user, it is not a retailer.

2. Distribution into Maine from any company or warehouse outside the state, including virtual stores, is prohibited when a product is no longer registered or is in discontinuance.

3. Product that was registered when received and held in stock by retailers within Maine may continue to be distributed until stock is depleted. New product may not be shipped into Maine after the registration expires on Dec. 31 each calendar year.

4. "Obtained" means the retailer or end user in Maine took possession of the pesticide when the pesticide was registered. Product purchased, but not received when registered, may not be shipped into Maine.

5. Pesticides manufactured in Maine may no longer be produced once registration is canceled. However, sales of product in inventory may be sold direct to the end user until supplies are depleted.

From:	Pesticides
To:	DACF-Pesticides
Subject:	FW: New restrictions on Neonicotinoids.
Date:	Monday, April 10, 2023 8:30:23 AM
Attachments:	IpmLogosmall.bmp Invasive Certificate2.png NHAA LogoSmall.png

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From: Xavier Asbridge-IPM Of New Hampshire <xasbridge@gmail.com>
Sent: Friday, April 07, 2023 5:40 PM
To: Pesticides <Pesticides@maine.gov>
Subject: New restrictions on Neonicotinoids.

Thank you for the information. For the most part I support restricting these and some other pesticides to use by those who know what they are doing. Bifenthrin is one I would like to see suffer this fate.

I have some comments on this rule though. First it gives the impression that the Neonicotinoids are effective against Asian Longhorned Beetle which they are not as when the larvae emerge they immediately tunnel into the heartwood where the chemicals do not reach. Unlike most other borers they do not spend enough time in the cambium to absorb enough chemical to kill all or even most of them. If we can't get 100% control we might as well not bother trying to eradicate them. Of course if there is some new research which shows I am wrong please let me know.

If we give people the idea that we can control this pest with pesticides we are in for a really rough awakening. The only way to battle Asian Longhorn Beetle is the immediate and total eradication of all food sources around any area where it is found.

I was also not pleased to see Elongate Hemlock Scale skipped in the list of invasive species. This pest is likely to cause far more Hemlock death than Woolly Adelgid in colder areas. Fortunately they almost always occur together so that won't present much of a problem except when they occur on Fir.

Thanks,

Xavier.

IPM Of New Hampshire

--

Thank You

Xavier 603-380-3845

[**Website**]


UNIVERSITY OF MASSACHUSETTS EXTENSION

This Certificate acknowledges that

Xavier Asbridge

has successfully completed UMass Extension's 3-Day

Invasive Insect Certification Program

October 17, 31, and November 14, 2019
University of Massachusetts Amherst

This course covers the characteristics of invasive insects and the impacts and costs they have regionally and nationwide. It highlights the biology, ecology, and identification of some of the most destructive of these insects; the state and federal regulations pertaining to invasive insect management, and their cultural, mechanical, and biological control management strategies with a focus on using Integrated Pest Management.

Tawny Simisky
UMass Extension Entomologist
University of Massachusetts Amherst

UMass Extension

NHAA
CERTIFIED
ARBORIST

From: Heather Spalding <heathers@mofga.org>
Sent: Thursday, May 11, 2023 4:00 PM
To: Pesticides <Pesticides@maine.gov>
Cc: Grohoski, Nicole <nicole.grohoski@legislature.maine.gov>; Pluecker, Bill <bill.pluecker@legislature.maine.gov>; Ingwersen, Henry <henry.ingwersen@legislature.maine.gov>; Osher, Laurie <laurie.osher@legislature.maine.gov>
Subject: Please include in the next BPC meeting packet

Dear members of the Board of Pesticides Control,

I wanted to be sure you saw the recent report from EPA indicating that three of the most widely-used neonicotinoid insecticides (Imidacloprid, Thiamethoxam and Clothianidin) are putting more than 200 endangered species at risk of extinction. It's attached for your reference. This report builds on the grave concerns about the use of neonics generally, not just for landscaping purposes. EPA issued its final biological evaluations in June of 2022, finding that each "neonic" is likely to adversely affect from two-thirds to over three-fourths of America's endangered species -- 1,225 to 1,445 species in all. The latest report puts a finer point on the need for finding safer alternatives to neonics.

Respectfully,

Heather Spalding

Heather Spalding
Deputy Director & Senior Policy Director
Maine Organic Farmers and Gardeners Association (MOFGA)
she/her/hers

heathers@mofga.org
207-505-5569 (cell)
207-568-6006 (direct line)
207-568-4142 (main office)

US Mail:
MOFGA
PO Box 170
Unity, ME 04988

Physical location of Common Ground Education Center:
294 Crosby Brook Rd, Unity, ME

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF CHEMICAL SAFETY
AND POLLUTION PREVENTION

Imidacloprid, Thiamethoxam and Clothianidin: Draft Predictions of Likelihood of Jeopardy and Adverse Modification for Federally Listed Endangered and Threatened Species and Designated Critical Habitats

May 1, 2023

Prepared by:
ENVIRONMENTAL FATE AND EFFECTS DIVISION
OFFICE OF PESTICIDE PROGRAMS

U.S. Environmental Protection Agency
1200 Pennsylvania Ave., NW
Washington, DC 20460

Table of Contents

1. Executive Summary

The purpose of this assessment is to assess effects at the population level and then make predictions whether there is a likelihood that the neonicotinoid insecticides imidacloprid, thiamethoxam and clothianidin registrations (PC Codes: 129099, 060109, 044309) have the potential to lead to jeopardy of federally listed endangered and threatened ("listed") or adverse modification of designated critical habitat. EPA is providing this information to the U.S. Fish and Wildlife Service (USFWS) for their final determinations of jeopardy or adverse modification, which is responsible for the majority (98%) of species and designated critical habitats for which EPA made likely to adversely affect (LAA) determinations for the three neonicotinoid insecticides. Through consultation, EPA plans to work with National Marine and Fisheries Service (NMFS) to identify population-level concerns for those species with LAA determinations under NMFS' authority. For those listed species and designated critical habitats where EPA determined that imidacloprid, thiamethoxam or clothianidin are LAA one or more individuals or the designated critical habitats in the final biological evaluations (BEs) submitted to the Services to initiate the ongoing consultation, EPA is now providing predictions of whether the registration of imidacloprid, thiamethoxam, or clothianidin has a likelihood of jeopardizing (J) a listed species or adversely modifying (AM) any designated critical habitat (collectively abbreviated as J/AM), consistent with 50 C.F.R. §402.40(b)(1). While EPA is not required to include J/AM analyses in its effects determinations, EPA is including this analysis to further improve the efficiency of the consultation process.

Use Overview

Imidacloprid, thiamethoxam and clothianidin are systemic, neonicotinoid insecticides used to control piercing and sucking insects in both agricultural and non-agricultural settings. Imidacloprid, thiamethoxam and clothianidin are currently registered for foliar aerial and ground applications, soil applications, seed treatments, chemigation, bait and pellets, pet collars (imidacloprid only) and for controlling burrowing shrimp (imidacloprid only). In the final BEs, **APPENDIX 1-1** contains a list of the crops belonging to designated crop groups and subgroups on various imidacloprid, thiamethoxam or clothianidin labels. Detailed information on agricultural and non-agricultural use patterns was extracted from the pesticide product labels and is presented in summary tables in **APPENDIX 1-1** for foliar application, soil application and seed treatment. **Chapter 1** contains a summary of registered agricultural use patterns of imidacloprid, thiamethoxam and clothianidin showing registered combinations for each use. Furthermore, a master use summary table and the summary table used in aquatic modeling are included in **APPENDIX 1-2** and **APPENDIX 1-3**, respectively.

<u>Ecological Effects Overview</u>

Imidacloprid

On an acute exposure basis, imidacloprid is classified as very highly toxic to aquatic invertebrates. The available data suggest that aquatic insect species (class Insecta) are more sensitive on an acute exposure basis compared to other species of aquatic invertebrates (*e.g.,* crustaceans). By comparison, fish and aquatic plants are several orders of magnitude less sensitive following acute exposure to imidacloprid. On a chronic exposure basis, a decrease in survival was observed in aquatic insects. As with acute exposure, daphnids, mysid shrimp, and fish are orders of magnitude less sensitive compared to aquatic insects when chronically exposed to imidacloprid. For terrestrial organisms, imidacloprid is characterized as highly toxic to bees, highly toxic to birds and moderately toxic to mammals on an acute exposure basis. Available data suggest potential effects to honeybee and bumble bee colonies that manifest as impacts to numbers of adults and decreases in brood. Chronic exposures to birds and mammals lead to decreases in body weight and egg production in birds. Generally, no effects were observed in terrestrial plant studies that tested up to the currently registered single maximum application rate. There are reported ecological incidents involving imidacloprid use for birds, fish, terrestrial plants, and terrestrial and aquatic invertebrates. More details on the available toxicity data and incident reports are provided in **Chapter 2** of the final BE (USEPA, 2022a).

Thiamethoxam

On an acute exposure basis, thiamethoxam and clothianidin (as the primary degradate of thiamethoxam) are very highly toxic to aquatic invertebrates. Tested insect species are more sensitive on an acute exposure basis compared to tested species in other classes (*e.g.,* daphnids). By comparison, fish are several orders of magnitude less sensitive following acute exposure. On a chronic exposure basis, a decrease in survival was observed in aquatic insects for thiamethoxam, with effects to reproduction and development observed for clothianidin. As with acute exposure, daphnids are orders of magnitude less sensitive compared to insects when chronically exposed to thiamethoxam and clothianidin. Fish are also orders of magnitude less sensitive than aquatic insects on a chronic basis, with no effects observed for thiamethoxam and effects on growth observed for clothianidin. Aquatic plants are several orders of magnitude less sensitive to thiamethoxam compared to aquatic invertebrates, while effects on yield were observed for clothianidin (at relatively high concentrations).

Thiamethoxam and clothianidin are characterized as highly toxic to bees on an acute exposure basis. Available data suggest potential effects to honeybee and bumble bee colonies that manifest as impacts to numbers of adults and decreases in brood. Thiamethoxam is characterized as slightly toxic to birds and mammals on an acute exposure basis, while clothianidin is characterized as moderately toxic to birds and mammals on an acute exposure basis. Chronic exposures to birds and mammals lead to decreases in body weight for thiamethoxam and eggshell thinning and decreased growth and maturation for clothianidin. Generally, minimal effects are seen in terrestrial plant studies; however, some effects on plant height were observed in some species of dicots for thiamethoxam. Generally, clothianidin has similar toxicity to or is more toxic than thiamethoxam. More details on the available toxicity data are provided in **Chapter 2** of the final BE (USEPA, 2022b).

Clothianidin

Clothianidin is practically non-toxic to fish on an acute toxicity basis and effects growth following chronic exposure. For aquatic invertebrates, the level of sensitivity to clothianidin varies greatly among species on an acute toxicity basis. For example, clothianidin is practically non-toxic to water fleas (*Daphnia magna*) but is very highly toxic to other taxa such as aquatic insects. Reproduction is affected in both freshwater and estuarine/marine invertebrates. Effects on development are also observed in benthic invertebrates. Effects on yield are observed in both aquatic vascular and non-vascular plants, but only at relatively high-test concentrations (compared to aquatic invertebrates). In terrestrial organisms, clothianidin is characterized as moderately toxic to birds on an acute oral exposure basis and practically nontoxic on a subacute dietary exposure basis. Effects on eggshell thinning represent the most sensitive chronic toxicity endpoint, which is observed in the Northern bobwhite quail. Clothianidin is classified as moderately toxic to mammals on an acute oral exposure basis. Chronic exposure with the Norway rat (*Rattus norvegicus*) results in effects on growth and maturation in offspring. Clothianidin is also highly toxic to bees on an acute basis, and available data suggest potential effects to honeybee and bumble bee colonies, that manifest as decreases in brood and number of adults. Clothianidin exhibits low toxicity to terrestrial plants. From 2010 to 2018, there were 49 ecological incidents categorized as possible to highly probable in their certainty that clothianidin was involved in the incident. There are 4 additional backlogged incidents (*i.e.,* those that have not been fully investigated, and do not have a certainty classification) from 2017-2020 but appear to be related to clothianidin usage. Ecological incidents involving clothianidin have been reported for all assessed taxa except reptiles, amphibians, aquatic invertebrates, and aquatic plants.

Available toxicity data for aquatic taxa indicate that, in general, the degradates of clothianidin are of similar toxicity (non-toxic) or less toxic than parent clothianidin. However, a major degradate, N-(2-clorothiazol-5-ylmethy1)-N'-methyguanidi (TMG) is of concern to benthic invertebrates based on reductions in larval emergence. Because the mobility of clothianidin and its degradates indicate that they do not readily bind to soil or sediment, unextracted residues were not considered for further analysis. Therefore, the stressors of concern for the aquatic assessment are determined to be clothianidin as well as the degradate TMG. For the terrestrial assessment, the stressor of concern is clothianidin only. Consideration of the potential increased toxicity of formulations is considered through the selection of toxicity endpoints and is discussed further in **Chapter 2** of the final BE (USEPA, 2022c).

Environmental Fate Overview

Imidacloprid

Imidacloprid has a high solubility, low octanol-water partitioning coefficient, low vapor pressure, and low Henry's Constant. These data suggest that imidacloprid has a low potential for volatilization and bioaccumulation. However, the chemical will be readily soluble and thus available for leaching and movement with run-off water. The chemical will initially enter the environment via direct application (*e.g.,* as liquid sprays, dusts, seed coatings, granular formulations) to use sites (*e.g.,* seed treatment, soil, foliage). It is a systemic chemical and will be taken up by plants. It may move off-site via spray drift, dissolved in runoff, and/or as residue sorbed to eroded sediment. The chemical is highly susceptible to photodegradation in water with an observed half-life of 0.2 day. Aerobic and anaerobic aquatic transformation are expected to contribute to dissipation of imidacloprid reaching aquatic systems by run-off and drift. Persistence in soils may lead to accumulation over the years with repeated applications. However, the magnitude of soil accumulation is expected to be highly affected by other important routes of dissipation including leaching, run-off and plant up-take which are expected to reduce this accumulation. Additional details on the fate of imidacloprid are provided in **Chapter 3** of the final BE (USEPA, 2022a). Residues of concern are discussed in **APPENDIX 1-8** of the final BE.

Thiamethoxam

The main routes of dissipation of thiamethoxam are spray drift, runoff, microbial degradation under aerobic and anaerobic aquatic conditions and aqueous photolysis. Thiamethoxam is expected to reach surface water primarily through spray drift and transport through runoff of the dissolved phase of thiamethoxam. Thiamethoxam is water soluble with a low octanol-water partitioning coefficient, low vapor pressure, and low Henry's Law Constant. These data suggest that thiamethoxam has a low potential for volatilization and bioaccumulation.

Thiamethoxam degrades to clothianidin, a separate active ingredient (a.i.) in the neonicotinoid class of chemicals which is subject to its own BE. Both thiamethoxam and clothianidin share similar environmental fate characteristics and show similar behavior in the environment. Available fate and residue data of thiamethoxam indicate that the major route of formation of clothianidin (as a degradate) is from metabolism of thiamethoxam within plants. Clothianidin is also a major degradate in three of eight aerobic soil metabolism studies and one of two anaerobic soil metabolism studies. Clothianidin is also formed under field conditions as it is detected in terrestrial field dissipation studies. Therefore, both thiamethoxam and clothianidin are considered residues of concern for terrestrial and aquatic organisms in this BE. Additional details on the fate of thiamethoxam are provided in **Chapter 3** of the final BE (USEPA, 2022b).

Clothianidin

The major transport routes of clothianidin off the treated area include runoff and spray drift for broadcast uses. Clothianidin has a high solubility, low octanol-water partitioning coefficient, low vapor pressure, and low Henry's Constant. These data suggest that clothianidin has a low potential for volatilization and bioaccumulation. The major route of dissipation for clothianidin appears to be photolysis, with an aqueous photolysis half-life less than 1 day and a soil photolysis half-life of 34 days. The preponderance of clothianidin surface water detections is in agricultural areas and in the vicinity of local use areas. Additional details on the fate of clothianidin are provided in **Chapter 3** of the final BE (USEPA, 2022c).

Exposure Methods Overview

Exposure methods are discussed in more detail in the final BEs (USEPA, 2022a-c). Exposure estimates are based primarily on fate and transport model results. Aquatic exposures (surface water and benthic sediment pore water) are quantitatively estimated for representative thiamethoxam uses in specific geographic regions within generic habitats (referred to as bins) using the Pesticide Root Zone Model (PRZM5) and the Variable Volume Water Model (VVWM)[1] in the Pesticides in Water Calculator (PWC). Aquatic exposure results for the bin(s) most appropriate for the species and/or critical habitat are discussed in **Chapter 3** of the final BEs. Also discussed in **Chapter 3** of the final BEs are available water monitoring data. For terrestrial exposures, existing models [*i.e.*, AgDRIFT, earthworm fugacity model, Terrestrial Herpetofaunal Exposure Residue Program Simulation (T-HERPS), Terrestrial Residue Exposure model (T-REX) and portions of the Terrestrial Investigation Model (TIM)] were combined and modified into a single tool that is referred to as the MAGTool (**Chapter 4** of the final BEs). This assessment replaces EPA's TerrPlant model with the Plant Assessment Tool (PAT). The latter is a more refined exposure model for terrestrial, wetland and aquatic plants.

Summary of Predictions of Likelihood of Jeopardy and Adverse Modification

Imidacloprid

EPA evaluated the LAA species and designated CH and made predictions about the likelihood of jeopardy to any listed species or adverse modification of any designated CH from the use of imidacloprid. Of the species with LAA determinations, EPA predicted a likelihood of jeopardy for 199

[1] The exposure models can be found at: https://www.epa.gov/pesticide-science-and-assessing-pesticide-risks/models-pesticide-risk-assessment

listed species. EPA also predicted a likelihood of adverse modification of 30 designated CHs. These were identified primarily for invertebrates directly impacted or taxa that are highly dependent on terrestrial insects and have a high to medium overlap with a use data layer (UDL) with a higher certainty of leading to exposure. The predicted likelihood of J/AM for listed species and designated CHs is summarized in **Table E-1.**

Table E-1. Number of Listed Species Effects Determinations and Predictions of Likelihood of Jeopardy or Adverse Modification by Taxon for Imidacloprid[1].

Taxon	Number of LAA Species/CH[2]	LAA, No J/AM	LAA, J/AM
Amphibians[2]	38	38	0
Aquatic Invertebrates	35	24	11
Terrestrial and Aquatic Invertebrates	12	6	6
Birds	68	67	1
Fish	114	110	4
Mammals	62	62	0
Plants	873	715	158
Reptiles[2]	28	28	0
Terrestrial Invertebrates[3]	116	97	19
Total Listed Species	1346	1147	199
Designated Critical Habitat	621	591	30

[1] CH = critical habitat; LAA = likely to adversely affect; J = jeopardy; AM = adverse modification
[2] "Amphibians" and "Reptiles" include those species that have both a terrestrial and aquatic phase.
[3] "Terrestrial Invertebrates" includes damselflies which have both a terrestrial and aquatic phase.

Thiamethoxam

EPA evaluated the LAA species and designated CH and made predictions about the likelihood of jeopardy to any listed species or adverse modification of any designated CH from the use of thiamethoxam. Of the species with LAA determinations, EPA predicted a likelihood of jeopardy for 204 listed species. EPA also predicted a likelihood of adverse modification of 34 designated CHs. These were identified primarily for invertebrates directly impacted or taxa that are highly dependent on terrestrial insects and have a high to medium overlap with a UDL with a higher certainty of leading to exposure. The predicted likelihood of J/AM for listed species and designated CHs is summarized in **Table E-2.**

Table E-2. Number of Listed Species Effects Determinations and Predictions of Likelihood of Jeopardy or Adverse Modification by Taxon for Thiamethoxam[1].

Taxon	Number of LAA Species/CH[2]	LAA, No J/AM	LAA, J/AM
Amphibians[2]	36	36	0
Aquatic Invertebrates	34	24	10
Terrestrial and Aquatic Invertebrates	11	5	6
Birds	71	70	1
Fish	112	108	4
Mammals	47	47	0
Plants	850	687	163
Reptiles[2]	26	26	0
Terrestrial Invertebrates[3]	119	99	20
Total Listed Species	1306	1102	204

Taxon	Number of LAA Species/CH[2]	LAA, No J/AM	LAA, J/AM
Designated Critical Habitat	612	578	34

[1] CH = critical habitat; LAA = likely to adversely affect; J = jeopardy; AM = adverse modification
[2] "Amphibians" and "Reptiles" include those species that have both a terrestrial and aquatic phase.
[3] "Terrestrial Invertebrates" includes damselflies which have both a terrestrial and aquatic phase.

Clothianidin

EPA evaluated the LAA species and designated CH and made predictions about the likelihood of jeopardy to any listed species or adverse modification of any designated CH from the use of clothianidin. Of the species with LAA determinations, EPA predicted a likelihood of jeopardy for 166 listed species. EPA also predicted a likelihood of adverse modification of 20 designated CHs. These were identified primarily for invertebrates directly impacted or taxa that are highly dependent on terrestrial insects and have a high to medium overlap with a UDL with a higher certainty of leading to exposure. The predicted likelihood of J/AM for listed species and designated CHs is summarized in **Table E-3.**

Table E-3. Number of Listed Species Effects Determinations and Predictions of Likelihood of Jeopardy or Adverse Modification by Taxon for Clothianidin[1].

Taxon	Number of LAA Species/CH[2]	LAA, No J/AM	LAA, J/AM
Amphibians[2]	36	36	0
Aquatic Invertebrates	34	27	7
Terrestrial and Aquatic Invertebrates	11	5	6
Birds	71	70	1
Fish	113	109	4
Mammals	54	54	0
Plants	703	573	130
Reptiles[2]	26	26	0
Terrestrial Invertebrates[3]	103	85	18
Total Listed Species	1151	985	166
Designated Critical Habitat	410	390	20

[1] CH = critical habitat; LAA = likely to adversely affect; J = jeopardy; AM = adverse modification
[2] "Amphibians" and "Reptiles" include those species that have both a terrestrial and aquatic phase.
[3] "Terrestrial Invertebrates" includes damselflies which have both a terrestrial and aquatic phase.

2. Introduction

2.1. Purpose of this Assessment

EPA's obligation under the Endangered Species Act (ESA) is to ensure that its actions are "not likely to jeopardize the continued existence of any endangered species or threatened species" (listed species). For those species where EPA made LAA determinations, the Agency then predicted the likelihood of jeopardy to the species and adverse modification to the designated critical habitat (CH). When EPA predicts whether jeopardy or adverse modification (J/AM) are likely, the Agency considers a weight of evidence, including, degree of overlap of exposure area and locations of species or CH, exposures and potential effects across the population and life history information that may impact the magnitude of effects. EPA is providing this information to the U.S. Fish and Wildlife Service (USFWS) for their final determinations of jeopardy or adverse modification, which is responsible for the majority (98%) of species and critical habitats for which EPA made LAA determinations for the three neonicotinoid insecticides. Through consultation, EPA plans to work with National Marine and Fisheries Service (NMFS) to identify population-level concerns for those species with LAA determinations under NMFS' authority. These predictions help to inform the consultation process with USFWS. USFWS will make the final determination as to any jeopardy to listed species and any adverse modification to designated critical habitats.

2.2. Overview of Biological Evaluations for Imidacloprid, Clothianidin and Thiamethoxam

The assessments provided in the final BEs for imidacloprid, thiamethoxam and clothianidin (USEPA, 2022a-c) are comprehensive of all currently registered uses of these pesticides and all currently submitted toxicity and environmental fate data, updates modeling of exposure, and incorporates current label language to assess potential environmental risks of concern.

2.2.1. Imidacloprid

The currently registered uses of imidacloprid (summarized in **Chapter 1**, **APPENDIX 1-2** and **APPENDIX 1-3** of the final BE; USEPA, 2022a) consist of both agricultural and non-agricultural uses sites and are combined to derive the action area (along with the associated off-site transport zone). EPA made effects determinations (NE, NLAA or LAA) for 1821 listed species, and 791 designated critical habitats. EPA made NE determinations for 209 species and 78 designated critical habitats. EPA made MA determinations for 1612 species and 713 designated critical habitats. EPA made NLAA determinations for 167 species and 55 designated critical habitats. EPA made LAA determinations for 1445 species and 658 designated critical habitats. Specific species determinations are provided and described in **APPENDIX 4-1** of the final BE.

For each LAA determination, EPA also characterized these determinations into three categories (*i.e.,* strongest, moderate and weakest) which characterizes the strength of the weight of evidence. Each species or designated critical habitat was assigned a weak, moderate or strong evidence in the LAA determination based on multiple factors, including: the impact of using less conservative assumptions in the analysis, the quality of the species range or usage data, whether impacts could occur due to direct toxicity to the species or to both direct toxicity and to its prey, pollination, habitat, and dispersal (PPHD), the presence of reported incidents involving the species taxa or PPHD taxa, the presence of monitoring data that exceeds endpoints, whether species' habitats are potential use sites or if they could only be exposed from spray drift, and the likelihood of drift into a species habitat (*e.g.,* if the species inhabits forests). LAA determinations were made for species across all taxa. Because imidacloprid is highly toxic to terrestrial and aquatic invertebrates but is much less toxic to other vertebrate and plant taxa, 1107 of the 1444 LAA determinations were based on effects to PPHD alone (see **Table 4-7** in **Chapter 4** of the final BE).

Table 2-1 and **Table 2-2** summarize the NE, NLAA and LAA determinations for species and designated critical habitats. EPA makes an LAA determination when there is the potential for a single individual of a species to be affected by the labeled use of a pesticide, which is a conservative threshold. This often results in a high number of LAA determinations. In the final BE, EPA made determinations for all threatened, endangered, candidate and proposed species, along with experimental populations. For LAA determinations made for threatened and endangered species in the BE, EPA will predict if the registered use of imidacloprid is likely to put a listed species or designated critical habitat in jeopardy. Additionally, NMFS species and any species that have been delisted since the completion of the final BE were not considered here. Therefore, the total LAA species and designated critical habitats summarized in this section may not reflect the total number of predicted J/AM species in this analysis.

Table 2-1. Summary of Species Effects Determinations for Imidacloprid (Counts by Taxon).

Taxon	No Effect	May Affect	Not Likely to Adversely Affect	Likely to Adversely Affect	Totals
Mammals	1	101	32	69	102
Birds	0	108	31	77	108
Amphibians	0	38	0	38	38
Reptiles	1	46	16	30	47
Fish	4	188	13	175	192
Plants	49	901	17	884	950
Aquatic invertebrates	151	72	33	39	223
Terrestrial Invertebrates	3	158	25	133	161
Total	209	1612	167	1445	1821
Percent of Total	11%	89%	9%	79%	

Table 2-2. Summary of Designated Critical Habitat Effects Determinations for Imidacloprid (Counts by Taxon).

Taxon	No Effect	May Affect	Not Likely to Adversely Affect	Likely to Adversely Affect	Totals
Mammals	0	33	14	19	33
Birds	0	31	5	26	31
Amphibians	0	25	0	25	25
Reptiles	2	14	8	6	16
Fish	3	103	5	98	106
Plants	22	438	9	429	460
Aquatic invertebrates	50	21	3	18	71
Terrestrial Invertebrates	1	48	11	37	49
Total	78	713	55	658	791
Percent of Total	10%	90%	7%	83%	

2.2.2. Thiamethoxam

The currently registered uses of thiamethoxam (summarized in **Chapter 1**, **APPENDIX 1-2** and **APPENDIX 1-3** of the final BE) consist of both agricultural and non-agricultural uses sites and are combined to derive the action area (along with the associated off-site transport zone). EPA made effects determinations (NE, NLAA or LAA) for 1821 listed species, and 791 designated critical habitats. EPA made NE determinations for 221 species and 89 designated critical habitats. EPA made MA determinations for 1600 species and 702 designated critical habitats. EPA made NLAA determinations for 204 species and 58 designated critical habitats. EPA made LAA determinations for 1396 species and 644 designated critical habitats. Specific species determinations are provided in **APPENDIX 4-1** of the final BE.

For each LAA determination, EPA also characterized these determinations into three categories (*i.e.,* strongest, moderate and weakest) which characterizes the strength of the weight of evidence. Each species or designated critical habitat was assigned a weak, moderate or strong evidence in the LAA determination based on multiple factors, including: the impact of using less conservative assumptions in the analysis, the quality of the species range or usage data, whether impacts could occur due to direct toxicity to the species or to both direct toxicity and to its prey, pollination, habitat, and dispersal (PPHD), the presence of reported incidents involving the species taxa or PPHD taxa, the presence of monitoring data that exceeds endpoints, whether species' habitats are potential use sites or if they could only be exposed from spray drift, and the likelihood of drift into a species habitat (*e.g.,* if the species inhabits forests). LAA determinations were made for species across all taxa. Because thiamethoxam is highly toxic to terrestrial and aquatic invertebrates but is much less toxic to other vertebrate and plant taxa, 1208 of the 1396 LAA determinations were based on effects to PPHD alone (see **Table 4-7** in **Chapter 4** of the final BE).

Table 2-3 and **Table 2-4** summarize the NE, NLAA and LAA determinations for species and designated critical habitats. EPA makes an LAA determination when there is the potential for a single individual of a species to be affected by the labeled use of a pesticide, which is a conservative threshold. This often results in a high number of LAA determinations. In the final BE, EPA made determinations for all threatened, endangered, candidate and proposed species, along with experimental populations. For LAA determinations made for threatened and endangered species in the BE, EPA will predict if the registered use of imidacloprid is likely to put a listed species or designated critical habitat in jeopardy. Additionally, NMFS species and any species that have been delisted since the completion of the final BE were not considered here. Therefore, the total LAA species and designated critical habitats summarized in this section may not reflect the total number of predicted J/AM species in this analysis.

Table 2-3. Summary of Species Effects Determinations for Thiamethoxam (Counts by Taxon).

Taxon	No Effect	May Affect	Not Likely to Adversely Affect	Likely to Adversely Affect	Totals
Mammals	1	101	48	53	102
Birds	5	103	32	71	108
Amphibians	0	38	0	38	39
Reptiles	8	39	13	26	47
Fish	4	190	13	177	194
Plants	49	910	41	860	950
Aquatic invertebrates	151	70	34	36	221
Terrestrial Invertebrates	3	158	23	135	161
Total	221	1600	204	1396	1821
Percent of Total	12%	88%	11%	77%	

Table 2-4. Summary of Designated Critical Habitat Effects Determinations for Thiamethoxam (Counts by Taxon).

Taxon	No Effect	May Affect	Not Likely to Adversely Affect	Likely to Adversely Affect	Totals
Mammals	0	33	17	16	33
Birds	2	29	3	26	31
Amphibians	0	25	0	25	25
Reptiles	5	11	5	6	16
Fish	3	103	5	98	106
Plants	28	432	13	419	460
Aquatic invertebrates	50	21	3	18	71
Terrestrial Invertebrates	1	48	12	36	49
Total	89	702	58	644	791
Percent of Total	11%	89%	7%	81%	

2.2.3. Clothianidin

The currently registered uses of clothianidin (summarized in **Chapter 1**, **APPENDIX 1-2** and **APPENDIX 1-3** of the final BE) consist of both agricultural and non-agricultural uses sites and are combined to derive the action area (along with the associated off-site transport zone). EPA made effects determinations (NE, MA, NLAA, or LAA) for 1821 listed species, and 791 designated critical habitats. EPA made NE determinations for 259 species and 131 designated critical habitats. EPA made MA determinations for 1562 species and 660 designated critical habitats. EPA made NLAA determinations for 337 species and 214 designated critical habitats. EPA made LAA determinations for 1225 species and 446 designated critical habitats. Specific species determinations are provided and described in **APPENDIX 4-1** of the final BE.

For each LAA determination, EPA also characterized these determinations into three categories (*i.e.,* strongest, moderate and weakest) which characterize the strength of the weight of evidence. Each species or designated critical habitat was assigned a weak, moderate or strong evidence in the LAA determination based on multiple factors, including: the impact of using less conservative assumptions in the analysis, the quality of the species range or usage data, whether impacts could occur due to direct toxicity to the species or to both direct toxicity and to its PPHD, the presence of reported incidents involving the species taxa or PPHD taxa, the presence of monitoring data that exceeds endpoints, whether species' habitats are potential use sites or if they could only be exposed from spray drift, and the likelihood of drift into a species habitat (*e.g.,* if the species inhabits forests). LAA determinations were made for species across all taxa. Because clothianidin is highly toxic to terrestrial and aquatic invertebrates but is much less toxic to other vertebrate and plant taxa, 1225 of the 1057 LAA determinations were based on effects to PPHD alone (see **Table 4-7** in **Chapter 4** of the final BE).

Table 2-5 and **Table 2-6** summarize the NE, NLAA and LAA determinations for species and designated critical habitats. EPA makes an LAA determination when there is the potential for a single individual of a species to be affected by the labeled use of a pesticide, which is a conservative threshold. This often results in a high number of LAA determinations. In the final BE, EPA made determinations for all threatened, endangered, candidate and proposed species, along with experimental populations. For LAA determinations made for threatened and endangered species in the BE, EPA will predict if the registered use of imidacloprid is likely to put a listed species or designated critical habitat in jeopardy. Additionally, NMFS species and any species that have been delisted since the completion of the final BE were not considered here. Therefore, the total LAA species and designated critical habitats summarized in this section may not reflect the total number of predicted J/AM species in this analysis.

Table 2-5. Summary of Species Effects Determinations for Clothianidin (Counts by Taxon).

Taxon	No Effect	May Affect	Not Likely to Adversely Affect	Likely to Adversely Affect	Totals
Mammals	1	101	46	55	102
Birds	6	102	31	71	108
Amphibians	0	39	0	39	39
Reptiles	8	39	13	26	47
Fish	4	187	13	174	
Plants	72	878	175	703	
Aquatic invertebrates	151	72	34	38	
Terrestrial Invertebrates	17	144	25	119	
Total	259	1562	337	1225	1821
Percent of Total	14%	86%	19%	67%	

Table 2-6. Summary of Designated Critical Habitat Effects Determinations for Clothianidin (Counts by Taxon).

Taxon	No Effect	May Affect	Not Likely to Adversely Affect	Likely to Adversely Affect	Totals
Mammals	0	33	17	16	33
Birds	2	29	3	26	31
Amphibians	0	26	0	26	26
Reptiles	5	11	5	6	16
Fish	3	102	5	97	105
Plants	64	369	165	231	460
Aquatic invertebrates	50	21	3	18	71
Terrestrial Invertebrates	7	42	16	26	49
Total	131	660	214	446	791
Percent of Total	17%	83%	27%	56%	

3. Methodology overview

EPA used the United States Fish and Wildlife Service's (USFWS) draft biological opinion (BiOp) for malathion (USFWS 2021) as a guide in this assessment and met with USFWS to get input on EPA's approach to predict the likelihood that those listed species could be jeopardized by the registered uses of imidacloprid, thiamethoxam, and clothianidin. Although the USFWS malathion BiOp was finalized (USFWS 2022), because the final was a no jeopardy opinion, EPA used the draft as it includes examples of species where USFWS identified a likelihood of jeopardy. EPA used this information to inform the combination of potential exposure and species life history characteristics that for EPA's predictions of the likelihood for jeopardy. For those species with jeopardy likelihood predictions, EPA reviewed the species-specific information (in **Appendix K** of the USFWS's draft and final BiOp) in order to capture any changes between the draft and final malathion BiOps.

In the draft malathion BiOp, USFWS made their species-specific determinations by considering three major factors, which they referred to as: overall vulnerability of a species, usage, and risk. USFWS assigned each factor one of the three categories: high, medium or low, and based overall vulnerability on the species environmental baseline (independent of malathion exposure) and considered factors like population size, population trajectory, habitat quality and distribution. Additionally, USFWS based usage on the degree of overlap of the species range with non-federal lands, as well as usage data for malathion (in this assessment, EPA referred to this factor as "overlap"). USFWS based their risk factor on potential direct and indirect effects to those individuals that may be exposed (in this assessment, EPA referred to this factor as "magnitude of effect"). For direct effects, USFWS considered the magnitude of mortality and potential sublethal effects. For indirect effects, USFWS considered impacts on the PPHD relevant to the listed species. Once the high, medium, and low decisions were made for overall vulnerability, usage and risk, USFWS also considered whether there were "risk modifiers" relevant to each species. For malathion, the primary taxa identified for potential direct effects are invertebrates; however, USFWS also identified potential direct effects to other taxa (*e.g.,* birds, fish). Some examples of the risk modifiers USFWS considered include the likelihood that species will be exposed on use sites because of habitat preferences (*e.g.,* species may not occur on use sites), overestimates of spray drift exposures (*e.g.,* due to interception by trees in forest habitat), and availability of other types of prey. USFWS determined if there was potential jeopardy or no jeopardy to a species by considering the high, medium, and low conclusions for overall vulnerability, risk and usage. If usage or risk was low, USFWS determined there was no jeopardy to a species. If risk and/or usage were high or medium, USFWS made their decision based on a weight of evidence.

Imidacloprid, clothianidin and thiamethoxam have similar fate and toxicity profiles and are all considered highly toxic to terrestrial and aquatic invertebrates but much less toxic to other vertebrate and plant taxa. Additionally, the use profiles and action areas across all three chemicals are similar. Therefore, EPA developed and used a bridging strategy for making the predictions for the likelihood of jeopardy or adverse modification. Because imidacloprid had the highest number of LAA determinations for both species and designated critical habitats, with the list of species and designated critical habitats being similar across all three chemicals, EPA first considered the species and designated critical habitats rising to a likelihood of jeopardy or adverse modification for imidacloprid. Additionally, in the evaluation here, EPA considered alternative endpoints to represent the effects to populations. This consideration was applied to imidacloprid endpoints only, and any analyses, including the calculation of off-site runoff and drift distances representing effects to populations, were bridged to both clothianidin and thiamethoxam. Additionally, imidacloprid specific endpoints were used to determine an initial magnitude of effect for taxa. EPA then applied the same magnitude of effect and risk modifier considerations made for imidacloprid to both clothianidin and thiamethoxam and considered the specific clothianidin and thiamethoxam overlap analysis (including the addition of the Other Row Crops and Rice UDLs that were not present for imidacloprid; see **Section 4.1.1**) to complete the predictions across the remaining two chemicals.

3.1. Endangered and Threatened Species

In this analysis, EPA predicted the likelihood of jeopardy for all listed species with LAA determinations in the final BE by primarily relying upon overlap[2] and magnitude of effect[3]. EPA integrated concepts similar to USFWS "risk modifiers" into the likelihood predictions of jeopardy. For each species, EPA assigned a high, medium or low classification to both overlap and magnitude of effect. Similar to USFWS, if overlap was considered low, EPA predicted that there was not a likelihood of jeopardy. If overlap was medium or high and magnitude of effect was considered low (based on both direct and indirect effects and relevant risk modifiers), EPA predicted not likely jeopardy for the species. If there were risk modifiers that decreased the likelihood of effects or degree of overlap, EPA predicted that there was not a likelihood of jeopardy. Jeopardy was considered likely if species vulnerability is "high" and magnitude of effect and overlap are medium or high. Jeopardy was also considered likely if species vulnerability was "medium" or "low" and if overlap and magnitude of effect are both high. If species vulnerability was "medium" or "low" and magnitude of effect or overlap are medium, EPA considered the entire weight of evidence to make a best professional judgement decision to make predictions of the likelihood of jeopardy.

EPA used the species-specific overall vulnerability classifications that were included in the USFWS draft malathion BiOp. If no overall vulnerability was specified by USFWS for a listed species, EPA assumed its vulnerability was high. **Appendix 1** includes the species-specific vulnerability as defined by USFWS (USFWS 2022), along with the assumed high vulnerability as classified by EPA where no overall vulnerability was specified by USFWS for a listed species. **Sections 3.1.1** and **3.1.2** below describe EPA's approaches to determining the overlap and magnitude of effect used in predicting the likelihood of jeopardy for listed species. This process is summarized in **Table 3-1** below.

Table 3-1. Overlap, Species Vulnerability and Magnitude of Effect Classifications Used to Predict the Likelihood of Jeopardy or Adverse Modification

Overlap	**Species Vulnerability**	**Magnitude of Effect**	**Prediction of Jeopardy or Adverse Modification (J/AM)**
Low (<5%)	Low, Medium, High	Low, Medium, High	No J/AM
Medium, High (≥5%)	Low, Medium, High	Low	No J/AM
Medium, High (≥5%)	High	Medium, High	J/AM
Medium (5-<10%)	Low, Medium	Medium	Based on Weight of Evidence

3.1.1. Overlap

Similar to USFWS's approach in the malathion BiOp, if overlap for any UDL (and associated drift) was <5%, EPA classified the overlap as low, if 5 to <10%, overlap was medium and if any UDL (and drift) was >10%, EPA classified overlap as high. Also, similar to USFWS's approach, EPA considered qualitative factors impacting the overlap classification modifying the classification when appropriate. Overlap and magnitude of effect are not completely independent from each other. When determining the appropriate category (high, medium, or low) for overlap, assessors consider species life history (*e.g.,* habitat, diet) and exposure routes of concern (see USFWS, 2022 for more detail). These are important for evaluating which UDLs should be used to set the category. Similarly, assessors consider the major overlaps and the likely exposure when setting the appropriate category for magnitude of effect. In addition, the greatest possible off site transport distance used to set the overlap area where population

[2] Referred to by USFWS as "usage"
[3] Referred to by USFWS as "risk"

level effects are likely to occur is based on a weight of evidence of exposure and effects data available for terrestrial invertebrates. Spray drift exposure to terrestrial invertebrates, specifically insects, represents the exposure route and taxon with the greatest potential for effects and spatial extent. Therefore, off site transport represents areas where there could be potential population level effects from direct effects to listed insects and indirect effects to species that depend upon terrestrial insects (for prey or pollination). More details on this analysis can be found in the specific taxa sections below.

When calculating overlap, there were several differences between the USFWS and EPA approaches. First, USFWS did not quantitatively include spray drift, but rather discussed it qualitatively. EPA considered this transport route when calculating the quantitative overlap because spray drift transport may occur for foliar spray applications and believed it was appropriate to consider spray drift overlap with population relevant endpoints in the quantitative overlap of exposure areas and species ranges. Second, USFWS subtracted federal lands from the quantitative overlap, while EPA calculated the extent of a species range's overlap with federal lands separately. USFWS's rationale for excluding federal lands from the overlap is that malathion was not expected to be used on federal lands. EPA does not currently have information on the extent of usage expected on federal lands. Therefore, EPA provided the extent of overlap with federal lands is provided separately in **Appendix 1** for consideration as a line of evidence rather than adjusting the overlap given the lack of available information on imidacloprid, clothianidin and thiamethoxam usage on federal lands. Another difference between the USFWS approach and EPA's analysis is that USFWS calculated the total overlap using the sum of all UDLs, whereas EPA quantified the total overlap using the extent of the action area but relied on the extent of overlap for each individual UDL for the determinations. EPA used this approach because the UDL layers are not independent from each other and because of the conservative nature of the quantitative overlap analysis (see **Appendix 1-5** of each respective final BE). The overlap has several major conservative factors including the spatial distribution of UDLs, omnidirectional movement off-use sites at maximum distances. UDLs are designed to overestimate the total extent of use sites on any given year by combining all locations of a use across a 5-year window and spray drift as well as runoff is buffered on all four sides of fields despite the knowledge that drift would prominently occur in the direction of the wind at the time of application and runoff flows downgradient in the same general pathway and couldn't be omnidirectional. The final major difference in approaches is the type of usage data available for malathion and imidacloprid, clothianidin, and thiamethoxam. A limited amount of general usage data was available for some uses (*e.g.,* developed and open space developed uses, seed treatments), whereas chemical and use specific usage data were available for malathion.

Since the November 2020 download of the species location files, updates were made to 957 species ranges[4]. In order to evaluate potential impacts of the updated ranges on this assessment, EPA compared the range sizes from November 2020 and July 2022. In cases where the area of the species ranges decreased substantially, it is most likely that the overlap in this assessment is protective. This is because a decrease in species range is expected to decrease the likelihood of overlap with exposure areas. It is possible that some species where EPA made LAA determinations are overly conservative determinations if the overlap is <1% with the updated ranges. In cases where there is an increase in species range, it is possible that the overlap is underestimated in this assessment. Overall, the change in ranges does not impact EPA's confidence that the determinations in this assessment are sufficiently conservative for the majority of species. **Appendix A** includes the percent change in area for each of the 957 species where

[4]https://ecos.fws.gov/ecp/pullreports/catalog/species/report/species/export?format=html&columns=%2Fspecies%40cn%2Csn%2Cstatus%2Cdesc%2Clisting_date&sort=%2Fspecies%40cn%20asc%3B%2Fspecies%40sn%20asc&filter=%2Fspecies%40status%20%3D%20'Endangered'%20or%20%2Fspecies%40status%20%3D%20'Threatened'

ranges have changed. EPA may revisit the influence of the change in the ranges in the future based on the outcomes of formal consultation.

EPA used the overlap analysis previously included in the final BEs for each respective chemical. The UDLs, overlap, and usage data for imidacloprid, thiamethoxam, and clothianidin are described in **Appendices 1-4** through **1-8** of each respective BE (USEPA 2022). As outlined and summarized in **Appendices 1-7 and 1-8**, several overlap scenarios are generated. The overlap scenario used as part of this analysis includes the overlap with Percent Crop Treated (PCT) included (Scenario 2) and includes the UDLs with the application of usage data. This is a different scenario compared to the overlap used in the draft and final BEs for the MAGtool[5], where the overlap is used as a surrogate for the population exposed and not the geographic extent of where the use may occur.

Additional factors are applied to the overlap when it represents a surrogate value for the population exposed. The primary difference is the application redundancy factor so that the percent of the population exposed never exceeds 100%. Conceptually, the redundancy factor refers to the inability for a single site to simultaneously be multiple uses. Buffering the UDLs to account for off-site exposure area further compounds the redundancy because a single location will be found within the exposure areas of multiple UDLs. While the application of this factor is appropriate when estimating the population exposed, the resulting value no longer represents the geographic extent of the use, which needs to be considered as part of this analysis. It may underestimate or overestimate the overall geographic extent of an individual UDL. EPA used two sets of assumptions related to how usage data were distributed, including an upper bound based on a maximum PCT, whereas many treated acres as possible for a given UDL were assumed to be located within a species range, and an average distribution based on an average PCT, where treated acres were assumed to be uniformly distributed throughout the species range. When usage data were not available for a UDL or surrogate, EPA assumed 100% of the UDL was treated (see **Appendix 1-5** of each respective final BE).

The text below explains how EPA calculated the overlap analysis, selected UDLs that are relevant to species, calculated spray drift and qualitatively evaluated the confidence and uncertainties associated with different UDLs.

3.1.1.1. Calculation of Spray Drift Overlap

As discussed in **Chapter 1** of the final imidacloprid, clothianidin and thiamethoxam BEs, each pesticide is registered for use as a foliar spray, soil application and seed treatment. Foliar sprays (applied via aerial or ground equipment) and some soil application methods may result in spray drift. However, while dust-off may occur, seed treatments were not expected to have spray drift concerns. Therefore, for those UDLs represented by seed treatments, only direct overlap was considered.

In the final BEs, indirect effects to individuals from spray drift was quantitatively estimated using the most sensitive endpoints or endpoints derived from species sensitivity distributions (SSD). In the evaluation here, EPA considered alternative endpoints to represent the effects to populations. This consideration was applied to imidacloprid endpoints only, and the distances representing effects to

[5] The Magnitude of effect tool (MAGtool) was created to assist in the determination of the magnitude of the effect of potential pesticide use on listed species and combines toxicological information, species traits, exposure analysis and spatial results into one tool.

populations were bridged to both clothianidin and thiamethoxam for the spray drift analyses. Additionally, drift distances in the final BEs were represented by the empirically based bounds of the AgDRIFT model (305 m for ground spray applications, 792 m for aerial spray applications).
Likelihood that applications will be made via aerial or ground equipment

The amount a chemical that is deposited via spray drift depends upon several factors, including application method, droplet size and boom height. EPA uses the AgDRIFT model to quantify spray drift deposition in consideration of these factors. When considering imidacloprid, thiamethoxam and clothianidin, these chemicals are registered for aerial, ground spray, soil applications and seed treatments. EPA assumes that soil applications (*e.g.,* soil drench, injection) and seed treatments do not lead to spray drift. Aerial applications lead to the greatest exposures due to spray drift. EPA has usage information on the proportion of applications made by air (**Appendix 1-4** of the BEs). This information is used to determine the spray drift buffers by basing them on the most likely application method (*i.e.,* ground or aerial) for crops within each agricultural UDL.

The following agricultural UDLs are relevant to spray applications of imidacloprid, thiamethoxam and clothianidin (**Appendix 1-5** of the BEs):

- Citrus,
- Cotton,
- Grapes/Vineyards,
- Other crops,
- Other orchards,
- Other row crops,
- Soybeans and
- Vegetables and ground fruit.

In addition, clothianidin has the rice UDL. **Table 3-2** includes the percent of treated acres where applications were made by air to crops within these UDLs (excluding crops with limited treated acres; *i.e.,* <10,000 A). Based on this information, there is a high likelihood that soybean applications of the three neonicotinoids will be made via air (35% chance or greater). For all the other UDLs (except rice), it is most likely application method is ground. For clothianidin applications to rice, it is unknown whether applications are most likely to be made via air or ground. Since other use sites are most likely to be treated via ground, EPA also assumes that ground applications are most likely for rice. As discussed in **Appendix A**, the other crops UDL is represented by sod farms. Sod farms does not represent a substantial proportion of the other crops UDL; therefore, EPA does not predict a likelihood of J/AM to listed species or CHs that overlap with this UDL. Because of this, EPA did not consider the other crops UDL further in this drift analysis.

Table 3-2. Percent of acres treated by one of the neonicotinoids where spray applications were made by air (from Appendix 1-4 of the BEs).

UDL	Percent of treated acres where applications are by air**			Most likely application method for spray across the UDL
	Imidacloprid	Thiamethoxam	Clothianidin	
Citrus	10% (oranges, grapefruit, lemon)	5% (oranges), <2.5% (grapefruit and lemon)	NA	ground
Cotton	5%	5%	20%	ground

UDL	Percent of treated acres where applications are by air**			Most likely application method for spray across the UDL
	Imidacloprid	Thiamethoxam	Clothianidin	
Grapes	<1%	<2.5%	<1%	ground
Other crops (sod farms)	NA	NA	NA	ground
Other orchards	<1% (pome and stone fruit) <2.5% (pecans) 5% (walnuts)	5% (apples) <1% (stone fruit, tree nuts and pears)	<1% pome fruit, tree nuts)	ground
Other row crops	0% (tobacco, peanuts)	0% (tobacco)	NA	ground
Rice	NR	NR	NA	Unknown
Soybeans	35%	40%	100%	aerial
Vegetables and ground fruit	10% (potatoes) 5% (carrots) <2.5% (lettuce) 20% (spinach) 10% (broccoli) <2.5% (cabbage) 10% (cauliflower) 25% (Beans) 40% (Dry beans/peas) <1% (peppers) 10% (Tomato) 0% (Cantaloupe) 0% (Pumpkin) 0% (Watermelon)	10% (potatoes) 10% (celery) 10% (lettuce) 20% (broccoli) <2.5% (cabbage) 30% (cauliflower) <2.5% (peppers) <1% (tomatoes)	10% (potatoes) 0% (lettuce) <1% (broccoli) 0% (tomatoes)	ground

NA = not available; NR = not relevant
**Includes crops with 10,000 treated acres or more.

Usage data in **Appendix 1-4** of the BEs does not distinguish between ground applications made directly to soil (where EPA assumes no drift) and foliage (where EPA assumes drift occurs). BEAD evaluated available information on soil and foliar applications made via ground for imidacloprid in some states. They concluded that "Usage of imidacloprid in California in the vegetable and ground fruits crops is a mix of soil-directed and foliar applications, with imidacloprid applied throughout the year. Foliar uses of imidacloprid would be important to maintain for pests that occur later in the season that feed on fruit, and soil applications would not be effective." (USEPA 2023) Based on this information, EPA based the ground spray distance on the assumption that applications are foliar sprays. This is conservative for cases where ground applications are directed to the soil because spray drift would be minimal.

3.1.1.2. Matching Overlap Assumptions with Species Life History

Species habitat information was used to determine which UDLs to consider, and whether direct overlap and/or drift are most relevant to assign a high, medium, or low classification to the overlap. For example, it was assumed that imidacloprid, clothianidin and thiamethoxam would not be applied directly to non-tidal zones of beaches, and thus for species that inhabit only beaches (*e.g.,* beach mice) the only relevant exposure would be from spray drift from adjacent areas. For species such as the

Indiana bat, it was assumed that all agricultural and forestry UDLs and their associated drift footprints were relevant (because the species is known to forage over agricultural areas and roost in forests). For species that only inhabit forests (*e.g.,* golden-cheeked warbler), the only direct overlap considered was for imidacloprid uses on forestry because drift estimates based upon AgDrift do not accurately represent distances through vegetation canopies such as forest interiors.

Species diet information was also used. For those species where seeds are their primary dietary item (*e.g.,* kangaroo rats), it was assumed that the only relevant exposure is from consumption of treated seeds (upper bound T-REX EECs indicate that contamination of untreated seeds following a spray application is a low magnitude of effect) and the overlap category was based on direct overlap with the seed treatment UDL. It should be noted that the seed treatment overlap is an overestimate because it does not utilize usage data, but rather only overlap with potential use sites. For indirect effects, EPA only considered effects from loss of invertebrates for PPHD. For species with terrestrial invertebrates in their diets, spray drift was considered a relevant exposure route.

3.1.1.3. Qualitative considerations of confidence and uncertainty in overlap estimates for non-agricultural or non-crop UDLs

There were several non-agricultural or non-crop UDLs where EPA had a lower degree of confidence in the overlap due to the UDL having less precision and a lack of usage data. These UDLs included poultry litter (represented by all agricultural fields), managed forests, developed and open spaced developed, other crops (sod farms). If a quantitative estimate of overlap was medium or high, EPA considered the likelihood of exposure from the use and whether the certainty of exposure should be reconsidered. Non-agricultural uses with the greatest overlap with the largest number of species (See **Table 4-8** of **Chapter 4** of the BE) include open space developed and developed areas (*e.g.,* residential uses), managed forests and poultry litter. For UDLs where 100% usage was assumed, including open space developed areas, developed areas, field nurseries and other crops, further qualitative refinements were considered. If a quantitative estimate of overlap for the use sites listed above was medium or high (>5%), and there were no UDLs with usage data likely contributing to exposure for a given species, the overlap was assumed to be an overestimate and EPA reconsidered the certainty of exposure. In these cases, EPA predicted that there was not a likelihood of jeopardy (see **Appendix B** for more details on the considerations for each UDL and the J/AM workbooks for each taxon and chemical (**Appendices C-F** and **H-I**) for qualitative overlap considerations for each species).

3.1.2. Magnitude of Effect

For magnitude of effect, EPA assigned an initial low, medium, or high classification to each species based on the species taxonomy, life history, likelihood of exposure and screening level assessment based on the most sensitive endpoints. EPA considered potential exposures and effects to listed species and organisms relevant to the prey, habitat and/or dispersal (indirect effects) as one line of evidence to establish the magnitude of effect. **Chapter 2** of the final BEs (USEPA, 2022) summarizes the available lethal and sublethal toxicity data available for imidacloprid, clothianidin and thiamethoxam. **Chapter 3** of the final BEs summarizes the estimated environmental exposures from direct exposures (on use sites), runoff transport and spray drift of imidacloprid, clothianidin and thiamethoxam. For example, for species that are terrestrial insects or depend upon insects, their initial magnitude of effect was high (because the screening level assessment indicated that exposures are orders of magnitude above effects levels and spray drift transport could result in effects at hundreds of meters from the edge of the field).

Effect modifiers are then considered that may influence the initial magnitude of effect. These effect modifiers include species-specific life history traits, habitat requirements, dietary composition, reproductive strategy (in the case of terrestrial plants) and uncertainty associated with the UDLs and underlying assumptions related to exposure and effects. The initial magnitude of effect category is then refined to reflect these modifiers. Additional factors including other pathways (*i.e.,* drinking water, inhalation and dermal absorption) were considered in the BE in Step 1 and are not considered further in this analysis.

3.2. Critical Habitats

There are 791 CHs, with 762 CHs under USFWS responsibility. In EPA's BE for imidacloprid, thiamethoxam and clothianidin, NE, NLAA and LAA determinations were made for CHs as summarized in **Table 3-3** below. There are many similarities between the species analysis (discussed in **Sections 3.3.1 – 3.3.2**) and the CH analysis. EPA obtained spatial locations of CHs from USFWS ECOS[6]. There are 6 CHs for which GIS files are not available. As a surrogate for the lack spatial data files, EPA used the range files when determining overlap exposure areas and CH.

Table 3-3. Final BE Designated Critical Habitat Determinations for Imidacloprid, Thiamethoxam and Clothianidin

Chemical	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Imidacloprid	78	55	658
Thiamethoxam	89	58	644
Clothianidin	131	214	446

EPA used the same overlap approach described in **Section 3.1.1** above to predict whether overlap is sufficient to lead to a prediction of the likelihood for adverse modification (*i.e.,* >5%) of CHs. For those CHs with medium or high overlap, EPA considered potential impacts to the CH. One key difference between the CH and species is that the Services define physical or biological features (PBFs) that are necessary for the CH to support the species for which it was designated. Based on the taxa based RQs, EPA considered the following PBFs relevant to imidacloprid, thiamethoxam and clothianidin:

1. Terrestrial habitat quality and function (for listed terrestrial invertebrates);
2. Aquatic habitat quality and function (for listed aquatic invertebrates);
3. Insect pollinators (for plants);
4. Terrestrial insect prey; and
5. Aquatic insect prey.

Although EPA considered impacts to habitat quality of listed mammals and birds that may consume seeds, the species-specific assessments considered here did not lead to a prediction of a likelihood of jeopardy from consumption of imidacloprid treated seeds. Therefore, effects to critical habitats of birds and mammals are also not expected from seed treatments. CHs from seed treatments are not considered because the exposures are not substantial enough to be of concern.

[6] https://ecos.fws.gov/ecp/report/criticalHabitat

A dichotomous key serves as a tool and guide for identifying concern to each CH that has physical and biological features (PBFs) that may be affected by neonicotinoid use (relevant PBFs above). Conclusions of either "is not likely to adversely modify" or "is likely to adversely modify" are made for each critical habitat evaluated. Several factors in addition to the PBFs were considered when predicting likelihood of adverse modification of CH. The first factor is direct overlap with a UDL that has a high confidence in likelihood of exposure. Direct overlap occurs when the UDL is found within the boundaries of the CH. Drift distances for each taxon were also taken into account for each UDL to account for areas where exposure from spray drift could occur. When considering these drift areas, there is uncertainty in the drift overlap that needs to be considered when determining if exposure is likely. Quantitative overlap values are likely overestimations based on several factors. Firstly, the UDL itself overestimates the area of registered use sites and assumes that drift occurs on all sides of the treated site. Also, drift overlap is not adjusted for percent of treated acres. Given these biases, the total overlap classification is not based solely on the quantitative drift overlap values. **Table 4-6** below summarizes the drift distances used for CH adverse modification calls due to indirect effects from loss of invertebrates. For more details on how each was determined, please see the taxa specific sections.

For all listed invertebrates or species with PBFs that include invertebrates for pollination or prey with <5% overlap (either directly with the UDL or using a refined drift buffer distance representing population or habitat level effects as discussed above), EPA predicted that there was not a likelihood for adverse modification. For those CHs with relevant PBFs, >5% overlap, and consideration of other risk modifiers, EPA predicted that there could be a likelihood of adverse modification. **Appendix G** includes the dichotomous key used and it provides more detailed descriptions of PBF, UDL, and drift distances and the decision points for predictions of the likelihood of adverse modification.

4. Approach to Predicting the Likelihood of Jeopardy and Adverse Modification

EPA's obligation under the Endangered Species Act (ESA) is to ensure that its actions are "not likely to jeopardize the continued existence of any endangered species or threatened species" (listed species). For those species where EPA made LAA determinations, the Agency then predicted the likelihood of jeopardy to the species. The likelihood of jeopardy predictions is included in this assessment in order to better inform consultation with USFWS. USFWS will make the final determination as to any jeopardy to listed species and adverse modification to designated critical habitat. When EPA assesses whether there is jeopardy, the Agency considers exposures and potential effects across the population. It considers life history information that may modify the magnitude of effects.

Additional risk characterization was considered for the potential for population level effects as discussed below in a taxa-based approach. Given that invertebrates were identified as being the most sensitive taxa to the neonicotinoids, this document will first discuss direct effects to the invertebrates, followed by the other taxa and CH that depend on them. The Agency implemented a bridging approach to assess the likelihood of jeopardy and adverse modification from exposure to clothianidin and thiamethoxam. Any results and conclusions made for effects to populations from imidacloprid (*e.g.,* drift distances) will also be utilized for clothianidin and thiamethoxam. This recognizes a similarity in toxicity of the chemicals, and despite some differences in application rates, this will be a conservative approach. The Agency began this analysis with imidacloprid predictions as this chemical of the class has the most registered use patterns and the highest percent LAA from the final BEs.

4.1. Terrestrial Invertebrates

In EPA's BE for imidacloprid, thiamethoxam and clothianidin, NE, NLAA and LAA determinations were made for threatened and endangered invertebrate species as summarized in **Table 4-1**, **Table 4-2,** and **Table 4-3** below. LAA determinations are based on potential impacts to an individual of a listed species through either effects following direct exposure or as a result of indirect effects through impacts on the prey, pollination, and/or dispersal. For listed invertebrates, when EPA identified concerns for indirect effects, they were driven by impacts to invertebrate prey and resulting loss of the invertebrate's food availability. Since EPA does not anticipate substantial effects to vertebrate animals or plants, there are no concerns for indirect effects to lead to population level impacts through impacts on habitat or dispersal.

Table 4-1. Final BE Determinations for Terrestrial Invertebrates for Imidacloprid

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Terrestrial-Phase Invertebrates	2	6	116
Terrestrial- and Aquatic-Phase Invertebrates	0	0	12
Qualitative Invertebrates[1]	0	41	0

[1] Some species are assessed qualitatively due to incomplete exposure pathway or unreliable exposure model.

Table 4-2. Final BE Determinations for Terrestrial Invertebrates for Thiamethoxam

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Terrestrial-Phase Invertebrates	0	1	119
Terrestrial- and Aquatic-Phase Invertebrates	0	0	11
Qualitative Invertebrates[1]	3	22	5

[1] Some species are assessed qualitatively due to incomplete exposure pathway or unreliable exposure model.

Table 4-3. Final BE Determinations for Terrestrial Invertebrates for Clothianidin

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Terrestrial-Phase Invertebrates	0	0	103
Terrestrial- and Aquatic-Phase Invertebrates	0	0	11
Qualitative Invertebrates[1]	17	25	5

[1] Some species are assessed qualitatively due to incomplete exposure pathway or unreliable exposure model.

Exposure assessment for listed terrestrial invertebrates varies according to the exposure route, dietary composition, life stage and taxonomic group (*e.g.,* insects vs. mollusks). The basis for estimating exposure of terrestrial invertebrates from various exposure routes and taxonomic groups is described below. Exposure assessment of invertebrates that inhabit both aquatic and terrestrial habitats at different times during their life cycle will be based on the applicable aquatic EECs described in the final BEs, in addition to the methods described here for terrestrial invertebrate exposure.

Listed terrestrial invertebrate species could be exposed to imidacloprid, thiamethoxam or clothianidin through a variety of routes including direct contact with spray droplets, residual contact with contaminated surfaces (*i.e.,* foliage, soil), and dietary intake of contaminated food sources (*i.e.,* pollen, nectar, leaves, other terrestrial invertebrates). Therefore, the effects characterization for listed terrestrial invertebrates varies in accordance with the applicable exposure route. When considering on-field exposure, EPA relied on species-specific life history traits and habitat requirements to determine if a species may occur on treated sites. However, for most terrestrial invertebrates, spray drift is expected to be the primary transport route resulting in exposure. Several modifiers were considered when evaluating potential likelihood of exposure to drift, including the interception of spray drift by trees in forest habitat. The effects findings from spray drift exposure for terrestrial invertebrates are described in the following subsections.

4.1.1. Spray Drift Analysis for Effects to Terrestrial Invertebrates

4.1.1.1. Toxicity endpoints

As mentioned previously, the toxicity endpoints used in the spray drift analysis are specific to imidacloprid, and the results are then bridged to both thiamethoxam and clothianidin. A summary of the toxicity endpoints used for assessing the risk to terrestrial invertebrates associated with the registered uses of imidacloprid are shown in **Chapter 2** of the final BE. Due to the binding affinity/specificity for the insect nicotinic acetylcholine receptor (nAChR), neonicotinoids are more toxic to insects compared to non-insect species (*e.g.,* Arachnida, gastropoda; see **Chapter 2** of the final BEs). Where possible, EPA used a weight of evidence to support this differential toxicity. Specifically, no data have been identified that quantifies the toxicity of imidacloprid to terrestrial snails. However, in the absence of terrestrial snail toxicity data, this effects determination relies on the toxicity findings for aquatic mollusks as a surrogate for terrestrial snails.

Given that the neonicotinoids target insects, further analyses will focus on insect taxa only. Since terrestrial insects may be directly affected by imidacloprid, thiamethoxam and/or clothianidin exposure both on and off the treated field, and invertebrates that consume insects may be indirectly affected due to loss of insect prey, EPA considered the imidacloprid dietary and contact-based terrestrial invertebrate SSDs (see **Chapter 2** and **Appendix 2-6** of BE). These SSDs were used to estimate distances to which the potential for direct effects to insects extend. Several insect orders were represented in the SSDs (*e.g.,* Hymenoptera, Lepidoptera, Coleoptera, Diptera, Orthoptera, Odonata, Plecoptera); however, there was a large variation among the data and EPA did not differentiate toxicity among insect Orders. For direct effects, and effects to listed species with an obligate relationship to terrestrial invertebrates, EPA relied upon the 5th percentile (referred to as the HC_{05}) of the SSDs to determine a spray drift distance relevant to a population level effect.

4.1.1.2. Contact Exposure

Terrestrial invertebrates may be exposed to imidacloprid via interception of spray droplets on the treated field or off-field via spray drift or via contact with residues on various surfaces such as foliage. For many insect species, this route of exposure is most relevant to the adult stage since larvae are likely to be buried, in nests or hidden in vegetation. For example, the Callippe silverspot butterfly larvae remain exclusively in the host-plant, *Viola pedunculata*. Estimates of contact exposure of listed terrestrial invertebrates are based on an SSD for contact-based toxicity data, which incorporated data from 13 species and ranged from 0.04 to 50.8 mg/kg-bw. For contact-based exposures to terrestrial invertebrates, the HC_{05} is 0.015 mg/kg-bw (95% CI: 0.0017-0.15 mg/kg-bw) and the HC_{25} is 0.16 mg/kg-bw (95% CI: 0.033-0.8 mg/kg-bw). The contact-based HC_{05} lies just above the most sensitive acute LC_{50} of 0.013 mg a.i./kg-bw identified for the stingless bee, *Melipona scutellaris* (Costa *et al.,* 2015; ECOTOX Reference Number 184470). The least sensitive LC_{50} of 50.8 mg a.i./kg-bw bis associated with tobacco budworm, *Toxoneuron nigriceps (*Nelson 2018; E184372) which is about 4000X less acutely sensitive than *M. scutellaris*. The 2nd most sensitive species identified was the chalcid wasp, *Nasonia vitripennis,* with an acute LC_{50} of 0.029 mg a.i./kg-bw (Tappert *et al.,* 2017; E184317). A total of 13 LC_{50} values were identified for the European honey bee, *Apis mellifera*, which represented 6 different studies and toxicity tests of different strains. The geometric mean LC_{50} for *A. mellifera* is 0.23 mg a.i./kg-bw, but the range in LC_{50} values varies from 0.021 to 0.81 mg a.i./kg-bw; this maximum approaches the HC_{50} from the SSD. The 40-fold variation in LC_{50} values observed for *A. mellifera* suggests that intraspecies variability in sensitivity may contribute substantially to observed differences in LC_{50} values among species. For more detailed description of SSD creation and model selection see **APPENDIX 2-5** of the final imidacloprid BE**.**

The T-REX (version 1.5.2; (USEPA, 2012b) and AgDRIFT™ (Version 2.1.1; using the Tier 1 modules) models were used to predict potential exposures through contact and the extent to which drift influences exposure. Estimated environmental concentrations (EEC) for contact exposure is based on the mean arthropod body burden (65 µg ai/g-bw per 1 lb ai/A). Spray application rates for imidacloprid range 0.05-0.5 lb ai/A. On field EECs range 2.9-4.2 µg ai/g-bw, respectively (for single applications). Figure x represents spray drift distances (estimating using AgDrift based on the most conservative labeled applications estimated for different test species representing orders of listed insects (e.g., hymenoptera, coleoptera, lepidoptera) and the HC_{05} of the SSD. EPA determined that there is most likely a population level concern for direct effects to terrestrial invertebrates from contact exposure within 305 m, 120 m, and 792 m of treated sites from ground, air blast, and aerial applications, respectively (see **Figure 4-1**; **Table 4-4**; **Appendix J**).

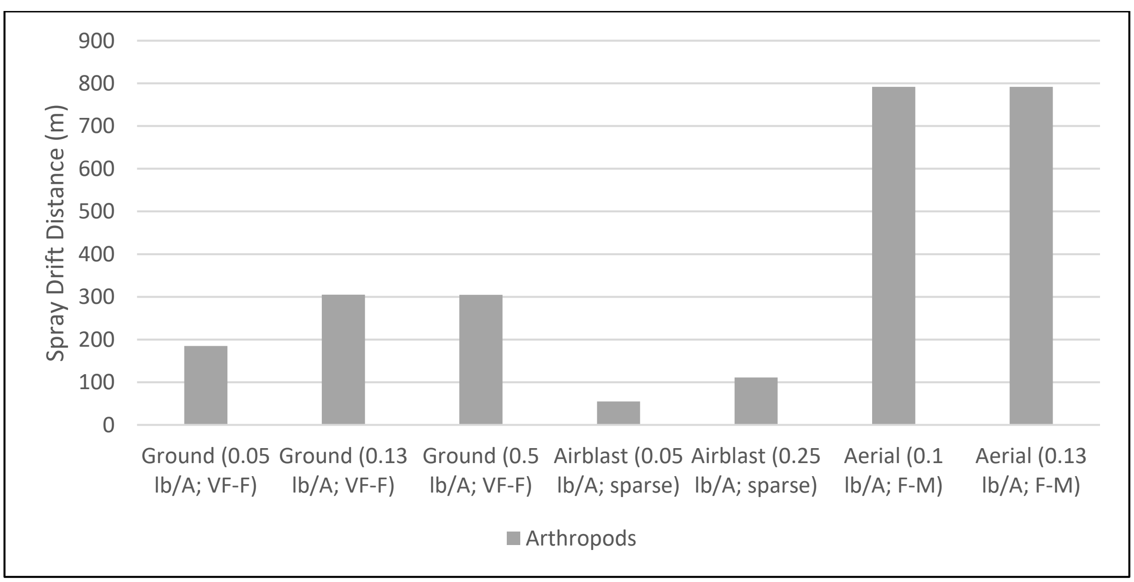

Figure 4-1. Spray drift distances relevant to assessing population level effects to listed insects from contact exposure.

Table 4-4. Spray drift distances relevant to assessing population level effects to listed insects from contact exposure.

UDL[1]	Application Method	Spray drift distance for making individual level effects determinations for terrestrial invertebrates (NE, NLAA, LAA)	Spray drift distance for predicting the likelihood of J/AM based on direct effects
Cotton, Soybeans, Vegetables and Ground Fruit, Other Row Crops, Xmas Trees, Nurseries, Open Space Developed, Other Crops, Rice, NL48 Ag, NL48 Open Space Developed, NL48 Nurseries	Ground	305 m	305 m
Citrus, Grapes, Managed Forests, Other Orchards, NL48 Managed Forests	Airblast	305 m	120 m
Cotton, Soybeans, Vegetables and Ground Fruit, Other Row Crops, Rice	Aerial	792 m	792 m*

[1] See Appendix 1-5 of the final BEs for the labeled uses associated with each UDL.
*Only aerial applications to soybean were considered for the Jeopardy/Adverse Modification (J/AM) analysis.

4.1.1.3. Dietary Exposure

Terrestrial invertebrates may be exposed to imidacloprid via dietary consumption. Terrestrial insects consume a range of dietary items including grass, leaves, nectar, other insects. In terms of seed consumption, three listed terrestrial invertebrates are identified as consuming seeds (*i.e.,* Palos Verdes blue butterfly, Smith's blue butterfly, and Lotis blue butterfly), none had overlap with seed uses. Therefore, seed consumption is not considered a likely route of dietary exposure and is not expected to contribute to population level effects. Estimates of dietary exposure of listed terrestrial invertebrates are based on an SSD for acute dietary-based toxicity data, which incorporated data from 10 species and ranged from 0.13 to 643 mg/kg food. For dietary-based exposures to terrestrial invertebrates, the HC_{05} is 0.064 mg/kg food (95% CI: 0.0045-0.81 mg/kg food) and the HC_{25} is 0.78 mg/kg food (95% CI: 0.15-4.6 mg/kg food). The threshold for terrestrial invertebrates based on the HC_{05} from the SSD is about 2X below the most sensitive LC_{50} of 0.13 mg a.i./kg-food for the larval silkworm, *Bombyx mori* (Sun *et al.*, 2012; E162856). The least sensitive LC_{50} of 643 mg a.i./kg-food belongs to the Argentine ant, *Linepithema humile* (Rust *et al.,* 2004) which is about 5000X less acutely sensitive than *B. mori*. The 2[nd] most sensitive species identified was the southern house mosquito, *Culex quinquefasciatus*, with an acute LC_{50} of 0.31 mg a.i./kg-food (Shah *et al.,* 2016; E175414). A total of 9 definitive LC_{50} values were identified for the European honeybee, *Apis mellifera*, from 8 studies. The geometric mean LC_{50} for *A. mellifera* is 2.02 mg a.i./kg-food, but the range in LC_{50} values varies from 0.18 to 24 mg a.i./kg-bw; this maximum approaches the HC_{80} from the SSD and the minimum value approaches the HC_{05}. The 100-fold variation in LC_{50} values observed for *A. mellifera* suggests that intraspecies variability in sensitivity may contribute substantially to observed differences in LC_{50} values among species. This data suggests that the endpoint used is protective of both larval and adult stages of terrestrial insects. For more detailed description of SSD creation and model selection see **APPENDIX 2-5.**

The T-REX (version 1.5.2; (USEPA, 2012b) and AgDRIFT™ (Version 2.1.1; using the Tier 1 modules) models were used to predict potential exposures through diet and the extent to which drift influences exposure. Estimated environmental concentrations (EEC) for dietary exposure is based on the mean consumption of tall grass (surrogate for nectar) and broadleaf plants. Spray application rates for imidacloprid range 0.05-0.5 lb ai/A. On field EECs range 2.9-4.2 µg ai/g-bw, respectively (for single applications). ***Figure 4-2*** represents spray drift distances (estimating using AgDrift based on the most conservative labeled applications) representing different test species representing orders of listed insects (*e.g.,* hymenoptera, coleoptera, lepidoptera) and the HC_{05} of the SSD. EPA determined that there is most likely a population level concern for direct effects to terrestrial invertebrates from dietary exposure within 210 m, 60 m, and 792 m of treated sites from ground, air blast, and aerial applications, respectively (see ***Figure 4-2***; ***Table 4-5***; **Appendix J**).

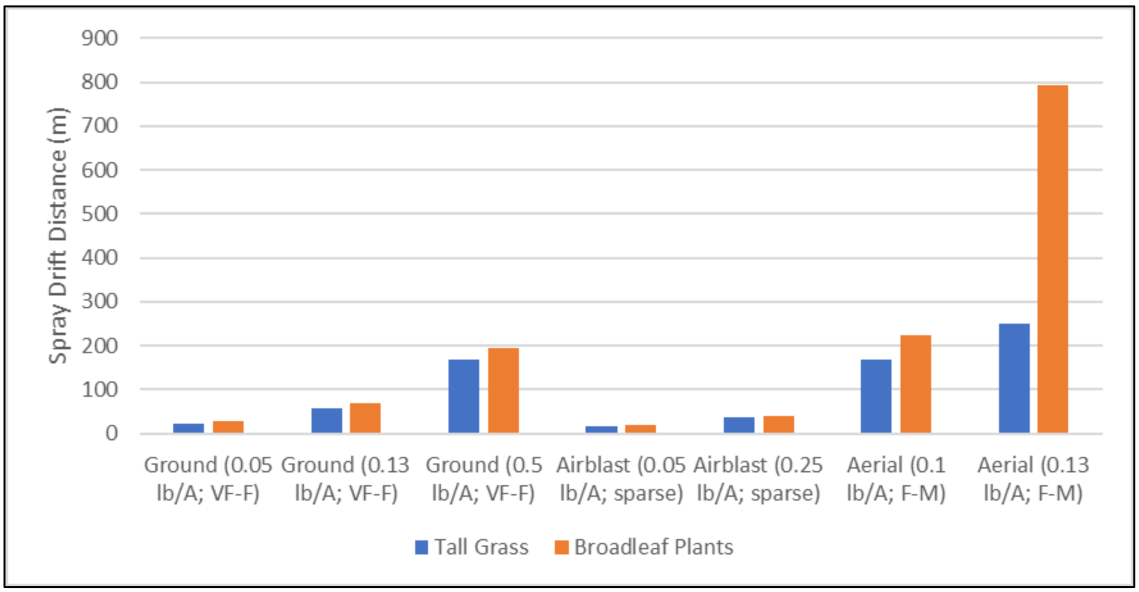

Figure 4-2. Spray drift distances relevant to assessing population level effects to listed insects from dietary exposure

Table 4-5. Spray drift distances relevant to assessing population level effects to listed insects from dietary exposure.

UDL[1]	**Application Method**	**Spray drift distance for making individual level effects determinations for terrestrial invertebrates (NE, NLAA, LAA)**	**Spray drift distance for predicting the likelihood of J/AM based on direct effects**
Cotton, Soybeans, Vegetables and Ground Fruit, Other Row Crops, Xmas Trees, Nurseries, Open Space Developed, Other Crops, Rice, NL48 Ag, NL48 Open Space Developed, NL48 Nurseries	Ground	305 m	210 m
Citrus, Grapes, Managed Forests, Other Orchards, NL48 Managed Forests	Airblast	305 m	60 m
Cotton, Soybeans, Vegetables and Ground Fruit, Other Row Crops, Rice	Aerial	792 m	792 m*

[1] See Appendix 1-5 of the final BEs for the labeled uses associated with each UDL.

*Only aerial applications to soybean were considered for the Jeopardy/Adverse Modification (J/AM) analysis.

SSD Based Thresholds for Indirect Effects to Taxa that Rely on Terrestrial Invertebrates and Distance to Potential Population Effects

Terrestrial invertebrates may be exposed to imidacloprid via contact and dietary consumption. The direct effects to terrestrial invertebrates are used to inform the potential distance to indirect effects for listed species populations that depend upon invertebrates for prey, pollination, habitat and/or dispersal (PPHD). Estimates for contact- and dietary-based exposures of terrestrial invertebrates are based on the HC_{25}s from the SSDs mentioned previously (see **Appendix 2-5** of the Imidacloprid final BE for more details; USEPA 2022). For contact exposure, the HC_{25} is 0.16 mg/kg-bw (95% CI: 0.033-0.8 mg/kg-bw) and 0.78 mg/kg-diet (95% CI: 0.15-4.6 mg/kg-diet) for dietary exposure. While both contact and dietary exposure was considered, contact exposure was considered protective of dietary exposure. EPA used the 95% confidence interval to account for a range of relevant distances. At the HC_{25}, 75% of all terrestrial invertebrate species are expected to experience less than 50% mortality. EPA believes that for exposures less than the invertebrate SSD-derived HC_{25}s, prey loss for insectivorous vertebrate populations would not likely result in population level effects based on diet alone. In general, this threshold is protective of a majority of listed species, terrestrial invertebrate populations are known to recover relatively quickly following pesticide exposures (e.g., through immigration, reproduction, mobility), non-insect prey are expected to be less sensitive than insects and spatially, it is unlikely that entire ranges of prey base would be affected at the same time.

The T-REX (version 1.5.2) and AgDRIFT™ (Version 2.1.1; using the Tier 1 modules) models were used to predict potential exposures through diet and the extent to which drift influences exposure. Estimated environmental concentrations (EEC) for contact exposure is based on the mean arthropod body burden (65 µg ai/g-bw per 1 lb ai/A). Estimated environmental concentrations (EEC) for dietary exposure is based on the mean consumption of tall grass (surrogate for nectar) and broadleaf plants. Spray application rates for imidacloprid range 0.05-0.5 lb ai/A. On field EECs range 2.9-4.2 µg ai/g-bw, respectively (for single applications). **Figure 4-3** represents spray drift distances (estimating using AgDrift based on the most conservative labeled applications) representing different test species representing orders of listed insects (*e.g.,* hymenoptera, coleoptera, lepidoptera) and the HC_{25}s of the SSDs. EPA determined that there is most likely a population level concern for indirect effects to taxa that rely on terrestrial invertebrates from contact exposure (protect of dietary exposure) within 120 m, 30 m, and 150 m of treated sites from ground, air blast, and aerial applications, respectively (see **Figure 4-3**; **Table 4-6**; **Appendix K**). The refined distances will be used for terrestrial vertebrate, plant and designated critical habitat analyses.

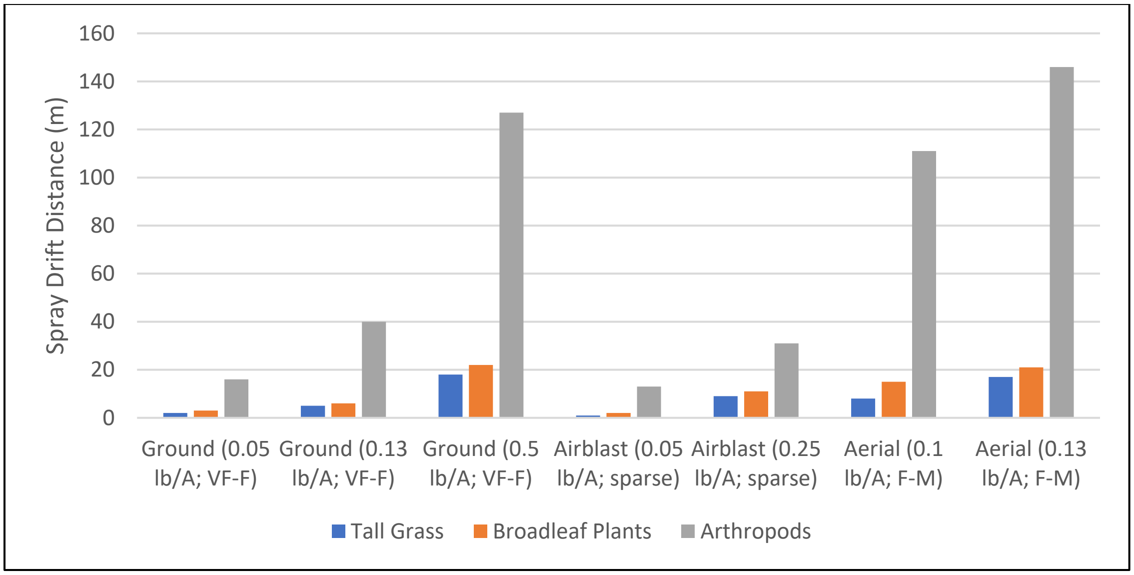

Figure 4-3. Spray drift distances for population level concerns for indirect effects to terrestrial invertebrates and taxa that rely on terrestrial invertebrates

Table 4-6. Spray Drift Distances Used for Estimating Spatial Overlap in Indirect Effects Determinations and Predictions of Likelihood of Jeopardy and Adverse Modification

UDL[1]	Application Method	Spray Drift Distance for making individual level effects determinations for terrestrial invertebrates (NE, NLAA, LAA)	Spray Drift Distance for predicting the likelihood J/AM based on indirect effects
Cotton, Soybeans, Vegetables and Ground Fruit, Other Row Crops, Citrus, Grapes, Managed Forests, Other Orchards, Rice, Xmas Trees, NL48 Managed Forests	Ground and Airblast	305 m	30 m
Nurseries, Open Space Developed, Other Crops, NL48 Ag, NL48 Open Space Developed, NL48 Nurseries	Ground	305 m	120 m
Cotton, Soybeans, Vegetables and Ground Fruit, Other Row Crops, Rice	Aerial	792 m	150 m*

[1] See Appendix 1-5 of the final BEs for the labeled uses associated with each UDL.

*Only aerial applications to soybean were considered for the Jeopardy/Adverse Modification (J/AM) analysis.

4.2. Mammals, Birds, Terrestrial-Phase Amphibians and Reptiles

In EPA's BE for imidacloprid, thiamethoxam and clothianidin, NE, NLAA and LAA determinations were made for threatened and endangered terrestrial vertebrates (**Table 4-7**, **Table 4-8**, **Table 4-9**). After the final BEs were developed, USFWS identified 4 species that are presumed extinct including the Hawaiian crow, Eskimo curlew, Bachman's warbler and Kauai nukupuu, which were considered NLAA for this assessment. LAA determinations are based on potential impacts to an individual of a listed species through either effects following direct exposure, or as a result of indirect effects through impacts on the prey, pollination, habitat and/or dispersal. For listed terrestrial vertebrates, when EPA identified concerns for indirect effects, they were driven by impacts to invertebrate prey and resulting loss of the vertebrate's food availability.

Table 4-7. Final BE Determinations for Terrestrial Vertebrates for Imidacloprid

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Birds	0	32[1]	68
Terrestrial-Phase Amphibians	0	0	27
Reptiles	1	16	28
Mammals	1	31	62
Total	2	79	185

[1] The final imidacloprid BE included four additional species as NLAA that are presumed extinct including the Hawaiian crow, Eskimo curlew, Bachman's warbler and Kauai nukupuu

Table 4-8. Final BE Determinations for Terrestrial Vertebrates for Thiamethoxam

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Birds	4	34[1]	62
Terrestrial-Phase Amphibians	0	0	27
Reptiles	6	13	26
Mammals	1	46	47
Total	11	89	166

[1] The final thiamethoxam BE included four additional species as NLAA that are presumed extinct including the Hawaiian crow, Eskimo curlew, Bachman's warbler and Kauai nukupuu

Table 4-9. Final BE Determinations for Terrestrial Vertebrates for Clothianidin

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Birds	5	33[1]	62
Terrestrial-Phase Amphibians	0	0	27
Reptiles	6	13	26
Mammals	1	44	49
Total	12	90	164

[1] The final clothianidin BE included four additional species as NLAA that are presumed extinct including the Hawaiian crow, Eskimo curlew, Bachman's warbler and Kauai nukupuu

4.3. Plants

In EPA's BE for imidacloprid, thiamethoxam and clothianidin, NE, NLAA and LAA determinations were made for threatened and endangered plants (**Table 4-10**, **Table 4-11**, **Table 4-12**). LAA determinations are based on potential impacts to an individual of a listed species through either effects following direct exposure or as a result of indirect effects through impacts on the prey, pollination, habitat and/or dispersal. For listed terrestrial plants, when EPA identified concerns for indirect effects, they were driven by impacts to invertebrate pollination and/or seed dispersal. Because only indirect effects via potential impacts on insect pollinators are relevant for the effects of imidacloprid, thiamethoxam and clothianidin on listed plants, spatial overlap is defined based on the distances described in **Section 4.1.1**.

Table 4-10. Final BE Determinations for Plants for Imidacloprid

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Plants	49	16	873

Table 4-11. Final BE Determinations for Plants for Thiamethoxam

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Plants	49	40	850

Table 4-12. Final BE Determinations for Plants for Clothianidin

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Plants	72	174	703

4.4. Aquatic Invertebrates

In EPA's BE for imidacloprid, thiamethoxam and clothianidin, NE, NLAA and LAA determinations were made for threatened and endangered invertebrate species as summarized below (**Table 4-13**, **Table 4-14**, **Table 4-15**). LAA determinations are based on potential impacts to an individual of a listed species through either effects following direct exposure or as a result of indirect effects through impacts on the prey, pollination, and/or dispersal. For listed invertebrates, when EPA identified concerns for indirect effects, they were driven by impacts to invertebrate prey and resulting loss of the invertebrate's food availability. Since EPA does not anticipate substantial effects to vertebrate animals or plants, there are no concerns for indirect effects to lead to population level impacts through impacts on habitat or dispersal.

Table 4-13. Final BE Determinations for Aquatic Invertebrates for Imidacloprid

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Aquatic-Phase Invertebrates	113	23	35

Table 4-14. Final BE Determinations for Aquatic Invertebrates for Thiamethoxam

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Aquatic-Phase Invertebrates	113	24	34

Table 4-15. Final BE Determinations for Aquatic Invertebrates for Clothianidin

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Aquatic-Phase Invertebrates	113	24	34

Because imidacloprid, thiamethoxam and clothianidin display high specificity in terms of toxicity to different taxonomic groups of aquatic invertebrates, toxicity data are organized separately among crustaceans, mollusks and aquatic insects. Crustaceans and mollusks are both considered to be less sensitive compared to insects.

4.4.1. Aquatic Exposure Estimation

Chapter 3 of the final BEs summarizes the estimated environmental exposures from direct exposures (on use sites), runoff transport and spray drift of imidacloprid. Maximum application rates/number of applications and minimum application retreatment intervals were modeled using PWC or PFAM to estimate the exposure to imidacloprid based on current labeled uses. Aquatic exposures (surface water and benthic sediment pore water) were quantitatively estimated by aquatic habitat bins (**Table 4-16**) and by Hydrologic Unit Code (HUC) 2 Regions.

Table 4-16. Endangered Species Aquatic Habitat Bins

Generic Habitat	Depth (meters)	Width (meters)	Length (meters)	Flow (m^3/second)
1 – Aquatic-associated terrestrial habitats[1]	0.005-0.15	64	156	0
2- Low-flow	0.1	2	length of field[2]	0.001
3- Moderate-flow	1	8	length of field	1
4- High-flow	2	40	length of field	100
5 – Low-volume	0.1	1	1	0
6- Moderate-volume	1	10	10	0
7- High-volume	2	100	100	0
8- Intertidal near shore	0.5	50	length of field	NA
9- Subtidal near shore	5	200	length of field	NA
10- Offshore marine	200	300	length of field	NA

[1] Dimensions were not defined, as they were for the other 9 bins, for Bin 1. For the purposes of modeling plant exposures in wetlands, dimensions similar to EPA's standard farm pond were used and reported here.
[2] Length of field – The habitat being evaluated is the reach or segment that abuts or is immediately adjacent to the treated field. This habitat is assumed to run the entire length of the treated area.
NA – not applicable

Aquatic bin 1 represents aquatic habitats associated with terrestrial habitats (*e.g.,* riparian zones, seasonal wetlands) and was simulated using the PRZM5/VVWM and the Plant Assessment Tool (PAT). Aquatic bins 8 and 9 are intertidal and subtidal near shore habitats, respectively, and aquatic bin 10 is the offshore marine habitat. EFED does not currently have standard conceptual models designed to estimate EECs for these estuarine/marine systems. EFED and the Services have assigned surrogate freshwater flowing or static systems to evaluate exposure for these estuary and marine bins. Aquatic bin 5 was used as surrogate for pesticide exposure to species in tidal pools; aquatic bins 2 and 3 were used for exposure to species at low and high tide, and aquatic bins 4 and 7 were used to assess exposure to marine species that occasionally inhabit offshore areas. **Table 4-17** presents the habitat bins described above along with the standard EPA waterbodies used to model EECs for each habitat.

Table 4-17. Aquatic Bin, Modeled Waterbody Crosswalk

Aquatic Bin	Description	Width (m)	Length (m)	Depth (m)	Flow (m^3/s)	Waterbody Used for Modeling
1	Wetland	64	157	0.15	Variable[1]	Custom[3]
2	Low-flowing waterbody	2	Field[2]	0.1	0.001	Edge-of-field
3	Medium-flowing waterbody	8	Field[2]	1	1	Index reservoir
4	High-flowing waterbody	40	Field[2]	2	100	Index reservoir
5	Low-volume, static waterbody	1	1	0.1	N/A	Edge-of-field
6	Medium-volume, static waterbody	10	10	1	N/A	Farm pond
7	High-volume, static waterbody	100	100	2	N/A	Farm pond

[1] The depth and flowrate in this waterbody is variable, depending on rainfall.
[2] The habitat being evaluated is the reach or segment that abuts or is immediately adjacent to the treated field. This habitat is assumed to run the entire length of the treated area. NA – not applicable.
[3] The custom waterbody used for modeling was based on the Wetland Plant Exposure Zone (WPEZ) from the Plant Assessment Tool (PAT)

When using PWC, EFED relied on two standard waterbodies which have been traditionally used in EFED to estimate EECs for the various bins. The standard farm pond was used to develop EECs for the medium and large static bins (*e.g.*, bins 6 and 7) and the index reservoir for the medium and large flowing bins (*e.g.*, bins 3 and 4). For the smallest flowing and static bins (bin 2 and 5), EFED derived edge of field estimates from the PRZM daily runoff file (*e.g.*, ZTS file).

While the standard farm pond is bigger than bin 6, the EECs estimated for bin 6 in previous BEs were close to those generated for bin 7, and so an economy of modeling was deemed appropriate. Similarly, the index reservoir has a much lower effluent flowrate than bins 3 and 4, it has been used as a vetted flow-through waterbody for EFED for years, with an accepted watershed-to-waterbody ratio developed for an actual vulnerable watershed (Shipman Reservoir, Shipman, IL) and has been reviewed by a previous Federal Insecticide Fungicide Rodenticide Act (FIFRA) Scientific Advisory Panel (SAP) (Jones *et al*, 1998). EFED expects the EECs that are generated using the index reservoir to be a conservative surrogate for those observed in bins 3 and 4. The watershed area associated with the index reservoir is roughly an order of magnitude smaller than the average area for a HUC 12 (the smallest areal delineation for an aquatic species range), but within the range of minimum and maximum values (9.54×10^7 m^2, 2.08×10^3 – 9.24×10^9 m^2). Lastly, bins 2 and 5 are very small waterbodies and the EECs in them would be reflective of concentrations in a headwater stream or a standing puddle that received runoff at the edge of a treated field. As such, edge-of-field concentrations were estimated and used as a surrogate for EECs in these waterbodies.

A conceptual depiction of the standard EFED waterbodies used to model the aquatic species habitat bins may be found in **Figure 4-4**. Further information on EPA's aquatic exposure modeling for endangered species can be found in **Attachment 3-1** of EPA's final BEs.

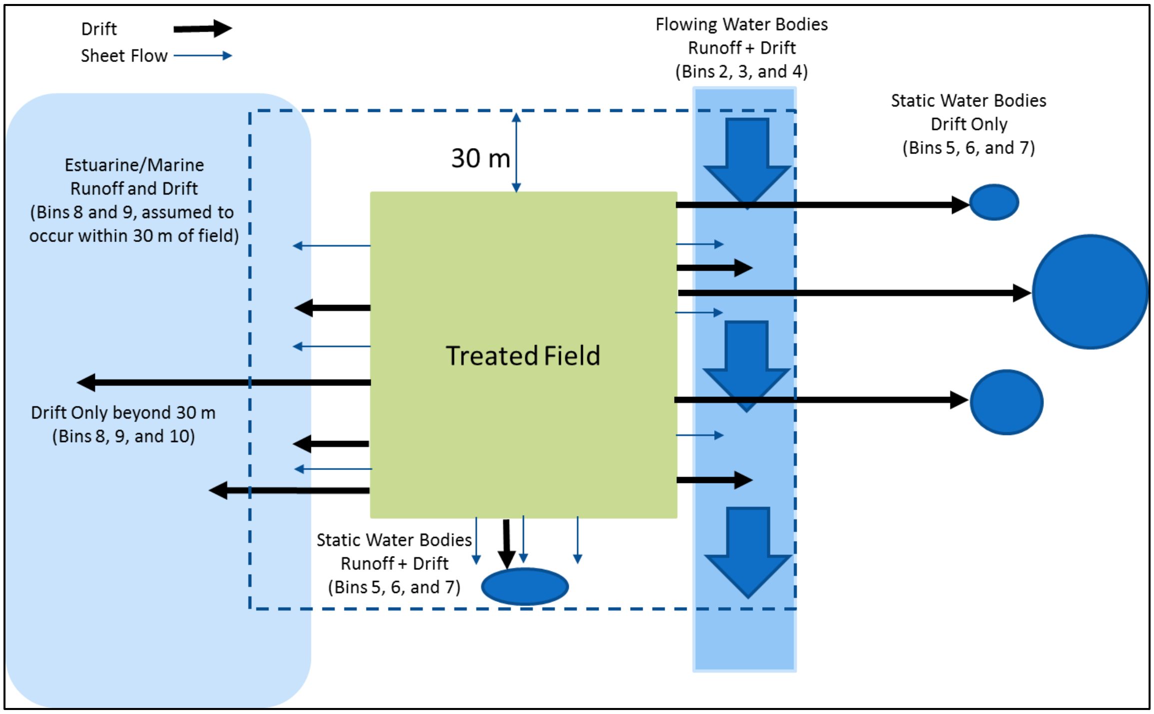

Figure 4-4. Conceptual model for estimating the aquatic exposure of endangered species to pesticides. The applied pesticide from edge of the treated field is received by ten potential aquatic habitat bins (static, flowing, estuarine/marine), and estimated exposure.

4.4.2. SSD Based Thresholds for Direct Effects to Aquatic Invertebrates (Non-Mollusks) and Distance to Potential Population Effects

EPA considered the imidacloprid aquatic invertebrate SSD (see **Chapter 2** and **Appendix 2-5** of the final BE; USEPA, 2022a) to estimate distances that represent potential direct effects to aquatic invertebrates. Sufficient toxicity data were available to derive SSDs for freshwater and estuarine/marine (saltwater) invertebrates. EPA set the threshold for direct effects based on the available mortality endpoint (LD_{50}). In addition, EPA relied upon the 5th percentile (referred to as the HC_{05}) of the SSD, or the concentration at which 95% of aquatic invertebrate species are expected to experience less than 50% mortality. Given the variation in susceptibility across aquatic invertebrate taxa (*i.e.,* insects vs. non-insects), EPA used the mean and upper 95% confidence interval to account for a range of concentrations at which reductions in aquatic invertebrates may be of concern for aquatic insects and non-insects, respectively. SSDs were fit to median lethal or sublethal effects (immobility) concentrations (LC_{50} or EC_{50} values, respectively) for all aquatic invertebrates (HC_{05} = 1.43 [0.71-5.54 µg/L]), aquatic insects (HC_{05} = 1.1 [0.54-4.4 µg/L]), and aquatic non-insects (HC_{05} = 26.1 [4-234.4 µg/L]) exposed to imidacloprid. Overall, the non-insect distributions around the HC_{05} would be less protective of some non-insect species, while the insect only SSD was likely to be overly conservative; therefore, an SSD inclusive of all aquatic invertebrates was used. This selection resulted in a toxicity endpoint range of 1.43-5.54 µg/L. Therefore, in practice, EECs above 1.43 and 5.54 µg/L were considered to exceed the toxicity endpoint and potentially present adverse population-level concerns for listed aquatic insects and non-insects (non-mollusks), respectively.

For data used in the SSD, the most sensitive acute endpoint for insects is 0.65 µg/L (*Epeorus longimanus*), while the most sensitive non-insect endpoint was 14.2 µg/L for a crustacean (*Gammarus roeseli*). The most sensitive insect endpoint falls just below the lower bound of the CI, while the most sensitive non-insect endpoint exceed the upper bound of the CI. The range of acute endpoints from the SSD for insects was 0.65-12,000 µg/L and the range of acute endpoints for non-insects (crustaceans) was 14.2-97,000 µg/L.

When considering aquatic invertebrate data outside of the SSD, the most sensitive overall insect endpoint was a 28-day NOAEC = 0.125 µg/L (MATC = 0.280 µg/L; LOAEC = 0.625 µg/L) for a freshwater midge (*Chironomus dilutus*) (ECOTOX 183987). The most sensitive overall non-insect endpoint was a 28-day NOAEC = 0.163 µg/L (MATC = 0.231 µg/L; LOAEC = 0.326 µg/L) for an estuarine/marine mysid (*Americamysis bahia*; *i.e.,* crustacean) (MRID 42055322). Using the data arrays from **Chapter 2** of the final BE, the range of sublethal NOAECs for insects was 0.125 (emergence) to 150 µg/L, with most endpoints $\leq$ 2 µg/L. The range of sublethal endpoints for crustaceans was 0.163 (based on growth) to ~6,000 µg/L (based on maturity and fecundity). In terms of sublethal endpoints for freshwater crustaceans near the lower end, there are two NOAECs that are ~12 µg/L based on dry weight.
Given that the species we will be considering for jeopardy are mostly freshwater, it is more appropriate to consider the freshwater endpoints described above for the drift analysis to aquatic areas. For aquatic insects, the most sensitive acute endpoint is 0.65 µg/L (ECOTOX 102580) and the most sensitive sublethal endpoint is MATC = 0.28 µg/L (ECOTOX 183987). While both values fall just outside of the confidence interval of the aquatic invertebrate SSD (*i.e.,* CI = 0.71-5.54 µg/L), the freshwater insect data range suggests that the median HC_{05} is conservative for most insect species and will be used to calculate drift distances. For crustaceans, the most sensitive acute endpoint is 14.2 ug/L (ECOTOX 178290) and the most sensitive sublethal endpoint is ~12 µg/L. Both of these values are 2-2.5 times greater than the upper bound CI for the SSD (*i.e.,* upper bound CI = 5.54 µg/L); therefore, the upper bound of the CI is conservative for all freshwater crustaceans and will be used to calculate drift distances. Drift distances were calculated using the spray drift estimator tool from the MAGtool and are summarized in **Table 4-18** (see **Appendix L**).

Table 4-18. Spray Drift Distances Used for Estimating Spatial Overlap in Effects Determinations and Predictions of Likelihood of Jeopardy

UDL	Application Method	Spray Drift Distance for Individual Level Effects Determination for Terrestrial Invertebrates (NE, NLAA, LAA)	Spray Drift Distance for Population-Level Effects Determinations Based on Direct Effects to Aquatic Insects	Spray Drift Distance for Population-Level Effects Determinations Based on Direct Effects to Aquatic Non-Insects
Other Orchards, Citrus, Vegetables and Ground Fruit, Other Row Crops, Xmas Trees	Airblast, Ground	305 m	60 m	30 m
Grapes, Soybean	Airblast, Ground	305 m	30 m	0 m
Managed Forests and NL48 Managed Forests, Cotton, Rice	Airblast, Ground	305 m	30 m	30 m

UDL	Application Method	Spray Drift Distance for Individual Level Effects Determination for Terrestrial Invertebrates (NE, NLAA, LAA)	Spray Drift Distance for Population-Level Effects Determinations Based on Direct Effects to Aquatic Insects	Spray Drift Distance for Population-Level Effects Determinations Based on Direct Effects to Aquatic Non-Insects
Field Nurseries, NL48 Field Nurseries	Ground	305 m	180 m	60 m
Open Space Developed, Other Crops, NL48 Ag, NL48 Open Space Developed	Ground	305 m	210 m	60 m
Vegetables and Ground Fruit	Aerial	792 m	360 m	60 m
Cotton, Rice	Aerial	792 m	120 m	0 m
Other Row Crops	Aerial	792 m	270 m	30 m
Soybeans	Aerial	792 m	90 m	30 m

4.4.3. Mollusks

4.4.3.1. Direct effects

Acute toxicity data for mollusks was evaluated separately from other invertebrates. Imidacloprid is a member of the Group 4A class of insecticides with nitroguanidine-substitution according to the Insecticide Resistance Action Committee (IRAC). Group 4 chemicals are known agonists of the nAChR, whereupon binding, they exhibit excitatory responses within the affected organism, including tremors, followed by paralysis and mortality in target insects (Zhu et al. 2011). Acetylcholine is the major excitatory neurotransmitter in the insect central nervous system.

In line with the neonicotinoids targeting insects, imidacloprid is classified as practically non-toxic to mollusks on an acute exposure basis based on OCSPP acute shell deposition studies (EC_{50} >145,000 µg a.i./L). Additionally, on an acute basis, an open literature study found no effects on lampmussel glochidia (*Lampsilis fasciola*) up to the highest tested concentration (LC_{50} >688 µg a.i./L; Prosser et al. 2016). However, there is some evidence that suggests aquatic gastropods may be more sensitive to nAChR agonists compared to bivalves (Prosser et al. 2016). The acute threshold for gastropods is 3,980 µg a.i./L based on a 7-day LC_{50} for the File Rams-horn snail (*Planorbella pilsbryi*; Prosser et al. 2016). In terms of sublethal effects, most open literature studies did not identify effects up to the highest concentration tested. The sublethal threshold for gastropods is 100 µg a.i./L based on a 28-day NOAEC for the File Rams-horn snail (*Planorbella pilsbryi*; LOAEC = 500 µg a.i./L, MATC = 224 µg a.i./L; Prosser et al. 2016).

No data have been identified that quantifies the toxicity of imidacloprid to terrestrial snails. However, in the absence of terrestrial snail toxicity data, this effects determination relies on the toxicity findings for aquatic mollusks as a surrogate for terrestrial snails. Terrestrial insect toxicity data are not suitable as a surrogate to assess terrestrial snail exposure due to imidacloprid binding affinity/specificity for the insect nicotinic acetylcholine receptor (nAChR).

There are different expected imidacloprid exposure routes for aquatic and terrestrial snails. Aquatic snails are expected to be exposed primarily via respiration whereas terrestrial snails are expected to be exposed through dietary consumption or from direct/residual contact. However, the snail's shell would likely result in substantially reduced direct contact exposure from spray. While the aforementioned differences in exposure pathways introduce some uncertainty surrounding the use of aquatic mollusks as a surrogate for terrestrial snails, differences between the relative sensitivities of terrestrial insects and snails to imidacloprid, mainly due the greater binding affinity of terrestrial insect's nAChRs, support the suitability of using aquatic mollusk toxicity data as a surrogate for terrestrial snail exposure and inform the likelihood of its low toxicity to terrestrial snails. Furthermore, this approach of using aquatic mollusks as a surrogate for terrestrial snails was adopted recently by the USFWS in the final malathion biological opinion (USFWS 2022).

Ultimately, of the available toxicity endpoints for mollusks, the endpoints are similar to or greater than the maximum modeled EEC for imidacloprid (*i.e.,* 228 µg/L). Therefore, weight of evidence is used to show that there would be no direct effects to listed species of mollusks from use of imidacloprid.

4.4.3.2. Indirect effects

Since the listed snails are herbivores, the toxicity data for aquatic plants are used for evaluating indirect effects to these species. The listed mussels are filter feeders and consume a variety of planktonic organisms (phytoplankton, zooplankton, bacteria, detritus). Therefore, the following endpoints are considered most appropriate for assessing indirect effects of imidacloprid to listed snails and mussels:

Snails:

- **Aquatic plants.** 7-d and 96-h IC_{50} values of >105,000 and 12,400 µg a.i./L for vascular (duckweed) and non-vascular plants (freshwater diatom), respectively.

Mussels:

- **Phytoplankton.** A 96-h IC_{50} of 12,400 µg a.i./L for freshwater diatom (most sensitive non-vascular plant).
- **Zooplankton:** Acute (48-h EC_{50}) of > 400,000 and chronic (21-d NOAEC) of 50,500 µg a.i./L.

These toxicity endpoints are 2 to 5 orders of magnitude greater than the maximum EECs derived for various model waterbodies (see **Chapter 3**). Therefore, the potential for indirect effects to listed aquatic mollusks is not indicated.

4.5. Fish and Aquatic-Phase Amphibians

As of November 2020, there were 203 federally listed species of fish and aquatic-phase amphibians. This total includes distinct population segments of fish species, experimental populations, and some presumed extinct species, and excludes terrestrial-phase and terrestrial and aquatic-phase amphibians, which were evaluated in the terrestrial vertebrates' section. EPA's BE for imidacloprid, thiamethoxam and clothianidin made NE, NLAA and LAA determinations. LAA determinations are based on potential impacts to an individual of a listed species through either direct exposure or because of indirect effects through impacts on the prey, pollination, habitat and/or dispersal. For fish and aquatic-phase amphibians, all LAA determinations are driven by indirect effects of imidacloprid exposure on the invertebrate prey base in aquatic habitats. The most sensitive, quantitatively acceptable endpoints available for the exposure of fish to imidacloprid indicate that imidacloprid is only slightly to practically non-toxic to fish and aquatic-phase amphibians on an acute basis (**Section 4** in EPA's final BE for imidacloprid). Additionally, the most sensitive, quantitatively acceptable sublethal toxicity values are, on average, higher than estimated environmental concentrations that may be present in aquatic environments from current uses of imidacloprid. However, as would be expected of an insecticide, imidacloprid can be very highly toxic to and evoke sublethal effects at concentrations as low as <0.5 µg ai/L in aquatic invertebrates, especially those in class *Insecta*, on which many aquatic vertebrates feed for some portion or all of their life cycle (**Section 6** in EPA's final BE for imidacloprid). Therefore, when EPA identified concerns for indirect effects for listed fish and aquatic vertebrates, they were driven solely by impacts to invertebrate prey and the resulting loss of a portion of the prey base for a particular aquatic vertebrate.

Table 4-19. Final BE Determinations for Aquatic Vertebrates for Imidacloprid

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Amphibians (aquatic-phase)	0	0	11
Fish	4	13	114
Total	4	13	125

Table 4-20. Final BE Determinations for Aquatic Vertebrates for Thiamethoxam

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Amphibians (aquatic-phase)	0	0	9
Fish	3	12	112
Total	3	12	121

Table 4-21. Final BE Determinations for Aquatic Vertebrates for Clothianidin

Taxa	Number of NE Determinations	Number of NLAA Determinations	Number of LAA Determinations
Amphibians (aquatic-phase)	0	0	9
Fish	3	12	113
Total	3	12	122

4.5.1. Aquatic Invertebrate Toxicity Threshold

To set the environmental concentration of imidacloprid that could cause enough of a reduction in the aquatic invertebrate prey base for aquatic vertebrates to be of concern, EPA used the aquatic invertebrate species sensitivity distributions (SSDs) from the imidacloprid BE (**Chapter 2** and **Appendix 2-5** of BE). To investigate differences in sensitivity among aquatic invertebrates to imidacloprid exposure, SSDs fit to median lethal or effects (immobility) concentrations (LC_{50} or EC_{50} values, respectively) were derived for freshwater and estuarine/marine (saltwater) invertebrates as well as invertebrates belonging to the class *Insecta* and those belonging to other non-Insecta classes or other higher taxonomic groupings (*for example, Sub-phylum Crustacea, orders Isopoda or Amphipoda, or phylum Annelida (worms)*). From these SSDs, concentrations of imidacloprid that would be expected to be hazardous (hazard concentration; HC) to 5%, 25%, and 50% (HC_{05}, HC_{25}, and HC_{50}, respectively) of all aquatic invertebrates for which data were available were derived.

For the jeopardy analysis, EPA relied upon the HC_{25} of the freshwater invertebrate SSDs, or the concentration at which 75% of freshwater invertebrate species are expected to experience less than 50% mortality, as the prey base reduction level which would present a concern to the persistence of an aquatic vertebrate species (**Table 4-22**). Freshwater invertebrates were more sensitive to imidacloprid exposure than estuarine/marine invertebrates and so endpoints derived from the freshwater invertebrate SSDs are presumed protective (Appendix 2-5 of BE). Similarly, aquatic invertebrates in the class *Insecta* are more than an order of magnitude more sensitive than non-*Insecta* aquatic invertebrates. Given the variation in susceptibility across aquatic invertebrates and the uncertainty of the protectiveness/relevance of the HC_{25} (i.e., there is little to no empirical evidence to support the selection of the HC_{25} over, for example, the HC_{15} or HC_{30} as the level at which the persistence of a species may be jeopardized), EPA used the 95% confidence interval of the HC_{25} from the freshwater invertebrate SSD including all aquatic invertebrates to represent reductions in the aquatic vertebrate prey base that may be of concern. EPA believes that for exposures less than the HC_{25} of the freshwater invertebrate SSD for all aquatic invertebrates, diet losses for insectivorous aquatic vertebrate populations would not likely result in significant adverse species-level effects. This selection resulted in a toxicity endpoint range of 11-55 µg/L. Therefore, in practice, EECs above 11 µg/L were considered to exceed the toxicity endpoint and potentially present adverse population-level concerns for aquatic vertebrates.

Table 4-22. Summary of HC_{25} imidacloprid mortality endpoints for freshwater aquatic invertebrates (values in µg a.i./L).

Model run	HC_{25}	CI
All Aquatic Invertebrates	20.7	10.6 – 55.4
Class *Insecta* Aquatic Invertebrates	9.8	4.9 – 26.2
Non-*Insecta* Aquatic Invertebrates	297.8	108.3 – 1448.6

4.5.2. Qualitative Effects Analysis

The toxicity endpoint selected as the threshold for concern (TOC) for reductions in the aquatic invertebrate prey base for aquatic vertebrates (11 ug/L; the lower bound of the 95% CI of the HC_{25} on imidacloprid's freshwater invertebrate insect SSD) was compared to the EECs from use data layers (UDLs) representing all registered uses of imidacloprid. All registered imidacloprid uses may result in some degree of off-site transport (*i.e.,* runoff, spray drift, or dust-off from seed treatments), with EECs generally decreasing with greater distance from the site of use. Only EECs up to 30 meters from use sites were compared to the TOC because an analysis of spray drift EECs generated by AgDrift concluded that EECs decreased to levels below which toxicity to aquatic invertebrates would be expected at approximately 30 meters. Because spray drift is expected to be impactful at distances farther from the field than runoff, this spray drift buffer is expected to be protective of additional spatial extent from runoff as well. UDL EECs in this analysis consequently consist of on-site EECs in addition to EECs expected up to 30 meters from use sites.

UDL EECs also vary by Hydrologic Unit Code (HUC) and the physical characteristics of the aquatic habitat bins described above (see **Chapter 3** of EPA's final imidacloprid BE for further information on the influence of HUCs and aquatic habitat bins on aquatic exposure modeling). Accordingly, only some UDL EECs will be relevant to some aquatic vertebrate species depending on their habitat use and diet while using habitats in certain areas (*e.g.,* HUCs). Therefore, the UDL EECs used for comparison to the TOC for each species were determined by species-specific life history.

For uses with medium or high overlap with species' ranges, maximum EECs in the aquatic habitat bins and HUCs relevant to a particular aquatic vertebrate were compared to the TOC. Where EECs for species-relevant bins exceed the TOC, the base effect category was medium. In contrast, where EECs did not exceed the TOC, the base effect category was low. If EECs exceeded the TOC by less than 2x, the distribution of EECs was compared to the 95% CI of the HC_{25} to qualitatively gauge the likelihood of exposure of the prey base for a particular aquatic vertebrate to an exceedance. Due to uncertainties with the determined spatial extent and thus EECs of non-agricultural or non-crop UDLs, only EECs from agricultural/crop uses were considered in this analysis.

Effect categories were then modified (raised or lowered) based on the effect modifiers of 1) diet breadth and preference 2) habitat use during life stages that might be expected to be more highly impacted by a reduction in the invertebrate prey base, and 3) species vulnerability. For example, the magnitude of effect for an aquatic vertebrate that is mono- or steno-phagous and is primarily insectivorous would likely result in an increased magnitude of effect towards high. This contrasts with an aquatic vertebrate that is euryphagous, omnivorous, and eats a wide variety of items, including detritus, fish, amphibians, for which the magnitude of effect would be decreased towards low. Similarly, the magnitude of effect would be increased for species with life history information indicating a reliance/preference for invertebrates in the class *Insecta* (which are particularly sensitive to imidacloprid exposure; BE **Chapter 2**) versus species that have been noted to primarily consume mollusks or other non-*Insecta* invertebrates, for which the lower bound of the HC_{25} is at least an order of magnitude greater than for *Insecta* invertebrates. Furthermore, the magnitude of effect increased where there were TOC exceedances in aquatic bins where life stages particularly sensitive to reduction in the aquatic vertebrate prey base (*e.g.,* exogenously-feeding fry or juveniles that rely heavily on aquatic invertebrate prey) were expected to occur. Lastly, species-specific overall vulnerability classifications from the USFWS 2022 malathion BiOp were considered. If no overall vulnerability was specified by USFWS for a listed species, EPA assumed its vulnerability was high.

4.5.3. Probabilistic Analysis with EPA's Magnitude of Effect Tool (MAGTool)

As described in the Revised Methods (USEPA, 2020), probabilistic analysis methods were developed as part of EPA's MAGTool, where aquatic EECs are drawn across all available EECs for a species based on the specific use sites having overlap with the species range, the HUC location and the species bins assignments. Additionally, in the probabilistic analysis, EECs are drawn from the distribution of daily EECs based on a 90-day window of daily concentrations for flowing bins or the annual maximum yearly daily averages over 30 years for the static bins. Curve number and application date scaling factors are also applied to the EECs in the probabilistic analysis, as was described in the imidacloprid biological evaluation (USEPA, 2022).

A probabilistic analysis using the MAGTool was used for 16 species that had a high or medium overlap and/or magnitude of effect categorization. Probabilistic methods for the MAGtool were not utilized for species in karst or cave environments. In the probabilistic analysis, the combination of HUC2s, aquatic bins, and overlap between the geographic location of a species produced a number of variable UDL EECs (*i.e.,* EECs may be above or below the endpoint across the distribution and depending on bin assignments and scenarios utilized in the aquatic modeling) were considered for each aquatic vertebrate species as a weight of evidence for predicting the likelihood of jeopardy. Species for which jeopardy was preliminarily predicted were further assessed with the qualitative effects modifiers discussed above.

4.5.4. Qualitative consideration of aquatic species in cave/karst systems

Currently, all of EPA's modeled aquatic EECs overestimate exposures in the karst systems. Following USFWS' BiOp, it is expected that any imidacloprid, thiamethoxam or clothianidin that enters these systems would be diluted to concentrations that would not lead to the high level of risk described above. However, if use sites occur adjacent to cave/spring openings and the aquatic habitat directly downstream, effects to aquatic invertebrates or reductions in the prey resources may occur. Therefore, cave/karst species were considered for the likelihood of jeopardy.

5. Predictions of the Likelihood of Jeopardy to Endangered and Threatened Species

5.1. Invertebrates

To predict which species are likely jeopardized from imidacloprid, thiamethoxam or clothianidin use, EPA evaluated the potential population level exposures and effects for those species with LAA determinations for individuals. **Appendices C, H and I** provide the species-specific rationales for determining which species were likely and not likely to be jeopardized.

5.1.1. Imidacloprid

Of the 163 invertebrate species with LAA determinations, EPA predicted that 36 listed species are likely jeopardized by currently registered uses of imidacloprid and 127 species are not likely jeopardized by imidacloprid. **Table 5-1** summarizes the effects determinations by taxon and

Table *5-2* summarizes the species where EPA predicted the likelihood of jeopardy. EPA used several lines of evidence to support predictions of not likely jeopardy including low overlap, overlaps that were qualitatively decreased where the exposure was assumed to be highly overestimated due to exposure from drift only, or the species only had overlap with uses with less certainty of leading to exposure and were considered not likely to lead to jeopardy alone based on uses. Additionally, some species had a low magnitude of effect, with common risk modifiers including habitat preferences that limited a species likelihood of exposure, either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat) and species life history. More details on the rationale for each species can be found in **Appendices C, H and I**.

Table 5-1. Summary of individual level and population level effects determinations for listed terrestrial and aquatic invertebrates.

Taxon	Number of Listed LAA[1] Species	Jeopardy not Likely[2]	Jeopardy Likely[2]
Terrestrial-Phase Invertebrates	116	97	19
Aquatic-Phase Invertebrates	35	24	11
Terrestrial- and Aquatic-Phase Invertebrates	12	6	6
Total Invertebrates	163	127	36

[1] Based on potential for effects to an individual
[2] Based on potential for effects to a population

Table 5-2. Overall vulnerability, overlap and magnitude of effect for invertebrate species with predicted likelihood of jeopardy determinations for imidacloprid. This table also includes the uses that are likely contributing to exposure.

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Aquatic-Phase Invertebrates						
Squirrel Chimney Cave shrimp (*Palaemonetes cummingi*)	487	High	Medium	High	CONUS_Vegetables and ground fruit_360 (10.30), CONUS_Other Row Crops_30 (4.52), CONUS_Other Row Crops_60 (6.52), CONUS_Other Row Crops_270 (26.58)	CONUS_Open Space Developed_0 (5.82), CONUS_Open Space Developed_30 (13.02), CONUS_Open Space Developed_210 (40.62), CONUS_Other Crops_0 (4.51), CONUS_Other Crops_30 (9.58), CONUS_Other Crops_210 (39.19), CONUS_Developed_30 (7.41), CONUS_Managed Forests_0 (21.29), CONUS_Managed Forests_30 (37.43), CONUS_Poultry Litter_0 (92.30), CONUS_Poultry Litter_30 (92.64)
Alabama cave shrimp (*Palaemonias alabamae*)	480	High	High	High	CONUS_Vegetables and ground fruit_360 (8.18), CONUS_Cotton_0 (4.84), CONUS_Cotton_30 (7.64), CONUS_Cotton_120 (17.68), CONUS_Soybeans_0 (4.66), CONUS_Soybeans_30 (11.19), CONUS_Soybeans_90 (25.14)	CONUS_Open Space Developed_0 (9.50), CONUS_Open Space Developed_30 (21.02), CONUS_Open Space Developed_210 (56.63), CONUS_Other Crops_210 (25.32), CONUS_Developed_0 (11.56), CONUS_Developed_30 (18.43), CONUS_Managed Forests_0 (4.70), CONUS_Managed Forests_30 (7.08), CONUS_Poultry Litter_0 (99.88), CONUS_Poultry Litter_30 (99.93)
California freshwater shrimp (*Syncaris pacifica*)	481	High	High	High	CONUS_Other Orchards_0 (4.71), CONUS_Other Orchards_30 (6.09), CONUS_Other Orchards_60 (7.03), CONUS_Grapes_0 (7.28), CONUS_Grapes_30 (11.56)	CONUS_Field Nurseries_0 (4.73), CONUS_Field Nurseries_30 (6.12), CONUS_Field Nurseries_180 (10.85), CONUS_Open Space Developed_30 (9.53), CONUS_Open Space Developed_210 (32.93), CONUS_Other Crops_210 (7.22), CONUS_Developed_0 (6.51), CONUS_Developed_30 (9.39), CONUS_Poultry Litter_0 (62.59), CONUS_Poultry Litter_30 (63.27)
Kentucky cave shrimp (*Palaemonias ganteri*)	482	High	High	High	CONUS_Other Row Crops_270 (17.06), CONUS_Soybeans_0 (7.45), CONUS_Soybeans_30 (12.81), CONUS_Soybeans_90 (24.08)	CONUS_Open Space Developed_0 (5.32), CONUS_Open Space Developed_30 (12.65), CONUS_Open Space Developed_210 (48.04), CONUS_Other Crops_210 (5.40), CONUS_Managed Forests_0 (5.92), CONUS_Managed Forests_30 (10.72), CONUS_Poultry Litter_0 (97.50), CONUS_Poultry Litter_30 (97.57)
Illinois cave amphipod (*Gammarus acherondytes*)	484	High	High	High	CONUS_Vegetables and ground fruit_360 (6.14), CONUS_Soybeans_0 (45.34), CONUS_Soybeans_30 (53.84), CONUS_Soybeans_90 (64.79)	CONUS_Open Space Developed_0 (5.64), CONUS_Open Space Developed_30 (13.94), CONUS_Open Space Developed_210 (51.75), CONUS_Other Crops_210 (26.91), CONUS_Developed_0 (13.08), CONUS_Developed_30 (19.82), CONUS_Poultry Litter_0 (98.99), CONUS_Poultry Litter_30 (99.12)
Kauai cave amphipod (*Spelaeorchestia koloana*)	485	High	Medium	High	NL48_Ag_30 (5.41), NL48_Ag_210 (10.24)	NL48_Developed_0 (5.22), NL48_Developed_30 (9.54), NL48_Managed Forests_0 (21.51), NL48_Managed Forests_30 (28.83), NL48_Open Space Developed_210 (13.76), NL48_Poultry Litter_30 (5.41)

Species common name (scientific name)	**Entity ID**	**Overall vulnerability**	**Overlap**	**Magnitude of Effect**	**Uses with higher certainty of contributing to exposure[1]**	**Uses with less certainty of contributing to exposure[1]**
Conservancy fairy shrimp (*Branchinecta conservatio*)	490	High	High	High	CONUS_Other Orchards_0 (12.34), CONUS_Other Orchards_30 (16.17), CONUS_Other Orchards_60 (18.91), CONUS_Vegetables and ground fruit_30 (5.32), CONUS_Vegetables and ground fruit_360 (21.26), CONUS_Grapes_0 (4.64), CONUS_Grapes_30 (7.91), CONUS_Other Row Crops_270 (4.62)	CONUS_Field Nurseries_0 (12.54), CONUS_Field Nurseries_30 (16.34), CONUS_Field Nurseries_180 (27.95), CONUS_Open Space Developed_30 (8.33), CONUS_Open Space Developed_210 (30.39), CONUS_Other Crops_0 (9.51), CONUS_Other Crops_30 (15.49), CONUS_Other Crops_210 (41.61), CONUS_Developed_0 (4.55), CONUS_Developed_30 (6.87), CONUS_Managed Forests_30 (5.06), CONUS_Poultry Litter_0 (73.25), CONUS_Poultry Litter_30 (73.72)
Longhorn fairy shrimp (*Branchinecta longiantenna*)	491	High	High	High	CONUS_Other Orchards_30 (4.74), CONUS_Other Orchards_60 (6.21), CONUS_Vegetables and ground fruit_0 (4.78), CONUS_Vegetables and ground fruit_30 (6.23), CONUS_Vegetables and ground fruit_360 (14.99)	CONUS_Field Nurseries_30 (4.74), CONUS_Field Nurseries_180 (11.45), CONUS_Open Space Developed_0 (5.81), CONUS_Open Space Developed_30 (12.66), CONUS_Open Space Developed_210 (39.48), CONUS_Other Crops_0 (5.21), CONUS_Other Crops_30 (9.24), CONUS_Other Crops_210 (28.89), CONUS_Poultry Litter_0 (87.04), CONUS_Poultry Litter_30 (87.81)
Vernal pool fairy shrimp (*Branchinecta lynchi*)	493	High	High	High	CONUS_Other Orchards_0 (11.19), CONUS_Other Orchards_30 (15.01), CONUS_Other Orchards_60 (17.59), CONUS_Vegetables and ground fruit_30 (5.27), CONUS_Vegetables and ground fruit_360 (21.83), CONUS_Grapes_30 (5.99)	CONUS_Field Nurseries_0 (14.89), CONUS_Field Nurseries_30 (18.66), CONUS_Field Nurseries_180 (28.81), CONUS_Open Space Developed_30 (8.80), CONUS_Open Space Developed_210 (32.54), CONUS_Other Crops_0 (11.06), CONUS_Other Crops_30 (16.48), CONUS_Other Crops_210 (38.81), CONUS_Developed_0 (4.68), CONUS_Developed_30 (7.09), CONUS_Managed Forests_0 (8.51), CONUS_Managed Forests_30 (10.36), CONUS_Poultry Litter_0 (68.98), CONUS_Poultry Litter_30 (69.42)
Vernal pool tadpole shrimp (*Lepidurus packardi*)	494	High	High	High	CONUS_Other Orchards_0 (15.23), CONUS_Other Orchards_30 (19.29), CONUS_Other Orchards_60 (22.05), CONUS_Vegetables and ground fruit_30 (5.60), CONUS_Vegetables and ground fruit_360 (24.07), CONUS_Grapes_30 (6.26), CONUS_Other Row Crops_270 (7.10)	CONUS_Field Nurseries_0 (15.41), CONUS_Field Nurseries_30 (19.40), CONUS_Field Nurseries_180 (30.09), CONUS_Open Space Developed_30 (8.49), CONUS_Open Space Developed_210 (32.83), CONUS_Other Crops_0 (10.10), CONUS_Other Crops_30 (15.44), CONUS_Other Crops_210 (36.56), CONUS_Developed_30 (6.38), CONUS_Managed Forests_0 (14.07), CONUS_Managed Forests_30 (16.44), CONUS_Poultry Litter_0 (64.79), CONUS_Poultry Litter_30 (65.16)
Madison Cave isopod (*Antrolana lira*)	476	High	High	High	CONUS_Soybeans_0 (5.28), CONUS_Soybeans_30 (9.66), CONUS_Soybeans_90 (19.57)	CONUS_Field Nurseries_180 (7.85), CONUS_Open Space Developed_0 (6.76), CONUS_Open Space Developed_30 (16.71), CONUS_Open Space Developed_210 (59.59), CONUS_Other Crops_30 (8.66), CONUS_Other Crops_210 (63.49), CONUS_Developed_0 (5.81), CONUS_Developed_30 (11.15), CONUS_Managed Forests_0 (5.13), CONUS_Managed Forests_30 (11.46), CONUS_Poultry Litter_0 (99.99), CONUS_Poultry Litter_30 (100.00)

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Terrestrial- and Aquatic-Phase Invertebrates						
Orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*)	6867	High	High	High	NL48_Ag_305 (11.32)	NL48_Managed Forests_0 (20.75), NL48_Managed Forests_120 (39.62), NL48_Open Space Developed_0 (7.55), NL48_Open Space Developed_305 (30.19)
Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*)	442	High	High	Medium	CONUS_Cotton_792 (6.63), CONUS_Soybeans_305 (26.50), CONUS_Soybeans_792 (43.83), CONUS_Vegetables and Ground Fruit_305 (15.69), CONUS_Vegetables and Ground Fruit_792 (28.91)	CONUS_Other Crops_305 (34.79), CONUS_Managed Forests_120 (13.78), CONUS_Open Space Developed_305 (46.69), CONUS_Poultry Litter_0 (81.05)
Delta green ground beetle (*Elaphrus viridis*)	435	High	High	High	CONUS_Vegetables and Ground Fruit_305 (32.77), CONUS_Vegetables and Ground Fruit_792 (57.09), CONUS_Other Orchards_0 (4.88), CONUS_Other Orchards_120 (19.79), CONUS_Other Row Crops_305 (10.95), CONUS_Grapes_0 (5.28), CONUS_Grapes_120 (22.70), CONUS_Other Row Crops_792 (32.24)	CONUS_Other Crops_0 (21.03), CONUS_Other Crops_305 (79.99), CONUS_Developed_0 (9.48), CONUS_Field Nurseries_0 (4.92), CONUS_Field Nurseries_305 (42.35), CONUS_Open Space Developed_305 (45.21), CONUS_Poultry Litter_0 (98.75)
Salt Creek Tiger beetle (*Cicindela nevadica lincolniana*)	4910	High	High	High	CONUS_Soybeans_0 (30.76), CONUS_Soybeans_305 (62.42), CONUS_Soybeans_792 (67.62), CONUS_Vegetables and Ground Fruit_792 (17.94)	CONUS_Other Crops_305 (25.24), CONUS_Developed_0 (5.57), CONUS_Open Space Developed_305 (64.29), CONUS_Poultry Litter_0 (99.83)
Rota blue damselfly (*Ischnura luta*)	9282	High	High	Medium	NL48_Ag_305 (24.96)	NL48_Open Space Developed_305 (11.96)
Hine's emerald dragonfly (*Somatochlora hineana*)	445	High	High	High	CONUS_Soybeans_0 (6.31), CONUS_Soybeans_305 (31.86), CONUS_Soybeans_792 (53.25), CONUS_Vegetables and Ground Fruit_305 (7.79), CONUS_Vegetables and Ground Fruit_792 (21.78), CONUS_Other Row Crops_792 (4.86)	CONUS_Other Crops_305 (18.46), CONUS_Developed_0 (9.33), CONUS_Managed Forests_0 (10.43), CONUS_Managed Forests_120 (30.16), CONUS_Open Space Developed_0 (4.71), CONUS_Open Space Developed_305 (58.05), CONUS_Poultry Litter_0 (85.45)
Terrestrial-Phase Invertebrates						

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Callippe silverspot butterfly (*Speyeria callippe callippe*)	430	High	Medium	Medium	CONUS_Vegetables and Ground Fruit_305 (5.59), CONUS_Vegetables and Ground Fruit_792 (9.87), CONUS_Grapes_120 (6.57)	CONUS_Other Crops_305 (21.26), CONUS_Field Nurseries_305 (7.74), CONUS_Managed Forests_0 (6.80), CONUS_Managed Forests_120 (14.99), CONUS_Open Space Developed_305 (26.34), CONUS_Poultry Litter_0 (42.60)
Bay checkerspot butterfly (*Euphydryas editha bayensis*)	438	High	High	Medium	CONUS_Cotton_792 (6.76), CONUS_Vegetables and Ground Fruit_0 (5.21), CONUS_Vegetables and Ground Fruit_305 (12.05), CONUS_Vegetables and Ground Fruit_792 (17.12), CONUS_Other Orchards_120 (6.53), CONUS_Grapes_120 (12.68)	CONUS_Other Crops_0 (5.14), CONUS_Other Crops_305 (36.32), CONUS_Developed_0 (9.90), CONUS_Field Nurseries_305 (12.20), CONUS_Managed Forests_0 (5.63), CONUS_Managed Forests_120 (12.03), CONUS_Open Space Developed_305 (33.20), CONUS_Poultry Litter_0 (57.21)
Lange's metalmark butterfly (*Apodemia mormo langei*)	421	High	High	Medium	CONUS_Vegetables and Ground Fruit_305 (13.75), CONUS_Vegetables and Ground Fruit_792 (41.93), CONUS_Other Orchards_120 (6.76), CONUS_Grapes_120 (4.70), CONUS_Other Row Crops_792 (17.22)	CONUS_Other Crops_0 (18.26), CONUS_Other Crops_305 (71.22), CONUS_Developed_0 (14.52), CONUS_Field Nurseries_305 (24.03), CONUS_Open Space Developed_305 (45.90), CONUS_Poultry Litter_0 (99.60)
Saint Francis' satyr butterfly (*Neonympha mitchellii francisci*)	455	High	High	High	CONUS_Cotton_0 (5.79), CONUS_Cotton_305 (45.39), CONUS_Cotton_792 (77.07), CONUS_Soybeans_0 (14.48), CONUS_Soybeans_305 (66.35), CONUS_Soybeans_792 (90.98), CONUS_Vegetables and Ground Fruit_305 (16.01), CONUS_Vegetables and Ground Fruit_792 (47.04), CONUS_Other Row Crops_305 (16.13), CONUS_Other Row Crops_792 (45.51)	CONUS_Other Crops_0 (8.23), CONUS_Other Crops_305 (79.35), CONUS_Developed_0 (8.93), CONUS_Managed Forests_0 (23.39), CONUS_Managed Forests_120 (80.29), CONUS_Open Space Developed_0 (8.13), CONUS_Open Space Developed_305 (69.40), CONUS_Poultry Litter_0 (99.51)
Mission blue butterfly (*Icaricia icarioides missionensis*)	423	High	High	High	CONUS_Vegetables and Ground Fruit_792 (9.27), CONUS_Grapes_120 (4.76)	CONUS_Other Crops_305 (6.15), CONUS_Developed_0 (44.30), CONUS_Managed Forests_120 (8.02), CONUS_Open Space Developed_0 (13.39), CONUS_Open Space Developed_305 (68.83), CONUS_Poultry Litter_0 (73.71)
Dakota Skipper (*Hesperia dacotae*)	3412	High	High	High	CONUS_Soybeans_0 (7.88), CONUS_Soybeans_305 (41.65), CONUS_Soybeans_792 (52.67), CONUS_Vegetables and Ground Fruit_305 (33.98), CONUS_Vegetables	CONUS_Other Crops_305 (41.33), CONUS_Open Space Developed_305 (50.56), CONUS_Poultry Litter_0 (99.47)

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
					and Ground Fruit_792 (61.27), CONUS_Other Row Crops_305 (27.47), CONUS_Other Row Crops_792 (57.40)	
American burying beetle (*Nicrophorus americanus*)	440	Medium	High	Medium	CONUS_Soybeans_305 (23.37), CONUS_Soybeans_792 (40.68), CONUS_Vegetables and Ground Fruit_305 (13.69), CONUS_Vegetables and Ground Fruit_792 (28.74), CONUS_Other Row Crops_305 (5.27), CONUS_Other Row Crops_792 (11.94)	CONUS_Other Crops_305 (29.69), CONUS_Field Nurseries_305 (6.72), CONUS_Managed Forests_0 (7.34), CONUS_Managed Forests_120 (22.91), CONUS_Open Space Developed_305 (49.14), CONUS_Poultry Litter_0 (85.68)
Fender's blue butterfly (*Icaricia icarioides fenderi*)	450	High	High	High	CONUS_Vegetables and Ground Fruit_305 (26.97), CONUS_Vegetables and Ground Fruit_792 (42.58), CONUS_Other Orchards_120 (15.91), CONUS_Other Row Crops_305 (11.77), CONUS_Other Row Crops_792 (24.25)	CONUS_Other Crops_0 (15.38), CONUS_Other Crops_305 (38.37), CONUS_Developed_0 (5.35), CONUS_Field Nurseries_305 (30.14), CONUS_Managed Forests_0 (28.08), CONUS_Managed Forests_120 (40.26), CONUS_Open Space Developed_305 (42.96), CONUS_Poultry Litter_0 (60.05), CONUS_Xmas Trees_305 (30.17)
Mariana wandering butterfly (Vagrans egistina)	5168	High	High	Medium	NL48_Ag_305 (11.17)	NL48_Developed_0 (8.71), NL48_Managed Forests_0 (16.94), NL48_Managed Forests_120 (27.30), NL48_Open Space Developed_0 (10.21), NL48_Open Space Developed_305 (65.14)
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	436	High	High	High	CONUS_Cotton_305 (8.75), CONUS_Cotton_792 (18.94), CONUS_Vegetables and Ground Fruit_0 (6.14), CONUS_Vegetables and Ground Fruit_305 (33.78), CONUS_Vegetables and Ground Fruit_792 (50.87), CONUS_Other Orchards_0 (22.81), CONUS_Other Orchards_120 (39.96), CONUS_Other Row Crops_305 (13.30), CONUS_Grapes_0 (4.77), CONUS_Grapes_120 (20.26), CONUS_Other Row Crops_792 (27.02)	CONUS_Other Crops_0 (15.57), CONUS_Other Crops_305 (62.74), CONUS_Developed_0 (6.34), CONUS_Field Nurseries_0 (22.87), CONUS_Field Nurseries_305 (52.84), CONUS_Open Space Developed_305 (44.12), CONUS_Poultry Litter_0 (85.59)
Pacific Hawaiian damselfly (*Megalagrion pacificum*)	1953	High	Medium	Medium	NL48_Ag_305 (6.43)	NL48_Developed_0 (4.48), NL48_Managed Forests_0 (13.80), NL48_Managed Forests_120 (23.06), NL48_Open Space Developed_305 (12.66)

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Casey's June Beetle (*Dinacoma caseyi*)	8503	high	High	Medium	CONUS_Vegetables and Ground Fruit_305 (9.53), CONUS_Vegetables and Ground Fruit_792 (32.03)	CONUS_Other Crops_305 (13.15), CONUS_Developed_0 (38.01), CONUS_Open Space Developed_0 (6.38), CONUS_Open Space Developed_305 (57.90), CONUS_Poultry Litter_0 (67.60)
Poweshiek skipperling (*Oarisma poweshiek*)	10147	High	High	High	CONUS_Soybeans_0 (13.69), CONUS_Soybeans_305 (45.36), CONUS_Soybeans_792 (51.47), CONUS_Vegetables and Ground Fruit_305 (5.37), CONUS_Vegetables and Ground Fruit_792 (20.07), CONUS_Other Row Crops_305 (9.07), CONUS_Other Row Crops_792 (22.55)	CONUS_Other Crops_305 (26.70), CONUS_Open Space Developed_305 (55.50), CONUS_Poultry Litter_0 (99.60)
Mitchell's satyr Butterfly (*Neonympha mitchellii mitchellii*)	424	High	High	High	CONUS_Cotton_305 (5.67), CONUS_Cotton_792 (13.35), CONUS_Soybeans_0 (6.26), CONUS_Soybeans_305 (57.44), CONUS_Soybeans_792 (73.69), CONUS_Vegetables and Ground Fruit_305 (29.63), CONUS_Vegetables and Ground Fruit_792 (57.46), CONUS_Other Orchards_120 (9.67), CONUS_Grapes_120 (8.12), CONUS_Other Row Crops_792 (11.00)	CONUS_Other Crops_305 (55.85), CONUS_Developed_0 (5.06), CONUS_Field Nurseries_305 (20.82), CONUS_Managed Forests_0 (11.22), CONUS_Managed Forests_120 (38.42), CONUS_Open Space Developed_0 (5.45), CONUS_Open Space Developed_305 (66.43), CONUS_Poultry Litter_0 (98.75)
Karner blue butterfly (*Lycaeides melissa samuelis*)	420	High	High	High	CONUS_Soybeans_305 (54.33), CONUS_Soybeans_792 (74.02), CONUS_Vegetables and Ground Fruit_305 (31.04), CONUS_Vegetables and Ground Fruit_792 (64.07), CONUS_Other Orchards_120 (5.33), CONUS_Other Row Crops_792 (12.03)	CONUS_Other Crops_305 (42.09), CONUS_Developed_0 (4.71), CONUS_Field Nurseries_305 (12.73), CONUS_Managed Forests_0 (5.90), CONUS_Managed Forests_120 (23.86), CONUS_Open Space Developed_0 (4.77), CONUS_Open Space Developed_305 (63.85), CONUS_Poultry Litter_0 (98.77), CONUS_Xmas Trees_305 (7.91)
Kern primrose sphinx moth (*Euproserpinus euterpe*)	433	High	High	Medium	CONUS_Cotton_305 (7.33), CONUS_Cotton_792 (16.05), CONUS_Vegetables and Ground Fruit_0 (6.38), CONUS_Vegetables and Ground Fruit_305 (15.84), CONUS_Vegetables and Ground Fruit_792 (22.54)	CONUS_Other Crops_0 (10.76), CONUS_Other Crops_305 (41.17), CONUS_Field Nurseries_305 (7.05), CONUS_Managed Forests_120 (8.48), CONUS_Open Space Developed_305 (30.56), CONUS_Poultry Litter_0 (70.29)
Miami Blue Butterfly (*Cyclargus*	4508	High	High	High	CONUS_Vegetables and Ground Fruit_305 (7.29), CONUS_Vegetables and Ground Fruit_792 (15.26)	CONUS_Other Crops_305 (7.85), CONUS_Developed_0 (7.73), CONUS_Field Nurseries_305 (7.66), CONUS_Open Space Developed_305 (17.95), CONUS_Poultry Litter_0 (31.05)

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
(=Hemiargus) thomasi bethunebakeri)						
Rusty patched bumble bee (*Bombus affinis*)	10383	High	High	High	CONUS_Soybeans_0 (11.12), CONUS_Soybeans_305 (51.82), CONUS_Soybeans_792 (75.24), CONUS_Vegetables and Ground Fruit_305 (12.58), CONUS_Vegetables and Ground Fruit_792 (35.49)	CONUS_Other Crops_305 (18.11), CONUS_Developed_0 (23.20), CONUS_Managed Forests_0 (5.13), CONUS_Managed Forests_120 (20.16), CONUS_Open Space Developed_0 (11.73), CONUS_Open Space Developed_305 (79.19), CONUS_Poultry Litter_0 (94.54)
Taylor's (=whulge) Checkerspot (*Euphydryas editha taylori*)	7495	high	High	High	CONUS_Vegetables and Ground Fruit_305 (18.77), CONUS_Vegetables and Ground Fruit_792 (44.30), CONUS_Other Orchards_120 (8.70), CONUS_Other Row Crops_792 (5.13)	CONUS_Other Crops_305 (32.77), CONUS_Developed_0 (6.22), CONUS_Field Nurseries_305 (30.11), CONUS_Managed Forests_0 (23.83), CONUS_Managed Forests_120 (50.87), CONUS_Open Space Developed_0 (5.75), CONUS_Open Space Developed_305 (64.92), CONUS_Poultry Litter_0 (75.29), CONUS_Xmas Trees_305 (49.16)

[1] Each use contains the region_UDL_distance in meters with percent overlap in parentheses. Values are based on maximum upper overlap.

5.1.2. Thiamethoxam

Of the 164 invertebrate species with LAA determinations, EPA predicted that 36 listed species are likely jeopardized by currently registered uses of imidacloprid and 128 species are not likely jeopardized by imidacloprid. **Table 5-3** summarizes the effects determinations by taxon and

Table *5-4* summarizes the species where EPA predicted the likelihood of jeopardy. EPA used several lines of evidence to support predictions of not likely jeopardy including low overlap, overlaps that were qualitatively decreased where the exposure was assumed to be highly overestimated due to exposure from drift only, or the species only had overlap with uses with less certainty of leading to exposure and were considered not likely to lead to jeopardy alone based on uses. Additionally, some species had a low magnitude of effect, with common risk modifiers including habitat preferences that limited a species likelihood of exposure, either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat) and species life history. More details on the rationale for each species can be found in **Appendices C, H and I**.

Table 5-3. Summary of individual level and population level effects determinations for listed terrestrial and aquatic invertebrates.

Taxon	Number of Listed LAA[1] Species	Jeopardy Not Likely[2]	Jeopardy Likely[2]
Terrestrial-Phase Invertebrates	119	99	20
Aquatic-Phase Invertebrates	34	24	10
Terrestrial- and Aquatic-Phase Invertebrates	11	5	6
Total Invertebrates	164	128	36

[1] Based on potential for effects to an individual
[2] Based on potential for effects to a population

Table 5-4. Overall vulnerability, overlap and magnitude of effect for invertebrate species with predicted likelihood of jeopardy determinations for thiamethoxam. This table also includes the uses that are likely contributing to exposure.

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Aquatic-Phase Invertebrates						
Madison Cave isopod (*Antrolana lira*)	476	High	High	High	CONUS_Other Grains_30 (5.70), CONUS_Soybeans_0 (6.19), CONUS_Soybeans_30 (10.57)	CONUS_Other Crops_60 (16.72), CONUS_Developed_0 (5.81), CONUS_Open Space Developed_0 (4.62), CONUS_Open Space Developed_60 (23.45), CONUS_Poultry Litter_0 (72.24)
Alabama cave shrimp (*Palaemonias alabamae*)	480	High	High	High	CONUS_Cotton_0 (4.84), CONUS_Cotton_30 (7.64), CONUS_Soybeans_0 (4.66), CONUS_Soybeans_30 (11.19)	CONUS_Other Crops_60 (4.73), CONUS_Developed_0 (11.56), CONUS_Open Space Developed_0 (6.59), CONUS_Open Space Developed_60 (27.12), CONUS_Poultry Litter_0 (99.88)
California freshwater shrimp (*Syncaris pacifica*)	481	High	High	High	CONUS_Other Orchards_0 (4.71), CONUS_Other Orchards_30 (6.09)	CONUS_Field Nurseries_0 (4.73), CONUS_Field Nurseries_60 (7.09), CONUS_Developed_0 (6.51), CONUS_Open Space Developed_60 (13.49), CONUS_Poultry Litter_0 (45.06)
Kentucky cave shrimp (*Palaemonias ganteri*)	482	High	High	High	CONUS_Soybeans_0 (7.45), CONUS_Soybeans_30 (12.81)	CONUS_Open Space Developed_60 (16.49), CONUS_Poultry Litter_0 (50.58)
Illinois cave amphipod (*Gammarus acherondytes*)	484	High	High	High	CONUS_Soybeans_0 (45.34), CONUS_Soybeans_30 (53.84)	CONUS_Other Crops_60 (6.09), CONUS_Developed_0 (13.08), CONUS_Open Space Developed_60 (20.39), CONUS_Poultry Litter_0 (98.85)
Kauai cave amphipod (*Spelaeorchestia koloana*)	485	High	Medium	High	NL48_Ag_60 (6.22)	NL48_Developed_0 (5.22), NL48_Managed Forests_0 (21.51), NL48_Managed Forests_30 (28.83)
Conservancy fairy shrimp (*Branchinecta conservatio*)	490	High	High	High	CONUS_Vegetables and ground fruit_60 (6.90), CONUS_Vegetables and ground fruit_30 (5.32), CONUS_Other Orchards_0 (12.34), CONUS_Other Orchards_30 (16.17), CONUS_Other Grains_30 (6.07)	CONUS_Field Nurseries_0 (12.54), CONUS_Field Nurseries_60 (19.08), CONUS_Other Crops_0 (9.51), CONUS_Other Crops_60 (20.74), CONUS_Developed_0 (4.55), CONUS_Open Space Developed_60 (9.81), CONUS_Poultry Litter_0 (7.87)
Longhorn fairy shrimp (*Branchinecta longiantenna*)	491	High	High	High	CONUS_Vegetables and ground fruit_0 (4.78), CONUS_Vegetables and ground fruit_60 (7.54), CONUS_Vegetables and ground fruit_30 (6.23), CONUS_Other Orchards_30 (4.74), CONUS_Other Grains_30 (7.57)	CONUS_Field Nurseries_60 (6.21), CONUS_Other Crops_0 (5.21), CONUS_Other Crops_60 (12.94), CONUS_Open Space Developed_0 (5.81), CONUS_Open Space Developed_60 (18.55), CONUS_Poultry Litter_0 (87.04)

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Vernal pool fairy shrimp (*Branchinecta lynchi*)	493	High	High	High	CONUS_Vegetables and ground fruit_60 (4.98), CONUS_Other Orchards_0 (14.45), CONUS_Other Orchards_30 (18.28)	CONUS_Field Nurseries_0 (14.89), CONUS_Field Nurseries_60 (21.22), CONUS_Other Crops_0 (11.06), CONUS_Other Crops_60 (21.03), CONUS_Developed_0 (4.68), CONUS_Open Space Developed_60 (10.10), CONUS_Poultry Litter_0 (4.54)
Vernal pool tadpole shrimp (*Lepidurus packardi*)	494	High	High	High	CONUS_Vegetables and ground fruit_60 (6.81), CONUS_Vegetables and ground fruit_30 (4.92), CONUS_Other Orchards_0 (15.23), CONUS_Other Orchards_30 (19.29), CONUS_Other Grains_30 (5.61)	CONUS_Field Nurseries_0 (15.41), CONUS_Field Nurseries_60 (22.14), CONUS_Other Crops_0 (10.10), CONUS_Other Crops_60 (19.90), CONUS_Open Space Developed_60 (10.24), CONUS_Poultry Litter_0 (5.79)
Terrestrial- and Aquatic-Phase Invertebrates						
Delta green ground beetle (*Elaphrus viridis*)	435	High	High	High	CONUS_Grapes_0 (5.28), CONUS_Grapes_120 (22.70), CONUS_Vegetables and ground fruit_305 (32.77), CONUS_Vegetables and ground fruit_792 (57.09), CONUS_Other Orchards_0 (4.88), CONUS_Other Orchards_120 (19.79), CONUS_Other Grains_0 (13.98), CONUS_Other Grains_305 (65.70), CONUS_Other Grains_792 (88.29)	CONUS_Field Nurseries_0 (4.92), CONUS_Field Nurseries_305 (42.35), CONUS_Other Crops_0 (21.03), CONUS_Other Crops_305 (79.99), CONUS_Developed_0 (9.48), CONUS_Open Space Developed_305 (45.21), CONUS_Poultry Litter_0 (98.75)
Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*)	442	High	High	Medium	CONUS_Cotton_792 (6.63), CONUS_Vegetables and ground fruit_305 (15.69), CONUS_Vegetables and ground fruit_792 (28.91), CONUS_Other Grains_305 (10.38), CONUS_Other Grains_792 (27.06), CONUS_Soybeans_305 (26.50), CONUS_Soybeans_792 (43.83)	CONUS_Other Crops_305 (34.79), CONUS_Open Space Developed_305 (46.69), CONUS_Poultry Litter_0 (81.05)
Hine's emerald dragonfly (*Somatochlora hineana*)	445	High	High	High	CONUS_Other Row Crops_792 (4.83), CONUS_Vegetables and ground fruit_305 (7.82), CONUS_Vegetables and ground fruit_792 (21.81), CONUS_Other Grains_305 (18.49), CONUS_Other Grains_792 (37.93), CONUS_Soybeans_0 (6.31), CONUS_Soybeans_305 (31.86), CONUS_Soybeans_792 (53.25)	CONUS_Other Crops_305 (18.46), CONUS_Developed_0 (9.33), CONUS_Open Space Developed_305 (54.58), CONUS_Poultry Litter_0 (29.12)
Salt Creek Tiger beetle (*Cicindela nevadica lincolniana*)	4910	High	High	High	CONUS_Vegetables and ground fruit_792 (17.94), CONUS_Other Grains_305 (20.85), CONUS_Other Grains_792 (68.64), CONUS_Soybeans_0 (30.76), CONUS_Soybeans_305 (62.42), CONUS_Soybeans_792 (67.62)	CONUS_Other Crops_305 (25.24), CONUS_Developed_0 (5.57), CONUS_Open Space Developed_305 (63.01), CONUS_Poultry Litter_0 (99.83)
Orangeblack Hawaiian damselfly	6867	High	High	High	NL48_Ag_305 (11.32)	NL48_Open Space Developed_0 (7.55), NL48_Open Space Developed_305 (30.19), NL48_Managed Forests_0 (20.75), NL48_Managed Forests_120 (39.62)

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
(*Megalagrion xanthomelas*)						
Rota blue damselfly (*Ischnura luta*)	9282	High	High	Medium	NL48_Ag_305 (24.96)	NL48_Open Space Developed_305 (11.96)
Terrestrial-Phase Invertebrates						
Karner blue butterfly (*Lycaeides melissa samuelis*)	420	High	High	High	CONUS_Other Row Crops_792 (12.01), CONUS_Vegetables and ground fruit_305 (31.06), CONUS_Vegetables and ground fruit_792 (64.09), CONUS_Other Orchards_120 (5.33), CONUS_Other Grains_305 (44.39), CONUS_Other Grains_792 (76.81), CONUS_Soybeans_305 (54.33), CONUS_Soybeans_792 (74.02)	CONUS_Field Nurseries_305 (12.73), CONUS_Other Crops_305 (42.09), CONUS_Developed_0 (4.71), CONUS_Open Space Developed_305 (60.22), CONUS_Xmas Trees_305 (7.91), CONUS_Poultry Litter_0 (19.09)
Lange's metalmark butterfly (*Apodemia mormo langei*)	421	High	High	Medium	CONUS_Grapes_120 (4.70), CONUS_Vegetables and ground fruit_305 (13.75), CONUS_Vegetables and ground fruit_792 (41.93), CONUS_Other Orchards_120 (6.76), CONUS_Other Grains_0 (12.05), CONUS_Other Grains_305 (58.22), CONUS_Other Grains_792 (81.90)	CONUS_Field Nurseries_305 (24.03), CONUS_Other Crops_0 (18.26), CONUS_Other Crops_305 (71.22), CONUS_Developed_0 (14.52), CONUS_Open Space Developed_305 (45.90), CONUS_Poultry Litter_0 (99.60)
Mission blue butterfly (*Icaricia icarioides missionensis*)	423	High	High	High	CONUS_Grapes_120 (4.76), CONUS_Vegetables and ground fruit_792 (9.27), CONUS_Other Grains_792 (16.74)	CONUS_Other Crops_305 (6.15), CONUS_Developed_0 (44.30), CONUS_Open Space Developed_0 (13.39), CONUS_Open Space Developed_305 (68.83), CONUS_Poultry Litter_0 (73.71)
Mitchell's satyr Butterfly (*Neonympha mitchellii mitchellii*)	424	High	High	High	CONUS_Cotton_305 (5.67), CONUS_Cotton_792 (13.35), CONUS_Other Row Crops_792 (5.46), CONUS_Grapes_120 (7.40), CONUS_Vegetables and ground fruit_305 (29.62), CONUS_Vegetables and ground fruit_792 (57.45), CONUS_Other Orchards_120 (9.67), CONUS_Other Grains_305 (28.75), CONUS_Other Grains_792 (60.23), CONUS_Soybeans_0 (6.26), CONUS_Soybeans_305 (57.44), CONUS_Soybeans_792 (73.69)	CONUS_Field Nurseries_305 (20.82), CONUS_Other Crops_305 (55.85), CONUS_Developed_0 (5.06), CONUS_Open Space Developed_305 (63.38), CONUS_Poultry Litter_0 (47.98)
Callippe silverspot butterfly (*Speyeria callippe callippe*)	430	High	High	Medium	CONUS_Grapes_120 (5.31), CONUS_Vegetables and ground fruit_305 (5.59), CONUS_Vegetables and ground fruit_792 (9.87), CONUS_Other Grains_305 (9.92), CONUS_Other Grains_792 (21.50)	CONUS_Field Nurseries_305 (7.74), CONUS_Other Crops_305 (21.26), CONUS_Open Space Developed_305 (24.08), CONUS_Poultry Litter_0 (6.12)
Kern primrose sphinx moth	433	High	High	Medium	CONUS_Cotton_305 (7.33), CONUS_Cotton_792 (16.05), CONUS_Vegetables and ground fruit_0 (6.38),	CONUS_Field Nurseries_305 (7.05), CONUS_Other Crops_0 (10.76), CONUS_Other Crops_305 (41.17),

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
(*Euproserpinus euterpe*)					CONUS_Vegetables and ground fruit_305 (15.84), CONUS_Vegetables and ground fruit_792 (22.54), CONUS_Other Grains_305 (25.98), CONUS_Other Grains_792 (48.80)	CONUS_Open Space Developed_305 (30.56), CONUS_Poultry Litter_0 (70.29)
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	436	High	High	High	CONUS_Cotton_305 (7.54), CONUS_Cotton_792 (17.72), CONUS_Grapes_120 (16.13), CONUS_Vegetables and ground fruit_0 (5.21), CONUS_Vegetables and ground fruit_305 (32.85), CONUS_Vegetables and ground fruit_792 (49.94), CONUS_Other Orchards_0 (22.81), CONUS_Other Orchards_120 (39.96), CONUS_Other Grains_0 (4.55), CONUS_Other Grains_305 (40.25), CONUS_Other Grains_792 (63.21)	CONUS_Field Nurseries_0 (22.87), CONUS_Field Nurseries_305 (52.84), CONUS_Other Crops_0 (15.57), CONUS_Other Crops_305 (62.74), CONUS_Developed_0 (6.34), CONUS_Open Space Developed_305 (41.21), CONUS_Poultry Litter_0 (9.75)
Bay checkerspot butterfly (*Euphydryas editha bayensis*)	438	High	High	Medium	CONUS_Cotton_792 (6.76), CONUS_Grapes_120 (10.98), CONUS_Vegetables and ground fruit_0 (5.21), CONUS_Vegetables and ground fruit_305 (12.05), CONUS_Vegetables and ground fruit_792 (17.12), CONUS_Other Orchards_120 (6.53), CONUS_Other Grains_305 (14.77), CONUS_Other Grains_792 (29.97)	CONUS_Field Nurseries_305 (12.20), CONUS_Other Crops_0 (5.14), CONUS_Other Crops_305 (36.32), CONUS_Developed_0 (9.90), CONUS_Open Space Developed_305 (31.17), CONUS_Poultry Litter_0 (29.46)
American burying beetle (*Nicrophorus americanus*)	440	Medium	High	Medium	CONUS_Other Row Crops_792 (9.62), CONUS_Vegetables and ground fruit_305 (13.32), CONUS_Vegetables and ground fruit_792 (28.37), CONUS_Other Grains_305 (23.21), CONUS_Other Grains_792 (48.60), CONUS_Soybeans_305 (23.51), CONUS_Soybeans_792 (40.82)	CONUS_Field Nurseries_305 (6.72), CONUS_Other Crops_305 (29.69), CONUS_Open Space Developed_305 (45.93), CONUS_Poultry Litter_0 (9.34)
Fender's blue butterfly (*Icaricia icarioides fenderi*)	450	High	High	High	CONUS_Other Row Crops_305 (11.35), CONUS_Other Row Crops_792 (23.83), CONUS_Vegetables and ground fruit_305 (23.16), CONUS_Vegetables and ground fruit_792 (38.77), CONUS_Other Orchards_120 (15.83), CONUS_Other Row Crops ORWA_305 (11.35), CONUS_Other Row Crops ORWA_792 (23.83), CONUS_Other Grains_305 (18.59), CONUS_Other Grains_792 (34.27)	CONUS_Field Nurseries_305 (30.14), CONUS_Other Crops_0 (15.38), CONUS_Other Crops_305 (38.37), CONUS_Developed_0 (5.35), CONUS_Open Space Developed_305 (40.55), CONUS_Xmas Trees_305 (30.17), CONUS_Poultry Litter_0 (13.67)
Saint Francis' satyr butterfly (*Neonympha mitchellii francisci*)	455	High	High	High	CONUS_Cotton_0 (5.79), CONUS_Cotton_305 (45.39), CONUS_Cotton_792 (77.07), CONUS_Other Row Crops_305 (16.02), CONUS_Other Row Crops_792 (45.40), CONUS_Vegetables and ground fruit_305 (16.01), CONUS_Vegetables and ground fruit_792 (47.04), CONUS_Other Grains_305 (34.25),	CONUS_Other Crops_0 (8.23), CONUS_Other Crops_305 (79.35), CONUS_Developed_0 (8.93), CONUS_Open Space Developed_0 (8.13), CONUS_Open Space Developed_305 (69.40), CONUS_Poultry Litter_0 (99.51)

Species common name (scientific name)	**Entity ID**	**Overall vulnerability**	**Overlap**	**Magnitude of Effect**	**Uses with higher certainty of contributing to exposure[1]**	**Uses with less certainty of contributing to exposure[1]**
					CONUS_Other Grains_792 (75.09), CONUS_Soybeans_0 (14.48), CONUS_Soybeans_305 (66.35), CONUS_Soybeans_792 (90.98)	
Pacific Hawaiian damselfly (*Megalagrion pacificum*)	1953	High	Medium	Medium	NL48_Ag_305 (6.26)	NL48_Open Space Developed_305 (11.54), NL48_Managed Forests_120 (11.74)
Dakota Skipper (*Hesperia dacotae*)	3412	High	High	High	CONUS_Other Row Crops_305 (25.34), CONUS_Other Row Crops_792 (50.72), CONUS_Vegetables and ground fruit_305 (31.30), CONUS_Vegetables and ground fruit_792 (58.59), CONUS_Other Grains_0 (5.12), CONUS_Other Grains_305 (45.75), CONUS_Other Grains_792 (77.72), CONUS_Soybeans_0 (10.62), CONUS_Soybeans_305 (44.39), CONUS_Soybeans_792 (55.41)	CONUS_Other Crops_305 (41.33), CONUS_Open Space Developed_305 (47.99), CONUS_Poultry Litter_0 (11.11)
Miami Blue Butterfly (*Cyclargus (=Hemiargus) thomasi bethunebakeri*)	4508	High	High	High	CONUS_Vegetables and ground fruit_305 (7.29), CONUS_Vegetables and ground fruit_792 (15.26)	CONUS_Field Nurseries_305 (7.66), CONUS_Other Crops_305 (7.85), CONUS_Developed_0 (7.73), CONUS_Open Space Developed_305 (17.80), CONUS_Poultry Litter_0 (24.40)
Mariana wandering butterfly (*Vagrans egistina*)	5168	High	High	Medium	NL48_Ag_305 (11.17)	NL48_Developed_0 (8.71), NL48_Open Space Developed_305 (55.36), NL48_Managed Forests_0 (16.94), NL48_Managed Forests_120 (27.30)
Island marble Butterfly (*Euchloe ausonides insulanus*)	5610	High	High	Medium	CONUS_Vegetables and ground fruit_792 (15.84), CONUS_Other Grains_305 (6.61), CONUS_Other Grains_792 (19.66)	CONUS_Other Crops_305 (15.91), CONUS_Open Space Developed_305 (25.19), CONUS_Poultry Litter_0 (45.33)
Taylor's (=whulge) Checkerspot (*Euphydryas editha taylori*)	7495	high	High	High	CONUS_Other Row Crops_792 (5.13), CONUS_Vegetables and ground fruit_305 (18.77), CONUS_Vegetables and ground fruit_792 (44.30), CONUS_Other Orchards_120 (8.70), CONUS_Other Grains_305 (10.73), CONUS_Other Grains_792 (20.69)	CONUS_Field Nurseries_305 (30.11), CONUS_Other Crops_305 (32.77), CONUS_Developed_0 (6.22), CONUS_Open Space Developed_0 (5.75), CONUS_Open Space Developed_305 (64.92), CONUS_Xmas Trees_305 (49.16), CONUS_Poultry Litter_0 (75.29)

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Casey's June Beetle (*Dinacoma caseyi*)	8503	high	High	Medium	CONUS_Vegetables and ground fruit_305 (9.53), CONUS_Vegetables and ground fruit_792 (32.03)	CONUS_Other Crops_305 (13.15), CONUS_Developed_0 (38.01), CONUS_Open Space Developed_0 (6.38), CONUS_Open Space Developed_305 (57.90), CONUS_Poultry Litter_0 (67.60)
Poweshiek skipperling (*Oarisma poweshiek*)	10147	High	High	High	CONUS_Other Row Crops_305 (6.10), CONUS_Other Row Crops_792 (12.36), CONUS_Vegetables and ground fruit_305 (5.35), CONUS_Vegetables and ground fruit_792 (20.04), CONUS_Other Grains_305 (32.05), CONUS_Other Grains_792 (71.96), CONUS_Soybeans_0 (24.02), CONUS_Soybeans_305 (55.69), CONUS_Soybeans_792 (61.80)	CONUS_Other Crops_305 (26.70), CONUS_Open Space Developed_305 (53.24), CONUS_Poultry Litter_0 (36.81)
Rusty patched bumble bee (*Bombus affinis*)	10383	High	High	High	CONUS_Vegetables and ground fruit_305 (12.58), CONUS_Vegetables and ground fruit_792 (35.49), CONUS_Other Grains_305 (20.64), CONUS_Other Grains_792 (50.80), CONUS_Soybeans_0 (11.12), CONUS_Soybeans_305 (51.82), CONUS_Soybeans_792 (75.24)	CONUS_Other Crops_305 (18.11), CONUS_Developed_0 (23.20), CONUS_Open Space Developed_0 (6.69), CONUS_Open Space Developed_305 (74.15), CONUS_Poultry Litter_0 (94.54)

[1] Each use contains the region_UDL_distance in meters with percent overlap in parentheses. Values are based on maximum upper overlap.

5.1.3. Clothianidin

Of the 148 invertebrate species with LAA determinations, EPA predicted that 31 listed species are likely jeopardized by currently registered uses of imidacloprid and 117 species are not likely jeopardized by imidacloprid. **Table 5-5** summarizes the effects determinations by taxon and

Table *5-6* summarizes the species where EPA predicted the likelihood of jeopardy. EPA used several lines of evidence to support predictions of not likely jeopardy including low overlap, overlaps that were qualitatively decreased where the exposure was assumed to be highly overestimated due to exposure from drift only, or the species only had overlap with uses with less certainty of leading to exposure and were considered not likely to lead to jeopardy alone based on uses. Additionally, some species had a low magnitude of effect, with common risk modifiers including habitat preferences that limited a species likelihood of exposure, either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat) and species life history. More details on the rationale for each species can be found in **Appendices C, H and I**.

Table 5-5. Summary of individual level and population level effects determinations for listed terrestrial and aquatic invertebrates.

Taxon	Number of Listed LAA[1] Species	Jeopardy not Likely[2]	Jeopardy Likely[2]
Terrestrial-Phase Invertebrates	103	85	18
Aquatic-Phase Invertebrates	34	27	7
Terrestrial- and Aquatic-Phase Invertebrates	11	5	6
Total Invertebrates	148	117	31

[1] Based on potential for effects to an individual
[2] Based on potential for effects to a population

Table 5-6. Overall vulnerability, overlap and magnitude of effect for invertebrate species with predicted likelihood of jeopardy determinations for clothianidin. This table also includes the uses that are likely contributing to exposure.

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Aquatic-Phase Invertebrates						
California freshwater shrimp (*Syncaris pacifica*)	481	High	Medium	High	CONUS_Grapes_0 (6.37), CONUS_Other.Orchards_0 (4.71), CONUS_Other.Orchards_30 (6.09)	CONUS_Developed_0 (6.51), CONUS_Poultry.Litter_0 (62.59), CONUS_Federal.Lands_0 (5.81), CONUS_Open.Space.Developed_60 (14.23)
Conservancy fairy shrimp (*Branchinecta conservatio*)	490	High	Medium	High	CONUS_Vegetables.and.ground.fruit_30 (4.51), CONUS_Other.Orchards_30 (4.96), CONUS_Vegetables.and.ground.fruit_60 (6.09)	CONUS_Other.Crops_0 (9.51), CONUS_Developed_0 (4.55), CONUS_Poultry.Litter_0 (73.25), CONUS_Federal.Lands_0 (15.38), CONUS_Open.Space.Developed_60 (12.71), CONUS_Other.Crops_60 (20.74)
Longhorn fairy shrimp (*Branchinecta longiantenna*)	491	High	Medium	High	CONUS_Vegetables.and.ground.fruit_0 (4.78), CONUS_Vegetables.and.ground.fruit_30 (6.23), CONUS_Other.Orchards_30 (4.74), CONUS_Vegetables.and.ground.fruit_60 (7.54)	CONUS_Other.Crops_0 (5.21), CONUS_Open.Space.Developed_0 (5.81), CONUS_Poultry.Litter_0 (87.04), CONUS_Federal.Lands_0 (31.41), CONUS_Open.Space.Developed_60 (18.55), CONUS_Other.Crops_60 (12.94)
Vernal pool tadpole shrimp (*Lepidurus packardi*)	494	High	Medium	High	CONUS_Other.Orchards_30 (4.89), CONUS_Vegetables.and.ground.fruit_60 (5.73)	CONUS_Other.Crops_0 (10.1), CONUS_Poultry.Litter_0 (64.79), CONUS_Federal.Lands_0 (30.01), CONUS_Open.Space.Developed_60 (13.25), CONUS_Other.Crops_60 (19.9)
Hungerford's crawling water Beetle (*Brychius hungerford*)	441	High	High	High	CONUS_Soybeans_90 (5.44), CONUS_Vegetables.and.ground.fruit_360 (16.06)	CONUS_Poultry.Litter_0 (97.73), CONUS_Federal.Lands_0 (16.39), CONUS_Open.Space.Developed_210 (48.35), CONUS_Other.Crops_210 (23.68)
Illinois cave amphipod (*Gammarus acherondytes*)	484	High	High	High	CONUS_Soybeans_0 (45.34), CONUS_Soybeans_30 (53.84)	CONUS_Developed_0 (13.08), CONUS_Open.Space.Developed_0 (5.64), CONUS_Poultry.Litter_0 (98.99), CONUS_Open.Space.Developed_60 (21.72), CONUS_Other.Crops_60 (6.09)

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Kauai cave amphipod (*Spelaeorchestia koloana*)	485	High	Medium	High	NL48_Ag_60 (6.22)	NL48_Developed_0 (5.22), NL48_Open.Space.Developed_60 (4.99)
Terrestrial-Phase Invertebrates						
Karner blue butterfly (*Lycaeides melissa samuelis*)	420	High	High	High	CONUS_Vegetables.and.ground.fruit_305 (29.66), CONUS_Soybeans_305 (54.33), CONUS_Soybeans_792 (74.02), CONUS_Other.Orchards_120 (5.22)	CONUS_Developed_0 (4.71), CONUS_Open.Space.Developed_0 (4.77), CONUS_Poultry.Litter_0 (98.77), CONUS_Federal.Lands_0 (8.56), CONUS_Open.Space.Developed_305 (63.85), CONUS_Other.Crops_305 (42.09)
Mitchell's satyr Butterfly (*Neonympha mitchellii mitchellii*)	424	High	High	High	CONUS_Soybeans_0 (6.26), CONUS_Cotton_305 (5.67), CONUS_Vegetables.and.ground.fruit_305 (27.98), CONUS_Soybeans_305 (57.44), CONUS_Soybeans_792 (73.69), CONUS_Grapes_120 (7.46), CONUS_Other.Orchards_120 (9.67)	CONUS_Developed_0 (5.06), CONUS_Open.Space.Developed_0 (5.45), CONUS_Poultry.Litter_0 (98.75), CONUS_Open.Space.Developed_305 (66.43), CONUS_Other.Crops_305 (55.85)
Taylor's (=whulge) Checkerspot (*Euphydryas editha taylori*)	7495	High	High	High	CONUS_Vegetables.and.ground.fruit_305 (18.77), CONUS_Other.Orchards_120 (8.7)	CONUS_Developed_0 (6.22), CONUS_Open.Space.Developed_0 (5.75), CONUS_Poultry.Litter_0 (75.29), CONUS_Federal.Lands_0 (8.16), CONUS_Open.Space.Developed_305 (64.92), CONUS_Other.Crops_305 (32.77)
Rusty patched bumble bee (*Bombus affinis*)	10383	High	High	High	CONUS_Soybeans_0 (11.12), CONUS_Vegetables.and.ground.fruit_305 (12.58), CONUS_Soybeans_305 (51.82), CONUS_Soybeans_792 (75.24)	CONUS_Developed_0 (23.2), CONUS_Open.Space.Developed_0 (11.73), CONUS_Poultry.Litter_0 (94.54), CONUS_Federal.Lands_0 (7.36), CONUS_Open.Space.Developed_305 (79.19), CONUS_Other.Crops_305 (18.11)
Miami Blue Butterfly (Cyclargus *(=Hemiargus) thomasi bethunebakeri*)	4508	High	Medium	High	CONUS_Vegetables.and.ground.fruit_305 (6.08)	CONUS_Developed_0 (7.73), CONUS_Poultry.Litter_0 (31.05), CONUS_Federal.Lands_0 (58.91), CONUS_Open.Space.Developed_305 (17.95), CONUS_Other.Crops_305 (7.85)
Saint Francis' satyr butterfly	455	High	High	High	CONUS_Cotton_0 (5.79), CONUS_Soybeans_0 (14.48), CONUS_Cotton_305 (45.39),	CONUS_Other.Crops_0 (8.23), CONUS_Developed_0 (8.93),

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
(*Neonympha mitchellii francisci*)					CONUS_Vegetables.and.ground.fruit_305 (16.01), CONUS_Soybeans_305 (66.35), CONUS_Other.Row.Crops_305 (16.02), CONUS_Soybeans_792 (90.98)	CONUS_Open.Space.Developed_0 (8.13), CONUS_Poultry.Litter_0 (99.51), CONUS_Federal.Lands_0 (20.33), CONUS_Open.Space.Developed_305 (69.4), CONUS_Other.Crops_305 (79.35)
Dakota Skipper (*Hesperia dacotae*)	3412	High	High	High	CONUS_Vegetables.and.ground.fruit_305 (30.94), CONUS_Soybeans_305 (37.61), CONUS_Soybeans_792 (48.63)	CONUS_Poultry.Litter_0 (99.47), CONUS_Open.Space.Developed_305 (50.56), CONUS_Other.Crops_305 (41.33)
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	436	High	High	High	CONUS_Cotton_305 (8.75), CONUS_Vegetables.and.ground.fruit_305 (31.01), CONUS_Rice_305 (11), CONUS_Grapes_120 (16.87), CONUS_Other.Orchards_120 (18.56)	CONUS_Other.Crops_0 (15.57), CONUS_Developed_0 (6.34), CONUS_Poultry.Litter_0 (85.59), CONUS_Open.Space.Developed_305 (44.12), CONUS_Other.Crops_305 (62.74)
Mission blue butterfly (*Icaricia icarioides missionensis*)	423	High	Medium	High	CONUS_Grapes_120 (4.76)	CONUS_Developed_0 (44.3), CONUS_Open.Space.Developed_0 (13.39), CONUS_Poultry.Litter_0 (73.71), CONUS_Federal.Lands_0 (22.76), CONUS_Open.Space.Developed_305 (68.83), CONUS_Other.Crops_305 (6.15)
Fender's blue butterfly (*Icaricia icarioides fenderi*)	450	High	High	High	CONUS_Vegetables.and.ground.fruit_305 (22.72), CONUS_Other.Orchards_120 (13.2)	CONUS_Other.Crops_0 (15.38), CONUS_Developed_0 (5.35), CONUS_Poultry.Litter_0 (60.05), CONUS_Federal.Lands_0 (17.11), CONUS_Open.Space.Developed_305 (42.96), CONUS_Other.Crops_305 (38.37)
Poweshiek skipperling (*Oarisma poweshiek*)	10147	High	High	High	CONUS_Soybeans_0 (13.69), CONUS_Vegetables.and.ground.fruit_305 (5.31), CONUS_Soybeans_305 (45.36), CONUS_Soybeans_792 (51.47)	CONUS_Poultry.Litter_0 (99.6), CONUS_Open.Space.Developed_305 (55.5), CONUS_Other.Crops_305 (26.7)
Kern primrose sphinx moth (*Euproserpinus euterpe*)	433	High	High	Medium	CONUS_Vegetables.and.ground.fruit_0 (6.38), CONUS_Cotton_305 (7.33), CONUS_Vegetables.and.ground.fruit_305 (15.84)	CONUS_Other.Crops_0 (10.76), CONUS_Poultry.Litter_0 (70.29), CONUS_Federal.Lands_0 (58.43), CONUS_Open.Space.Developed_305 (30.56), CONUS_Other.Crops_305 (41.17)

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Pacific Hawaiian damselfly (*Megalagrion pacificum*)	1953	High	Medium	Medium	NL48_Ag_305 (6.32)	NL48_Developed_0 (4.48), NL48_Federal.Lands_0 (15.34), NL48_Open.Space.Developed_305 (12.66)
Lange's metalmark butterfly (*Apodemia mormo langei*)	421	High	High	Medium	CONUS_Vegetables.and.ground.fruit_305 (13.75), CONUS_Rice_305 (5.78), CONUS_Grapes_120 (4.7), CONUS_Other.Orchards_120 (6.76)	CONUS_Other.Crops_0 (18.26), CONUS_Developed_0 (14.52), CONUS_Poultry.Litter_0 (99.6), CONUS_Open.Space.Developed_305 (45.9), CONUS_Other.Crops_305 (71.22)
Callippe silverspot butterfly (*Speyeria callippe callippe*)	430	High	Medium	Medium	CONUS_Vegetables.and.ground.fruit_305 (5.59), CONUS_Grapes_120 (5.77)	CONUS_Poultry.Litter_0 (42.6), CONUS_Federal.Lands_0 (47.24), CONUS_Open.Space.Developed_305 (26.34), CONUS_Other.Crops_305 (21.26)
Bay checkerspot butterfly (*Euphydryas editha bayensis*)	438	High	High	Medium	CONUS_Vegetables.and.ground.fruit_0 (5.21), CONUS_Vegetables.and.ground.fruit_305 (12.05), CONUS_Grapes_120 (12.68), CONUS_Other.Orchards_120 (6.53)	CONUS_Other.Crops_0 (5.14), CONUS_Developed_0 (9.9), CONUS_Poultry.Litter_0 (57.21), CONUS_Federal.Lands_0 (18.02), CONUS_Open.Space.Developed_305 (33.2), CONUS_Other.Crops_305 (36.32)
Mariana wandering butterfly (*Vagrans egistina*)	5168	High	High	Medium	NL48_Ag_305 (11.17)	NL48_Developed_0 (8.71), NL48_Open.Space.Developed_0 (10.21), NL48_Open.Space.Developed_305 (65.14)
American burying beetle (*Nicrophorus americanus*)	440	Medium	High	Medium	CONUS_Vegetables.and.ground.fruit_305 (13.11), CONUS_Soybeans_305 (23.19), CONUS_Soybeans_792 (40.5)	CONUS_Poultry.Litter_0 (85.68), CONUS_Federal.Lands_0 (8.51), CONUS_Open.Space.Developed_305 (49.14), CONUS_Other.Crops_305 (29.69)
Aquatic- and Terrestrial-Phase Invertebrates						
Delta green ground beetle (*Elaphrus viridis*)	435	High	High	High	CONUS_Grapes_0 (5.28), CONUS_Other.Orchards_0 (4.88), CONUS_Vegetables.and.ground.fruit_305 (32.77), CONUS_Rice_305 (11.01), CONUS_Grapes_120 (22.7), CONUS_Other.Orchards_120 (19.79)	CONUS_Other.Crops_0 (21.03), CONUS_Developed_0 (9.48), CONUS_Poultry.Litter_0 (98.75), CONUS_Open.Space.Developed_305 (45.21), CONUS_Other.Crops_305 (79.99)
Hine's emerald dragonfly	445	High	High	High	CONUS_Soybeans_0 (6.16), CONUS_Vegetables.and.ground.fruit_305	CONUS_Developed_0 (9.33), CONUS_Open.Space.Developed_0 (4.71), CONUS_Poultry.Litter_0 (85.45),

Species common name (scientific name)	**Entity ID**	**Overall vulnerability**	**Overlap**	**Magnitude of Effect**	**Uses with higher certainty of contributing to exposure[1]**	**Uses with less certainty of contributing to exposure[1]**
(*Somatochlora hineana*)					(7.82), CONUS_Soybeans_305 (31.71), CONUS_Soybeans_792 (53.1)	CONUS_Federal.Lands_0 (14.81), CONUS_Open.Space.Developed_305 (58.05), CONUS_Other.Crops_305 (18.46)
Salt Creek Tiger beetle (*Cicindela nevadica lincolniana*)	4910	High	High	High	CONUS_Soybeans_0 (30.76), CONUS_Soybeans_305 (62.42), CONUS_Soybeans_792 (67.62)	CONUS_Developed_0 (5.57), CONUS_Poultry.Litter_0 (99.83), CONUS_Open.Space.Developed_305 (64.29), CONUS_Other.Crops_305 (25.24)
Orangeblack Hawaiian damselfly (*Megalagrion xanthomelas*)	6867	High	High	High	NL48_Ag_305 (11.32)	NL48_Open.Space.Developed_0 (7.55), NL48_Federal.Lands_0 (5.66), NL48_Open.Space.Developed_305 (30.19)
Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*)	442	High	High	Medium	CONUS_Vegetables.and.ground.fruit_305 (15.69), CONUS_Soybeans_305 (26.5), CONUS_Soybeans_792 (43.83)	CONUS_Poultry.Litter_0 (81.05), CONUS_Federal.Lands_0 (13.1), CONUS_Open.Space.Developed_305 (46.69), CONUS_Other.Crops_305 (34.79)
Rota blue damselfly (*Ischnura luta*)	9282	High	High	Medium	NL48_Ag_305 (24.96)	NL48_Open.Space.Developed_305 (11.96)

[1] Each use contains the region_UDL_distance in meters with percent overlap in parentheses. Values are based on maximum upper overlap.

5.2. Mammals

In order to determine which species are likely jeopardized, EPA evaluated the potential population level exposures and effects for those species with LAA determinations for individuals. **Appendices D, H and I** provide the species-specific rationales for determining which species were likely and not likely to be jeopardized.

5.2.1. Imidacloprid

Of the 62 mammal species with LAA determinations, EPA predicted that all are not likely jeopardized by imidacloprid. Common risk modifiers that that led to a low magnitude of effect included: habitat preferences that limited a species likelihood of exposure either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix C.**

Table 5-7. Summary of individual level and population level effects determinations for listed mammals.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Mammals	62	62	0

*Based on potential for effects to an individual
**Based on potential for effects to a population

5.2.2. Thiamethoxam

Of the 47 mammal species with LAA determinations, EPA predicted that all are not likely jeopardized by thiamethoxam. Common risk modifiers that that led to a low magnitude of effect included: habitat preferences that limited a species likelihood of exposure either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix H.**

Table 5-8. Summary of individual level and population level effects determinations for listed mammals.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Mammals	47	47	0

*Based on potential for effects to an individual
**Based on potential for effects to a population

5.2.3. Clothianidin

Of the 54 mammal species with LAA determinations, EPA predicted that all are not likely jeopardized by clothianidin. Common risk modifiers that that led to a low magnitude of effect included: habitat preferences that limited a species likelihood of exposure either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix I**.

Table 5-9. Summary of individual level and population level effects determinations for listed mammals.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Mammals	54	54	0

*Based on potential for effects to an individual
**Based on potential for effects to a population

5.3. Birds

In order to determine which species are likely jeopardized, EPA evaluated the potential population level exposures and effects for those species with LAA determinations for individuals. **Appendices D, H and I** provide the species-specific rationales for determining which species were likely and not likely to be jeopardized.

5.3.1. Imidacloprid

Of the 68 bird species with LAA determinations, EPA predicted that 1 listed species is likely jeopardized by currently registered uses of imidacloprid. This species is Attwater's prairie chicken (*Tympanuchus cupido attwateri*). This species was predicted to have potential population level effects from loss of invertebrate prey and had high overlaps based on drift from several different agricultural uses likely contributing to jeopardy. **Table 5-22** summarizes the effects determinations and **Table 5-11** summarizes the species where EPA predicted the likelihood of jeopardy. EPA used several lines of evidence to support predictions of not likely jeopardy including low overlap, overlaps that were qualitatively decreased where the exposure was assumed to be highly overestimated due to exposure from drift only, or the species only had overlap with uses with less certainty of leading to exposure and were considered not likely to lead to jeopardy alone based on uses. Additionally, some species had a low magnitude of effect, with common risk modifiers including habitat preferences that limited a species likelihood of exposure, either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), species life history and the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix D**.

Table 5-10. Summary of individual level and population level effects determinations for listed birds.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Birds	68	67	1

*Based on potential for effects to an individual
**Based on potential for effects to a population

Table 5-11. Overall vulnerability, overlap and magnitude of effect for bird species with predicted likelihood of jeopardy determinations for imidacloprid. This table also includes the uses that are likely contributing to exposure.

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Attwater's prairie chicken (*Tympanuchus cupido attwateri*)	83	High	High	High	CONUS_Cotton_0 (5.46), CONUS_Cotton_30 (7.49), CONUS_Cotton_150 (16.73), CONUS_Soybeans_150 (6.30)	CONUS_Other Crops_0 (8.47), CONUS_Other Crops_120 (26.76), CONUS_Poultry Litter_0 (97.51)

[1] Each use contains the region_UDL_distance in meters with percent overlap in parentheses. Values are based on maximum upper overlap.

5.3.2. Thiamethoxam

Of the 62 bird species with LAA determinations, EPA predicted that 1 listed species is likely jeopardized by currently registered uses of imidacloprid. This species is Attwater's prairie chicken (*Tympanuchus cupido attwateri*). This species was predicted to have potential population level effects from loss of invertebrate prey and had high overlaps based on drift from several different agricultural uses likely contributing to jeopardy. **Table 5-12** summarizes the effects determinations and **Table 5-13** summarizes the species where EPA predicted the likelihood of jeopardy. EPA used several lines of evidence to support predictions of not likely jeopardy including low overlap, overlaps that were qualitatively decreased where the exposure was assumed to be highly overestimated due to exposure from drift only, or the species only had overlap with uses with less certainty of leading to exposure and were considered not likely to lead to jeopardy alone based on uses. Additionally, some species had a low magnitude of effect, with common risk modifiers including habitat preferences that limited a species likelihood of exposure, either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), species life history and the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix H**.

Table 5-12. Summary of individual level and population level effects determinations for listed birds.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Birds	62	61	1

*Based on potential for effects to an individual
**Based on potential for effects to a population

Table 5-13. Overall vulnerability, overlap and magnitude of effect for bird species with predicted likelihood of jeopardy determinations for thiamethoxam. This table also includes the uses that are likely contributing to exposure.

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Attwater's prairie chicken (*Tympanuchus cupido attwateri*)	83	High	High	High	CONUS_Cotton_0 (5.46), CONUS_Cotton_30 (7.49), CONUS_Cotton_150 (16.73), CONUS_Other Grains_150 (12.96), CONUS_Soybeans_150 (6.30)	CONUS_Other Crops_0 (8.47), CONUS_Other Crops_120 (26.76), CONUS_Open Space Developed_120 (18.01), CONUS_Poultry Litter_0 (97.51)

[1] Each use contains the region_UDL_distance in meters with percent overlap in parentheses. Values are based on maximum upper overlap.

5.3.3. Clothianidin

Of the 62 bird species with LAA determinations, EPA predicted that 1 listed species is likely jeopardized by currently registered uses of imidacloprid. This species is Attwater's prairie chicken (*Tympanuchus cupido attwateri*). This species was predicted to have potential population level effects from loss of invertebrate prey and had high overlaps based on drift from several different agricultural uses likely contributing to jeopardy. **Table 5-14** summarizes the effects determinations and **Table 5-15** summarizes the species where EPA predicted the likelihood of jeopardy. EPA used several lines of evidence to support predictions of not likely jeopardy including low overlap, overlaps that were qualitatively decreased where the exposure was assumed to be highly overestimated due to exposure from drift only, or the species only had overlap with uses with less certainty of leading to exposure and were considered not likely to lead to jeopardy alone based on uses. Additionally, some species had a low magnitude of effect, with common risk modifiers including habitat preferences that limited a species likelihood of exposure, either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), species life history and the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix I**.

Table 5-14. Summary of individual level and population level effects determinations for listed birds.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Birds	62	61	1

*Based on potential for effects to an individual
**Based on potential for effects to a population

Table 5-15. Overall vulnerability, overlap and magnitude of effect for bird species with predicted likelihood of jeopardy determinations for clothianidin. This table also includes the uses that are likely contributing to exposure.

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Attwater's prairie chicken (*Tympanuchus cupido attwateri*)	83	High	High	High	CONUS_Cotton_0 (5.46), CONUS_Cotton_0_seed (5.6), CONUS_Corn_0_seed (5.22), CONUS_Other.Grains_0_seed (6.18), CONUS_Cotton_30 (7.49), CONUS_Soybeans_150 (6.3)	CONUS_Other.Crops_0 (8.47), CONUS_Poultry.Litter_0 (97.51), CONUS_Open.Space.Developed_120 (18.01), CONUS_Other.Crops_120 (26.76)

[1] Each use contains the region_UDL_distance in meters with percent overlap in parentheses. Values are based on maximum upper overlap.

5.4. Reptiles

In order to determine which species are likely jeopardized, EPA evaluated the potential population level exposures and effects for those species with LAA determinations for individuals. **Appendices D, H and I** provide the species-specific rationales for determining which species were likely and not likely to be jeopardized.

5.4.1. Imidacloprid

Of the 28 reptiles with LAA determinations, EPA predicted that all are not likely jeopardized by imidacloprid. Common risk modifiers that that led to a low magnitude of effect included: habitat preferences that limited a species likelihood of exposure either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix D.**

Table 5-16. Summary of individual level and population level effects determinations for listed reptiles.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Reptiles	28	28	0

*Based on potential for effects to an individual
**Based on potential for effects to a population

5.4.2. Thiamethoxam

Of the 26 reptiles with LAA determinations, EPA predicted that all are not likely jeopardized by thiamethoxam. Common risk modifiers that that led to a low magnitude of effect included: habitat preferences that limited a species likelihood of exposure either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix H.**

Table 5-17. Summary of individual level and population level effects determinations for listed reptiles.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Reptiles	26	26	0

*Based on potential for effects to an individual
**Based on potential for effects to a population

5.4.3. Clothianidin

Of the 26 reptiles with LAA determinations, EPA predicted that all are not likely jeopardized by clothianidin. Common risk modifiers that that led to a low magnitude of effect included: habitat preferences that limited a species likelihood of exposure either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix I**.

Table 5-18. Summary of individual level and population level effects determinations for listed reptiles.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Reptiles	26	26	0

*Based on potential for effects to an individual
**Based on potential for effects to a population

5.5. Amphibians

In order to determine which species are likely jeopardized, EPA evaluated the potential population level exposures and effects for those species with LAA determinations for individuals. **Appendices D, E, H and I** provide the species-specific rationales for determining which species were likely and not likely to be jeopardized.

5.5.1. Imidacloprid

Of the 7 terrestrial-phase, 20 terrestrial- and aquatic-phase, and 11 aquatic-phase amphibians with LAA determinations, EPA predicted that all are not likely jeopardized by imidacloprid. Common risk modifiers that that led to a low magnitude of effect included: habitat preferences that limited a species likelihood of exposure either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix D** and **E.**

Table 5-19. Summary of individual level and population level effects determinations for listed amphibians.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Terrestrial-phase	7	7	0
Aquatic-phase	11	11	0
Terrestrial- and aquatic-phase	20	20	0

*Based on potential for effects to an individual
**Based on potential for effects to a population

5.5.2. Thiamethoxam

Of the 7 terrestrial-phase, 20 terrestrial- and aquatic-phase, and 9 aquatic-phase amphibians with LAA determinations, EPA predicted that all are not likely jeopardized by thiamethoxam. Common risk modifiers that that led to a low magnitude of effect included: habitat preferences that limited a species likelihood of exposure either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix H.**

Table 5-20. Summary of individual level and population level effects determinations for listed amphibians.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Terrestrial-phase	7	7	0
Aquatic-phase	9	9	0
Terrestrial- and aquatic-phase	20	20	0

*Based on potential for effects to an individual
**Based on potential for effects to a population

5.5.3. Clothianidin

Of the 7 terrestrial-phase, 20 terrestrial- and aquatic-phase, and 12 aquatic-phase amphibians with LAA determinations, EPA predicted that all are not likely jeopardized by thiamethoxam. Common risk modifiers that that led to a low magnitude of effect included: habitat preferences that limited a species likelihood of exposure either on the use sites or through drift (*e.g.,* due to interception by trees in forest habitat), the species relied upon multiple taxa for diet, and/or the ability to forage in unaffected areas. More details on the rationale for each species can be found in **Appendix I.**

Table 5-21. Summary of individual level and population level effects determinations for listed amphibians.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Terrestrial-phase	7	7	0
Aquatic-phase	9	9	0
Terrestrial- and aquatic-phase	20	20	0

*Based on potential for effects to an individual
**Based on potential for effects to a population

5.6. Fish

In order to determine which species are likely jeopardized, EPA evaluated the potential population level exposures and effects for those species with LAA determinations for individuals. **Appendices E, H** and **I** provide the species-specific rationales for determining which species were likely and not likely to be jeopardized.

5.6.1. Imidacloprid

Of the 114 fish species with LAA determinations, EPA predicted that 4 listed species are likely jeopardized by currently registered uses of imidacloprid including the Slackwater darter (*Etheostoma boschungi*), Relict darter (*Etheostoma chienense*), Carolina madtom (*Noturus furiosus*), and Spring pygmy sunfish (*Elassoma alabamae*). EPA predicted that 110 species are not likely jeopardized by imidacloprid. **Table 5-22** summarizes the effects determinations by taxon and **Table 5-23** summarizes the species where EPA predicted the likelihood of jeopardy. EPA used several lines of evidence to support predictions of not likely jeopardy including low overlap, probabilistic analysis in the MAGtool, overlaps that were qualitatively decreased where the exposure was assumed to be highly overestimated due to exposure from drift only, or the species only had overlap with uses with less certainty of leading to exposure and were considered not likely to lead to jeopardy alone based on uses. No jeopardy determinations were made for species with a low or medium magnitude of effect driven primarily by species-relevant UDL EECs not exceeding the TOC for aquatic vertebrates but also effect modifiers such as diet preferences that limited a species' reliance on aquatic invertebrates that could be exposed to toxic concentrations of imidacloprid, expected dilution of environmental concentrations of imidacloprid in particular aquatic systems, and poor matching between modeled EECs and species' expected habitat use. More details on the rationale for each species can be found in **Appendix E**.

Table 5-22. Summary of individual level and population level effects determinations for listed fish.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Fish	114	110	4

*Based on potential for effects to an individual
**Based on potential for effects to a population

Table 5-23. Overall vulnerability, overlap and magnitude of effect for the fish species with predicted likelihood jeopardy determinations for imidacloprid. This table also includes the uses that are likely contributing to exposure.

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Slackwater darter (*Etheostoma boschungi*)	239	High	High	Medium	High overlap (Soybeans is 13%), and medium overlap (cotton is 7%)	Dev 5%, OSD 13%. No description on percentage of diet that is insects vs. non-insects.
Relict darter (*Etheostoma chienense*)	313	Medium	High	Medium	High overlap (soybeans 29%, no other ag overlaps).	Other Row Crops is 1%. OSD is 10%. Seed overlap is 49%. No details given on percentage of diet that is insects vs. non-insects.
Carolina madtom (*Noturus furiosus*)	5288	High	High	Medium	High overlap (Cotton is 12%, Soybeans is 11%); also medium overlap (Other Row Crops is 8%, Veg and Ground fruit is 5%).	Dev is 10%, OSD 16%.
Spring pygmy sunfish (*Elassoma alabamae*)	7332	Medium	High	Medium	High overlap (Cotton is 12%, Soybeans is 14%).	Dev is 17%, OSD 21%. No details given on percentage of diet that is insects. Seed overlap is 23%.

5.6.2. Thiamethoxam

Of the 112 fish species with LAA determinations, EPA predicted that 4 listed species are likely jeopardized by currently registered uses of imidacloprid including the Slackwater darter (*Etheostoma boschungi*), Relict darter (*Etheostoma chienense*), Carolina madtom (*Noturus furiosus*), and Spring pygmy sunfish (*Elassoma alabamae*). EPA predicted that 108 species are not likely jeopardized by imidacloprid. **Table 5-24** summarizes the effects determinations by taxon and **Table 5-25** summarizes the species where EPA predicted the likelihood of jeopardy. EPA used several lines of evidence to support predictions of not likely jeopardy including low overlap, probabilistic analysis in the MAGtool, overlaps that were qualitatively decreased where the exposure was assumed to be highly overestimated due to exposure from drift only, or the species only had overlap with uses with less certainty of leading to exposure and were considered not likely to lead to jeopardy alone based on uses. No jeopardy determinations were made for species with a low or medium magnitude of effect driven primarily by species-relevant UDL EECs not exceeding the TOC for aquatic vertebrates but also effect modifiers such as diet preferences that limited a species' reliance on aquatic invertebrates that could be exposed to toxic concentrations of imidacloprid, expected dilution of environmental concentrations of imidacloprid in particular aquatic systems, and poor matching between modeled EECs and species' expected habitat use. More details on the rationale for each species can be found in **Appendix H**.

Table 5-24. Summary of individual level and population level effects determinations for listed fish.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Fish	112	108	4

*Based on potential for effects to an individual
**Based on potential for effects to a population

Table 5-25. Overall vulnerability, overlap and magnitude of effect for the fish species with predicted likelihood jeopardy determinations for thiamethoxam. This table also includes the uses that are likely contributing to exposure.

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Slackwater darter (*Etheostoma boschungi*)	239	High	High	Medium	CONUS_Cotton_30 (4.96), CONUS_Soybeans_0 (5.06), CONUS_Soybeans_30 (10.55)	CONUS_Open Space Developed_30 (11.20), CONUS_Poultry Litter_0 (66.22)
Relict darter (*Etheostoma chienense*)	313	Medium	High	Medium	CONUS_Soybeans_0 (16.06), CONUS_Soybeans_30 (27.43)	CONUS_Open Space Developed_30 (9.70), CONUS_Poultry Litter_0 (74.37)
Carolina madtom (*Noturus furiosus*)	5288	High	High	Medium	CONUS_Cotton_0 (7.50), CONUS_Cotton_30 (11.55), CONUS_Soybeans_0 (6.30), CONUS_Soybeans_30 (13.93)	CONUS_Developed_0 (10.46), CONUS_Open Space Developed_0 (7.86), CONUS_Open Space Developed_30 (19.76), CONUS_Poultry Litter_0 (99.88)
Spring pygmy sunfish (*Elassoma alabamae*)	7332	Medium	High	Medium	CONUS_Cotton_30 (6.74), CONUS_Soybeans_30 (11.08)	CONUS_Other Crops_0 (7.35), CONUS_Other Crops_30 (18.89), CONUS_Developed_0 (4.88), CONUS_Open Space Developed_30 (10.01), CONUS_Poultry Litter_0 (13.27)

5.6.3. Clothianidin

Of the 113 fish species with LAA determinations, EPA predicted that 4 listed species are likely jeopardized by currently registered uses of imidacloprid including the Slackwater darter (*Etheostoma boschungi*), Relict darter (*Etheostoma chienense*), Carolina madtom (*Noturus furiosus*), and Spring pygmy sunfish (*Elassoma alabamae*). EPA predicted that 128 species are not likely jeopardized by imidacloprid. **Table 5-26** summarizes the effects determinations by taxon and **Table 5-27** summarizes the species where EPA predicted the likelihood of jeopardy. EPA used several lines of evidence to support predictions of not likely jeopardy including low overlap, probabilistic analysis in the MAGtool, overlaps that were qualitatively decreased where the exposure was assumed to be highly overestimated due to exposure from drift only, or the species only had overlap with uses with less certainty of leading to exposure and were considered not likely to lead to jeopardy alone based on uses. No jeopardy determinations were made for species with a low or medium magnitude of effect driven primarily by species-relevant UDL EECs not exceeding the TOC for aquatic vertebrates but also effect modifiers such as diet preferences that limited a species' reliance on aquatic invertebrates that could be exposed to toxic concentrations of imidacloprid, expected dilution of environmental concentrations of imidacloprid in particular aquatic systems, and poor matching between modeled EECs and species' expected habitat use. More details on the rationale for each species can be found in **Appendix H**.

Table 5-26. Summary of individual level and population level effects determinations for listed fish.

	Number of Listed LAA* Species	Jeopardy not Likely**	Jeopardy Likely**
Fish	113	109	4

*Based on potential for effects to an individual
**Based on potential for effects to a population

Table 5-27. Overall vulnerability, overlap and magnitude of effect for the fish species with predicted likelihood jeopardy determinations for clothianidin. This table also includes the uses that are likely contributing to exposure.

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Slackwater darter (*Etheostoma boschungi*)	239	High	High	Medium	CONUS_Soybeans_0 (5.06), CONUS_Soybeans_30 (10.55)	CONUS_Open.Space.Developed_0 (5.41), CONUS_Poultry.Litter_0 (99.69), CONUS_Open.Space.Developed_30 (12.87), CONUS_Poultry.Litter_30 (99.76)
Relict darter (*Etheostoma chienense*)	313	Medium	High	Medium	CONUS_Soybeans_0 (16.06), CONUS_Soybeans_30 (27.43)	CONUS_Poultry.Litter_0 (99.68), CONUS_Open.Space.Developed_30 (10.26), CONUS_Poultry.Litter_30 (99.75)
Carolina madtom (*Noturus furiosus*)	5288	High	High	Medium	CONUS_Cotton_30 (6.57), CONUS_Soybeans_30 (11.08)	CONUS_Other.Crops_0 (7.35), CONUS_Developed_0 (4.88), CONUS_Open.Space.Developed_0 (7.22), CONUS_Poultry.Litter

Species common name (scientific name)	Entity ID	Overall vulnerability	Overlap	Magnitude of Effect	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
						_0 (99.84), CONUS_Other.Crops_30 (18.89), CONUS_Open.Space.Developed_30 (16.27), CONUS_Poultry.Litter_30 (99.86)
Spring pygmy sunfish (*Elassoma alabamae*)	7332	Medium	High	Medium	CONUS_Cotton_0 (4.59), CONUS_Soybeans_0 (6.3), CONUS_Cotton_30 (8.64), CONUS_Soybeans_30 (13.93)	CONUS_Developed_0 (10.46), CONUS_Open.Space.Developed_0 (9.3), CONUS_Poultry.Litter_0 (99.88), CONUS_Federal.Lands_0 (13.85), CONUS_Open.Space.Developed_30 (21.2), CONUS_Poultry.Litter_30 (99.9), CONUS_Federal.Lands_30 (14.13)

5.7. Plants

In order to determine which species are likely jeopardized, EPA evaluated the potential population level exposures and effects for those species with LAA determinations for individuals. **Appendices F, H** and **I** provide the species-specific rationales for determining which species were likely and not likely to be jeopardized.

5.7.1. Imidacloprid

Draft predictions of likelihood of jeopardy are presented in this section for 873 currently listed terrestrial plants that were determined as LAA in the imidacloprid BE. With imidacloprid, no direct effects on terrestrial plants are indicated for the currently registered uses since it is not toxic to terrestrial plants up to the current maximum application rates. Therefore, the potential for effects of imidacloprid on listed terrestrial plants is limited to indirect effects, including impacts on pollination and seed dispersal mechanisms. To the extent that available information identifies insects as significant contributors to seed dispersal, it will be considered in the assessment of indirect effects on listed plants. The following sections provide the predicted likelihood of jeopardy. Of the 873 species for which an LAA determination is made in the imidacloprid BE, EPA predicted there is not a likelihood of jeopardy for 715 species and predicted there is a likelihood of jeopardy for 158 species (**Table 5-28** and

Table 5-29).

EPA predicted there is not a likelihood of jeopardy for those species with <5% overlap of species range and UDLs with higher certainty of leading to exposure when considering UDL and usage refinements. Moreover, several species of listed plants have predictions of not likely for jeopardy because they are found in remote and/or forested (non-plantation) habitats, and the likelihood of any imidacloprid application impacting invertebrate populations in these remote areas is highly unlikely. EPA predicted there is a likelihood of jeopardy for those species with a final spatial overlap category of medium or high (>5%) and an effects category of high. It is noted that for some listed plants in groups 7 and 11, biotic-mediated pollination is known but the exact mechanism is unknown. Since insects are the dominant biotic pollination mechanism for plants, it is presumed that plants in these groups rely on insects as the sole pollination mechanism.

Table 5-28. Plant Assessment Groups for Predicted Likelihood of Jeopardy for Listed Terrestrial Plant Species with LAA Determinations

Plant Group	Number of Listed LAA[1] Species	Jeopardy not Likely[2]	Jeopardy Likely[2]
1 - Lichens	0	0	0
2 - Ferns and Allies	0	0	0
3 - Conifers & Cyads	4	4	0
4 - Monocots	36	36	0
5 - Monocots	9	6	3
6 - Monocots	20	18	2
7 - Monocots	18	11	7
8 - Dicots	8	8	0
9 - Dicots	242	188	54
10 - Dicots	112	74	38
11 - Dicots	424	370	54
Total	873	715	158

[1] Based on potential for effects to an individual
[2] Based on potential for effects to a population

Table 5-29. Listed Terrestrial Plants and UDLs Associated with Predicted Likelihood of Jeopardy for Imidacloprid

Entity ID	Common Name (Scientific Name)	Overall vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
508	Clara Hunt's milk-vetch (*Astragalus clarianus*)	High	High	High	CONUS_Grapes_0 (10.66), CONUS_Grapes_0_30 (10.66), CONUS_Other Orchards_0 (7.78), CONUS_Other Orchards_30 (9.65)	CONUS_Developed_0 (8.00), CONUS_Field Nurseries_0 (7.80), CONUS_Open Space Developed_0 (5.79), CONUS_Poultry Litter_0 (64.31)
513	Star cactus (*Astrophytum asterias*)	Medium	high	High	CONUS_Cotton_0 (8.44), CONUS_Cotton_30 (13.11), CONUS_Cotton_150 (28.25), CONUS_Other Row Crops_150 (7.62), CONUS_Vegetables and ground fruit_30 (7.05), CONUS_Vegetables and ground fruit_150 (20.99)	CONUS_Developed_0 (7.21), CONUS_Open Space Developed_120 (4.55), CONUS_Other Crops_0 (10.01), CONUS_Other Crops_120 (37.00), CONUS_Poultry Litter_0 (96.90)
522	Fleshy owl's-clover (*Castilleja campestris ssp. succulenta*)	Low	High	High	CONUS_Grapes_0 (16.12), CONUS_Grapes_0_30 (16.12), CONUS_Other Orchards_0 (25.32), CONUS_Other Orchards_30 (31.61), CONUS_Vegetables and ground fruit_150 (9.97)	CONUS_Developed_0 (5.99), CONUS_Field Nurseries_0 (25.57), CONUS_Other Crops_0 (6.29), CONUS_Other Crops_120 (28.90), CONUS_Poultry Litter_0 (83.89)
528	purple amole (*Chlorogalum purpureum*)	Medium	High	High	CONUS_Grapes_0 (6.95), CONUS_Grapes_0_30 (6.95), CONUS_Other Orchards_30 (4.64), CONUS_Vegetables and ground fruit_150 (4.46)	CONUS_Managed Forests_30 (4.86), CONUS_Other Crops_0 (7.96), CONUS_Other Crops_120 (37.11), CONUS_Poultry Litter_0 (79.62)
530	Suisun thistle (*Cirsium hydrophilum var. hydrophilum*)	High	Low	High		CONUS_Developed_0 (5.51), CONUS_Other Crops_0 (6.76), CONUS_Other Crops_120 (37.82), CONUS_Poultry Litter_0 (99.49)
546	Lompoc yerba santa (*Eriodictyon capitatum*)	High	High	High	CONUS_Grapes_0 (6.15), CONUS_Grapes_0_30 (6.15), CONUS_Other Orchards_30 (6.22), CONUS_Vegetables and ground fruit_30 (6.30), CONUS_Vegetables and ground fruit_150 (12.89)	CONUS_Other Crops_120 (9.47), CONUS_Poultry Litter_0 (80.06)
568	Spring Creek bladderpod (*Lesquerella perforata*)	High	High	High	CONUS_Soybeans_150 (14.33)	CONUS_Developed_0 (5.71), CONUS_Open Space Developed_0 (7.01), CONUS_Open Space Developed_120 (5.75), CONUS_Poultry Litter_0 (99.98)
570	Pitkin Marsh lily (*Lilium pardalinum*	High	high	High	CONUS_Grapes_0 (21.35), CONUS_Grapes_0_30 (21.35), CONUS_Other Orchards_0 (9.86), CONUS_Other Orchards_30 (12.62)	CONUS_Developed_0 (9.19), CONUS_Field Nurseries_0 (9.90), CONUS_Open Space Developed_0 (8.86), CONUS_Open Space

Entity ID	Common Name (Scientific Name)	Overall vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
	ssp. pitkinense)					Developed_120 (6.52), CONUS_Poultry Litter_0 (98.93)
593	Calistoga allocarya (*Plagiobothrys strictus*)	High	High	High	CONUS_Grapes_0 (12.73), CONUS_Grapes_0_30 (12.73), CONUS_Other Orchards_0 (9.48), CONUS_Other Orchards_30 (12.24)	CONUS_Field Nurseries_0 (9.48), CONUS_Poultry Litter_0 (50.96)
598	Lo`ulu (*Pritchardia remota*)	High	Medium	High	NL48_Ag_0 (6.55), NL48_Ag_120 (11.01)	NL48_Developed_0 (21.19), NL48_Managed Forests_0 (23.10), NL48_Managed Forests_30 (27.13), NL48_Open Space Developed_30 (8.04), NL48_Poultry Litter_0 (6.59)
599	Hartweg's golden sunburst (*Pseudobahia bahiifolia*)	High	Medium	High	CONUS_Other Orchards_0 (21.54), CONUS_Other Orchards_30 (26.43), CONUS_Other Row Crops_150 (5.91), CONUS_Vegetables and ground fruit_150 (10.80)	CONUS_Field Nurseries_0 (21.56), CONUS_Other Crops_0 (13.90), CONUS_Other Crops_120 (31.65), CONUS_Poultry Litter_0 (77.82)
600	San Joaquin adobe sunburst (*Pseudobahia peirsonii*)	Medium	Medium	High	CONUS_Citrus_0 (21.77), CONUS_Citrus_30 (29.87), CONUS_Cotton_150 (4.45), CONUS_Grapes_0 (7.78), CONUS_Grapes_0_30 (7.78), CONUS_Other Orchards_0 (24.17), CONUS_Other Orchards_30 (32.58), CONUS_Vegetables and ground fruit_150 (8.83)	CONUS_Field Nurseries_0 (28.94), CONUS_Open Space Developed_120 (4.86), CONUS_Other Crops_0 (12.27), CONUS_Other Crops_120 (44.34), CONUS_Poultry Litter_0 (92.28)
610	Keck's Checker-mallow (*Sidalcea keckii*)	High	High	High	CONUS_Other Orchards_30 (4.94)	CONUS_Other Crops_0 (5.92), CONUS_Other Crops_120 (18.60), CONUS_Poultry Litter_0 (53.87)
613	Spalding's Catchfly (*Silene spaldingii*)	Medium	High	High	CONUS_Vegetables and ground fruit_0 (10.98), CONUS_Vegetables and ground fruit_30 (13.28), CONUS_Vegetables and ground fruit_150 (21.03)	CONUS_Managed Forests_0 (9.00), CONUS_Managed Forests_30 (11.30), CONUS_Other Crops_0 (21.53), CONUS_Other Crops_120 (36.67), CONUS_Poultry Litter_0 (92.48)
617	Ko`oloa`ula (*Abutilon menziesii*)	High	High	High	NL48_Ag_0 (10.19), NL48_Ag_120 (14.74)	NL48_Developed_0 (6.99), NL48_Open Space Developed_30 (4.83), NL48_Poultry Litter_0 (17.42)
620	Northern wild monkshood (*Aconitum*	Medium	High	High	CONUS_Soybeans_0 (12.29), CONUS_Soybeans_30 (20.61), CONUS_Soybeans_150 (49.02)	CONUS_Open Space Developed_0 (4.60), CONUS_Open Space Developed_120 (5.65), CONUS_Poultry Litter_0 (98.50)

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	noveboracense)					
625	Little amphianthus (*Amphianthus pusillus*)	Medium	Medium	High	CONUS_Soybeans_150 (6.35)	CONUS_Managed Forests_0 (32.75), CONUS_Managed Forests_30 (48.91), CONUS_Open Space Developed_0 (6.03), CONUS_Open Space Developed_120 (5.63), CONUS_Other Crops_120 (10.59), CONUS_Poultry Litter_0 (96.59)
628	Price's potato-bean (*Apios priceana*)	Low	High	High	CONUS_Cotton_150 (6.70), CONUS_Soybeans_0 (4.95), CONUS_Soybeans_30 (9.96), CONUS_Soybeans_150 (30.86)	CONUS_Managed Forests_0 (12.44), CONUS_Managed Forests_30 (20.09), CONUS_Open Space Developed_0 (5.04), CONUS_Open Space Developed_120 (5.01), CONUS_Other Crops_120 (9.58), CONUS_Poultry Litter_0 (97.77)
636	Mead's milkweed (*Asclepias meadii*)	Medium	High	High	CONUS_Soybeans_0 (12.27), CONUS_Soybeans_30 (19.47), CONUS_Soybeans_150 (40.11)	CONUS_Developed_0 (7.53), CONUS_Open Space Developed_120 (5.99), CONUS_Other Crops_120 (13.98), CONUS_Poultry Litter_0 (96.91)
637	Four-petal pawpaw (*Asimina tetramera*)	Medium	High	High	CONUS_Citrus_30 (5.12), CONUS_Vegetables and ground fruit_30 (4.72), CONUS_Vegetables and ground fruit_150 (11.12)	CONUS_Developed_0 (11.84), CONUS_Managed Forests_0 (4.87), CONUS_Managed Forests_30 (5.76), CONUS_Open Space Developed_0 (7.02), CONUS_Other Crops_0 (13.23), CONUS_Other Crops_120 (31.91), CONUS_Poultry Litter_0 (80.70)
645	Ko`oko`olau (*Bidens micrantha ssp. kalealaha*)	High	Low	High	NL48_Ag_0 (7.17), NL48_Ag_120 (11.13)	NL48_Managed Forests_0 (11.74), NL48_Managed Forests_30 (16.04), NL48_Poultry Litter_0 (7.26)
647	Sonoma sunshine (*Blennosperma bakeri*)	High	Medium	High	CONUS_Grapes_0 (14.28), CONUS_Grapes_0_30 (14.28), CONUS_Other Orchards_0 (8.40), CONUS_Other Orchards_30 (10.76)	CONUS_Developed_0 (13.16), CONUS_Field Nurseries_0 (8.43), CONUS_Open Space Developed_0 (7.72), CONUS_Open Space Developed_120 (5.77), CONUS_Other Crops_120 (6.44), CONUS_Poultry Litter_0 (94.72)
651	Texas poppy-mallow (*Callirhoe scabriuscula*)	High	High	High	CONUS_Cotton_0 (12.47), CONUS_Cotton_30 (15.67), CONUS_Cotton_150 (29.29)	CONUS_Other Crops_120 (27.74), CONUS_Poultry Litter_0 (98.90)
655	Small-anthered bittercress	High	High	High	CONUS_Other Row Crops_150 (7.34), CONUS_Soybeans_30 (7.90), CONUS_Soybeans_150 (32.24)	CONUS_Developed_0 (6.48), CONUS_Managed Forests_0 (7.47), CONUS_Managed Forests_30 (13.96), CONUS_Open Space Developed_0 (12.49),

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	(*Cardamine micranthera*)					CONUS_Open Space Developed_120 (6.57), CONUS_Other Crops_120 (36.91), CONUS_Poultry Litter_0 (99.81)
661	Fragrant prickly-apple (*Cereus eriophorus var. fragrans*)	High	High	High	CONUS_Citrus_0 (27.96), CONUS_Citrus_30 (34.49)	CONUS_Developed_0 (9.95), CONUS_Managed Forests_0 (20.95), CONUS_Managed Forests_30 (24.48), CONUS_Field Nurseries_0 (28.05), CONUS_Open Space Developed_0 (9.67), CONUS_Other Crops_120 (19.26), CONUS_Poultry Litter_0 (91.78)
662	`Akoko (*Euphorbia celastroides var. kaenana*)	Medium	High	High	NL48_Ag_0 (7.91), NL48_Ag_120 (13.30)	NL48_Developed_0 (25.09), NL48_Managed Forests_0 (16.46), NL48_Managed Forests_30 (20.09), NL48_Open Space Developed_0 (4.53), NL48_Open Space Developed_30 (9.64), NL48_Poultry Litter_0 (7.96)
665	Ewa Plains `akoko (*Euphorbia skottsbergii var. skottsbergii*)	High	High	High	NL48_Ag_0 (8.16), NL48_Ag_120 (12.90)	NL48_Developed_0 (7.12), NL48_Managed Forests_0 (4.74), NL48_Managed Forests_30 (6.57), NL48_Open Space Developed_30 (4.70), NL48_Poultry Litter_0 (14.91)
666	Sonoma spineflower (*Chorizanthe valida*)	High	High	High	CONUS_Grapes_0 (9.68), CONUS_Grapes_0_30 (9.68), CONUS_Other Orchards_0 (4.56), CONUS_Other Orchards_30 (5.93)	CONUS_Developed_0 (6.59), CONUS_Field Nurseries_0 (4.58), CONUS_Open Space Developed_0 (4.79), CONUS_Poultry Litter_0 (75.06)
667	Chorro Creek bog thistle (*Cirsium fontinale var. obispoense*)	High	Low	High		CONUS_Open Space Developed_0 (4.79), CONUS_Other Crops_120 (16.34), CONUS_Poultry Litter_0 (81.34)
675	Short-leaved rosemary (*Conradina brevifolia*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Developed_0 (5.96), CONUS_Managed Forests_0 (9.95), CONUS_Managed Forests_30 (14.26), CONUS_Field Nurseries_0 (16.29), CONUS_Open Space Developed_0 (8.03), CONUS_Poultry Litter_0 (61.50)
677	Cumberland rosemary (*Conradina verticillata*)	Medium	High	High	CONUS_Soybeans_150 (7.19)	CONUS_Managed Forests_0 (13.79), CONUS_Managed Forests_30 (15.63), CONUS_Open Space Developed_120 (4.85), CONUS_Poultry Litter_0 (85.78)

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679	Palmate-bracted bird's beak (*Cordylanthus palmatus*)	High	High	High	CONUS_Cotton_150 (9.72), CONUS_Grapes_0 (9.95), CONUS_Grapes_0_30 (9.95), CONUS_Other Orchards_0 (34.23), CONUS_Other Orchards_30 (43.31), CONUS_Other Row Crops_0 (5.88), CONUS_Other Row Crops_150 (17.99), CONUS_Vegetables and ground fruit_0 (11.75), CONUS_Vegetables and ground fruit_30 (16.25), CONUS_Vegetables and ground fruit_150 (36.71)	CONUS_Developed_0 (8.61), CONUS_Field Nurseries_0 (34.27), CONUS_Open Space Developed_120 (4.53), CONUS_Other Crops_0 (27.78), CONUS_Other Crops_120 (59.28), CONUS_Poultry Litter_0 (98.80)
695	Scrub mint (*Dicerandra frutescens*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Developed_0 (5.96), CONUS_Managed Forests_0 (9.95), CONUS_Managed Forests_30 (14.26), CONUS_Field Nurseries_0 (16.29), CONUS_Open Space Developed_0 (8.03), CONUS_Poultry Litter_0 (61.50)
696	Lakela's mint (*Dicerandra immaculata*)	High	High	High	CONUS_Citrus_0 (22.22), CONUS_Citrus_30 (28.29), CONUS_Vegetables and ground fruit_150 (6.84)	CONUS_Developed_0 (8.92), CONUS_Managed Forests_0 (17.82), CONUS_Managed Forests_30 (20.77), CONUS_Field Nurseries_0 (22.30), CONUS_Open Space Developed_0 (8.42), CONUS_Other Crops_0 (4.75), CONUS_Other Crops_120 (22.32), CONUS_Poultry Litter_0 (89.57)
702	Black lace cactus (*Echinocereus reichenbachii var. albertii*)	High	High	High	CONUS_Cotton_0 (7.32), CONUS_Cotton_30 (8.96), CONUS_Cotton_150 (15.95)	CONUS_Other Crops_0 (5.55), CONUS_Other Crops_120 (23.91), CONUS_Poultry Litter_0 (96.47)
715	Hawaiian gardenia *(=Na`u) (Gardenia brighamii*)	High	High	High	NL48_Ag_0 (6.38), NL48_Ag_120 (9.66)	NL48_Developed_0 (5.71), NL48_Managed Forests_0 (6.94), NL48_Managed Forests_30 (9.33), NL48_Poultry Litter_0 (6.38)
716	No common name (*Geocarpon minimum*)	Low	High	High	CONUS_Soybeans_30 (6.05), CONUS_Soybeans_150 (12.74)	CONUS_Managed Forests_0 (19.00), CONUS_Managed Forests_30 (32.27), CONUS_Open Space Developed_120 (5.41), CONUS_Other Crops_120 (8.25), CONUS_Poultry Litter_0 (74.15)
718	Spreading avens (*Geum radiatum*)	High	High	High	CONUS_Soybeans_150 (6.18)	CONUS_Managed Forests_0 (15.83), CONUS_Managed Forests_30 (18.55), CONUS_Open Space Developed_0 (8.85), CONUS_Open Space

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						Developed_120 (5.29), CONUS_Other Crops_120 (7.62), CONUS_Poultry Litter_0 (83.18)
739	Slender rush-pea (*Hoffmannseg gia tenella*)	High	High	High	CONUS_Cotton_0 (28.53), CONUS_Cotton_30 (32.08), CONUS_Cotton_150 (41.72)	CONUS_Developed_0 (5.20), CONUS_Other Crops_0 (5.92), CONUS_Other Crops_120 (21.66), CONUS_Poultry Litter_0 (88.51)
740	Highlands scrub hypericum (*Hypericum cumulicola*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Developed_0 (5.96), CONUS_Managed Forests_0 (9.95), CONUS_Managed Forests_30 (14.26), CONUS_Field Nurseries_0 (16.29), CONUS_Open Space Developed_0 (8.03), CONUS_Poultry Litter_0 (61.50)
750	Lyrate bladderpod (*Lesquerella lyrata*)	High	High	High	CONUS_Cotton_0 (5.07), CONUS_Cotton_30 (7.82), CONUS_Cotton_150 (20.92), CONUS_Soybeans_0 (10.23), CONUS_Soybeans_30 (16.49), CONUS_Soybeans_150 (40.76)	CONUS_Managed Forests_0 (5.74), CONUS_Managed Forests_30 (8.80), CONUS_Open Space Developed_0 (4.57), CONUS_Open Space Developed_120 (5.29), CONUS_Other Crops_120 (8.49), CONUS_Poultry Litter_0 (99.83)
752	Scrub blazingstar (*Liatris ohlingerae*)	Medium	Medium	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Developed_0 (5.96), CONUS_Managed Forests_0 (9.95), CONUS_Managed Forests_30 (14.26), CONUS_Field Nurseries_0 (16.29), CONUS_Open Space Developed_0 (8.03), CONUS_Poultry Litter_0 (61.50)
756	Nehe (*Lipochaeta lobata var. leptophylla*)	High	Low	High	NL48_Ag_0 (8.95), NL48_Ag_120 (15.01)	NL48_Developed_0 (27.85), NL48_Managed Forests_0 (12.56), NL48_Managed Forests_30 (15.95), NL48_Open Space Developed_0 (5.07), NL48_Open Space Developed_30 (10.76), NL48_Poultry Litter_0 (9.00)
763	Walker's manioc (*Manihot walkerae*)	High	High	High	CONUS_Cotton_0 (5.15), CONUS_Cotton_30 (8.06), CONUS_Cotton_150 (17.76), CONUS_Other Row Crops_150 (4.75), CONUS_Vegetables and ground fruit_30 (4.49), CONUS_Vegetables and ground fruit_150 (13.36)	CONUS_Developed_0 (4.68), CONUS_Other Crops_0 (6.47), CONUS_Other Crops_120 (25.08), CONUS_Poultry Litter_0 (88.08)
764	Mohr's Barbara's buttons (*Marshallia mohrii*)	Medium	Medium	High	CONUS_Cotton_150 (6.94), CONUS_Soybeans_150 (14.88)	CONUS_Managed Forests_0 (19.28), CONUS_Managed Forests_30 (27.56), CONUS_Open Space Developed_0 (6.24), CONUS_Open Space Developed_120 (5.44), CONUS_Other Crops_120 (10.25), CONUS_Poultry Litter_0 (96.65)

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782	Kulu`i (*Nototrichium humile*)	High	Low	High	NL48_Ag_0 (12.15), NL48_Ag_120 (17.59)	NL48_Developed_0 (6.00), NL48_Managed Forests_0 (15.28), NL48_Managed Forests_30 (18.48), NL48_Open Space Developed_30 (5.68), NL48_Poultry Litter_0 (12.15)
784	Antioch Dunes evening-primrose (*Oenothera deltoides ssp. howellii*)	High	High	High	CONUS_Other Orchards_30 (5.25), CONUS_Vegetables and ground fruit_150 (9.66)	CONUS_Developed_0 (22.69), CONUS_Open Space Developed_0 (8.21), CONUS_Open Space Developed_120 (5.05), CONUS_Other Crops_0 (10.77), CONUS_Other Crops_120 (31.59), CONUS_Poultry Litter_0 (89.27)
789	Papery whitlow-wort (*Paronychia chartacea*)	Low	High	High	CONUS_Citrus_0 (9.21), CONUS_Citrus_30 (14.19)	CONUS_Developed_0 (7.81), CONUS_Managed Forests_0 (11.62), CONUS_Managed Forests_30 (17.46), CONUS_Field Nurseries_0 (9.28), CONUS_Open Space Developed_0 (8.24), CONUS_Poultry Litter_0 (56.21)
790	Furbish lousewort (*Pedicularis furbishiae*)	High	High	High	CONUS_Vegetables and ground fruit_30 (5.61), CONUS_Vegetables and ground fruit_150 (20.03)	CONUS_Open Space Developed_120 (5.83), CONUS_Other Crops_120 (14.95), CONUS_Poultry Litter_0 (67.86)
803	Lewton's polygala (*Polygala lewtonii*)	Medium	Medium	High	CONUS_Citrus_0 (7.53), CONUS_Citrus_30 (11.65)	CONUS_Developed_0 (6.31), CONUS_Managed Forests_0 (13.17), CONUS_Managed Forests_30 (19.46), CONUS_Field Nurseries_0 (7.60), CONUS_Open Space Developed_0 (8.08), CONUS_Other Crops_120 (4.87), CONUS_Poultry Litter_0 (63.58)
804	Wireweed (*Polygonella basiramia*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Developed_0 (5.96), CONUS_Managed Forests_0 (9.95), CONUS_Managed Forests_30 (14.26), CONUS_Field Nurseries_0 (16.29), CONUS_Open Space Developed_0 (8.03), CONUS_Poultry Litter_0 (61.50)
805	Sandlace (*Polygonella myriophylla*)	High	High	High	CONUS_Citrus_0 (10.28), CONUS_Citrus_30 (15.42)	CONUS_Developed_0 (8.50), CONUS_Managed Forests_0 (7.12), CONUS_Managed Forests_30 (10.70), CONUS_Field Nurseries_0 (10.35), CONUS_Open Space Developed_0 (8.31), CONUS_Poultry Litter_0 (51.33)

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809	Scrub plum (*Prunus geniculata*)	Medium	High	High	CONUS_Citrus_0 (11.71), CONUS_Citrus_30 (17.82)	CONUS_Developed_0 (9.24), CONUS_Managed Forests_0 (11.67), CONUS_Managed Forests_30 (17.70), CONUS_Field Nurseries_0 (11.80), CONUS_Open Space Developed_0 (9.32), CONUS_Poultry Litter_0 (57.80)
817	Miccosukee gooseberry (*Ribes echinellum*)	High	High	High	CONUS_Soybeans_150 (4.67)	CONUS_Managed Forests_0 (53.34), CONUS_Managed Forests_30 (70.08), CONUS_Open Space Developed_0 (4.52), CONUS_Open Space Developed_120 (4.95), CONUS_Other Crops_120 (6.93), CONUS_Poultry Litter_0 (81.48)
819	Green pitcher-plant (*Sarracenia oreophila*)	Medium	High	High	CONUS_Cotton_150 (7.53), CONUS_Soybeans_30 (4.97), CONUS_Soybeans_150 (25.65)	CONUS_Managed Forests_0 (14.70), CONUS_Managed Forests_30 (18.69), CONUS_Open Space Developed_0 (6.18), CONUS_Open Space Developed_120 (6.18), CONUS_Other Crops_120 (18.97), CONUS_Poultry Litter_0 (92.77)
831	Fringed campion (*Silene polypetala*)	Medium	High	High	CONUS_Cotton_0 (6.73), CONUS_Cotton_30 (10.16), CONUS_Cotton_150 (23.50), CONUS_Other Row Crops_0 (7.56), CONUS_Other Row Crops_150 (24.91), CONUS_Soybeans_150 (15.13)	CONUS_Managed Forests_0 (33.44), CONUS_Managed Forests_30 (52.85), CONUS_Open Space Developed_0 (4.95), CONUS_Open Space Developed_120 (5.23), CONUS_Other Crops_0 (7.77), CONUS_Other Crops_120 (37.54), CONUS_Poultry Litter_0 (95.32)
835	Short's goldenrod (*Solidago shortii*)	High	Medium	High	CONUS_Other Row Crops_150 (4.60), CONUS_Soybeans_0 (9.40), CONUS_Soybeans_30 (13.89), CONUS_Soybeans_150 (32.25), CONUS_Vegetables and ground fruit_150 (6.08)	CONUS_Managed Forests_0 (4.79), CONUS_Managed Forests_30 (9.38), CONUS_Open Space Developed_120 (5.67), CONUS_Poultry Litter_0 (98.76)
836	Gentian pinkroot (*Spigelia gentianoides*)	High	High	High	CONUS_Cotton_0 (7.90), CONUS_Cotton_30 (11.90), CONUS_Cotton_150 (28.08), CONUS_Other Row Crops_0 (8.05), CONUS_Other Row Crops_150 (27.67), CONUS_Soybeans_150 (19.00)	CONUS_Managed Forests_0 (33.78), CONUS_Managed Forests_30 (50.21), CONUS_Open Space Developed_0 (6.74), CONUS_Open Space Developed_120 (6.13), CONUS_Other Crops_0 (7.47), CONUS_Other Crops_120 (36.85), CONUS_Poultry Litter_0 (97.44)
845	No common name (*Tetramolopium arenarium*)	High	Medium	Medium	NL48_Ag_120 (5.22)	NL48_Managed Forests_30 (4.72)
850	No common name	High	Medium	High	NL48_Ag_120 (5.77)	

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	(*Tetramolopium rockii*)					
852	Cooley's meadowrue (*Thalictrum cooleyi*)	High	Low	High	CONUS_Cotton_0 (7.10), CONUS_Cotton_30 (9.87), CONUS_Cotton_150 (22.12), CONUS_Other Orchards_30 (6.01), CONUS_Other Row Crops_0 (5.84), CONUS_Other Row Crops_150 (16.81), CONUS_Soybeans_30 (7.50), CONUS_Soybeans_150 (25.05)	CONUS_Managed Forests_0 (20.98), CONUS_Managed Forests_30 (37.55), CONUS_Other Crops_0 (7.82), CONUS_Other Crops_120 (41.59), CONUS_Poultry Litter_0 (91.28)
862	No common name *(Vigna o-wahuensis*)	High	Medium	High	NL48_Ag_120 (6.50)	NL48_Developed_0 (7.94), NL48_Managed Forests_0 (6.23), NL48_Managed Forests_30 (8.67), NL48_Poultry Litter_0 (8.37)
874	Round-leaved chaff-flower (*Achyranthes splendens var. rotundata*)	High	Low	High	NL48_Ag_120 (5.75)	NL48_Developed_0 (9.91), NL48_Managed Forests_0 (13.91), NL48_Managed Forests_30 (17.49), NL48_Open Space Developed_30 (4.84), NL48_Poultry Litter_0 (7.31)
875	Sensitive joint-vetch (*Aeschynomene virginica*)	High	High	High	CONUS_Cotton_30 (5.92), CONUS_Cotton_150 (16.19), CONUS_Other Row Crops_150 (5.85), CONUS_Soybeans_0 (5.32), CONUS_Soybeans_30 (9.46), CONUS_Soybeans_150 (22.74), CONUS_Vegetables and ground fruit_150 (5.78)	CONUS_Managed Forests_0 (13.14), CONUS_Managed Forests_30 (21.24), CONUS_Other Crops_120 (18.38), CONUS_Poultry Litter_0 (78.64)
891	Decurrent false aster (*Boltonia decurrens*)	Medium	Medium	High	CONUS_Soybeans_0 (11.62), CONUS_Soybeans_30 (19.30), CONUS_Soybeans_150 (36.36), CONUS_Vegetables and ground fruit_150 (4.96)	CONUS_Developed_0 (6.27), CONUS_Open Space Developed_120 (5.82), CONUS_Other Crops_120 (9.24), CONUS_Poultry Litter_0 (98.25)
892	Florida bonamia (*Bonamia grandiflora*)	Medium	High	High	CONUS_Citrus_0 (8.21), CONUS_Citrus_30 (12.78)	CONUS_Developed_0 (9.18), CONUS_Managed Forests_0 (12.16), CONUS_Managed Forests_30 (18.02), CONUS_Field Nurseries_0 (8.28), CONUS_Open Space Developed_0 (9.27), CONUS_Poultry Litter_0 (62.26)
899	golden paintbrush (*Castilleja levisecta*)	Medium	High	High	CONUS_Other Orchards_30 (6.32), CONUS_Other Row Crops_150 (6.13), CONUS_Vegetables and ground fruit_0 (5.06), CONUS_Vegetables and ground fruit_30 (8.53),	CONUS_Developed_0 (17.11), CONUS_Managed Forests_0 (13.80), CONUS_Managed Forests_30 (19.48), CONUS_Open Space Developed_0 (6.59), CONUS_Open Space Developed_120 (7.07),

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					CONUS_Vegetables and ground fruit_150 (22.80)	CONUS_Other Crops_0 (15.74), CONUS_Other Crops_120 (33.38), CONUS_Poultry Litter_0 (90.88)
901	Pygmy fringe-tree (*Chionanthus pygmaeus*)	High	High	High	CONUS_Citrus_0 (10.37), CONUS_Citrus_30 (15.85)	CONUS_Developed_0 (9.12), CONUS_Managed Forests_0 (8.44), CONUS_Managed Forests_30 (12.62), CONUS_Field Nurseries_0 (10.44), CONUS_Open Space Developed_0 (8.80), CONUS_Poultry Litter_0 (61.92)
903	Monterey spineflower (*Chorizanthe pungens var. pungens*)	Medium	High	High	CONUS_Grapes_0 (4.71), CONUS_Grapes_0_30 (4.71), CONUS_Other Orchards_30 (6.97), CONUS_Vegetables and ground fruit_0 (10.28), CONUS_Vegetables and ground fruit_30 (15.61), CONUS_Vegetables and ground fruit_150 (26.99)	CONUS_Developed_0 (9.82), CONUS_Field Nurseries_0 (4.48), CONUS_Open Space Developed_0 (8.32), CONUS_Open Space Developed_120 (4.63), CONUS_Other Crops_0 (8.43), CONUS_Other Crops_120 (30.01), CONUS_Poultry Litter_0 (78.23)
904	Florida golden aster (*Chrysopsis floridana*)	Medium	Medium	High	CONUS_Citrus_0 (9.57), CONUS_Citrus_30 (14.78), CONUS_Vegetables and ground fruit_150 (6.50)	CONUS_Developed_0 (18.96), CONUS_Managed Forests_0 (5.88), CONUS_Managed Forests_30 (8.34), CONUS_Field Nurseries_0 (9.63), CONUS_Open Space Developed_0 (9.92), CONUS_Open Space Developed_120 (4.76), CONUS_Poultry Litter_0 (68.04)
905	Pitcher's thistle (*Cirsium pitcheri*)	Low	Medium	High	CONUS_Other Orchards_30 (4.62), CONUS_Soybeans_30 (8.05), CONUS_Soybeans_150 (21.98), CONUS_Vegetables and ground fruit_30 (5.53), CONUS_Vegetables and ground fruit_150 (16.64)	CONUS_Developed_0 (5.33), CONUS_Managed Forests_0 (12.42), CONUS_Managed Forests_30 (20.04), CONUS_Open Space Developed_0 (4.49), CONUS_Open Space Developed_120 (6.10), CONUS_Other Crops_120 (20.84), CONUS_Poultry Litter_0 (93.26)
907	Pigeon wings (*Clitoria fragrans*)	Medium	High	High	CONUS_Citrus_0 (9.73), CONUS_Citrus_30 (14.99)	CONUS_Developed_0 (8.11), CONUS_Managed Forests_0 (9.56), CONUS_Managed Forests_30 (14.58), CONUS_Field Nurseries_0 (9.81), CONUS_Open Space Developed_0 (8.31), CONUS_Poultry Litter_0 (53.76)
920	Leafy prairie-clover (*Dalea foliosa*)	Medium	High	High	CONUS_Soybeans_0 (18.57), CONUS_Soybeans_30 (22.03), CONUS_Soybeans_150 (35.01)	CONUS_Developed_0 (20.28), CONUS_Managed Forests_30 (6.01), CONUS_Open Space Developed_0 (7.72), CONUS_Open Space Developed_120 (6.54), CONUS_Poultry Litter_0 (94.01)
922	Beautiful pawpaw (*Deeringotha*	High	High	High	CONUS_Citrus_30 (6.63)	CONUS_Developed_0 (17.86), CONUS_Managed Forests_30 (6.43), CONUS_Open Space

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	mnus pulchellus)					Developed_0 (13.77), CONUS_Poultry Litter_0 (45.44)
924	Smooth coneflower (*Echinacea laevigata*)	Medium	Medium	High	CONUS_Cotton_150 (6.82), CONUS_Other Row Crops_150 (5.07), CONUS_Soybeans_150 (18.61)	CONUS_Developed_0 (7.04), CONUS_Managed Forests_0 (19.98), CONUS_Managed Forests_30 (32.70), CONUS_Open Space Developed_0 (8.75), CONUS_Open Space Developed_120 (6.06), CONUS_Other Crops_120 (25.26), CONUS_Poultry Litter_0 (94.66)
929	Scrub buckwheat (*Eriogonum longifolium var. gnaphalifolium*)	Medium	High	High	CONUS_Citrus_0 (7.91), CONUS_Citrus_30 (12.28)	CONUS_Developed_0 (7.50), CONUS_Managed Forests_0 (14.02), CONUS_Managed Forests_30 (20.85), CONUS_Field Nurseries_0 (7.99), CONUS_Open Space Developed_0 (8.71), CONUS_Other Crops_120 (4.69), CONUS_Poultry Litter_0 (59.88)
930	Clay-Loving wild buckwheat (*Eriogonum pelinophilum*)	High	High	High	CONUS_Vegetables and ground fruit_0 (6.92), CONUS_Vegetables and ground fruit_30 (11.71), CONUS_Vegetables and ground fruit_150 (29.35)	CONUS_Developed_0 (4.59), CONUS_Other Crops_120 (26.28), CONUS_Poultry Litter_0 (91.63)
932	Snakeroot (*Eryngium cuneifolium*)	High	High	High	CONUS_Citrus_0 (18.91), CONUS_Citrus_30 (26.11)	CONUS_Managed Forests_0 (9.09), CONUS_Managed Forests_30 (12.47), CONUS_Field Nurseries_0 (18.99), CONUS_Open Space Developed_0 (6.21), CONUS_Poultry Litter_0 (72.50)
933	Menzies' wallflower (*Erysimum menziesii*)	High	High	High	CONUS_Other Orchards_0 (9.67), CONUS_Other Orchards_30 (12.69), CONUS_Vegetables and ground fruit_150 (9.26)	CONUS_Managed Forests_0 (12.72), CONUS_Managed Forests_30 (15.18), CONUS_Field Nurseries_0 (12.41), CONUS_Other Crops_0 (8.23), CONUS_Other Crops_120 (20.49), CONUS_Poultry Litter_0 (52.51)
940	Monterey gilia (*Gilia tenuiflora ssp. arenaria*)	Medium	High	High	CONUS_Other Orchards_30 (4.79), CONUS_Vegetables and ground fruit_0 (8.02), CONUS_Vegetables and ground fruit_30 (14.20), CONUS_Vegetables and ground fruit_150 (28.00)	CONUS_Developed_0 (16.00), CONUS_Open Space Developed_0 (10.57), CONUS_Open Space Developed_120 (5.68), CONUS_Other Crops_0 (8.55), CONUS_Other Crops_120 (30.39), CONUS_Poultry Litter_0 (85.00)
943	Roan Mountain bluet	High	High	High	CONUS_Soybeans_150 (4.55)	CONUS_Managed Forests_0 (14.51), CONUS_Managed Forests_30 (17.50), CONUS_Open Space Developed_0 (7.16), CONUS_Open Space

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	(*Hedyotis purpurea var. montana*)					Developed_120 (5.70), CONUS_Other Crops_120 (5.85), CONUS_Poultry Litter_0 (92.15)
945	Schweinitz's sunflower (*Helianthus schweinitzii*)	Medium	Medium	High	CONUS_Cotton_150 (6.04), CONUS_Soybeans_30 (7.97), CONUS_Soybeans_150 (33.30)	CONUS_Developed_0 (8.19), CONUS_Managed Forests_0 (13.88), CONUS_Managed Forests_30 (23.00), CONUS_Open Space Developed_0 (10.16), CONUS_Open Space Developed_120 (6.49), CONUS_Other Crops_0 (5.07), CONUS_Other Crops_120 (40.13), CONUS_Poultry Litter_0 (98.80)
946	Swamp pink (*Helonias bullata*)	Medium	High	High	CONUS_Soybeans_30 (5.16), CONUS_Soybeans_150 (15.40), CONUS_Vegetables and ground fruit_150 (10.45)	CONUS_Developed_0 (7.88), CONUS_Managed Forests_0 (17.08), CONUS_Managed Forests_30 (21.23), CONUS_Open Space Developed_0 (9.69), CONUS_Open Space Developed_120 (5.61), CONUS_Other Crops_120 (15.82), CONUS_Poultry Litter_0 (87.53)
957	Prairie bush-clover (*Lespedeza leptostachya*)	Low	High	High	CONUS_Soybeans_0 (6.99), CONUS_Soybeans_30 (16.26), CONUS_Soybeans_150 (33.99)	CONUS_Open Space Developed_120 (6.03), CONUS_Poultry Litter_0 (99.05)
960	Pondberry (*Lindera melissifolia*)	Medium	High	High	CONUS_Cotton_0 (5.17), CONUS_Cotton_30 (7.67), CONUS_Cotton_150 (19.08), CONUS_Other Row Crops_150 (9.06), CONUS_Soybeans_30 (8.45), CONUS_Soybeans_150 (21.36)	CONUS_Managed Forests_0 (14.40), CONUS_Managed Forests_30 (25.18), CONUS_Open Space Developed_120 (4.56), CONUS_Other Crops_0 (9.19), CONUS_Other Crops_120 (36.11), CONUS_Poultry Litter_0 (90.05)
964	Nehe (*Lipochaeta waimeaensis*)	Medium	Low	High	NL48_Ag_0 (6.55), NL48_Ag_120 (11.01)	NL48_Developed_0 (21.19), NL48_Managed Forests_0 (23.10), NL48_Managed Forests_30 (27.13), NL48_Open Space Developed_30 (8.04), NL48_Poultry Litter_0 (6.59)
967	Rough-leaved loosestrife (*Lysimachia asperulaefolia*)	Medium	High	High	CONUS_Cotton_30 (5.53), CONUS_Cotton_150 (17.03), CONUS_Other Row Crops_150 (7.48), CONUS_Soybeans_30 (6.71), CONUS_Soybeans_150 (24.10)	CONUS_Managed Forests_0 (19.77), CONUS_Managed Forests_30 (34.54), CONUS_Open Space Developed_0 (4.73), CONUS_Other Crops_0 (5.15), CONUS_Other Crops_120 (31.92), CONUS_Poultry Litter_0 (87.78)
969	Michigan monkey-flower (*Mimulus*	High	High	High	CONUS_Other Orchards_30 (5.86)	CONUS_Managed Forests_0 (21.32), CONUS_Managed Forests_30 (30.47), CONUS_Open Space Developed_120 (5.47), CONUS_Other Crops_120 (15.79), CONUS_Poultry Litter_0 (91.15)

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	michiganensis)					
976	Canby's dropwort (*Oxypolis canbyi*)	Medium	High	High	CONUS_Cotton_0 (5.05), CONUS_Cotton_30 (8.79), CONUS_Cotton_150 (24.33), CONUS_Other Row Crops_150 (17.47), CONUS_Soybeans_30 (5.47), CONUS_Soybeans_150 (23.89)	CONUS_Managed Forests_0 (21.35), CONUS_Managed Forests_30 (38.07), CONUS_Open Space Developed_0 (4.96), CONUS_Open Space Developed_120 (4.68), CONUS_Other Crops_0 (8.21), CONUS_Other Crops_120 (38.82), CONUS_Poultry Litter_0 (90.83)
977	Fassett's locoweed (*Oxytropis campestris var. chartacea*)	Medium	High	High	CONUS_Soybeans_30 (7.62), CONUS_Soybeans_150 (20.93), CONUS_Vegetables and ground fruit_30 (5.17), CONUS_Vegetables and ground fruit_150 (11.17)	CONUS_Managed Forests_0 (5.83), CONUS_Managed Forests_30 (10.02), CONUS_Open Space Developed_120 (5.22), CONUS_Other Crops_120 (5.58), CONUS_Poultry Litter_0 (85.79)
978	Blowout penstemon (*Penstemon haydenii*)	High	High	High	CONUS_Soybeans_150 (5.73), CONUS_Vegetables and ground fruit_150 (4.44)	CONUS_Other Crops_120 (7.35), CONUS_Poultry Litter_0 (73.66)
984	Eastern prairie fringed orchid (*Platanthera leucophaea*)	Medium	High	High	CONUS_Soybeans_30 (11.44), CONUS_Soybeans_150 (30.63), CONUS_Vegetables and ground fruit_150 (8.53)	CONUS_Developed_0 (6.41), CONUS_Open Space Developed_0 (4.63), CONUS_Open Space Developed_120 (6.22), CONUS_Other Crops_120 (12.77), CONUS_Poultry Litter_0 (97.04)
989	Tiny polygala (*Polygala smallii*)	High	Low	High	CONUS_Citrus_30 (5.70), CONUS_Vegetables and ground fruit_150 (8.68)	CONUS_Developed_0 (14.25), CONUS_Managed Forests_0 (5.07), CONUS_Managed Forests_30 (6.07), CONUS_Field Nurseries_0 (5.53), CONUS_Open Space Developed_0 (6.55), CONUS_Other Crops_0 (6.94), CONUS_Other Crops_120 (18.99), CONUS_Poultry Litter_0 (68.67)
991	Harperella (*Ptilimnium nodosum*)	Medium	High	High	CONUS_Cotton_150 (6.59), CONUS_Other Row Crops_150 (4.81), CONUS_Soybeans_150 (15.74)	CONUS_Managed Forests_0 (18.67), CONUS_Managed Forests_30 (29.35), CONUS_Open Space Developed_0 (4.98), CONUS_Open Space Developed_120 (5.34), CONUS_Other Crops_120 (18.77), CONUS_Poultry Litter_0 (72.39)
992	Michaux's sumac (*Rhus michauxii*)	Medium	High	High	CONUS_Cotton_30 (4.48), CONUS_Cotton_150 (14.67), CONUS_Other Row Crops_150 (9.52), CONUS_Soybeans_30 (7.89),	CONUS_Developed_0 (9.61), CONUS_Managed Forests_0 (21.46), CONUS_Managed Forests_30 (36.49), CONUS_Open Space Developed_0 (10.21), CONUS_Open Space Developed_120 (6.03),

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					CONUS_Soybeans_150 (29.47), CONUS_Vegetables and ground fruit_150 (6.23)	CONUS_Other Crops_0 (5.28), CONUS_Other Crops_120 (37.72), CONUS_Poultry Litter_0 (96.97)
994	Alabama canebrake pitcher-plant (*Sarracenia rubra ssp. alabamensis*)	High	High	High	CONUS_Cotton_150 (13.03), CONUS_Soybeans_150 (16.04), CONUS_Vegetables and ground fruit_150 (5.23)	CONUS_Managed Forests_0 (29.35), CONUS_Managed Forests_30 (48.98), CONUS_Open Space Developed_0 (4.78), CONUS_Open Space Developed_120 (5.45), CONUS_Other Crops_120 (26.11), CONUS_Poultry Litter_0 (99.19)
995	Mountain sweet pitcher-plant (*Sarracenia rubra ssp. jonesii*)	High	High	High	CONUS_Soybeans_150 (8.07)	CONUS_Developed_0 (7.39), CONUS_Managed Forests_0 (16.61), CONUS_Managed Forests_30 (22.80), CONUS_Open Space Developed_0 (12.88), CONUS_Open Space Developed_120 (5.94), CONUS_Other Crops_120 (12.68), CONUS_Poultry Litter_0 (85.47)
996	American chaffseed (*Schwalbea americana*)	Medium	High	High	CONUS_Cotton_150 (7.74), CONUS_Other Row Crops_150 (7.84), CONUS_Soybeans_150 (7.94)	CONUS_Developed_0 (6.64), CONUS_Managed Forests_0 (16.23), CONUS_Managed Forests_30 (26.39), CONUS_Open Space Developed_0 (6.46), CONUS_Other Crops_120 (19.36), CONUS_Poultry Litter_0 (75.77)
999	Ohai (*Sesbania tomentosa*)	High	High	High	NL48_Ag_120 (6.36)	NL48_Developed_0 (10.10), NL48_Managed Forests_30 (5.77), NL48_Open Space Developed_30 (4.92), NL48_Poultry Litter_0 (8.20)
1008	Howell''s spectacular thelypody (*Thelypodium howellii ssp. spectabilis*)	High	High	High	CONUS_Vegetables and ground fruit_0 (7.05), CONUS_Vegetables and ground fruit_30 (9.29), CONUS_Vegetables and ground fruit_150 (19.01)	CONUS_Other Crops_120 (18.43), CONUS_Poultry Litter_0 (89.04)
1014	Wide-leaf warea (*Warea amplexifolia*)	High	High	High	CONUS_Citrus_0 (7.94), CONUS_Citrus_30 (12.82)	CONUS_Developed_0 (8.98), CONUS_Managed Forests_0 (9.66), CONUS_Managed Forests_30 (15.00), CONUS_Field Nurseries_0 (8.02), CONUS_Open Space Developed_0 (8.72), CONUS_Poultry Litter_0 (50.10)
1015	Carter's mustard (*Warea carteri*)	High	High	High	CONUS_Citrus_0 (7.48), CONUS_Citrus_30 (11.11)	CONUS_Developed_0 (8.52), CONUS_Managed Forests_0 (5.13), CONUS_Managed Forests_30 (7.50), CONUS_Field Nurseries_0 (8.62), CONUS_Open Space Developed_0 (6.31),

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						CONUS_Other Crops_120 (5.77), CONUS_Poultry Litter_0 (61.31)
1017	Tennessee yellow-eyed grass (*Xyris tennesseensis*)	High	High	High	CONUS_Cotton_150 (4.45), CONUS_Soybeans_150 (12.72)	CONUS_Developed_0 (5.52), CONUS_Managed Forests_0 (19.94), CONUS_Managed Forests_30 (28.30), CONUS_Open Space Developed_0 (7.89), CONUS_Open Space Developed_120 (5.58), CONUS_Other Crops_120 (6.40), CONUS_Poultry Litter_0 (96.13)
1023	Pennell's bird's-beak (*Cordylanthus tenuis ssp. capillaris*)	High	High	High	CONUS_Grapes_0 (18.78), CONUS_Grapes_0_30 (18.78), CONUS_Other Orchards_0 (11.73), CONUS_Other Orchards_30 (14.39)	CONUS_Field Nurseries_0 (11.75), CONUS_Open Space Developed_0 (4.61), CONUS_Open Space Developed_120 (4.86), CONUS_Poultry Litter_0 (56.08)
1031	Scrub lupine (*Lupinus aridorum*)	High	High	High	CONUS_Citrus_0 (8.17), CONUS_Citrus_30 (12.80)	CONUS_Developed_0 (9.69), CONUS_Managed Forests_0 (6.63), CONUS_Managed Forests_30 (10.27), CONUS_Field Nurseries_0 (8.24), CONUS_Open Space Developed_0 (8.82), CONUS_Poultry Litter_0 (46.15)
1036	Ruth's golden aster (*Pityopsis ruthii*)	High	Medium	High	CONUS_Soybeans_150 (10.68)	CONUS_Managed Forests_0 (50.14), CONUS_Managed Forests_30 (55.92), CONUS_Open Space Developed_120 (4.85), CONUS_Poultry Litter_0 (60.27)
1039	Virginia spiraea (*Spiraea virginiana*)	Medium	High	High	CONUS_Soybeans_150 (7.99)	CONUS_Managed Forests_0 (14.73), CONUS_Managed Forests_30 (17.05), CONUS_Open Space Developed_0 (5.52), CONUS_Open Space Developed_120 (5.01), CONUS_Poultry Litter_0 (83.14)
1043	Crenulate lead-plant (*Amorpha crenulata*)	High	High	High	CONUS_Other Orchards_30 (5.50), CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24)	CONUS_Developed_0 (13.78), CONUS_Other Crops_120 (8.83), CONUS_Poultry Litter_0 (47.80)
1044	Small's milkpea (*Galactia smallii*)	High	High	High	CONUS_Other Orchards_30 (5.50), CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24)	CONUS_Developed_0 (13.78), CONUS_Other Crops_120 (8.83), CONUS_Poultry Litter_0 (47.80)
1045	Texas prairie dawn-flower	Medium	Low	High	CONUS_Cotton_30 (5.54), CONUS_Cotton_150 (12.90), CONUS_Soybeans_150 (8.32)	CONUS_Developed_0 (31.13), CONUS_Managed Forests_0 (11.03), CONUS_Managed Forests_30 (15.28), CONUS_Open Space Developed_0 (9.60),

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	(*Hymenoxys texana*)					CONUS_Open Space Developed_120 (6.79), CONUS_Other Crops_0 (7.76), CONUS_Other Crops_120 (32.51), CONUS_Poultry Litter_0 (85.27)
1046	Garrett's mint (*Dicerandra christmanii*)	High	High	High	CONUS_Citrus_0 (18.91), CONUS_Citrus_30 (26.11)	CONUS_Managed Forests_0 (9.09), CONUS_Managed Forests_30 (12.47), CONUS_Field Nurseries_0 (18.99), CONUS_Open Space Developed_0 (6.21), CONUS_Poultry Litter_0 (72.50)
1048	Alabama leather flower (*Clematis socialis*)	High	High	High	CONUS_Cotton_30 (5.90), CONUS_Cotton_150 (13.71), CONUS_Soybeans_30 (6.87), CONUS_Soybeans_150 (23.60)	CONUS_Managed Forests_0 (11.82), CONUS_Managed Forests_30 (17.78), CONUS_Open Space Developed_0 (6.34), CONUS_Open Space Developed_120 (5.50), CONUS_Other Crops_120 (21.67), CONUS_Poultry Litter_0 (99.67)
1055	Kern mallow (*Eremalche kernensis*)	High	High	High	CONUS_Cotton_0 (4.54), CONUS_Cotton_30 (5.52), CONUS_Cotton_150 (9.83), CONUS_Other Orchards_0 (22.77), CONUS_Other Orchards_30 (27.23), CONUS_Vegetables and ground fruit_30 (5.75), CONUS_Vegetables and ground fruit_150 (12.39)	CONUS_Field Nurseries_0 (22.81), CONUS_Open Space Developed_0 (6.39), CONUS_Other Crops_0 (24.82), CONUS_Other Crops_120 (46.25), CONUS_Poultry Litter_0 (83.32)
1058	Mountain golden heather (*Hudsonia montana*)	High	High	High	CONUS_Soybeans_150 (13.94)	CONUS_Managed Forests_0 (26.73), CONUS_Managed Forests_30 (32.45), CONUS_Open Space Developed_0 (7.95), CONUS_Open Space Developed_120 (4.94), CONUS_Other Crops_120 (16.47), CONUS_Poultry Litter_0 (85.95)
1063	Lo`ulu (*Pritchardia schattaueri*)	High	Medium	High	NL48_Ag_0 (24.21), NL48_Ag_120 (41.97)	NL48_Managed Forests_0 (13.09), NL48_Managed Forests_30 (14.37), NL48_Poultry Litter_0 (24.21)
1077	Texas ayenia (*Ayenia limitaris*)	High	High	High	CONUS_Cotton_0 (20.35), CONUS_Cotton_30 (27.81), CONUS_Cotton_150 (47.70), CONUS_Other Row Crops_150 (4.80), CONUS_Vegetables and ground fruit_30 (6.84), CONUS_Vegetables and ground fruit_150 (22.67)	CONUS_Developed_0 (8.25), CONUS_Open Space Developed_0 (4.52), CONUS_Open Space Developed_120 (4.77), CONUS_Other Crops_0 (12.17), CONUS_Other Crops_120 (48.77), CONUS_Poultry Litter_0 (92.58)
1078	California jewelflower (*Caulanthus californicus*)	Medium	High	High	CONUS_Other Orchards_0 (9.42), CONUS_Other Orchards_30 (12.05), CONUS_Vegetables and ground fruit_30 (4.51), CONUS_Vegetables and ground fruit_150 (8.99)	CONUS_Field Nurseries_0 (9.76), CONUS_Other Crops_0 (12.79), CONUS_Other Crops_120 (33.01), CONUS_Poultry Litter_0 (81.50)

Entity ID	Common Name (Scientific Name)	Overall vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
1080	Western prairie fringed Orchid (*Platanthera praeclara*)	Medium	high	High	CONUS_Soybeans_30 (7.45), CONUS_Soybeans_150 (17.61)	CONUS_Other Crops_120 (9.63), CONUS_Poultry Litter_0 (85.48)
1081	Butte County meadowfoam (*Limnanthes floccosa ssp. californica*)	High	medium	High	CONUS_Other Orchards_0 (26.23), CONUS_Other Orchards_30 (29.73), CONUS_Vegetables and ground fruit_150 (4.94)	CONUS_Developed_0 (8.39), CONUS_Field Nurseries_0 (26.24), CONUS_Other Crops_0 (9.94), CONUS_Other Crops_120 (32.36), CONUS_Poultry Litter_0 (70.12)
1082	Bakersfield cactus (*Opuntia treleasei*)	High	high	High	CONUS_Citrus_0 (11.16), CONUS_Citrus_30 (15.33), CONUS_Cotton_0 (4.53), CONUS_Cotton_30 (6.30), CONUS_Cotton_150 (13.99), CONUS_Grapes_0 (11.47), CONUS_Grapes_0_30 (11.47), CONUS_Other Orchards_0 (22.97), CONUS_Other Orchards_30 (30.11), CONUS_Vegetables and ground fruit_0 (10.80), CONUS_Vegetables and ground fruit_30 (15.42), CONUS_Vegetables and ground fruit_150 (31.97)	CONUS_Developed_0 (6.95), CONUS_Field Nurseries_0 (25.89), CONUS_Open Space Developed_0 (4.74), CONUS_Open Space Developed_120 (4.58), CONUS_Other Crops_0 (19.56), CONUS_Other Crops_120 (44.39), CONUS_Poultry Litter_0 (83.30)
1087	Guthrie's (=Pyne's) ground-plum (*Astragalus bibullatus*)	High	high	High	CONUS_Soybeans_30 (5.70), CONUS_Soybeans_150 (16.99)	CONUS_Developed_0 (16.83), CONUS_Managed Forests_30 (8.04), CONUS_Open Space Developed_0 (13.16), CONUS_Open Space Developed_120 (5.81), CONUS_Poultry Litter_0 (97.79)
1093	Awiwi (*Centaurium sebaeoides*)	High	High	High	NL48_Ag_0 (10.09), NL48_Ag_120 (15.86)	NL48_Developed_0 (14.55), NL48_Managed Forests_30 (4.89), NL48_Open Space Developed_30 (8.72), NL48_Poultry Litter_0 (15.89)
1094	`Akoko (*Euphorbia kuwaleana*)	High	High	High	NL48_Ag_0 (13.42), NL48_Ag_120 (21.27)	NL48_Developed_0 (18.98), NL48_Managed Forests_0 (12.16), NL48_Managed Forests_30 (15.49), NL48_Open Space Developed_30 (5.58), NL48_Poultry Litter_0 (13.42)
1116	Nioi (*Eugenia koolauensis*)	High	High	High	NL48_Ag_0 (10.91), NL48_Ag_120 (16.01)	NL48_Developed_0 (11.77), NL48_Managed Forests_0 (15.50), NL48_Managed Forests_30 (18.91), NL48_Poultry Litter_0 (10.91)
1119	Gaviota Tarplant (*Deinandra*	High	medium	High	CONUS_Vegetables and ground fruit_150 (6.60)	CONUS_Managed Forests_0 (5.09), CONUS_Managed Forests_30 (7.40), CONUS_Other Crops_120 (5.62), CONUS_Poultry Litter_0 (69.07)

Entity ID	Common Name (Scientific Name)	Overall vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
	increscens ssp. villosa)					
1123	San Joaquin wooly-threads (*Monolopia (=Lembertia) congdonii*)	Medium	Low	High	CONUS_Cotton_150 (8.26), CONUS_Other Orchards_0 (20.78), CONUS_Other Orchards_30 (25.37), CONUS_Vegetables and ground fruit_0 (8.07), CONUS_Vegetables and ground fruit_30 (10.25), CONUS_Vegetables and ground fruit_150 (18.24)	CONUS_Field Nurseries_0 (21.14), CONUS_Other Crops_0 (25.44), CONUS_Other Crops_120 (50.81), CONUS_Poultry Litter_0 (86.62)
1142	Lo`ulu (*Pritchardia maideniana*)	High	medium	High	NL48_Ag_0 (9.11), NL48_Ag_120 (18.99)	NL48_Developed_0 (4.72), NL48_Managed Forests_0 (6.86), NL48_Managed Forests_30 (9.12), NL48_Poultry Litter_0 (9.11)
1150	Leedy's roseroot (*Rhodiola integrifolia ssp. leedyi*)	High	high	High	CONUS_Soybeans_0 (10.70), CONUS_Soybeans_30 (13.62), CONUS_Soybeans_150 (21.37), CONUS_Vegetables and ground fruit_150 (8.75)	CONUS_Developed_0 (17.04), CONUS_Managed Forests_30 (5.52), CONUS_Open Space Developed_0 (8.80), CONUS_Poultry Litter_0 (62.03)
1153	White irisette (*Sisyrinchium dichotomum*)	High	high	High	CONUS_Soybeans_150 (16.89)	CONUS_Developed_0 (6.87), CONUS_Managed Forests_0 (16.80), CONUS_Managed Forests_30 (25.81), CONUS_Open Space Developed_0 (11.61), CONUS_Open Space Developed_120 (6.18), CONUS_Other Crops_120 (21.94), CONUS_Poultry Litter_0 (93.25)
1154	No common name (*Spermolepis hawaiiensis*)	High	High	High	NL48_Ag_120 (8.00)	NL48_Developed_0 (6.57), NL48_Managed Forests_0 (10.75), NL48_Managed Forests_30 (14.86), NL48_Poultry Litter_0 (9.11)
1229	Deltoid spurge (*Chamaesyce deltoidea ssp. deltoidea*)	High	High	High	CONUS_Other Orchards_30 (5.50), CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24)	CONUS_Developed_0 (13.78), CONUS_Other Crops_120 (8.83), CONUS_Poultry Litter_0 (47.80)
1233	Willamette daisy (*Erigeron decumbens*)	High	Low	High	CONUS_Other Orchards_30 (4.94), CONUS_Other Row Crops_150 (5.00), CONUS_Vegetables and ground fruit_30 (6.02), CONUS_Vegetables and ground fruit_150 (15.40)	CONUS_Developed_0 (6.65), CONUS_Managed Forests_0 (28.43), CONUS_Managed Forests_30 (32.91), CONUS_Other Crops_0 (12.58), CONUS_Other Crops_120 (24.51), CONUS_Poultry Litter_0 (59.74)
1234	Florida ziziphus	High	high	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Developed_0 (5.96), CONUS_Managed Forests_0 (9.95), CONUS_Managed Forests_30

Entity ID	Common Name (Scientific Name)	Overall vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
	(*Ziziphus celata*)					(14.26), CONUS_Field Nurseries_0 (16.29), CONUS_Open Space Developed_0 (8.03), CONUS_Poultry Litter_0 (61.50)
1235	Avon Park harebells (*Crotalaria avonensis*)	High	high	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Developed_0 (5.96), CONUS_Managed Forests_0 (9.95), CONUS_Managed Forests_30 (14.26), CONUS_Field Nurseries_0 (16.29), CONUS_Open Space Developed_0 (8.03), CONUS_Poultry Litter_0 (61.50)
1264	No common name (*Nesogenes rotensis*)	High	High	High	NL48_Ag_120 (6.42)	NL48_Open Space Developed_30 (8.29)
1415	White fringeless orchid (*Platanthera integrilabia*)	Medium	high	High	CONUS_Soybeans_150 (12.84)	CONUS_Managed Forests_0 (22.15), CONUS_Managed Forests_30 (30.77), CONUS_Open Space Developed_0 (6.04), CONUS_Open Space Developed_120 (5.46), CONUS_Poultry Litter_0 (91.11)
1710	Fleshy-fruit gladecress (*Leavenworthia crassa*)	High	high	High	CONUS_Cotton_30 (5.37), CONUS_Cotton_150 (15.30), CONUS_Soybeans_0 (7.92), CONUS_Soybeans_30 (13.28), CONUS_Soybeans_150 (40.94)	CONUS_Managed Forests_0 (5.40), CONUS_Managed Forests_30 (7.80), CONUS_Open Space Developed_0 (5.90), CONUS_Open Space Developed_120 (6.45), CONUS_Other Crops_120 (9.48), CONUS_Poultry Litter_0 (99.19)
1831	Short's bladderpod (*Physaria globosa*)	Medium	high	High	CONUS_Soybeans_0 (8.08), CONUS_Soybeans_30 (11.15), CONUS_Soybeans_150 (25.02)	CONUS_Developed_0 (5.31), CONUS_Managed Forests_0 (6.02), CONUS_Managed Forests_30 (10.83), CONUS_Open Space Developed_0 (6.53), CONUS_Open Space Developed_120 (5.79), CONUS_Poultry Litter_0 (98.63)
1881	Whorled Sunflower (*Helianthus verticillatus*)	High	medium	High	CONUS_Cotton_150 (9.28), CONUS_Soybeans_30 (4.52), CONUS_Soybeans_150 (17.43)	CONUS_Managed Forests_0 (26.47), CONUS_Managed Forests_30 (43.25), CONUS_Open Space Developed_120 (4.77), CONUS_Other Crops_120 (14.66), CONUS_Poultry Litter_0 (94.47)
2211	Aboriginal Prickly-apple (*Harrisia (=Cereus) aboriginum (=gracilis)*)	High	high	High	CONUS_Citrus_30 (6.14)	CONUS_Developed_0 (16.26), CONUS_Open Space Developed_0 (13.74), CONUS_Poultry Litter_0 (53.72)

Entity ID	Common Name (Scientific Name)	Overall vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
2278	Ko`oko`olau (*Bidens amplectens*)	High	Low	High	NL48_Ag_0 (8.86), NL48_Ag_120 (13.40)	NL48_Developed_0 (5.70), NL48_Managed Forests_0 (21.13), NL48_Managed Forests_30 (25.52), NL48_Poultry Litter_0 (8.86)
2810	Slickspot peppergrass (*Lepidium papilliferum*)	Medium	high	High	CONUS_Other Row Crops_150 (8.55), CONUS_Vegetables and ground fruit_0 (5.32), CONUS_Vegetables and ground fruit_30 (8.05), CONUS_Vegetables and ground fruit_150 (17.38)	CONUS_Other Crops_120 (22.82), CONUS_Poultry Litter_0 (72.85)
3116	Ihi (*Portulaca villosa*)	High	High	High	NL48_Ag_120 (8.56)	NL48_Developed_0 (11.43), NL48_Managed Forests_30 (5.98), NL48_Open Space Developed_30 (4.87), NL48_Poultry Litter_0 (11.00)
4030	No common name (*Schiedea salicaria*)	High	High	High	NL48_Ag_0 (9.94), NL48_Ag_120 (17.86)	NL48_Managed Forests_0 (10.84), NL48_Managed Forests_30 (16.73), NL48_Poultry Litter_0 (9.94)
4253	Florida brickell-bush (*Brickellia mosieri*)	High	medium	High	CONUS_Other Orchards_30 (5.50), CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24)	CONUS_Developed_0 (13.78), CONUS_Other Crops_120 (8.83), CONUS_Poultry Litter_0 (47.80)
4420	Ko`oko`olau (*Bidens micrantha ssp. ctenophylla*)	High		High	CONUS_Other Orchards_30 (5.50), CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24)	CONUS_Developed_0 (13.78), CONUS_Other Crops_120 (8.83), CONUS_Poultry Litter_0 (47.80)
4589	`Ena`ena (*Pseudognaphalium sandwicensium var. molokaiense*)	High		High	NL48_Ag_120 (5.27)	NL48_Managed Forests_0 (12.34), NL48_Managed Forests_30 (16.02)
5334	Georgia rockcress (*Arabis georgiana*)	High	high	High	NL48_Ag_120 (7.54)	NL48_Managed Forests_0 (10.60), NL48_Managed Forests_30 (14.25), NL48_Poultry Litter_0 (9.04)
6672	Popolo (*Solanum nelsonii*)	High	High	High	CONUS_Cotton_150 (9.78), CONUS_Soybeans_150 (12.51)	CONUS_Developed_0 (4.59), CONUS_Managed Forests_0 (26.36), CONUS_Managed Forests_30 (41.15), CONUS_Open Space Developed_0 (5.73), CONUS_Open Space Developed_120 (4.72),

Entity ID	Common Name (Scientific Name)	Overall vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
						CONUS_Other Crops_120 (22.45), CONUS_Poultry Litter_0 (94.87)
6870	Kentucky glade cress (*Leavenworthia exigua laciniata*)	Medium	High	High	NL48_Ag_120 (5.70)	NL48_Developed_0 (26.28), NL48_Managed Forests_30 (5.01), NL48_Open Space Developed_0 (5.95), NL48_Open Space Developed_30 (12.58)
7167	Carter's small-flowered flax (*Linum carteri carteri*)	High	high	High	CONUS_Soybeans_150 (14.39)	CONUS_Developed_0 (22.36), CONUS_Managed Forests_0 (9.63), CONUS_Managed Forests_30 (14.32), CONUS_Open Space Developed_0 (13.76), CONUS_Open Space Developed_120 (5.88), CONUS_Poultry Litter_0 (91.65)
7206	`Awikiwiki (*Canavalia pubescens*)	High	High	High	CONUS_Other Orchards_30 (5.50), CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24)	CONUS_Developed_0 (13.78), CONUS_Other Crops_120 (8.83), CONUS_Poultry Litter_0 (47.80)
7805	No common name (*Polyscias bisattenuata*)	High	Low	High	NL48_Ag_0 (5.85), NL48_Ag_120 (10.91)	NL48_Developed_0 (6.18), NL48_Managed Forests_0 (6.65), NL48_Managed Forests_30 (10.45), NL48_Open Space Developed_30 (4.46), NL48_Poultry Litter_0 (12.18)
7886	Ko`oko`olau (*Bidens campylotheca ssp. waihoiensis*)	High	Low	High	NL48_Ag_120 (7.89)	NL48_Developed_0 (5.22), NL48_Managed Forests_0 (21.51), NL48_Managed Forests_30 (28.82)
8277	Missouri bladderpod (*Physaria filiformis*)	Low	high	High	NL48_Ag_120 (6.41)	NL48_Managed Forests_0 (9.17), NL48_Managed Forests_30 (12.53), NL48_Poultry Litter_0 (7.68)
8392	No common name (*Phyllostegia pilosa*)	High	High	High	CONUS_Soybeans_150 (7.26)	CONUS_Managed Forests_0 (7.13), CONUS_Managed Forests_30 (12.30), CONUS_Open Space Developed_0 (4.57), CONUS_Open Space Developed_120 (6.14), CONUS_Poultry Litter_0 (64.26)
10231	No common name (*Santalum involutum*)	High	High	High	NL48_Ag_0 (7.19), NL48_Ag_120 (11.94)	NL48_Developed_0 (4.51), NL48_Managed Forests_0 (21.31), NL48_Managed Forests_30 (26.88), NL48_Open Space Developed_30 (5.10), NL48_Poultry Litter_0 (7.19)

Entity ID	Common Name (Scientific Name)	Overall vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
10584	Baker's Loulu (*Pritchardia bakeri*)	High	medium	High	NL48_Ag_0 (4.75), NL48_Ag_120 (8.92)	NL48_Developed_0 (5.84), NL48_Managed Forests_0 (24.32), NL48_Managed Forests_30 (32.60), NL48_Poultry Litter_0 (4.75)
10590	Clara Hunt's milk-vetch (*Astragalus clarianus*)	High	High	High	NL48_Ag_0 (6.55), NL48_Ag_120 (11.01)	NL48_Developed_0 (21.19), NL48_Managed Forests_0 (23.10), NL48_Managed Forests_30 (27.13), NL48_Open Space Developed_30 (8.04), NL48_Poultry Litter_0 (6.59)

5.7.2. Thiamethoxam

Draft predictions of likelihood of jeopardy are presented in this section for 850 currently listed terrestrial plants that were determined as LAA in the thiamethoxam BE. With thiamethoxam, no direct effects on terrestrial plants are indicated for the currently registered uses since it is not toxic to terrestrial plants up to the current maximum application rates. Therefore, the potential for effects of thiamethoxam on listed terrestrial plants is limited to indirect effects, including impacts on pollination and seed dispersal mechanisms. To the extent that available information identifies insects as significant contributors to seed dispersal, it will be considered in the assessment of indirect effects on listed plants. The following sections provide the predicted likelihood of jeopardy. Of the 850 species for which an LAA determination is made in the thiamethoxam BE, EPA predicted there is not a likelihood of jeopardy for 687 species and predicted there is a likelihood of jeopardy for 163 species (**Table 5-30** and **Table 5-31**).

EPA predicted there is not a likelihood of jeopardy for those species with <5% overlap of species range and UDLs with higher certainty of leading to exposure when considering UDL and usage refinements. Moreover, several species of listed plants have predictions of not likely for jeopardy because they are found in remote and/or forested (non-plantation) habitats, and the likelihood of any thiamethoxam application impacting invertebrate populations in these remote areas is highly unlikely. Last, EPA predicted there is not a likelihood of jeopardy for those remaining listed plants with multiple reproductive and/or dispersal mechanisms other than insect pollination, as they would have alternative means of pollination and dispersal available. EPA predicted there is a likelihood of jeopardy for those species with a final spatial overlap category of medium or high (>5%) and an effects category of high. It is noted that for some listed plants in groups 7 and 11, biotic-mediated pollination is known but the exact mechanism is unknown. Since insects are the dominant biotic pollination mechanism for plants, it is presumed that plants in these groups rely on insects as the sole pollination mechanism.

Table 5-30. Plant Assessment Groups for Predicted Likelihood of Jeopardy for Listed Terrestrial Plant Species with LAA Determinations

Plant Group	Number of Listed LAA[1] Species	Jeopardy not Likely[2]	Jeopardy Likely[2]
1 - Lichens	0	0	0
2 - Ferns and Allies	0	0	0
3 - Conifers & Cyads	4	4	0
4 - Monocots	33	33	0
5 - Monocots	9	6	3
6 - Monocots	20	18	2
7 - Monocots	18	11	7
8 - Dicots	6	6	0
9 - Dicots	237	180	57
10 - Dicots	111	73	38
11 - Dicots	412	356	56
Total	850	687	163

[1] Based on potential for effects to an individual
[2] Based on potential for effects to a population

Table 5-31. Listed Terrestrial Plants and UDLs Associated with Predicted Likelihood of Jeopardy for Thiamethoxam

Entity ID	Common Name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
508	Clara Hunt's milk-vetch *(Astragalus clarianus*)	High	High	High	CONUS_Grapes_0 (10.66), CONUS_Grapes_30 (15.77), CONUS_Other Orchards_0 (7.78), CONUS_Other Orchards_30 (9.65)	CONUS_Field Nurseries_0 (7.80), CONUS_Field Nurseries_120 (13.94), CONUS_Developed_0 (8.00), CONUS_Open Space Developed_0 (5.79), CONUS_Open Space Developed_120 (27.88), CONUS_Poultry Litter_0 (64.31)
513	Star cactus (*Astrophytum asterias*)	Medium	High	High	CONUS_Cotton_0 (8.44), CONUS_Cotton_30 (13.11), CONUS_Cotton_150 (28.25), CONUS_Vegetables and ground fruit_30 (6.07), CONUS_Vegetables and ground fruit_150 (20.01), CONUS_Other Grains_30 (7.34), CONUS_Other Grains_150 (26.85)	CONUS_Field Nurseries_120 (7.94), CONUS_Other Crops_0 (10.01), CONUS_Other Crops_120 (37.00), CONUS_Developed_0 (7.21), CONUS_Open Space Developed_120 (25.01), CONUS_Poultry Litter_0 (96.90)
522	Fleshy owl's-clover (*Castilleja campestris ssp. succulenta*)	Low	High	High	CONUS_Grapes_0 (5.17), CONUS_Grapes_30 (12.85), CONUS_Vegetables and ground fruit_150 (9.97), CONUS_Other Orchards_0 (25.32), CONUS_Other Orchards_30 (31.61), CONUS_Other Grains_30 (7.23), CONUS_Other Grains_150 (21.84)	CONUS_Field Nurseries_0 (25.57), CONUS_Field Nurseries_120 (43.17), CONUS_Other Crops_0 (6.29), CONUS_Other Crops_120 (28.90), CONUS_Developed_0 (5.99), CONUS_Open Space Developed_120 (21.88), CONUS_Poultry Litter_0 (78.73)
528	purple amole (*Chlorogalum purpureum*)	Medium	high	High	CONUS_Grapes_0 (6.49), CONUS_Grapes_30 (10.79), CONUS_Vegetables and ground fruit_150 (4.46), CONUS_Other Orchards_30 (4.64), CONUS_Other Grains_30 (5.10), CONUS_Other Grains_150 (16.07)	CONUS_Field Nurseries_120 (8.59), CONUS_Other Crops_0 (7.96), CONUS_Other Crops_120 (37.11), CONUS_Open Space Developed_120 (19.82), CONUS_Poultry Litter_0 (79.62)
964	Nehe (*Lipochaeta waimeaensis*)	Medium	Low	High	NL48_Ag_0 (4.72), NL48_Ag_120 (9.18)	NL48_Developed_0 (8.66), NL48_Poultry Litter_0 (6.59), NL48_Open Space Developed_120 (18.60), NL48_Managed Forests_0 (23.10), NL48_Managed Forests_30 (27.13)
546	Lompoc yerba santa (*Eriodictyon capitatum*)	High	High	High	CONUS_Grapes_0 (6.15), CONUS_Grapes_30 (11.84), CONUS_Vegetables and ground fruit_30 (6.30), CONUS_Vegetables and ground fruit_150 (12.89), CONUS_Other Orchards_30 (6.22), CONUS_Other Grains_150 (8.00)	CONUS_Field Nurseries_120 (15.19), CONUS_Other Crops_120 (9.47), CONUS_Open Space Developed_120 (22.27), CONUS_Poultry Litter_0 (80.06)

Entity ID	Common Name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
989	Tiny polygala (*Polygala smallii*)	High	Low	High	CONUS_Vegetables and ground fruit_150 (8.68), CONUS_Citrus_30 (5.70)	CONUS_Field Nurseries_0 (5.53), CONUS_Field Nurseries_120 (12.28), CONUS_Other Crops_0 (6.94), CONUS_Other Crops_120 (18.99), CONUS_Developed_0 (14.25), CONUS_Open Space Developed_120 (19.04), CONUS_Poultry Litter_0 (15.14)
568	Spring Creek bladderpod (*Lesquerella perforata*)	High	High	High	CONUS_Soybeans_150 (14.33)	CONUS_Developed_0 (5.71), CONUS_Open Space Developed_0 (7.01), CONUS_Open Space Developed_120 (36.17), CONUS_Poultry Litter_0 (99.98)
570	Pitkin Marsh lily (*Lilium pardalinum ssp. pitkinense*)	High	High	High	CONUS_Grapes_0 (21.35), CONUS_Grapes_30 (34.77), CONUS_Other Orchards_0 (9.86), CONUS_Other Orchards_30 (12.62), CONUS_Other Grains_150 (16.74)	CONUS_Field Nurseries_0 (9.90), CONUS_Field Nurseries_120 (17.68), CONUS_Developed_0 (9.19), CONUS_Open Space Developed_0 (8.86), CONUS_Open Space Developed_120 (44.39), CONUS_Poultry Litter_0 (98.93)
585	Lake County stonecrop (*Parvisedum leiocarpum*)	High	High	High	CONUS_Grapes_30 (6.31)	CONUS_Open Space Developed_0 (6.97), CONUS_Open Space Developed_120 (30.66), CONUS_Poultry Litter_0 (61.73)
593	Calistoga allocarya (*Plagiobothrys strictus*)	High	High	High	CONUS_Grapes_0 (12.73), CONUS_Grapes_30 (18.19), CONUS_Other Orchards_0 (9.48), CONUS_Other Orchards_30 (12.24)	CONUS_Field Nurseries_0 (9.48), CONUS_Field Nurseries_120 (17.41), CONUS_Open Space Developed_120 (21.02), CONUS_Poultry Litter_0 (50.96)
7886	No common name (*Polyscias bisattenuata*)	High	Low	High	NL48_Ag_120 (7.89)	NL48_Developed_0 (5.22), NL48_Open Space Developed_120 (7.63), NL48_Managed Forests_0 (21.51), NL48_Managed Forests_30 (28.82)
625	Little amphianthus (*Amphianthus pusillus*)	Medium	Medium	High	CONUS_Soybeans_150 (6.35)	CONUS_Other Crops_120 (10.59), CONUS_Open Space Developed_120 (32.46), CONUS_Poultry Litter_0 (71.09)
647	Sonoma sunshine (*Blennosperma bakeri*)	High	Medium	High	CONUS_Grapes_0 (14.28), CONUS_Grapes_30 (24.35), CONUS_Other Orchards_0 (8.40), CONUS_Other Orchards_30 (10.76), CONUS_Other Grains_30 (6.86), CONUS_Other Grains_150 (19.02)	CONUS_Field Nurseries_0 (8.43), CONUS_Field Nurseries_120 (15.19), CONUS_Other Crops_120 (6.44), CONUS_Developed_0 (13.16), CONUS_Open Space Developed_0 (7.72), CONUS_Open Space Developed_120 (38.73), CONUS_Poultry Litter_0 (94.72)

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610	Keck's Checker-mallow (*Sidalcea keckii*)	High	High	High	CONUS_Other Orchards_30 (4.94), CONUS_Other Grains_30 (5.43), CONUS_Other Grains_150 (12.88)	CONUS_Field Nurseries_120 (9.18), CONUS_Other Crops_0 (5.92), CONUS_Other Crops_120 (18.60), CONUS_Open Space Developed_120 (10.83), CONUS_Poultry Litter_0 (53.87)
613	Spalding's Catchfly (*Silene spaldingii*)	Medium	High	High	CONUS_Vegetables and ground fruit_0 (5.50), CONUS_Vegetables and ground fruit_30 (7.81), CONUS_Vegetables and ground fruit_150 (15.56), CONUS_Other Grains_0 (6.32), CONUS_Other Grains_30 (9.62), CONUS_Other Grains_150 (23.49)	CONUS_Other Crops_0 (21.53), CONUS_Other Crops_120 (36.67), CONUS_Open Space Developed_120 (12.00), CONUS_Poultry Litter_0 (20.56)
617	Ko`oloa`ula (*Abutilon menziesii*)	High	High	High	NL48_Ag_0 (7.35), NL48_Ag_120 (11.90)	NL48_Developed_0 (6.99), NL48_Poultry Litter_0 (17.42), NL48_Open Space Developed_120 (8.76)
752	Scrub blazingstar (*Liatris ohlingerae*)	Medium	Medium	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Field Nurseries_0 (16.29), CONUS_Field Nurseries_120 (43.37), CONUS_Developed_0 (5.96), CONUS_Open Space Developed_120 (24.37), CONUS_Poultry Litter_0 (33.84)
628	Price's potato-bean (*Apios priceana*)	Low	High	High	CONUS_Cotton_150 (6.70), CONUS_Soybeans_30 (8.15), CONUS_Soybeans_150 (29.05)	CONUS_Other Crops_120 (9.58), CONUS_Open Space Developed_120 (25.41), CONUS_Poultry Litter_0 (28.02)
636	Mead's milkweed (*Asclepias meadii*)	Medium	High	High	CONUS_Other Grains_150 (9.82), CONUS_Soybeans_0 (11.15), CONUS_Soybeans_30 (18.35), CONUS_Soybeans_150 (38.99)	CONUS_Other Crops_120 (13.98), CONUS_Developed_0 (7.53), CONUS_Open Space Developed_120 (27.68), CONUS_Poultry Litter_0 (25.73)
637	Four-petal pawpaw (*Asimina tetramera*)	Medium	High	High	CONUS_Vegetables and ground fruit_30 (4.72), CONUS_Vegetables and ground fruit_150 (11.12), CONUS_Citrus_30 (5.12)	CONUS_Field Nurseries_120 (10.34), CONUS_Other Crops_0 (13.23), CONUS_Other Crops_120 (31.91), CONUS_Developed_0 (11.84), CONUS_Open Space Developed_120 (19.77), CONUS_Poultry Litter_0 (36.27)
764	Mohr's Barbara's buttons (*Marshallia mohrii*)	Medium	Medium	High	CONUS_Cotton_150 (6.94), CONUS_Soybeans_150 (14.88)	CONUS_Other Crops_120 (10.25), CONUS_Open Space Developed_120 (29.48), CONUS_Poultry Litter_0 (50.38)
803	Lewton's polygala (*Polygala lewtonii*)	Medium	Medium	High	CONUS_Citrus_0 (7.53), CONUS_Citrus_30 (11.65)	CONUS_Field Nurseries_0 (7.60), CONUS_Field Nurseries_120 (24.40), CONUS_Other Crops_120 (4.87), CONUS_Developed_0 (6.31), CONUS_Open Space Developed_120 (23.51), CONUS_Poultry Litter_0 (12.09)

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651	Texas poppy-mallow (*Callirhoe scabriuscula*)	High	High	High	CONUS_Cotton_0 (12.47), CONUS_Cotton_30 (15.67), CONUS_Cotton_150 (29.29), CONUS_Other Grains_150 (19.26)	CONUS_Other Crops_120 (27.74), CONUS_Open Space Developed_120 (15.60), CONUS_Poultry Litter_0 (98.90)
655	Small-anthered bittercress (*Cardamine micranthera*)	High	High	High	CONUS_Other Row Crops_150 (7.34), CONUS_Other Grains_150 (7.55), CONUS_Soybeans_30 (7.90), CONUS_Soybeans_150 (32.24)	CONUS_Other Crops_120 (36.91), CONUS_Developed_0 (6.48), CONUS_Open Space Developed_0 (8.94), CONUS_Open Space Developed_120 (45.58), CONUS_Poultry Litter_0 (99.81)
661	Fragrant prickly-apple (*Cereus eriophorus var. fragrans*)	High	High	High	CONUS_Citrus_0 (27.96), CONUS_Citrus_30 (34.49)	CONUS_Field Nurseries_0 (28.05), CONUS_Field Nurseries_120 (47.55), CONUS_Other Crops_120 (19.26), CONUS_Developed_0 (9.95), CONUS_Open Space Developed_0 (9.02), CONUS_Open Space Developed_120 (29.69), CONUS_Poultry Litter_0 (91.65)
662	`Akoko (*Euphorbia celastroides var. kaenana*)	Medium	High	High	NL48_Ag_0 (5.71), NL48_Ag_120 (11.10)	NL48_Developed_0 (10.47), NL48_Poultry Litter_0 (7.96), NL48_Open Space Developed_120 (22.12), NL48_Managed Forests_0 (16.46), NL48_Managed Forests_30 (20.09)
665	Ewa Plains `akoko (*Euphorbia skottsbergii var. skottsbergii*)	High	High	High	NL48_Ag_0 (5.89), NL48_Ag_120 (10.63)	NL48_Developed_0 (7.12), NL48_Poultry Litter_0 (14.91), NL48_Open Space Developed_120 (9.06), NL48_Managed Forests_0 (4.74), NL48_Managed Forests_30 (6.57)
666	Sonoma spineflower (*Chorizanthe valida*)	High	High	High	CONUS_Grapes_0 (9.68), CONUS_Grapes_30 (16.56), CONUS_Other Orchards_0 (4.56), CONUS_Other Orchards_30 (5.93), CONUS_Other Grains_150 (13.16)	CONUS_Field Nurseries_0 (4.58), CONUS_Field Nurseries_120 (8.63), CONUS_Developed_0 (6.59), CONUS_Open Space Developed_0 (4.79), CONUS_Open Space Developed_120 (25.84), CONUS_Poultry Litter_0 (75.06)
835	Short's goldenrod (*Solidago shortii*)	High	Medium	High	CONUS_Other Row Crops_150 (4.60), CONUS_Vegetables and ground fruit_150 (5.45), CONUS_Soybeans_0 (9.40), CONUS_Soybeans_30 (13.89), CONUS_Soybeans_150 (32.25)	CONUS_Open Space Developed_120 (28.90), CONUS_Poultry Litter_0 (95.04)
675	Short-leaved rosemary (*Conradina brevifolia*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Field Nurseries_0 (16.29), CONUS_Field Nurseries_120 (43.37), CONUS_Developed_0 (5.96), CONUS_Open Space Developed_120 (24.37), CONUS_Poultry Litter_0 (33.84)

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677	Cumberland rosemary (*Conradina verticillata*)	Medium	High	High	CONUS_Soybeans_150 (7.19)	CONUS_Open Space Developed_120 (25.05), CONUS_Poultry Litter_0 (43.34)
845	No common name (*Tetramolopium arenarium*)	High	Medium	Medium	NL48_Ag_120 (5.22)	NL48_Open Space Developed_120 (4.77), NL48_Managed Forests_30 (4.72)
679	Palmate-bracted bird's beak (*Cordylanthus palmatus*)	High	High	High	CONUS_Cotton_150 (9.72), CONUS_Grapes_0 (9.95), CONUS_Grapes_30 (15.47), CONUS_Vegetables and ground fruit_0 (11.75), CONUS_Vegetables and ground fruit_30 (16.25), CONUS_Vegetables and ground fruit_150 (36.71), CONUS_Other Orchards_0 (34.23), CONUS_Other Orchards_30 (43.31), CONUS_Other Grains_0 (5.23), CONUS_Other Grains_30 (10.27), CONUS_Other Grains_150 (34.10)	CONUS_Field Nurseries_0 (34.27), CONUS_Field Nurseries_120 (60.30), CONUS_Other Crops_0 (27.78), CONUS_Other Crops_120 (59.28), CONUS_Developed_0 (8.61), CONUS_Open Space Developed_120 (22.95), CONUS_Poultry Litter_0 (98.80)
695	Scrub mint (*Dicerandra frutescens*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Field Nurseries_0 (16.29), CONUS_Field Nurseries_120 (43.37), CONUS_Developed_0 (5.96), CONUS_Open Space Developed_120 (24.37), CONUS_Poultry Litter_0 (33.84)
696	Lakela's mint (*Dicerandra immaculata*)	High	High	High	CONUS_Vegetables and ground fruit_150 (6.84), CONUS_Citrus_0 (22.22), CONUS_Citrus_30 (28.29)	CONUS_Field Nurseries_0 (22.30), CONUS_Field Nurseries_120 (41.42), CONUS_Other Crops_0 (4.75), CONUS_Other Crops_120 (22.32), CONUS_Developed_0 (8.92), CONUS_Open Space Developed_0 (5.68), CONUS_Open Space Developed_120 (24.38), CONUS_Poultry Litter_0 (57.69)
698	Santa Barbara Island liveforever (*Dudleya traskiae*)	High	High	High	CONUS_Grapes_30 (5.16), CONUS_Vegetables and ground fruit_150 (7.14), CONUS_Other Grains_150 (5.72)	CONUS_Field Nurseries_120 (7.73), CONUS_Other Crops_120 (9.42), CONUS_Open Space Developed_120 (17.29), CONUS_Poultry Litter_0 (52.45)
702	Black lace cactus (*Echinocereus reichenbachii var. albertii*)	High	High	High	CONUS_Cotton_0 (7.32), CONUS_Cotton_30 (8.96), CONUS_Cotton_150 (15.95), CONUS_Other Grains_150 (17.68)	CONUS_Other Crops_0 (5.55), CONUS_Other Crops_120 (23.91), CONUS_Open Space Developed_120 (14.63), CONUS_Poultry Litter_0 (56.27)

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712	Contra Costa wallflower (*Erysimum capitatum var. angustatum*)	High	High	High	CONUS_Vegetables and ground fruit_150 (5.83), CONUS_Other Grains_0 (12.04), CONUS_Other Grains_30 (21.11), CONUS_Other Grains_150 (45.82)	CONUS_Field Nurseries_120 (6.83), CONUS_Other Crops_0 (18.33), CONUS_Other Crops_120 (49.72), CONUS_Developed_0 (14.53), CONUS_Open Space Developed_120 (20.67), CONUS_Poultry Litter_0 (99.60)
715	Hawaiian gardenia (=Na`u) (*Gardenia brighamii*)	High	High	Medium	NL48_Ag_0 (6.38), NL48_Ag_120 (9.66)	NL48_Developed_0 (5.71), NL48_Poultry Litter_0 (6.38), NL48_Open Space Developed_120 (6.05), NL48_Managed Forests_0 (6.94), NL48_Managed Forests_30 (9.33)
716	No common name (*Geocarpon minimum*)	Low	High	High	CONUS_Soybeans_30 (6.05), CONUS_Soybeans_150 (12.74)	CONUS_Other Crops_120 (8.25), CONUS_Open Space Developed_120 (24.94), CONUS_Poultry Litter_0 (34.20)
850	No common name (*Tetramolopium rockii*)	High	Medium	Medium	NL48_Ag_120 (5.77)	NL48_Open Space Developed_120 (5.22)
874	Round-leaved chaff-flower (*Achyranthes splendens var. rotundata*)	High	Low	High	NL48_Ag_120 (5.13)	NL48_Poultry Litter_0 (7.31), NL48_Open Space Developed_120 (10.04), NL48_Managed Forests_0 (9.06), NL48_Managed Forests_30 (12.64)
740	Highlands scrub hypericum (*Hypericum cumulicola*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Field Nurseries_0 (16.29), CONUS_Field Nurseries_120 (43.37), CONUS_Developed_0 (5.96), CONUS_Open Space Developed_120 (24.37), CONUS_Poultry Litter_0 (33.84)
750	Lyrate bladderpod (*Lesquerella lyrata*)	High	High	High	CONUS_Cotton_0 (5.07), CONUS_Cotton_30 (7.82), CONUS_Cotton_150 (20.92), CONUS_Other Grains_150 (4.87), CONUS_Soybeans_0 (10.23), CONUS_Soybeans_30 (16.49), CONUS_Soybeans_150 (40.76)	CONUS_Other Crops_120 (8.49), CONUS_Open Space Developed_0 (4.57), CONUS_Open Space Developed_120 (28.83), CONUS_Poultry Litter_0 (99.83)
891	Decurrent false aster (*Boltonia decurrens*)	Medium	Medium	High	CONUS_Vegetables and ground fruit_150 (5.17), CONUS_Other Grains_150 (4.88), CONUS_Soybeans_0 (11.62), CONUS_Soybeans_30 (19.30), CONUS_Soybeans_150 (36.36)	CONUS_Other Crops_120 (9.24), CONUS_Developed_0 (6.27), CONUS_Open Space Developed_120 (26.31), CONUS_Poultry Litter_0 (17.47)
904	Florida golden aster (*Chrysopsis floridana*)	Medium	Medium	High	CONUS_Vegetables and ground fruit_150 (6.50), CONUS_Citrus_0 (9.57), CONUS_Citrus_30 (14.78)	CONUS_Field Nurseries_0 (9.63), CONUS_Field Nurseries_120 (29.85), CONUS_Developed_0 (18.96), CONUS_Open Space Developed_0

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						(4.49), CONUS_Open Space Developed_120 (35.49), CONUS_Poultry Litter_0 (45.64)
763	Walker's manioc (*Manihot walkerae*)	High	High	High	CONUS_Cotton_0 (5.15), CONUS_Cotton_30 (8.06), CONUS_Cotton_150 (17.76), CONUS_Vegetables and ground fruit_150 (12.64), CONUS_Other Grains_30 (4.94), CONUS_Other Grains_150 (19.38)	CONUS_Field Nurseries_120 (4.85), CONUS_Other Crops_0 (6.47), CONUS_Other Crops_120 (25.08), CONUS_Developed_0 (4.68), CONUS_Open Space Developed_120 (18.68), CONUS_Poultry Litter_0 (88.08)
905	Pitcher's thistle (*Cirsium pitcheri*)	Low	Medium	High	CONUS_Vegetables and ground fruit_150 (15.32), CONUS_Other Orchards_30 (4.62), CONUS_Other Grains_150 (17.25), CONUS_Soybeans_30 (8.05), CONUS_Soybeans_150 (21.98)	CONUS_Field Nurseries_120 (12.25), CONUS_Other Crops_120 (20.84), CONUS_Developed_0 (5.33), CONUS_Open Space Developed_120 (28.13), CONUS_Poultry Litter_0 (19.65)
924	Smooth coneflower (*Echinacea laevigata*)	Medium	Medium	High	CONUS_Cotton_150 (6.82), CONUS_Other Row Crops_150 (4.48), CONUS_Other Grains_150 (7.72), CONUS_Soybeans_150 (18.61)	CONUS_Other Crops_120 (25.26), CONUS_Developed_0 (7.04), CONUS_Open Space Developed_120 (35.58), CONUS_Poultry Litter_0 (31.12)
784	Antioch Dunes evening-primrose (*Oenothera deltoides ssp. howellii*)	High	High	High	CONUS_Grapes_30 (4.71), CONUS_Vegetables and ground fruit_150 (9.66), CONUS_Other Orchards_30 (5.25), CONUS_Other Grains_30 (7.82), CONUS_Other Grains_150 (24.16)	CONUS_Field Nurseries_120 (12.38), CONUS_Other Crops_0 (10.77), CONUS_Other Crops_120 (31.59), CONUS_Developed_0 (22.69), CONUS_Open Space Developed_0 (8.21), CONUS_Open Space Developed_120 (36.82), CONUS_Poultry Litter_0 (89.27)
789	Papery whitlow-wort (*Paronychia chartacea*)	Low	High	High	CONUS_Citrus_0 (9.21), CONUS_Citrus_30 (14.19)	CONUS_Field Nurseries_0 (9.28), CONUS_Field Nurseries_120 (29.20), CONUS_Developed_0 (7.81), CONUS_Open Space Developed_120 (24.57), CONUS_Poultry Litter_0 (14.73)
945	Schweinitz's sunflower (*Helianthus schweinitzii*)	Medium	Medium	High	CONUS_Cotton_150 (6.04), CONUS_Other Grains_150 (11.80), CONUS_Soybeans_30 (7.97), CONUS_Soybeans_150 (33.30)	CONUS_Other Crops_0 (5.07), CONUS_Other Crops_120 (40.13), CONUS_Developed_0 (8.19), CONUS_Open Space Developed_120 (37.69), CONUS_Poultry Litter_0 (21.22)
804	Wireweed (*Polygonella basiramia*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Field Nurseries_0 (16.29), CONUS_Field Nurseries_120 (43.37), CONUS_Developed_0 (5.96), CONUS_Open Space Developed_120 (24.37), CONUS_Poultry Litter_0 (33.84)
805	Sandlace (*Polygonella myriophylla*)	High	High	High	CONUS_Citrus_0 (10.28), CONUS_Citrus_30 (15.42)	CONUS_Field Nurseries_0 (10.35), CONUS_Field Nurseries_120 (30.97), CONUS_Developed_0 (8.50), CONUS_Open Space Developed_120 (23.32), CONUS_Poultry Litter_0 (18.76)

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809	Scrub plum (*Prunus geniculata*)	Medium	High	High	CONUS_Citrus_0 (11.71), CONUS_Citrus_30 (17.82)	CONUS_Field Nurseries_0 (11.80), CONUS_Field Nurseries_120 (35.41), CONUS_Developed_0 (9.24), CONUS_Open Space Developed_120 (27.72), CONUS_Poultry Litter_0 (19.99)
1036	Ruth's golden aster (*Pityopsis ruthii*)	High	Medium	High	CONUS_Soybeans_150 (10.68)	CONUS_Open Space Developed_120 (26.68), CONUS_Poultry Litter_0 (60.27)
819	Green pitcher-plant (*Sarracenia oreophila*)	Medium	High	High	CONUS_Cotton_150 (7.53), CONUS_Soybeans_30 (4.97), CONUS_Soybeans_150 (25.65)	CONUS_Other Crops_120 (18.97), CONUS_Open Space Developed_120 (33.83), CONUS_Poultry Litter_0 (54.18)
1081	Butte County meadowfoam (*Limnanthes floccosa ssp. californica*)	High	Medium	High	CONUS_Vegetables and ground fruit_150 (4.94), CONUS_Other Orchards_0 (26.23), CONUS_Other Orchards_30 (29.73), CONUS_Other Grains_150 (6.37)	CONUS_Field Nurseries_0 (26.24), CONUS_Field Nurseries_120 (35.59), CONUS_Other Crops_0 (9.94), CONUS_Other Crops_120 (32.36), CONUS_Developed_0 (8.39), CONUS_Open Space Developed_120 (22.91), CONUS_Poultry Litter_0 (70.12)
1119	Gaviota Tarplant (*Deinandra increscens ssp. villosa*)	High	Medium	High	CONUS_Grapes_30 (7.42), CONUS_Vegetables and ground fruit_150 (6.60), CONUS_Other Grains_150 (5.24)	CONUS_Field Nurseries_120 (11.06), CONUS_Other Crops_120 (5.62), CONUS_Open Space Developed_120 (19.04), CONUS_Poultry Litter_0 (69.07)
1142	Lo`ulu (*Pritchardia maideniana*)	High	Medium	High	NL48_Ag_0 (9.11), NL48_Ag_120 (18.99)	NL48_Developed_0 (4.72), NL48_Poultry Litter_0 (9.11), NL48_Open Space Developed_120 (9.35), NL48_Managed Forests_0 (6.86), NL48_Managed Forests_30 (9.12)
836	Gentian pinkroot (*Spigelia gentianoides*)	High	High	High	CONUS_Cotton_30 (4.67), CONUS_Cotton_150 (20.84), CONUS_Other Row Crops_150 (18.80), CONUS_Soybeans_150 (19.00)	CONUS_Other Crops_0 (7.47), CONUS_Other Crops_120 (36.85), CONUS_Open Space Developed_0 (5.91), CONUS_Open Space Developed_120 (36.42), CONUS_Poultry Litter_0 (60.21)
1881	Whorled Sunflower (*Helianthus verticillatus*)	High	Medium	High	CONUS_Cotton_150 (9.59), CONUS_Soybeans_150 (17.11)	CONUS_Other Crops_120 (14.66), CONUS_Open Space Developed_120 (22.06), CONUS_Poultry Litter_0 (5.59)
4420	Florida brickell-bush (*Brickellia mosieri*)	High	Medium	High	CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24), CONUS_Other Orchards_30 (5.50)	CONUS_Field Nurseries_120 (8.67), CONUS_Other Crops_120 (8.83), CONUS_Developed_0 (13.78), CONUS_Open Space Developed_120 (20.50), CONUS_Poultry Litter_0 (47.32)

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8277	Ko`oko`olau (*Bidens campylotheca ssp. waihoiensis*)	High	Low	High	NL48_Ag_120 (5.47)	NL48_Poultry Litter_0 (7.68), NL48_Open Space Developed_120 (5.79), NL48_Managed Forests_0 (9.17), NL48_Managed Forests_30 (12.53)
862	No common name (*Vigna o-wahuensis*)	High	Medium	Medium	NL48_Ag_120 (5.80)	NL48_Poultry Litter_0 (8.37), NL48_Open Space Developed_120 (8.51), NL48_Managed Forests_0 (6.23), NL48_Managed Forests_30 (8.67)
10590	Baker's Loulu (*Pritchardia bakeri*)	High	Medium	High	NL48_Ag_0 (4.72), NL48_Ag_120 (9.19)	NL48_Developed_0 (8.67), NL48_Poultry Litter_0 (6.59), NL48_Open Space Developed_120 (18.60), NL48_Managed Forests_0 (23.10), NL48_Managed Forests_30 (27.13)
875	Sensitive joint-vetch (*Aeschynomene virginica*)	High	High	High	CONUS_Cotton_30 (4.72), CONUS_Cotton_150 (14.99), CONUS_Other Row Crops_150 (5.71), CONUS_Vegetables and ground fruit_150 (5.78), CONUS_Other Grains_150 (7.81), CONUS_Soybeans_0 (5.32), CONUS_Soybeans_30 (9.46), CONUS_Soybeans_150 (22.74)	CONUS_Other Crops_120 (18.38), CONUS_Open Space Developed_120 (19.00), CONUS_Poultry Litter_0 (34.75)
879	Morro manzanita (*Arctostaphylos morroensis*)	High	High	High	CONUS_Other Grains_30 (4.86), CONUS_Other Grains_150 (12.98)	CONUS_Other Crops_120 (13.01), CONUS_Open Space Developed_0 (4.71), CONUS_Open Space Developed_120 (24.20), CONUS_Poultry Litter_0 (82.99)
1063	Lo`ulu (*Pritchardia schattaueri*)	High	Medium	High	NL48_Ag_0 (24.21), NL48_Ag_120 (41.97)	NL48_Poultry Litter_0 (24.21), NL48_Open Space Developed_120 (6.42), NL48_Managed Forests_0 (13.09), NL48_Managed Forests_30 (14.37)
530	Suisun thistle (*Cirsium hydrophilum var. hydrophilum*)	High	Low	High	CONUS_Other Grains_30 (6.66), CONUS_Other Grains_150 (24.32)	CONUS_Field Nurseries_120 (6.62), CONUS_Other Crops_0 (6.76), CONUS_Other Crops_120 (37.82), CONUS_Developed_0 (5.51), CONUS_Open Space Developed_120 (14.84), CONUS_Poultry Litter_0 (99.49)
667	Chorro Creek bog thistle (*Cirsium fontinale var. obispoense*)	High	Low	High	CONUS_Grapes_30 (6.00), CONUS_Other Grains_150 (12.37)	CONUS_Field Nurseries_120 (7.59), CONUS_Other Crops_120 (16.34), CONUS_Open Space Developed_0 (4.79), CONUS_Open Space Developed_120 (23.44), CONUS_Poultry Litter_0 (81.34)

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756	Nehe (*Lipochaeta lobata var. leptophylla*)	High	Low	High	NL48_Ag_0 (6.46), NL48_Ag_120 (12.51)	NL48_Developed_0 (11.84), NL48_Poultry Litter_0 (9.00), NL48_Open Space Developed_120 (24.49), NL48_Managed Forests_0 (12.56), NL48_Managed Forests_30 (15.95)
899	golden paintbrush (*Castilleja levisecta*)	Medium	High	High	CONUS_Other Row Crops_150 (5.68), CONUS_Vegetables and ground fruit_30 (4.82), CONUS_Vegetables and ground fruit_150 (19.09), CONUS_Other Orchards_30 (6.32), CONUS_Other Row Crops ORWA_150 (5.63), CONUS_Other Grains_150 (11.13)	CONUS_Field Nurseries_120 (19.27), CONUS_Other Crops_0 (15.74), CONUS_Other Crops_120 (33.38), CONUS_Developed_0 (17.11), CONUS_Open Space Developed_120 (36.41), CONUS_Poultry Litter_0 (38.43)
782	Kulu`i (*Nototrichium humile*)	High	Low	High	NL48_Ag_0 (11.05), NL48_Ag_120 (16.49)	NL48_Developed_0 (6.00), NL48_Poultry Litter_0 (12.15), NL48_Open Space Developed_120 (10.29), NL48_Managed Forests_0 (15.28), NL48_Managed Forests_30 (18.48)
903	Monterey spineflower (*Chorizanthe pungens var. pungens*)	Medium	High	High	CONUS_Grapes_0 (4.71), CONUS_Grapes_30 (8.17), CONUS_Vegetables and ground fruit_0 (10.28), CONUS_Vegetables and ground fruit_30 (15.61), CONUS_Vegetables and ground fruit_150 (26.99), CONUS_Other Orchards_30 (6.97), CONUS_Other Grains_30 (5.26), CONUS_Other Grains_150 (19.45)	CONUS_Field Nurseries_0 (4.48), CONUS_Field Nurseries_120 (13.95), CONUS_Other Crops_0 (8.43), CONUS_Other Crops_120 (30.01), CONUS_Developed_0 (9.82), CONUS_Open Space Developed_0 (8.32), CONUS_Open Space Developed_120 (34.74), CONUS_Poultry Litter_0 (78.23)
852	Cooley's meadowrue (*Thalictrum cooleyi*)	High	Low	High	CONUS_Cotton_0 (7.10), CONUS_Cotton_30 (9.87), CONUS_Cotton_150 (22.12), CONUS_Other Row Crops_150 (11.60), CONUS_Other Orchards_30 (6.01), CONUS_Other Grains_150 (10.01), CONUS_Soybeans_30 (7.50), CONUS_Soybeans_150 (25.05)	CONUS_Field Nurseries_120 (15.04), CONUS_Other Crops_0 (7.82), CONUS_Other Crops_120 (41.59), CONUS_Open Space Developed_120 (23.04), CONUS_Poultry Litter_0 (47.06)
1045	Texas prairie dawn-flower (*Hymenoxys texana*)	Medium	Low	High	CONUS_Cotton_30 (5.54), CONUS_Cotton_150 (12.90), CONUS_Other Grains_150 (9.16), CONUS_Soybeans_150 (8.32)	CONUS_Other Crops_0 (7.76), CONUS_Other Crops_120 (32.51), CONUS_Developed_0 (31.13), CONUS_Open Space Developed_0 (5.26), CONUS_Open Space Developed_120 (43.23), CONUS_Poultry Litter_0 (85.27)
1123	San Joaquin wooly-threads	Medium	Low	High	CONUS_Cotton_150 (6.64), CONUS_Grapes_30 (5.17),	CONUS_Field Nurseries_0 (21.14), CONUS_Field Nurseries_120 (33.75), CONUS_Other Crops_0

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	(*Monolopia (=Lembertia) congdonii*)				CONUS_Vegetables and ground fruit_0 (8.07), CONUS_Vegetables and ground fruit_30 (10.25), CONUS_Vegetables and ground fruit_150 (18.24), CONUS_Other Orchards_0 (20.78), CONUS_Other Orchards_30 (25.37), CONUS_Other Grains_30 (5.96), CONUS_Other Grains_150 (19.74)	(25.44), CONUS_Other Crops_120 (50.81), CONUS_Open Space Developed_120 (19.90), CONUS_Poultry Litter_0 (38.86)
1233	Willamette daisy (*Erigeron decumbens*)	High	Low	High	CONUS_Other Row Crops_150 (4.66), CONUS_Vegetables and ground fruit_150 (12.28), CONUS_Other Orchards_30 (4.81), CONUS_Other Row Crops ORWA_150 (4.66), CONUS_Other Grains_150 (8.19)	CONUS_Field Nurseries_120 (13.81), CONUS_Other Crops_0 (12.58), CONUS_Other Crops_120 (24.51), CONUS_Developed_0 (6.65), CONUS_Open Space Developed_120 (20.27), CONUS_Poultry Litter_0 (10.94)
922	Beautiful pawpaw (*Deeringothamnus pulchellus*)	High	High	High	CONUS_Citrus_30 (6.63)	CONUS_Field Nurseries_120 (16.17), CONUS_Developed_0 (17.86), CONUS_Open Space Developed_120 (32.50), CONUS_Poultry Litter_0 (36.70)
2278	Ko`oko`olau (*Bidens amplectens*)	High	Low	High	NL48_Ag_0 (8.86), NL48_Ag_120 (13.40)	NL48_Developed_0 (5.70), NL48_Poultry Litter_0 (8.86), NL48_Open Space Developed_120 (9.42), NL48_Managed Forests_0 (21.13), NL48_Managed Forests_30 (25.52)
929	Scrub buckwheat (*Eriogonum longifolium var. gnaphalifolium*)	Medium	High	High	CONUS_Citrus_0 (7.91), CONUS_Citrus_30 (12.28)	CONUS_Field Nurseries_0 (7.99), CONUS_Field Nurseries_120 (25.75), CONUS_Other Crops_120 (4.69), CONUS_Developed_0 (7.50), CONUS_Open Space Developed_120 (25.45), CONUS_Poultry Litter_0 (12.49)
4589	Ko`oko`olau (*Bidens micrantha ssp. ctenophylla*)	High	0	High	NL48_Ag_120 (5.27)	NL48_Open Space Developed_120 (8.16), NL48_Managed Forests_0 (12.34), NL48_Managed Forests_30 (16.02)
5334	`Ena`ena (*Pseudognaphalium sandwicensium var. molokaiense*)	High	0	High	NL48_Ag_120 (6.43)	NL48_Poultry Litter_0 (9.04), NL48_Open Space Developed_120 (6.61), NL48_Managed Forests_0 (10.60), NL48_Managed Forests_30 (14.25)
645	Ko`oko`olau (*Bidens micrantha ssp. kalealaha*)	High	Low	High	NL48_Ag_0 (5.17), NL48_Ag_120 (9.14)	NL48_Poultry Litter_0 (7.26), NL48_Open Space Developed_120 (7.34), NL48_Managed Forests_0 (11.74), NL48_Managed Forests_30 (16.04)

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598	Lo`ulu (*Pritchardia remota*)	High	Medium	High	NL48_Ag_0 (4.72), NL48_Ag_120 (9.18)	NL48_Developed_0 (8.66), NL48_Poultry Litter_0 (6.59), NL48_Open Space Developed_120 (18.60), NL48_Managed Forests_0 (23.10), NL48_Managed Forests_30 (27.13)
599	Hartweg's golden sunburst (*Pseudobahia bahiifolia*)	High	Medium	High	CONUS_Vegetables and ground fruit_150 (10.80), CONUS_Other Orchards_0 (21.54), CONUS_Other Orchards_30 (26.43), CONUS_Other Grains_150 (12.21)	CONUS_Field Nurseries_0 (21.56), CONUS_Field Nurseries_120 (35.31), CONUS_Other Crops_0 (13.90), CONUS_Other Crops_120 (31.65), CONUS_Open Space Developed_120 (18.20), CONUS_Poultry Litter_0 (77.82)
946	Swamp pink (*Helonias bullata*)	Medium	High	High	CONUS_Vegetables and ground fruit_150 (10.00), CONUS_Other Grains_150 (7.44), CONUS_Soybeans_0 (5.60), CONUS_Soybeans_30 (8.45), CONUS_Soybeans_150 (18.69)	CONUS_Other Crops_120 (15.82), CONUS_Developed_0 (7.88), CONUS_Open Space Developed_120 (36.28), CONUS_Poultry Litter_0 (35.12)
600	San Joaquin adobe sunburst (*Pseudobahia peirsonii*)	Medium	Medium	High	CONUS_Cotton_150 (4.45), CONUS_Grapes_0 (7.45), CONUS_Grapes_30 (13.27), CONUS_Vegetables and ground fruit_150 (8.83), CONUS_Other Orchards_0 (24.17), CONUS_Other Orchards_30 (32.58), CONUS_Other Grains_30 (8.11), CONUS_Other Grains_150 (26.30), CONUS_Citrus_0 (21.77), CONUS_Citrus_30 (29.87)	CONUS_Field Nurseries_0 (28.94), CONUS_Field Nurseries_120 (45.06), CONUS_Other Crops_0 (12.27), CONUS_Other Crops_120 (44.34), CONUS_Open Space Developed_120 (25.83), CONUS_Poultry Litter_0 (92.28)
960	Pondberry (*Lindera melissifolia*)	Medium	High	High	CONUS_Cotton_0 (4.90), CONUS_Cotton_30 (7.39), CONUS_Cotton_150 (18.81), CONUS_Other Row Crops_150 (6.51), CONUS_Other Grains_150 (6.46), CONUS_Soybeans_30 (9.32), CONUS_Soybeans_150 (22.23)	CONUS_Field Nurseries_120 (5.22), CONUS_Other Crops_0 (9.19), CONUS_Other Crops_120 (36.11), CONUS_Open Space Developed_120 (22.98), CONUS_Poultry Litter_0 (23.04)
620	Northern wild monkshood (*Aconitum noveboracense*)	Medium	High	High	CONUS_Other Grains_150 (17.15), CONUS_Soybeans_0 (12.29), CONUS_Soybeans_30 (20.61), CONUS_Soybeans_150 (49.02)	CONUS_Open Space Developed_120 (27.46), CONUS_Poultry Litter_0 (41.37)
967	Rough-leaved loosestrife (*Lysimachia asperulaefolia*)	Medium	High	High	CONUS_Cotton_150 (15.54), CONUS_Other Row Crops_150 (6.55), CONUS_Other Grains_150 (8.78), CONUS_Soybeans_30 (6.71), CONUS_Soybeans_150 (24.10)	CONUS_Other Crops_0 (5.15), CONUS_Other Crops_120 (31.92), CONUS_Open Space Developed_120 (23.06), CONUS_Poultry Litter_0 (15.34)

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718	Spreading avens (*Geum radiatum*)	High	High	High	CONUS_Soybeans_150 (6.18)	CONUS_Other Crops_120 (7.62), CONUS_Open Space Developed_120 (32.24), CONUS_Poultry Litter_0 (41.67)
977	Fassett's locoweed (*Oxytropis campestris var. chartacea*)	Medium	High	High	CONUS_Vegetables and ground fruit_30 (5.32), CONUS_Vegetables and ground fruit_150 (11.32), CONUS_Other Grains_150 (12.13), CONUS_Soybeans_30 (7.62), CONUS_Soybeans_150 (20.93)	CONUS_Other Crops_120 (5.58), CONUS_Open Space Developed_120 (23.93), CONUS_Poultry Litter_0 (30.45)
978	Blowout penstemon (*Penstemon haydenii*)	High	High	Medium	CONUS_Other Grains_150 (8.09), CONUS_Soybeans_150 (5.73)	CONUS_Other Crops_120 (7.35), CONUS_Open Space Developed_120 (6.89), CONUS_Poultry Litter_0 (6.80)
739	Slender rush-pea (*Hoffmannseggia tenella*)	High	High	High	CONUS_Cotton_0 (28.53), CONUS_Cotton_30 (32.08), CONUS_Cotton_150 (41.72), CONUS_Other Grains_150 (14.60)	CONUS_Other Crops_0 (5.92), CONUS_Other Crops_120 (21.66), CONUS_Developed_0 (5.20), CONUS_Open Space Developed_120 (18.13), CONUS_Poultry Litter_0 (88.51)
984	Eastern prairie fringed orchid (*Platanthera leucophaea*)	Medium	High	High	CONUS_Vegetables and ground fruit_150 (8.30), CONUS_Other Grains_150 (8.94), CONUS_Soybeans_30 (11.23), CONUS_Soybeans_150 (30.42)	CONUS_Other Crops_120 (12.77), CONUS_Developed_0 (6.41), CONUS_Open Space Developed_120 (27.95), CONUS_Poultry Litter_0 (6.28)
790	Furbish lousewort (*Pedicularis furbishiae*)	High	High	High	CONUS_Vegetables and ground fruit_30 (5.61), CONUS_Vegetables and ground fruit_150 (20.03), CONUS_Other Grains_0 (5.03), CONUS_Other Grains_30 (9.61), CONUS_Other Grains_150 (29.85)	CONUS_Other Crops_120 (14.95), CONUS_Open Space Developed_120 (28.39), CONUS_Poultry Litter_0 (67.86)
817	Miccosukee gooseberry (*Ribes echinellum*)	High	High	High	CONUS_Soybeans_150 (4.67)	CONUS_Field Nurseries_120 (7.18), CONUS_Other Crops_120 (6.93), CONUS_Open Space Developed_0 (4.52), CONUS_Open Space Developed_120 (27.73), CONUS_Poultry Litter_0 (81.16)
994	Alabama canebrake pitcher-plant (*Sarracenia rubra ssp. alabamensis*)	High	High	High	CONUS_Cotton_150 (13.03), CONUS_Vegetables and ground fruit_150 (5.22), CONUS_Soybeans_150 (16.04)	CONUS_Other Crops_120 (26.11), CONUS_Open Space Developed_0 (4.78), CONUS_Open Space Developed_120 (30.64), CONUS_Poultry Litter_0 (99.19)
831	Fringed campion (*Silene polypetala*)	Medium	High	High	CONUS_Cotton_150 (17.28), CONUS_Other Row Crops_150 (17.34), CONUS_Soybeans_150 (15.13)	CONUS_Other Crops_0 (7.77), CONUS_Other Crops_120 (37.54), CONUS_Open Space Developed_0 (4.95), CONUS_Open Space

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						Developed_120 (30.23), CONUS_Poultry Litter_0 (77.84)
999	Ohai (*Sesbania tomentosa*)	High	High	High	NL48_Ag_120 (5.70)	NL48_Poultry Litter_0 (8.20), NL48_Open Space Developed_120 (10.24), NL48_Managed Forests_30 (5.77)
1008	Howell''s spectacular thelypody (*Thelypodium howellii ssp. spectabilis*)	High	High	High	CONUS_Vegetables and ground fruit_0 (7.05), CONUS_Vegetables and ground fruit_30 (9.29), CONUS_Vegetables and ground fruit_150 (19.01), CONUS_Other Grains_30 (5.55), CONUS_Other Grains_150 (20.98)	CONUS_Other Crops_120 (18.43), CONUS_Open Space Developed_120 (17.87), CONUS_Poultry Litter_0 (89.04)
1014	Wide-leaf warea (*Warea amplexifolia*)	High	High	High	CONUS_Citrus_0 (7.94), CONUS_Citrus_30 (12.82)	CONUS_Field Nurseries_0 (8.02), CONUS_Field Nurseries_120 (28.26), CONUS_Developed_0 (8.98), CONUS_Open Space Developed_120 (25.43), CONUS_Poultry Litter_0 (18.59)
892	Florida bonamia (*Bonamia grandiflora*)	Medium	High	High	CONUS_Citrus_0 (8.21), CONUS_Citrus_30 (12.78)	CONUS_Field Nurseries_0 (8.28), CONUS_Field Nurseries_120 (26.89), CONUS_Developed_0 (9.18), CONUS_Open Space Developed_120 (26.27), CONUS_Poultry Litter_0 (9.66)
1017	Tennessee yellow-eyed grass (*Xyris tennesseensis*)	High	High	High	CONUS_Cotton_150 (4.45), CONUS_Soybeans_150 (12.72)	CONUS_Other Crops_120 (6.40), CONUS_Developed_0 (5.52), CONUS_Open Space Developed_120 (32.89), CONUS_Poultry Litter_0 (66.31)
1023	Pennell's bird's-beak (*Cordylanthus tenuis ssp. capillaris*)	High	High	High	CONUS_Grapes_0 (18.78), CONUS_Grapes_30 (26.18), CONUS_Other Orchards_0 (11.73), CONUS_Other Orchards_30 (14.39)	CONUS_Field Nurseries_0 (11.75), CONUS_Field Nurseries_120 (18.45), CONUS_Open Space Developed_0 (4.61), CONUS_Open Space Developed_120 (27.12), CONUS_Poultry Litter_0 (56.08)
1031	Scrub lupine (*Lupinus aridorum*)	High	High	High	CONUS_Citrus_0 (8.17), CONUS_Citrus_30 (12.80)	CONUS_Field Nurseries_0 (8.24), CONUS_Field Nurseries_120 (27.79), CONUS_Developed_0 (9.69), CONUS_Open Space Developed_120 (24.75), CONUS_Poultry Litter_0 (23.35)
901	Pygmy fringe-tree (*Chionanthus pygmaeus*)	High	High	High	CONUS_Citrus_0 (10.37), CONUS_Citrus_30 (15.85)	CONUS_Field Nurseries_0 (10.44), CONUS_Field Nurseries_120 (32.14), CONUS_Developed_0 (9.12), CONUS_Open Space Developed_120 (24.51), CONUS_Poultry Litter_0 (11.17)
907	Pigeon wings (*Clitoria fragrans*)	Medium	High	High	CONUS_Citrus_0 (9.73), CONUS_Citrus_30 (14.99)	CONUS_Field Nurseries_0 (9.81), CONUS_Field Nurseries_120 (30.83), CONUS_Developed_0

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						(8.11), CONUS_Open Space Developed_120 (24.13), CONUS_Poultry Litter_0 (15.56)
1043	Crenulate lead-plant (*Amorpha crenulata*)	High	High	High	CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24), CONUS_Other Orchards_30 (5.50)	CONUS_Field Nurseries_120 (8.67), CONUS_Other Crops_120 (8.83), CONUS_Developed_0 (13.78), CONUS_Open Space Developed_120 (20.50), CONUS_Poultry Litter_0 (47.32)
1044	Small's milkpea (*Galactia smallii*)	High	High	High	CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24), CONUS_Other Orchards_30 (5.50)	CONUS_Field Nurseries_120 (8.67), CONUS_Other Crops_120 (8.83), CONUS_Developed_0 (13.78), CONUS_Open Space Developed_120 (20.50), CONUS_Poultry Litter_0 (47.32)
920	Leafy prairie-clover (*Dalea foliosa*)	Medium	High	High	CONUS_Soybeans_0 (17.89), CONUS_Soybeans_30 (21.34), CONUS_Soybeans_150 (34.33)	CONUS_Developed_0 (20.28), CONUS_Open Space Developed_120 (35.15), CONUS_Poultry Litter_0 (38.67)
1046	Garrett's mint (*Dicerandra christmanii*)	High	High	High	CONUS_Citrus_0 (18.91), CONUS_Citrus_30 (26.11)	CONUS_Field Nurseries_0 (18.99), CONUS_Field Nurseries_120 (43.98), CONUS_Open Space Developed_0 (6.21), CONUS_Open Space Developed_120 (23.66), CONUS_Poultry Litter_0 (72.50)
930	Clay-Loving wild buckwheat (*Eriogonum pelinophilum*)	High	High	High	CONUS_Vegetables and ground fruit_0 (6.92), CONUS_Vegetables and ground fruit_30 (11.71), CONUS_Vegetables and ground fruit_150 (29.35), CONUS_Other Grains_30 (6.34), CONUS_Other Grains_150 (26.41)	CONUS_Field Nurseries_120 (5.97), CONUS_Other Crops_120 (26.28), CONUS_Developed_0 (4.59), CONUS_Open Space Developed_120 (19.69), CONUS_Poultry Litter_0 (91.63)
1055	Kern mallow (*Eremalche kernensis*)	High	High	High	CONUS_Cotton_0 (4.51), CONUS_Cotton_30 (5.49), CONUS_Cotton_150 (9.80), CONUS_Vegetables and ground fruit_30 (5.75), CONUS_Vegetables and ground fruit_150 (12.39), CONUS_Other Orchards_0 (22.77), CONUS_Other Orchards_30 (27.23), CONUS_Other Grains_0 (4.50), CONUS_Other Grains_30 (7.22), CONUS_Other Grains_150 (18.90)	CONUS_Field Nurseries_0 (22.81), CONUS_Field Nurseries_120 (34.65), CONUS_Other Crops_0 (24.82), CONUS_Other Crops_120 (46.25), CONUS_Open Space Developed_0 (6.39), CONUS_Open Space Developed_120 (29.70), CONUS_Poultry Litter_0 (83.32)
932	Snakeroot (*Eryngium cuneifolium*)	High	High	High	CONUS_Citrus_0 (18.91), CONUS_Citrus_30 (26.11)	CONUS_Field Nurseries_0 (18.99), CONUS_Field Nurseries_120 (43.98), CONUS_Open Space Developed_0 (6.21), CONUS_Open Space

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						Developed_120 (23.66), CONUS_Poultry Litter_0 (72.50)
933	Menzies' wallflower (*Erysimum menziesii*)	High	High	High	CONUS_Vegetables and ground fruit_150 (7.84), CONUS_Other Orchards_0 (12.16), CONUS_Other Orchards_30 (15.18), CONUS_Other Grains_150 (11.07)	CONUS_Field Nurseries_0 (12.41), CONUS_Field Nurseries_120 (20.50), CONUS_Other Crops_0 (8.23), CONUS_Other Crops_120 (20.49), CONUS_Open Space Developed_120 (15.16)
1077	Texas ayenia (*Ayenia limitaris*)	High	High	High	CONUS_Cotton_0 (20.35), CONUS_Cotton_30 (27.81), CONUS_Cotton_150 (47.70), CONUS_Vegetables and ground fruit_30 (5.74), CONUS_Vegetables and ground fruit_150 (21.57), CONUS_Other Grains_30 (9.17), CONUS_Other Grains_150 (30.43)	CONUS_Field Nurseries_120 (8.86), CONUS_Other Crops_0 (12.17), CONUS_Other Crops_120 (48.77), CONUS_Developed_0 (8.25), CONUS_Open Space Developed_0 (4.52), CONUS_Open Space Developed_120 (27.39), CONUS_Poultry Litter_0 (92.58)
1078	California jewelflower (*Caulanthus californicus*)	Medium	High	High	CONUS_Grapes_30 (4.79), CONUS_Vegetables and ground fruit_30 (4.51), CONUS_Vegetables and ground fruit_150 (8.99), CONUS_Other Orchards_0 (9.42), CONUS_Other Orchards_30 (12.05), CONUS_Other Grains_30 (5.56), CONUS_Other Grains_150 (16.78)	CONUS_Field Nurseries_0 (9.76), CONUS_Field Nurseries_120 (17.92), CONUS_Other Crops_0 (12.79), CONUS_Other Crops_120 (33.01), CONUS_Open Space Developed_120 (20.47), CONUS_Poultry Litter_0 (30.13)
1080	Western prairie fringed Orchid (*Platanthera praeclara*)	Medium	High	High	CONUS_Other Grains_150 (10.04), CONUS_Soybeans_30 (8.11), CONUS_Soybeans_150 (18.28)	CONUS_Other Crops_120 (9.63), CONUS_Open Space Developed_120 (18.36), CONUS_Poultry Litter_0 (7.96)
940	Monterey gilia (*Gilia tenuiflora ssp. arenaria*)	Medium	High	High	CONUS_Vegetables and ground fruit_0 (8.02), CONUS_Vegetables and ground fruit_30 (14.20), CONUS_Vegetables and ground fruit_150 (28.00), CONUS_Other Orchards_30 (4.79), CONUS_Other Grains_30 (4.69), CONUS_Other Grains_150 (19.73)	CONUS_Field Nurseries_120 (11.70), CONUS_Other Crops_0 (8.55), CONUS_Other Crops_120 (30.39), CONUS_Developed_0 (16.00), CONUS_Open Space Developed_0 (10.57), CONUS_Open Space Developed_120 (43.91), CONUS_Poultry Litter_0 (85.00)
1082	Bakersfield cactus (*Opuntia treleasei*)	High	High	High	CONUS_Cotton_0 (4.53), CONUS_Cotton_30 (6.30), CONUS_Cotton_150 (13.99), CONUS_Grapes_0 (10.33), CONUS_Grapes_30 (15.36), CONUS_Vegetables and ground fruit_0 (10.80), CONUS_Vegetables and ground fruit_30 (15.42), CONUS_Vegetables and	CONUS_Field Nurseries_0 (25.89), CONUS_Field Nurseries_120 (44.13), CONUS_Other Crops_0 (19.56), CONUS_Other Crops_120 (44.39), CONUS_Developed_0 (6.95), CONUS_Open Space Developed_0 (4.74), CONUS_Open Space Developed_120 (26.84), CONUS_Poultry Litter_0 (83.30)

Entity ID	Common Name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
					ground fruit_150 (31.97), CONUS_Other Orchards_0 (22.97), CONUS_Other Orchards_30 (30.11), CONUS_Other Grains_0 (5.76), CONUS_Other Grains_30 (10.70), CONUS_Other Grains_150 (30.19), CONUS_Citrus_0 (11.16), CONUS_Citrus_30 (15.33)	
1087	Guthrie's (=Pyne's) ground-plum (*Astragalus bibullatus*)	High	High	High	CONUS_Soybeans_30 (5.70), CONUS_Soybeans_150 (16.99)	CONUS_Developed_0 (16.83), CONUS_Open Space Developed_0 (5.33), CONUS_Open Space Developed_120 (43.47), CONUS_Poultry Litter_0 (87.01)
1093	Awiwi (*Centaurium sebaeoides*)	High	High	High	NL48_Ag_0 (7.28), NL48_Ag_120 (13.05)	NL48_Developed_0 (13.36), NL48_Poultry Litter_0 (15.89), NL48_Open Space Developed_120 (16.90), NL48_Managed Forests_30 (4.89)
1094	`Akoko (*Euphorbia kuwaleana*)	High	High	High	NL48_Ag_0 (13.42), NL48_Ag_120 (21.27)	NL48_Developed_0 (18.98), NL48_Poultry Litter_0 (13.42), NL48_Open Space Developed_120 (17.08), NL48_Managed Forests_0 (12.16), NL48_Managed Forests_30 (15.49)
1116	Nioi (*Eugenia koolauensis*)	High	High	High	NL48_Ag_0 (10.91), NL48_Ag_120 (16.01)	NL48_Developed_0 (11.77), NL48_Poultry Litter_0 (10.91), NL48_Open Space Developed_120 (11.29), NL48_Managed Forests_0 (15.50), NL48_Managed Forests_30 (18.91)
943	Roan Mountain bluet (*Hedyotis purpurea var. montana*)	High	High	High	CONUS_Soybeans_150 (4.55)	CONUS_Other Crops_120 (5.85), CONUS_Open Space Developed_0 (4.78), CONUS_Open Space Developed_120 (33.39), CONUS_Poultry Litter_0 (68.76)
957	Prairie bush-clover (*Lespedeza leptostachya*)	Low	High	High	CONUS_Other Grains_150 (10.15), CONUS_Soybeans_0 (6.99), CONUS_Soybeans_30 (16.26), CONUS_Soybeans_150 (33.99)	CONUS_Open Space Developed_120 (26.28), CONUS_Poultry Litter_0 (7.50)
969	Michigan monkey-flower (*Mimulus michiganensis*)	High	High	High	CONUS_Other Orchards_30 (5.86), CONUS_Other Grains_150 (13.14)	CONUS_Field Nurseries_120 (13.72), CONUS_Other Crops_120 (15.79), CONUS_Open Space Developed_120 (25.42), CONUS_Poultry Litter_0 (41.16)
976	Canby's dropwort (*Oxypolis canbyi*)	Medium	High	High	CONUS_Cotton_30 (6.55), CONUS_Cotton_150 (22.09), CONUS_Other	CONUS_Field Nurseries_120 (9.91), CONUS_Other Crops_0 (8.21), CONUS_Other

Entity ID	Common Name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
					Row Crops_150 (13.77), CONUS_Other Grains_150 (11.38), CONUS_Soybeans_30 (5.47), CONUS_Soybeans_150 (23.89)	Crops_120 (38.82), CONUS_Open Space Developed_120 (24.07), CONUS_Poultry Litter_0 (11.25)
1153	White irisette (*Sisyrinchium dichotomum*)	High	High	High	CONUS_Soybeans_150 (16.89)	CONUS_Field Nurseries_120 (7.05), CONUS_Other Crops_120 (21.94), CONUS_Developed_0 (6.87), CONUS_Open Space Developed_0 (5.47), CONUS_Open Space Developed_120 (42.05), CONUS_Poultry Litter_0 (76.93)
1154	No common name (*Spermolepis hawaiiensis*)	High	High	High	NL48_Ag_120 (7.05)	NL48_Developed_0 (4.54), NL48_Poultry Litter_0 (9.11), NL48_Open Space Developed_120 (7.74), NL48_Managed Forests_0 (10.75), NL48_Managed Forests_30 (14.86)
1229	Deltoid spurge (*Chamaesyce deltoidea ssp. deltoidea*)	High	High	High	CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24), CONUS_Other Orchards_30 (5.50)	CONUS_Field Nurseries_120 (8.67), CONUS_Other Crops_120 (8.83), CONUS_Developed_0 (13.78), CONUS_Open Space Developed_120 (20.50), CONUS_Poultry Litter_0 (47.32)
991	Harperella (*Ptilimnium nodosum*)	Medium	High	High	CONUS_Cotton_150 (6.59), CONUS_Other Grains_150 (6.15), CONUS_Soybeans_150 (15.74)	CONUS_Field Nurseries_120 (5.41), CONUS_Other Crops_120 (18.77), CONUS_Open Space Developed_120 (28.40), CONUS_Poultry Litter_0 (43.30)
992	Michaux's sumac (*Rhus michauxii*)	Medium	High	High	CONUS_Cotton_150 (13.17), CONUS_Other Row Crops_150 (8.31), CONUS_Vegetables and ground fruit_150 (6.20), CONUS_Other Grains_150 (13.40), CONUS_Soybeans_30 (7.89), CONUS_Soybeans_150 (29.47)	CONUS_Other Crops_0 (5.28), CONUS_Other Crops_120 (37.72), CONUS_Developed_0 (9.61), CONUS_Open Space Developed_120 (37.64), CONUS_Poultry Litter_0 (31.03)
1235	Avon Park harebells (*Crotalaria avonensis*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Field Nurseries_0 (16.29), CONUS_Field Nurseries_120 (43.37), CONUS_Developed_0 (5.96), CONUS_Open Space Developed_120 (24.37), CONUS_Poultry Litter_0 (33.84)
1264	No common name (*Nesogenes rotensis*)	High	High	High	NL48_Ag_120 (6.42)	NL48_Open Space Developed_120 (15.01)
1415	White fringeless orchid (*Platanthera integrilabia*)	Medium	High	High	CONUS_Soybeans_150 (12.26)	CONUS_Open Space Developed_120 (29.22), CONUS_Poultry Litter_0 (33.18)

Entity ID	Common Name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
1710	Fleshy-fruit gladecress (*Leavenworthia crassa*)	High	High	High	CONUS_Cotton_30 (5.37), CONUS_Cotton_150 (15.30), CONUS_Other Grains_150 (5.17), CONUS_Soybeans_0 (7.92), CONUS_Soybeans_30 (13.28), CONUS_Soybeans_150 (40.94)	CONUS_Other Crops_120 (9.48), CONUS_Open Space Developed_0 (5.90), CONUS_Open Space Developed_120 (36.52), CONUS_Poultry Litter_0 (99.19)
1831	Short's bladderpod (*Physaria globosa*)	Medium	High	High	CONUS_Soybeans_0 (7.53), CONUS_Soybeans_30 (10.60), CONUS_Soybeans_150 (24.47)	CONUS_Developed_0 (5.31), CONUS_Open Space Developed_120 (31.10), CONUS_Poultry Litter_0 (34.72)
995	Mountain sweet pitcher-plant (*Sarracenia rubra ssp. jonesii*)	High	High	High	CONUS_Soybeans_150 (8.07)	CONUS_Field Nurseries_120 (6.53), CONUS_Other Crops_120 (12.68), CONUS_Developed_0 (7.39), CONUS_Open Space Developed_0 (5.00), CONUS_Open Space Developed_120 (41.83), CONUS_Poultry Litter_0 (70.35)
2211	Aboriginal Prickly-apple (*Harrisia (=Cereus) aboriginum (=gracilis)*)	High	High	High	CONUS_Citrus_30 (6.14)	CONUS_Field Nurseries_120 (15.29), CONUS_Developed_0 (16.26), CONUS_Open Space Developed_120 (29.79), CONUS_Poultry Litter_0 (42.62)
996	American chaffseed (*Schwalbea americana*)	Medium	High	High	CONUS_Cotton_150 (7.04), CONUS_Other Row Crops_150 (6.20), CONUS_Soybeans_150 (7.95)	CONUS_Field Nurseries_120 (12.97), CONUS_Other Crops_120 (19.36), CONUS_Developed_0 (6.64), CONUS_Open Space Developed_120 (23.82), CONUS_Poultry Litter_0 (8.67)
2810	Slickspot peppergrass (*Lepidium papilliferum*)	Medium	High	High	CONUS_Other Row Crops_150 (8.55), CONUS_Vegetables and ground fruit_0 (5.32), CONUS_Vegetables and ground fruit_30 (8.05), CONUS_Vegetables and ground fruit_150 (17.38), CONUS_Other Grains_150 (13.76)	CONUS_Other Crops_120 (22.82), CONUS_Open Space Developed_120 (13.77), CONUS_Poultry Litter_0 (28.69)
3116	Ihi (*Portulaca villosa*)	High	High	High	NL48_Ag_120 (7.57)	NL48_Developed_0 (4.69), NL48_Poultry Litter_0 (11.00), NL48_Open Space Developed_120 (10.39), NL48_Managed Forests_30 (5.98)
4030	No common name (*Schiedea salicaria*)	High	High	High	NL48_Ag_0 (9.94), NL48_Ag_120 (17.86)	NL48_Poultry Litter_0 (9.94), NL48_Open Space Developed_120 (4.80), NL48_Managed Forests_0 (10.84), NL48_Managed Forests_30 (16.73)

Entity ID	Common Name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
4253	Carter's mustard (*Warea carteri*)	High	High	High	CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24), CONUS_Other Orchards_30 (5.50)	CONUS_Field Nurseries_120 (8.67), CONUS_Other Crops_120 (8.83), CONUS_Developed_0 (13.78), CONUS_Open Space Developed_120 (20.50), CONUS_Poultry Litter_0 (47.32)
1015	Virginia spiraea (*Spiraea virginiana*)	Medium	High	High	CONUS_Citrus_0 (7.48), CONUS_Citrus_30 (11.11)	CONUS_Field Nurseries_0 (8.62), CONUS_Field Nurseries_120 (24.22), CONUS_Other Crops_120 (5.77), CONUS_Developed_0 (8.52), CONUS_Open Space Developed_120 (19.72), CONUS_Poultry Litter_0 (13.85)
1039	Alabama leather flower (*Clematis socialis*)	High	High	High	CONUS_Soybeans_150 (7.99)	CONUS_Open Space Developed_120 (26.65), CONUS_Poultry Litter_0 (31.27)
1048	Georgia rockcress (*Arabis georgiana*)	High	High	High	CONUS_Cotton_30 (5.90), CONUS_Cotton_150 (13.71), CONUS_Soybeans_30 (6.87), CONUS_Soybeans_150 (23.60)	CONUS_Other Crops_120 (21.67), CONUS_Open Space Developed_0 (6.34), CONUS_Open Space Developed_120 (33.78), CONUS_Poultry Litter_0 (99.67)
6672	Popolo (*Solanum nelsonii*)	High	High	High	CONUS_Cotton_150 (9.58), CONUS_Soybeans_150 (12.51)	CONUS_Other Crops_120 (22.45), CONUS_Developed_0 (4.59), CONUS_Open Space Developed_120 (26.85), CONUS_Poultry Litter_0 (48.38)
6870	Kentucky glade cress (*Leavenworthia exigua laciniata*)	Medium	High	High	NL48_Ag_120 (5.70)	NL48_Developed_0 (26.28), NL48_Open Space Developed_120 (27.50), NL48_Managed Forests_30 (5.01)
7167	Carter's small-flowered flax (*Linum carteri carteri*)	High	High	High	CONUS_Soybeans_150 (14.39)	CONUS_Developed_0 (22.36), CONUS_Open Space Developed_0 (6.59), CONUS_Open Space Developed_120 (48.83), CONUS_Poultry Litter_0 (91.65)
7206	`Awikiwiki (*Canavalia pubescens*)	High	High	High	CONUS_Vegetables and ground fruit_30 (4.55), CONUS_Vegetables and ground fruit_150 (9.24), CONUS_Other Orchards_30 (5.50)	CONUS_Field Nurseries_120 (8.67), CONUS_Other Crops_120 (8.83), CONUS_Developed_0 (13.78), CONUS_Open Space Developed_120 (20.50), CONUS_Poultry Litter_0 (47.32)
7805	Mountain golden heather (*Hudsonia montana*)	High	High	High	NL48_Ag_120 (9.28)	NL48_Developed_0 (6.18), NL48_Poultry Litter_0 (12.18), NL48_Open Space Developed_120 (8.44), NL48_Managed Forests_0 (6.65), NL48_Managed Forests_30 (10.45)

Entity ID	Common Name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
1058	Leedy's roseroot (*Rhodiola integrifolia ssp. leedyi*)	High	High	High	CONUS_Soybeans_150 (13.94)	CONUS_Other Crops_120 (16.47), CONUS_Open Space Developed_0 (7.95), CONUS_Open Space Developed_120 (34.51), CONUS_Poultry Litter_0 (85.95)
1150	Missouri bladderpod (*Physaria filiformis*)	Low	High	High	CONUS_Vegetables and ground fruit_150 (8.75), CONUS_Soybeans_0 (10.70), CONUS_Soybeans_30 (13.62), CONUS_Soybeans_150 (21.37)	CONUS_Developed_0 (17.04), CONUS_Open Space Developed_120 (27.93), CONUS_Poultry Litter_0 (47.08)
8392	Vandenberg monkeyflower (*Diplacus vandenbergensis*)	Not specified, assumed high	High	High	CONUS_Soybeans_150 (7.26)	CONUS_Open Space Developed_120 (30.11), CONUS_Poultry Litter_0 (42.23)
10076	No common name (*Phyllostegia pilosa*)	High	High	High	CONUS_Grapes_30 (5.52), CONUS_Vegetables and ground fruit_30 (4.50), CONUS_Vegetables and ground fruit_150 (7.66), CONUS_Other Grains_150 (6.00)	CONUS_Field Nurseries_120 (8.29), CONUS_Other Crops_120 (9.95), CONUS_Open Space Developed_120 (18.58), CONUS_Poultry Litter_0 (52.99)
10231	No common name (*Santalum involutum*)	High	High	High	NL48_Ag_0 (7.19), NL48_Ag_120 (11.94)	NL48_Developed_0 (4.51), NL48_Poultry Litter_0 (7.19), NL48_Open Space Developed_120 (9.64), NL48_Managed Forests_0 (21.31), NL48_Managed Forests_30 (26.88)
10584	Florida ziziphus (*Ziziphus celata*)	High	High	High	NL48_Ag_0 (4.75), NL48_Ag_120 (8.92)	NL48_Developed_0 (5.84), NL48_Poultry Litter_0 (4.75), NL48_Open Space Developed_120 (8.29), NL48_Managed Forests_0 (24.32), NL48_Managed Forests_30 (32.60)
1234	Clara Hunt's milk-vetch (*Astragalus clarianus*)	High	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.50)	CONUS_Field Nurseries_0 (16.29), CONUS_Field Nurseries_120 (43.37), CONUS_Developed_0 (5.96), CONUS_Open Space Developed_120 (24.37), CONUS_Poultry Litter_0 (33.84)

5.7.3. Clothianidin

Draft predictions of likelihood of jeopardy are presented in this section for 703 currently listed terrestrial plants that were determined as LAA in the clothianidin BE. With clothianidin, no direct effects on terrestrial plants are indicated for the currently registered uses since it is not toxic to terrestrial plants up to the current maximum application rates. Therefore, the potential for effects of clothianidin on listed terrestrial plants is limited to indirect effects, including impacts on pollination and seed dispersal mechanisms. To the extent that available information identifies insects as significant contributors to seed dispersal, it will be considered in the assessment of indirect effects on listed plants. The following sections provide the predicted likelihood of jeopardy. Of the 703 species for which an LAA determination is made in the clothianidin BE, EPA predicted there is not a likelihood of jeopardy for 573 species and predicted there is a likelihood of jeopardy for 130 species (**Table 5-32** and

Table 5-33).

EPA predicted there is not a likelihood of jeopardy for those species with <5% overlap of species range and UDLs with higher certainty of leading to exposure when considering UDL and usage refinements. Moreover, several species of listed plants have predictions of not likely for jeopardy because they are found in remote and/or forested (non-plantation) habitats, and the likelihood of any thiamethoxam application impacting invertebrate populations in these remote areas is highly unlikely. Last, EPA predicted there is not a likelihood of jeopardy for those remaining listed plants with multiple reproductive and/or dispersal mechanisms other than insect pollination, as they would have alternative means of pollination and dispersal available. EPA predicted there is a likelihood of jeopardy for those species with a final spatial overlap category of medium or high (>5%) and an effects category of high. It is noted that for some listed plants in groups 7 and 11, biotic-mediated pollination is known but the exact mechanism is unknown. Since insects are the dominant biotic pollination mechanism for plants, it is presumed that plants in these groups rely on insects as the sole pollination mechanism.

Table 5-32. Plant Assessment Groups for Predicted Likelihood of Jeopardy for Listed Terrestrial Plant Species with LAA Determinations

Plant Group	Number of Listed LAA[1] Species	Jeopardy not Likely[2]	Jeopardy Likely[2]
1 - Lichens	0	0	0
2 - Ferns and Allies	0	0	0
3 - Conifers & Cyads	5	5	0
4 - Monocots	28	28	0
5 - Monocots	9	6	3
6 - Monocots	19	15	4
7 - Monocots	15	9	6
8 - Dicots	5	5	0
9 - Dicots	223	182	41
10 - Dicots	104	74	30
11 - Dicots	295	249	46
Total	703	573	130

[1] Based on potential for effects to an individual
[2] Based on potential for effects to a population

Table 5-33. Listed Terrestrial Plants and UDLs Associated with Predicted Likelihood of Jeopardy for Clothianidin

Entity ID	Common name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure	Uses with less certainty of contributing to exposure
568	Spring Creek bladderpod (*Lesquerella perforata*)	Not specified, assumed high	High	High	CONUS_Soybeans_150 (14.33)	CONUS_Developed_0 (5.71), CONUS_Open.Space.Developed_0 (7.01), CONUS_Poultry.Litter_0 (99.98), CONUS_Open.Space.Developed_120 (36.17)
637	Four-petal pawpaw (*Asimina tetramera*)	Not specified, assumed high	High	Medium	CONUS_Citrus_30 (5.12)	CONUS_Other.Crops_0 (13.23), CONUS_Developed_0 (11.84), CONUS_Open.Space.Developed_0 (7.02), CONUS_Poultry.Litter_0 (80.7), CONUS_Open.Space.Developed_120 (23.21), CONUS_Other.Crops_120 (31.91)
651	Texas poppy-mallow (*Callirhoe scabriuscula*)	Not specified, assumed high	High	High	CONUS_Cotton_0 (12.47), CONUS_Cotton_30 (15.67)	CONUS_Poultry.Litter_0 (98.9), CONUS_Open.Space.Developed_120 (15.6), CONUS_Other.Crops_120 (27.74)
677	Cumberland rosemary (*Conradina verticillata)*	Not specified, assumed high	High	Medium	CONUS_Soybeans_150 (7.19)	CONUS_Poultry.Litter_0 (85.78), CONUS_Federal.Lands_0 (18.89), CONUS_Open.Space.Developed_120 (26.41)
696	Lakela's mint (*Dicerandra immaculata*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (22.22), CONUS_Citrus_30 (28.29)	CONUS_Other.Crops_0 (4.75), CONUS_Developed_0 (8.92), CONUS_Open.Space.Developed_0 (8.42), CONUS_Poultry.Litter_0 (89.57), CONUS_Open.Space.Developed_120 (27.12), CONUS_Other.Crops_120 (22.32)
698	Santa Barbara Island liveforever (*Dudleya traskiae)*	Not specified, assumed high	High	Medium	CONUS_Grapes_30 (5.16)	CONUS_Poultry.Litter_0 (52.98), CONUS_Federal.Lands_0 (50.09), CONUS_Open.Space.Developed_120 (17.29), CONUS_Other.Crops_120 (9.42)
716	No common name (*Geocarpon minimum*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (6.05), CONUS_Soybeans_150 (12.74)	CONUS_Poultry.Litter_0 (74.15), CONUS_Federal.Lands_0 (4.9), CONUS_Open.Space.Developed_120 (26.69), CONUS_Other.Crops_120 (8.25)
789	Papery whitlow-wort (*Paronychia chartacea*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (9.21), CONUS_Citrus_30 (14.19)	CONUS_Developed_0 (7.81), CONUS_Open.Space.Developed_0 (8.24), CONUS_Poultry.Litter_0 (56.21), CONUS_Federal.Lands_0 (4.49), CONUS_Open.Space.Developed_120 (31.36)
790	Furbish lousewort (*Pedicularis furbishiae*)	Not specified, assumed high	High	Medium	CONUS_Vegetables.and.ground.fruit_30 (5.61)	CONUS_Poultry.Litter_0 (67.86), CONUS_Open.Space.Developed_120 (28.39), CONUS_Other.Crops_120 (14.95)
809	Scrub plum (*Prunus geniculata)*	Not specified, assumed high	High	High	CONUS_Citrus_0 (11.71), CONUS_Citrus_30 (17.82)	CONUS_Developed_0 (9.24), CONUS_Open.Space.Developed_0 (9.32), CONUS_Poultry.Litter_0 (57.8), CONUS_Federal.Lands_0 (6.1), CONUS_Open.Space.Developed_120 (35.07)
836	Gentian pinkroot (*Spigelia gentianoides*)	Not specified, assumed high	High	High	CONUS_Cotton_30 (4.67), CONUS_Soybeans_150 (18.7)	CONUS_Other.Crops_0 (7.47), CONUS_Open.Space.Developed_0 (6.74), CONUS_Poultry.Litter_0 (97.44), CONUS_Open.Space.Developed_120 (37.25), CONUS_Other.Crops_120 (36.85)

Entity ID	Common name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure	Uses with less certainty of contributing to exposure
920	Leafy prairie-clover (*Dalea foliosa*)	Not specified, assumed high	High	High	CONUS_Soybeans_0 (12.64), CONUS_Soybeans_30 (16.09), CONUS_Soybeans_150 (29.07)	CONUS_Developed_0 (20.28), CONUS_Open.Space.Developed_0 (7.72), CONUS_Poultry.Litter_0 (94.01), CONUS_Open.Space.Developed_120 (41)
922	Beautiful pawpaw (*Deeringothamnus pulchellus*)	Not specified, assumed high	High	Medium	CONUS_Citrus_30 (6.63)	CONUS_Developed_0 (17.86), CONUS_Open.Space.Developed_0 (13.77), CONUS_Poultry.Litter_0 (45.44), CONUS_Open.Space.Developed_120 (42.66)
967	Rough-leaved loosestrife (*Lysimachia asperulaefolia*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (6.71), CONUS_Soybeans_150 (24.1)	CONUS_Other.Crops_0 (5.15), CONUS_Open.Space.Developed_0 (4.73), CONUS_Poultry.Litter_0 (87.78), CONUS_Federal.Lands_0 (8.23), CONUS_Open.Space.Developed_120 (26.7), CONUS_Other.Crops_120 (31.92)
991	Harperella (*Ptilimnium nodosum*)	Not specified, assumed high	High	High	CONUS_Soybeans_150 (15.74)	CONUS_Open.Space.Developed_0 (4.98), CONUS_Poultry.Litter_0 (72.39), CONUS_Federal.Lands_0 (25.29), CONUS_Open.Space.Developed_120 (30.58), CONUS_Other.Crops_120 (18.77)
992	Michaux's sumac (*Rhus michauxii*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (7.89), CONUS_Soybeans_150 (29.47)	CONUS_Other.Crops_0 (5.28), CONUS_Developed_0 (9.61), CONUS_Open.Space.Developed_0 (10.21), CONUS_Poultry.Litter_0 (96.97), CONUS_Open.Space.Developed_120 (45.89), CONUS_Other.Crops_120 (37.72)
1031	Scrub lupine (*Lupinus aridorum)*	Not specified, assumed high	High	High	CONUS_Citrus_0 (8.17), CONUS_Citrus_30 (12.8)	CONUS_Developed_0 (9.69), CONUS_Open.Space.Developed_0 (8.82), CONUS_Poultry.Litter_0 (46.15), CONUS_Open.Space.Developed_120 (31.27)
2211	Aboriginal Prickly-apple (*Harrisia (=Cereus) aboriginum (=gracilis))*	Not specified, assumed high	High	Medium	CONUS_Citrus_30 (6.14)	CONUS_Developed_0 (16.26), CONUS_Open.Space.Developed_0 (13.74), CONUS_Poultry.Litter_0 (53.72), CONUS_Open.Space.Developed_120 (39.34)
6672	Georgia rockcress (*Arabis georgiana*)	Not specified, assumed high	High	High	CONUS_Soybeans_150 (12.51)	CONUS_Developed_0 (4.59), CONUS_Open.Space.Developed_0 (5.73), CONUS_Poultry.Litter_0 (94.87), CONUS_Federal.Lands_0 (9.82), CONUS_Open.Space.Developed_120 (29.94), CONUS_Other.Crops_120 (22.45)
8392	Missouri bladderpod (*Physaria filiformis*)	Not specified, assumed high	High	Medium	CONUS_Soybeans_150 (7.26)	CONUS_Open.Space.Developed_0 (4.57), CONUS_Poultry.Litter_0 (64.26), CONUS_Federal.Lands_0 (9.43), CONUS_Open.Space.Developed_120 (32.77)
875	Sensitive joint-vetch (*Aeschynomene virginica)*	Not specified, assumed high	High	High	CONUS_Soybeans_0 (5.32), CONUS_Soybeans_30 (9.46), CONUS_Soybeans_150 (22.74)	CONUS_Poultry.Litter_0 (78.64), CONUS_Federal.Lands_0 (9.89), CONUS_Open.Space.Developed_120 (19.72), CONUS_Other.Crops_120 (18.38)
508	Clara Hunt's milk-vetch (*Astragalus clarianus)*	Not specified, assumed high	High	High	CONUS_Grapes_0 (10.66), CONUS_Other.Orchards_0 (7.78), CONUS_Grapes_30 (15.77), CONUS_Other.Orchards_30 (9.65)	CONUS_Developed_0 (8), CONUS_Open.Space.Developed_0 (5.79), CONUS_Poultry.Litter_0 (64.31), CONUS_Open.Space.Developed_120 (27.88)

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513	Star cactus (*Astrophytum asterias*)	Not specified, assumed high	High	High	CONUS_Cotton_0 (8.44), CONUS_Cotton_30 (13.11)	CONUS_Other.Crops_0 (10.01), CONUS_Developed_0 (7.21), CONUS_Poultry.Litter_0 (96.9), CONUS_Open.Space.Developed_120 (25.01), CONUS_Other.Crops_120 (37)
528	purple amole (*Chlorogalum purpureum*)	Not specified, assumed high	High	High	CONUS_Grapes_0 (6.95), CONUS_Grapes_30 (11.25), CONUS_Other.Orchards_30 (4.64)	CONUS_Other.Crops_0 (7.96), CONUS_Poultry.Litter_0 (79.62), CONUS_Federal.Lands_0 (22.79), CONUS_Open.Space.Developed_120 (19.82), CONUS_Other.Crops_120 (37.11)
546	Lompoc yerba santa (*Eriodictyon capitatum*)	Not specified, assumed high	High	High	CONUS_Grapes_0 (6.15), CONUS_Grapes_30 (11.84), CONUS_Vegetables.and.ground.fruit_30 (6.3), CONUS_Other.Orchards_30 (6.22)	CONUS_Poultry.Litter_0 (80.06), CONUS_Federal.Lands_0 (15.26), CONUS_Open.Space.Developed_120 (22.27), CONUS_Other.Crops_120 (9.47)
585	Lake County stonecrop (*Parvisedum leiocarpum*)	Not specified, assumed high	High	Medium	CONUS_Grapes_30 (6.31)	CONUS_Open.Space.Developed_0 (6.97), CONUS_Poultry.Litter_0 (61.73), CONUS_Open.Space.Developed_120 (30.66)
593	Calistoga allocarya (*Plagiobothrys strictus)*	Not specified, assumed high	High	High	CONUS_Grapes_0 (12.73), CONUS_Other.Orchards_0 (9.48), CONUS_Grapes_30 (18.19), CONUS_Other.Orchards_30 (12.24)	CONUS_Poultry.Litter_0 (50.96), CONUS_Open.Space.Developed_120 (21.02)
610	Keck's Checker-mallow (*Sidalcea keckii)*	Not specified, assumed high	High	Medium	CONUS_Other.Orchards_30 (4.94)	CONUS_Other.Crops_0 (5.92), CONUS_Poultry.Litter_0 (53.87), CONUS_Federal.Lands_0 (10.31), CONUS_Open.Space.Developed_120 (10.83), CONUS_Other.Crops_120 (18.6)
617	Ko`oloa`ula (*Abutilon menziesii)*	Not specified, assumed high	High	High	NL48_Ag_0 (8.29), NL48_Ag_120 (12.84)	NL48_Developed_0 (6.99), NL48_Poultry.Litter_0 (17.42), NL48_Open.Space.Developed_120 (10.79)
620	Northern wild monkshood (*Aconitum noveboracense*)	Not specified, assumed high	High	High	CONUS_Soybeans_0 (12.29), CONUS_Soybeans_30 (20.61), CONUS_Soybeans_150 (49.02)	CONUS_Open.Space.Developed_0 (4.6), CONUS_Poultry.Litter_0 (98.5), CONUS_Federal.Lands_0 (4.72), CONUS_Open.Space.Developed_120 (30.15)
655	Small-anthered bittercress (*Cardamine micranthera*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (7.9), CONUS_Soybeans_150 (32.24)	CONUS_Developed_0 (6.48), CONUS_Open.Space.Developed_0 (12.49), CONUS_Poultry.Litter_0 (99.81), CONUS_Open.Space.Developed_120 (49.12), CONUS_Other.Crops_120 (36.91)
662	`Akoko (*Euphorbia celastroides var. kaenana)*	Not specified, assumed high	High	High	NL48_Ag_0 (6.44), NL48_Ag_120 (11.83)	NL48_Developed_0 (25.09), NL48_Open.Space.Developed_0 (4.53), NL48_Poultry.Litter_0 (7.96), NL48_Federal.Lands_0 (16.46), NL48_Open.Space.Developed_120 (26.28)
665	Ewa Plains `akoko (*Euphorbia*	Not specified, assumed high	High	High	NL48_Ag_0 (6.64), NL48_Ag_120 (11.38)	NL48_Developed_0 (7.12), NL48_Poultry.Litter_0 (14.91), NL48_Federal.Lands_0 (4.87), NL48_Open.Space.Developed_120 (11.07)

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	skottsbergii var. skottsbergii)					
666	Sonoma spineflower (*Chorizanthe valida*)	Not specified, assumed high	High	High	CONUS_Grapes_0 (9.68), CONUS_Other.Orchards_0 (4.56), CONUS_Grapes_30 (16.56), CONUS_Other.Orchards_30 (5.93)	CONUS_Developed_0 (6.59), CONUS_Open.Space.Developed_0 (4.79), CONUS_Poultry.Litter_0 (75.06), CONUS_Federal.Lands_0 (12.71), CONUS_Open.Space.Developed_120 (25.84)
718	Spreading avens (*Geum radiatum*)	Not specified, assumed high	High	Medium	CONUS_Soybeans_150 (6.18)	CONUS_Open.Space.Developed_0 (8.85), CONUS_Poultry.Litter_0 (83.18), CONUS_Federal.Lands_0 (41.2), CONUS_Open.Space.Developed_120 (37.84), CONUS_Other.Crops_120 (7.62)
739	Slender rush-pea (*Hoffmannseggia tenella*)	Not specified, assumed high	High	High	CONUS_Cotton_0 (20.65), CONUS_Cotton_30 (24.2)	CONUS_Other.Crops_0 (5.92), CONUS_Developed_0 (5.2), CONUS_Poultry.Litter_0 (88.51), CONUS_Open.Space.Developed_120 (18.13), CONUS_Other.Crops_120 (21.66)
740	Highlands scrub hypericum (*Hypericum cumulicola*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.5)	CONUS_Developed_0 (5.96), CONUS_Open.Space.Developed_0 (8.03), CONUS_Poultry.Litter_0 (61.5), CONUS_Federal.Lands_0 (5.52), CONUS_Open.Space.Developed_120 (29.06)
763	Walker's manioc (*Manihot walkerae*)	Not specified, assumed high	High	Medium	CONUS_Cotton_0 (5.15), CONUS_Cotton_30 (8.06)	CONUS_Other.Crops_0 (6.47), CONUS_Developed_0 (4.68), CONUS_Poultry.Litter_0 (88.08), CONUS_Open.Space.Developed_120 (18.68), CONUS_Other.Crops_120 (25.08)
784	Antioch Dunes evening-primrose (*Oenothera deltoides ssp. howellii)*	Not specified, assumed high	High	Medium	CONUS_Grapes_30 (4.71), CONUS_Other.Orchards_30 (5.25)	CONUS_Other.Crops_0 (10.77), CONUS_Developed_0 (22.69), CONUS_Open.Space.Developed_0 (8.21), CONUS_Poultry.Litter_0 (89.27), CONUS_Open.Space.Developed_120 (36.82), CONUS_Other.Crops_120 (31.59)
804	Wireweed (*Polygonella basiramia*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.5)	CONUS_Developed_0 (5.96), CONUS_Open.Space.Developed_0 (8.03), CONUS_Poultry.Litter_0 (61.5), CONUS_Federal.Lands_0 (5.52), CONUS_Open.Space.Developed_120 (29.06)
805	Sandlace (*Polygonella myriophylla)*	Not specified, assumed high	High	High	CONUS_Citrus_0 (10.28), CONUS_Citrus_30 (15.42)	CONUS_Developed_0 (8.5), CONUS_Open.Space.Developed_0 (8.31), CONUS_Poultry.Litter_0 (51.33), CONUS_Open.Space.Developed_120 (29.78)
817	Miccosukee gooseberry (*Ribes echinellum)*	Not specified, assumed high	High	Medium	CONUS_Soybeans_150 (4.67)	CONUS_Open.Space.Developed_0 (4.52), CONUS_Poultry.Litter_0 (81.48), CONUS_Federal.Lands_0 (49.57), CONUS_Open.Space.Developed_120 (27.73), CONUS_Other.Crops_120 (6.93)
819	Green pitcher-plant (*Sarracenia oreophila*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (4.97), CONUS_Soybeans_150 (25.65)	CONUS_Open.Space.Developed_0 (6.18), CONUS_Poultry.Litter_0 (92.77), CONUS_Federal.Lands_0 (23.32), CONUS_Open.Space.Developed_120 (36.43), CONUS_Other.Crops_120 (18.97)

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831	Fringed campion (*Silene polypetala*)	Not specified, assumed high	High	High	CONUS_Soybeans_150 (15.02)	CONUS_Other.Crops_0 (7.77), CONUS_Open.Space.Developed_0 (4.95), CONUS_Poultry.Litter_0 (95.32), CONUS_Open.Space.Developed_120 (30.23), CONUS_Other.Crops_120 (37.54)
892	Florida bonamia (*Bonamia grandiflora*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (8.21), CONUS_Citrus_30 (12.78)	CONUS_Developed_0 (9.18), CONUS_Open.Space.Developed_0 (9.27), CONUS_Poultry.Litter_0 (62.26), CONUS_Federal.Lands_0 (7.63), CONUS_Open.Space.Developed_120 (34.59)
901	Pygmy fringe-tree (*Chionanthus pygmaeus*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (10.37), CONUS_Citrus_30 (15.85)	CONUS_Developed_0 (9.12), CONUS_Open.Space.Developed_0 (8.8), CONUS_Poultry.Litter_0 (61.92), CONUS_Open.Space.Developed_120 (32.21)
903	Monterey spineflower (*Chorizanthe pungens var. pungens*)	Not specified, assumed high	High	High	CONUS_Grapes_0 (4.71), CONUS_Vegetables.and.ground.fruit_0 (10.28), CONUS_Grapes_30 (8.17), CONUS_Vegetables.and.ground.fruit_30 (15.61), CONUS_Other.Orchards_30 (6.97)	CONUS_Other.Crops_0 (8.43), CONUS_Developed_0 (9.82), CONUS_Open.Space.Developed_0 (8.32), CONUS_Poultry.Litter_0 (78.23), CONUS_Open.Space.Developed_120 (34.74), CONUS_Other.Crops_120 (30.01)
929	Scrub buckwheat (*Eriogonum longifolium var. gnaphalifolium*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (7.91), CONUS_Citrus_30 (12.28)	CONUS_Developed_0 (7.5), CONUS_Open.Space.Developed_0 (8.71), CONUS_Poultry.Litter_0 (59.88), CONUS_Federal.Lands_0 (9.77), CONUS_Open.Space.Developed_120 (32.93), CONUS_Other.Crops_120 (4.69)
930	Clay-Loving wild buckwheat (*Eriogonum pelinophilum*)	Not specified, assumed high	High	Medium	CONUS_Vegetables.and.ground.fruit_30 (6.13)	CONUS_Developed_0 (4.59), CONUS_Poultry.Litter_0 (91.63), CONUS_Federal.Lands_0 (19.77), CONUS_Open.Space.Developed_120 (19.69), CONUS_Other.Crops_120 (26.28)
932	Snakeroot (*Eryngium cuneifolium)*	Not specified, assumed high	High	High	CONUS_Citrus_0 (18.91), CONUS_Citrus_30 (26.11)	CONUS_Open.Space.Developed_0 (6.21), CONUS_Poultry.Litter_0 (72.5), CONUS_Federal.Lands_0 (8), CONUS_Open.Space.Developed_120 (23.66)
940	Monterey gilia (*Gilia tenuiflora ssp. arenaria)*	Not specified, assumed high	High	High	CONUS_Vegetables.and.ground.fruit_0 (8.02), CONUS_Vegetables.and.ground.fruit_30 (14.2), CONUS_Other.Orchards_30 (4.79)	CONUS_Other.Crops_0 (8.55), CONUS_Developed_0 (16), CONUS_Open.Space.Developed_0 (10.57), CONUS_Poultry.Litter_0 (85), CONUS_Federal.Lands_0 (4.68), CONUS_Open.Space.Developed_120 (43.91), CONUS_Other.Crops_120 (30.39)
946	Swamp pink (*Helonias bullata)*	Not specified, assumed high	High	High	CONUS_Soybeans_150 (14.47)	CONUS_Developed_0 (7.88), CONUS_Open.Space.Developed_0 (9.69), CONUS_Poultry.Litter_0 (87.53), CONUS_Federal.Lands_0 (27.25), CONUS_Open.Space.Developed_120 (43.22), CONUS_Other.Crops_120 (15.82)
957	Prairie bush-clover (*Lespedeza leptostachya*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (12.55), CONUS_Soybeans_150 (30.27)	CONUS_Poultry.Litter_0 (99.05), CONUS_Open.Space.Developed_120 (29.78)

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960	Pondberry (*Lindera melissifolia)*	Not specified, assumed high	High	High	CONUS_Soybeans_0 (6.13), CONUS_Soybeans_30 (11.05), CONUS_Soybeans_150 (23.97)	CONUS_Other.Crops_0 (9.19), CONUS_Poultry.Litter_0 (90.05), CONUS_Federal.Lands_0 (7.75), CONUS_Open.Space.Developed_120 (25.91), CONUS_Other.Crops_120 (36.11)
976	Canby's dropwort (*Oxypolis canbyi*)	Not specified, assumed high	High	High	CONUS_Cotton_30 (4.46), CONUS_Soybeans_30 (5.47), CONUS_Soybeans_150 (23.89)	CONUS_Other.Crops_0 (8.21), CONUS_Open.Space.Developed_0 (4.96), CONUS_Poultry.Litter_0 (90.83), CONUS_Federal.Lands_0 (5.4), CONUS_Open.Space.Developed_120 (28.31), CONUS_Other.Crops_120 (38.82)
977	Fassett's locoweed (*Oxytropis campestris var. chartacea*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (7.62), CONUS_Soybeans_150 (20.93)	CONUS_Poultry.Litter_0 (85.79), CONUS_Federal.Lands_0 (12.49), CONUS_Open.Space.Developed_120 (26.19), CONUS_Other.Crops_120 (5.58)
984	Eastern prairie fringed orchid (*Platanthera leucophaea*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (10.76), CONUS_Soybeans_150 (29.95)	CONUS_Developed_0 (6.41), CONUS_Open.Space.Developed_0 (4.63), CONUS_Poultry.Litter_0 (97.04), CONUS_Open.Space.Developed_120 (32.29), CONUS_Other.Crops_120 (12.77)
994	Alabama canebrake pitcher-plant (*Sarracenia rubra ssp. alabamensis*)	Not specified, assumed high	High	High	CONUS_Soybeans_150 (16.04)	CONUS_Open.Space.Developed_0 (4.78), CONUS_Poultry.Litter_0 (99.19), CONUS_Open.Space.Developed_120 (30.64), CONUS_Other.Crops_120 (26.11)
995	Mountain sweet pitcher-plant (*Sarracenia rubra ssp. jonesii)*	Not specified, assumed high	High	Medium	CONUS_Soybeans_150 (8.07)	CONUS_Developed_0 (7.39), CONUS_Open.Space.Developed_0 (12.88), CONUS_Poultry.Litter_0 (85.47), CONUS_Federal.Lands_0 (15), CONUS_Open.Space.Developed_120 (49.71), CONUS_Other.Crops_120 (12.68)
996	American chaffseed (*Schwalbea americana*)	Not specified, assumed high	High	Medium	CONUS_Soybeans_150 (7.89)	CONUS_Developed_0 (6.64), CONUS_Open.Space.Developed_0 (6.46), CONUS_Poultry.Litter_0 (75.77), CONUS_Federal.Lands_0 (9.55), CONUS_Open.Space.Developed_120 (29.71), CONUS_Other.Crops_120 (19.36)
999	Ohai (*Sesbania tomentosa*)	Not specified, assumed high	High	Medium	NL48_Ag_120 (5.92)	NL48_Developed_0 (10.1), NL48_Poultry.Litter_0 (8.2), NL48_Federal.Lands_0 (8.67), NL48_Open.Space.Developed_120 (12.44)
1014	Wide-leaf warea (*Warea amplexifolia*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (7.94), CONUS_Citrus_30 (12.82)	CONUS_Developed_0 (8.98), CONUS_Open.Space.Developed_0 (8.72), CONUS_Poultry.Litter_0 (50.1), CONUS_Open.Space.Developed_120 (32.32)
1015	Carter's mustard (*Warea carteri*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (7.48), CONUS_Citrus_30 (11.11)	CONUS_Developed_0 (8.52), CONUS_Open.Space.Developed_0 (6.31), CONUS_Poultry.Litter_0 (61.31), CONUS_Federal.Lands_0 (18.76), CONUS_Open.Space.Developed_120 (24.67), CONUS_Other.Crops_120 (5.77)
1055	Kern mallow (*Eremalche kernensis*)	Not specified, assumed high	High	High	CONUS_Cotton_0 (4.54), CONUS_Other.Orchards_0 (17.79), CONUS_Cotton_30 (5.52),	CONUS_Other.Crops_0 (24.82), CONUS_Open.Space.Developed_0 (6.39), CONUS_Poultry.Litter_0 (83.32), CONUS_Federal.Lands_0

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					CONUS_Vegetables.and.ground.fruit_30 (5.75), CONUS_Other.Orchards_30 (22.25)	(23.17), CONUS_Open.Space.Developed_120 (29.7), CONUS_Other.Crops_120 (46.25)
1058	Mountain golden heather (*Hudsonia montana)*	Not specified, assumed high	High	High	CONUS_Soybeans_150 (13.94)	CONUS_Open.Space.Developed_0 (7.95), CONUS_Poultry.Litter_0 (85.95), CONUS_Federal.Lands_0 (32.74), CONUS_Open.Space.Developed_120 (34.51), CONUS_Other.Crops_120 (16.47)
1077	Texas ayenia (*Ayenia limitaris)*	Not specified, assumed high	High	High	CONUS_Cotton_0 (12.52), CONUS_Cotton_30 (19.98)	CONUS_Other.Crops_0 (12.17), CONUS_Developed_0 (8.25), CONUS_Open.Space.Developed_0 (4.52), CONUS_Poultry.Litter_0 (92.58), CONUS_Federal.Lands_0 (7.56), CONUS_Open.Space.Developed_120 (27.39), CONUS_Other.Crops_120 (48.77)
1080	Western prairie fringed Orchid (*Platanthera praeclara*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (7.19), CONUS_Soybeans_150 (17.36)	CONUS_Poultry.Litter_0 (85.48), CONUS_Federal.Lands_0 (8.5), CONUS_Open.Space.Developed_120 (20.81), CONUS_Other.Crops_120 (9.63)
1087	Guthrie's (=Pyne's) ground-plum (*Astragalus bibullatus*)	Not specified, assumed high	High	High	CONUS_Soybeans_30 (5.7), CONUS_Soybeans_150 (16.99)	CONUS_Developed_0 (16.83), CONUS_Open.Space.Developed_0 (13.16), CONUS_Poultry.Litter_0 (97.79), CONUS_Open.Space.Developed_120 (51.3)
1093	Awiwi (*Centaurium sebaeoides)*	Not specified, assumed high	High	High	NL48_Ag_0 (8.21), NL48_Ag_120 (13.98)	NL48_Developed_0 (14.55), NL48_Poultry.Litter_0 (15.89), NL48_Federal.Lands_0 (4.75), NL48_Open.Space.Developed_120 (20.79)
1094	`Akoko (*Euphorbia kuwaleana)*	Not specified, assumed high	High	High	NL48_Ag_0 (13.42), NL48_Ag_120 (21.27)	NL48_Developed_0 (18.98), NL48_Poultry.Litter_0 (13.42), NL48_Federal.Lands_0 (13.64), NL48_Open.Space.Developed_120 (18.21)
1150	Leedy's roseroot (*Rhodiola integrifolia ssp. leedyi)*	Not specified, assumed high	High	High	CONUS_Soybeans_0 (10.7), CONUS_Soybeans_30 (13.62), CONUS_Soybeans_150 (21.37)	CONUS_Developed_0 (17.04), CONUS_Open.Space.Developed_0 (8.8), CONUS_Poultry.Litter_0 (62.03), CONUS_Open.Space.Developed_120 (34.61)
1153	White irisette (*Sisyrinchium dichotomum*)	Not specified, assumed high	High	High	CONUS_Soybeans_150 (16.89)	CONUS_Developed_0 (6.87), CONUS_Open.Space.Developed_0 (11.61), CONUS_Poultry.Litter_0 (93.25), CONUS_Federal.Lands_0 (6.59), CONUS_Open.Space.Developed_120 (48.18), CONUS_Other.Crops_120 (21.94)
1154	No common name (*Spermolepis hawaiiensis*)	Not specified, assumed high	High	Medium	NL48_Ag_120 (7.36)	NL48_Developed_0 (6.57), NL48_Poultry.Litter_0 (9.11), NL48_Federal.Lands_0 (7.92), NL48_Open.Space.Developed_120 (9.22)
1235	Avon Park harebells (*Crotalaria avonensis*)	Not specified, assumed high	High	High	CONUS_Citrus_0 (16.24), CONUS_Citrus_30 (23.5)	CONUS_Developed_0 (5.96), CONUS_Open.Space.Developed_0 (8.03), CONUS_Poultry.Litter_0 (61.5), CONUS_Federal.Lands_0 (5.52), CONUS_Open.Space.Developed_120 (29.06)

Entity ID	Common name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure	Uses with less certainty of contributing to exposure
1831	Short's bladderpod (*Physaria globosa*)	Not specified, assumed high	High	High	CONUS_Soybeans_0 (7.53), CONUS_Soybeans_30 (10.6), CONUS_Soybeans_150 (24.47)	CONUS_Developed_0 (5.31), CONUS_Open.Space.Developed_0 (6.53), CONUS_Poultry.Litter_0 (98.63), CONUS_Open.Space.Developed_120 (35.73)
2810	Slickspot peppergrass (*Lepidium papilliferum*)	Not specified, assumed high	High	Medium	CONUS_Vegetables.and.ground.fruit_30 (4.88)	CONUS_Poultry.Litter_0 (72.85), CONUS_Federal.Lands_0 (54.04), CONUS_Open.Space.Developed_120 (16.95), CONUS_Other.Crops_120 (22.82)
3116	Ihi (*Portulaca villosa*)	Not specified, assumed high	High	Medium	NL48_Ag_120 (7.9)	NL48_Developed_0 (11.43), NL48_Poultry.Litter_0 (11), NL48_Open.Space.Developed_120 (12.53)
4030	No common name (*Schiedea salicaria*)	Not specified, assumed high	High	High	NL48_Ag_0 (9.94), NL48_Ag_120 (17.86)	NL48_Poultry.Litter_0 (9.94), NL48_Open.Space.Developed_120 (4.8)
6870	Popolo (*Solanum nelsonii)*	Not specified, assumed high	High	Medium	NL48_Ag_120 (5.7)	NL48_Developed_0 (26.28), NL48_Open.Space.Developed_0 (5.95), NL48_Federal.Lands_0 (12.06), NL48_Open.Space.Developed_120 (31.65)
7167	Kentucky glade cress (*Leavenworthia exigua laciniata*)	Not specified, assumed high	High	High	CONUS_Soybeans_150 (14.39)	CONUS_Developed_0 (22.36), CONUS_Open.Space.Developed_0 (13.76), CONUS_Poultry.Litter_0 (91.65), CONUS_Federal.Lands_0 (7.97), CONUS_Open.Space.Developed_120 (55.99)
7805	`Awikiwiki (*Canavalia pubescens)*	Not specified, assumed high	High	Medium	NL48_Ag_0 (4.76), NL48_Ag_120 (9.82)	NL48_Developed_0 (6.18), NL48_Poultry.Litter_0 (12.18), NL48_Open.Space.Developed_120 (10.38)
10584	No common name (*Santalum involutum*)	Not specified, assumed high	High	Medium	NL48_Ag_0 (4.75), NL48_Ag_120 (8.92)	NL48_Developed_0 (5.84), NL48_Poultry.Litter_0 (4.75), NL48_Open.Space.Developed_120 (9.64)
531	La Graciosa thistle (*Cirsium loncholepis*)	Not specified, assumed high	Low	Medium	CONUS_Vegetables.and.ground.fruit_0 (5.1), CONUS_Grapes_30 (5.22), CONUS_Vegetables.and.ground.fruit_30 (7.61), CONUS_Other.Orchards_30 (6.41)	CONUS_Other.Crops_0 (4.46), CONUS_Developed_0 (4.53), CONUS_Open.Space.Developed_0 (5.31), CONUS_Poultry.Litter_0 (86.04), CONUS_Federal.Lands_0 (42.65), CONUS_Open.Space.Developed_120 (28.32), CONUS_Other.Crops_120 (18.28)
540	Yellow larkspur (*Delphinium luteum*)	Not specified, assumed high	Low	High	CONUS_Grapes_0 (9.79), CONUS_Other.Orchards_0 (5.34), CONUS_Grapes_30 (16.91), CONUS_Other.Orchards_30 (6.82)	CONUS_Developed_0 (6.15), CONUS_Open.Space.Developed_0 (5.19), CONUS_Poultry.Litter_0 (85.1), CONUS_Open.Space.Developed_120 (28), CONUS_Other.Crops_120 (4.55)
645	Ko`oko`olau (*Bidens micrantha ssp. kalealaha)*	Not specified, assumed high	Low	Medium	NL48_Ag_0 (5.83), NL48_Ag_120 (9.8)	NL48_Poultry.Litter_0 (7.26), NL48_Federal.Lands_0 (4.94), NL48_Open.Space.Developed_120 (9.05)
667	Chorro Creek bog thistle (*Cirsium fontinale var. obispoense*)	Not specified, assumed high	Low	Medium	CONUS_Grapes_30 (6)	CONUS_Open.Space.Developed_0 (4.79), CONUS_Poultry.Litter_0 (81.34), CONUS_Federal.Lands_0 (27.38), CONUS_Open.Space.Developed_120 (23.44), CONUS_Other.Crops_120 (16.34)
756	Nehe (*Lipochaeta lobata var. leptophylla)*	Not specified, assumed high	Low	High	NL48_Ag_0 (7.28), NL48_Ag_120 (13.34)	NL48_Developed_0 (27.85), NL48_Open.Space.Developed_0 (5.07), NL48_Poultry.Litter_0 (9), NL48_Federal.Lands_0 (16.62), NL48_Open.Space.Developed_120 (29.14)

Entity ID	Common name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure	Uses with less certainty of contributing to exposure
782	Kulu`i (*Nototrichium humile)*	Not specified, assumed high	Low	High	NL48_Ag_0 (12.15), NL48_Ag_120 (17.59)	NL48_Developed_0 (6), NL48_Poultry.Litter_0 (12.15), NL48_Federal.Lands_0 (11.78), NL48_Open.Space.Developed_120 (12.36)
852	Cooley's meadowrue (*Thalictrum cooleyi*)	Not specified, assumed high	Low	High	CONUS_Cotton_30 (5.52), CONUS_Other.Orchards_30 (6.01), CONUS_Soybeans_30 (7.5), CONUS_Soybeans_150 (25.05)	CONUS_Other.Crops_0 (7.82), CONUS_Poultry.Litter_0 (91.28), CONUS_Open.Space.Developed_120 (24.73), CONUS_Other.Crops_120 (41.59)
874	Round-leaved chaff-flower (*Achyranthes splendens var. rotundata)*	Not specified, assumed high	Low	Medium	NL48_Ag_120 (5.33)	NL48_Developed_0 (9.91), NL48_Poultry.Litter_0 (7.31), NL48_Federal.Lands_0 (8.11), NL48_Open.Space.Developed_120 (12.24)
964	Nehe (*Lipochaeta waimeaensis)*	Not specified, assumed high	Low	Medium	NL48_Ag_0 (5.33), NL48_Ag_120 (9.79)	NL48_Developed_0 (21.19), NL48_Poultry.Litter_0 (6.59), NL48_Federal.Lands_0 (15.98), NL48_Open.Space.Developed_120 (22.06)
989	Tiny polygala (*Polygala small*lii)	Not specified, assumed high	Low	Medium	CONUS_Citrus_30 (5.7)	CONUS_Other.Crops_0 (6.94), CONUS_Developed_0 (14.25), CONUS_Open.Space.Developed_0 (6.55), CONUS_Poultry.Litter_0 (68.67), CONUS_Federal.Lands_0 (14.86), CONUS_Open.Space.Developed_120 (24.09), CONUS_Other.Crops_120 (18.99)
1045	Texas prairie dawn-flower (*Hymenoxys texana)*	Not specified, assumed high	Low	Medium	CONUS_Cotton_30 (5.54), CONUS_Soybeans_150 (8.32)	CONUS_Other.Crops_0 (7.76), CONUS_Developed_0 (31.13), CONUS_Open.Space.Developed_0 (9.6), CONUS_Poultry.Litter_0 (85.27), CONUS_Federal.Lands_0 (9.05), CONUS_Open.Space.Developed_120 (47.57), CONUS_Other.Crops_120 (32.51)
1123	San Joaquin wooly-threads (*Monolopia (=Lembertia) congdonii)*	Not specified, assumed high	Low	High	CONUS_Vegetables.and.ground.fruit_0 (8.07), CONUS_Other.Orchards_0 (5.63), CONUS_Grapes_30 (6.46), CONUS_Vegetables.and.ground.fruit_30 (10.25), CONUS_Other.Orchards_30 (10.21)	CONUS_Other.Crops_0 (25.44), CONUS_Poultry.Litter_0 (86.62), CONUS_Federal.Lands_0 (19.84), CONUS_Open.Space.Developed_120 (20.43), CONUS_Other.Crops_120 (50.81)
2265	Kaulu (*Pteralyxia macrocarpa*)	Not specified, assumed high	Low	Medium	NL48_Ag_120 (5.98)	NL48_Developed_0 (5.36), NL48_Federal.Lands_0 (19.26), NL48_Open.Space.Developed_120 (5.71)
2278	Ko`oko`olau (*Bidens amplectens)*	Not specified, assumed high	Low	High	NL48_Ag_0 (8.86), NL48_Ag_120 (13.4)	NL48_Developed_0 (5.7), NL48_Poultry.Litter_0 (8.86), NL48_Federal.Lands_0 (20.05), NL48_Open.Space.Developed_120 (9.42)
3737	Hala pepe (*Pleomele forbesii)*	Not specified, assumed high	Low	High	NL48_Ag_0 (9), NL48_Ag_120 (12.11)	NL48_Developed_0 (7.06), NL48_Poultry.Litter_0 (9), NL48_Federal.Lands_0 (21.54), NL48_Open.Space.Developed_120 (7.33)

Entity ID	Common name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure	Uses with less certainty of contributing to exposure
7886	No common name (*Polyscias bisattenuata*)	Not specified, assumed high	Low	Medium	NL48_Ag_120 (7.89)	NL48_Developed_0 (5.22), NL48_Open.Space.Developed_120 (8.85)
8277	Ko`oko`olau (*Bidens campylotheca ssp. waihoiensis)*	Not specified, assumed high	Low	Medium	NL48_Ag_120 (5.78)	NL48_Poultry.Litter_0 (7.68), NL48_Open.Space.Developed_120 (7.19)
10480	haiwale (*Cyrtandra nanawaleensis)*	Not specified, assumed high	Low	High	NL48_Ag_0 (9.88), NL48_Ag_120 (20.18)	NL48_Developed_0 (11.51), NL48_Poultry.Litter_0 (9.88), NL48_Open.Space.Developed_120 (24.46)
10588	No common name (*Cyanea kauaulaensis*)	Not specified, assumed high	Low	Medium	NL48_Ag_120 (8.64)	NL48_Developed_0 (5.21), NL48_Poultry.Litter_0 (11.61), NL48_Federal.Lands_0 (6.29), NL48_Open.Space.Developed_120 (9.74)
625	Little amphianthus (*Amphianthus pusillus)*	Not specified, assumed high	Medium	Medium	CONUS_Soybeans_150 (6.35)	CONUS_Open.Space.Developed_0 (6.03), CONUS_Poultry.Litter_0 (96.59), CONUS_Open.Space.Developed_120 (34.58), CONUS_Other.Crops_120 (10.59)
835	Short's goldenrod (*Solidago shortii*)	Not specified, assumed high	Medium	High	CONUS_Soybeans_0 (9.4), CONUS_Soybeans_30 (13.89), CONUS_Soybeans_150 (32.25)	CONUS_Poultry.Litter_0 (98.76), CONUS_Open.Space.Developed_120 (28.9)
891	Decurrent false aster (*Boltonia decurrens*)	Not specified, assumed high	Medium	High	CONUS_Soybeans_0 (6.93), CONUS_Soybeans_30 (14.62), CONUS_Soybeans_150 (31.68)	CONUS_Developed_0 (6.27), CONUS_Poultry.Litter_0 (98.25), CONUS_Open.Space.Developed_120 (29.56), CONUS_Other.Crops_120 (9.24)
904	Florida golden aster (*Chrysopsis floridana*)	Not specified, assumed high	Medium	High	CONUS_Citrus_0 (9.57), CONUS_Citrus_30 (14.78)	CONUS_Developed_0 (18.96), CONUS_Open.Space.Developed_0 (9.92), CONUS_Poultry.Litter_0 (68.04), CONUS_Open.Space.Developed_120 (40.91)
945	Schweinitz's sunflower (*Helianthus schweinitzii)*	Not specified, assumed high	Medium	High	CONUS_Soybeans_30 (7.97), CONUS_Soybeans_150 (33.3)	CONUS_Other.Crops_0 (5.07), CONUS_Developed_0 (8.19), CONUS_Open.Space.Developed_0 (10.16), CONUS_Poultry.Litter_0 (98.8), CONUS_Open.Space.Developed_120 (46.34), CONUS_Other.Crops_120 (40.13)
1064	Kral's water-plantain (*Sagittaria secundifol*ia)	Not specified, assumed high	Medium	Medium	CONUS_Soybeans_150 (8.52)	CONUS_Poultry.Litter_0 (80.54), CONUS_Federal.Lands_0 (45.68), CONUS_Open.Space.Developed_120 (22.44)
532	Vine Hill clarkia (*Clarkia imbricata*)	Not specified, assumed high	Medium	High	CONUS_Grapes_0 (39.01), CONUS_Other.Orchards_0 (19.7), CONUS_Grapes_30 (60.27), CONUS_Other.Orchards_30 (25.11)	CONUS_Developed_0 (16.28), CONUS_Open.Space.Developed_0 (12.71), CONUS_Poultry.Litter_0 (98.92), CONUS_Open.Space.Developed_120 (57.69), CONUS_Other.Crops_120 (5.04)
598	Lo`ulu (*Pritchardia remota)*	Not specified, assumed high	Medium	Medium	NL48_Ag_0 (5.33), NL48_Ag_120 (9.79)	NL48_Developed_0 (21.19), NL48_Poultry.Litter_0 (6.59), NL48_Federal.Lands_0 (15.98), NL48_Open.Space.Developed_120 (22.06)

Entity ID	Common name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure	Uses with less certainty of contributing to exposure
599	Hartweg's golden sunburst (*Pseudobahia bahiifolia*)	Not specified, assumed high	Medium	High	CONUS_Other.Orchards_0 (21.54), CONUS_Other.Orchards_30 (26.43), CONUS_Rice_30 (4.86)	CONUS_Other.Crops_0 (13.9), CONUS_Poultry.Litter_0 (77.82), CONUS_Open.Space.Developed_120 (18.2), CONUS_Other.Crops_120 (31.65)
600	San Joaquin adobe sunburst (*Pseudobahia peirsonii*)	Not specified, assumed high	Medium	High	CONUS_Grapes_0 (7.78), CONUS_Other.Orchards_0 (16.44), CONUS_Grapes_30 (13.6), CONUS_Other.Orchards_30 (24.85)	CONUS_Other.Crops_0 (12.27), CONUS_Poultry.Litter_0 (92.28), CONUS_Open.Space.Developed_120 (25.83), CONUS_Other.Crops_120 (44.34)
647	Sonoma sunshine (*Blennosperma bakeri)*	Not specified, assumed high	Medium	High	CONUS_Grapes_0 (14.28), CONUS_Other.Orchards_0 (8.4), CONUS_Grapes_30 (24.35), CONUS_Other.Orchards_30 (10.76)	CONUS_Developed_0 (13.16), CONUS_Open.Space.Developed_0 (7.72), CONUS_Poultry.Litter_0 (94.72), CONUS_Open.Space.Developed_120 (38.73), CONUS_Other.Crops_120 (6.44)
649	Olulu (*Brighamia insignis)*	Not specified, assumed high	Medium	Medium	NL48_Ag_120 (7.95)	NL48_Developed_0 (10.58), NL48_Open.Space.Developed_120 (22.04)
653	Brooksville bellflower (*Campanula robinsiae*)	Not specified, assumed high	Medium	Medium	CONUS_Citrus_30 (8.66)	CONUS_Developed_0 (17.67), CONUS_Open.Space.Developed_0 (13.37), CONUS_Poultry.Litter_0 (79.27), CONUS_Open.Space.Developed_120 (49.05)
754	Sebastopol meadowfoam (*Limnanthes vinculans*)	Not specified, assumed high	Medium	High	CONUS_Grapes_0 (15.02), CONUS_Other.Orchards_0 (9.89), CONUS_Grapes_30 (24.41), CONUS_Other.Orchards_30 (12.4)	CONUS_Developed_0 (11.65), CONUS_Open.Space.Developed_0 (7.02), CONUS_Poultry.Litter_0 (82.55), CONUS_Open.Space.Developed_120 (35.72), CONUS_Other.Crops_120 (6.05)
764	Mohr's Barbara's buttons (*Marshallia mohrii)*	Not specified, assumed high	Medium	High	CONUS_Soybeans_150 (14.88)	CONUS_Open.Space.Developed_0 (6.24), CONUS_Poultry.Litter_0 (96.65), CONUS_Federal.Lands_0 (10.9), CONUS_Open.Space.Developed_120 (32.87), CONUS_Other.Crops_120 (10.25)
803	Lewton's polygala (*Polygala lewtonii*)	Not specified, assumed high	Medium	High	CONUS_Citrus_0 (7.53), CONUS_Citrus_30 (11.65)	CONUS_Developed_0 (6.31), CONUS_Open.Space.Developed_0 (8.08), CONUS_Poultry.Litter_0 (63.58), CONUS_Federal.Lands_0 (12.07), CONUS_Open.Space.Developed_120 (30.39), CONUS_Other.Crops_120 (4.87)
818	Bunched arrowhead (*Sagittaria fasciculata*)	Not specified, assumed high	Medium	High	CONUS_Soybeans_150 (10.08)	CONUS_Developed_0 (9.32), CONUS_Open.Space.Developed_0 (14.75), CONUS_Poultry.Litter_0 (90.06), CONUS_Federal.Lands_0 (8.61), CONUS_Open.Space.Developed_120 (53.97), CONUS_Other.Crops_120 (15.51)
850	No common name (*Tetramolopium rockii)*	Not specified, assumed high	Medium	Medium	NL48_Ag_120 (5.77)	NL48_Open.Space.Developed_120 (5.22)
905	Pitcher's thistle (*Cirsium pitcheri*)	Not specified, assumed high	Medium	High	CONUS_Soybeans_30 (8.05), CONUS_Soybeans_150 (21.98)	CONUS_Developed_0 (5.33), CONUS_Open.Space.Developed_0 (4.49), CONUS_Poultry.Litter_0 (93.26), CONUS_Federal.Lands_0 (18.41), CONUS_Open.Space.Developed_120 (31.52), CONUS_Other.Crops_120 (20.84)

Entity ID	Common name (Scientific Name)	Overall Vulnerability	Magnitude of Effect	Overlap	Uses with higher certainty of contributing to exposure	Uses with less certainty of contributing to exposure
924	Smooth coneflower (*Echinacea laevigata*)	Not specified, assumed high	Medium	High	CONUS_Soybeans_150 (18.61)	CONUS_Developed_0 (7.04), CONUS_Open.Space.Developed_0 (8.75), CONUS_Poultry.Litter_0 (94.66), CONUS_Federal.Lands_0 (11.9), CONUS_Open.Space.Developed_120 (42.15), CONUS_Other.Crops_120 (25.26)
974	Britton's beargrass (*Nolina brittoniana*)	Not specified, assumed high	Medium	High	CONUS_Citrus_0 (7.91), CONUS_Citrus_30 (12.28)	CONUS_Developed_0 (7.5), CONUS_Open.Space.Developed_0 (8.71), CONUS_Poultry.Litter_0 (59.88), CONUS_Federal.Lands_0 (9.77), CONUS_Open.Space.Developed_120 (32.93), CONUS_Other.Crops_120 (4.69)
1036	Ruth's golden aster (*Pityopsis ruthii*)	Not specified, assumed high	Medium	High	CONUS_Soybeans_150 (10.68)	CONUS_Poultry.Litter_0 (60.27), CONUS_Federal.Lands_0 (76.93), CONUS_Open.Space.Developed_120 (26.68)
1063	Lo`ulu (*Pritchardia schattaueri)*	Not specified, assumed high	Medium	High	NL48_Ag_0 (24.21), NL48_Ag_120 (41.97)	NL48_Poultry.Litter_0 (24.21), NL48_Open.Space.Developed_120 (6.42)
1142	Lo`ulu (*Pritchardia maideniana)*	Not specified, assumed high	Medium	High	NL48_Ag_0 (9.11), NL48_Ag_120 (18.99)	NL48_Developed_0 (4.72), NL48_Poultry.Litter_0 (9.11), NL48_Federal.Lands_0 (7.33), NL48_Open.Space.Developed_120 (10.18)
1881	Whorled Sunflower (*Helianthus verticillatus*)	Not specified, assumed high	Medium	High	CONUS_Soybeans_150 (17.11)	CONUS_Poultry.Litter_0 (94.47), CONUS_Federal.Lands_0 (8.42), CONUS_Open.Space.Developed_120 (25.71), CONUS_Other.Crops_120 (14.66)
10590	Baker's Loulu (*Pritchardia bakeri*)	Not specified, assumed high	Medium	Medium	NL48_Ag_0 (5.33), NL48_Ag_120 (9.79)	NL48_Developed_0 (21.19), NL48_Poultry.Litter_0 (6.59), NL48_Federal.Lands_0 (15.98), NL48_Open.Space.Developed_120 (22.06)
4589	Ko`oko`olau (*Bidens micrantha ssp. ctenophylla)*	Not specified, assumed high	ND	Medium	NL48_Ag_120 (5.27)	NL48_Open.Space.Developed_120 (8.47)
5334	`Ena`ena (*Pseudognaphalium sandwicensium var. molokaiense*)	Not specified, assumed high	ND	Medium	NL48_Ag_120 (6.8)	NL48_Poultry.Litter_0 (9.04), NL48_Federal.Lands_0 (6.01), NL48_Open.Space.Developed_120 (8.19)
10076	Vandenberg monkeyflower (*Diplacus vandenbergensis*)	Not specified, assumed high	High	Medium	CONUS_Grapes_30 (5.52), CONUS_Vegetables.and.ground.fruit_30 (4.5)	CONUS_Poultry.Litter_0 (52.99), CONUS_Federal.Lands_0 (46.38), CONUS_Open.Space.Developed_120 (18.58), CONUS_Other.Crops_120 (9.95)

6. Predictions of the Likelihood of Adverse Modification of Designated Critical Habitats

The designated critical habitat effects determination process for imidacloprid, thiamethoxam and clothianidin begins by considering the results from the BEs, where likely to adversely affect calls were made. For the species-specific effects determinations and predictions of the likelihood of jeopardy, EPA identified potential concerns for direct effects to some insect species in aquatic or terrestrial habitats. EPA also identified potential concerns for indirect effects to some animal and plant species based on loss of insect prey or pollinators. These conclusions were used to identify relevant Physical or Biological Features (PBFs) to considered when predicting whether adverse modification is likely or not for designated critical habitats. When considering potential exposures from spray applications and effects of imidacloprid, thiamethoxam and/or clothianidin, the following PBFs may be affected (if there is sufficient overlap of the CH and exposure areas):

1. Terrestrial habitat quality and function (for listed terrestrial invertebrates);
2. Aquatic habitat quality and function (for listed aquatic invertebrates);
3. Insect pollinators (for plants);
4. Terrestrial insect prey; and
5. Aquatic insect prey.

The discussion below summarizes the designated critical habitat conclusions by determination and whether adverse modification is predicted for the LAA determinations. This assessment considers all 762 CHs that were designated as of February 16, 2022, under the responsibility of the USFWS.

6.1. Imidacloprid

Appendix G includes the determinations for each designated critical habitat. The appendix includes a dichotomous key that walks through EPA's criteria for predicting when adverse modification is likely or not**. Table 6-1** summarizes the determinations by type and taxon. The text below provides more information about the determinations.

Table 6-1. Summary of designated critical habitat effects determinations and predictions of likelihood of adverse modification by taxa.

Taxon	Number of Listed LAA[1] Species	Adverse Modification not Likely[2]	Adverse Modification Likely[2]
Amphibians	26	26	0
Aquatic invertebrates	18	16	2
Birds	26	23	3
Fish	63	55	8
Mammals	17	15	2
Plants	428	421	7
Reptiles	6	5	1
Terrestrial invertebrates	37	30	7
Total	621	591	30

[1] Based on potential for effects to an individual
[2] Based on potential for effects to a population

6.1.1. Not Likely to Adversely Modify Predictions

EPA concluded that imidacloprid is not likely to adversely modify 591 of the 762 designated CHs. No AM determinations were made for CHs of listed taxa with less than 5% overlap of imidacloprid exposure areas. Exposure areas included direct overlap of potential use sites and spray drift areas for terrestrial habitats and spray drift and runoff areas for aquatic habitats. These spray drift and runoff areas were calculated on a taxa-by-taxa basis. The analysis for each buffer distance is included in the discussion for each taxonomic group (**Section 4**).

Although potential effects to an individual insect within the CH is indicated due to impacts on habitat quality, when the overlap is considered low (i.e., <5%) it is not expected to result in adverse modification of the CH. As discussed previously, medium or high overlap with use sites with high uncertainty were also not expected to result in adverse modification of the CH. Similarly, no AM determinations were made for plants and vertebrate species that did not include invertebrates in their PBFs (based on Appendix L of the USFWS malathion BiOp) or when the overlap is considered low (*i.e.,* <5%).

6.1.2. Likely Adverse Modification Predictions

EPA concluded that 30 of the 762 designated CHs are likely to be adversely modified. This includes the CHs of 7 terrestrial and 2 aquatic invertebrates, where impacts to habitat quality may occur because of imidacloprid concentrations within the CH. There are potential effects on the PBFs of the CH of 3 birds, 8 fish, 1 reptile, and 2 mammal species, specifically, potential effects to their invertebrate diets. Finally, there are potential effects on the PBFs of the CHs of 14 listed plant species due to effects on their insect pollinators.

The designated CHs of these 30 species are all located within the continental US. Fifteen CHs have >5% direct overlap with potential imidacloprid use sites. The remaining CHs have potential spray drift or runoff exposures from adjacent imidacloprid use sites. These spray drift and runoff areas were calculated on a taxa-by-taxa basis.

Table 6-2. Drift distance considered and uses that are likely contributing to adverse modification for designated critical habitats with predicted likelihood of adverse modification determinations for imidacloprid.

Common name	Entity ID	Drift distance considered	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Aquatic invertebrate				
Vernal pool fairy shrimp	493	30	Field Nurseries, Other Orchards	Other Crops, Open Space Developed, Poultry Litter
Vernal pool tadpole shrimp	494	30	Field Nurseries, Other Orchards, Xmas Trees	Other Crops, Poultry Litter
Birds				
Whooping crane	67	150	Soybeans	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Piping Plover	130	150	Field Nurseries, Soybeans, Vegetables and Ground Fruit, Other Orchards	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Yellow-billed Cuckoo	6901	150	Field Nurseries, Vegetables and Ground Fruit, Citrus, Cotton, Other Orchards	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Fish				
Snail darter	235	30	Soybeans	Developed, Open Space Developed, Managed Forests, Poultry Litter
Slackwater darter	239	30	Soybeans	Open Space Developed, Managed Forests, Poultry Litter
Niangua darter	257	30	Soybeans	Managed Forests, Poultry Litter
June sucker	287	30	Field Nurseries, Other Orchards, Xmas Trees	Developed, Open Space Developed, Poultry Litter
Delta smelt	305	30	Field Nurseries, Vegetables and Ground Fruit, Grapes, Other Orchards	Developed, Other Crops, Open Space Developed, Poultry Litter
Topeka shiner	311	30	Soybeans	Open Space Developed, Poultry Litter
Rush Darter	3525	30	Soybeans	Developed, Open Space Developed, Managed Forests, Poultry Litter
Chucky Madtom	7150	30	Soybeans	Open Space Developed, Poultry Litter
Mammals				
Indiana bat	1	150	Soybeans	Developed, Open Space Developed, Managed Forests, Poultry Litter
Buena Vista Lake ornate Shrew	58	150	Field Nurseries, Vegetables and Ground Fruit, Citrus, Grapes, Cotton, Other Orchards	Developed, Other Crops, Open Space Developed, Poultry Litter
Plants				
La Graciosa thistle	531	150	Field Nurseries, Vegetables and Ground Fruit, Grapes, Other Orchards	Developed, Other Crops, Open Space Developed, Poultry Litter
Santa Cruz tarplant	562	150	Field Nurseries, Vegetables and Ground Fruit	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter

Common name	Entity ID	Drift distance considered	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Braun's rock-cress	630	150	Soybeans	Developed, Open Space Developed, Managed Forests, Poultry Litter
Florida brickell-bush	4420	150	Field Nurseries, Vegetables and Ground Fruit, Citrus, Other Orchards	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
White Bluffs bladderpod	4565	150	Field Nurseries, Vegetables and Ground Fruit, Grapes, Other Orchards	Other Crops, Open Space Developed, Poultry Litter
Kentucky glade cress	7167	150	Soybeans	Developed, Open Space Developed, Managed Forests, Poultry Litter
Carter's small-flowered flax	7206	150	Field Nurseries, Vegetables and Ground Fruit, Citrus, Other Orchards	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Reptile				
Plymouth Redbelly Turtle	170	150	Vegetables and Ground Fruit	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Terrestrial invertebrate				
fValley elderberry longhorn beetle	436	792	Field Nurseries, Vegetables and Ground Fruit, Grapes, Other Row Crops, Other Orchards	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Hine's emerald dragonfly	445	792	Field Nurseries, Soybeans, Vegetables and Ground Fruit, Other Orchards	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Dakota Skipper	3412	792	Soybeans, Vegetables and Ground Fruit, Other Row Crops	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Salt Creek Tiger beetle	4910	792	Soybeans, Vegetables and Ground Fruit	Developed, Other Crops, Open Space Developed, Poultry Litter
Bartram's hairstreak Butterfly	5067	792	Field Nurseries, Vegetables and Ground Fruit, Citrus, Other Orchards	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Taylor's (=whulge) Checkerspot	7495	792	Field Nurseries, Vegetables and Ground Fruit, Other Row Crops, Other Orchards, Xmas Trees	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter
Poweshiek skipperling	10147	792	Soybeans, Vegetables and Ground Fruit, Other Row Crops	Developed, Other Crops, Open Space Developed, Managed Forests, Poultry Litter

6.2. Thiamethoxam

Appendix H includes the determinations for each designated critical habitat. **Table 6-3** summarizes the determinations by type and taxon. The text below provides more information about the determinations.

Table 6-3. Summary of designated critical habitat effects determinations and predictions of likelihood of adverse modification by taxa.

Taxon	Number of Listed LAA[1] Species	Adverse Modification not Likely[2]	Adverse Modification Likely[2]
Amphibians	25	25	0
Aquatic invertebrates	16	14	2
Birds	26	23	3
Fish	68	60	8
Mammals	15	13	2
Plants	418	410	8
Reptiles	6	5	1
Terrestrial invertebrates	36	26	10
Total	612	578	34

[1] Based on potential for effects to an individual
[2] Based on potential for effects to a population

6.2.1. Not Likely to Adversely Modify Predictions

EPA concluded that thiamethoxam is not likely to adversely modify 578 of the 762 designated CHs. No AM determinations were made for CHs of listed taxa with less than 5% overlap of imidacloprid exposure areas. Exposure areas included direct overlap of potential use sites and spray drift areas for terrestrial habitats and spray drift and runoff areas for aquatic habitats. These spray drift and runoff areas were calculated on a taxa-by-taxa basis. The analysis for each buffer distance is included in the discussion for each taxonomic group (**Section 4**).

Although potential effects to an individual insect within the CH is indicated due to impacts on habitat quality, when the overlap is considered low (i.e., <5%) it is not expected to result in adverse modification of the CH. As discussed previously, medium or high overlap with use sites with high uncertainty were also not expected to result in adverse modification of the CH. Similarly, no AM determinations were made for plants and vertebrate species that did not include invertebrates in their PBFs (based on Appendix L of the USFWS malathion BiOp) or when the overlap is considered low (i.e., <5%).

6.2.2. Likely Adverse Modification Predictions

EPA concluded that 34 of the 762 designated CHs are likely to be adversely modified. This includes the CHs of 12 invertebrates, where impacts to habitat quality may occur because of thiamethoxam concentrations within the CH. There are potential effects on the PBFs of the CH of 3 birds, 8 fish, 1 reptile, and 2 mammal species, specifically, potential effects to their invertebrate diets. Finally, there are potential effects on the PBFs of the CHs of 8 listed plant species due to effects on their insect pollinators.

The designated CHs of these 34 species are all located within the continental US. Fifteen CHs have >5% direct overlap with potential thiamethoxam use sites. The remaining CHs have potential spray drift or runoff exposures from adjacent imidacloprid use sites. These spray drift and runoff areas were calculated on a taxa-by-taxa basis.

Table 6-4. Drift distance considered and uses that are likely contributing to adverse modification for designated critical habitats with predicted likelihood of adverse modification determinations for thiamethoxam.

Entity ID	Common Name	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
Aquatic Invertebrates			
493	Vernal pool fairy shrimp	CONUS_Other Orchards_0 (4.64), CONUS_Other Orchards_30 (6.83)	CONUS_Field Nurseries_0 (4.68), CONUS_Field Nurseries_30 (6.88), CONUS_Other Crops_0 (6.66), CONUS_Other Crops_30 (12.40), CONUS_Open Space Developed_30 (5.18), CONUS_Poultry Litter_0 (76.85)
494	Vernal pool tadpole shrimp	CONUS_Other Orchards_0 (6.01), CONUS_Other Orchards_30 (8.59)	CONUS_Field Nurseries_0 (6.05), CONUS_Field Nurseries_30 (8.62), CONUS_Other Crops_30 (7.67), CONUS_Poultry Litter_0 (80.19)
Birds			
67	Whooping crane	CONUS_Other Grains_150 (10.49), CONUS_Soybeans_0 (7.30), CONUS_Soybeans_30 (9.11), CONUS_Soybeans_150 (16.45)	CONUS_Other Crops_120 (5.63), CONUS_Open Space Developed_120 (9.17), CONUS_Poultry Litter_0 (71.44)
130	Piping Plover	CONUS_Vegetables and ground fruit_150 (5.17), CONUS_Other Grains_150 (13.12), CONUS_Soybeans_150 (6.78)	CONUS_Other Crops_120 (13.11), CONUS_Developed_0 (5.50), CONUS_Open Space Developed_0 (5.02), CONUS_Open Space Developed_120 (31.99), CONUS_Poultry Litter_0 (97.72)
6901	Yellow-billed Cuckoo	CONUS_Cotton_150 (6.25), CONUS_Vegetables and ground fruit_150 (6.46), CONUS_Other Orchards_0 (5.34), CONUS_Other Orchards_30 (8.66), CONUS_Other Grains_150 (6.02)	CONUS_Field Nurseries_0 (5.50), CONUS_Field Nurseries_120 (18.35), CONUS_Other Crops_0 (5.10), CONUS_Other Crops_120 (23.80), CONUS_Open Space Developed_120 (11.58), CONUS_Poultry Litter_0 (80.57)
Fish			
235	Snail darter	CONUS_Soybeans_0 (4.46), CONUS_Soybeans_30 (6.85)	CONUS_Developed_0 (8.55), CONUS_Open Space Developed_0 (10.46), CONUS_Open Space Developed_30 (22.01), CONUS_Poultry Litter_0 (99.98)
239	Slackwater darter	CONUS_Soybeans_30 (10.73)	CONUS_Open Space Developed_30 (9.97), CONUS_Poultry Litter_0 (100.00)
257	Niangua darter	CONUS_Soybeans_30 (5.01)	CONUS_Poultry Litter_0 (99.68)
287	June sucker	CONUS_Other Orchards_30 (8.50)	CONUS_Field Nurseries_30 (8.50), CONUS_Developed_0 (36.57), CONUS_Open Space Developed_0 (23.52), CONUS_Open Space Developed_30 (48.10), CONUS_Poultry Litter_0 (100.00)
305	Delta smelt	CONUS_Grapes_0 (7.36), CONUS_Grapes_30 (13.58), CONUS_Vegetables and ground fruit_0 (14.93), CONUS_Vegetables and ground fruit_30 (21.76), CONUS_Other Orchards_0 (19.47),	CONUS_Field Nurseries_0 (19.59), CONUS_Field Nurseries_30 (26.75), CONUS_Other Crops_0 (24.59), CONUS_Other Crops_30 (37.88), CONUS_Developed_0 (9.19), CONUS_Open Space Developed_30 (7.32), CONUS_Poultry Litter_0 (98.21)

Entity ID	Common Name	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
		CONUS_Other Orchards_30 (26.63), CONUS_Other Grains_0 (16.74), CONUS_Other Grains_30 (27.88)	
311	Topeka shiner	CONUS_Soybeans_0 (32.63), CONUS_Soybeans_30 (41.15)	CONUS_Open Space Developed_30 (8.19), CONUS_Poultry Litter_0 (35.90)
3525	Rush Darter	CONUS_Soybeans_30 (5.85)	CONUS_Developed_0 (6.18), CONUS_Open Space Developed_0 (9.95), CONUS_Open Space Developed_30 (21.44), CONUS_Poultry Litter_0 (99.80)
7150	Chucky Madtom	CONUS_Soybeans_30 (10.22)	CONUS_Open Space Developed_30 (8.75), CONUS_Poultry Litter_0 (100.00)
Mammals			
1	Indiana bat	CONUS_Soybeans_0 (12.75), CONUS_Soybeans_30 (15.65), CONUS_Soybeans_150 (25.74)	CONUS_Open Space Developed_120 (25.56), CONUS_Poultry Litter_0 (40.71)
58	Buena Vista Lake ornate Shrew	CONUS_Cotton_150 (20.70), CONUS_Grapes_30 (5.24), CONUS_Vegetables and ground fruit_30 (7.93), CONUS_Vegetables and ground fruit_150 (37.92), CONUS_Other Orchards_0 (53.05), CONUS_Other Orchards_30 (75.64), CONUS_Other Grains_0 (6.59), CONUS_Other Grains_30 (16.22), CONUS_Other Grains_150 (54.50)	CONUS_Field Nurseries_0 (53.07), CONUS_Field Nurseries_120 (96.75), CONUS_Other Crops_0 (67.98), CONUS_Other Crops_120 (99.24), CONUS_Open Space Developed_120 (16.72), CONUS_Poultry Litter_0 (100.00)
Plants			
516	Thread-leaved brodiaea	CONUS_Other Grains_0 (4.82), CONUS_Other Grains_30 (7.06), CONUS_Other Grains_150 (10.60)	CONUS_Other Crops_0 (8.35), CONUS_Other Crops_120 (18.00), CONUS_Developed_0 (7.42), CONUS_Open Space Developed_0 (10.75), CONUS_Open Space Developed_120 (44.57), CONUS_Poultry Litter_0 (48.61)
531	La Graciosa thistle	CONUS_Grapes_30 (7.06), CONUS_Vegetables and ground fruit_0 (7.87), CONUS_Vegetables and ground fruit_30 (13.77), CONUS_Vegetables and ground fruit_150 (31.05), CONUS_Other Orchards_0 (4.85), CONUS_Other Orchards_30 (9.40), CONUS_Other Grains_30 (6.12), CONUS_Other Grains_150 (25.95)	CONUS_Field Nurseries_0 (4.92), CONUS_Field Nurseries_120 (23.53), CONUS_Other Crops_0 (5.23), CONUS_Other Crops_120 (26.78), CONUS_Open Space Developed_120 (15.67), CONUS_Poultry Litter_0 (94.63)
562	Santa Cruz tarplant	CONUS_Vegetables and ground fruit_30 (5.91), CONUS_Vegetables and ground fruit_150 (24.06), CONUS_Other Grains_150 (11.58)	CONUS_Other Crops_120 (30.13), CONUS_Developed_0 (10.70), CONUS_Open Space Developed_0 (18.26), CONUS_Open Space Developed_120 (66.55), CONUS_Poultry Litter_0 (98.38)
630	Braun's rock-cress	CONUS_Soybeans_150 (10.04)	CONUS_Open Space Developed_120 (22.17), CONUS_Poultry Litter_0 (100.00)
4420	Florida brickell-bush	CONUS_Vegetables and ground fruit_0 (12.00), CONUS_Vegetables and ground fruit_30 (23.89), CONUS_Vegetables and ground fruit_150 (49.71), CONUS_Other Orchards_0 (16.59), CONUS_Other Orchards_30 (29.88)	CONUS_Field Nurseries_0 (16.72), CONUS_Field Nurseries_120 (52.40), CONUS_Other Crops_0 (13.28), CONUS_Other Crops_120 (52.65), CONUS_Developed_0 (9.56), CONUS_Open Space

Entity ID	Common Name	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
			Developed_0 (22.34), CONUS_Open Space Developed_120 (79.55), CONUS_Poultry Litter_0 (99.02)
4565	White Bluffs bladderpod	CONUS_Grapes_30 (5.39), CONUS_Vegetables and ground fruit_150 (13.71)	CONUS_Field Nurseries_120 (9.77), CONUS_Other Crops_0 (16.64), CONUS_Other Crops_120 (65.81), CONUS_Open Space Developed_120 (8.26), CONUS_Poultry Litter_0 (99.99)
7167	Kentucky glade cress	CONUS_Soybeans_30 (5.81), CONUS_Soybeans_150 (22.54)	CONUS_Open Space Developed_120 (14.04), CONUS_Poultry Litter_0 (100.00)
7206	Carter's small-flowered flax	CONUS_Vegetables and ground fruit_0 (11.88), CONUS_Vegetables and ground fruit_30 (23.73), CONUS_Vegetables and ground fruit_150 (49.48), CONUS_Other Orchards_0 (16.27), CONUS_Other Orchards_30 (29.47)	CONUS_Field Nurseries_0 (16.40), CONUS_Field Nurseries_120 (51.92), CONUS_Other Crops_0 (13.04), CONUS_Other Crops_120 (52.45), CONUS_Developed_0 (10.15), CONUS_Open Space Developed_0 (22.83), CONUS_Open Space Developed_120 (80.28), CONUS_Poultry Litter_0 (99.03)
Reptile			
170	Plymouth Redbelly Turtle	CONUS_Vegetables and ground fruit_0 (6.89), CONUS_Vegetables and ground fruit_30 (11.03), CONUS_Vegetables and ground fruit_150 (31.27)	CONUS_Other Crops_120 (19.37), CONUS_Developed_0 (4.88), CONUS_Open Space Developed_0 (7.97), CONUS_Open Space Developed_120 (47.86), CONUS_Poultry Litter_0 (99.94)
Terrestrial Invertebrates			
435	Delta green ground beetle	CONUS_Vegetables and ground fruit_150 (7.68), CONUS_Other Grains_30 (4.82), CONUS_Other Grains_150 (24.49)	CONUS_Other Crops_120 (20.19), CONUS_Open Space Developed_120 (18.62), CONUS_Poultry Litter_0 (100.00)
436	Valley elderberry longhorn beetle	CONUS_Grapes_30 (11.85), CONUS_Vegetables and ground fruit_150 (13.01), CONUS_Other Orchards_0 (7.92), CONUS_Other Orchards_30 (17.32), CONUS_Other Grains_150 (12.41)	CONUS_Field Nurseries_0 (7.92), CONUS_Field Nurseries_120 (51.80), CONUS_Other Crops_0 (6.80), CONUS_Other Crops_120 (70.94), CONUS_Developed_0 (5.35), CONUS_Open Space Developed_0 (11.00), CONUS_Open Space Developed_120 (61.54), CONUS_Poultry Litter_0 (100.00)
445	Hine's emerald dragonfly	CONUS_Soybeans_150 (6.82)	CONUS_Open Space Developed_120 (18.00), CONUS_Poultry Litter_0 (94.68)
450	Fender's blue butterfly	CONUS_Vegetables and ground fruit_150 (12.91), CONUS_Other Grains_30 (6.44), CONUS_Other Grains_150 (19.91)	CONUS_Field Nurseries_120 (21.32), CONUS_Other Crops_0 (12.15), CONUS_Other Crops_120 (35.51), CONUS_Open Space Developed_120 (23.75), CONUS_Xmas Trees_30 (8.99), CONUS_Poultry Litter_0 (93.41)
3412	Dakota Skipper	CONUS_Other Row Crops_150 (4.50), CONUS_Other Grains_150 (7.06), CONUS_Soybeans_30 (9.24), CONUS_Soybeans_150 (33.40)	CONUS_Other Crops_120 (8.14), CONUS_Open Space Developed_120 (14.40), CONUS_Poultry Litter_0 (99.56)
4910	Salt Creek Tiger beetle	CONUS_Other Grains_150 (9.04), CONUS_Soybeans_0 (13.93), CONUS_Soybeans_30 (23.22), CONUS_Soybeans_150 (60.26)	CONUS_Other Crops_120 (13.34), CONUS_Open Space Developed_120 (19.66), CONUS_Poultry Litter_0 (100.00)
5067	Bartram's hairstreak Butterfly	CONUS_Vegetables and ground fruit_30 (5.27), CONUS_Vegetables and ground fruit_150 (13.41), CONUS_Other Orchards_30 (7.15)	CONUS_Field Nurseries_120 (15.98), CONUS_Other Crops_120 (16.75), CONUS_Open Space Developed_0 (7.15), CONUS_Open Space Developed_120 (28.09), CONUS_Poultry Litter_0 (92.25)

Entity ID	Common Name	Uses with higher certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]	Uses with less certainty of contributing to exposure with max upper overlap >4.44 [region_UDL_distance (% overlap)]
5610	Island marble Butterfly	CONUS_Vegetables and ground fruit_150 (7.67), CONUS_Other Grains_30 (11.60), CONUS_Other Grains_150 (47.45)	CONUS_Other Crops_120 (36.20), CONUS_Developed_0 (9.92), CONUS_Open Space Developed_120 (17.98), CONUS_Poultry Litter_0 (100.00)
7495	Taylor's (=whulge) Checkerspot	CONUS_Vegetables and ground fruit_30 (4.77), CONUS_Vegetables and ground fruit_150 (19.34), CONUS_Other Grains_150 (12.44)	CONUS_Field Nurseries_120 (11.10), CONUS_Other Crops_0 (6.09), CONUS_Other Crops_120 (24.10), CONUS_Open Space Developed_120 (13.00), CONUS_Xmas Trees_30 (7.47), CONUS_Poultry Litter_0 (77.31)
10147	Poweshiek skipperling	CONUS_Other Row Crops_150 (5.52), CONUS_Other Grains_150 (7.31), CONUS_Soybeans_30 (10.92), CONUS_Soybeans_150 (42.77)	CONUS_Other Crops_120 (8.26), CONUS_Open Space Developed_120 (13.41), CONUS_Poultry Litter_0 (100.00)

6.3. Clothianidin

Appendix H includes the determinations for each designated critical habitat.

Table *6-6* summarizes the determinations by type and taxon. The text below provides more information about the determinations.

Table 6-5. Summary of designated critical habitat effects determinations and predictions of likelihood of adverse modification by taxa.

Taxon	Number of Listed LAA[1] Species	Adverse Modification not Likely[2]	Adverse Modification Likely[2]
Amphibians	26	26	0
Aquatic invertebrates	18	16	2
Birds	25	24	1
Fish	63	57	6
Mammals	15	15	0
Plants	231	227	4
Reptiles	6	6	0
Terrestrial invertebrates	26	19	7
Total	410	390	20

[1] Based on potential for effects to an individual
[2] Based on potential for effects to a population

6.3.1. Not Likely to Adversely Modify Predictions

EPA concluded that clothianidin is not likely to adversely modify 390 of the 762 designated CHs. No AM determinations were made for CHs of listed taxa with less than 5% overlap of imidacloprid exposure areas. Exposure areas included direct overlap of potential use sites and spray drift areas for terrestrial habitats and spray drift and runoff areas for aquatic habitats. These spray drift and runoff areas were calculated on a taxa-by-taxa basis. The analysis for each buffer distance is included in the discussion for each taxonomic group (**Section 4**).

Although potential effects to an individual insect within the CH is indicated due to impacts on habitat quality, when the overlap is considered low (*i.e.,* <5%) it is not expected to result in adverse modification of the CH. As discussed previously, medium or high overlap with use sites with high uncertainty were also not expected to result in adverse modification of the CH. Similarly, no AM determinations were made for plants and vertebrate species that did not include invertebrates in their PBFs (based on Appendix L of the USFWS malathion BiOp) or when the overlap is considered low (i.e., <5%).

6.3.2. Likely Adverse Modification Predictions

EPA concluded that 20 of the 762 designated CHs are likely to be adversely modified. This includes the CHs of 7 terrestrial and 2 aquatic invertebrates, where impacts to habitat quality may occur because of imidacloprid concentrations within the CH. There are potential effects on the PBFs of the CH of 1 bird and 6 fish species, specifically, potential effects to their invertebrate diets. Finally, there are potential effects on the PBFs of the CHs of 4 listed plant species due to effects on their insect pollinators.

The designated CHs of these 20 species are all located within the continental US. Seven CHs have >5% direct overlap with potential imidacloprid use sites. The remaining CHs have potential spray drift or runoff exposures from adjacent imidacloprid use sites. These spray drift and runoff areas were calculated on a taxa-by-taxa basis.

Table 6-6. Drift distance considered and uses that are likely contributing to adverse modification for designated critical habitats with predicted likelihood of adverse modification determinations for clothianidin.

Species common name (scientific name)	Entity ID	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Aquatic Invertebrates			
Vernal pool fairy shrimp (*Branchinecta lynchi*)	493	CONUS_Other.Orchards_0 (4.64), CONUS_Other.Orchards_30 (6.83)	CONUS_Other.Crops_0 (6.66), CONUS_Poultry.Litter_0 (76.85), CONUS_Federal.Lands_0 (11.6), CONUS_Other.Crops_30 (12.4), CONUS_Open.Space.Developed_30 (5.18), CONUS_Poultry.Litter_30 (77.46), CONUS_Federal.Lands_30 (11.8)
Vernal pool tadpole shrimp (*Lepidurus packardi*)	494	CONUS_Other.Orchards_0 (6.01), CONUS_Other.Orchards_30 (8.59)	CONUS_Poultry.Litter_0 (80.19), CONUS_Federal.Lands_0 (10.92), CONUS_Other.Crops_30 (7.67), CONUS_Poultry.Litter_30 (80.66), CONUS_Federal.Lands_30 (11.31)
Terrestrial Invertebrates			
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	436	CONUS_Other.Orchards_0 (7.92), CONUS_Grapes_30 (11.85), CONUS_Other.Orchards_30 (17.32)	CONUS_Other.Crops_0 (6.8), CONUS_Developed_0 (5.35), CONUS_Open.Space.Developed_0 (11), CONUS_Poultry.Litter_0 (100), CONUS_Open.Space.Developed_120 (61.54), CONUS_Other.Crops_120 (70.94)
Dakota Skipper (*Hesperia dacotae*)	3412	CONUS_Soybeans_30 (9.24), CONUS_Soybeans_150 (33.4)	CONUS_Poultry.Litter_0 (99.56), CONUS_Federal.Lands_0 (23.79), CONUS_Open.Space.Developed_120 (14.4), CONUS_Other.Crops_120 (8.14)
Bartram's hairstreak Butterfly (*Strymon acis bartrami*)	5067	CONUS_Vegetables.and.ground.fruit_30 (5.27), CONUS_Other.Orchards_30 (7.15)	CONUS_Open.Space.Developed_0 (7.15), CONUS_Poultry.Litter_0 (92.25), CONUS_Federal.Lands_0 (69.77), CONUS_Open.Space.Developed_120 (28.09), CONUS_Other.Crops_120 (16.75)
Taylor's (=whulge) Checkerspot (*Euphydryas editha taylori*)	7495	CONUS_Vegetables.and.ground.fruit_30 (4.77)	CONUS_Other.Crops_0 (6.09), CONUS_Poultry.Litter_0 (77.31), CONUS_Federal.Lands_0 (19.68), CONUS_Open.Space.Developed_120 (13), CONUS_Other.Crops_120 (24.1)
Poweshiek skipperling (*Oarisma poweshiek*)	10147	CONUS_Soybeans_30 (10.92), CONUS_Soybeans_150 (42.77)	CONUS_Poultry.Litter_0 (100), CONUS_Federal.Lands_0 (7.58), CONUS_Open.Space.Developed_120 (13.41), CONUS_Other.Crops_120 (8.26)
Aquatic and Terrestrial Invertebrates			
Hine's emerald dragonfly (*Somatochlora hineana*)	445	CONUS_Soybeans_150 (6.82)	CONUS_Poultry.Litter_0 (94.68), CONUS_Federal.Lands_0 (50.85), CONUS_Open.Space.Developed_120 (18)
Salt Creek Tiger beetle (*Cicindela nevadica lincolniana*)	4910	CONUS_Soybeans_0 (13.93), CONUS_Soybeans_30 (23.22), CONUS_Soybeans_150 (60.26)	CONUS_Poultry.Litter_0 (100), CONUS_Open.Space.Developed_120 (19.66), CONUS_Other.Crops_120 (13.34)
Birds			
Piping Plover (*Charadrius melodus*)	83	CONUS_Soybeans_150 (6.78)	CONUS_Developed_0 (5.5), CONUS_Open.Space.Developed_0 (5.02), CONUS_Poultry.Litter_0 (97.72), CONUS_Federal.Lands_0 (14.56), CONUS_Open.Space.Developed_120 (31.99), CONUS_Other.Crops_120 (13.11)
Fish			

Species common name (scientific name)	Entity ID	Uses with higher certainty of contributing to exposure[1]	Uses with less certainty of contributing to exposure[1]
Slackwater darter (*Etheostoma boschungi*)	239	CONUS_Soybeans_30 (10.73)	CONUS_Poultry.Litter_0 (100), CONUS_Open.Space.Developed_30 (9.97), CONUS_Poultry.Litter_30 (100)
Niangua darter (*Etheostoma nianguae*)	257	CONUS_Soybeans_30 (5.01)	CONUS_Poultry.Litter_0 (99.68), CONUS_Poultry.Litter_30 (99.75)
June sucker (*Chasmistes liorus*)	287	CONUS_Other.Orchards_30 (8.5)	CONUS_Developed_0 (36.57), CONUS_Open.Space.Developed_0 (23.52), CONUS_Poultry.Litter_0 (100), CONUS_Open.Space.Developed_30 (48.1), CONUS_Poultry.Litter_30 (100)
Topeka shiner (*Notropis topeka* (=tristis))	311	CONUS_Soybeans_0 (18.62), CONUS_Soybeans_30 (27.14)	CONUS_Poultry.Litter_0 (99.54), CONUS_Open.Space.Developed_30 (10.6), CONUS_Poultry.Litter_30 (99.64)
Rush Darter (*Etheostoma phytophilum*)	3525	CONUS_Soybeans_30 (5.85)	CONUS_Developed_0 (6.18), CONUS_Open.Space.Developed_0 (9.95), CONUS_Poultry.Litter_0 (99.8), CONUS_Open.Space.Developed_30 (21.44), CONUS_Poultry.Litter_30 (99.84)
Chucky Madtom (*Noturus crypticus*)	7150	CONUS_Soybeans_30 (10.22)	CONUS_Poultry.Litter_0 (100), CONUS_Open.Space.Developed_30 (8.75), CONUS_Poultry.Litter_30 (100)
Plants			
Santa Cruz tarplant (*Holocarpha macradenia*)	562	CONUS_Vegetables.and.ground.fruit_30 (5.91)	CONUS_Developed_0 (10.7), CONUS_Open.Space.Developed_0 (18.26), CONUS_Poultry.Litter_0 (98.38), CONUS_Open.Space.Developed_120 (66.55), CONUS_Other.Crops_120 (30.13)
Florida brickell-bush (*Brickellia mosieri*)	4420	CONUS_Vegetables.and.ground.fruit_0 (12), CONUS_Other.Orchards_0 (16.59), CONUS_Vegetables.and.ground.fruit_30 (23.89), CONUS_Other.Orchards_30 (29.88)	CONUS_Other.Crops_0 (13.28), CONUS_Developed_0 (9.56), CONUS_Open.Space.Developed_0 (22.34), CONUS_Poultry.Litter_0 (99.02), CONUS_Open.Space.Developed_120 (79.55), CONUS_Other.Crops_120 (52.65)
Kentucky glade cress (*Leavenworthia exigua laciniata*)	7167	CONUS_Soybeans_30 (5.81), CONUS_Soybeans_150 (22.54)	CONUS_Poultry.Litter_0 (100), CONUS_Open.Space.Developed_120 (14.04)
Carter's small-flowered flax (*Linum carteri carteri*)	7206	CONUS_Vegetables.and.ground.fruit_0 (11.88), CONUS_Other.Orchards_0 (16.27), CONUS_Vegetables.and.ground.fruit_30 (23.73), CONUS_Other.Orchards_30 (29.47)	CONUS_Other.Crops_0 (13.04), CONUS_Developed_0 (10.15), CONUS_Open.Space.Developed_0 (22.83), CONUS_Poultry.Litter_0 (99.03), CONUS_Open.Space.Developed_120 (80.28), CONUS_Other.Crops_120 (52.45)

[1] Each use contains the region_UDL_distance in meters with percent overlap in parentheses. Values are based on maximum upper overlap.

7. Conclusions

Imidacloprid

EPA evaluated the LAA species and designated CH and made predictions about the likelihood of jeopardy to any listed species or adverse modification of any designated CH from the use of imidacloprid. Of the species with LAA determinations, EPA predicted a likelihood of jeopardy for 199 listed species. EPA also predicted a likelihood of adverse modification of 30 designated CHs. These were identified primarily for invertebrates directly impacted or taxa that are highly dependent on terrestrial insects and have a high to medium overlap with the use data layer (UDL). The predicted likelihood of J/AM for listed species and designated CHs is summarized in **Table 7-1.**

Table 7-1. Number of Listed Species Effects Determinations and Predictions of Likelihood of Jeopardy or Adverse Modification by Taxon for Imidacloprid[1].

Taxon	Number of LAA Species/CH[2]	LAA, No J/AM	LAA, J/AM
Amphibians[2]	38	38	0
Aquatic Invertebrates	35	24	11
Terrestrial and Aquatic Invertebrates	12	6	6
Birds	68	67	1
Fish	114	110	4
Mammals	62	62	0
Plants	873	715	158
Reptiles[2]	28	28	0
Terrestrial Invertebrates[4]	116	97	19
Total Listed Species	1346	1147	199
Designated Critical Habitat	621	591	30

[1] CH = critical habitat; LAA = likely to adversely affect; J = jeopardy; AM = adverse modification
[2] ”Amphibians” and “Reptiles” include those species that have both a terrestrial and aquatic phase.

Thiamethoxam

EPA evaluated the LAA species and designated CH and made predictions about the likelihood of jeopardy to any listed species or adverse modification of any designated CH from the use of thiamethoxam. Of the species with LAA determinations, EPA predicted a likelihood of jeopardy for 204 listed species. EPA also predicted a likelihood of adverse modification of 34 designated CHs. These were identified primarily for invertebrates directly impacted or taxa that are highly dependent on terrestrial insects and have a high to medium overlap with the use data layer (UDL). The predicted likelihood of J/AM for listed species and designated CHs is summarized in **Table 7-2.**

Table 7-2. Number of Listed Species Effects Determinations and Predictions of Likelihood of Jeopardy or Adverse Modification by Taxon for Thiamethoxam[1].

Taxon	Number of LAA Species/CH[2]	LAA, No J/AM	LAA, J/AM
Amphibians[2]	36	36	0
Aquatic Invertebrates	34	24	10
Terrestrial and Aquatic Invertebrates	11	5	6
Birds	71	70	1
Fish	112	108	4
Mammals	47	47	0
Plants	850	687	163
Reptiles[2]	26	26	0
Terrestrial Invertebrates[4]	119	99	20
Total Listed Species	1306	1102	204
Designated Critical Habitat	612	578	34

[1] CH = critical habitat; LAA = likely to adversely affect; J = jeopardy; AM = adverse modification
[2] "Amphibians" and "Reptiles" include those species that have both a terrestrial and aquatic phase.

Clothianidin

EPA evaluated the LAA species and designated CH and made predictions about the likelihood of jeopardy to any listed species or adverse modification of any designated CH from the use of clothianidin. Of the species with LAA determinations, EPA predicted a likelihood of jeopardy for 166 listed species. EPA also predicted a likelihood of adverse modification of 20 designated CHs. These were identified primarily for invertebrates directly impacted or taxa that are highly dependent on terrestrial insects and have a high to medium overlap with the use data layer (UDL). The predicted likelihood of J/AM for listed species and designated CHs is summarized in **Table 7-3.**

Table 7-3. Number of Listed Species Effects Determinations and Predictions of Likelihood of Jeopardy or Adverse Modification by Taxon for Clothianidin[1].

Taxon	Number of LAA Species/CH[2]	LAA, No J/AM	LAA, J/AM
Amphibians[2]	36	36	0
Aquatic Invertebrates	34	27	7
Terrestrial and Aquatic Invertebrates	11	5	6
Birds	71	70	1
Fish	113	109	4
Mammals	54	54	0
Plants	703	573	130
Reptiles[2]	26	26	0
Terrestrial Invertebrates[4]	103	85	18
Total Listed Species	1151	985	166
Designated Critical Habitat	410	390	20

[1] CH = critical habitat; LAA = likely to adversely affect; J = jeopardy; AM = adverse modification
[2] "Amphibians" and "Reptiles" include those species that have both a terrestrial and aquatic phase.

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Appendix A: Species Range Percent Change since November 2020

Excel file with percent change updates to the species ranges since November 2020.

Appendix B: Qualitative considerations of confidence and uncertainty in overlap estimates for non-agricultural or non-crop UDLs

Poultry litter

The poultry litter can be treated with imidacloprid when the litter is found in a poultry house and then moved and applied to agriculture field as a soil amendment. The poultry litter layer represents the geographic extent of crops known to be treated with litter (**see Appendix 1-6).** However, this assumes that litter is used on every acres of these crops. In general, given the low usage of imidacloprid in the US for the poultry litter use (**Appendix 1-4** of BE), and the overestimation of where the use sites may occur, it is assumed that at the population level, overlap for this use is unlikely to contribute to jeopardy given the limited geographic usage footprint of usage and would not require mitigation.

Managed forests

The labeled tree plantation are spatially represented using the managed forest UDLs. When considering theses managed forest use sites, imidacloprid is applied via spray to Christmas tree, poplars and cottonwoods plantations. For all other tree uses, imidacloprid (this is not a registered use for thiamethoxam and clothianidin) is applied as a trunk drench or injection. These application methods have low geographic cohesiveness, low uniformity in geographic placement, making them similar to spot treatments. For trunk drench and injection, it was assumed that exposure is so limited that it is unlikely to contribute to jeopardy and therefore would not require mitigation. Therefore, for the managed forest use sites, only spray applications to Christmas tree, cottonwoods and poplars plantations were considered relevant at the population level.

In the conterminous United States (CONUS), Christmas trees is a unique UDL that is mostly independent from the Managed Forest UDL, thus, overlap with this use site was assessed separately without geospatial uncertainty evaluation. This is the only labeled conifer tree plantation. However, the CONUS Managed Forest UDL represents all forest tree plantations and forested area managed for timber extraction. Cottonwood and poplar plantations are captured in these forestry practices; however, this is an overestimate because it also represents other tree plantations and managed trees for timber extraction. When considering the land cover classes found within the Managed Forest UDL across different regions across the United States, tree plantations made up between 2 and 53% of Managed Forest UDL (USGS 2012). In some regions, identification of deciduous tree plantations like cottonwood and poplar, and evergreen or pine tree plantation is possible. In the southeast region where 53% of the Managed Forest UDL represented tree plantations, only 4% of the identified tree plantations were deciduous (USGS 2011). The 2017 Census of Agriculture reports acreage for short rotation wood crops by state. Short rotation woody crops are defined as trees that grow from seed to a mature tree in 10 years or less and would include mostly deciduous trees like cottonwood and poplar plantations (USDA 2017). When considering the same regions as identified in the UDL, the reported acreage for short rotation woody crops represents less than 1% of the total Managed Forest UDL area and less than 1% to 3% of the area identified as tree plantation. The 3% estimate based on available information from the Census of Agriculture, is similar to PCA for deciduous trees identified using the USGS GAP land cover information. The Short Rotation Wood Crop description from the Census of Agriculture would capture deciduous tree plantations (**Table A-1**)**.** In regions with available spatial data on deciduous verses

evergreen or pine plantations the Managed Forest UDL includes mostly evergreen, or pine plantation compared to deciduous. Christmas Tree plantations, assessed using a separate UDL, is the only registered conifer plantation making these evergreen or pine plantation a non-registered use area. Deciduous tree plantation only represents 5% or less of the total Managed Forest UDL. The Census of Agriculture also reports Short Rotation Wood Crops, with a description that aligns with deciduous tree plantations. When considering the area reported from the Census of Agriculture the deciduous tree plantations would also make up <5% of the total Managed Forest UDL. Usage information on these tree plantations is unknown resulting in an assumption of 100% usage. Given Managed Forest UDL overestimates, the area associated with the registered deciduous tree planation, and the lack of usage information, it is assumed that at the population level, overlap for this use is unlikely to contribute to jeopardy given the limited geographic use and usage footprint and would not require mitigation.
In Hawaii, tree plantations are also included in the Managed Forest UDL. Additional consideration of the land cover classes found within the Managed Forest UDL indicates tree plantations represent 5% of the Hawaii Managed Forest UDL (USGS 2012). The Census of Agriculture reports less than 100 acres of Christmas Trees in Hawaii, which represent <1% of the Managed Forest UDL in Hawaii (USDA 2017). This overestimate from the Managed Forest UDL of the cottonwood and poplar tree plantation was qualitatively considered if overlap with the managed forest UDL was >5%.

Table A-1. Percent of the Managed Forest UDL represented by Tree Plantations

Region[1]	Percent of Managed Forest UDL		Percent of Area (PCA) Identified as Tree Plantation			
	Area Identified as Tree Plantation (LandFire)	Short Rotation Woody Crop (CoA)	Deciduous Tree Plantation (GAP)	Evergreen or Pine Plantation (GAP)	Unknown Plantation Type (GAP)	Short Rotation Wood Crop (CoA)
North Central	12%	<1%	--	--	100%	<1%
North East	18%	<1%	0%	83%	17%	<1%
North West	--	<1%	--	--	--	<1%
South Central	2%	<1%	5%	0%	95%	3%
South East	53%	<1%	4%	78%	18%	<1%
South West	--	<1%	--	--	--	<1%
Hawaii	5%	--	--	--	--	--

North Central: IL, IN, IA, KS, MI, MN, MO, MT, NE, ND, OH, SD, WI, WY
North East: AR, GA, IN, IA, KS, KY, ME, MD, MA, MI, MO, NH, NJ, NY, NC, OH, PA, RI, SC, TN, VT, VA, WV, WI
North West: CA, CO, ID, MT, NE, ND, OR, SD, UT, WA, WY
South Central: CO, IL, IA, KS, MO, NE, NM, OK, SD, TX, WY
South East: AL, AR, FL, GA, IL, KY, LA, MS, MO, OK, SC, TN, TX
South West: AZ, CA, CO, ID, NM, OR, TX, UT, WY
--: Unknown or Data is not available in the GIS source data

Field nurseries

The Field Nurseries UDL is a combination of two other non-agricultural UDLs including Nurseries and Other Orchards. The Nurseries UDL identifies locations occupied by retail nurseries, garden supply stores, retail greenhouse, retail shade houses or retail horticultural. Orchard trees initially grown in these nursery locations may be transplanted to orchards or tree plantations following a pesticide application. In order to capture applications occurring in the nursery prior to transplant, or separately in both locations, these two UDLs were combined into the Field Nurseries UDL. While the geographic extent of the represents where imidacloprid could be applied, it is not expected that every acre would be treated. Additionally, not all application types for this UDL are expected to lead to exposure. In general, given the lack of usage information of imidacloprid in the US for the field nurseries uses, it is assumed that at the population level, overlap for this use is unlikely to contribute to jeopardy given the limited geographic usage footprint, unless the species is known to occur in these habitats.

Developed and open space developed

There are a number of labels uses that are geographically represented using the developed and open spaced developed UDLs. In general, the developed UDL represents non-agricultural areas with a mixture of some constructed materials and vegetation that has >20% impervious and the open space developed represents <20% impervious surface. Given the number of label uses that align with the land cover found in these UDLs, these geographic extents are considered representative of locations where imidacloprid could be applied. Available usage data for these uses is minimal therefore 100% usage was assumed. While the geographic extent of the represents where imidacloprid could be applied, it is not expected that every acre would be treated. In general, given the lack of usage information of imidacloprid in the US for the developed and open spaced developed uses, it is assumed that at the population level, overlap for this use is unlikely to contribute to jeopardy given the limited geographic usage footprint, unless the species is known to occur in these habitats.

Other crops (sod farms)

The sod farm label use is mapped using the Other Crops UDL, however, this UDL includes areas in addition to sod farms such as clover, wildflowers and idle cropland (see **Appendix 1-5 of the BE** for additional information on the Other Crops UDL). As a result, the geographic extent of the Other Crops UDL overestimates the area of sod farms, and therefore overestimates where imidacloprid can be applied for this use pattern. It is not possible to refine the locations of sod farm based solely on available GIS data, while maintaining the accuracy thresholds outlined in **Appendix 1-5.**

Nationally, nearly 340,000 acres of sod were harvested in 2017 based on the Census of Agriculture; top producing states were Florida and Texas, each representing about 20% of the national acreage harvested (USDA NASS 2017). Alabama (6%), Oklahoma (6%), and Georgia (5%) represent the next highest producing states. Various additional states represent less than 5% of national sod production each in terms of acres harvested (USEPA 2022). Nationally, the Other Crops UDL estimated ~73,402,000 acres, at this scale sod farms make up <1% of the total area found in the Other Crops UDL (**Table A-2**).

Table A-2. Percent of the Other Crops UDL represented by sod farms

Region*	Area from CoA (Acres)	Area from UDL	Counties with Sod Farm Production (CoA)	Reported Acres from CoA to Estimated Acres in the UDL PCA
National	340,000	73,402,000	589	<1%
North Central	46,000	2,9172,200	80	<1%
Northeast	119,200	13,239,460	252	1%
Northwest	34,500	32,933,310	71	<1%
South Central	104,000	32,683,380	54	<1%
Southeast	239,000	33,556,670	125	1%
Southwest	85,500	24,204,530	2	<1%
Hawaii	175	142,210	4	<1%

Region*	Area from CoA (Acres)	Area from UDL	Counties with Sod Farm Production (CoA)	Reported Acres from CoA to Estimated Acres in the UDL PCA
National	340,000	73,402,000	589	<1%
Alaska	>5	71,050	1	<1%

*State in bold below are found in multiple regions. Area is assumed to be found in both regions therefore the sum of the individual regions does not equal the national total.
North Central: IL, IN, IA, KS, MI, MN, MO, MT, NE, ND, OH, SD, WI, WY
Northeast: AR, CT, DE, GA, IN, IA, KY, ME, MD, MA, MI, MO, NH, NJ, NY, NC, OH, PA, RI, SC, TN, VT, VA, WV, WI
Northwest: CA, CO, ID, MT, NE, ND, OR, SD, UT, WA, WY
South Central: CO, IL, IA, KS, MO, NE, NM, OK, SD, TX, WY
Southeast: AL, AR, FL, GA, IL, KS, KY, LA, MS, MO, OK, SC, TN, TX
Southwest: AZ, CA, CO, ID, NM, OR, TX, UT, WY

When considering the percent cropped area (PCA) of sod farms (based on the reported harvest area in the Census of Agriculture) within the Other Crops UDL (based on the estimated acres of all crops with the UDL), regionally sod farms represent at least 1 percent of the total area in the Other Crops UDL on the east coast. At a state level, Rhode Island, Florida, and Tennessee have the highest PCA of sod farms within the Other Crop UDL with 20%, 6% and 6% respectively. Both datasets indicate the east coast as the most likely area where listed species could come in contact with sod farms.

Given Other Crops UDL overestimates the area associated with the registered sod farm use and the lack of usage information it is assumed that at the population level, overlap for this use is unlikely to contribute to jeopardy and would not require mitigation.

Appendix C: Predictions of the Likelihood of Jeopardy for Invertebrates for Imidacloprid

Excel file with predicted of the likelihood of jeopardy for invertebrates for imidacloprid.

Appendix D: Predictions of the Likelihood of Jeopardy for Terrestrial Vertebrates for Imidacloprid

Excel file with predicted of the likelihood of jeopardy for terrestrial vertebrates for imidacloprid.

Appendix E: Predictions of the Likelihood of Jeopardy for Aquatic Vertebrates for Imidacloprid

Excel file with predicted of the likelihood of jeopardy for aquatic vertebrates for imidacloprid.

Appendix F: Predictions of the Likelihood of Jeopardy for Plants for Imidacloprid

Excel file with predicted of the likelihood of jeopardy for plants for imidacloprid.

Appendix G: Predictions of the Likelihood of Adverse Modification for Designated Critical Habitats for Imidacloprid

Excel file with predicted of the likelihood of adverse modification for designated critical habiats for imidacloprid.

Appendix H: Predictions of the Likelihood of Jeopardy and Adverse Modification for Thiamethoxam

Excel file with predicted of the likelihood of jeopardy and adverse modification for all species and designated critical habitats for thiamethoxam.

Appendix I: Predictions of the Likelihood of Jeopardy and Adverse Modification for Clothianidin

Excel file with predicted of the likelihood of jeopardy and adverse modification for all species and designated critical habitats for clothianidin.

Appendix J: Drift Distance Refinements for Terrestrial Invertebrates

Excel file with drift distance refinements for terrestrial invertebrates for imidacloprid.

Appendix K: Drift Distance Refinements for Indirect Effects

Excel file with drift distance refinements for indirect effects considerations for imidacloprid.

Appendix L: Drift Distance Refinements for Aquatic Taxa

Excel file with drift distance refinements for aquatic taxa for imidacloprid.

13e

EPA

Pesticide Update

EPA's Office of Chemical Safety and Pollution Prevention

EPA Completes Scientific Testing of Pesticide Products for PFAS

Today, the U.S. Environmental Protection Agency (EPA) is taking another step in addressing concerns that per- and polyfluoroalkyl substances (PFAS) have been found in pesticide products by releasing a summary of the laboratory analysis of 10 pesticide products reported to contain PFAS residues. EPA did not find any PFAS in the tested pesticide products, differing from the results of a published study in the Journal of Hazardous Materials. EPA is also releasing its newly developed and validated analytical methodology used in the testing process alongside the summary of its findings. EPA is confident in the results of this newly released method, which is specifically targeted to detect the presence of PFAS in pesticide products formulated with surfactants.

Since learning about potential PFAS contamination in a small number of mosquitocide products in September 2020, EPA has taken a number of steps to address this issue. This includes releasing data in March 2021 that preliminarily determined that PFAS in those specific products was most likely formed from a chemical reaction during the container fluorination process which then leached into the pesticide product, releasing another study in September 2022 testing the leaching potential of PFAS over a specific time into test solutions packaged in different brands of HDPE fluorinated containers, and notifying manufacturers (including importers), processors, distributors, users, and those that dispose of fluorinated HDPE containers and similar plastics that the presence of PFAS formed as a byproduct in these containers may be a violation of the Toxic Substances Control Act. Following that notification, the Department of Justice, on behalf of EPA, filed a complaint against Inhance, the company that manufactured the plastic mosquitocide containers in which PFAS was found, for its failure to comply with

TSCA's notice, review, and determination requirements prior to manufacture.

As a continuation of these ongoing efforts, EPA has completed its verification analysis of a study published in September 2022 in the Journal of Hazardous Materials entitled "Targeted analysis and Total Oxidizable Precursor assay of several insecticides for PFAS." This study reported the presence of PFOS in six of 10 pesticide products tested.

EPA evaluated the 10 pesticide products included in this study using two different test methods to detect PFAS. The first method was developed by the Agency to specifically measure PFAS in pesticide samples containing surfactants and non-volatile oils, and the second method was used in the study published in the Journal of Hazardous Materials.

EPA obtained samples of the specific pesticide products from the study author and purchased additional products with the same EPA registration numbers on the open market to conduct analyses. EPA tested all samples using both methods and did not detect the presence of PFOS, nor any of 28 additional PFAS it screened for, above the lowest level that our lab instruments can detect (0.2 parts per billion) in any of the pesticide products using either method of detection. The equipment and methodology used by EPA would have shown PFAS detections if present in those pesticide products given that our level of detection (LOD) is 2,500 times more sensitive than the LOD reported by the equipment used by the study author. EPA requested additional information, including raw data from the study author, but did not receive any beyond the published results. EPA's study report contains additional scientific details regarding how the two methods differ and the significance of using the Agency's new method when testing these specific formulations.

One of the most important differences between the two methods is that EPA's method ensures accurate measuring of PFAS by eliminating interference from the oils and surfactants present in these formulations which can result in false positive detections.

EPA's PFAS Strategic Roadmap renewed the Agency's commitment to using sound science and investing in research to proactively stop PFAS chemicals from entering the environment. This latest action is an important step in EPA's ongoing efforts to better understand and manage, when necessary, pesticide formulations that contain PFAS to ensure enduring and protective solutions. As part of our continuing efforts, EPA will continue to invest in scientific research to fill gaps in understanding of PFAS, to identify which PFAS may pose human health and ecological risks at which exposure levels and develop methods to better test and measure them.

Read the report containing the summary of EPA's study and learn more about the Agency's work on PFAS in pesticide containers.

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CENTER for BIOLOGICAL DIVERSITY Saving life on Earth

For Immediate Release, May 2, 2023

Contact: Nathan Donley, Center for Biological Diversity, (971) 717-6406, ndonley@biologicaldiversity.org
Kyla Bennett, Public Employees for Environmental Responsibility, (508) 230-9933, kbennett@peer.org

High Levels of Dangerous ‘Forever Chemicals’ Found in California’s Most-Used Insecticide

40% of Tested Agricultural Pesticide Products Contain PFAS

WASHINGTON— California’s most-used insecticide, along with two other pesticides, is contaminated with potentially dangerous levels of PFAS “forever chemicals,” according to test results released today by the Center for Biological Diversity and Public Employees for Environmental Responsibility.

Intrepid 2F is the most widely applied insecticide product in the state of California and the second most widely used pesticide product in the state, behind only Roundup. In 2021, the most recent year data are available, more than 1.7 million pounds of it were applied to over 1.3 million cumulative acres of California land. Use is highest in the Central Valley on crops such as almonds, grapes, peaches and pistachios.

The findings that 3 of 7 agricultural pesticides tested contain high levels of per- and polyfluoroalkyl substances, or PFAS — in one case far exceeding what the Environmental Protection Agency considers safe in drinking water — highlights the need for much broader testing and removal of contaminated products, according to the groups.

“I can’t imagine anything that could make these products any more dangerous than they already are, but apparently my imagination isn’t big enough,” said Nathan Donley, environmental health science director at the Center for Biological Diversity. “The EPA has to take control of this situation and remove pesticide products that are contaminated with these extremely dangerous, persistent chemicals.”

PFAS do not break down in the environment and are associated with immune system suppression, liver damage, thyroid disease, reduced fertility, high cholesterol, obesity and cancer. PFAS have been detected in more than 330 animal species around the world, including many that are at risk of extinction.

The testing, commissioned by the Center and conducted by an independent, certified lab, found PFAS in 3 out of 7 agricultural pesticides tested. No PFAS were detected in concentrations above the detection limit in the two residential pesticide products that were tested.

Malathion 5EC, a product that contains the known neurotoxin malathion, was found to also contain 510 parts-per-trillion (ppt) perfluorooctanoic acid (PFOA) and 680 ppt perfluoroheptanesulfonic acid (PFHpS). The level of PFOA found in this product is over *100,000 times higher* than the level EPA considers safe in drinking water (0.004 ppt).

Oberon 2SC was found to contain 1,500 ppt perfluorobutanoic acid (PFBA), and Intrepid 2F had 350 ppt of perfluorobutanesulfonic acid (PFBS).

“While communities around the country are struggling to remove PFAS from their drinking-water supplies, we are spraying millions of acres of our land with the same toxic chemicals,” said PEER’s science policy director Kyla Bennett, a scientist and attorney formerly with the EPA. “It’s nonsensical; we can’t protect our drinking water unless and until we get PFAS out of all pesticides.”

This is not the first time PFAS have been found in pesticide products. Testing done by PEER and separately by the Massachusetts Department of Environmental Protection and the EPA found high levels of PFAS in several mosquito insecticide products sprayed throughout states like Massachusetts, Florida and New York.

PFAS have also been found in some widely used flea and tick pesticide products.

Two of the detected PFAS, PFBS and PFHpS, are not known to leach from fluorinated containers, which the EPA considers the primary source of PFAS contamination in pesticides.

These results suggest that at least some of the identified PFAS contamination of agricultural products is coming from other unknown sources.

The groups on Monday submitted the test results to both the EPA and the California Department of Pesticide Regulation, asking them to remove these products from use until contamination can be removed from their supply lines.

Pesticide spraying/USDA Image is available for media use.

The Center for Biological Diversity is a national, nonprofit conservation organization with more than 1.7 million members and online activists dedicated to the protection of endangered species and wild places.

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HOW TO APPLY: Interested candidates need to complete and submit a State of Maine Direct Hire Application, cover letter, and detailed résumé.

Direct Hire Application *forms can be obtained by contacting the NRSC Personnel Office at (207) 624-6370 or by accessing the NRSC website at* *http://www.maine.gov/nrsc/jobs/application.shtml*

If you are unable to apply online, please contact this office at (207) 624-6370.

APPLICATIONS MUST BE RECEIVED BY:
5:00 pm, June 30, 2023

For questions specific to this position, please contact Megan Patterson at (207) 592-0911

Direct Hire Career Opportunity Bulletin

DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY

28 State House Station, Augusta, ME 04333-0028
*Offices Located at Harlow, Williams Pavilion and Deering Buildings - AMHI Complex, Augusta

PESTICIDE CONTROL BOARD DIRECTOR

Opening Date:	June 1, 2023	**Closing Date:**	June 30, 2023
Location:	Augusta	**Position #:**	00500-0713
Position Type:	Full Time	**Class Code:**	MA31
Grade/Salary:	31 $68,432.00 - $93,184.00 annually		

The Board of Pesticides Control is the state's lead agency for pesticide oversight. The BPC is affiliated with the Department for administrative and staffing purposes. Policy decisions are made by a seven-member board.

BRIEF JOB DESCRIPTION: This is a high-visibility role that sits at the intersection of science and public policy, requiring frequent interface with the agricultural community, pest management professionals, the Maine legislature, environmental groups, the general public, and more. The role also supervises a professional staff of 14. The work demands an even-tempered, science-literate leader who can manage numerous disparate tasks and priorities while directing work in ways that are clear, transparent, and responsive.

As a professional supervisory position, it requires the direction of pesticide regulatory programs for the State of Maine under the oversight of the BPC. To meet BPC mandates, this position oversees the following program areas: licensing pesticide applicators and distributors, registering pesticides used in the state, administering federal and state pesticide laws and regulations, and determining pesticide policy through regular public meetings. Responsibilities include administering laws and regulations, disseminating technical pesticide information, managing a budget, supervising professional staff, presenting to professional groups, and serving as the primary contact to the board and the Maine Legislature. Work is performed under administrative direction from the Division of Animal & Plant Health Director. For more information, please contact Megan Patterson at (207) 592-0911.

KNOWLEDGE/SKILLS/ABILITIES REQUIRED:

- Ability to interpret and amend regulations and laws related to regulating pesticides.
- Ability to act as a liaison to represent the Department on pesticide issues with the public, commodity groups, and other state and federal agencies.
- Ability to staff and take direction from a public board.
- Ability to write, submit and administer the budget in order to have adequate resources and funds to administer the program.
- Ability to manage personnel and oversee the work of the program to ensure effective operations.
- Ability to write reports and press releases and answer inquiries to provide information related to pesticide issues.

MINIMUM QUALIFICATIONS: A bachelor's Degree in Biology, Chemistry, or a related field. Equivalent related experience may be substituted for education on a year-for-year basis.

PREFERENCES: Preference will be given to candidates with management experience and public or private regulatory experience.

No matter where you work across Maine state government, you find employees who embody our state motto—"Dirigo" or "I lead"—as they provide essential services to Mainers every day. We believe in supporting our workforce's health and wellbeing with a valuable total compensation package, including:

- **Work-Life Balance** – Rest is essential. Take time for yourself using **13 paid holidays**, **12 days of sick leave**, and **3+ weeks of vacation leave** annually. Vacation leave accrual increases with years of service, and overtime-exempt employees receive personal leave.
- **Health Insurance Coverage**– The State of Maine pays **85%-100%** of employee-only premiums ($9,893.52-$11,057.52 annual value), depending on salary. Use this chart to find the premium costs for you and your family, including the percentage of dependent coverage paid by the State.
- **Health Insurance Premium Credit** – Participation decreases employee-only premiums by 5%. Visit the Office of Employee Health and Wellness for more information about program requirements.
- **Dental Insurance**– The State of Maine pays 100% of employee-only dental premiums ($350.40 annual value).
- **Retirement Plan**– The State of Maine contributes at least **17.80% of pay** to the Maine Public Employees Retirement System (MainePERS), on behalf of the employee.
- **Gym Membership Reimbursement**– Improve overall health with regular exercise and receive up to $40 per month to offset this expense.
- **Health and Dependent Care Flexible Spending Accounts**– Set aside money pre-tax to help pay for out-of-pocket health care expenses and/or daycare expenses.
- **Public Service Student Loan Forgiveness**– The State of Maine is a qualified employer for this federal program. For more information, visit the Federal Student Aid office.
- **Living Resources Program** – Navigate challenging work and life situations with our employee assistance program.
- **Parental leave** is one of the most important benefits for any working parent. All employees who are welcoming a child—including fathers and adoptive parents—receive **four weeks of fully paid parental leave**. Additional, unpaid leave may also be available, under the Family and Medical Leave Act.
- **Voluntary Deferred Compensation**– Save additional pre-tax funds for retirement in a MaineSaves 457(b) account through payroll deductions.
- Learn about **additional wellness benefits** for State employees from the Office of Employee Health and Wellness.

There's a job and then there's purposeful, transformative work. Our aim is to create a workplace where you can learn, grow, and continuously refine your skills. Applicants demonstrate job requirements in differing ways, and we appreciate that many skills and backgrounds can make people successful in this role.

As an Equal Opportunity employer, Maine State Government embraces a culture of respect and awareness. We are committed to creating a strong sense of belonging for all team members, and our process ensures an inclusive environment to applicants of all backgrounds including diverse race, color, sex, sexual orientation or gender identity, physical or mental disability, religion, age, ancestry, national origin, familial status or genetics.

If you're looking for a great next step, and want to feel good about what you do, we'd love to hear from you. Please note reasonable accommodations are provided to qualified individuals with disabilities upon request.

Thinking about applying?

Research shows that people from historically excluded communities tend to apply to jobs only when they check every box in the posting. If you're currently reading this and hesitating to apply for that reason, we encourage you to go for it! Let us know how your lived experience and passion set you apart.