APPENDIX 1-6. Use Site Footprints for Simazine

1. Agriculture Uses

Use site footprint layers represent the application sites for agricultural and non-agricultural label uses. The best available data to spatially characterize specific agricultural crops in the continuous United States (ConUS) is the Cropland Data Layer (CDL), produced by the U.S. Department of Agriculture. Several methods have been employed to minimize data errors within the CDL. The CDL is a landcover dataset that has over 100 cultivated classes that were grouped into 13 general classes (see **APPENDIX 1-5**). Lumping classes reduces the likelihood of errors of omission and commission between similar crop categories. In selecting how to group crops from the CDL, EPA referred to the grouping used by the U.S. Geological Survey (Baker and Capel, 2011[[1]](#footnote-2)) and the Generic Endangered Species Task Force (Amos et al, 2010[[2]](#footnote-3)). This information considers environmental factors that influence the location of crops and the error matrices provided by USDA with the original CDL data. By considering these agronomic factors in addition to the error matrices it is possible to improve the accuracy and year-to-year matches for these UDLs while retaining agronomic similarities. This categorical aggregation into the UDL crop groups does not account for changes in agricultural practices but the temporal aggregation does. The UDLs used in this assessment include 5 years of the CDL, 2013-2017, aggregated to account for changes year to year such as crop rotations. Anywhere a class occurs within those 5 years would be represented in the footprint layer. These temporally aggregated and categorially grouped layers generated from the CDL are referred to as Use Data Layers or UDLs.

The agricultural classes were further refined by comparing county level National Agricultural Statistics Service (NASS) 2012 Census of Agriculture (CoA) acreage reports to county level UDL acreages (additional detail can be found in the tool documentation, section “**Processing the Census of Agriculture Data”** section). The UDL acreages represent the temporally aggregated and categorically grouped processing steps previously described, summarized at the county level. If a county’s UDL acreage for a given class was lower than the NASS acreage, the UDL extent was expanded within cultivated areas until the UDL acreage matched or exceeded the NASS CoA. Using the temporally and categorially aggregated UDL as an input, a script was developed that compares each UDL in each county to the corresponding NASS CoA acreage report. If the UDL acreage was less than NASS, the raster was expanded in 1-pixel iterations until the NASS acreage value was reached, exceeded, or the area within the cultivated mask was built out. Region growing was restricted using the UDL Cultivated Layer from the last year of the CDL as a mask (2017). This avoids buffering into any non-agricultural landcover types. This method reduced landcover mapping errors by adjusting the extent of each category to the CoA values, in this case, 2012. Additional details and the python scripts for this process can be found in with the tool documentation, **Generating Use Data Layers**, “**CDL to UDL Processing and Action Area Python Scripts**” section.

Every assessment begins with cross-walking registered uses into a landcover category. Chemicals are often not represented by all 13 UDLs. Some chemicals specify geographic restrictions for a given use (*i.e.,* application on wheat is limited to the state of Idaho). Geographic limitations for registered uses are imposed on the dataset downstream in the data processing workflow. The geographic restriction should be extracted from the use layer before it is aggregated with all other chemical uses to generate the action area for the chemical. Simazine’s agricultural uses are crossed to 6 of the UDLs classes. There are geographic restrictions for simazine applied to both alfalfa grown for seed in OR and for cole crops grown for seed in WA. Both these crops were crosswalked to ‘other crops’ UDL, so there is a single georestricted layer for other crops in OR and WA. Complete crosswalk for the simazine agricultural uses is provided in **Table 1** generated from **Attachment 1-4.** This crosswalk includes the label use name, the name(s) from the Census of Agriculture, SUUM use site (**APPENDIX 1-4**), and the UDL.

In addition to the potential use site, each UDL is buffered in all directions using ESRI ArcGIS the Euclidean distance tool. This buffered area represents the potential exposure area associated with drift.

1. Non-Agricultural Uses

Non-agricultural label uses include a wide range of landcover and land use categories. Each label use was carefully considered and cross-walked with the best available landcover data. Where available, the 2011 National Land Cover Dataset (NLCD) was used to represent many non-agricultural label uses. Where NLCD wasn’t available, the NOAA C-CAP dataset and corresponding landcover classes were used. Details on the data sources for each non-agricultural UDL are provided in the Non-Agricultural UDL Data Source section. A complete crosswalk for the simazine non-agricultural uses is provided in Table 2. This crosswalk includes the label use name, SUUM use site (**APPENDIX 1-4**), and the UDL data sources used to generate each layer are provided in the UDL data source section.

1. Action Area

To create the action area for simazine all pertinent agricultural and non-agricultural UDLs are combined. This is completed by placing of UDL on top of each other and combining them into one footprint. The resulting layer includes all locations and buffered area found in each of the UDLs. The buffered areas represented a minimum distance to a potential use across UDLs and sets the exposure area for simazine related to drift. For additional detail on how the action area is generated see the tool documentation, “**CDL to UDL Processing and Action Area Python Scripts**” section.

1. UDL Data Sources
   1. Agricultural UDL Data Sources

* ConUS
  + Corn, Vineyards, Citrus, Other Crops, Other Orchards, Vegetables and ground fruit UDLs generated from the Cropland Data Layer (CDL) 2013-2017.
    - Where Other Crops refers to the cole crops and alfalfa grown for seed that is limited to WA and OR. U.S. vegetable seed production is located in the Pacific Northwest including primarily Willamette Valley, Treasure Valley, and near Madras in Oregon; Columbia Basin and Skagit River Valley in Washington; and Treasure Valley and Snake River Valley in Idaho. Oregon produces seed for hybrid cabbage and broccoli, Washington produces seed for hybrid cabbage; whereas Idaho does not produce cole crops for seed (ISU, 2013).
  1. Non-Agricultural UDL Data Sources

Simazine is registered for use on turf grasses, including residential, institutional facilities, and golf courses. Since simazine can only be used on warm season turfgrass species without causing turf injury, work was needed to determine where warm season turf grasses are grown in ConUS. The USDA defines these zones known as Plant Hardiness Zones (PHZ) based on long term temperature data. It was assumed that Warm Season Grasses are grown in approximately Zone 8 to 11, and transition grasses are grown in approximately Zone 6 to 7. The USDA PHZ 6-11 were combined into a single boundary that was used to refine the range of where simazine could be used on warm season grass. This assumption is consistent with information that was provided from an industry group (Golf Course Superintendents Association of America (GCSAA)) about where simazine is applied to turf on golf courses. In general, application sites were located within USDA PHZs 6-11.

* 1. Non-Agricultural UDL Description
* **Developed**

Developed land cover is used to spatially represent certain non-agricultural label uses, see Table 2for specific uses. For simazine this layer was geographically restricted to the warm season grass boundary, based on the label.

* + **ConUS**
    - NLCD class 22-24
* **Open Space Developed**

Open Space Developed (OSD) is used to spatially represent certain non-agricultural label uses, see **Table 2** for specific uses. For simazine this layer was geographically restricted to the warm season grass boundary, based on the label.

* + **ConUS**
    - NLCD class 21
* **Christmas Trees**

Forested areas managed for timber extraction and Cropland Data Layer (CDL) class 70, Christmas Trees, are used for ConUS.

* + **ConUS**
    - Cropland Data Layer (CDL) class 70, Christmas Trees
* **Other Crops (Turf-Sod farms)**

Sod farm are captured in USDA Cropland Data Layer and included in the Other Crops UDL, see **APPENDIX 1-5** for details on the individual crops found in the Other Crops UDL. For simazine this layer has two geographically restriction, one general turf farms in the contiguous United States that is limited to the warm season grass boundary and one Florida specific layer.

Table 1. Crosswalk of simazine agricultural uses across crop sources

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Use from Master Label | Crop Reported in SUUM | Census of Agriculture | ConUS UDL | Geographic Restrictions |
| ALFALFA | Alfalfa Grown for Seed | LEGUMES, ALFALFA, SEED | Other Crops | Limited to OR and WA |
| ALMOND | Almonds | ALMONDS | Other Orchards |  |
| APPLE | Apples | APPLES | Other Orchards |  |
| AVOCADO | Avocado | AVOCADOS | Other Orchards |  |
| BLACKBERRY | Caneberries (blackberries, boysenberries, loganberries, raspberries) | BLACKBERRIES, INCL DEWBERRIES & MARIONBERRIES; BOYSENBERRIES; LOGANBERRIES; RASPBERRIES | Vegetables and ground fruit |  |
| BLUEBERRY | Blueberries | BLUEBERRIES, TAME; BLUEBERRIES, WILD | Vegetables and ground fruit |  |
| BOYSENBERRY | Caneberries (blackberries, boysenberries, loganberries, raspberries) | BLACKBERRIES, INCL DEWBERRIES & MARIONBERRIES; BOYSENBERRIES; LOGANBERRIES; RASPBERRIES | Vegetables and ground fruit |  |
| BROCCOLI | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| BRUSSELS SPROUTS | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| CABBAGE | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| CABBAGE, CHINESE | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| CAULIFLOWER | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| CHERRY | Cherries | CHERRIES, SWEET; CHERRIES, TART | Other Orchards |  |
| CITRUS | Lemons; Orange; Grapefruit | LEMONS; ORANGE; GRAPEFRUIT | Citrus |  |
| CORN, FIELD | Corn, field | CORN | Corn |  |
| CORN, SWEET | Corn, Sweet | CORN | Vegetables and ground fruit |  |
| CRANBERRY | Cranberry | CRANBERRIES | Vegetables and ground fruit |  |
| FILBERT (HAZELNUT) | Hazelnuts (Filberts) | HAZELNUTS | Other Orchards |  |
| GRAPEFRUIT | Grapefruit | GRAPEFRUIT | Citrus |  |
| GRAPES | Grapes, Raisin; Grapes, Wine; Grapes, Table | GRAPES | Grapes |  |
| KALE | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| KOHLRABI | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| LEMON | Lemons | LEMONS | Citrus |  |
| LOGANBERRY | Caneberries (blackberries, boysenberries, loganberries, raspberries) | BLACKBERRIES, INCL DEWBERRIES & MARIONBERRIES; BOYSENBERRIES; LOGANBERRIES; RASPBERRIES | Vegetables and ground fruit |  |
| MACADAMIA NUT (BUSHNUT) | Macadamia | MACADAMIAS | Other Orchards |  |
| MUSTARD | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops |  |
| NECTARINE | Nectarines | NECTARINES | Other Orchards |  |
| OLIVE | Olives | OLIVES | Other Orchards |  |
| ORANGE | Oranges | ORANGES | Citrus |  |
| PEACH | Peaches | PEACHES | Other Orchards |  |
| PEAR | Pears | PEARS | Other Orchards |  |
| PECAN | Pecans | PECANS | Other Orchards |  |
| PLUM | Plums | PLUMS & PRUNES | Other Orchards |  |
| RADISH | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| RASPBERRY (BLACK, RED) | Caneberries (blackberries, boysenberries, loganberries, raspberries) | BLACKBERRIES, INCL DEWBERRIES & MARIONBERRIES; BOYSENBERRIES; LOGANBERRIES; RASPBERRIES | Vegetables and ground fruit |  |
| RUTABAGA | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| STRAWBERRY | Strawberries | STRAWBERRIES | Vegetables and ground fruit |  |
| TURNIP (GREENS) | Cole Crops grown for seed: Broccoli, Brussels sprout, cabbage, Chinese cabbage, Chinese mustard, kale, kohlrabi, radish, rutabaga, and turnip | FIELD CROPS, OTHER | Other Crops | Limited to OR and WA |
| WALNUT (ENGLISH/BLACK) | Walnut | WALNUTS, ENGLISH | Other Orchards |  |

**Table 2. Crosswalk of simazine non-agricultural uses.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Use from Master Label** | **Crop Reported in SUUM** | **Census of Agriculture** | **ConUS UDL** | **Geographic Restrictions** |
| Grass/Turf | Grass/Turf (Turf) (Lawns) | FIELD CROPS, OTHER | Developed | Limited to certain portions of the country where warm season grasses grow |
| Grass/Turf: golf course: fairways | Grass/Turf (Turf) (Golf Courses) | FIELD CROPS, OTHER | Open Space Developed | Limited to certain portions of the country where warm season grasses grow |
| Turfgrass for sod | Ornamental Sod Farms (Turf) (FL) | FIELD CROPS, OTHER | Other Crops | Florida Specific UDL |
| Turfgrass for sod | Ornamental Sod Farms (Turf) (Other States) | FIELD CROPS, OTHER | Other Crops | Limited to certain portions of the country where warm season grasses grow |
| Nurseries (conifers, deciduous trees and woody ornamental species) | Conifers/Deciduous Hardwoods | NA | Nurseries |  |
| Nurseries (conifers, deciduous trees and woody ornamental species) | Ornamentals (shrubs/vines) | NA | Nurseries |  |
| Coniferous/Evergreen/Softwood (non-food) | Trees (non-food) (Timber Plantations) | NA | Xmas Trees |  |
| Ornamental Ponds and Aquaria | Water Structures (Aquariums & Ornamental Ponds & Fountains) | NA | Assumed to be small closed systems and does not have a specific UDL |  |
| For use on: Deciduous/Broadleaf/Hardwood (non-food) | Winter annual broadleaf control on land to be planted corn the following spring | CORN | Corn |  |

1. References

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  + Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. Photogrammetric Engineering and Remote Sensing, v. 81, no. 5, p. 345-354
* **United States Department of Agriculture Cropland Data Layer (CDL) 2013-2017**
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* **USDA Plant Hardiness Zones -** United States Department of Agriculture. 2012. Plant hardiness zone map. Accessed on May 14, 2019 at <https://planthardiness.ars.usda.gov/PHZMWeb/>

1. Baker, N.T., and Capel, P.D., 2011, Environmental factors that influence the location of crop agriculture in the conterminous United States: U.S. Geological Survey Scientific Investigations Report 2011–5108, 72 p. [↑](#footnote-ref-2)
2. Amos, J.J., C.M. Holmes, C.G. Hoogeweg, and S.A. Kay. 2010. Development of Datasets to Meet USEPA Threatened and Endangered Species Proximity to Potential Use Sites Data Requirements. Report Number: 437.01-Overview. Prepared by Waterborne Environmental, Inc. for the Generic Endangered Species Task Force. [↑](#footnote-ref-3)