**Appendix 1-7: Diazinon Scenario Development**

In aquatic modeling three main categories of inputs are developed: chemical-specific, use scenario-specific, and selection of a PRZM5/VVWM scenario. Chemical-specific inputs are described in Section 3 (Measures of Aquatic Exposure). Use scenarios were defined by which general land cover class was assigned to the use pattern (see ‘use summary’ tab of **APPENDIX 3-4a: Diazinon Aquatic Modeling Inputs**). For use on ornamentals and nurseries, the PRZM5/VVWM scenario ‘NSlandcoverESA’ was utilized for the simulation. The non-specified (NS) land cover PRZM5/VVWM scenarios are used for use patterns that had a specialty land cover developed to represent the use (*e.g*., use on nurseries). This Appendix briefly describes the development of the use scenarios and the location of information supporting the analysis. For diazinon, the aquatic modeling work was documented in an Excel file (**APPENDIX 3-4a Diazinon Aquatic Modeling Inputs**) and the worksheets references are found in this appendix.

***HUC2 Region***

The first step in the scenario development was to determine which Hydrologic Unit Code (HUC2) regions to model for each use pattern. The worksheet titled ‘diazinon-NASS-HUC2’ contains rows of NASS acres by HUC relevant to diazinon use sites. The result of this analysis is shown below in the column titled ‘Relevant HUC2 Regions based on NASS acres’ in the “use summary’ worksheet. Not all of the HUCs identified in this row were necessarily simulated in modeling because some use patterns were restricted to specific geographic areas. These restrictions are identified in the ‘use summary’ worksheet in the column titled ‘comments’.

***Application dates***

Application dates were chosen as described in Section 3 (Application Timing). When choosing an application date within a time window (*i.e*., dormant season or foliar application), the first or 15th day of the month with the highest amount of precipitation (for the meteorological station corresponding to the PRZM5/VVWM scenario) for that time window was chosen. The first and 15th of the month were chosen as a standard date in a wet month to model, they are not expected to necessarily capture the peak precipitation event in the month. The worksheet titled, “wettest month” identifies the wettest month for each HUC2 region based on precipitation in the meteorological file used for each HUC2 region. **Table B 1-7.1** provides the PRZM5/VVWM scenario planting and harvest dates. When emergence and harvest dates are January 1 and December 31, respectively, it is generally for a crop that will not be harvested (*e.g*., turf). The method in which the dates were determined is described in **APPENDIX 1-7 Scenario Development** which describes the PRZM5/VVWM scenario development methods.

**Table B 1-7.1. PRZM5/VVWM SCENARIO EMERGENCE AND HARVEST DATES**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **HUC2** | **Corn** | | **Cotton** | | **Developed** | | **Grassland** | |
| **Emergence** | **Harvest** | **Emergence** | **Harvest** | **Emergence** | **Harvest** | **Emergence** | **Harvest** |
| 1 | 1-Jun | 4-Sep |  |  | 1-Sep | 2-Nov | 1-Jun | 30-Aug |
| 2 | 16-Apr | 10-Oct | 1-Jun | 1-Nov | 1-Sep | 2-Nov | 1-Apr | 1-Nov |
| 3 | 25-Apr | 17-Sep | 1-May | 22-Sep | 1-Sep | 2-Nov | 1-Apr | 28-Aug |
| 4 | 1-Jun | 4-Sep |  |  | 1-Sep | 2-Nov | 1-Apr | 1-Nov |
| 5 | 1-May | 25-Oct | 1-May | 22-Sep | 1-Sep | 2-Nov | 1-Jun | 30-Aug |
| 6 | 25-Apr | 17-Sep | 1-May | 22-Sep | 1-Sep | 2-Nov | 1-Apr | 28-Aug |
| 7 | 1-May | 20-Oct | 1-May | 22-Sep | 1-Sep | 2-Nov | 1-Jun | 30-Aug |
| 8 | 10-Apr | 2-Sep | 1-May | 22-Sep | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 9 | 5-May | 12-Aug |  |  | 1-Sep | 2-Nov | 1-Jun | 30-Aug |
| 10a | 10-May | 20-Oct | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Jun | 30-Aug |
| 10b | 10-May | 20-Oct | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Jun | 30-Aug |
| 11a | 25-May | 20-Oct | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 11b | 25-May | 20-Oct | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 12a | 1-Mar | 1-Jul | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 12b | 1-Mar | 1-Jul | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 13 | 16-Mar | 10-Sep | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 14 | 16-Mar | 10-Sep | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 15a | 16-Mar | 10-Sep | 1-May | 11-Nov | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 15b | 16-Mar | 10-Sep | 1-May | 11-Nov | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 16a | 16-Mar | 10-Sep | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 16b | 16-Mar | 10-Sep | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Sep | 1-Aug |
| 17a | 16-May | 10-Sep |  |  | 1-Sep | 2-Nov | 1-Sep | 1-Jul |
| 17b | 16-May | 10-Sep |  |  | 1-Sep | 2-Nov | 1-Sep | 1-Jul |
| 18a | 1-Apr | 8-Sep | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Nov | 1-May |
| 18b | 1-Apr | 8-Sep | 16-Mar | 15-Oct | 1-Sep | 2-Nov | 1-Nov | 1-May |
| 20a | 1-Oct | 16-Apr |  |  | 1-Sep | 2-Nov | 2-Jan | 15-Dec |
| 20b | 1-Oct | 16-Apr |  |  | 1-Sep | 2-Nov | 2-Jan | 15-Dec |
| 21 | 1-Oct | 16-Apr |  |  | 1-Sep | 2-Nov |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **HUC2** | **NSLandcover** | | **Orchard** | | **Other Grain** | | **Other Row** | |
| **Emergence** | **Harvest** | **Emergence** | **Harvest** | **Emergence** | **Harvest** | **Emergence** | **Harvest** |
| 1 | 1-Jan | 31-Dec | 1-Jun | 15-Oct | 16-Apr | 1-Nov | 1-Jun | 5-Oct |
| 2 | 1-Jan | 31-Dec | 16-Apr | 15-Oct | 16-Apr | 1-Nov | 1-May | 21-Jul |
| 3 | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 16-May | 10-Oct |
| 4 | 1-Jan | 31-Dec | 1-Jun | 15-Oct | 1-Jun | 30-Aug | 30-Apr | 15-Aug |
| 5 | 1-Jan | 31-Dec | 16-Apr | 15-Oct | 20-May | 1-Oct | 16-May | 10-Oct |
| 6 | 16-Mar | 22-Oct | 1-Apr | 25-Oct | 1-Apr | 28-Aug | 25-Apr | 17-Sep |
| 7 | 16-Mar | 22-Oct | 1-Jan | 31-Dec | 1-Jun | 30-Aug | 1-May | 20-Oct |
| 8 | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 10-Apr | 31-Jul |
| 9 | 1-Jan | 31-Dec | 1-Jun | 15-Oct | 16-May | 25-Aug | 16-May | 15-Oct |
| 10a | 16-Mar | 22-Oct | 1-Mar | 10-Nov | 20-May | 1-Oct | 10-May | 20-Oct |
| 10b | 16-Mar | 22-Oct | 1-Mar | 10-Nov | 20-May | 1-Oct | 10-May | 20-Oct |
| 11a | 16-Mar | 22-Oct | 1-Apr | 16-Nov | 16-Oct | 17-Jun | 25-May | 20-Oct |
| 11b | 16-Mar | 22-Oct | 1-Apr | 16-Nov | 16-Oct | 17-Jun | 25-May | 20-Oct |
| 12a | 1-Jan | 31-Dec | 1-Apr | 16-Nov | 1-Jun | 30-Aug | 1-Mar | 1-Jul |
| 12b | 1-Jan | 31-Dec | 1-Apr | 16-Nov | 1-Jun | 30-Aug | 1-Mar | 1-Jul |
| 13 | 1-Jan | 31-Dec | 1-Apr | 16-Nov | 1-Jun | 30-Aug | 1-Mar | 1-Jul |
| 14 | 16-Mar | 22-Oct | 1-Apr | 16-Nov | 1-Jun | 30-Aug | 1-Mar | 1-Jul |
| 15a | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 1-Jun | 30-Aug | 1-Mar | 1-Jul |
| 15b | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 1-Jun | 30-Aug | 1-Mar | 1-Jul |
| 16a | 1-Mar | 1-Nov | 1-Jan | 31-Dec | 1-Jun | 30-Aug | 1-Mar | 1-Jul |
| 16b | 1-Mar | 1-Nov | 1-Jan | 31-Dec | 1-Jun | 30-Aug | 1-Mar | 1-Jul |
| 17a | 1-Jan | 31-Dec | 1-Apr | 31-Oct | 1-Sep | 1-Jul | 1-Apr | 1-Sep |
| 17b | 1-Jan | 31-Dec | 1-Apr | 31-Oct | 1-Sep | 1-Jul | 1-Apr | 1-Sep |
| 18a | 1-Mar | 1-Nov | 16-Jan | 13-Sep | 1-Jan | 15-Jun | 1-Jan | 8-Apr |
| 18b | 1-Mar | 1-Nov | 16-Jan | 13-Sep | 1-Jan | 15-Jun | 1-Jan | 8-Apr |
| 20a | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 1-Jan | 1-May |
| 20b | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 1-Jan | 31-Dec | 1-Jan | 1-May |
| 21 | 1-Jan | 31-Dec | 1-Jan | 31-Dec |  |  |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **HUC2** | **Other Tree** | | **Soybean** | | **Vegetable** | | **Wheat** | |
| **Emergence** | **Harvest** | **Emergence** | **Harvest** | **Emergence** | **Harvest** | **Emergence** | **Harvest** |
| 1 | 1-Jun | 15-Oct | 1-Jun | 4-Sep | 1-Jun | 5-Oct | 16-Apr | 1-Nov |
| 2 | 16-Apr | 15-Oct | 16-Apr | 1-Oct | 10-May | 10-Oct | 16-Apr | 1-Nov |
| 3 | 1-Jan | 31-Dec | 25-Apr | 17-Sep | 1-Jan | 1-May | 1-Apr | 28-Aug |
| 4 | 1-May | 21-Jul | 1-Jun | 4-Sep | 30-Apr | 15-Aug | 16-May | 5-Aug |
| 5 | 16-Apr | 15-Oct | 1-May | 25-Oct | 1-Jun | 4-Sep | 20-May | 1-Oct |
| 6 | 1-Apr | 25-Oct | 25-Apr | 17-Sep | 1-Jan | 1-May | 1-Apr | 28-Aug |
| 7 | 1-Jan | 31-Dec | 1-May | 20-Oct | 16-Jun | 2-Sep | 1-Jun | 30-Aug |
| 8 | 1-Jan | 31-Dec | 10-Apr | 2-Sep | 10-Apr | 31-Jul | 1-Jun | 30-Aug |
| 9 | 1-May | 21-Jul | 5-May | 12-Aug | 16-May | 15-Oct | 16-May | 5-Aug |
| 10a | 1-Jan | 31-Dec | 10-May | 20-Oct | 16-May | 15-Oct | 16-May | 5-Aug |
| 10b | 1-Jan | 31-Dec | 10-May | 20-Oct | 16-May | 15-Oct | 16-May | 5-Aug |
| 11a | 1-Jan | 31-Dec | 25-May | 20-Oct | 1-Feb | 7-May | 16-Oct | 17-Jun |
| 11b | 1-Jan | 31-Dec | 25-May | 20-Oct | 1-Feb | 7-May | 16-Oct | 17-Jun |
| 12a | 1-Apr | 16-Nov | 1-Mar | 1-Jul | 1-Feb | 7-May | 1-Jun | 30-Aug |
| 12b | 1-Apr | 16-Nov | 1-Mar | 1-Jul | 1-Feb | 7-May | 1-Jun | 30-Aug |
| 13 | 1-Apr | 16-Nov | 16-Mar | 10-Sep | 1-Feb | 7-May | 1-Jun | 30-Aug |
| 14 | 1-Apr | 16-Nov | 16-Mar | 10-Sep | 1-Feb | 7-May | 1-Jun | 30-Aug |
| 15a | 1-Jan | 31-Dec | 16-Mar | 10-Sep | 16-Feb | 12-May | 1-Jun | 30-Aug |
| 15b | 1-Jan | 31-Dec | 16-Mar | 10-Sep | 16-Feb | 12-May | 1-Jun | 30-Aug |
| 16a | 1-Jan | 31-Dec | 16-Mar | 10-Sep | 1-Feb | 7-May | 1-Jun | 30-Aug |
| 16b | 1-Jan | 31-Dec | 16-Mar | 10-Sep | 1-Feb | 7-May | 1-Jun | 30-Aug |
| 17a | 1-Jan | 31-Dec | 16-May | 10-Sep | 16-Jun | 2-Sep | 1-Sep | 1-Jul |
| 17b | 1-Jan | 31-Dec | 16-May | 10-Sep | 16-Jun | 2-Sep | 1-Sep | 1-Jul |
| 18a | 16-Jan | 13-Sep | 1-Apr | 8-Sep | 1-Feb | 7-May | 1-Jan | 15-Jun |
| 18b | 16-Jan | 13-Sep | 1-Apr | 8-Sep | 1-Feb | 7-May | 1-Jan | 15-Jun |
| 20a | 1-Jan | 31-Dec |  |  | 1-Feb | 15-May |  |  |
| 20b | 1-Jan | 31-Dec |  |  | 1-Feb | 15-May |  |  |
| 21 | 1-Jan | 31-Dec |  |  | 1-Feb | 15-May |  |  |

***Use Patterns Simulated***

Diazinon use patterns were fairly straightforward, in that a detailed explanation of the assumptions employed in modeling is not needed (the use assumptions can be identified from the use summary table and the input file). When Airblast (a type of ground application) and ground applications were both allowed for an orchard crop, the ground application was selected because it resulted in a higher spray drift fraction (see the ‘Spray Drift’ worksheet). The only use with aerial application allowed was lettuce. For lettuce, both ground and aerial applications were simulated. The filename column in the ‘use summary’ identifies which simulations in the ‘step2’ input file were used to represent the use pattern. Below is an explanation of some of the file names. Model inputs were derived from current maximum label application rates for each use site.

**Filename or what use pattern to refer to in modeling:** Identifies the filename in aquatic modeling that represents the use pattern.

* Blueberry12x = application to blueberry at 1 lbs a.i./A with 2 applications
* Veg41x= application to vegetable at 4 lbs a.i./A with 1 application
* Veg41xxp55xTX = application to vegetable at 4 lbs a.i./A with 1 application followed by 0.5 lbs a.i./A with 5 applications. The ‘p’ identifies the point five. The application scenario only applies to Texas.
* Veg4p75xTX = Application to vegetables at 4 lbs a.i./A followed by another application at 0.75 lbs a.i./A. The application scenario only applies to Texas.
* Ornamental 1x1cc= ornamentals were simulated at 1 lbs a.i./A with 1 crop cycle assumed.
* Ornamental2cc = ornamentals were simulated at 1 lb a.i./A with 2 crop cycles assumed
* Ornamental3cc = ornamentals were simulated at 1 lb a.i./A with 3 crop cycles assumed
* Fly 5 CA = Simulation for control of fruit flies in California with a 5 lb a.i./A application rate assumed.
* Fly5FL=Simulation for control of fruit flies in Florida with an application rate of 5 lbs a.i./A
* Lettuce 2 = Simulation of application to lettuce at 2 lbs a.i./A with an aerial application
* Lettuce 2ground = simulation of application to lettuce at 2 lbs a.i./A with a ground application
* MultiCA = multiple crop cycle scenario for California. Modeled as described in Section 3.
* MultiFL = multiple crop cycle scenario for Florida. Modeled as described in Section 3.
* MultiMI = multiple crop cycle scenario for Michigan. Modeled as described in Section 3.
* MultiTX = multiple crop cycle scenario for Texas. Modeled as described in Section 3.
* CAfly3x= simulation of 3 crop cycles in California to control fruit flies

The worksheet titled ‘step 2’ is the input file for aquatic modeling in step 2 and documents all assumptions on the application scenario. The worksheet titled ‘step 1’ is the input file for step 1 analysis. The filename in the ‘step 2’ worksheet corresponds to the filename in the ‘use summary’. In the ‘chemical’ column of the ‘step2’ worksheet the name of the representative crop was sometimes identified. Below is an explanation of the other worksheets in the **APPENDIX 3-4a Diazinon Aquatic Modeling Inputs**. The filename, chemical column, HUC 2 column, and bin column from the input worksheets can be combined with the summary output file to identify which EECS correspond to which use patterns.

**Worksheet Explanation**

* **Readme:** Worksheet to provide information on what is in each worksheet
* **Use Summary:** Use summary table with added columns to support modeling work
* **Step1:** input file for step 1 aquatic modeling
* **Step2:** input file for step 2 aquatic modeling
* **Fate:** Input file for the sensitivity analysis for changing the chemical inputs and spray drift inputs
* **Date 1:** Input file for application date sensitivity analysis with application date ranging from January to June
* **Date 2:** Input file for application date sensitivity analysis with application date ranging from July to December
* **Diazinon-**NASS-HUC2: NASS acres per HUC 2 region for diazinon use patterns.
* **Spray drift:**  Default spray drift fractions for different aquatic bins when no buffer is assumed.
* **Met Stations:**  Provides information on the met file for each HUC 2 region along with some details on the wettest month.
* **Wettest Month:** Contains a summary of the precipitation data for different met files that are used to support application date selection.
* **NASS-HUC2:**  ArcGIS results of the crosswalk between NASS acres harvest in a county for different crops and HUC2 regions.
* **Aquatic Bin Dimensions by HUC2:** Reference file to populate bin, field size, waterbody area, depth, percent use area, met file, etc. in the input file.
* **PRZM5/VVWM Inputs:** this is a spreadsheet has information on what the selections for different inputs mean. For example, when False is entered in the KOCflag column that indicates that the input is a Kd value. This is useful in understanding the input files.
* **Scenario HUC matrix:** Matrix of the PRZM5/VVWM scenario by HUC and which scenarios are simulated for which HUCs.