APPENDIX 1-3. Glyphosate Scenario Development for Aquatic Modeling

The purpose of this Appendix is to provide supporting information for the aquatic modeling work.

The use sites simulated for glyphosate are documented in **APPENDIX 3-1**. Agricultural modeling simulations are also summarized in Table 2. The modeling for uses in residential areas are fully described in **Chapter 3** and are not included inTable 2. In Table2, the use data layer (UDL) was obtained from information provided in **APPENDIX 3-1**. The PWC scenario simulated was determined based on the UDLs used in mapping. Unless otherwise noted, aquatic modeling for a HUC2 was simulated when the 2012 National Agricultural Statistics Service (NASS) Census Data indicated that a crop was grown in that region. Limited data were available with regards to Puerto Rico, Alaska, and Hawaii and some assumptions were made in those areas based on best available information. Most crops were assumed to be grown in these areas when information was not available; however, some crops were assumed not to be grown in HUC-02 region 20 or HUC-02 region 21. For example, tobacco and sunflowers were assumed not to be grown in HUC-02 region 20 and HUC-02 region 21. See **Chapter 3** for additional details on the aquatic modeling.

In selecting application dates for aquatic modeling, EPA considered many factors. Label directions are considered, such as treatment timing (e.g., preemergence, postemergence, post-harvest). Selection of application dates included an analysis of weather files to determine the time of year most likely to produce the greatest off-site transport. The meteorological information is considered as pesticide loading to surface water may be directly affected by precipitation events. The wettest month (i.e., the month with the highest average daily precipitation) within each HUC2 was identified (Table 1), and a random date (i.e., the 1st of each month) was considered to maintain the probability of the distribution of environmental exposure concentrations generated. In cases when the application window is narrowed to a certain time of year (e.g., fall to late winter), the application date is the 1st day of the wettest month within a reasonable application window. The 1st of the given application month was arbitrarily selected and consistently used as the random date selection. Preharvest intervals and other restrictions specified on labels were also considered, so that applications were not modeled to occur within restricted timeframes.

In HUC2 regions with differing amounts of rainfall across the region, an additional location was selected with substantially different meteorological conditions to represent the range of conditions across the HUC2 region Table 1**.** These HUC2 regions with differing conditions are 10, 11, 12, 15, 16, 17, 18, 19, and 20.

Table 1. Month with highest total precipitation in each 30-year weather file in each HUC2

| **HUC2** | **City, State** | **Meteorological File** | **Average Wettest Month**  **in 30 Years of Data** |
| --- | --- | --- | --- |
| 1 | Hartford, CT | w14740 | May |
| 2 | Lynchburg, VA | w13733 | July |
| 3 | Atlanta, GA | w13874 | March |
| 4 | Milwaukee, WI | w14839 | August |
| 5 | Covington, KY | w93814 | May |
| 6 | Knoxville, TN | w13891 | March |
| 7 | Des Moines, IA | w14933 | June |
| 8 | Fort Smith, AR | w13970 | July |
| 9 | Fargo, ND | w14914 | June |
| 10a | Grand Island, NE | w14935 | June |
| 10b | Sheridan, WY | w24029 | May |
| 11a | Fort Smith, AR | w13964 | May |
| 11b | Amarillo, TX | w23047 | June |
| 12a | Fort Worth, TX | w03927 | May |
| 12b | Abilene, TX | w13962 | September |
| 13 | El Paso, TX | w23044 | September |
| 14 | Rock Springs, WY | w24027 | May |
| 15a | Flagstaff, AZ | w03103 | July |
| 15b | Phoenix, AZ | w23183 | December |
| 16a | Salt Lake City, UT | w24127 | April |
| 16b | Winnemucca, NV | w24128 | November |
| 17a | Eugene, OR | w24221 | December |
| 17b | Pocatello, ID | w24156 | May |
| 18a | Sacramento, CA | w23232 | January |
| 18b | San Diego, CA | w23188 | January |
| 19a | Big Delta, AK | w26415 | July |
| 19b | Talkeetna, AK | W26528 | August |
| 20a | Hilo, HI | w21504 | November |
| 20b | Honolulu, HI | w22521 | December |
| 21 | Puerto Rico | w11641 | May |

In general, minimum treatment intervals were modeled. However, for some uses typical application dates and rates were modeled up to the maximum annual application rate. This was done, for example, because of the unique nature of glyphosate to kill the target plant if applied when the plant is present on the field.

# Use Scenarios

Table 2 provides a listing of the glyphosate uses that were modeled in this BE, along with the maximum single application rate, number of applications, and retreatment interval. More information on the assumptions used in aquatic modeling and which HUC2 regions were modeled for each use pattern is available in **APPENDIX 3-2**.

Table 2. Modeled Crop Groups with Maximum Single Application Rate, Application Types, and Application Timing and/or Target

| **Crop/Use Site** | **Use Data Layer** | **PWC scenario** | **HUC2s** | **Specific crops included in this group** | **Max. Single App. Rate**  **(lb a.e./acre),**  **Max. Annual Rate**  **(lb a.e./acre),**  **No. of Apps, RTI** | **Application**  **Type** | **Application Timing** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Aquatic Use | everywhere | na | 01-21 |  | 8.0, 8.0, 3, na |  |  |
| Citrus | Citrus | Citrus | 03, 12, 13  *for use in Florida and Texas* | All cultivars, varieties and/or hybrids of calamondin; chironja; citrus hybrids; grapefruit (including Japanese summer); kumquat; lemon; lime (including Australian desert lime, Australian finger lime, Australian round lime, Brown river finger lime, Mount white, New Guinea wild, Russell river, sweet, and Tahiti); mandarin (including mediterranean, satsuma); orange (all); pummelo; tangelo; tangerine (mandarin); tangor; uniq fruit (ugli); citron | 3.75, 8.0, 3, 7 | Ground | Postemergence Broadcast Spray |
| Corn | Corn | Corn | 01-18, 20-21 | field corn; seed corn; silage corn | 3.75, 6.0, 3, 7 | Ground | Preemergence; Broadcast Spray |
| Cotton | Cotton | Cotton | 02, 03, 05-08, 10-13, 15, 18 | cotton | 3.75, 6.0, 3, 7 | Ground | Preemergence; Broadcast Spray |
| 1.55, 4.71, 3, 7 | Aerial |
| Residential | Developed | ROW  Developed | 01-21 | general weed control, lawn renovation. | 40.0, 40.0, 12, 7 | Ground | Broadcast Spray  \*also target spot treatment2 |
| Non-agriculture | airports, airfields, apartment complexes, commercial sites, ditch banks, driveways, ramps, alleys, lanes, paths, trails, sidewalks, walkways, access roads, farm roads, high- ways (including aprons, medians, guardrails, and rights-of-way), paved areas and prior to paving, dry ditches, dry canals, fences and fencerows, greenhouses, industrial sites, landscape areas, lumber yards, manufacturing sites, municipal sites, natural areas, office complexes, ornamentals, parks, campgrounds, sports areas, tennis courts, parking areas, cemeteries, petroleum or other tank farms and pumping installations, refineries, around telephone and communications equipment, public areas, drive-in theaters, railroads (including ballasts, shoulders, crossings and spot treatments), recreation areas, residential areas, rights-of- way, roadsides, firebreaks, schools, shadehouses4, sports complexes, storage areas, substations, construction and pre- construction sites, turfgrass areas, around ornamental gardens, around ornamental trees and shrubs, power and utility sites, around commercial or industrial outbuildings, warehouse areas, bare ground, gravel yards, mulched areas, beaches, habitat restoration and management areas, uncropped farmstead areas, uncultivated non-agricultural areas, vacant lots, wastelands, shelter belts, wildlife management and refuges areas. | 8.0, 8.0, 1, na | Ground  Aerial | Not specified |
| Impervious |
| Golf Course | Open Space Developed | Golf | 01-21 |  | 8.0, 8.0, 1, na | Ground  Aerial | Not specified |
| Grapes | Grapes | Grapes | 01-21 |  | 3.75, 8.0, 3, 7 | Ground | Postemergence; Broadcast Spray |
| Alfalfa | Pasture | Pasture | 01-21 |  | 1.55, 4.71, 3, 7 | Aerial | Preemergence; Broadcast Spray |
|  | 3.75, 6.0, 3, 7 | Ground | Preemergence; Broadcast Spray |
| Grass | 01-21 | Bahiagrass; bermudagrass; bluegrass; brome; fescue; guinea grass; kikuyu grass; orchardgrass; pangola grass; ryegrass; timothy; wheatgrass and any grass (gramineae family) except corn, sorghum, sugarcane and any other cereal and grain crops included on the label. | 1.55, 4.71, 3, 7 | Aerial | Preemergence; Broadcast Spray |
| 3.75, 6.0, 3, 7 | Ground | Preemergence; Broadcast Spray |
| Vetch | 02, 04, 05, 07, 08, 09, 10, 11, 12, 17, 18, 19 |  |
| 1.55, 4.71, 3, 7 | Aerial | Preemergence; Broadcast Spray |
| Fallow Cropland | All cultivated lands | Other Crops | 01-21 | Fallow period prior to the planting or emergence of any crop listed on the product label | 3.75, 6.0, 3, 7 | Ground3 | Postemergence; Broadcast Spray |
| Clover |  | 02-12, 17-18, |  |
| Grass Seed and Sod Production |  | 02-12, 14-20 | Any grass (gramineae family) except corn, sorghum, sugarcane and any other cereal and grain crops included on the label |
| Rice |  | na | 03, 05-08, 11-12, 16-18 |  | 3.75, 6.0, 3, 7 | Ground3 | Pre-plant, harvest aid |
| na |  | 1.55, 4.71, 3, 7 | Aerial |
| Wheat | Wheat | Wheat | 01-18, 19 | wheat |  | Ground3 |  |
| Soybean | Soybean | Soybean | 01-14, 16-18, 20 | soybean | 3.75, 6.0, 3, 7 | Ground3 | Preemergence; Broadcast Spray |
| Barley | Other Grain | Other Grain | 01-18, 19 | barley | 3.75, 6.0, 3, 7 | Ground3 | Ground Broadcast; selective |
| Buckwheat | 01-05, 07, 09-11, 17-18 | buckwheat |
| Millet | 02-05, 09-18 | millet |
| Oat | 01-19 | oat |
| Rye | 01-14, 16-18 | rye |
| Triticale | 01-07, 09-18 | triticale |
| Wild Rice | 04, 07, 09, 16-18 | wild rice |
| Sorghum | 01-18, 20 | sorghum |
| Oilseed Crops | 01-18, 20-21 | borage; buffalo gourd; calendula; canola; castor oil plant; chinese tallowtree; crambe; cuphea; echium; euphorbia; evening primrose; flax; gold of pleasure; hare’s ear mustard; jojoba; lesquerella; meadowfoam; milkweed; mustard; niger seed; oil radish; poppy seed; rape; rose hip; safflower; sesame; stokes aster; sweet rocket; tallowwood; tea oil plant; vernonia | Ground3 | Preemergence; Broadcast Spray |
| Sugarcane | 03, 08, 11-13, 20 |  | Ground |
| 2.25, 6.0, 3, 7 | Aerial |
| Peanut | Other Row | Other Row | 02-03, 05-06, 08, 11-13, 18 | peanut | 3.75, 6.0, 3, 7 | Ground3 | Pre-plant, Preemergence; Broadcast Spray |
| Sunflower | 01-14, 17-18, 20 | sunflower | Ground |
| Sugar Beet | 02, 04-05, 07, 09-10, 14-18 | sugar beet | Ground |
| 1.55, 4.71, 3, 7 | Aerial |
| Hops | 01-07, 10-11, 14-15, 14-18 | hops | 3.75, 8.0, 3, 7 |  |  |
| Tobacco | 01-08, 10-11 | tobacco | 2.0, 2.0, 1, na | Ground | Pre-plant,  Broadcast Spray |
| Stalk, Stem, and Leaf Petiole Vegetable | Vegetable and Ground Fruit | Vegetable and Ground Fruit |  | aloe vera, bamboo shoots, cactus, palm | 3.75, 6.0, 3, 7 | Ground | Postemergence; Broadcast Spray |
| Asparagus, Tomato, Watermelon | 01-21 | Asparagus, tomato, watermelon |
| 1.55, 4.71, 3, 7 | Aerial |
| Herbs |  | allspice; angelica; star anise; annatto (seed); balm; basil; borage; burnet; camomile; caper buds; caraway; black caraway; cardamom; cassia bark; cassia buds; catnip; celery seed; chervil (dried); chive; chinese chive; cinnamon; clary; clove buds; coriander leaf (cilantro or chinese parsley); coriander seed (cilantro); costmary; culantro (leaf); culantro (seed); cumin; curry (leaf); dill (dillweed); dill (seed); epazote; fennel seed (common and florence); fenugreek; white ginger flower; grains of paradise; horehound; hyssop; juniper berry; lavender; lemongrass; lovage (leaf and seed); mace; marigold; marjoram (including oregano); mexican oregano; mioga flower; mustard (seed); nasturtium; nutmeg; parsley (dried); pennyroyal; pepper (black and white); pepper leaves; peppermint; perilla; poppy (seed); rosemary; rue; saffron; sage; savory (summer and winter); spearmint; stevia leaves; sweet bay; tansy; tarragon; thyme; vanilla; wintergreen; woodruff; wormwood | 3.75, 6.0, 3, 7 |  |  |
| Sweet and Pop Corn |  | Sweet and pop corn |  |  |  |
| Brassica Vegetables |  | broccoli; chinese broccoli (gai lon); broccoli raab (rapini); brussels sprouts; cabbage; chinese cabbage (bok choy); chinese cabbage (napa); chinese mustard cabbage (gai choy); cauliflower; cavalo broccoli; collards; kale; kohlrabi; mizuna; mustard greens; mustard spinach; rape greens |  |  |  |
| Bulb Vegetables |  | all cultivars, varieties and/or hybrids of chive (including chinese); daylily; elegans hosta; fritillaria; garlic (including great-headed, serpent); kurrat; leek (including lady’s, wild); onion (including beltsville bunching, bulb, chinese, fresh, green, macrostem, pearl, potato, tree, welsh); shallot |  |  |  |
| Cucurbit Vegetables |  |  |  | hayote (fruit); chinese waxgourd (chinese preserving melon); citron melon; cucumber; gherkin; edible gourd (includes hyotan, cucuzza, hechima, chinese okra); melons (all); momordica spp. (includes balsam apple, balsam pear, bittermelon, chinese cucumber); muskmelon (includes cantaloupe, casaba, crenshaw melon, golden pershaw melon, honeydew melon, honey ball melon, mango melon, persian melon, pineapple melon, santa claus melon, snake melon); pumpkin; summer squash (includes crookneck squash, scallop squash, straightneck squash, vegetable marrow, zucchini); winter squash (includes butternut squash, calabaza, hubbard squash, acorn squash, spaghetti squash); watermelon |  |  |  |
| Leafy Vegetables |  | amaranth (chinese spinach); arugula (roquette); beet greens; cardoon; celery; chinese celery; celtuce; chaya; chervil; edible-leaved chrysanthemum; garland chrysanthemum; corn salad; cress (garden, upland); dandelion; dock (sorrel); dokudami; endive (escarole); florence fennel; gow kee; lettuce (head, leaf); orach; parsley; purslane (garden, winter); radicchio (red chicory); rhubarb; spinach; new zealand spinach; vine spinach; swiss chard; water spinach |  |  |  |
| Fruiting Vegetables |  | all cultivars, varieties and/or hybrids of eggplant (including african, pea, scarlet); cocona; garden huckleberry; goji berry; groundcherry (physalis spp.); martinynia; naranjilla; okra; pepino; pepper (includes bell pepper, chili pepper, cooking pepper, pimento, sweet pepper); roselle; sunberry; tomatillo; tomato |  |  |  |
| Legume Vegetables |  | bean (lupinus: includes grain lupin, sweet lupin, white lupin, white sweet lupin); bean (phaseolus: includes field bean, kidney bean, lima bean, navy bean, pinto bean, runner bean, snap bean, tepary bean, wax bean); bean (vigna: includes adzuki bean, asparagus bean, blackeyed pea, catjang, chinese longbean, cowpea, crowder pea, moth bean, mung bean, rice bean, southern pea, urd bean, yardlong bean); broad bean (fava); chickpea (garbanzo); guar; jackbean; lablab bean; lentil; pea (pisum: includes dwarf pea, edible-podded pea, english pea, field pea, garden pea, green pea, snowpea, sugar snap pea); pigeon pea; soybean (immature seed); sword bean, dry beans |  |  |  |
| Root and Tuber Vegetables |  |  |  | arracacha; arrowroot; chinese artichoke; jerusalem artichoke; beet (garden); burdock; canna; carrot; cassava (bitter and sweet); celeriac; chayote (root); chervil (turnip- rooted); chicory; chufa; dasheen (taro); galangal; ginger; ginseng; horseradish; leren; kava (turnip-rooted); parsley (turnip rooted); parsnip; potato; radish; oriental radish; rutabaga; salsify; black salsify; spanish salsify; skirret; sweet potato; tanier; turmeric; turnip; wasabi; yacon; yam bean; true yam |  |  | Postemergence; Broadcast Spray |
| Berry and Small Fruit Crops |  | all cultivars, varieties and/or hybrids of amur river grape; aronia berry; bayberry; bearberry; bilberry; blackberry (including andean blackberry, arctic blackberry, bingleberry, black satin berry, boysenberry, brombeere, california blackberry, cherokee blackberry, chesterberry, cheyenne blackberry, common blackberry, coryberry, darrowberry, dewberry, dirksen thornless berry, evergreen blackberry, himalayaberry, hullberry, lavacaberry, loganberry, lowberry, lucretiaberry, mammoth blackberry, marionberry, mora, mures de ronce, nectarberry, northern dewberry, olallieberry, oregon evergreen berry, phenomenalberry, rangeberry, ravenberry, rossberry, shawnee blackberry, southern dewberry, tayberry, youngberry, zarzamora); blueberry (highbush, lowbush); buffaloberry; che; chilean guava; chokecherry; cloudberry; currant (black, buffalo, red, native); elderberry; european barberry; gooseberry; grape; honeysuckle (edible); huckleberry; jostaberry; juneberry (saskatoon berry); kiwifruit (fuzzy, hardy); ligonberry; maypop; mountain pepper berries; mulberry; muntries; partridgeberry; phalsa; pincherry; raspberry (black, red, wild); riberry; salal; schisandra berry; sea buckthorn; serviceberry; strawberry | 3.75, 8.0, 3, 7 | Ground |
| Trees, Forestry | Forest Trees | Forest Trees | 01-21 | pine, poplar, eucalyptus, christmas trees and other non-food tree crops | 8.0, 8.0, 1, na | Ground  Aerial |  |
| Nursery | Nurseries | Non-specified | 01-21 | nursery, shade houses | 8.0, 8.0, 1, na | Ground  Aerial |  |
| Pome Fruit Crops | Other Orchard | Orchard | 01-21 | all cultivars, varieties and/or hybrids of apple; azarole; crabapple; loquat; mayhaw; medlar; pear (including asian pear); quince (including chinese and japanese quince); tejocote | 3.75, 8.0, 3, 7 | Ground2 | Ground Broadcast; selective |
| Stone Fruit Crops except olive | apricot; cherry (sweet, tart); nectarine; peach; plum/Prune (all types); plumcot |
| Tree Nut Crops |  | almond; beechnut; betelnut; brazil nut; butternut; cashew; chestnut; chinquapin; filbert (hazelnut); hickory nut; macadamia; pecan; pine nut; pistachio; walnut (black, english) |
| Banana |  | 03, 08, 12, 13, 18, 20 | banana |  |  |  |
| Olive |  | 03, 12, 13, 15, 16, 17, 18 | olive |  |  |  |
| Guava |  | 03, 12, 13, 15, 16, 18, 20 | guava |  |  |  |
| Papaya |  | 03, 12, 13, 18, 20 | papaya |  |  |  |
| Tropical and Subtropical Trees and Fruit Crops |  | 02, 03, 05, 06, 10-18, 20 | ambarella; atemoya; avocado; barbados cherry (acerola); biriba; blimbe; breadfruit; cacao (cocoa) bean; canistel; carambola (starfruit); cherimoya; custard apple; dates; durian; feijoa; figs; governor’s plum; ilama; imbe; imbu; jaboticaba; jackfruit; longan; lychee; mamey apple; mango; mangosteen; marmaladebox (genip); mountain papaya; noni (indian mulberry); pawpaw; persimmon; pomegranate; pulasan; rambutan; rose apple; sapodilla; sapote (black, mamey, white); spanish lime; soursop; star apple; sugar apple; surinam cherry; tamarind; tea; ti; wax jambu |  |  |  |
| Pineapple |  | 20 |  | 3.75, 6.0, 3, 7 |  |  |

1 the label permits annual rate up 6.0 lb a.e./A; however, to achieve this rate a ground application would be necessary.

2 drift and no drift scenarios modeled.

3 aerial applications permitted at much lower maximum single application rate of 1.55 lb/A but the maximum annual rate of 8.0 lb/A remains.

4 shade houses may also occur in agricultural areas.

# Additional Modeling Information

This section includes additional use site specific modeling input parameters including the referenced simulation names used in the batch input file. In addition, depending on the use being accessed different approaches were taken to model the maximum annual rates. The first approach used the minimum treatment interval (mti) to represents applications that occur at the mti specified on the label. However, based on the understood intended use (i.e., herbicide) it is not likely that applications occur at the mti for every application because it would kill the target crop, for example. As such, the second approach considers application dates that more likely to represent actual usage [or typical (t)] yet still results in use of the maximum annual rate. The simulations are generally organized by PRZM scenario for the various uses in the subsections below.

## Citrus

Modeled with PWC: Glyphosate\_citrus\_ground HUC-03, HUC-12, HUC-13 min treatment interval (mti)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence Broadcast Spray | 1st of the wettest month | Ground | 3.75  (4.2) |  |
| 2 | 7tt of the wettest month | 3.75  (4.2) |  |
| 3 | 14th of the wettest month | 0.5  (0.6) |  |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_citrus\_ground HUC-03, HUC-12, HUC-13 typical (t)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | Jun 1 | Ground | 3.75  (4.2) | Applied in early June after last harvest and then monthly. |
| 2 | July 1 | 1.25  (1.4) |  |
| 3 | Aug 1 | 1.0  (1.12) |  |
| 4 | Sept 1 | 1.0  (1.12) |  |
| 5 | Oct 1 | 1.0  (1.12) |  |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

## Corn

Modeled with PWC: Glyphosate\_corn\_ground\_noGMO\_mti

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Preemergence; Broadcast Spray | -21 | Ground | 3.75  (4.2) |  |
| 2 | Preemergence; Broadcast Spray | -14 | 2.25  (2.5) |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_corn\_ground\_GMO\_t

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Preemergence; Broadcast Spray | -7 | Ground | 1.125  (1.26) | Apply at most active period of planting corn or soybeans. |
| 2 | 14 | 1.125  (1.26) | Apply 2 weeks after planting. |
| 3 | Postemergence; Broadcast Spray | 114 | 3.75  (4.2) | Fall application for brush control. Apply 2 weeks after most active period of corn or soybean harvest.  Corn takes between 60-100 days to harvest after seeding. |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

## Cotton

Modeled with PWC: Glyphosate\_cotton\_ground\_mti

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Preemergence; Broadcast Spray | -21 | Ground | 3.75  (4.2) |  |
| 2 | -14 | 2.25  (2.5) |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_cotton\_noGMO\_ground\_t

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 2 | Preemergence; Broadcast Spray | -14 | Ground | 2.25  (2.5) |  |
| 1 | Postharvest; Broadcast Spray | 174 | 3.75  (4.2) | Cotton is fully mature and ready for harvesting approximately 160 days after being planted. Applications generally occur 2 weeks after most active period of cotton harvest. |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_cotton\_GMO\_ground\_t

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Preemergence; Broadcast Spray | 14 | Ground | 1.5  (1.4) | Apply 14 days after most active period of cotton planting |
| 2 | 28 | 0.75  (1.2) | Apply 1 month after most active period for cotton planting. |
| 3 | Postharvest; Broadcast Spray | 174 | 3.75  (4.2) | Cotton is fully mature and ready for harvesting approximately 160 days after being planted. Applications generally occur 2 weeks after most active period of cotton harvest. |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

## Cranberry

Modeled with PFAM

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Preemergence; Broadcast Spray | 3/15 (MA)  5/15 (OR, WI) | Ground | 3.75  (4.2) |  |
| 2 | 3/22 (MA) 5/22 (OR, WI) | 3.75  (4.2) |  |
| 3 | 3/29 (MA) 5/29 (OR, WI) | 0.5  (0.6) |  |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

## Developed

Modeled with PWC: Glyphosate\_developed\_max\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 8.0  (9.0) | Maximum single application rate. |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

## Direct Water Applications

Estimated using an equilibrium partitioning equation considering a single-compartment first-order transformation

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | NA | NA | direct | 3.75  (4.2) |  |
| Total |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | NA | NA | direct | 8.0  (9.0) |  |
| Total |  |  |  |  |  |

Modeled with PWC: Glyphosate\_developed\_max\_air

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Air | 8.0  (9.0) | Maximum single application rate. |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

## Golf

Modeled with PWC: Glyphosate\_golf\_max\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 8.0  (9.0) | Maximum single application rate. |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_golf\_max\_air

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 8.0  (9.0) | Maximum single application rate. |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

## Grapes

Modeled with PWC: Glyphosate\_grape\_max\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 3.75 | Maximum single application rate. |
| 2 | 7st of the wettest month | 3.75 |  |
| 3 | 14st of the wettest month | 0.5 |  |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

## Grassland

Modeled with PWC: Glyphosate\_alfalfa\_max\_ground\_mti

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 8/15 | Ground | 3.75  (4.2) | Apply in August 2 weeks before most active period of planting. |
| 2 | 8/22 | 2.25  (2.5) |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_alfalfa\_max\_ground\_t

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Preemergence; Broadcast Spray | 8/15 | Ground | 3.75  (4.2) | Apply in August 2 weeks before most active period of planting. |
| 2 | 9/1 | 2.25  (2.5) | Apply 1 to 5 days after planting, it only takes 6 days for seed to germinate. |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_alfalfa\_max\_GMO\_ground\_t

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Preplant; Broadcast Spray | 7/1 | Ground | 1.5  (1.7) | Apply 2 weeks after most active harvest period for winter wheat. |
| 2 | 7/14 | 1.5  (1.7) | Apply 1 to 5 days after planting, it only takes 6 days for seed to germinate. |
| 3 | 8/1 | Ground | 1.5  (1.7) | Apply 1 week before planting in most active alfalfa planting period. |
| 4 | Preemergence; Broadcast Spray | 9/1 | 1.5  (1.7) | Apply 1 to 5 days after planting, it only takes 6 days for seed to germinate. |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

## Impervious

Modeled with PWC: Glyphosate\_impervious\_max\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 8.0  (9.0) | Maximum single application rate. |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

## Non-specified Landcover

Modeled with PWC: Glyphosate\_nursery\_max\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 8.0  (9.0) | Maximum single application rate. |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_nursery\_max\_air

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Air | 8.0  (9.0) | Maximum single application rate. |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

## Orchard

Modeled with PWC: Glyphosate\_orchard\_max\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 3.75  (4.2) |  |
| 2 | 14tht of the wettest month | 3.75  (4.2) |  |
| 3 | 28tht of the wettest month | 0.5  (0.6) |  |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

## Other Crops

Modeled with PWC: Glyphosate\_othercrop\_max\_6\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 3.75 |  |
| 2 | 7tht of the wettest month | 2.25 |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_othercrop\_max\_\_8\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 3.75 |  |
| 2 | 7th of the wettest month | 3.75 |  |
| 3 | 14th of the wettest month | 0.5 |  |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_othercrop\_max\_6\_air

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Air | 3.75 |  |
| 2 | 7th of the wettest month | 2.25 |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_othercrop\_max\_\_8\_air

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Air | 3.75 |  |
| 2 | 7th of the wettest month | 3.75 |  |
| 3 | 14th of the wettest month | 0.5 |  |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

## Other Grains

Modeled with PWC: Glyphosate\_othergrain\_max\_ground\_mti

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 | Preplant; Broadcast Spray | -14 | Ground | 3.75 |  |
| 2 | Preemergence; Broadcast Spray | -7 | 2.25 |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

## Other Row Crops

Modeled with PWC: Glyphosate\_otherowcrops\_max\_ground\_mti

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 |  | -7 | Ground broadcast | 3.75 |  |
| 2 |  | -7 (h) | Ground broadcast | 2.25 |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_otherowcrops\_max\_air\_mti

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate lb a.i./A (kg/ha)** | **Comments** |
| 1 |  | -7 | Ground broadcast | 3.75 |  |
| 2 |  | -7 (h) | Aerial  broadcast | 1.55 |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate |

## Other Tree

Modeled with PWC: Glyphosate\_othertree\_max\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate (lb a.i./A)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 3.75  (4.2) |  |
| 2 | 7th of the wettest month | 3.75  (4.2) |  |
| 3 | 14th of the wettest month | 0.5  (0.6) |  |
| Total |  |  |  | 8.0 | Maximum Yearly Rate Permitted |

## Vegetables and Ground Fruit

Modeled with PWC: Glyphosate\_vegetables\_max\_6\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate (lb a.i./A)** | **Comments** |
| 1 | Preplant; Broadcast Spray | -7 | Ground | 3.75 |  |
| 2 | Postemergence; hood/shielded/wiper | 7 | 2.25 |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate Permitted |

Modeled with PWC: Glyphosate\_vegetables\_max\_8\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate (lb a.i./A)** | **Comments** |
| 1 | Preplant; Broadcast Spray | -14 | Ground | 3.75  (4.2) |  |
| 2 | -7 | 3.75  (4.2) |  |
| 3 | Postemergence; hood/shielded/wiper | 7 | 0.5  (0.6) |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate Permitted |

## Xmas Tree

Modeled with PWC: Glyphosate\_xmastree\_max\_ground

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate (lb a.i./A)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Ground | 8.0  (9.0) | Maximum single application rate. |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

Modeled with PWC: Glyphosate\_xmastree\_max\_air

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate (lb a.i./A)** | **Comments** |
| 1 | Postemergence; Broadcast Spray | 1st of the wettest month | Air | 8.0  (9.0) | Maximum single application rate. |
| Total |  |  |  | 8.0 | Maximum Yearly Rate |

## Soybean

Modeled with PWC: Glyphosate\_soybean

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate (lb a.i./A)** | **Comments** |
| 1 | Pre-plant | -7 | Ground broadcast | 3.75 |  |
| 2 | harvest aid | -7 (h) | Ground broadcast | 2.25 |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate Permitted |

## Rice

Modeled with PWC: Modeled with PFAM

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate (lb a.i./A)** | **Comments** |
| 1 | Pre-plant | -7 | Ground broadcast | 3.75 |  |
| 2 | harvest aid | -7 (h) | Ground broadcast | 2.25 |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate Permitted |

## Wheat

Modeled with PWC: Glyphosate\_wheat

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Application Number** | **Application Timing; Type** | **Date** | **Method** | **Application Rate (lb a.i./A)** | **Comments** |
| 1 |  | -7 | Ground broadcast | 3.75 |  |
| 2 |  | -7 (h) | Ground broadcast | 2.25 |  |
| Total |  |  |  | 6.0 | Maximum Yearly Rate Permitted |