Appendix D. Label Use Patterns for Carbaryl in California for Assessing the Risks to the Delta Smelt.

Chestnuts. (Group H) Chestnuts are grown in California, but information on the volume of production is unavailable. Almonds is being used as the surrogate crop for all nut crops grown in California as they all have the same application pattern and similar growth and production habits.

Citrus. (Group F) The citrus use patterns include a number of sub-tropical to tropical evergreen tree crops grown for their fruit. These include lemons, limes, oranges, grapefruit, pummelo, tangelo, tangerine, and kumquat. Citrus is being simulated using the California citrus scenario which is used to represent western citrus.

Commercial lawns. (Group B) This use pattern is one of several that consist of maintained turf that is treated with 8 lb/acre/application. These are being simulated separately from residential turf, which can be treated at a higher rate (9.2 $lb \cdot acre^{-1}$) and is expected to be broken into small lots. 'Lawns' is being used as a surrogate for these use patterns.

Cowpeas. (Group AD) Also known as the black-eyed pea, black-eye, Crowder pea, and cream pea or southern pea (*Vigna fasciculata*), this legume is predominantly grown in the Southern United States, but has some limited production in California. Fresh beans are being used as a surrogate for cowpeas as they have the same application practice and bushy or vine legume grown for the bean or pea like dry beans. For spray drift assessment, the rice use pattern was used as a surrogate for the legume crops (Group AE) as they have the same single application rate and method (aerial application).

Crabapple. (Group L) Crapapples are small apples (*Malus* sp.) and are generally used for jams, jellies and other processed uses. The application practice of carbaryl is the same for apples and crabapples. Apples are being used as a surrogate for crabapples and other pome fruits using the California Fruit scenario.

CRP & set-aside acreage. (Group AM) The rights-of –way use pattern is being used as a surrogate for CRP and set-aside acreage. CRP acreage is usually along agricultural field borders and thus has the long-narrow aspect of the rights-of –way use pattern and other use patterns in this group. Furthermore, all use patterns in this group have the same maximum carbaryl application practice. For spray drift assessment, the rangeland use pattern was used as a surrogate for CRP land and set-aside acreage as they have the same application rate and methods (aerial application).

Ditch banks. (Group AM) The rights-of –way use pattern is being used as a surrogate for ditch banks. Ditch banks are generally long and narrow and thus have the long-narrow aspect of the rights-of –way use pattern and the other use patterns in this group. Furthermore, all use patterns in this group have the same maximum carbaryl application practice. Note that this use pattern implies a close proximity to water, and the possibility

of rapid conveyance to water bodies of concern. For spray drift assessment, the rangeland use pattern was used as a surrogate for ditch banks as they have the same application rate and methods (aerial application).

Eggplant. (Group Q) Eggplant is being modeled with the tomatoes use pattern (Group Q) as they are related to tomatoes, have the same bushy growth habit, are both grown in the Central Valley of California, and they have the same carbaryl maximum label use pattern. For spray drift assessment, the grapes use patterns was used as a surrogate for eggplant as they have the same application rate and methods (aerial application).

Flowers. (Group I) This use pattern is separate from the 'flower beds around buildings use patterns' above as it is more generic, but has a lower use rate. Flowers is being used a surrogate for shrubs, as they the use pattern for all three is for the plants used as ornamentals and they have the same maximum carbaryl application pattern. The California ornamentals scenario is being used to simulate flowers for the aquatic exposure assessment.

Hanover salad. (Group T) This crop is the same species as canola and rape, but it has been bred to emphasize the leaves which are used in salads. Specific information on where Hanover salad is grown commercially could not be located. But guides for it culture on the internet are dominated by those from southeastern states. Given their propensity for vegetable culture in California, it production in California cannot be ruled out. (http://edis.ifas.ufl.edu/MV076 http://www.floridata.com/ref/b/bras_ole_kale.cfm). For the purposes of this assessment, Brussels sprouts are being used as a surrogate crop. . Brussels sprouts serves as a surrogate crop for Hanover salad. For the terrestrial assessments, Brussels sprouts are being modeled with the broccoli use pattern (Group T) as they have the same carbaryl maximum label use pattern. For spray drift assessment, the grapes use patterns was used as a surrogate for Hanover salad as they have the same application rate and methods (aerial application).

Hedgerows. (Group AM) The rights-of –way use pattern is being used as a surrogate for hedgerows. Hedgerows are generally long and narrow and thus have the long-narrow aspect of the rights-of –way use pattern and the other use patterns in this group. Furthermore, all use patterns in this group have the same maximum carbaryl application practice. For spray drift assessment, the rangeland use pattern was used as a surrogate for hedgerows as they have the same application rate and methods (aerial application).

Herbaceous plants. (Group AL) Carbaryl lists 'other herbaceous plants' and a use site, apparently referring to herbaceous plant grown as ornamentals. Roses is being used a surrogate for herbaceous and woody ornamental plants as they the use pattern for all three is for the plants used as ornamentals and they have the same maximum carbaryl application pattern. For the terrestrial assessments, herbaceous plants is being modeled with the melon use pattern (Group AK) as they have the same carbaryl maximum label use pattern. For spray drift assessment, the rangeland use pattern was used as a surrogate

for herbaceous plants as they have the same application rate and methods (aerial application).

Home lawns. (Group A) For aquatic exposure assessments, the California residential and California impervious scenario is being used to simulate the home lawn use pattern. Home lawns is being used as a surrogate for fire ants as this is expected to be a common use site for control of fire ants and the application rate to home lawns is greater than for the control of fire ants.

Imported fire ants. (Group A) Fire ants have found in southern California and carbaryl has a use pattern on fire ants of 1½ of a fluid oz of Sevin SL (Reg. No. 432-1227) per mound which corresponds to 0.0469 lb per mound. A high end measurement of fire ant mound density is 393 mounds per hectare (Hood *et al.*, 2003) which corresponds to 158 mounds per acre. This means that a high end estimate for the per acre application rate of carbaryl to fire ants is 7.4 $lb \cdot acre^{-1}$. Since this is less than the application for home lawns, the home lawn rate application pattern is being used as a surrogate for treatments for fire ants.

Kale. (Group S) Broccoli is used as the surrogate crops for kale as it a closely related crop, is grown in the same areas of California and has the same carbaryl label use pattern as cabbage. For spray drift assessment, the grapes use patterns was used as a surrogate for kale as they have the same application rate and methods (aerial application).

Kohlrabi. (Group S) Broccoli is used as the surrogate crops for kohlrabi as it a closely related crop, is grown in the same areas of California, and has the same carbaryl label use pattern as cabbage. For spray drift assessment, the grapes use patterns was used as a surrogate for kohlrabi as they have the same application rate and methods (aerial application).

Loquat. (Group M) Loquats are the fruit of a small evergreen tree. Loquat trees may grow the 5 to 10 meters tall but are usually less the 6 meters. While the application pattern for loquats is similar to the pome fruits, as an evergreen fruit tree, the citrus scenario was used a more appropriate surrogate scenario. For the terrestrial and spray drift assessments, loquats are being modeled with the apples use pattern (Group L) as they have the same carbaryl maximum label use pattern.

Non-urban forest. (Group AO) The non-urban forests use pattern is being used as a surrogate for forested or partly forested scenarios where the application is to the trees and 1 $lb \cdot acre^{-1}$ or less. These use patterns are tree plantations, Christmas trees, parks, and rangeland trees. Note that the application pattern for parks in this group is to the trees whereas the application pattern for parks in Group E is apparently to turf. For spray drift assessment, the rangeland use pattern was used as a surrogate for non-urban forests as they have the same application rate and methods (aerial application).

Oriental pears. (Group L) Apples is being as a surrogate for oriental pears and the other pome fruits as the application practice of carbaryl is the same for apples and all the pome fruits.

Parsnip. (Group AA) Parsnip is a root crop (*Pastinaca sativa)* related to the carrot and parsley. As a root crop, potatoes are being used as a surrogate as they both have the same maximum carbaryl application pattern. For the terrestrial assessments, Parsnip is being modeled with the sorghum use pattern (Group Y) as they have the same carbaryl maximum label use pattern. For spray drift assessment, the grapes use patterns was used as a surrogate for parsnip as they have the same application rate and methods (aerial application).

Pasture. (Group AH) Pasture is being simulated using the California rangeland scenario. The rangeland scenario was intended for use for grazed grassland such as pasture and was designed specifically for assessing exposure for the California Red Legged Frog assessments. For spray drift assessment, the okra use pattern was used as a surrogate for pasture as they have the same application rate and methods (aerial application).

Peas, southern, fresh. (Group AD) Also known as the black-eyed pea, black-eye, Crowder pea, and cream pea, or cowpea (*Vigna fasciculata*), this legume is predominantly grown in the Southern United States, but has some limited production in California. 'Dry beans' are being used as a surrogate for cowpeas as they have the same application practice and bushy or vine legume grown for the bean or pea like dry beans For spray drift assessment, the rice use pattern was used as a surrogate for the legume crops (Group AE) as they have the same single application rate and method (aerial application).

Prickly pear. (Group Y) Prickly pear is the fruit of a cactus of the same name. Celery is being used as a surrogate for prickly pear in this assessment as they have the carbaryl maximum label application practice. For the terrestrial assessments, prickly pear is being modeled with the sorghum use pattern (Group X) as they have the same carbaryl maximum label use pattern. For spray drift assessment, the grapes use patterns was used as a surrogate for prickly pear as they have the same application rate and methods (aerial application).

Rangeland trees. (Group AO) This use pattern is distinct from the rangeland use pattern in Group AK in that it is application to the trees. The non-urban forests use pattern is being used as a surrogate for rangeland trees as they are both tree crops and the application patterns are similar. For spray drift assessment, the rangeland use pattern was used as a surrogate for rangeland trees as they have the same application rate and methods (aerial application).

Roadsides. (Group AM) The rights-of –way use pattern is being used as a surrogate for roadsides. Roadsides are generally long and narrow and thus have the long-narrow aspect of the rights-of –way use pattern and to some extent, the roadsides, and rights-of-way use pattern can be considered synonymous. Furthermore, all use patterns in this group have

the same maximum carbaryl application practice. For spray drift assessment, the rangeland use pattern was used as a surrogate for roadsides as they have the same application rate and methods (aerial application).

Roses. (Group AL) Roses is being used as a surrogate for the 'other herbaceous plants' and woody plants use patterns as all three are for plants grown as ornamentals and the carbaryl use pattern is the same. The roses use pattern was simulated using the California ornamentals scenario. For the terrestrial assessments, roses are being modeled with the melon use pattern (Group AK) as they have the same carbaryl maximum label use pattern. For spray drift assessment, the roses use pattern was used as a surrogate for Christmas trees as they have the same application rate and methods (aerial application).

Rural shelter-belts. (Group AP) This use patterns was assessed using the rights-off-way scenario as it is a long, narrow use site like rights-of-ways. For the terrestrial assessments, rural shelter belts are being modeled with the melon use pattern (Group AO) as they have the same carbaryl maximum label use pattern. For spray drift assessment, the rangeland use pattern was used as a surrogate for rural shelter belts as they have the same application rate and methods (aerial application).

Salsify. (Group AA) Salsify, (*Tragopogon porrifolius*) also known as purple salsify and oyster plant is grown for the root and sometimes the young shoots. The potato use pattern has been used as a surrogate for salsify as it has the carbaryl maximum label use rate as salsify and both are root crops. For the terrestrial assessments, salsify is being modeled with the sorghum use pattern (Group X) as they have the same carbaryl maximum label use pattern. For spray drift assessment, the grapes use patterns was used as a surrogate for salsify as they have the same application rate and methods (aerial application).

Shrubs. (Group I) The flowers use pattern is being used as a surrogate for shrubs as they are both primarily used as ornamentals and the carbaryl maximum label use pattern is the same for both.

Southern peas, fresh(Group AR)

Squash. (Group AK) Melon is being used as a surrogate for all the registered cucurbits including squash as they all have similar agricultural management practices and the same application practices for carbaryl.

Strawberries. (Group P) Strawberries are being simulated using the California strawberry scenario. For the terrestrial assessments, strawberries are being modeled with the grapes use pattern (Group O) as they have the same carbaryl maximum label use pattern. For spray drift assessment, the grapes use patterns was used as a surrogate for strawberries as they have the same application rate and methods (aerial application).

Sugar beets. (Group AF). Sugar beets are being simulated on the California sugar beet scenario that was designed for use in the California red legged frog assessments for this

crop. For spray drift assessment, the okra use pattern was used as a surrogate for sugar beets as they have the same application rate and methods (aerial application).

Ticks. (Group AQ) The ticks use pattern is for all use sites on the Sevin 4F label (Reg. No. 264-349) and is for control of ticks which serve as vectors of Lyme disease (*Ixodes* and *Ablyomma* species). The application rate is 1 to 2 lb·acre^{-1},"as needed". It is assumed that since there are no restrictions on the number of applications, 25 applications were assumed. As no minimum re-application interval was indicated, 3 d was assumed. The turf use patterns was assumed for scenario, as it is expected that turf and turf-like scenarios would serve as the most common type of land cover to which this application is applied. This use pattern serves as surrogate for grasshoppers use pattern.

Transplants. (Group AR) The application pattern for transplants cannot be resolved to a lb per acre application rate. A application rate of this type is necessary in order to estimate the risk using EFED's current assessment methods.

Tree plantations. (Group AO) The non-urban forests use pattern is being used as a surrogate for tree plantations as they are both forests and can be used for timber, and the carbaryl maximum label use pattern is the same for both. For spray drift assessment, the rangeland use pattern was used as a surrogate for tree plantations as they have the same application rate and methods (aerial application).

Woody plants. (Group AL) Carbaryl lists 'woody plants' as a use site, referring to woody plant grown as ornamentals. Roses is being used a surrogate for herbaceous and woody ornamental plants as they the use pattern for all three is for the plants used as ornamentals and they have the same maximum carbaryl application pattern. For the terrestrial assessments, woody plants are being modeled with the melon use pattern (Group AK) as they have the same carbaryl maximum label use pattern. For spray drift assessment, the rangeland use pattern was used as a surrogate for woody plants as they have the same application rate and methods (aerial application).

References

Hood, W. M., P. M. Horton, and J. W. McCreadie. 2003. Field evaluation of the red imported fire ant (Hymenoptera: Formicidae) for the control of wax moths (Lepidoptera: Pyralidae) in stored honey bee comb. *Journal of Agricultural and Urban Entomology*, Vol. 20 (2) 93-103.

Orrick, G. and D. Young. 2007. *Guidance for Tier I Estimation of Aqueous Pesticide Concentrations in Rice Paddies.* Internal EPA Memorandum dated May 8, 2007.