Appendix D

Spatial Summary for Mancozeb Uses

I. Labeled Uses and Associated Land Cover Types for Mancozeb

The following use list is derived from label use information. It is used as a basis for the spatial mapping of mancozeb. Table 1 shows which land cover types are used to represent the spatial area of the use (*e.g.*, the use footprint). The landcover classes, were not designed to represent each use specifically but were chosen as the best spatial representation of a use area available. For example, dumpster use sites are associated with all developed landcover classes, including developed open space, since there is a possibility dumpsters can be found there. Greenhouses and nurseries are associated with cultivated classes since it is the most likely landcover class that can represent those use site areas.

Table 1 Mapping layers and associated use sites.

Land Cover Mapping Layer	Mancozeb Use Only	Mancozeb or Mancozeb
Cultivated	Asparagus, cereal grains, corn (field and seed), cotton, cucurbit, ginseng, fennel, shallot	Corn (Sweet/Pop), garlic, onion (dried), potatoes, sugar beet, tomatoes, ornamentals
Orchards and vineyards	Atemoya, cherimoya, custard apple, sugar apple, sweetsop, X-mas tree plantations, canistal, mamey, sapote, mango, crab apple, pear, quince, plantain, walnut	Apples, bananas, grapes, papayas
Developed – All	-	Ornamentals (Others) [3] Ornamentals (Pachysandra) Ornamentals (turf)
Turf	-	Turf (sod farms) Turf [4]
Forestry	Douglas Fir	

[1] Cereal grains include: wheat, barley, oats, rye, and triticale.
[2] Brassica include broccoli, cabbage and Chinese cabbage (tight head), cauliflower, and Kohlrabi
[3] Ornamentals include shade trees, ground cover plants, herbaceous plants, non-flowering plants and woody plants, shrubs and vines.
[4] Turf includes commercial/industrial/recreational area lawns, golf course turf, and ornamental sod farm turf.

II. Initial Area of Concern

After determining uses from label information and obtaining the representative NLCD landcover classes, a potential use _footprint' map is made. This includes all areas within the state of California where the pesticide could be applied and is shown in Figure 1 for

mancozeb. The footprint of potential use represents the chemical's initial area of concern, and is based on available NLCD land cover data and derived map layers.

Initial Area of Concern for Mancozeb

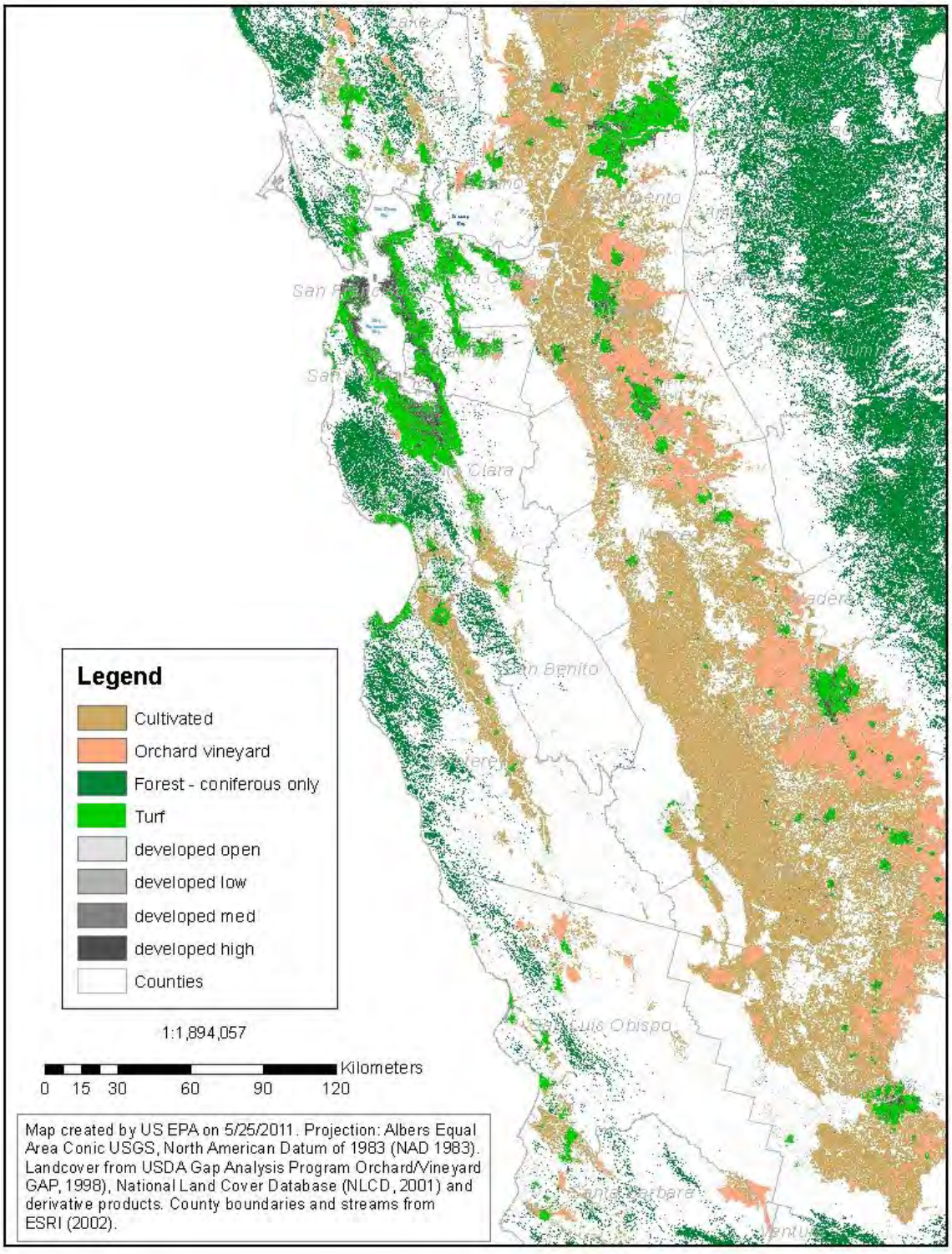

Figure 1 Mancozeb Initial Area of Concern

A. Land Cover

Base mapping land cover layers for the initial area of concern analysis were obtained from the National Land Cover Dataset (NLCD 2001) for the majority of land use types. The NLCD was released as a nationally consistent, regionally indexed dataset in January 2007. California Gap Analysis Project (GAP) data from the Biogeography Lab from UCLA-Santa Barbara (1998) were obtained for the orchard and vineyard uses. These raster files were converted to vectors using simplification and majority filter routines and merged into NLCD. The turf layer is derived from the NLCD developed areas with the impervious surface layer removed. The rights-of-way land cover layer was derived by combining road and rail information from TeleAtlas (2007) with U.S. Department of Transportation's National Pipeline Mapping System (1999). Table 2 lists the NLCD and derived layers used for initial area of concern representation.

Table 2 NLCD Layers and its description.

Layer name	Base source	Description
Cultivated Crops	NLCD	Grid code 82: Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and orchards/vineyards, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.
Developed, High Intensity	NLCD	Grid code 24: Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to100 percent of the total cover.
Developed, Low Intensity	NLCD	Grid code 22: Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.
Developed, Medium Intensity	NLCD	Grid code 23: Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.
Developed, Open Space	NLCD	Grid code 21: Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
Forest	NLCD	Grid codes 41,42,43: Deciduous, evergreen and mixed. Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Evergreen forest is represented by grid code 42.
Open Water	NLCD	Grid code 11: All areas of open water, generally with less than 25% cover of vegetation or soil.
Orchards and vineyards	CA GAP	Grid codes 11210, 11211 and 11212. This is the only CA GAP reference.
Pasture/Hay	NLCD	Grid code 81: Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.
Wetlands	NLCD	Grid codes 90, 95: Woody wetlands and emergent herbaceous.
Turf	NLCD	A derived NLCD class based on developed classes and the impervious surface

Layer name	Base source	Description
		layer with corrections applied.
Rights-of-way	US DOT; TeleAtlas	A derived class using road, rail, and pipeline coverages.

B. Initial Stream Reaches

In addition to the land cover classes described above, the initial area of concern includes the stream segments found within those land cover areas. The stream segments are obtained from the NHDPlus dataset. For each stream reach in the hydrography network, the data provide a tally of the total area in each NLCD land cover class for the upstream cumulative area contributing to the given stream reach. Using the cumulative land cover data provided by the NHDPlus (http://www.horizon-systems.com/nhdplus/), a cumulative percent cropped area (PCA) is calculated for each stream reach based on the area representing all uses for mancozeb and is divided by the total upstream contribution area. Pesticide exposures in the streams within the initial area of concern are conservatively assumed to be represented by the estimated environmental concentrations used in RQ calculation.

III. Spatial Extent of the Effects Determination

Based on the results of the risk quotient calculations for mancozeb which is independent of spatial analysis, a Likely to Adversely Affect (LAA) and modification to critical habitat determination was concluded for the California Tiger Salamander. The spatial extent of the LAA effects determination is the area where there is overlap between the area of potential LAA effects with critical habitat, habitat, or occurrence sections (see Figure 2). This area of potential LAA effects includes the initial area of concern for application of mancozeb on cultivated crops, orchards/vineyards, turf, and residential areas and the total area where there is potential for direct and/or indirect effects using EFED standard assessment procedures to occur via off-site transport mechanisms.

California Tiger Salamander Habitat Areas

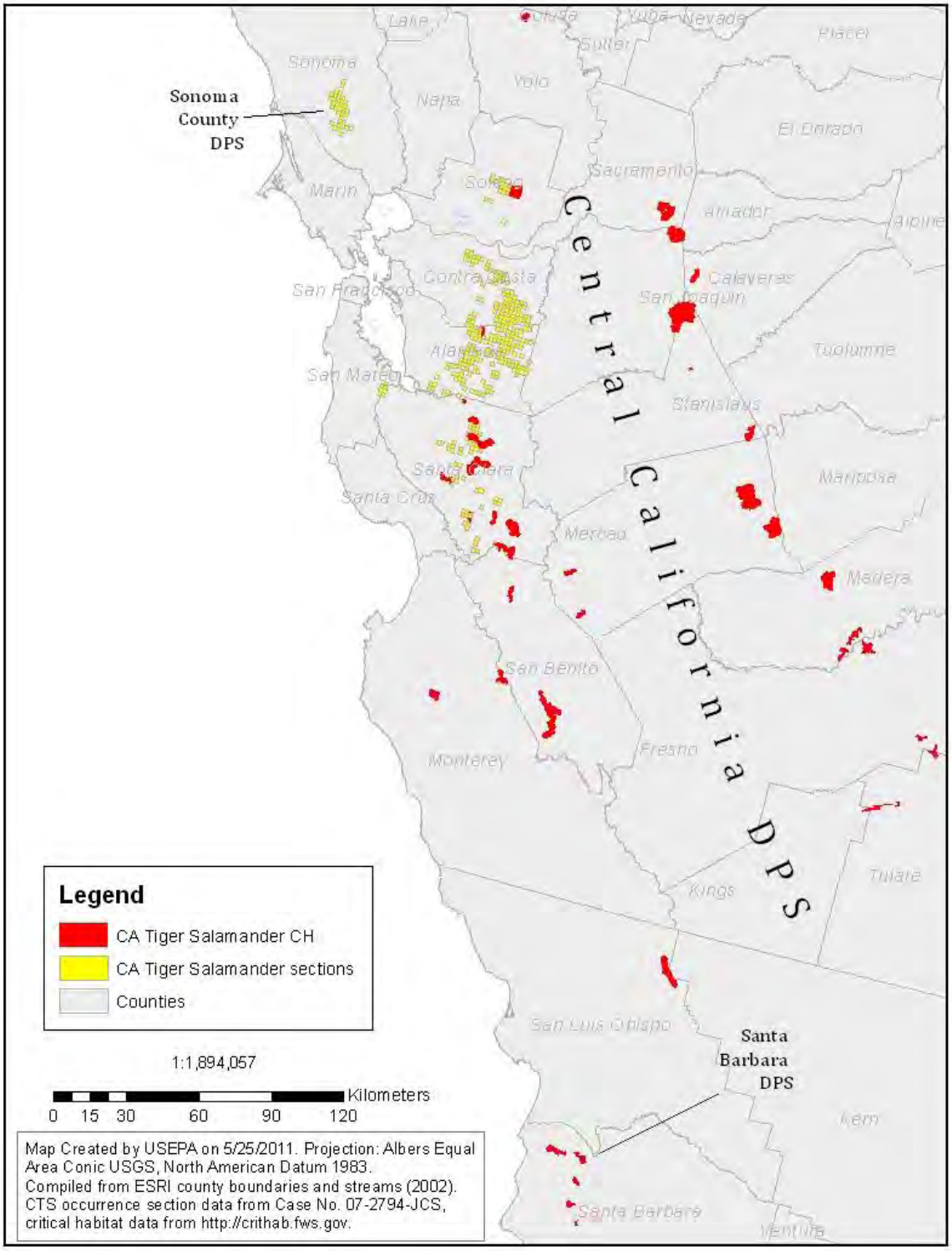

Figure 2 California Tiger Salamander habitat areas.

The extent of potential off-site transport is determined by deriving an aquatic and terrestrial spray drift distance using AgDRIFT and an estimate of the downstream distance where LOCs are exceeded using the downstream dilution model. Figure 3 is a diagram depicting overlap of a potential area of LAA effects and species habitat, critical habitat, or occurrence sections which would result in an LAA effects determination or Habitat Modification Determination for critical habitat. Figure 4 is a diagram depicting lack of overlap of a potential area of LAA effects and species habitat, critical habitat, or occurrence sections which would result in a No Effect determination or No Habitat Modification Determination for critical habitat.

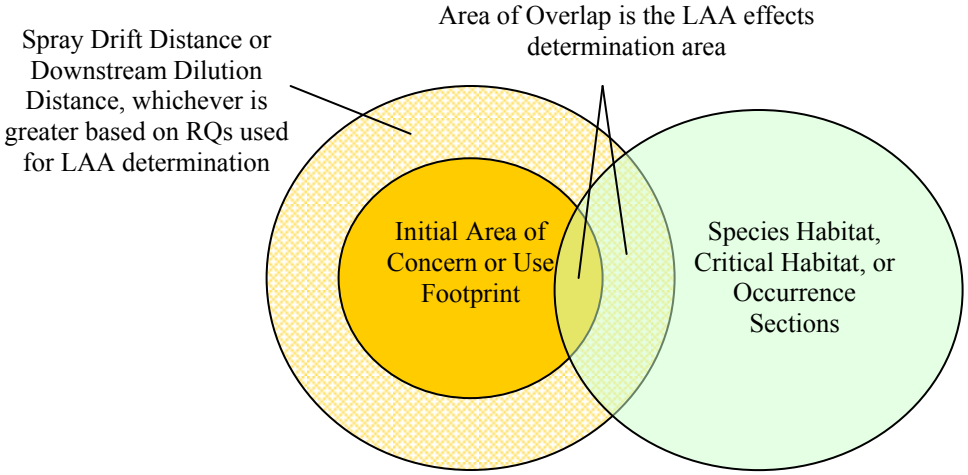

Figure 3 Conceptual diagram depicting an overlap of the area of potential LAA effect and the habitat, occurrence sections, or critical habitat of a species. If there is overlap, a LAA effects determination or habitat modification determination is made for the species.

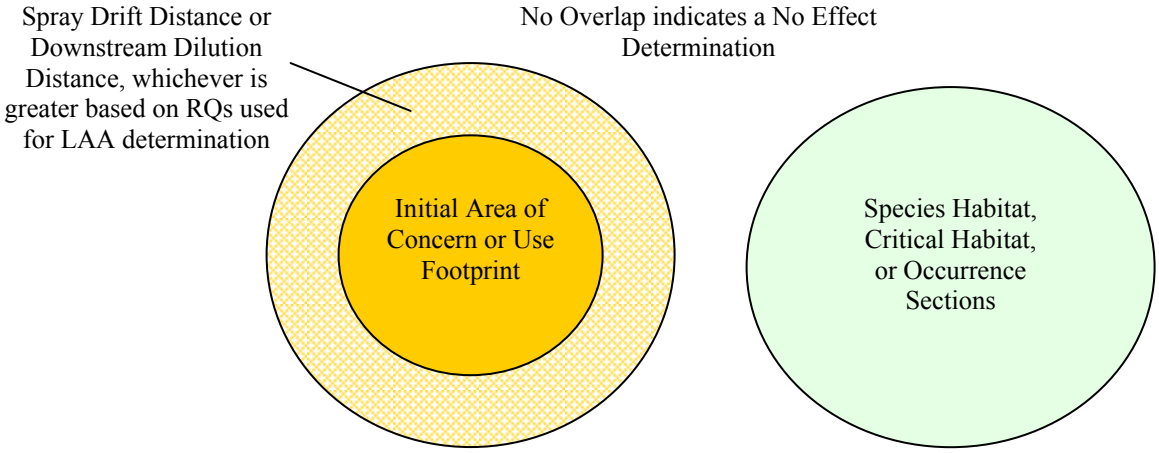

Figure 4 Conceptual diagram depicting no overlap of the area of potential LAA effect and the habitat, occurrence sections, or critical habitat of a species. If there is no overlap, a No Effect determination is made for the species.

The identified direct and/or indirect effects are anticipated to occur only for those currently occupied core areas, occurrence sections, and areas of designated critical habitat for the SFB that are located 2,051 to 2,067 ft for ground spray applications from legal use sites where mancozeb is applied for cultivated (Shallot) land uses and 3,494 to 3,615 ft for ground spray applications to turf land uses. Downstream extent analysis shows that 90,467 km is the furthest distance downstream from the initial area of concern, or largest area of potential LAA effects, that could have LOC exceedances. The downstream dilution distance is representative of the maximum continuous downstream dilution from the edge of the initial area of concern where direct/indirect effects and/or critical habitat modification may occur. The distance reflects the largest distance whether from potential for direct or indirect effects. It is possible that areas of potential indirect effects could have a larger area than areas of direct effects. Lotic (*i.e.*, flowing) water bodies within the downstream extent distance that overlap with the SFB habitat potentially contain concentrations of mancozeb sufficient to result in LAA determination and/or modification of critical habitat.

The geographic distribution and locations of the SFB species are based on three sources of data: critical habitat, occurrence sections obtained from USFWS and from *Center for Biological Diversity (CBD) vs. EPA et al*. (Case No. 07-2794-JCS), and distribution largely from Recovery Plans. Figure 2 represents the range for the California Tiger Salamander.

The overlap of land cover corresponding to mancozeb use patterns that result in an LAA determination and the California Tiger Salamander distribution and/or designated critical habitat for the entire state of California is shown in Figure 5. The overlap map(s) provide/s a depiction of land cover that corresponds to mancozeb use patterns, overlapped with the species‘ range and/or critical habitat. It does not show the spray drift distance or the downstream dilution distance *e.g.*, areas in addition to the initial area of concern where LAA direct or indirect effects may occur. The actual area of overlap is greater when off-site transport via spray drift is included for each land cover type. The buffers may be different for each land cover type due to varying application rates and/or methods for different use patterns. The actual area of overlap would also be greater if the downstream dilution distance were shown on the map. Further analysis of the extent of drift for each land cover type and the overlap with habitat can be included as part of the consultation process, if needed.

CTS Habitat Area Overlap with Use Patterns

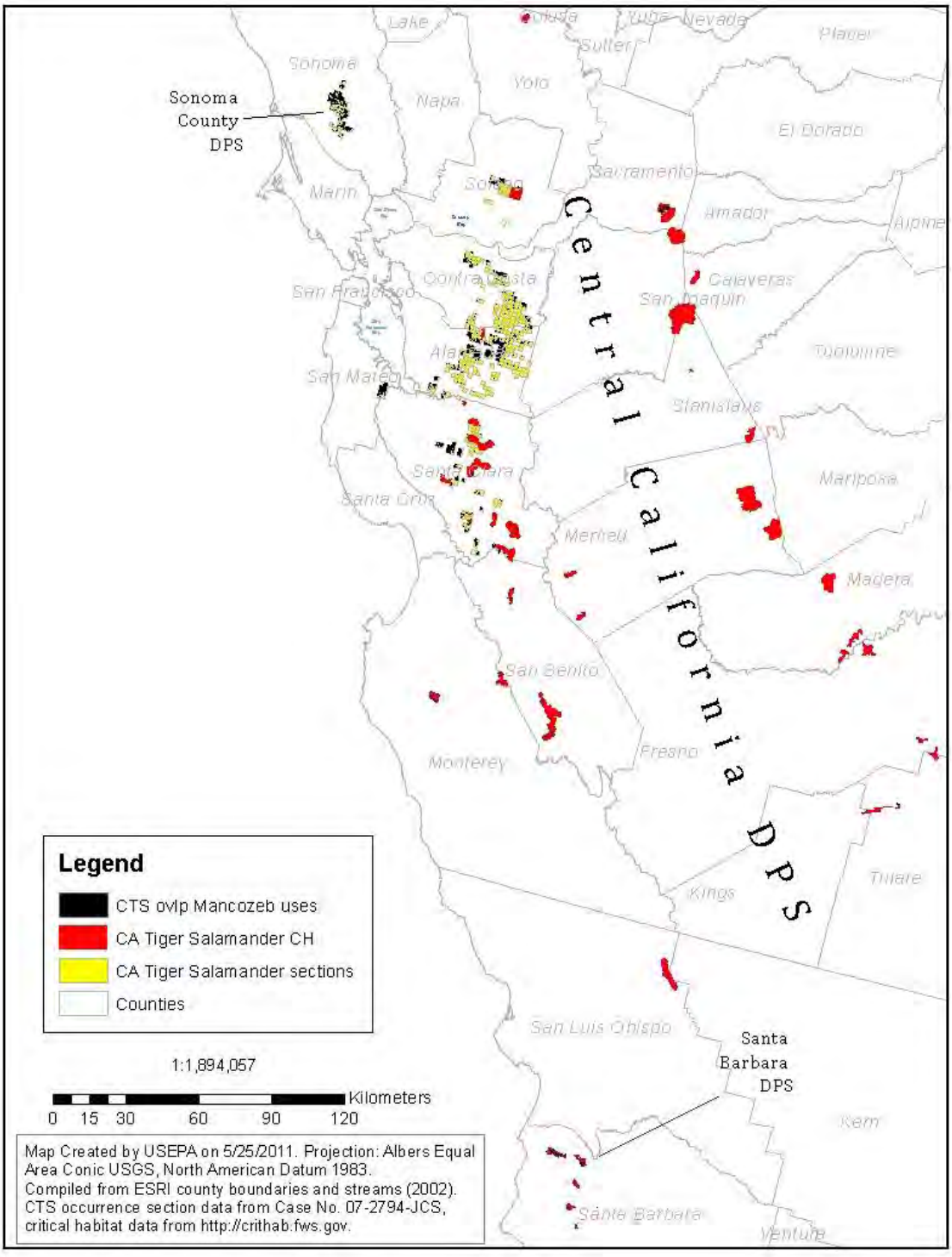

Figure 5 Map showing the overlap of CTS critical habitat and occurrence sections with any of cultivated, orchards/vineyards, and forestry (evergreen) land cover classes.

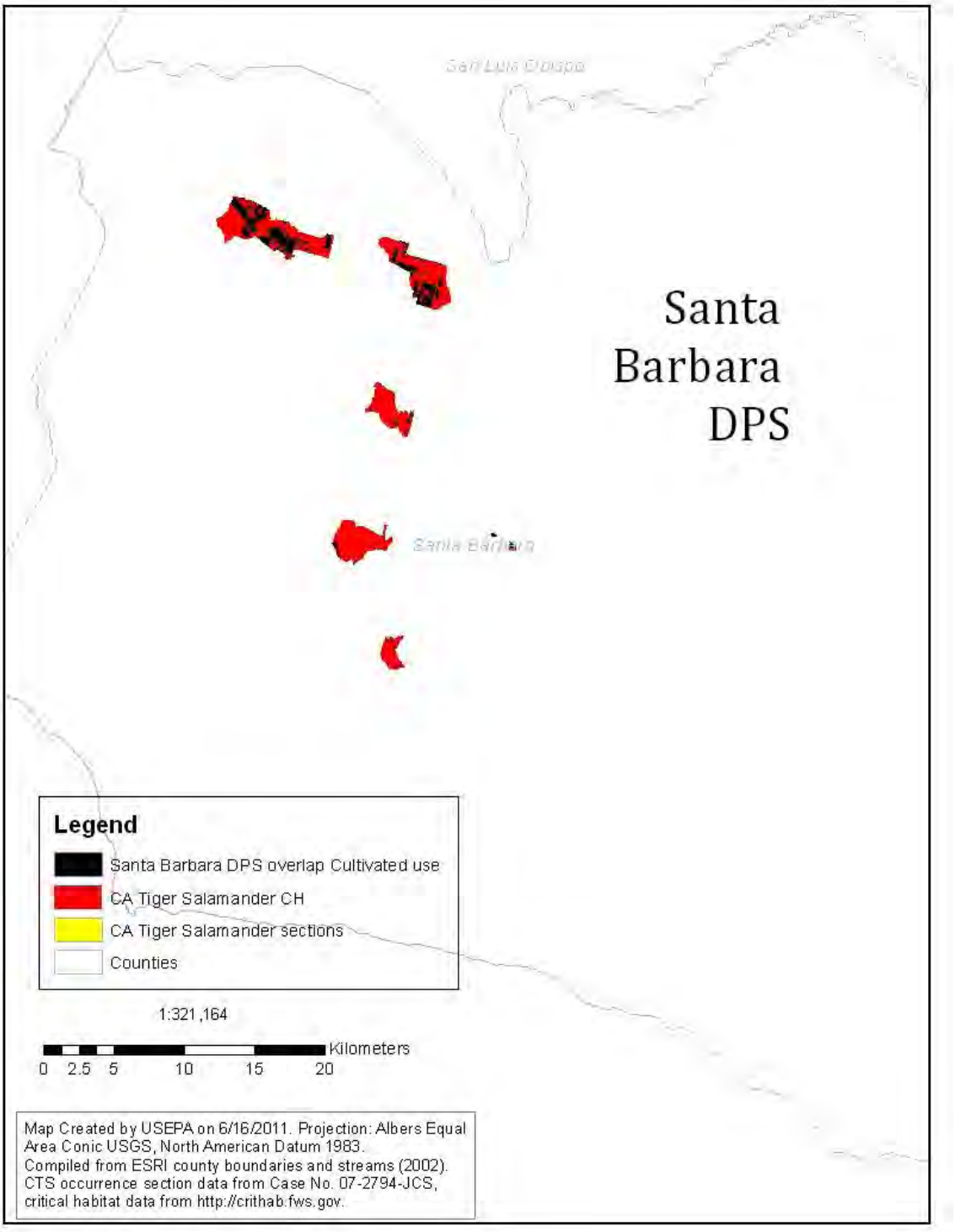

Fig 6 Map showing the overlap of CTS critical habitat and occurrence sections with the cultivated land cover class.

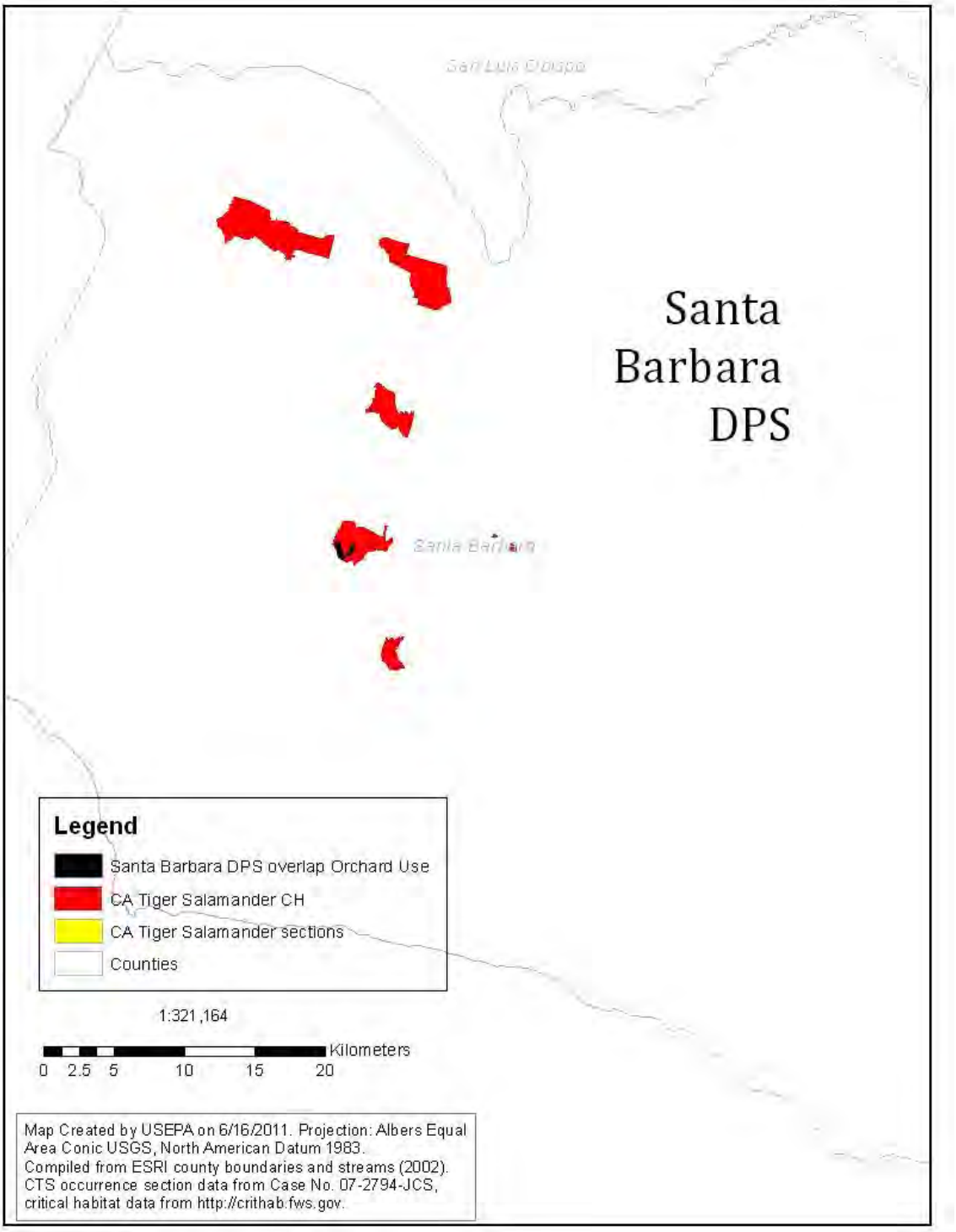

Fig 7 Map showing the overlap of CTS critical habitat and occurrence sections with the orchard land cover class.

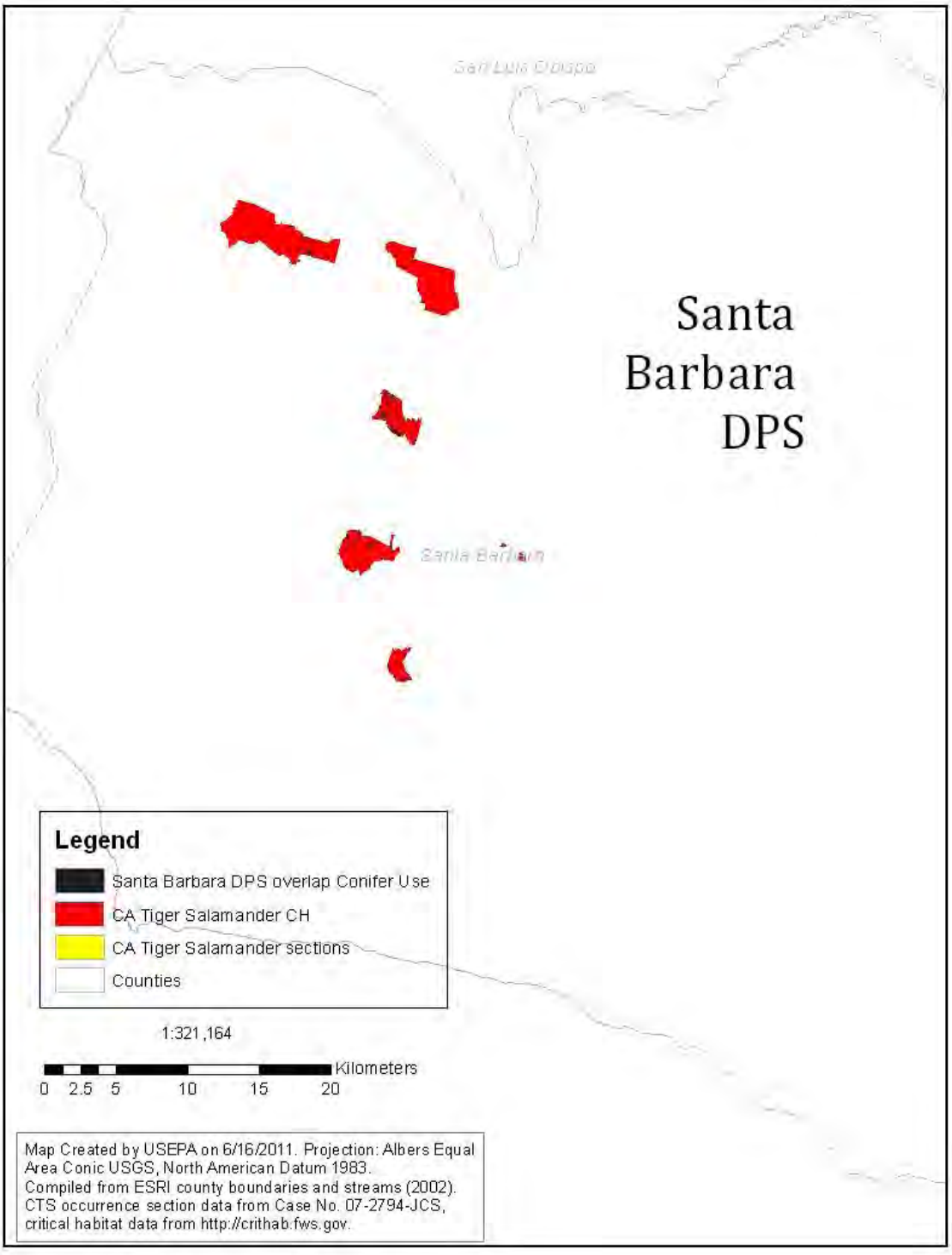

Fig 8 Map showing the overlap of CTS critical habitat and occurrence sections with the conifer land cover class.

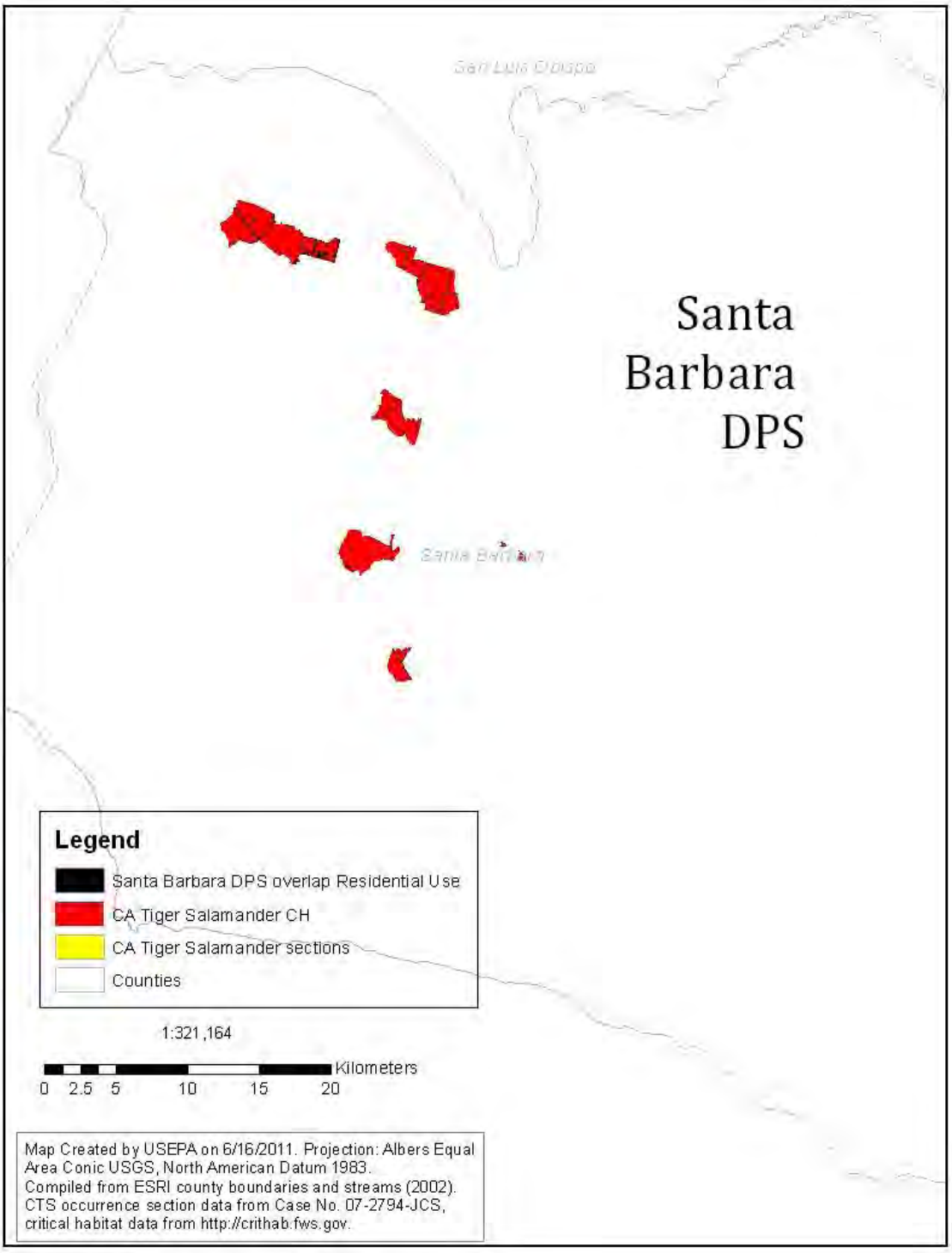

Fig 9 Map showing the overlap of CTS critical habitat and occurrence sections with the residential land cover class.

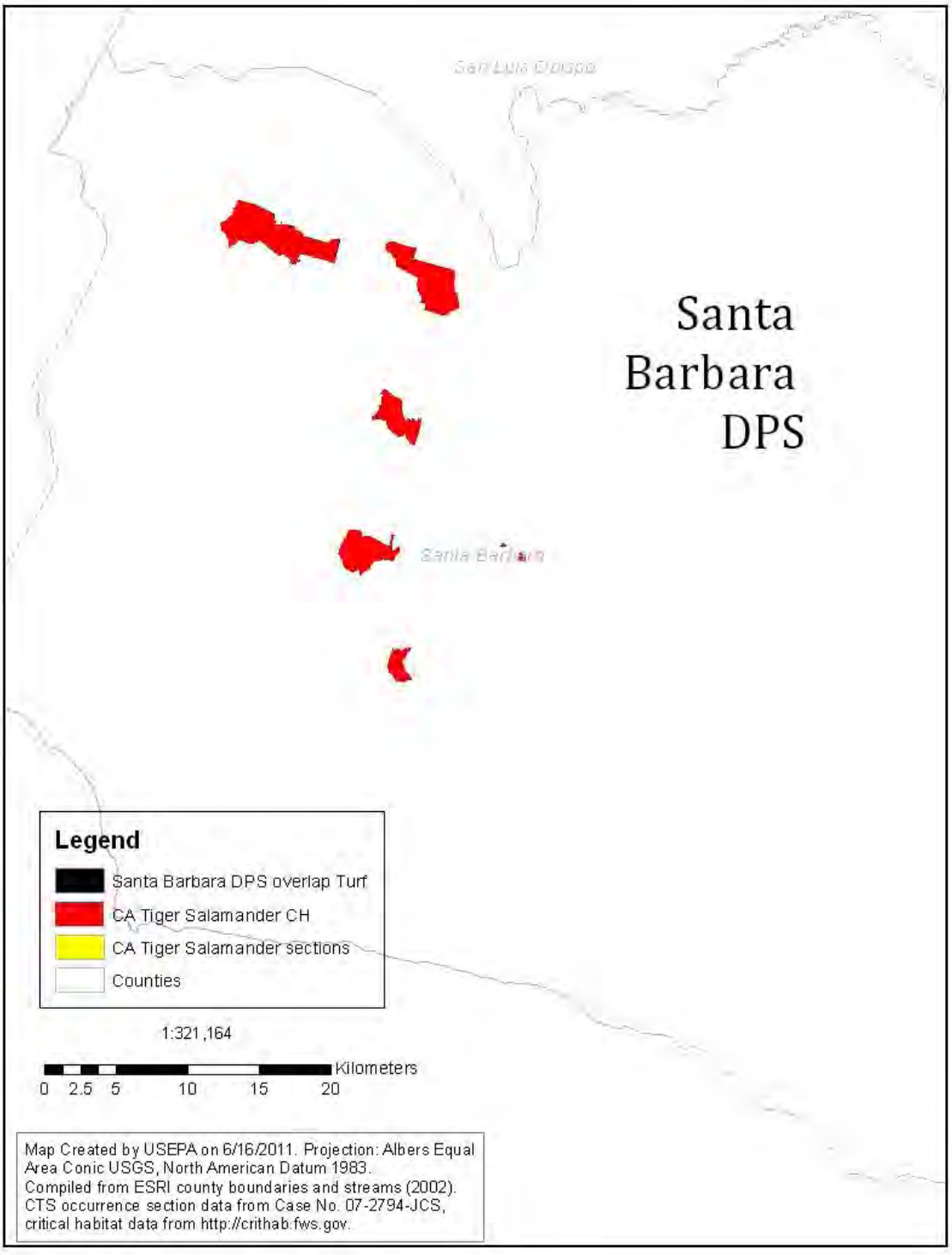

Fig 10 Map showing the overlap of CTS critical habitat and occurrence sections with the turf land cover class.

A. Spray Drift Area

The AgDRIFT spray drift model is used to determine the distance from the initial area of concern where no direct or indirect effects are expected to occur. Water bodies representing potential habitat areas are not excluded from risk to receiving spray drift.

B. Downstream Dilution

The downstream dilution approach is used to determine the downstream extent of exposure in flowing streams and rivers where direct/indirect effects and/or habitat modification may occur. The downstream component, combined with the initial area of concern, define the downstream dilution area. The downstream extent includes the area where predicted levels of exposure could potentially exceed the highest RQ (risk quotient) to LOC ratio. The approach calculates two values, the dilution factor (DF) and the threshold Percent Cropped Area (PCA). The dilution factor (DF) is the maximum RQ/LOC, and the threshold PCA is the inverse value represented as a percent.

As previously noted, the dilution approach uses the NHDPlus dataset for the downstream analysis. After the stream segments in the initial area of concern are identified, the dilution model traverses downstream from each stream segment. At each downstream node, the threshold PCA is compared to the aggregate cumulative PCA. If the cumulative PCA for that segment exceeds the threshold, the stream segment is included in the downstream extent. This continues traversing downstream until the cumulative PCA no longer exceeds the threshold.

The extent of downstream dilution is derived by identifying the stream segment that represents the maximum continuous length of stream miles downstream from the outer boundary of the initial area of concern.

In order to determine the downstream extent of the entire ―LAA" area, a conservative assumption is made that all streams exiting the boundary of the initial area of concern are the same length as the identified longest stream reach and extend the maximum distance. For example, if the analysis indicates that 100 streams exiting the initial area of concern have concentrations above the LOC and the average length of these streams is 200 feet but the maximum length for any one stream is 1,000 feet; the analysis will conservatively assume that all streams exiting the initial area of concern have concentrations above the LOC for 1,000 feet downstream. It is likely, however, that this conservative assumption will result in an overestimation of stream reaches that are identified as ―LAA". Although the maximum continuous downstream distance is reported, the overlap of potentially impacted stream reaches with species habitat is not depicted. However, shapefiles of the downstream analysis are available for further consideration as part of the consultation process, if needed.

IV. A Note on Limitations and Constraints of Tabular and Geospatial Sources

The geographic data sets used in this analysis are limited with respect to their accuracy and timeliness. The National Land Cover Data Set (Homer 2004) represents the most current and comprehensive collection of national land use and land cover information for the United States and represents land cover data obtained between 1994-1998. Three additional data sets were used as land cover types to depict use categories not available in the NLCD dataset. These supplemental data include orchard and vineyard land cover data from the California Gap Analysis Project data (Davis 1998), rights-of-way data derived from road and pipeline data from Teleatlas (2007) and the turf layer derived from NLCD developed class with corrections applied.

Hydrographic data are from the NHDPlus data set (http://www.horizon-systems.com/nhdplus/) and the generalized streams and rivers layer from ESRI. NHDPlus contains the most current and accurate nationwide representation of hydrologic data were also depicted in the maps. At a spatial scale of 1:100,000, the NHDPlus might omit the smallest streams and water bodies. In addition, in some isolated instances, there are errors in the data including missing or disconnected stream segments and incorrect assignment of flow direction.

OPP will continue to endeavor to identify and incorporate (as appropriate) additional land cover data sets for other land classes not captured in this assessment. In addition, as new updates to existing data occur, these will be evaluated and incorporated as appropriate.

References for GIS Maps

Center for Biological Diversity vs EPA Case No. 07-2794-JCS.

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EPA Environmental Fate and Effects Division, rights-of-way layer derived from road, rail and pipeline from TeleAtlas (2007) and US DoT (1999).

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Delta Smelt, CTS, Valley Elderberry Longhorn Beetle, Bay Checkerspot Butterfly, Alameda Whipsnake, Tidewater Goby

U.S. Fish and Wildlife Service (USFWS). *Critical habitat maps (Delta Smelt, Calif. Tiger Salamander, Valley Elderberry Longhorn Beetle, Bay Checkerspot Butterfly, Alameda Whipsnake, Tidewater Goby)*. Available online at http://criticalhabitat.fws.gov. (Accessed 24 September 2009).