Appendix H. Detailed analysis of final bromacil/bromacil lithium action area and overlap of action area with CRLF core areas and critical habitat

H.1. Currently registered uses of bromacil and bromacil lithium

Bromacil and bromacil lithium are currently registered for use on non-cropland areas, including (but not necessarily limited to) airports, parking lots, industrial areas, rights-of-way (for railroads, highways, pipeline and utilities), storage areas, lumberyards, tank farms, under asphalt and concrete pavement and fence rows. These chemicals can also be used in uncultivated portions of agricultural areas, including farmyards, fuel storage areas, fence rows and barrier strips. In addition, bromacil (but not bromacil lithium) is registered for use in citrus orchards and pineapple fields. Although labels allow applications of bromacil to pineapple, this crop is not grown in California and is therefore, not relevant to this assessment (USDA 2007). A comprehensive list of these uses included in **Table H1**. These uses are the basis for determining the initial action area for areas where bromacil and bromacil lithium can be directly applied.

Table H1. Bromacil and bromacil lithium uses.

Landcover Category	Use
Orchards/Vineyards	Citrus
Rights-of-way	Non-cropland (industrial areas, airports, rights-of-way (railroad, highways, utilities, pipelines), lumberyards, parking lots, sewage disposal areas, tank farms, storage areas, fence rows, bridge abutments, around buildings). Uses are generally prohibited in residential and recreational settings

H.2. Determination of area where bromacil and bromacil lithium are potentially directly applied (initial area of concern)

After determination of which uses will be assessed, an evaluation of the potential "footprint" of the use pattern is determined. This "footprint" represents the initial area of concern and is typically based on available land cover data. Local land cover data available for the state of California were analyzed to refine the understanding of potential bromacil and bromacil lithium use. The initial area of concern is defined as all land cover types that represent the labeled uses described above. The initial area of concern is represented by 1) orchard and vineyard landcovers which are assumed to be representative of citrus and 2) rights-of-way which are assumed to be representative of non-cropland areas.

Base mapping layers for determining the initial area of concern were obtained from the National Land-cover Dataset (NLCD 2001) for the majority of land use types and the California GAP data (6/98) for the orchards and vineyard uses. The NLCD is a recently released national land use dataset and the GAP is from the Biogeography Lab from UCLA-Santa Barbara. The rights-of-way landuse layer was derived from TeleAtlas (2006) for roads and rail, and the U.S. Department of Transportation's National Pipeline

Dataset (1999). These raster files were converted to vector and used in the analysis. **Table H.2** shows the land-cover sources used.

Table H2. Land cover data sources.

Land Cover Data Sources			
Layer name	**Base source**	**Description**	**non-NASS**
Cultivated Crops	NLCD	Grid code 82: Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, 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.	No
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.	Yes
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.	Yes
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.	Yes
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.	Yes
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.	Yes
Open Water	NLCD	Grid code 11: All areas of open water, generally with less than 25% cover of vegetation or soil.	Yes
Orchards and vineyards	CA GAP	Grid codes 11210, 11211 and 11212. This is the only CA GAP reference.	No
Pasture/Hay	NLCD	Grid codes 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.	No
Wetlands	NLCD	Grid codes 90, 95: Woody wetlands and emergent herbaceous.	Yes
Rights-of-Way	US DOT; TeleAtlas	A derived class, using road, rail, and pipeline coverages.	Yes
Turf	NLCD	A derived NLCD class based on developed classes and the impervious surface layer with corrections applied.	Yes

U.S. Department of Agriculture's National Agriculture Statistics Service (NASS) census dataset, 2002 was used to determine whether a crop was grown in a particular county. This census dataset provides survey information over five years on agricultural practices and is used mainly for cultivated or agriculture crops. Chemical labeled uses were matched to NASS uses; an agriculture use match would result in a mapped area for one or more counties. For uses that are not agricultural, the use is assumed to occur in every county where that particular land-cover occurs within California (*i.e.* a 'forestry' labeled use is assumed to potentially occur in all California counties where NLCD indicates there is forest land-cover).

In counties where a use has been identified, the use is associated with the appropriate landcover data set (**Table H.2**). It is assumed that this use is potentially grown in the area where the landcover has been identified. For example, almonds are grown in Kern County. According to CA GAP data, there are orchards or vineyards within Kern County. Therefore, it is assumed that oranges, which are grown in orchards, can be grown on any of the land specified by the CA GAP data as orchards or vineyards. This process is carried out for oranges in every county in California.

Uses of bromacil and bromacil lithium fall into two landcover categories: orchards/vineyards and non-cropland. Therefore, two separate action area maps are created for the different uses: 1) orchard crops, which is based on the orchard and vineyard layer from CA GAP and 2) non-cropland areas, which is based on the right-of-way layer from ????. Therefore, two separate action areas are defined for this assessment; one to represent citrus crops and one to represent non-cropland areas. For specific uses associated with these categories, see **Table H.1**. The initial citrus and non-cropland action areas are depicted in **Figures H.1-H.7**.

It should be noted that the initial action area map for non-cropland areas is defined only by rights-of-way, and does not include several other potential non-cropland uses of bromacil and bromacil lithium (e.g. parking lots, fence rows, tank farms, storage yards, etc.). The initial action area for non-cropland areas is actually larger than what is used in this definition of the non-cropland action area; however, spatial data are unavailable at this time to define the extent of these additional non-cropland areas where bromacil and bromacil lithium can be applied.

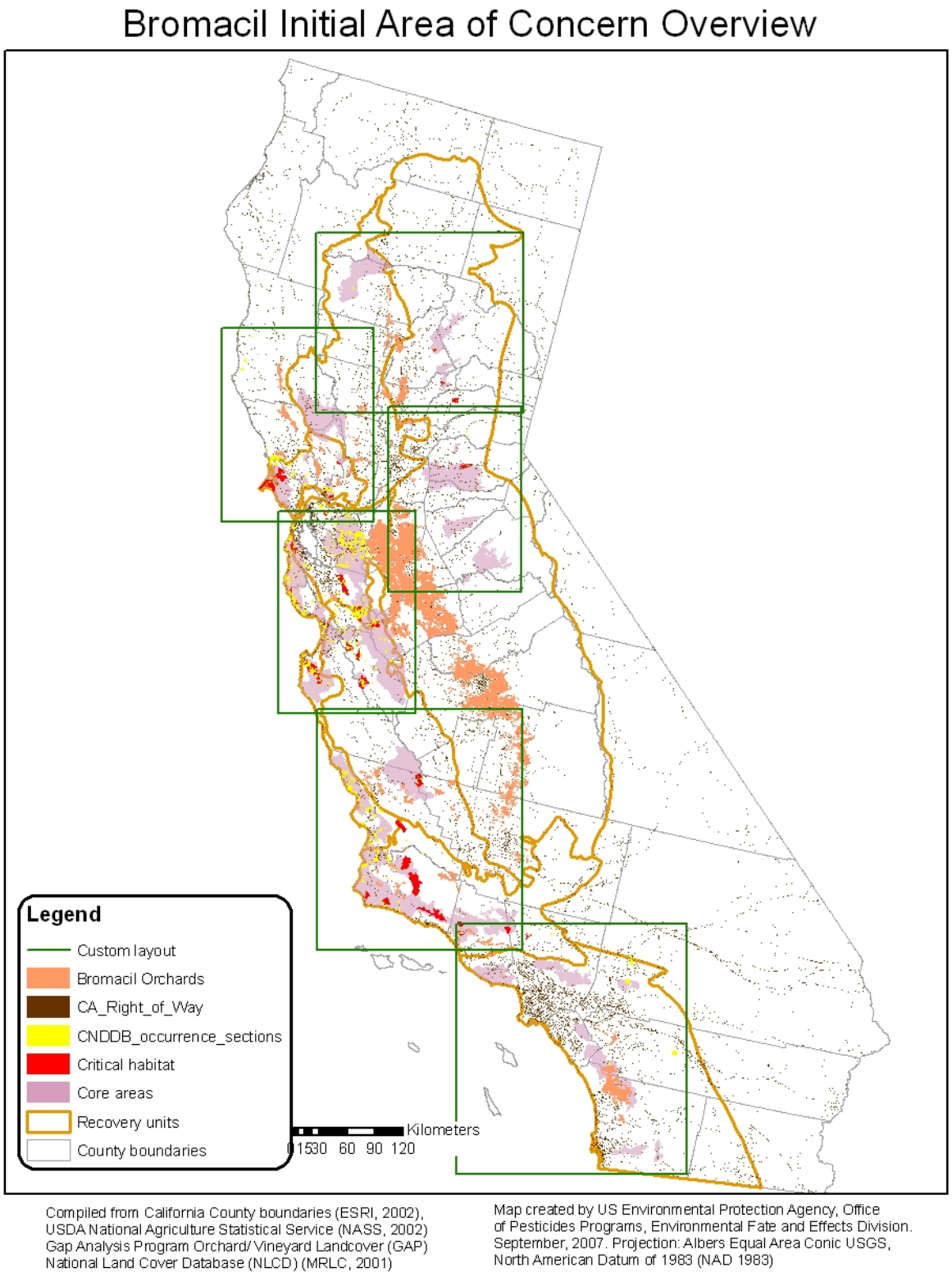

Figure H.1. Initial area of concern for bromacil and bromacil lithium uses on citrus and non-cropland areas (rights-of-way).

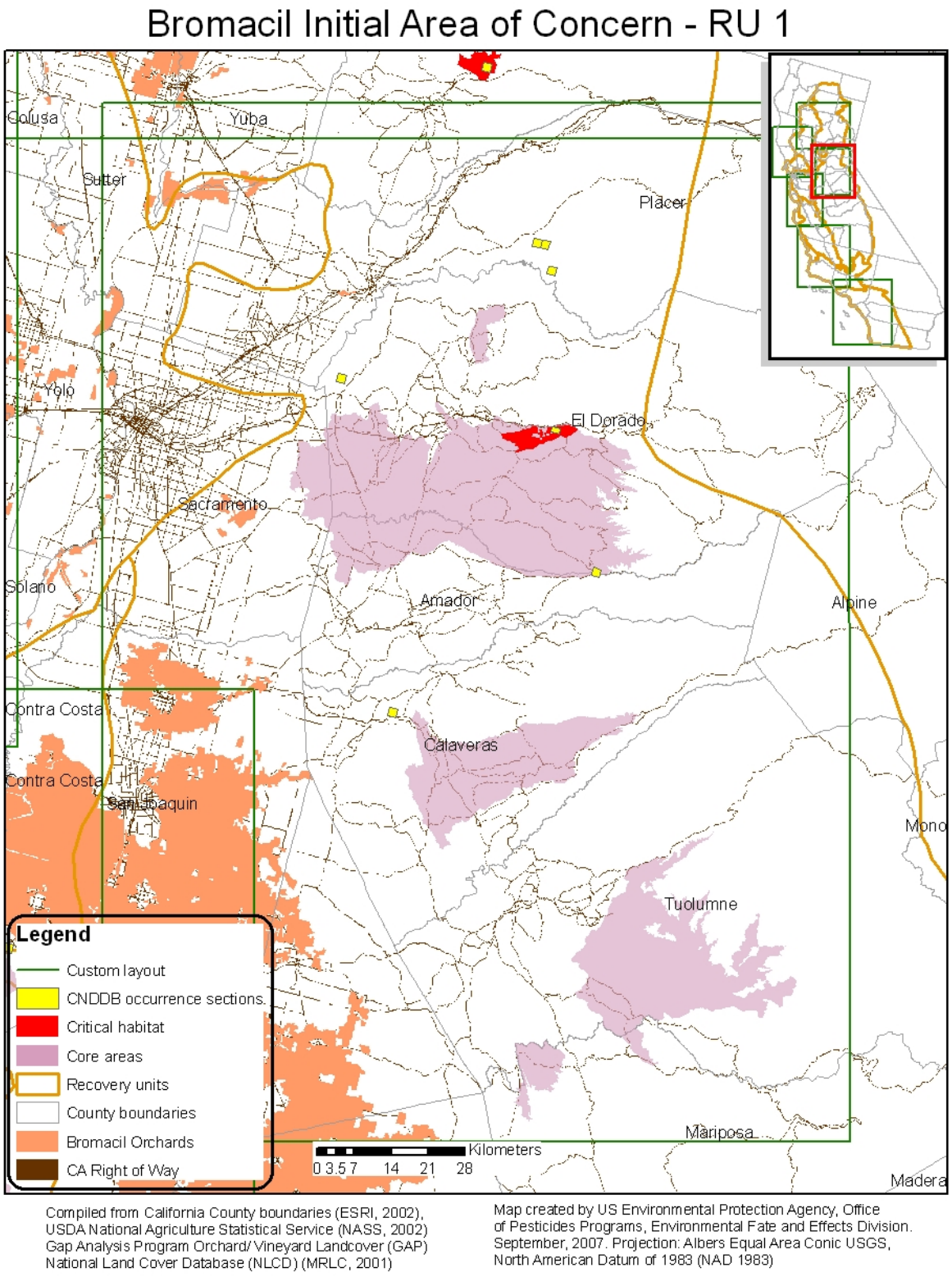

Figure H.2. Initial area of concern for bromacil and bromacil lithium uses on citrus and non-cropland areas (rights-of-way): enlarged view of recovery unit 1.

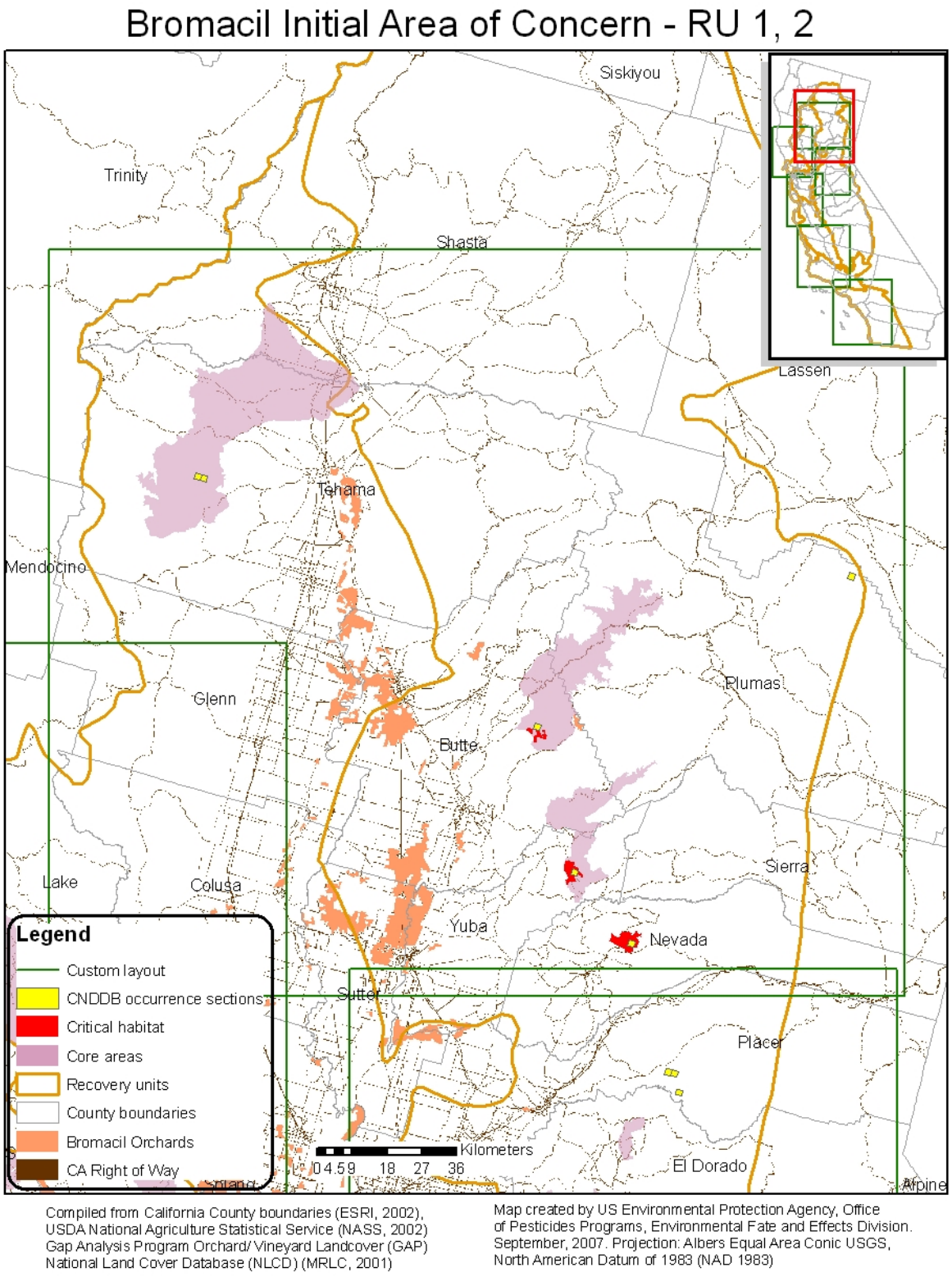

Figure H.3. Initial area of concern for bromacil and bromacil lithium uses on citrus and non-cropland areas (rights-of-way): enlarged view of recovery units 1 and 2.

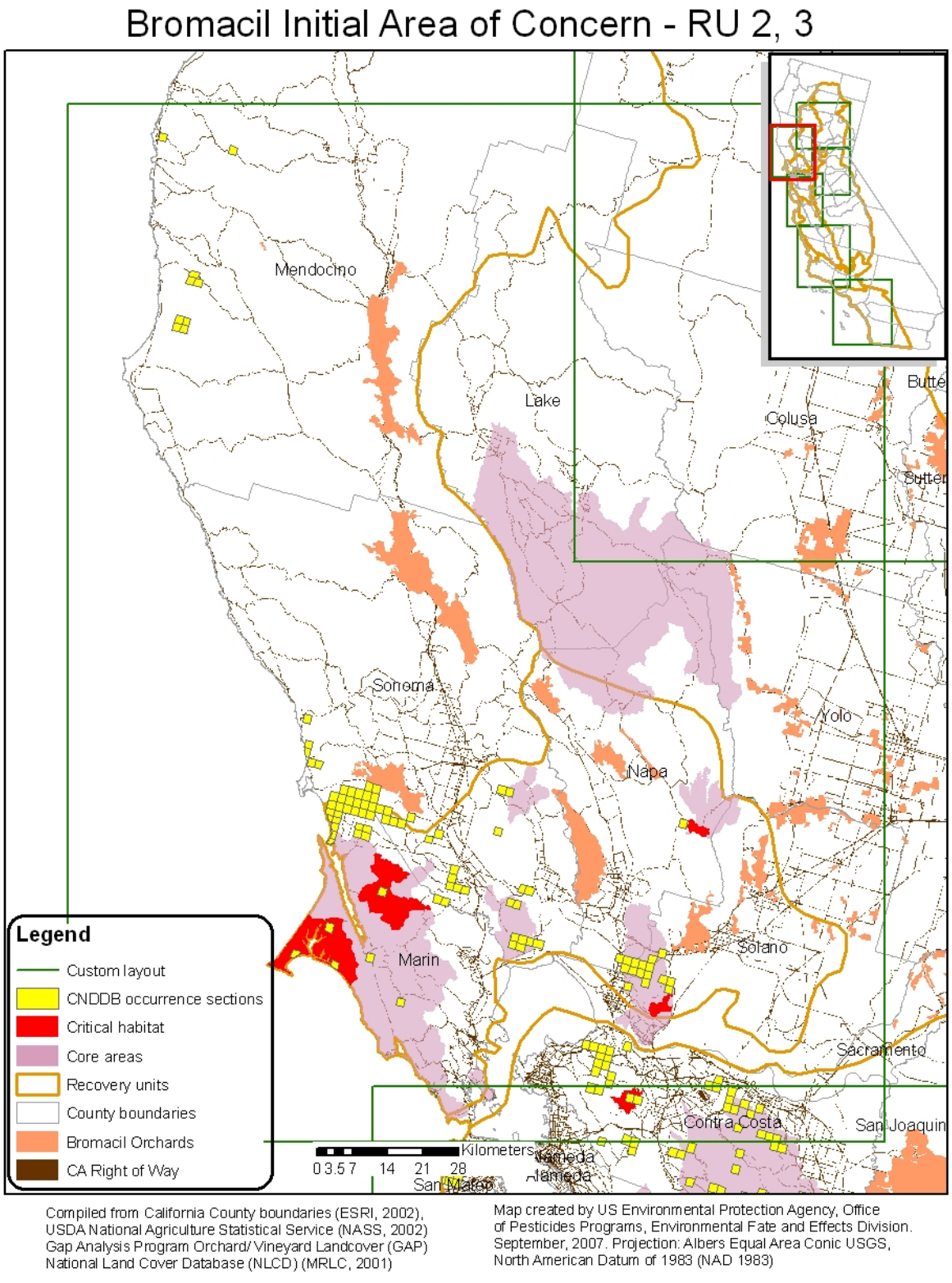

Figure H.4. Initial area of concern for bromacil and bromacil lithium uses on citrus and non-cropland areas (rights-of-way): enlarged view of recovery units 2 and 3

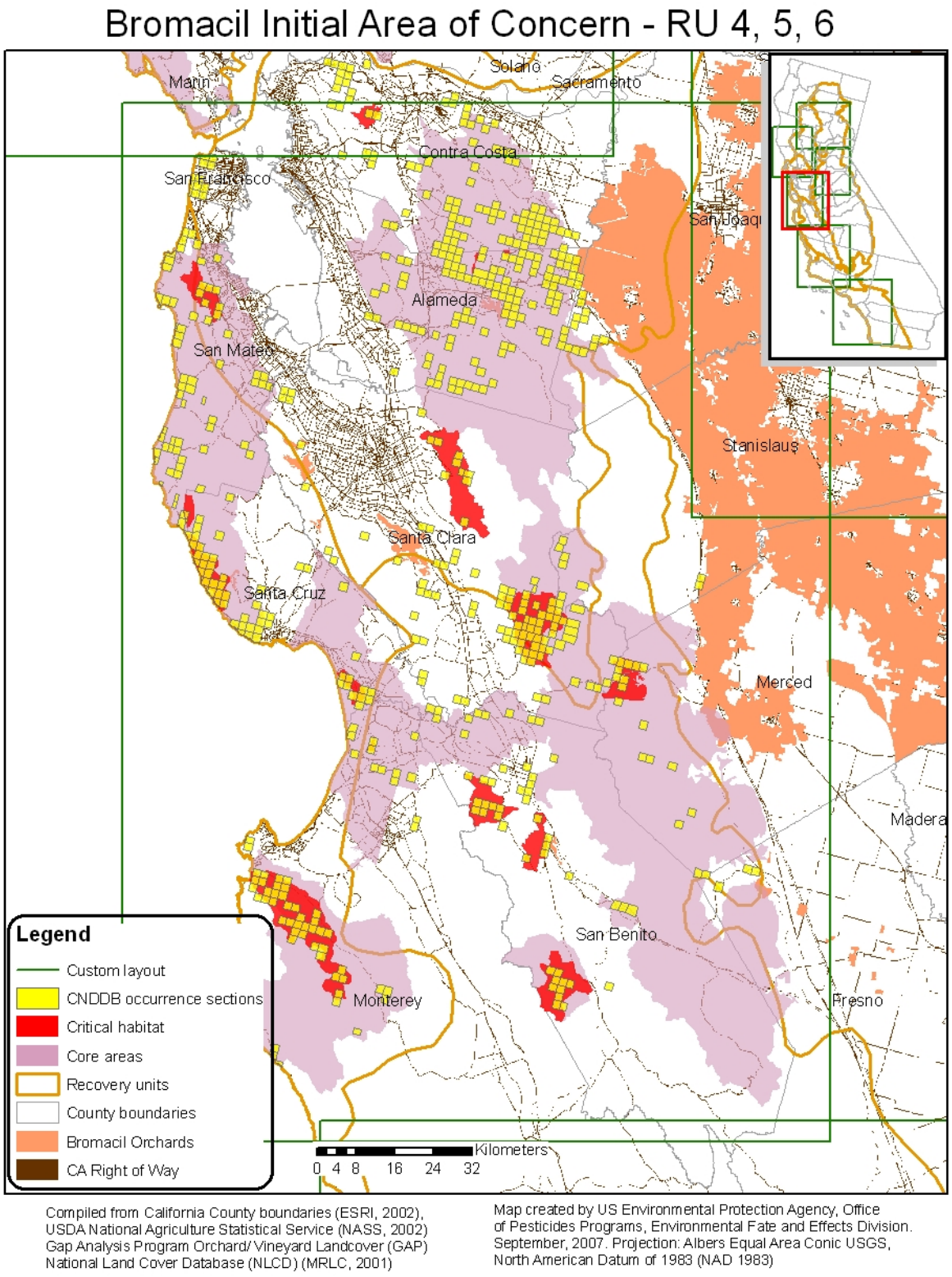

Figure H.5 Initial area of concern for bromacil and bromacil lithium uses on citrus and non-cropland areas (rights-of-way): enlarged view of recovery units 4-6.

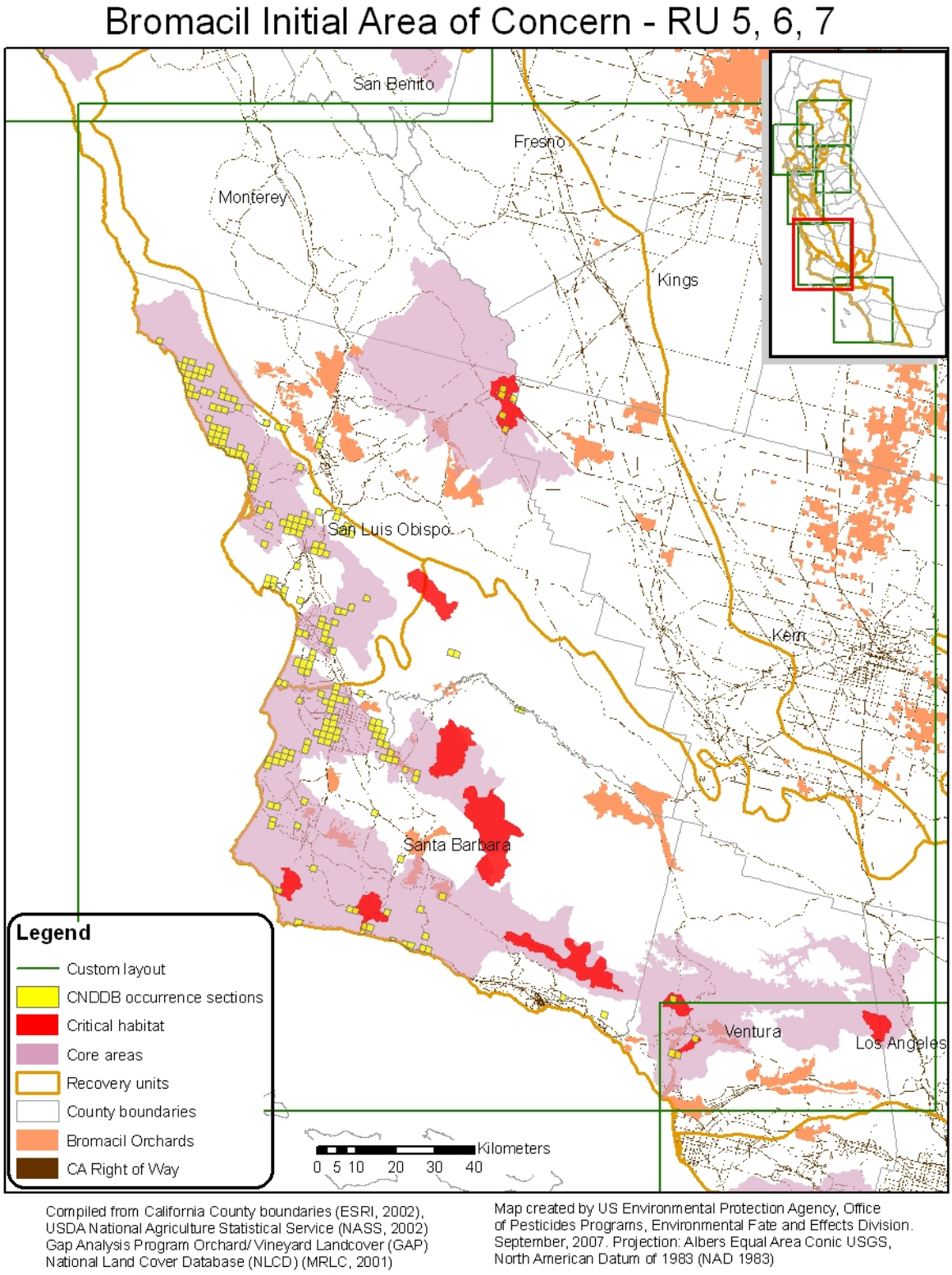

Figure H.6. Initial area of concern for bromacil and bromacil lithium uses on citrus and non-cropland areas (rights-of-way): enlarged view of recovery units 5-7.

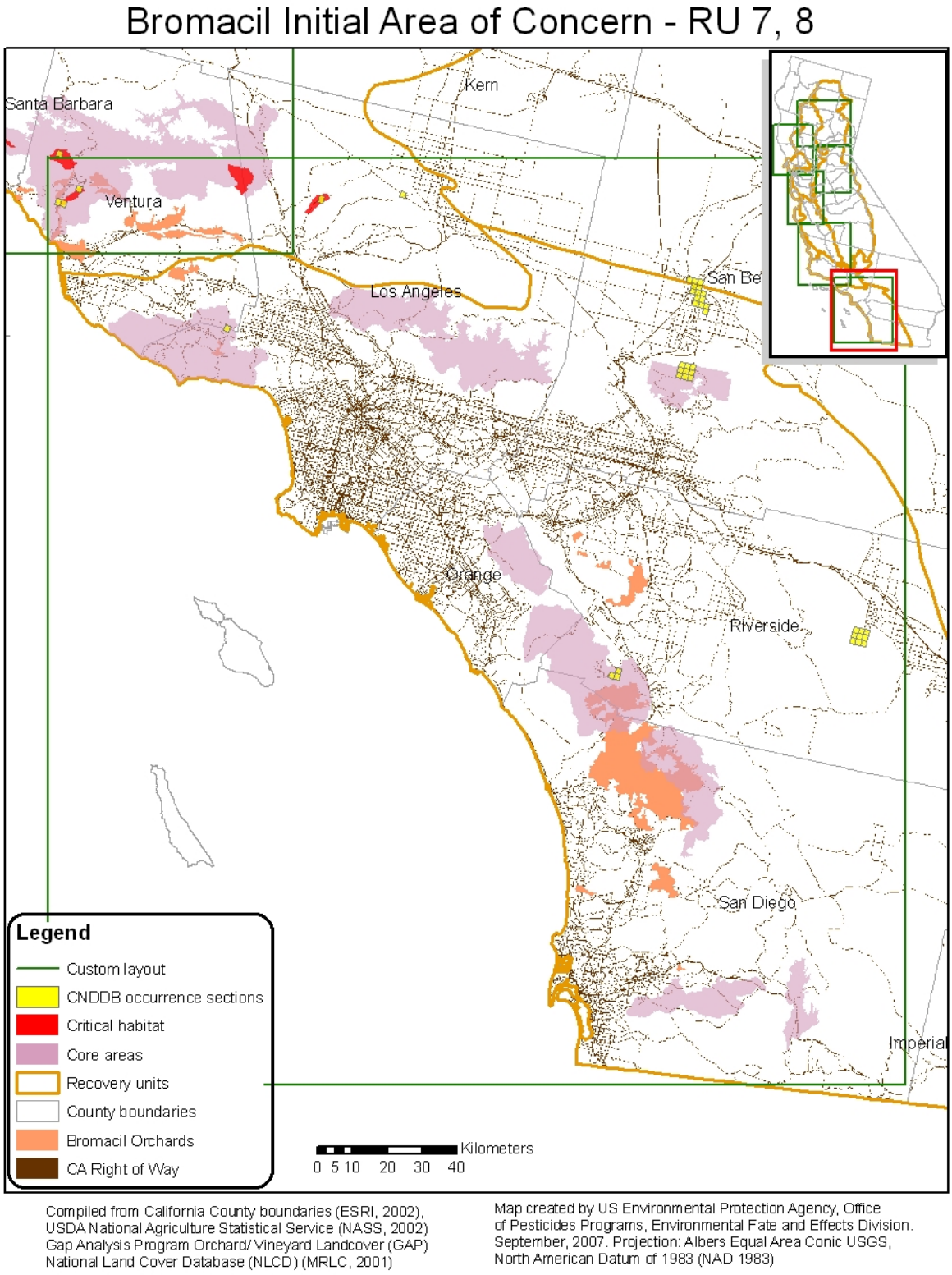

Figure H.7. Initial area of concern for bromacil and bromacil lithium uses on citrus and non-cropland areas (rights-of-way): enlarged view of recovery units 7 and 8.

H.3. Determination of area indirectly affected by bromacil and bromacil lithium use

Since this screening level risk assessment defines taxa that are predicted to be exposed through runoff and drift to bromacil at concentrations above the Agency's Levels of Concern (LOC), there is need to expand the action area to include areas that are affected indirectly by this federal action. Two methods are employed to define the areas indirectly affected by the federal action, and thus the total action area. These are the down stream dilution assessment for determining the extent of the affected lotic aquatic habitats (flowing) and the spray drift assessment for determining the extent of the affected terrestrial habitats. In order to define the final action areas relevant to uses of bromacil and bromacil lithium on citrus and non-cropland uses, it is necessary to combine areas directly affected, as well as aquatic and terrestrial habitats indirectly affected by the federal action. It is assumed that lentic aquatic habitats (e.g. ponds, pools, marshes) overlapping with the terrestrial areas are also indirectly affected by the federal action.

Lotic aquatic action area

The aquatic analysis uses a downstream dilution model to determine the downstream extent of exposure in streams and rivers. The downstream component, combined with the initial area of concern, define the aquatic action area. The downstream extent includes the area where the EEC could potentially be above levels that would exceed the most sensitive LOC. The model 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. The RQ/LOC ratios are: 51 for bromacil use on citrus, and 2127 for bromacil and bromacil lithium use on non-cropland areas.

The dilution model uses the NHDPlus data set (http://www.horizon-systems.com/nhdplus/) as the framework for the downstream analysis. The NHDPlus includes several pieces of information that can be used to analyze downstream effects. 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, an aggregated use class is created based on the classes listed in **Table H.2**. A cumulative PCA is calculated for each stream reach based on the aggregate use class (divided by the total upstream contribution area).

The dilution model traverses downstream from each stream segment within the initial area of concern. At each downstream node, the threshold PCA is compared to the aggregate cumulative PCA. If the cumulative PCA exceeds the threshold then the stream segment is included in the downstream extent. The model continues traversing downstream until the cumulative PCA no longer exceeds the threshold. The additional stream length by the downstream analysis is presented in **Table H.3** for citrus uses and **Table H.4** for rights-of-way uses. The down stream miles of concern for this assessment are depicted in **Figures H.8 and H.9** for citrus and non-cropland areas, respectively.

Table H3. Aquatic spatial summary results for citrus uses.

Measure	Total
Total California stream kilometers	332,962
Total stream kilometers in initial area of concern	17,283
Total stream kilometers added downstream	2019
Total stream kilometers in final action area	19,302

Table H4. Aquatic spatial summary results for rights-of-way uses

Measure	Total
Total California stream kilometers	332,962
Total stream kilometers in initial area of concern	87,867
Total stream kilometers added downstream	14,655
Total stream kilometers in final action area	102,522

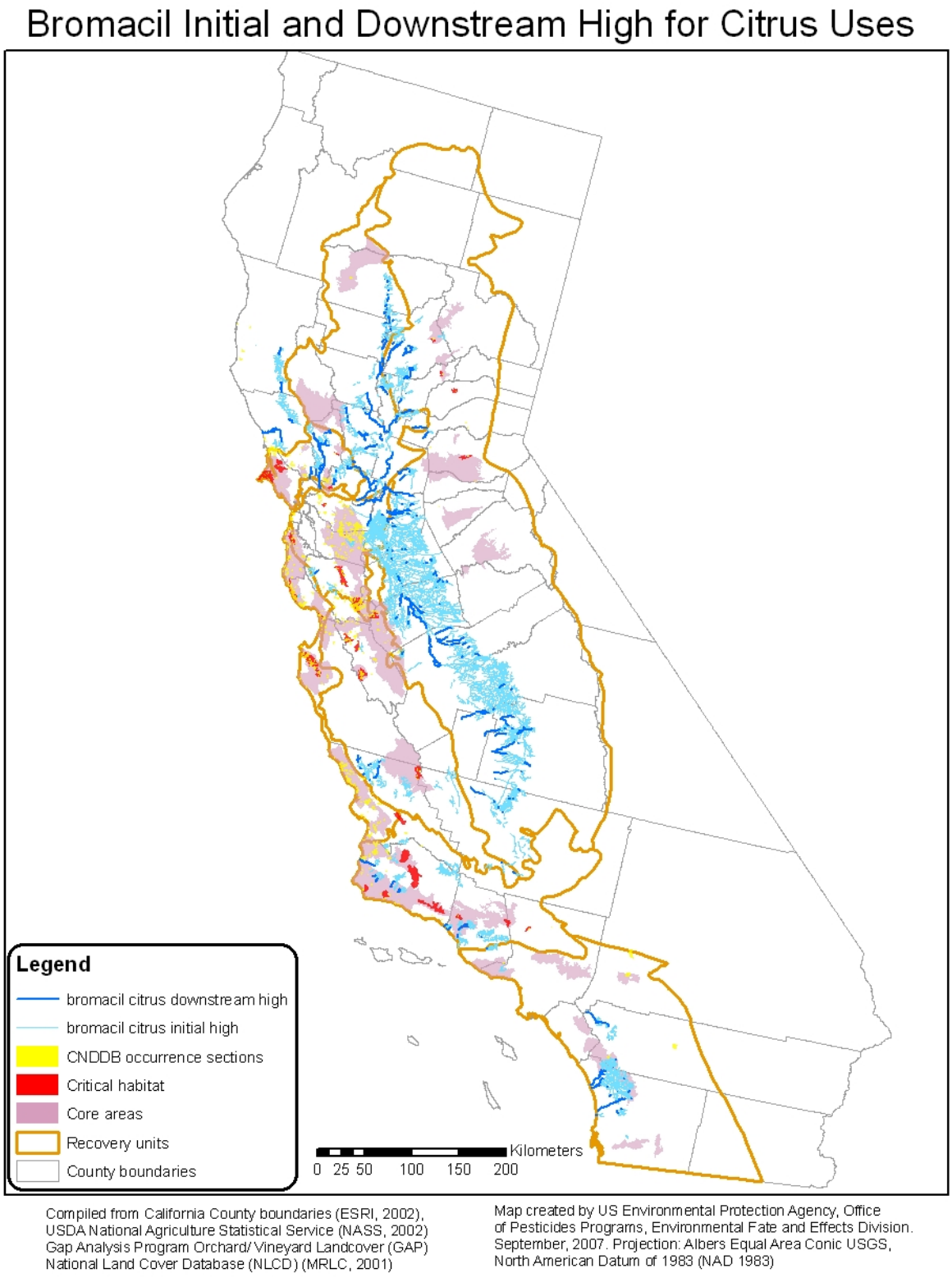

Figure H.8. Down stream miles of concern for potential area indirectly affected by bromacil applications to citrus.

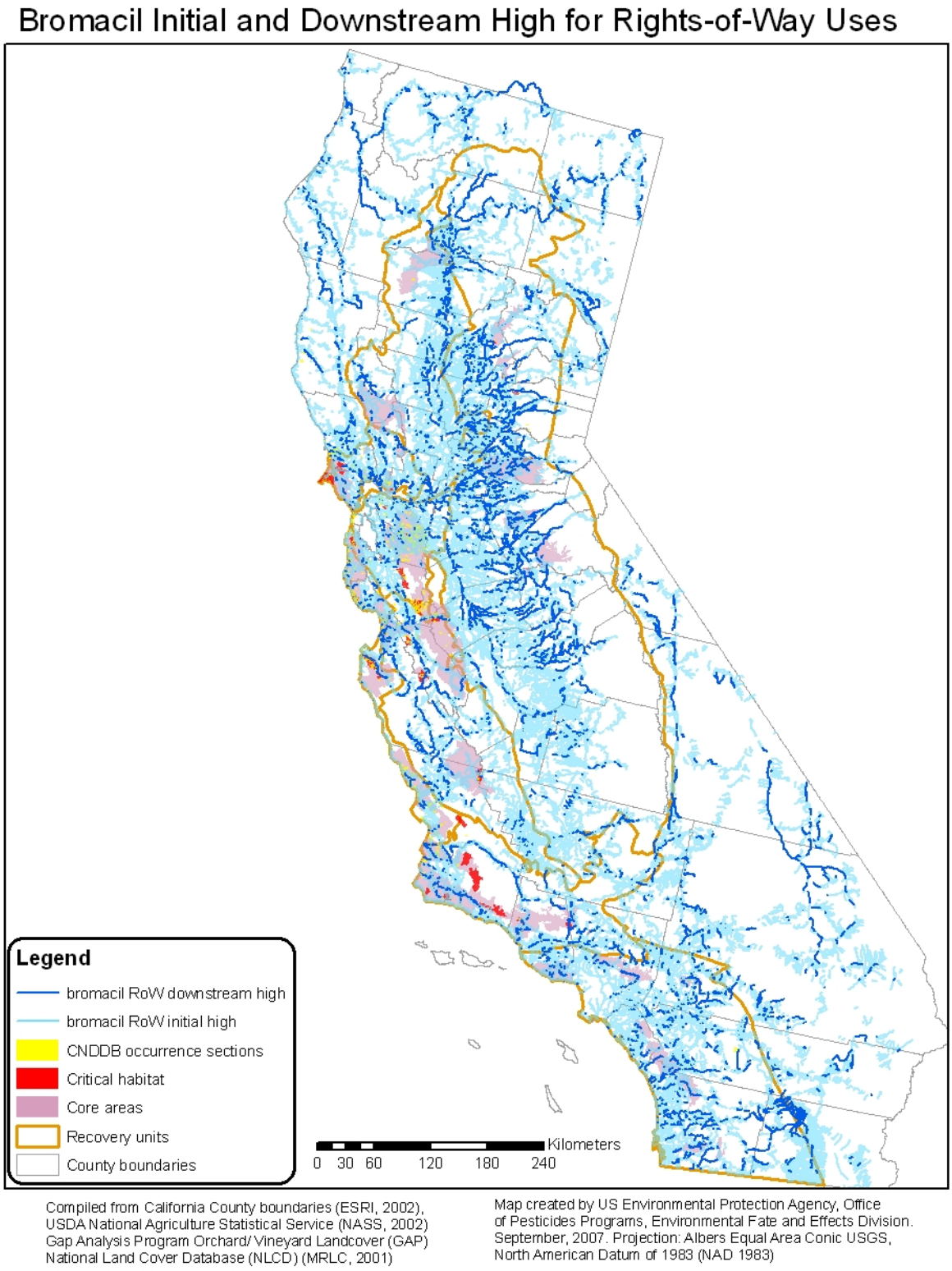

Figure H.9. Down stream miles of concern for potential area indirectly affected by bromacil and bromacil lithium applications to non-cropland areas.

Terrestrial and lentic aquatic action area

When considering the terrestrial habitats of the CRLF, spray drift from use sites onto non-target areas could potentially result in exposures of the CRLF, its prey and its habitat to bromacil. Therefore, it is necessary to estimate the distance from the application site where spray drift exposures do not result in LOC exceedances for organisms within the terrestrial habitat. To account for this, first, the bromacil application rate which does not result in an LOC exceedance is calculated for each terrestrial taxa of concern. The farthest distance where no LOC is exceeded applies to non-listed species of dicots (terrestrial plants). As mentioned above, the action area is determined based on risks to all listed species based on bromacil exposures resulting from applications of bromacil or bromacil lithium. Since effects thresholds for listed terrestrial plants are defined by the NOAEC of available seedling emergence and vegetative vigor data, the lowest NOAEC from terrestrial dicots (0.006 lbs a.i./A; MRID 44488307) is used to determine the farthest distance from the edge of the target area where there are no LOC exceedances for listed species. AgDISP was then used to determine the distance required to reach the NOAEC value. For bromacil use on citrus, this distance is 4167 feet. For bromacil and bromacil lithium use on non-cropland areas, this value is 5315 feet.

To understand the area indirectly affected by the federal action due to spray drift from application areas, the citrus and non-cropland landcovers are considered as potential application areas. These areas are "buffered" using ArcGIS 9.2. In this process, the original landcover is modified by expanding the border of each polygon representing a field out to a designated distance, which in this case, is the distance estimated where bromacil in spray drift does not exceed any LOCs. This effectively expands the action area relevant to terrestrial habitats so that it includes the area directly affected by the federal action, and the area indirectly affected by the federal action. The initial and final areas of concern related to the terrestrial and lentic aquatic action areas are depicted in **Tables H.5 and H.6**.

Table H5. Terrestrial spatial summary results by recovery unit for Orchard (citrus) uses.

Measure	**RU1**	**RU2**	**RU3**	**RU4**	**RU5**	**RU6**	**RU7**	**RU8**	**Total**
Initial Area of Concern (Orchards, no buffer)	9155	655	228	622	15	448	489	775	12,387
Action Area (Orchards with a 4167 ft buffer covering the respective Recovery Unit, in sq km).	14,842	2204	615	868	82	1209	1338	1428	22,586

Table H6. Terrestrial spatial summary results by recovery unit for Rights-of-Way uses.

Measure	RU1	RU2	RU3	RU4	RU5	RU6	RU7	RU8	Total
Initial Area of Concern (Rights-of-Way, no buffer)	2783	842	248	740	234	625	530	2446	8448
Action Area (Rights-of-Way with 1620 m buffer)	44244	12274	3226	5642	2943	10505	7785	21771	108,390

H.4. Determination of final action area for bromacil and bromacil lithium uses

In order to define the final action areas relevant to uses of bromacil and bromacil lithium on citrus and non-cropland areas, it is necessary to combine areas directly affected, as well as aquatic and terrestrial habitats indirectly affected by the federal action. This is done separately for citrus and non-cropland uses using ArcGIS 9.2. Landcovers representing areas directly affected by bromacil and bromacil lithium applications are overlapped with indirectly affected aquatic habitats (determined by down stream dilution modeling) and with indirectly affected terrestrial habitats (determined by spray drift modeling). It is assumed that lentic (standing water) aquatic habitats (*e.g*. ponds, pools, marshes) overlapping with the terrestrial areas are also indirectly affected by the federal action. The result is a final action area for bromacil uses on citrus (**Figure 10 of the assessment**) and a final action area for bromacil and bromacil lithium uses on non-cropland areas (**Figure 11 of the assessment**).

K.5. Determination of overlap between bromacil and bromacil lithium action area and CRLF habitat

There are three types of CRLF habitat areas considered in this assessment: Critical Habitat (CH); Core Areas; and California Natural Diversity Database (CNDDB) occurrence sections (EPA Region 9) (**Figure H.10**). Critical habitat areas were obtained from the U.S. Fish and Wildlife Service's (USFWS) final designation of critical habitat for the CRLF (USFWS 2006). Core areas were obtained from USFWS's Recovery Plan for the CRLF (USFWS 2002). The occurrence sections represent an EPA-derived subset of occurrences noted in the CNDDB. They are generalized by the Meridian Range and Township Section (MTRS) one square mile units so that individual habitat areas are obfuscated. As such, only occurrence section counts are provided and not the area potentially affected.

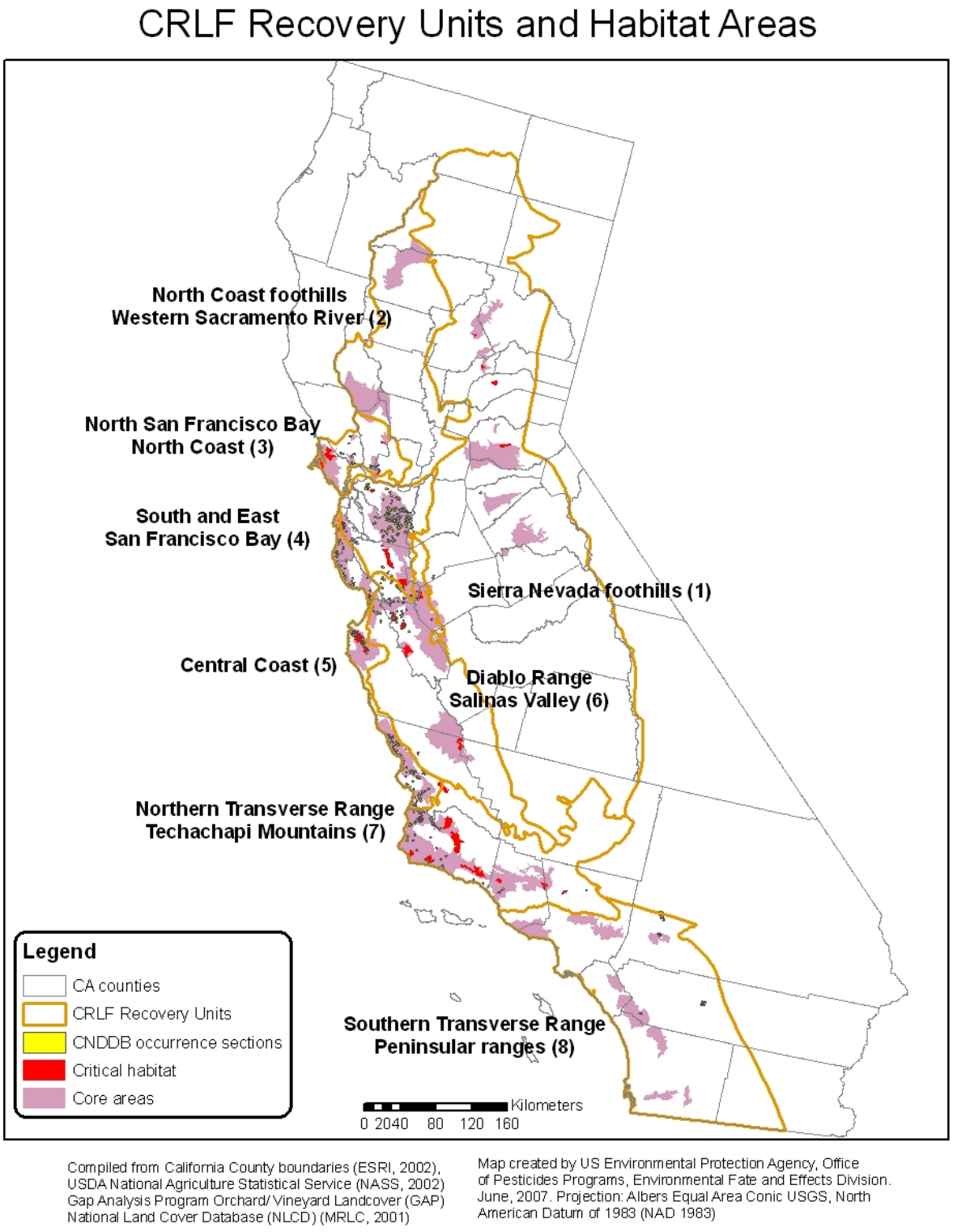

Figure H.10. Recovery units and areas relevant to the CRLF.

In order to confirm that uses of bromacil and bromacil have the potential to affect CRLF through direct applications to target areas and runoff and spray drift to non-target areas, it is necessary to determine whether or not the final action areas for citrus and non-cropland uses overlap with CRLF habitats. Spatial analysis using ArcGIS 9.2 indicates that lotic aquatic habitats within the CRLF core areas and critical habitats potentially contain concentrations of bromacil sufficient to result in RQ values that exceed LOCs. In addition, terrestrial habitats (and potentially lentic aquatic habitats) of the final action areas overlap with the core areas, critical habitat and available occurrence data for CRLF (**Tables H.7 and H.8**). Thus, uses of bromacil use on citrus and bromacil and bromacil lithium use on non-cropland areas could result in exposures of bromacil to CRLF in aquatic and terrestrial habitats.

Table H.7. Terrestrial overlap with CRLF areas by recovery unit for Orchard (citrus) uses.

Measure	**RU1**	**RU2**	**RU3**	**RU4**	**RU5**	**RU6**	**RU7**	**RU8**	**Total**
Established species range area (CH plus core in sq km)	3654	2742	1323	3279	3650	5306	4917	3326	28,197
Overlapping area (Orchards with 1270 m buffer covering habitat areas)	7	14	2	50	27	159	435	497	1191
Percent area affected	*0%*	*1%*	*0%*	*2%*	*1%*	*3%*	*9%*	*15%*	*4%*
Established occurrence sections (959 total; 30 outside recovery units)	13	3	70	324	276	120	90	33	929
# Occurrence sections affected	2	0	0	15	1	3	10	0	31

Table H.8. Terrestrial overlap with CRLF by recovery unit for Rights-of-Way uses.

Measure	**RU1**	**RU2**	**RU3**	**RU4**	**RU5**	**RU6**	**RU7**	**RU8**	**Total**
Established species range area (CH plus core in sq km)	3654	2742	1323	3279	3650	5306	4917	3326	28,197
Overlapping area (sq km)	1990	1220	768	1632	1661	1777	2069	1643	12,760
Percent area affected	*54%*	*44%*	*58%*	*50%*	*46%*	*33%*	*42%*	*49%*	*45%*
Established occurrence sections (959 total; 30 outside recovery units)	13	3	70	324	276	120	90	33	929
# Occurrence sections affected	6	1	45	191	174	63	73	21	574

A detailed analysis of the overlap of the Citrus and non-cropland area action areas with CRLF habitats is provided below:

Orchards

Use Area Overlap

1270 meter buffer

Recovery Unit 1 (3654 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Butte	7.2	0.2%
Total area for RU 1:	7	0.2%

Recovery Unit 2 (2742 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Yolo	13.9	0.5%
Total area for RU 2:	14	0.5%

Recovery Unit 3 (1320 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Solano	0.6	0.0%
Sonoma	1.1	0.1%
Total area for RU 3:	2	0.1%

Recovery Unit 4 (3278 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Alameda	48.7	1.5%
San Joaquin	0.8	0.0%
Total area for RU 4:	50	1.5%

Recovery Unit 5 (3647 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Santa Cruz	27.4	0.8%
Total area for RU 5:	27	0.8%

Recovery Unit 6 (5307 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Fresno	14.1	0.3%
Kern	0.5	0.0%
Merced	44.8	0.8%
San Benito	2.4	0.0%
San Luis Obispo	96.8	1.8%
Total area for RU 6:	159	3.0%

Recovery Unit 7 (4916 sq km habitat)

Use Area	Overlap Area/RU hab. %	
San Luis Obispo	2.2	0.0%
Santa Barbara	266.9	5.4%
Ventura	166.4	3.4%
Total area for RU 7:	435	8.9%

Recovery Unit 8 (3326 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Los Angeles	34.0	1.0%
Riverside	126.4	3.8%
San Diego	336.9	10.1%
Total area for RU 8:	497	14.9%

Rights-of-Way
1620 meter buffer

Recovery Unit 1 (3654 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Amador	184.4	5.0%
Butte	151.3	4.1%
Calaveras	343.4	9.4%
El Dorado	883.1	24.2%
Mariposa	56.2	1.5%
Nevada	17.0	0.5%
Plumas	125.6	3.4%
Sacramento	47.8	1.3%
Tuolumne	118.3	3.2%
Yuba	62.8	1.7%
Total area for RU 1:	1,990	54.5%

Recovery Unit 2 (2742 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Colusa	2.3	0.1%
Lake	528.0	19.3%
Marin	10.1	0.4%
Napa	110.4	4.0%
Shasta	138.1	5.0%
Solano	40.2	1.5%
Tehama	332.8	12.1%
Yolo	59.9	2.2%
Total area for RU 2:	1,222	44.6%

Recovery Unit 3 (1320 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Marin	474.5	35.9%
Napa	109.3	8.3%
Solano	89.3	6.8%
Sonoma	95.1	7.2%
Total area for RU 3:	768	58.2%

Recovery Unit 4 (3278 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Alameda	779.1	23.8%
Contra Costa	467.4	14.3%
San Joaquin	27.9	0.9%
San Mateo	269.0	8.2%
Santa Clara	89.0	2.7%
Total area for RU 4:	1,632	49.8%

Recovery Unit 5 (3647 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Monterey	289.2	7.9%
San Luis Obispo	608.5	16.7%
San Mateo	368.9	10.1%
Santa Clara	3.0	0.1%
Santa Cruz	391.0	10.7%
Total area for RU 5:	1,661	45.5%

Recovery Unit 6 (5307 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Fresno	38.6	0.7%
Kern	34.3	0.6%
Merced	160.3	3.0%
Monterey	440.9	8.3%
San Benito	591.1	11.1%
San Luis Obispo	415.1	7.8%
Santa Clara	43.1	0.8%
Santa Cruz	54.0	1.0%
Total area for RU 6:	1,777	33.5%

Recovery Unit 7 (4916 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Los Angeles	121.1	2.5%
San Luis Obispo	57.8	1.2%
Santa Barbara	1,526.7	31.1%
Ventura	362.9	7.4%
Total area for RU 7:	2,069	42.1%

Recovery Unit 8 (3326 sq km habitat)

	Use Area Overlap	Area/RU hab. %
Los Angeles	590.5	17.8%
Orange	122.1	3.7%
Riverside	202.7	6.1%
San Bernardino	123.9	3.7%
San Diego	486.0	14.6%
Ventura	117.7	3.5%
Total area for RU 8:	1,643	49.4%

Maps the overlap of CRLF core areas, critical habitat and occurrences and the total California action areas for citrus and non-cropland areas are depicted in **Figures H.11 and H.18**, respectively. Detailed maps of the intersection of the bromacil action area for citrus uses are depicted in **Figures H.12-17**. More detailed maps of the intersection of the bromacil and bromacil lithium action area for non-cropland uses are depicted in **Figures H.19-24**.

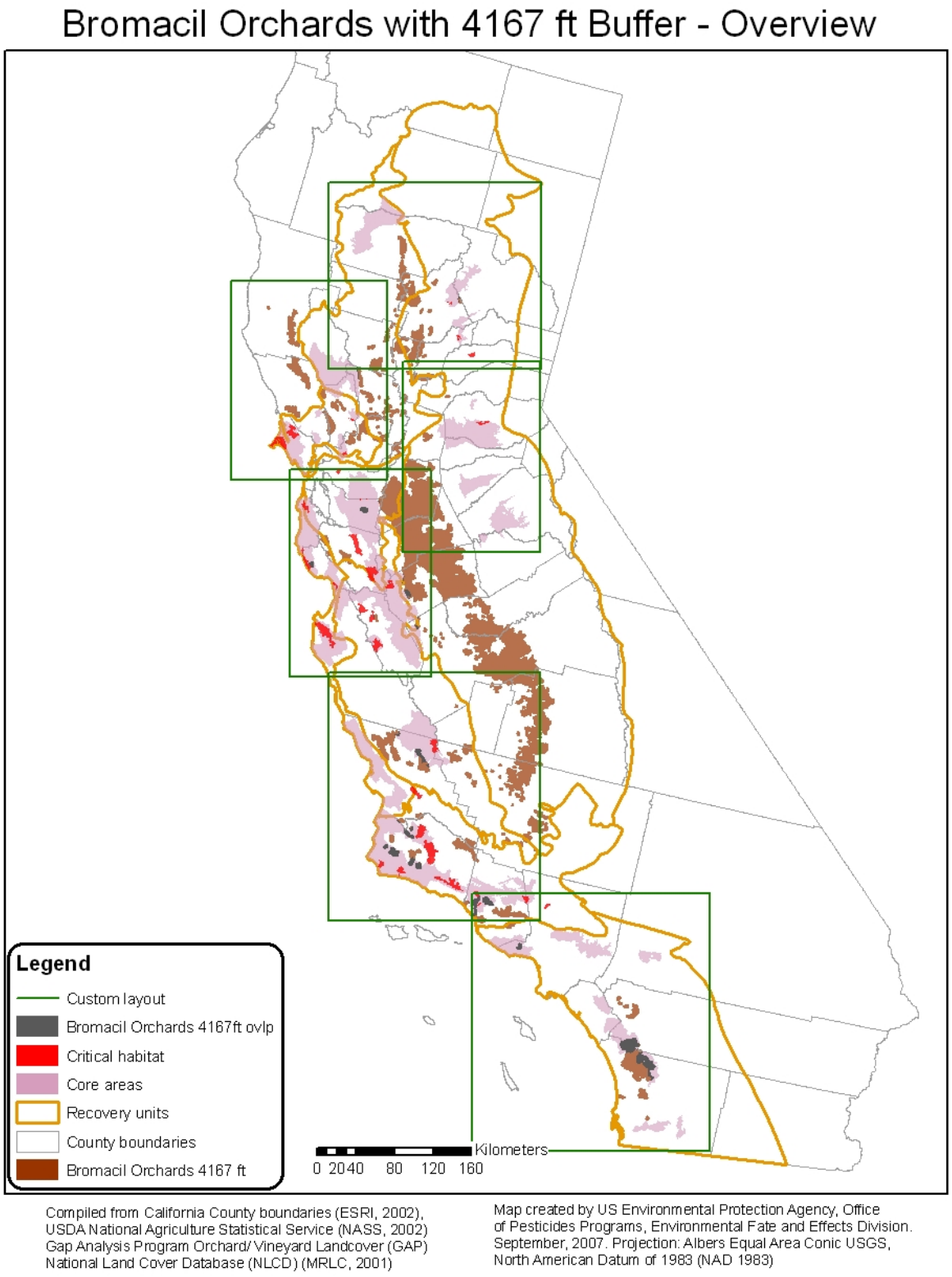

Figure H.11. Map of overlap between action area for citrus uses of bromacil and CRLF core areas and critical habitat.

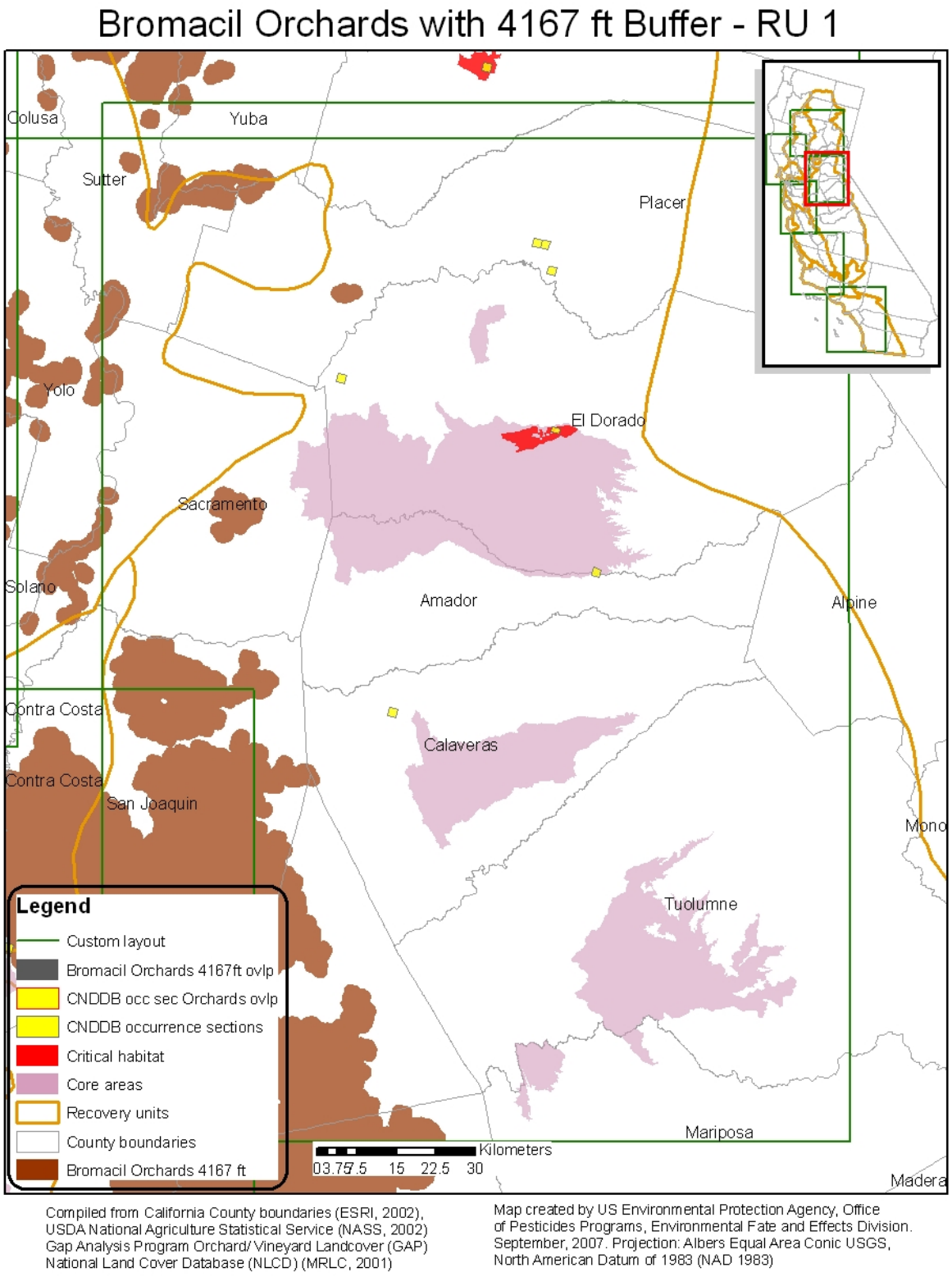

Figure H.12. Detailed map of overlap between action area for citrus uses of bromacil and CRLF core areas and critical habitat: enlarged view of recovery unit 1.

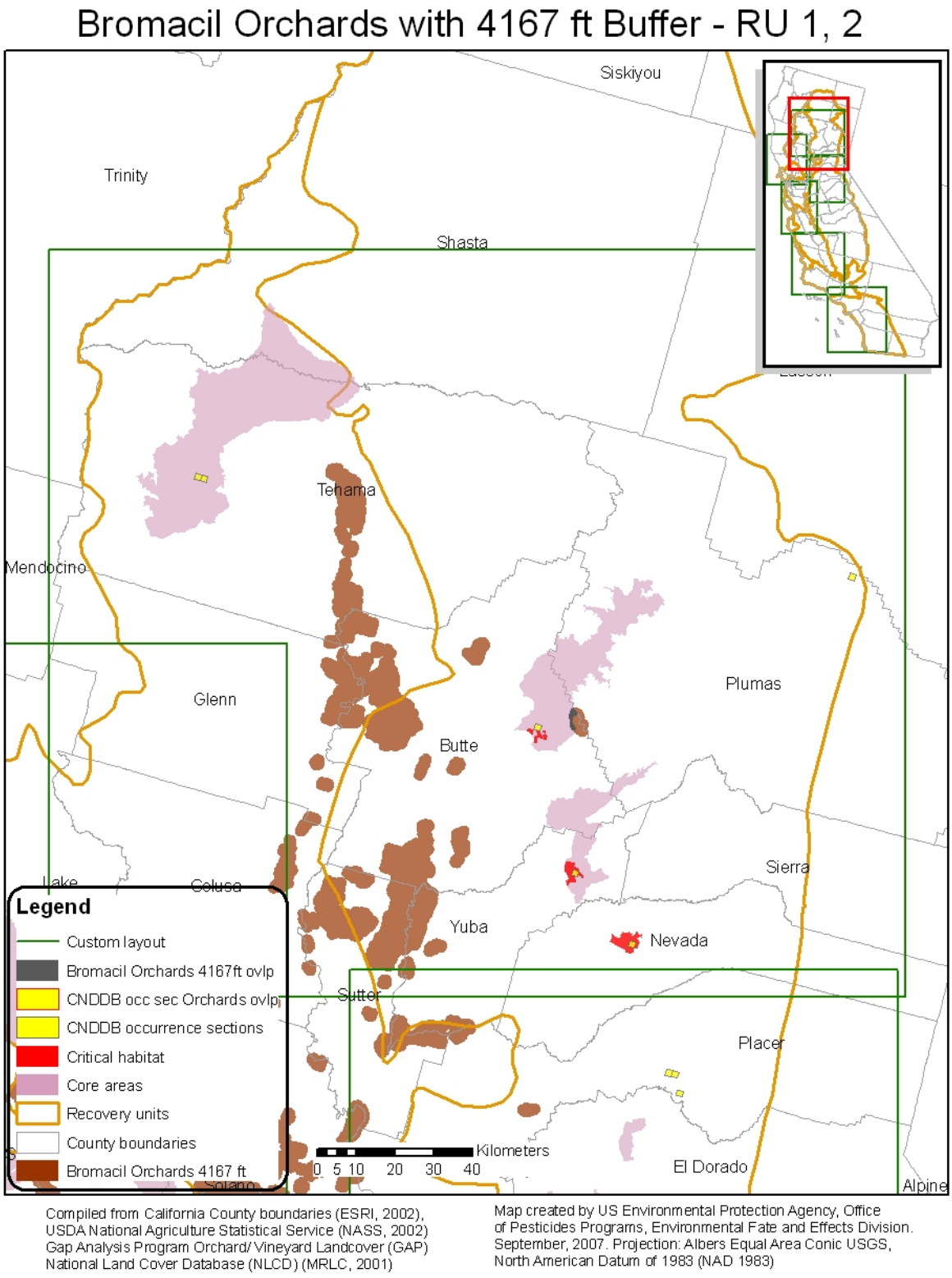

Figure H.13. Detailed map of overlap between action area for citrus uses of bromacil and CRLF core areas and critical habitat: enlarged view of recovery units 1 and 2.

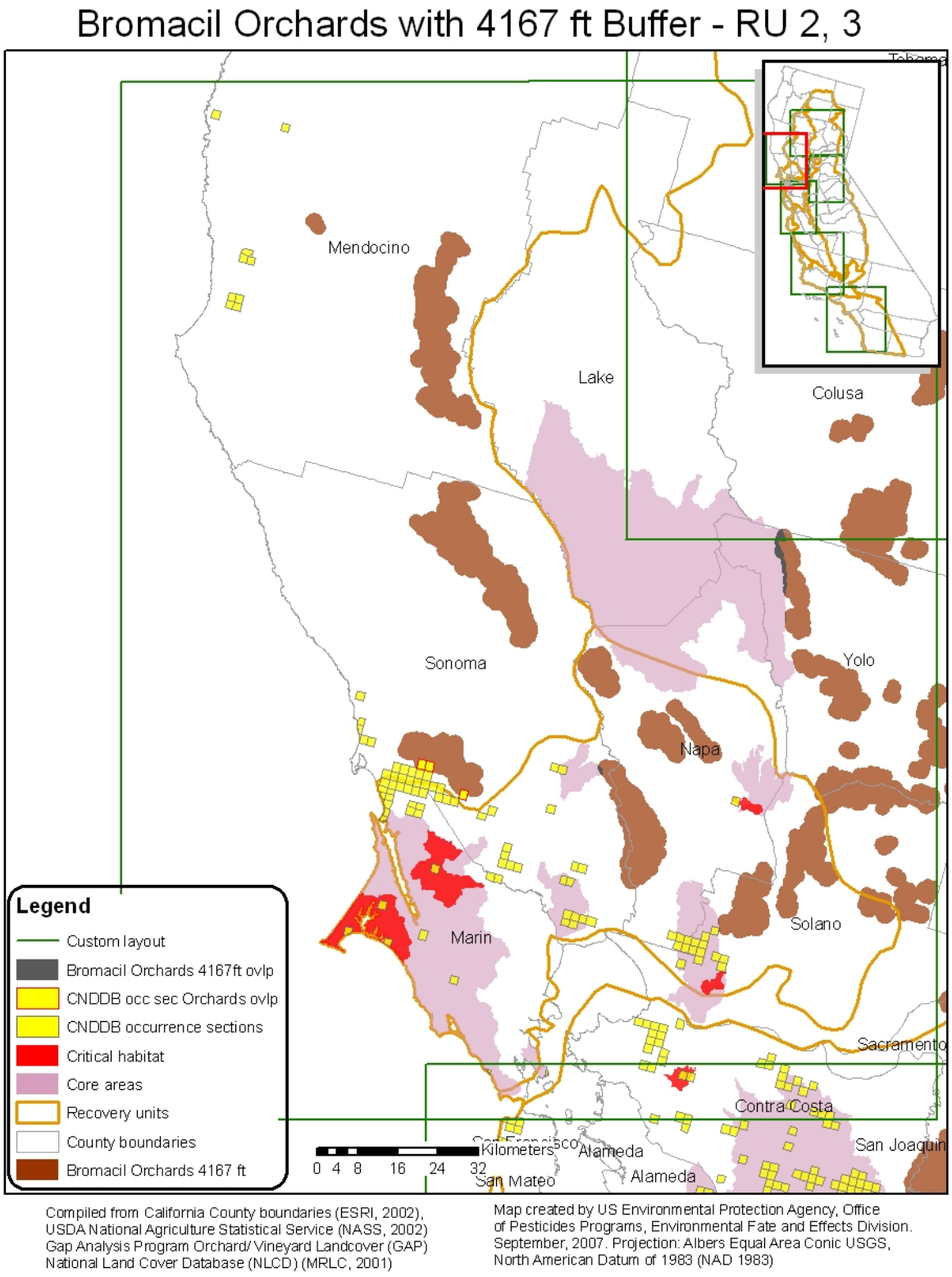

Figure H.14. Detailed map of overlap between action area for citrus uses of bromacil and CRLF core areas and critical habitat: enlarged view of recovery unit 2 and 3.

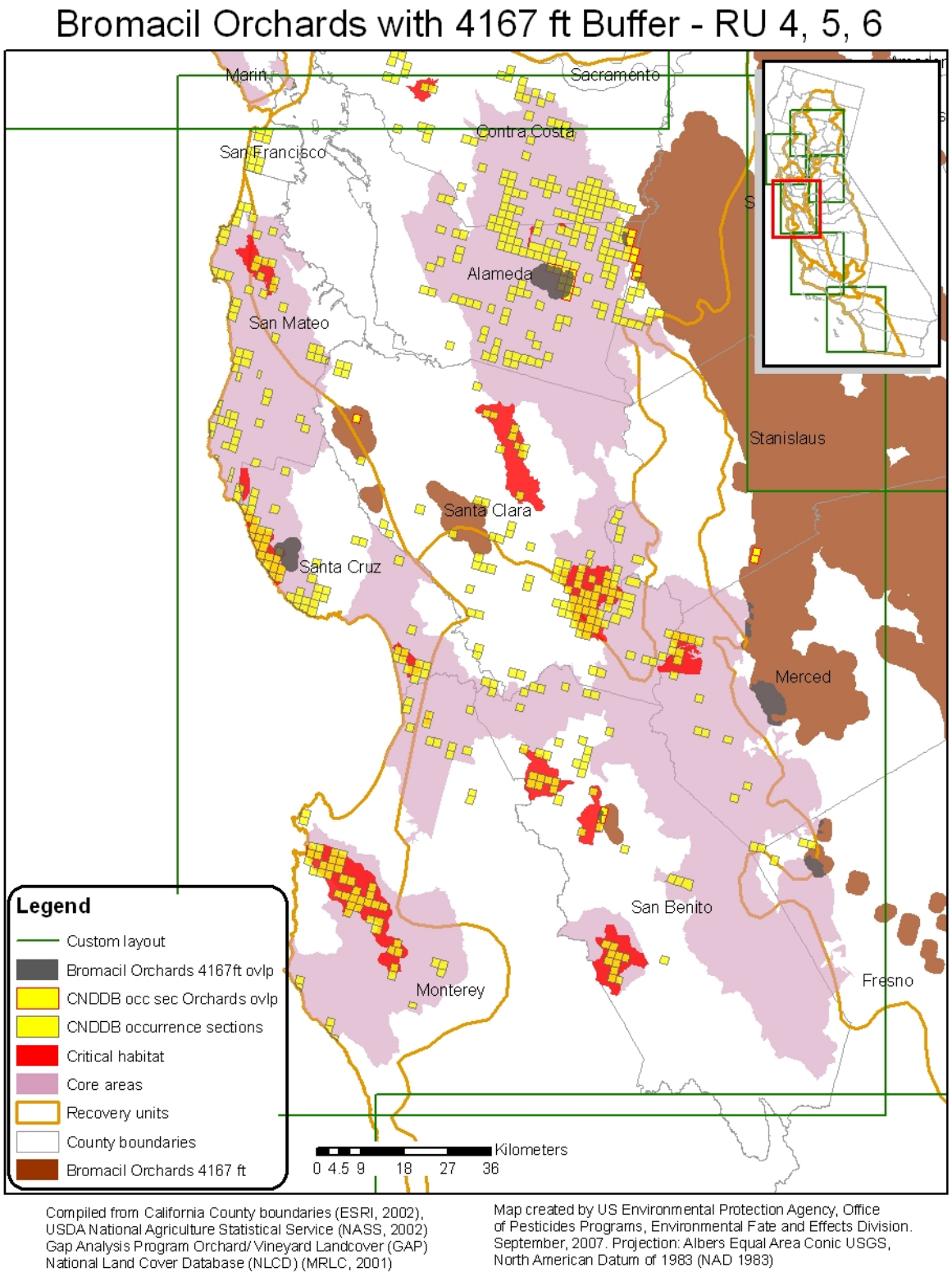

Figure H.15. Detailed map of overlap between action area for citrus uses of bromacil and CRLF core areas and critical habitat: enlarged view of recovery units 4-6.

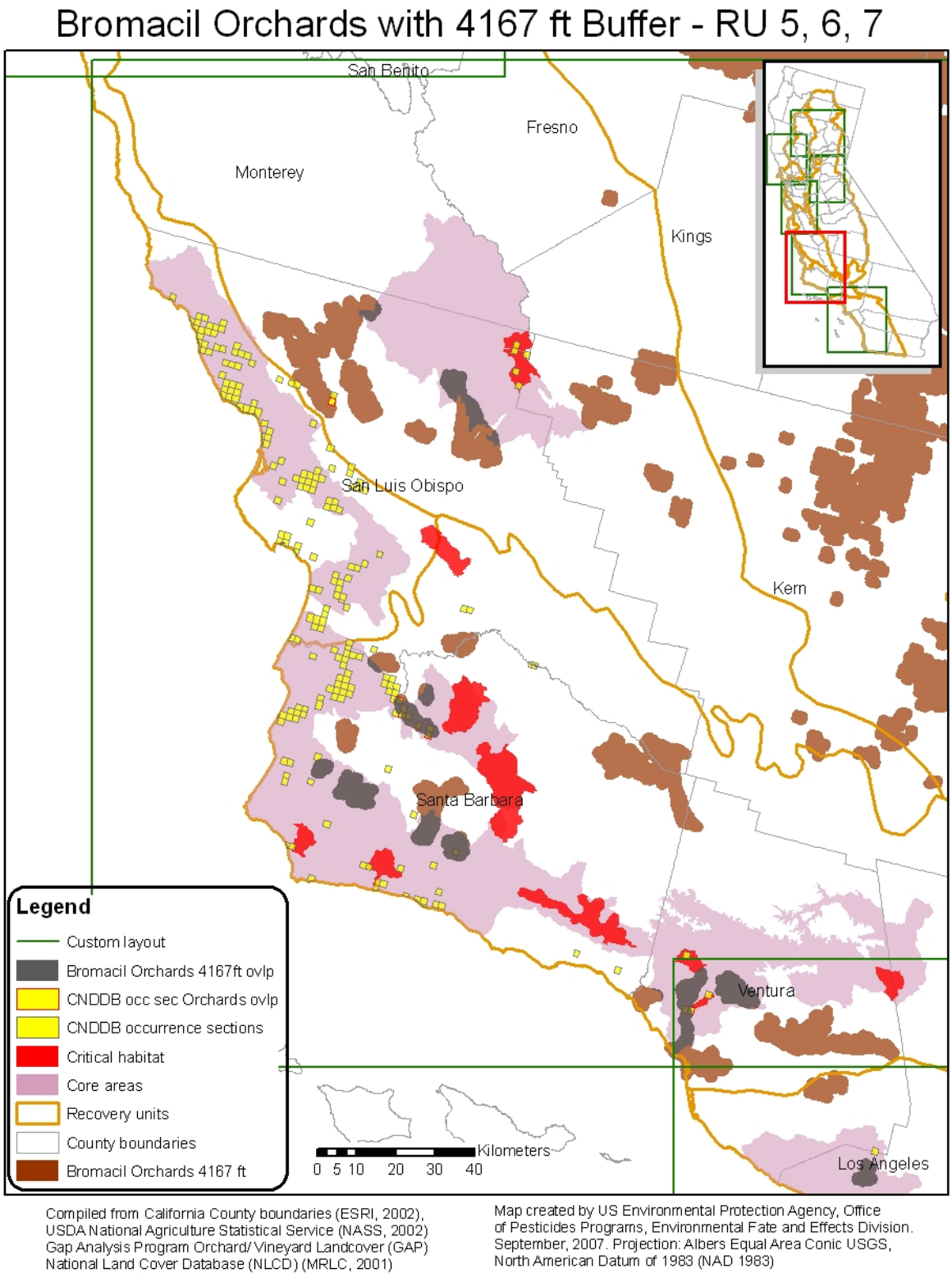

Figure H.16. Detailed map of overlap between action area for citrus uses of bromacil and CRLF core areas and critical habitat: enlarged view of recovery units 5-7.

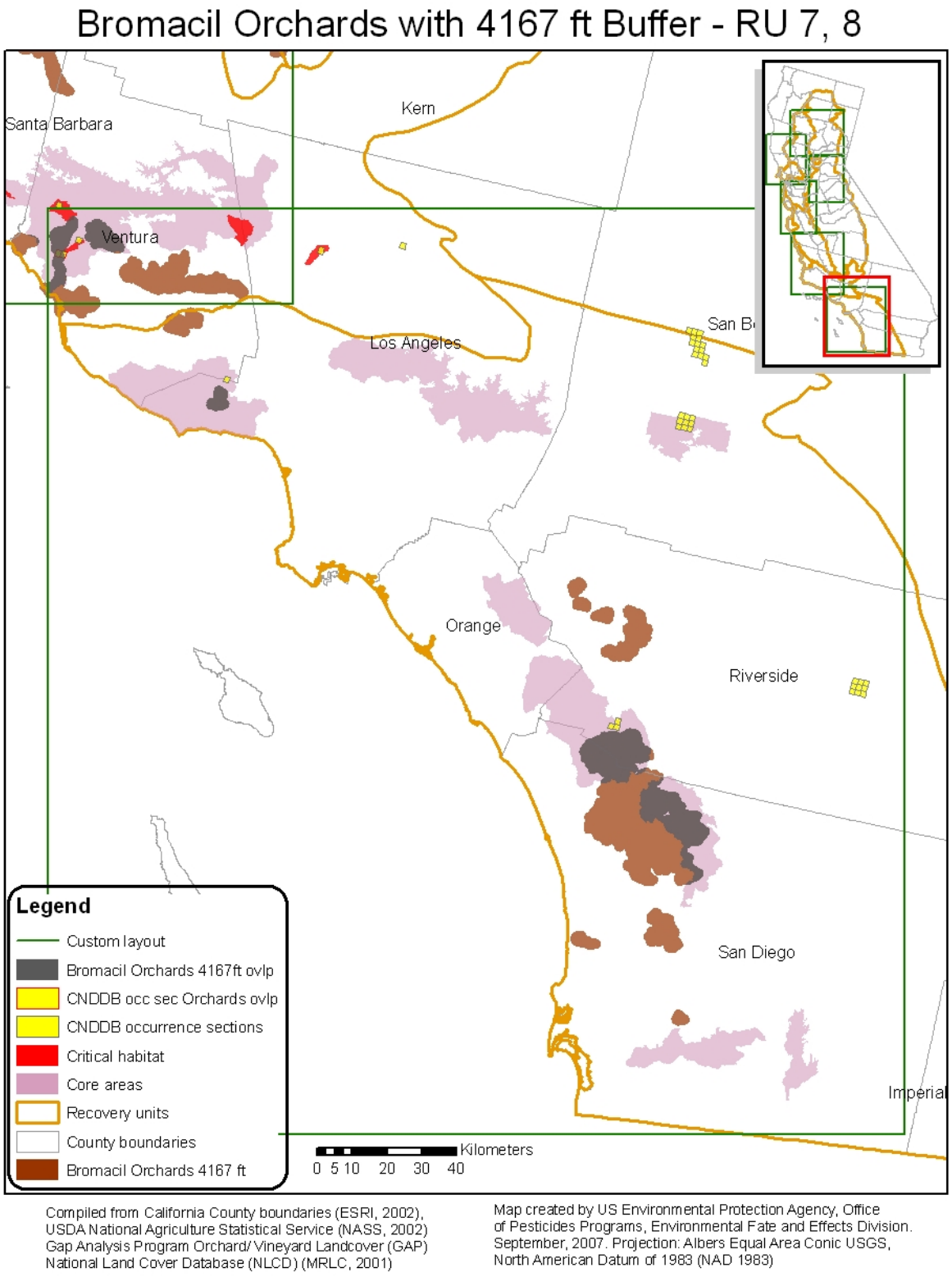

Figure H.17. Detailed map of overlap between action area for citrus uses of bromacil and CRLF core areas and critical habitat: enlarged view of recovery units 7-8.

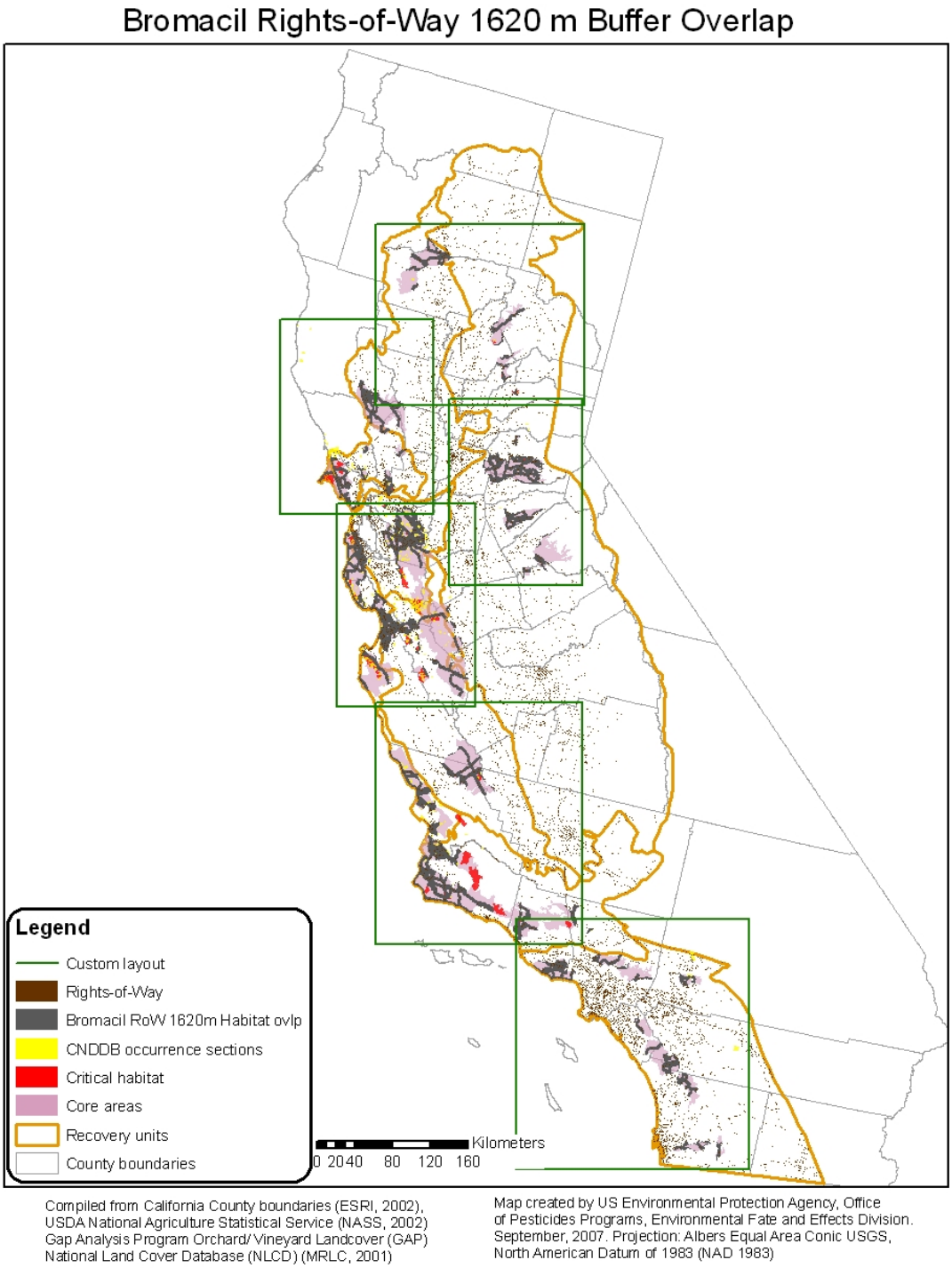

Figure H.18. Map of overlap between action area for non-cropland uses of bromacil and bromacil lithium and CRLF core areas and critical habitat.

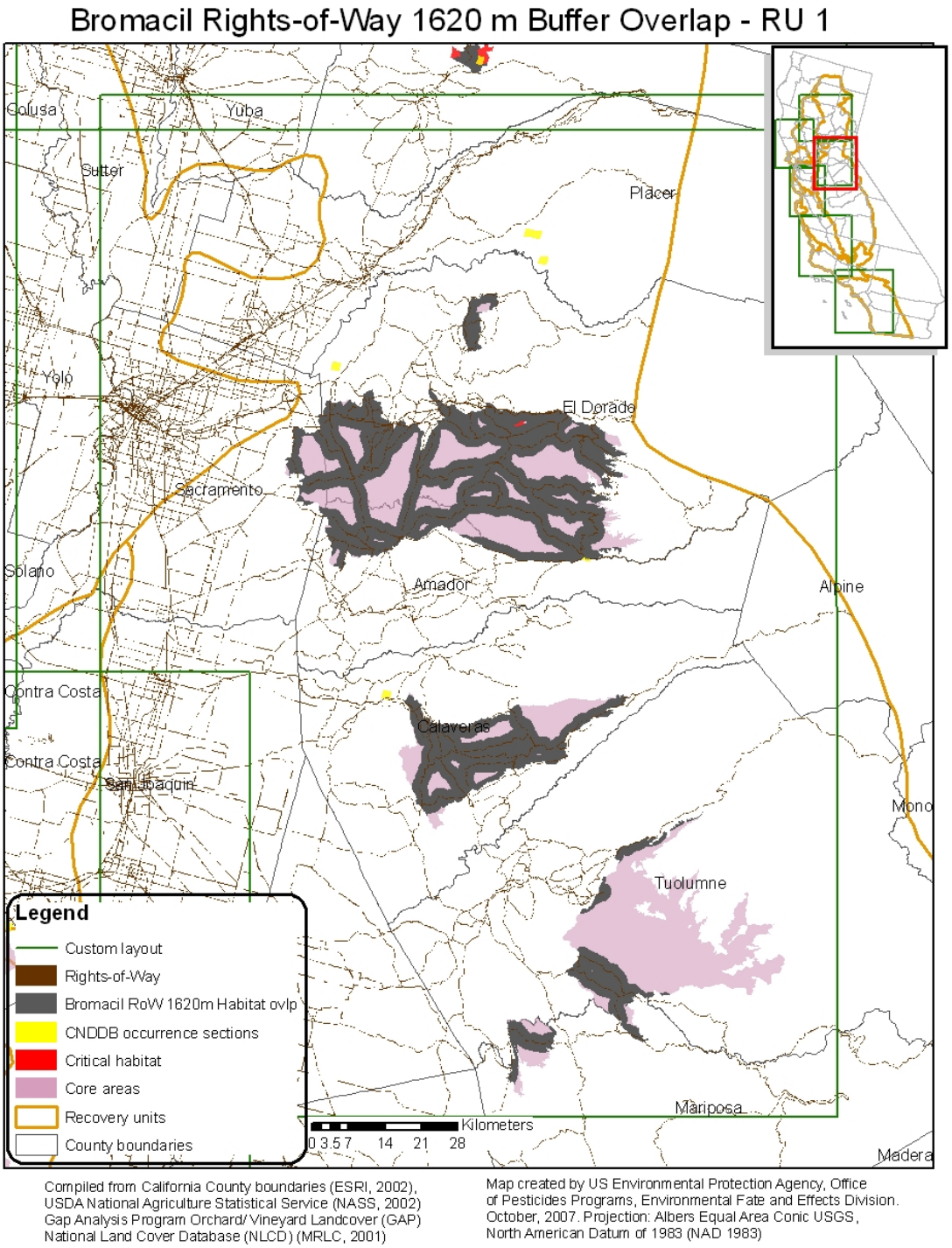

Figure H.19. Detailed map of overlap between action area for non-cropland uses of bromacil and bromacil lithium and CRLF core areas and critical habitat: enlarged view of recovery unit 1.

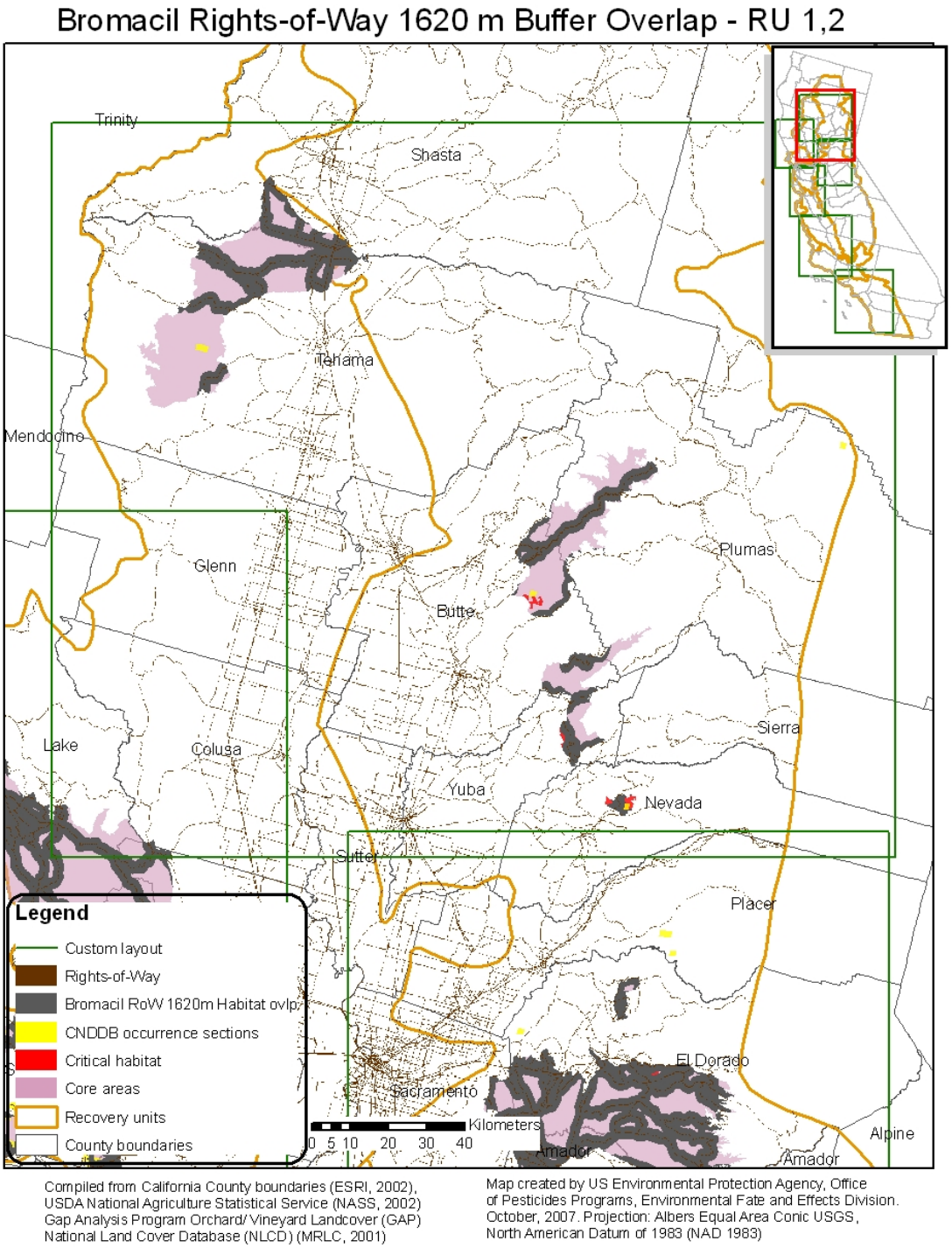

Figure H.20. Detailed map of overlap between action area for non-cropland uses of bromacil and bromacil lithium and CRLF core areas and critical habitat: enlarged view of recovery units 1 and 2.

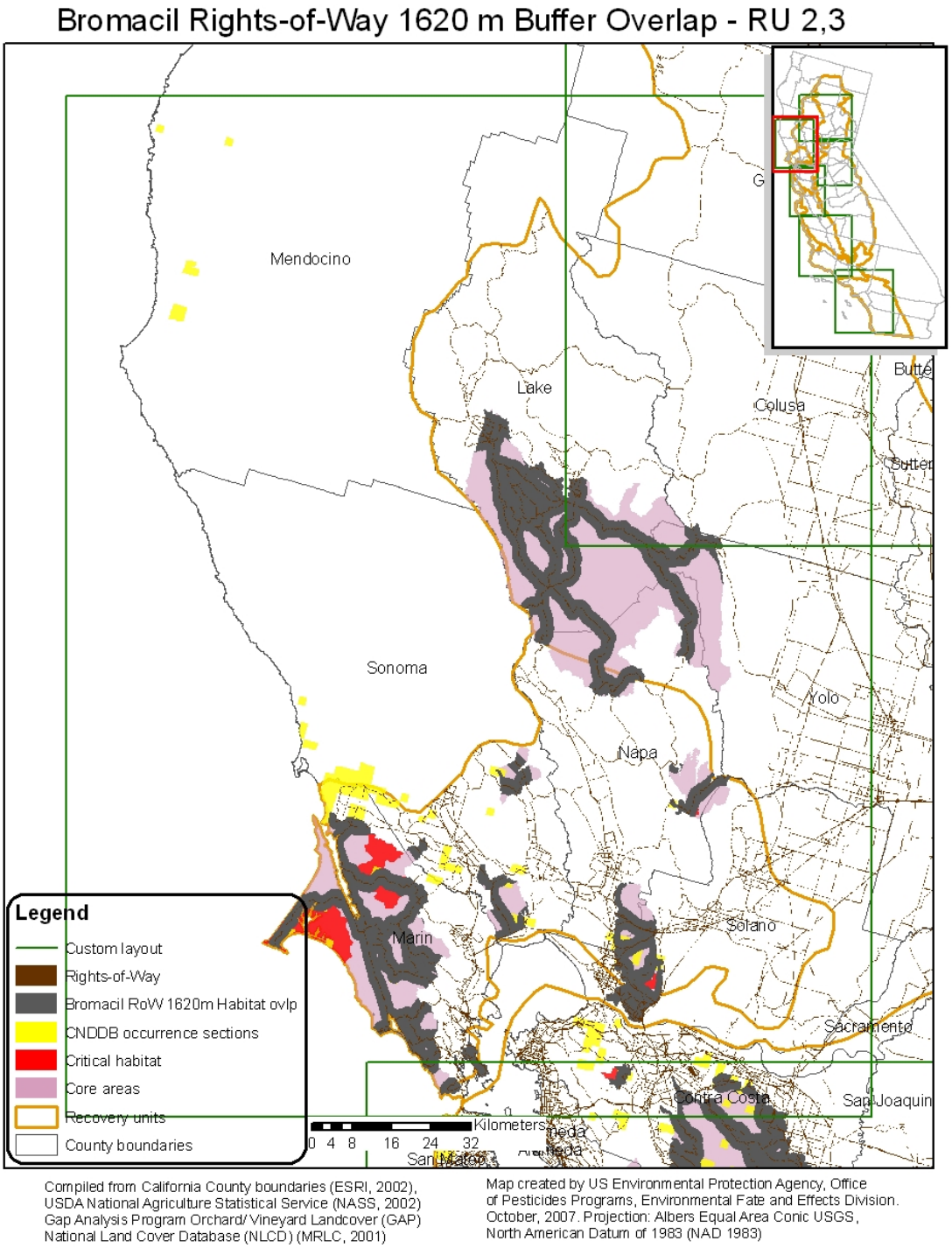

Figure H.21. Detailed map of overlap between action area for non-cropland uses of bromacil and bromacil lithium and CRLF core areas and critical habitat: enlarged view of recovery units 2 and 3.

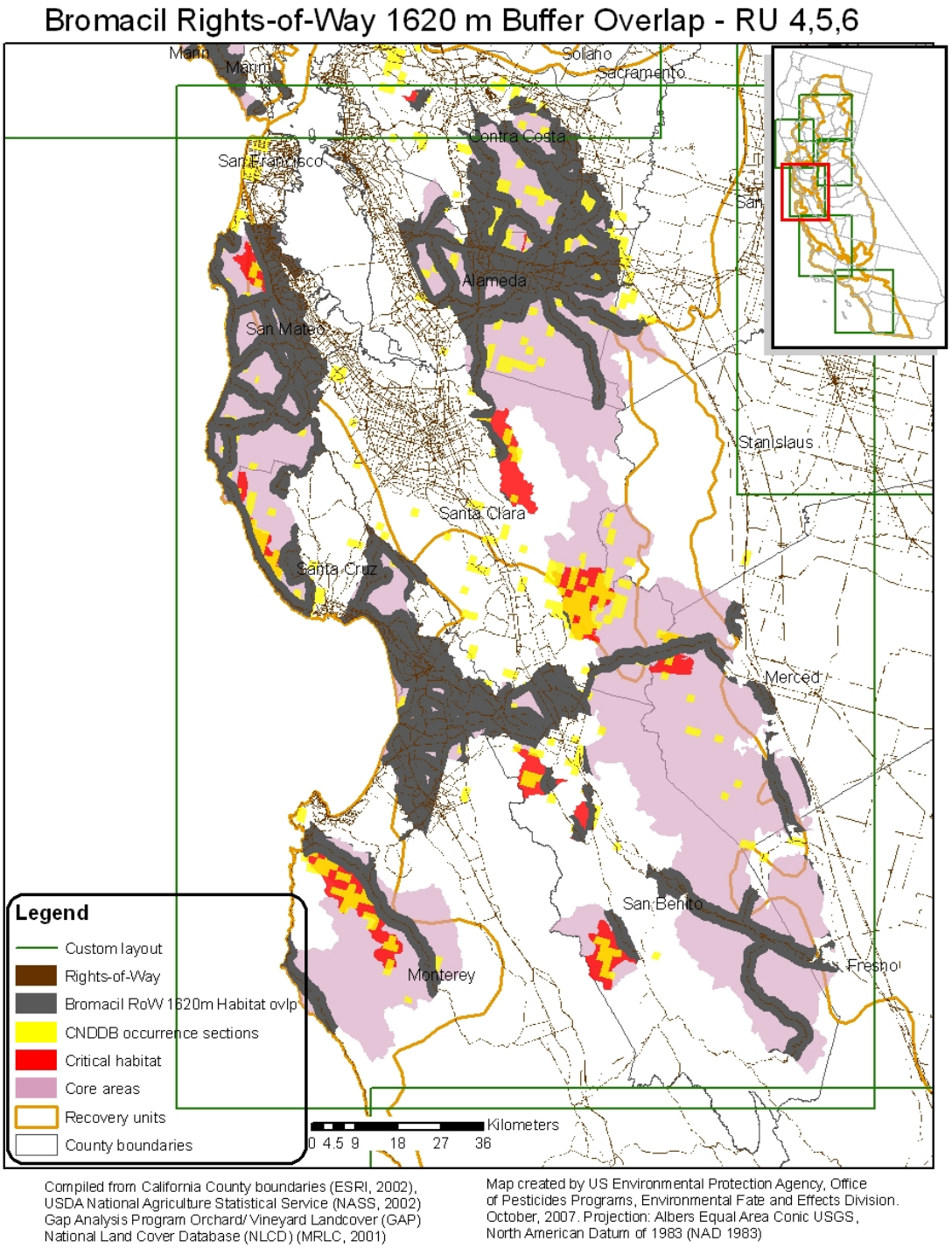

Figure H.22. Detailed map of overlap between action area for non-cropland uses of bromacil and bromacil lithium and CRLF core areas and critical habitat: enlarged view of recovery units 4-6.

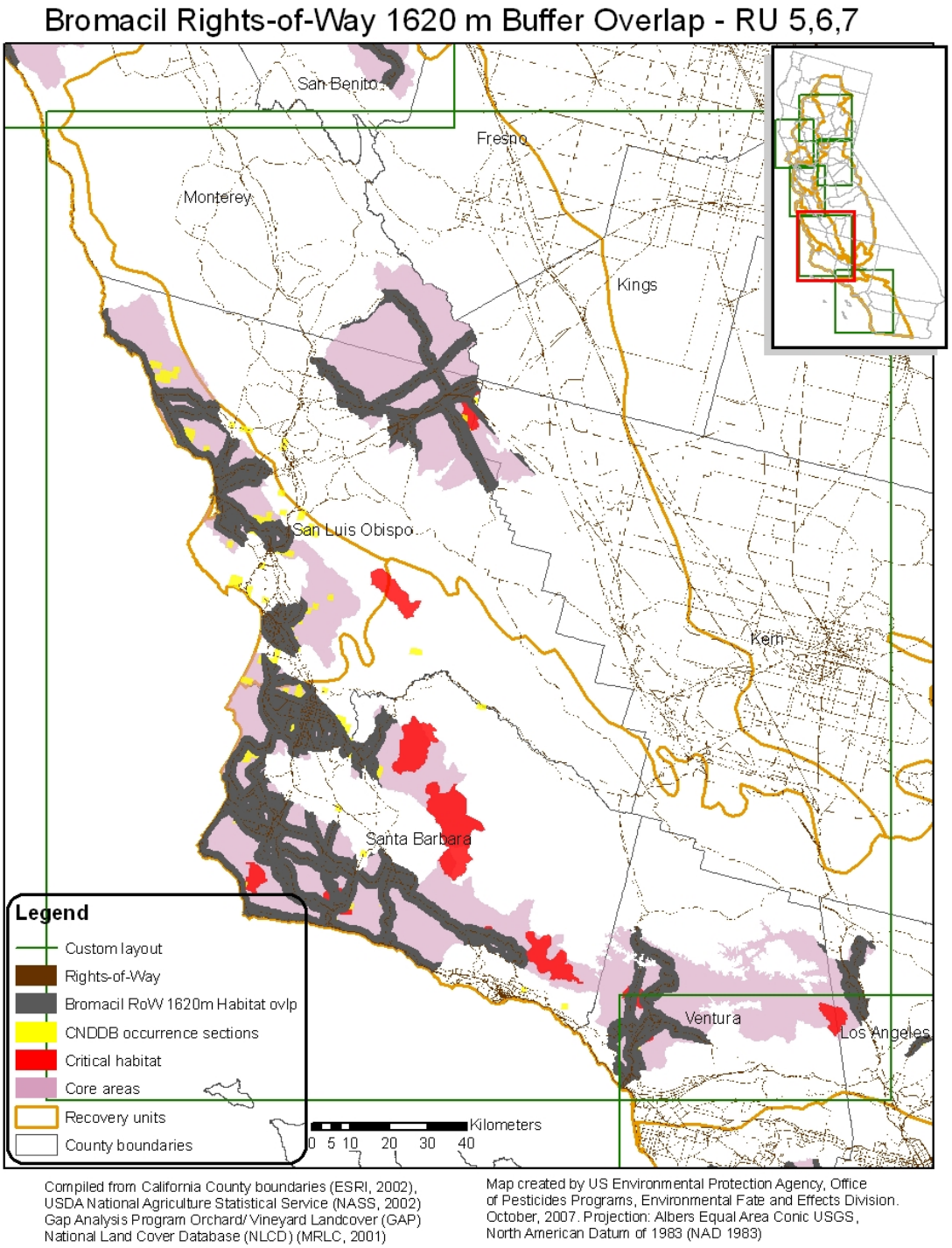

Figure H.23. Detailed map of overlap between action area for non-cropland uses of bromacil and bromacil lithium and CRLF core areas and critical habitat: enlarged view of recovery units 5-7.

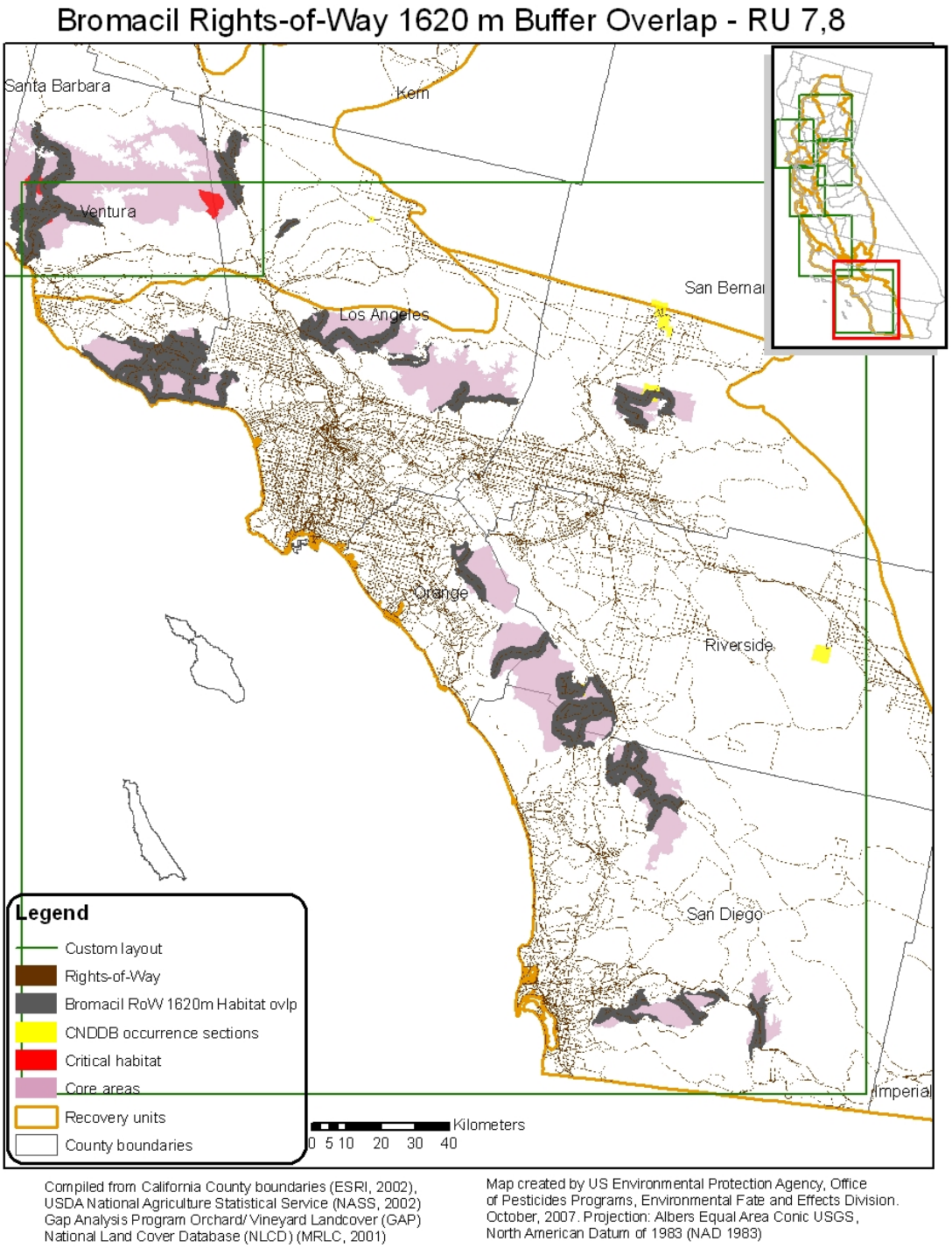

Figure H.24. Detailed map of overlap between action area for non-cropland uses of bromacil and bromacil lithium and CRLF core areas and critical habitat: enlarged view of recovery units 7 and 8.

H.6. 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 NASS Census of Agriculture (NASS 2002) contains adjusted survey data collected prior to 2002. Small use sites, and minor uses (e.g., specialty crops) tend to be underrepresented in this dataset. The National Land Cover Dataset (NLCD 2001) represents the best comprehensive collection of national land use and land cover information for the United States representing a range of years from 1994 – 1998. Because the NLCD does not explicitly include a class to represent orchard and vineyard landcover, California Gap Analysis Project data (CaGAP 1998) were overlaid with the NCLD and used to identify these areas.

Hydrographic data are from the NHDPlus dataset (http://www.horizon-systems.com/nhdplus/). NHDPlus contains the most current and accurate nationwide representation of hydrologic data. In some isolated instances, there are, however, errors in the data including missing or disconnected stream segments and incorrect assignment of flow direction. Spatial data describing the recovery zones and core areas are from the US Fish and Wildlife Service. The data depicting survey sections in which the species has been found in past surveys is from the California Natural Diversity Database (http://www.dfg.ca.gov/bdb/html/cnddb.html).

The relatively coarse spatial scale of these datasets precludes use of the data for highly localized studies, therefore, tabular information presented here is limited to the scale of individual Recovery Units. Additionally, some labeled uses are not possible to map precisely due to the lack of appropriate spatial data in NLCD on the location of these areas. To account for these uncertainties, the spatial analysis presented here is conservative, and may overestimate the aerial extent of actual pesticide use in California.

H.7. References for GIS Maps

Crop Maps

ESRI, 2002. Detailed Counties, ESRI data and maps. (1:24,000) www.esri.com

GAP. Gap Analysis. National Biological Information Infrastructure. www.nbii.gov

NASS, 2002. USDA National Agriculatural Statistics Service. www.nass.usda.gov

MRLC, 2001. Multiresolution Land Characteristics (MRLC) www.mrlc.gov

Habitat Maps

US FWS 2002 California red-legged frog General Recovery Zones

US FWS 2002 California red-legged frog Core Areas

US FWS 2005 Final Critical Habitat for California red-legged frog

CNDDB Occurrence Sections – California Natural Diversity Database
http://www.dfg.ca.gov/bdb/html/cnddb.html

ESRI, 2002. Detailed Counties, ESRI data and maps. (1:24,000) www.esri.com