Appendix N. Description of Spatial Analysis and Maps Showing the Overlap of the Initial Area of Concern and the Species Habitat and Occurrence Sections

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I. Labeled Uses and Associated Land Cover Types for Diazinon

The following use list is derived from label use information. It is used as a basis for the spatial mapping of diazinon. Table 1 shows which land cover types are used to represent the spatial area of the use (*e.g.*, the use footprint). The land cover 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. A land cover class was not chosen to represent use on nurseries or cattle ear tags.

Table 1 Mapping layers and associated use sites.

Land Cover Mapping Layer	Use list
Cultivated Crops	Beans, succulent beans, snap beans, lima beans, broccoli, Brussel sprouts, cabbage, cauliflower, collard, kale, mustard, carrot, peas, pepper, leafy vegetables, endive, spinach, lettuce, onion, green onion, scallions, spring onion, radish, shallot, rutabaga, strawberry, tomato
Orchards and vineyards	Almond, apple, cherry, pear, apricot, nectarine, plum, prune, peach, blackberry, caneberry, boysenberry, dewberry, loganberry, raspberry, blueberry, fig, filbert,
No Associated Land Cover	Nursery uses on ornamentals
No Associated Land Cover	Cattle Ear Tags

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.
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 with corrections applied.
Rights-of-way	US DOT; TeleAtlas	A derived class using road, rail, and pipeline coverages.

All the map layers depicted in Table 2 are used to create the footprint maps. Actual analysis for the downstream dilution (discussed below) uses a subset of these layers.

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 diazinon 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. Because diazinon was assumed to have wide usage, a downstream dilution distance was not determined.

II. Spatial Extent of the Effects Determination

Based on the results of the risk quotient calculations for diazinon which is independent of spatial analysis, a Likely to Adversely Affect (LAA) and modification to critical habitat determination was concluded for the Tidewater goby and Delta Smelt. 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. As diazinon may be used throughout California, there is a potential for overlap of critical habitat for Tidewater goby and Delta Smelt in California. Figure A 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 B 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.

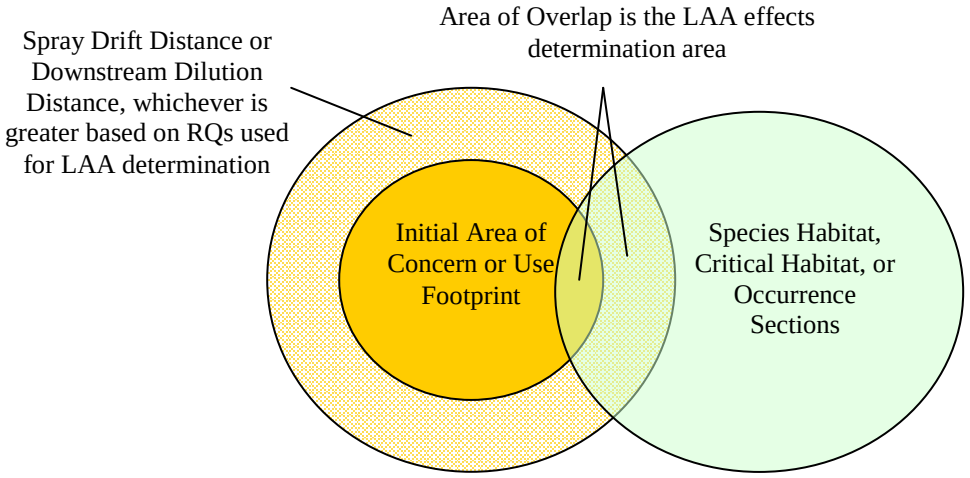


Figure A. Conceptual diagram depicting an overlap of the area of potential LAA effect and the habitat, occurrence sections, or critical habitat of a species. If there is overlap, a LAA effects determination or habitat modification determination is made for the species.

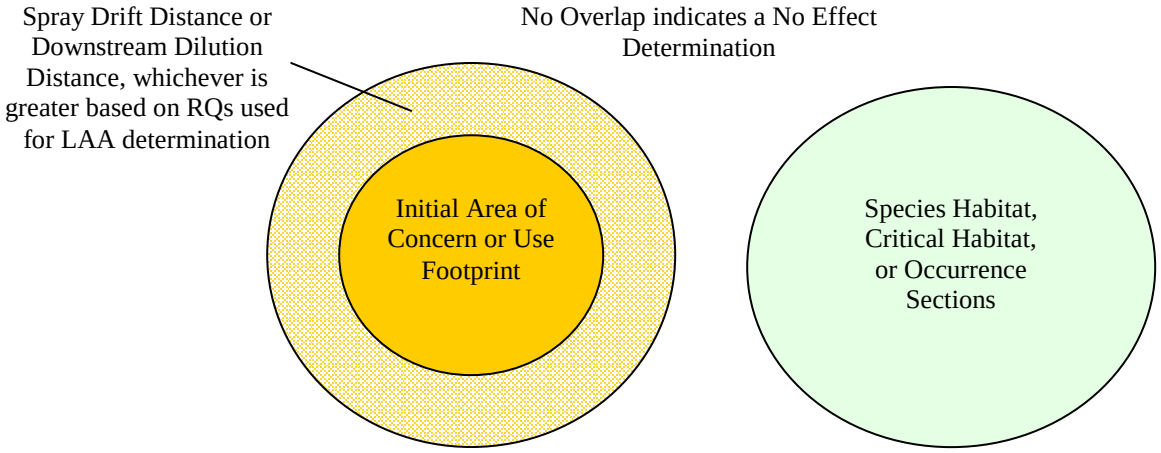
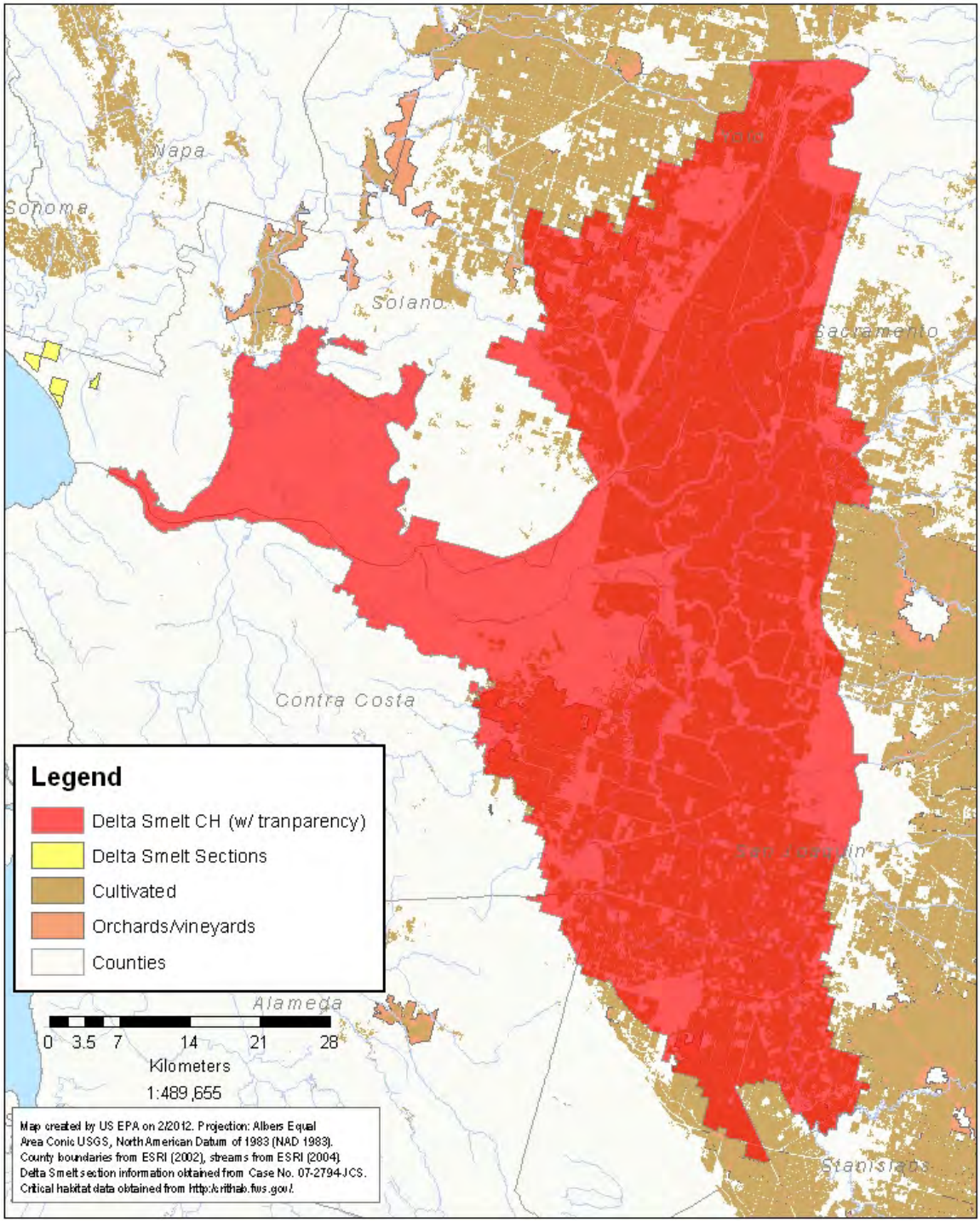


Figure B. Conceptual diagram depicting no overlap of the area of potential LAA effect and the habitat, occurrence sections, or critical habitat of a species. If there is no overlap, a No Effect determination is made for the species.

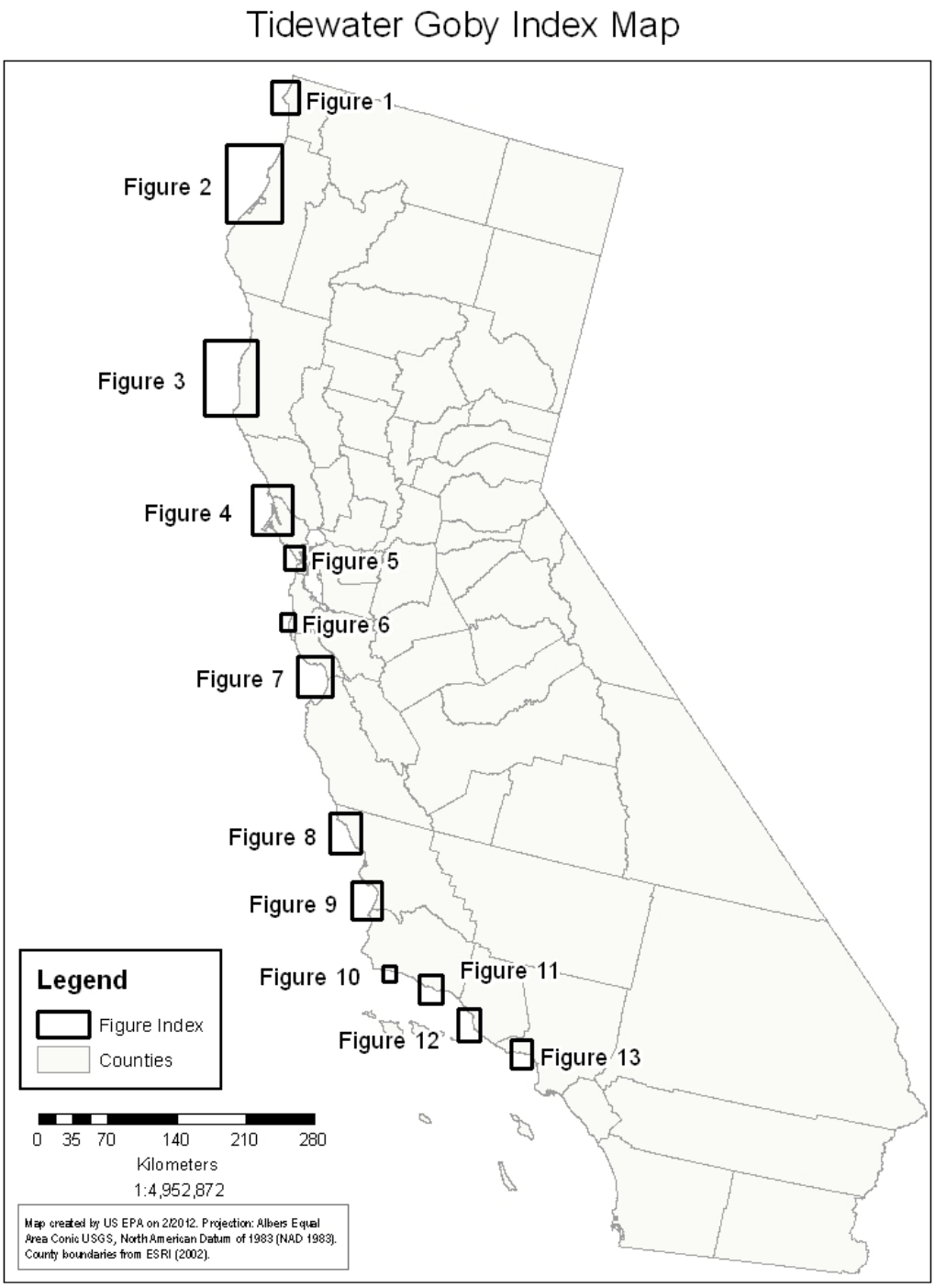
Maps 1 to 3 depict the land cover classes for agricultural crops and orchards and vineyards along with critical habitat areas and occurrence section for the TG and DS. This area of potential LAA effects includes the initial area of concern for application of diazinon assuming use on cultivated crops and orchards/vineyards 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. The extent of potential off-site transport is normally determined by deriving an aquatic and terrestrial spray drift distance using AgDRIFT and/or AGDISP and an estimate of the downstream distance where LOCs are exceeded using the downstream dilution model. As there is wide area usage, a terrestrial and aquatic spray drift distance and downstream dilution distance were not conducted. The overlap maps provide a depiction of land cover that corresponds to diazinon use patterns (excluding use on nurseries and cattle ear tags), 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 and because we do not have a land cover associated with the nursery uses, it is assumed that diazinon may be used throughout California. 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.

Maps were created depicting critical habitat and occurrence sections. The geographic distribution and locations of the San Franciso Bay 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.

Map 1. Map Showing the Overlap of DS Critical Habitat and Occurrence Sections Identified by Case No. 07-2794-JCS with the NLCD Cultivated Crop Land Cover Class and Orchards/vineyards land cover class. Use areas representing use on nurseries and cattle ear tags are not shown.

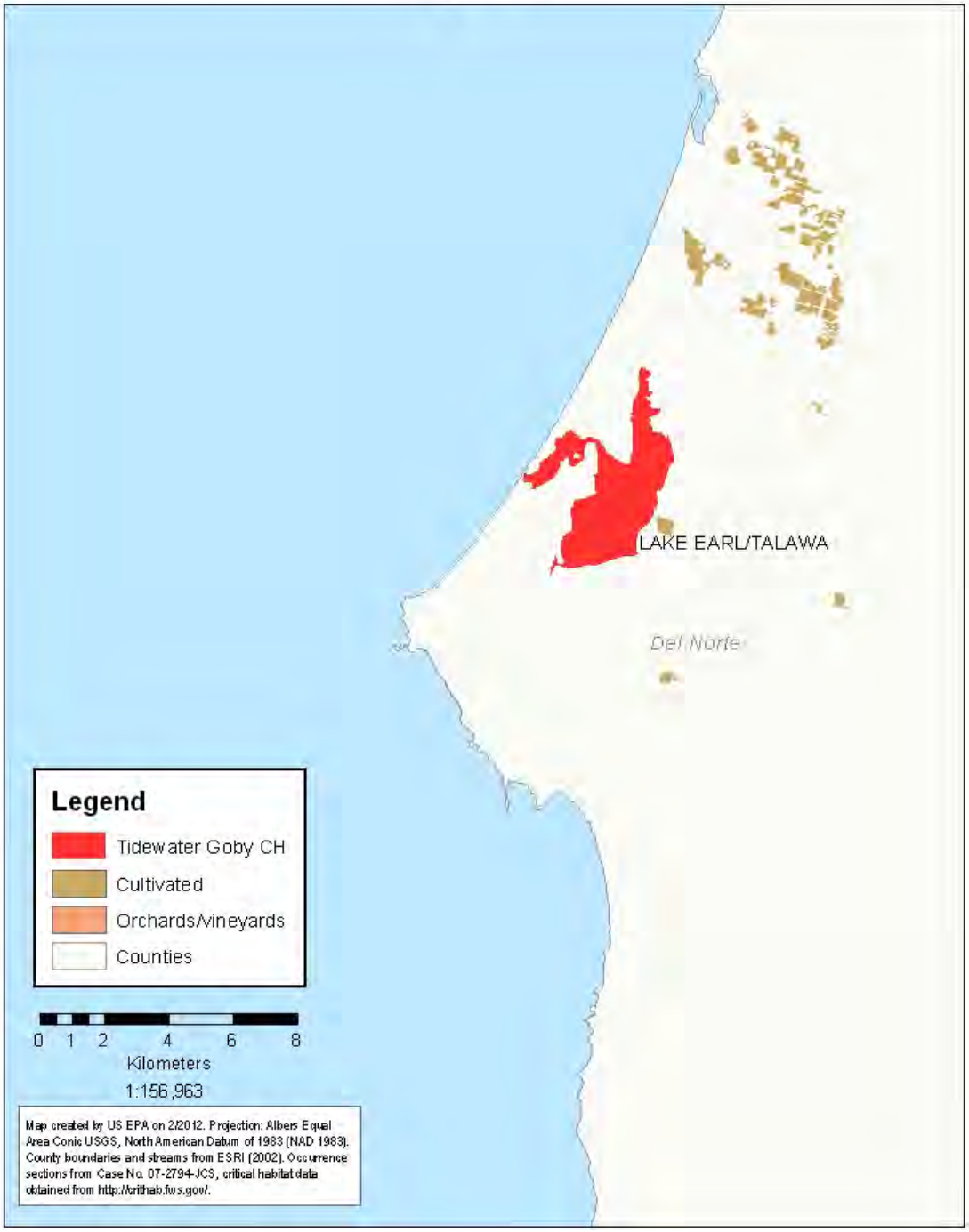


Map 2. Index of Tidewater Goby Maps

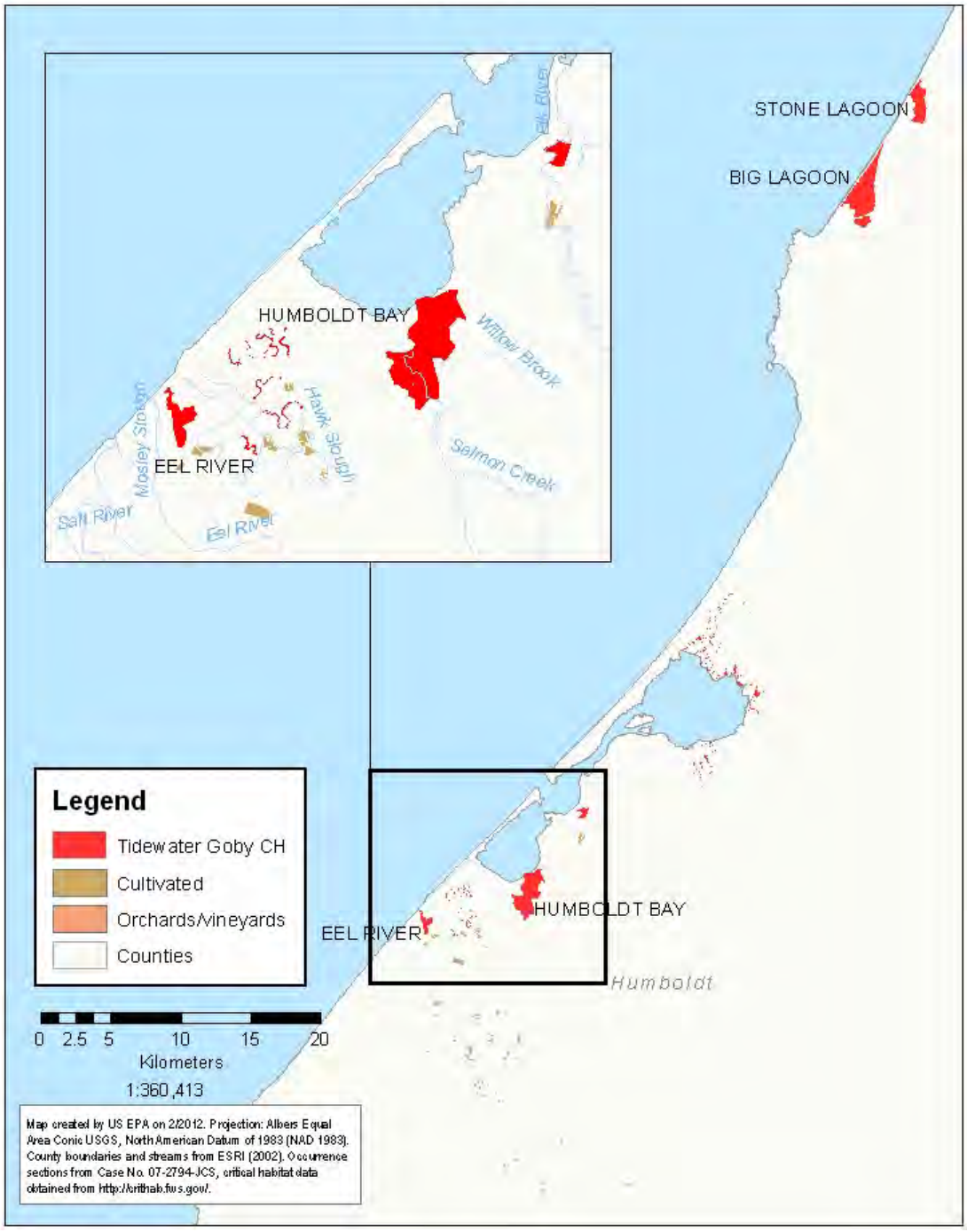


Map 3. 13 Maps (Figures 1-13) Showing the Overlap of TG Critical Habitat and Occurrence Sections Identified by Case No. 07-2794-JCS with the NLCD Cultivated Crop Land Cover Class and Orchards/Vineyards Land Cover. Map 2 is an index of Map 3. A Landcover Representing Uses in Nurseries is not Available and Possible Use in Nurseries is Not Depicted.

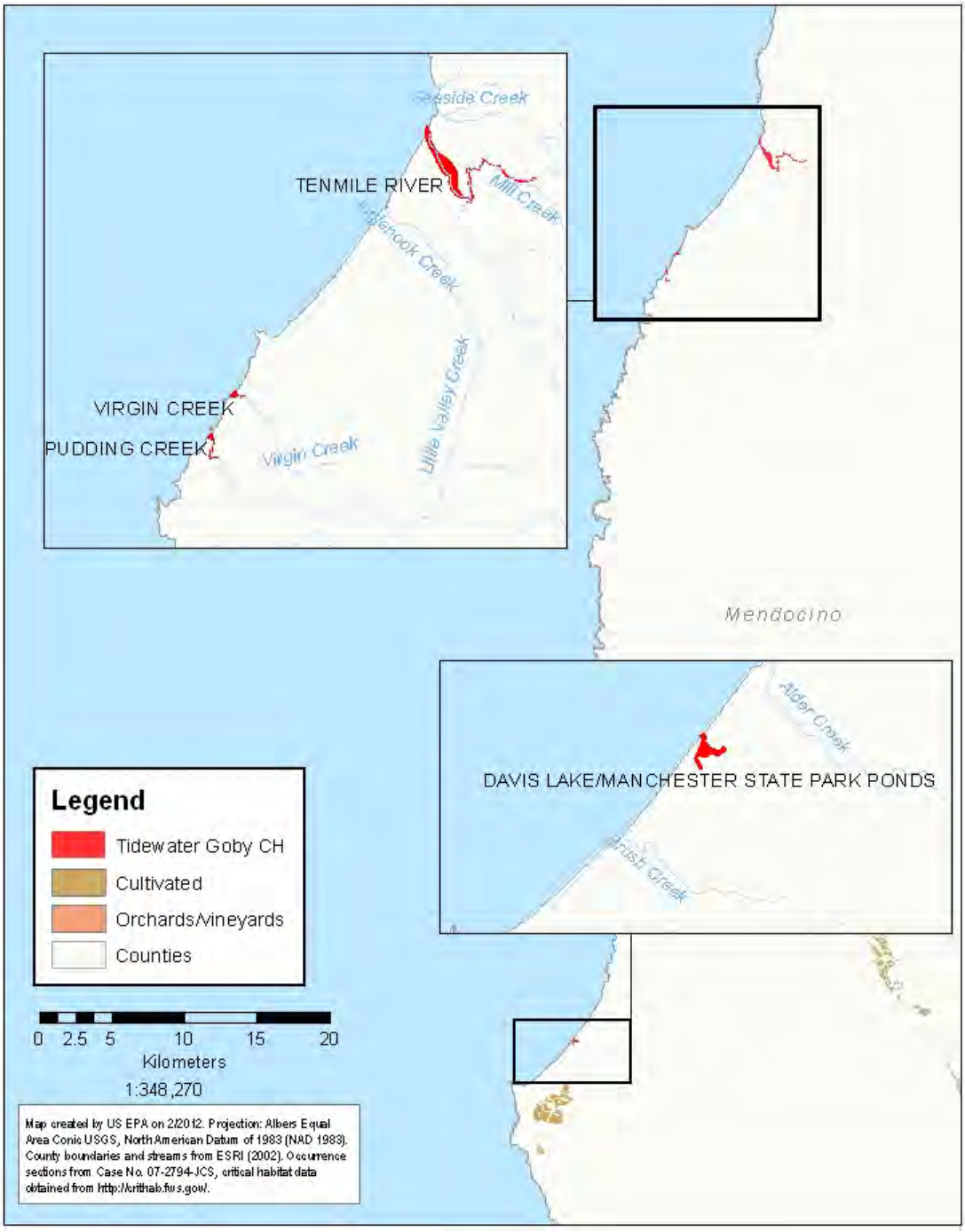
Tidewater Goby Critical Habitat with Potential Use Sites
Figure 1



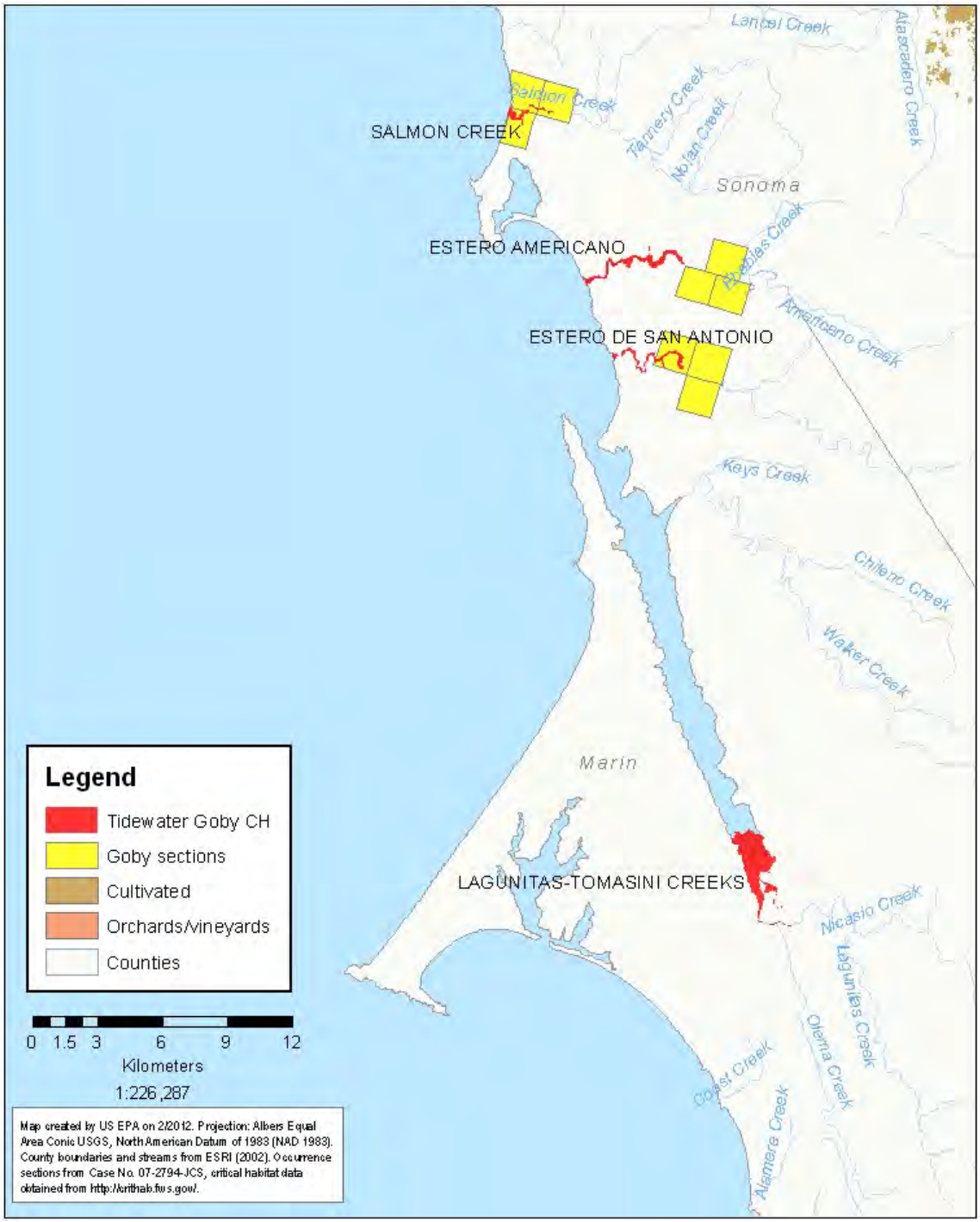
Tidewater Goby Critical Habitat with Potential Use Sites
Figure 2



Tidewater Goby Critical Habitat with Potential Use Sites
Figure 3

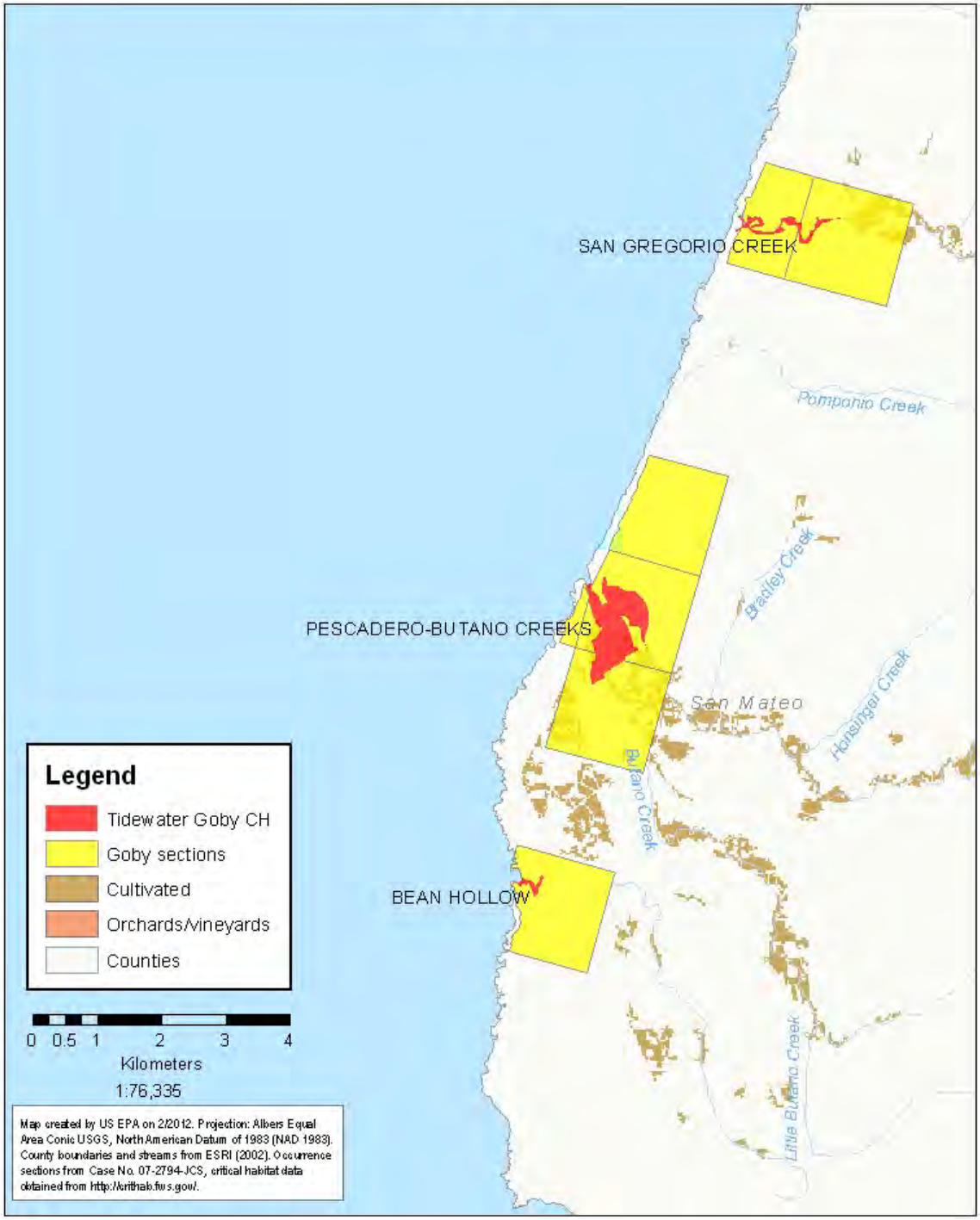


Tidewater Goby Habitat with Potential Use Sites
Figure 4



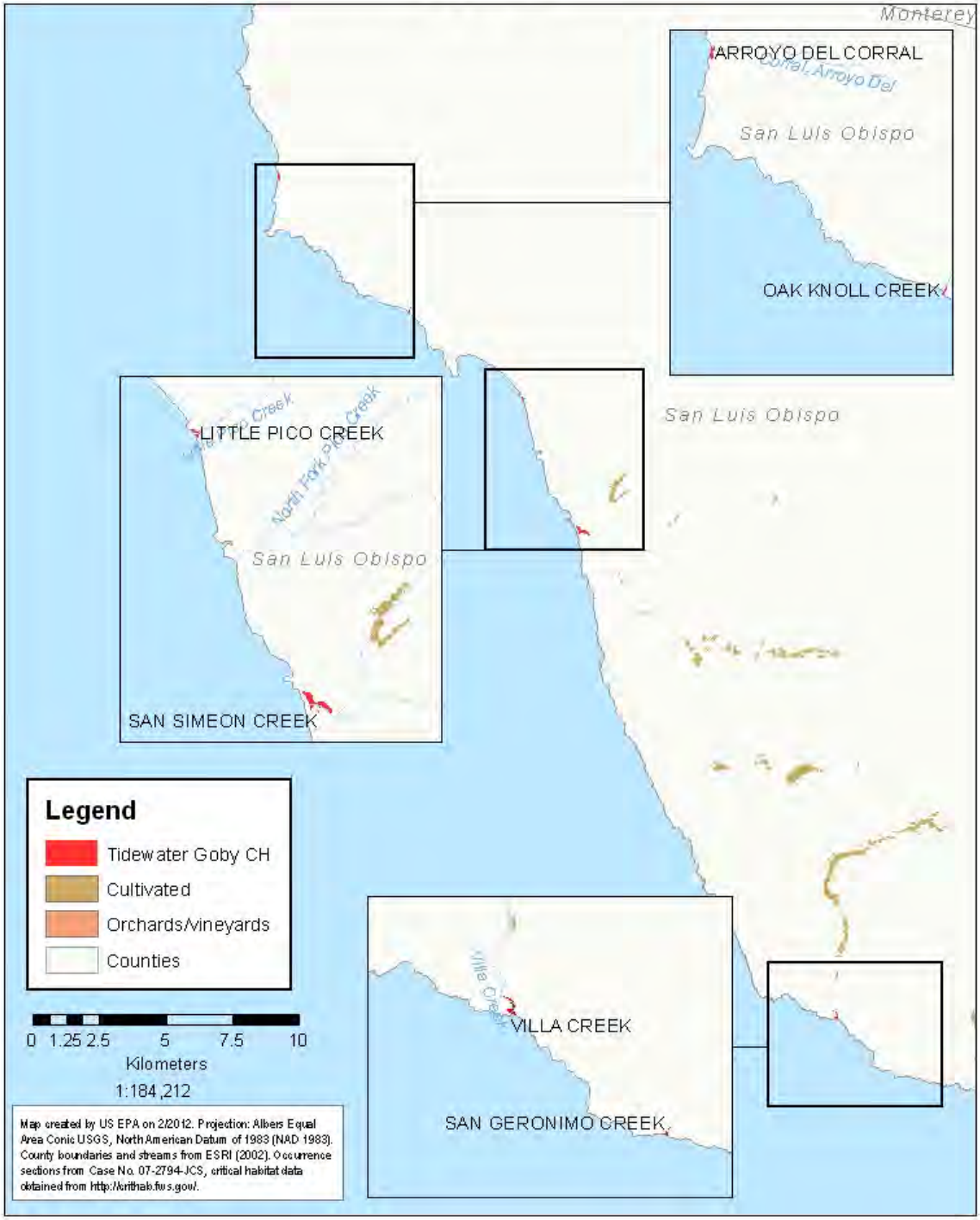
Tidewater Goby Habitat with Potential Use Sites
Figure 5

Tidewater Goby Habitat with Potential Use Sites
Figure 6



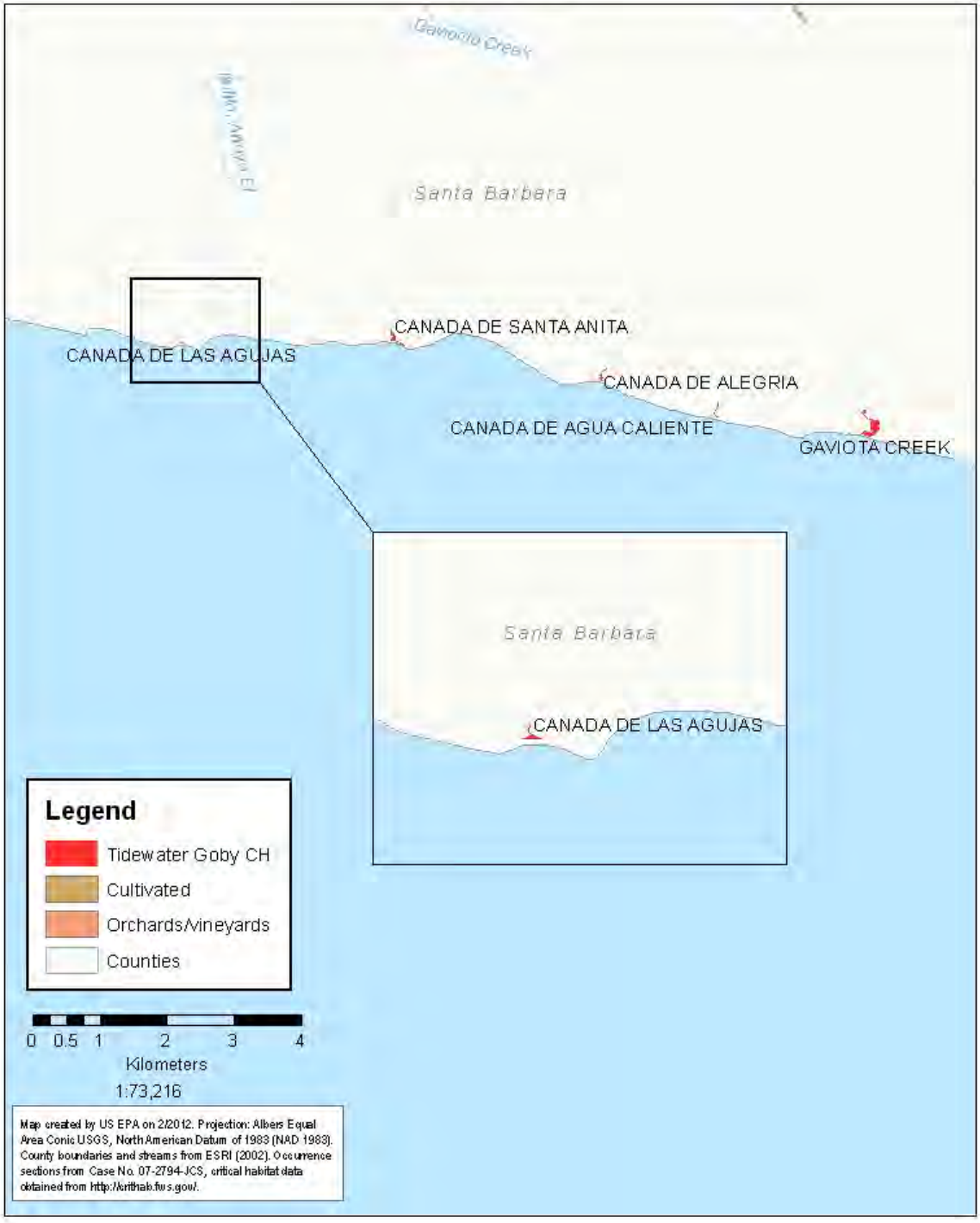
Tidewater Goby Critical Habitat with Potential Use Sites
Figure 7

Tidewater Goby Critical Habitat with Potential Use Sites
Figure 8

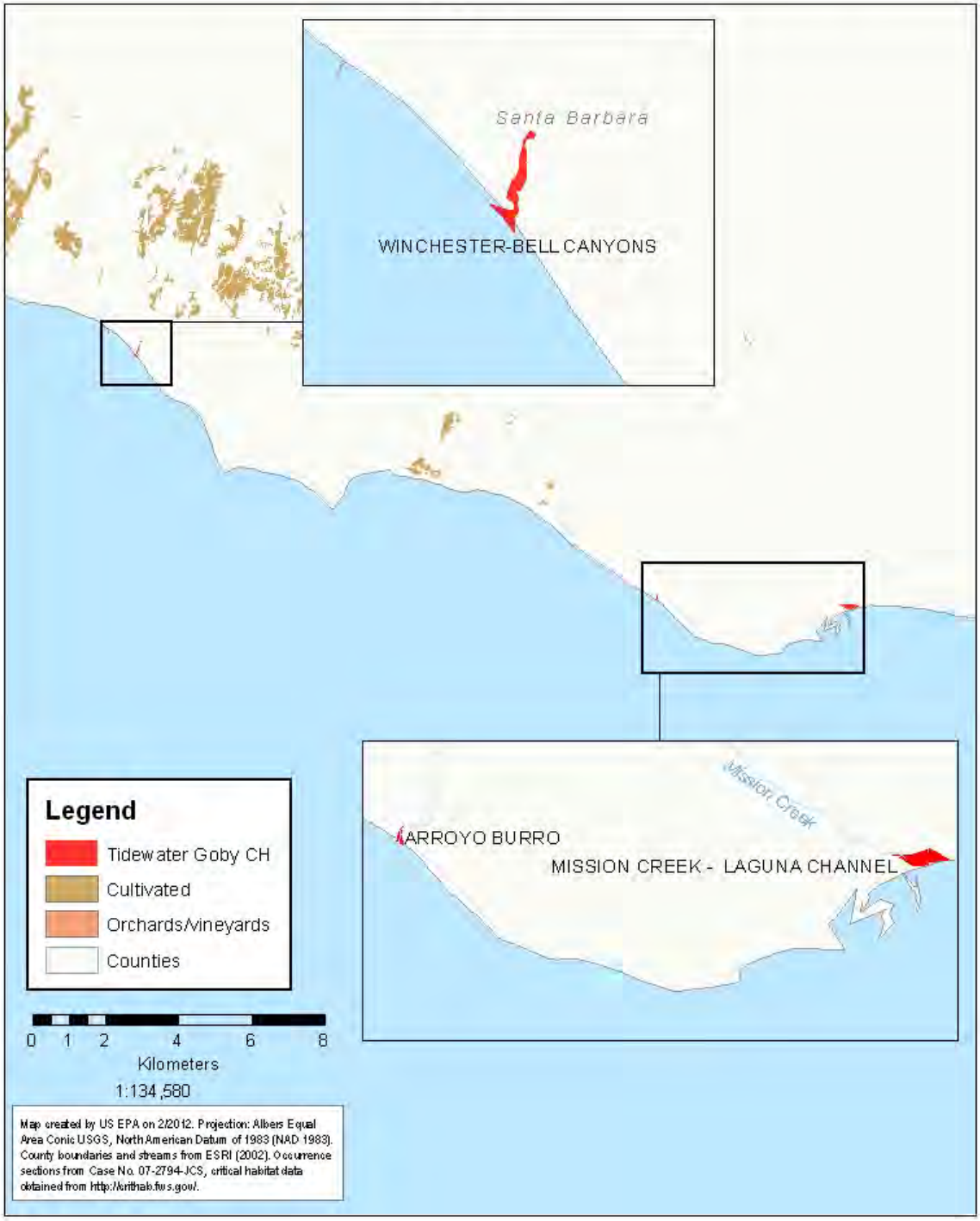


Tidewater Goby Critical Habitat with Potential Use Sites
Figure 9

Tidewater Goby Critical Habitat with Potential Use Sites
Figure 10



Tidewater Goby Critical Habitat with Potential Use Sites
Figure 11



Tidewater Goby Critical Habitat with Potential Use Sites
Figure 12

Tidewater Goby Critical Habitat with Potential Use Sites
Figure 13

III. 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 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.

IV. References for GIS Maps

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

Davis, F. W., D. M. Stoms, A. D. Hollander, K. A. Thomas, P. A. Stine, D. Odion, M. I. Borchert, J. H. Thorne, M. V. Gray, R. E. Walker, K. Warner, and J. Graae. 1998. *The California Gap Analysis Project--Final Report*. University of California, Santa Barbara, CA. Available online at http://www.biogeog.ucsb.edu/projects/gap/gap_rep.html. Orchard/vineyard layer.

EPA Environmental Fate and Effects Division NLCD-derived turf from developed and impervious layer classes.

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

ESRI Data and Maps DVD, 2002. (1:24,000). Available online at www.esri.com.

Homer, C. C. Huang, L. Yang, B. Wylie and M. Coan. 2004. *Development of a 2001 National Land cover Database for the United States. Photogrammetric Engineering and Remote Sensing*, Vol. 70, No. 7, July 2004, pp. 829-840. Available online at http://www.mrlc.gov/pdf/July_PERS.pdf. NLCD layers.

Sacramento San-Joaquin Delta Fact Sheet. California Department of Water Resources. Available online at http://www.water.ca.gov/deltainit/docs/factsheet.pdf.

Simley, J.D., Carswell Jr., W.J., 2009, *The National Map*—Hydrography: U.S. Geological Survey Fact Sheet 2009-3054, 4 p. Available online at nhd.usgs.gov.

TeleAtlas. 2007. "Dynamap 2000." Version No. 17.1. Released April 2007. USPS Current to February 2007.

U.S. Department of Transportation's National Pipeline Mapping System. 1999. USDoT/Baker. Office of Pipeline Safety, Washington, D.C. 03/30/1999. Available online at www.npms.rspa.dot.gov.

U.S. Fish and Wildlife Service. 1995. *Sacramento-San Joaquin Delta Native Fishes Recovery Plan*. U.S. Fish and Wildlife Service, Portland, Oregon. Available online at http://ecos.fws.gov/docs/recovery_plan/961126.pdf. (Accessed 24 November, 2009).

U.S. Fish and Wildlife Service. *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).

U.S. Fish and Wildlife Service. 2005. *Recovery Plan for the Tidewater Goby (Eucyclogobius newberryi)*. U.S. Fish and Wildlife Service, Portland, Oregon. Vi + 199 pp. Available online at http://ecos.fws.gov/docs/recovery_plan/051207.pdf. (Accessed 27 November 27, 2009).