El Dorado County
Integrated Natural Resources Management Plan

Revised Administrative Draft
Habitat Inventory and Mapping Report

March 24, 2010

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1.0 Updates to the Policy 7.4.2.8 Initial Inventory Map

Under Task 1 of the Scope of Work for Phase 1 of the INRMP, Sierra Ecosystem Associates (SEA) is charged with updating the Policy 7.4.2.8 Initial Inventory Map. This includes defining the key terms "Native Vegetation", "Important Habitat", and "Large Expanses". Using scientific literature, input received from the PAWTAC and ISAC (Committees), and analyzing the use of these terms within the context of the General Plan and the EIR, the terms have been defined to help identify the information to be displayed on the Inventory Map.

The five elements to be updated on the Initial Inventory Map (General Plan Policy 7.4.2.8 (A)) are:

1. Habitats that support special-status species;
2. Aquatic environments including lakes, streams, and rivers;
3. Wetland and riparian habitats;
4. Important habitat for migratory deer herds; and,
5. Large expanses of native vegetation.

In updating the map, SEA's goal is to delineate the five categories of Policy 7.4.2.8 resources using existing information without field verifying presence, assessing quality, or characterizing relative importance, which may be goals of the Phase II INRMP activities. Similar to a mineral or other resource inventory, this Phase I INRMP exercise is a compilation, integration, and presentation of what other existing map and data sources show for the five Policy 7.4.2.8 resources.

The first step in updating the existing map was to evaluate potential useful data sources. Table 1 summarizes the data sources that were evaluated by SEA and the PAWTAC/ISAC. The highlighted data sources were selected to prepare the Administrative Draft of the map updates.

For graphic clarity, SEA's approach was to map each of the five elements separately. Some updates are more straightforward than others; for example, the Aquatic Environments map was updated with the latest data available from the National Hydrography Database maintained by the USGS. However, mapping large expanses of native vegetation is more complicated. This required applying and translating the terms into a map using the best available data sources. A description of the data sources as well as the process used to create the maps for each of the five categories is presented below.

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Table 1. El Dorado County INRMP - Phase I Initial Inventory Mapping Data Sources (Listed by Data Type)

Source	*Data Description*	*Notes*
Vegetation Data		
CDFG	New CWHR vegetation mapping (only northern portion of County available)	
CalFire	Cal Veg - Land cover Mapping and Monitoring Program	Best available
CalFire	LCMMP - Vegetation Change Detection and cause	
CalFire	Hardwood Rangeland Vegetation	
USBR	Kuchler Vegetation (1976)	
USBR	Wieslander Vegetation (1945)	
USGS	Landfire Vegetation Data and associated derived data	
USGS	National Landcover Dataset	
Soil Data		
NRCS	Soil data for El Dorado County	
Special-status Species		
CDFG	California Natural Diversity Database; polygons	Nov. 2009
USFWS	Proposed new Critical Habitat for California Red-legged Frog	2009
SMUD	Amphibian species surveys for re-licensing (http://hydrorelicensing.smud.org)	Mostly outside Study
USFS	Goshawk and Spotted Owl Protected Activity Centers	area
USFS	Bald Eagle Management Areas	
USFWS/CDFG	Holland Vernal Pool Complexes	
ICE/USFS	SNEP: California Spotted Owl	USFS Pacs better
Terrestrial Habitat Classifications		
CDFG	CWHR species habitat	
CDFG	BIOS database: Riparian Habitats, Birds, Raptors (Sierra Nevada Foothills, CWHR)	
USFS	Special Interest Areas	
USFS	Old Forest Emphasis Areas	
ICE	Jepson Ecoregions	
USFS	Wildland /Urban intermix	
Aquatic Habitats		
USFWS	National Wetlands Inventory	
SMUD	Fish passage barriers (http://hydrorelicensing.smud.org)	
ACOE	Wetland data	
Terrestrial Wildlife Habitats		
EDC	OWMP Priority Conservation areas	
USFS	Deer Emphasis Areas	
Audubon	Important Bird Areas (none in study area)	
CWHR	Species Habitat Requirements	
Plant Habitats		

USFS	Critical Plant Habitat	(none in Study area)
NRCS	Soil Types	
Administrative Boundaries		
CDFG	Sierra Nevada Forest Plan Boundary	
EDC	Important Biological Corridors	
EDC	Pine Hill Preserve	
EDC	Various other administrative boundaries	
Agencies	Various other administrative boundaries	
Physical Features		
USGS	National Elevation Dataset 10 meter - Digital Elevation Model	
USGS	National Hydrography Dataset - geodatabase of waterbodies, streams, and other aquatic features	
Natural Processes		
CalFire	Various Fire-related data; fuel loads, threat, etc.	
FEMA	100-year flood plains	
Fish and Wildlife Occurrences		
SMUD	Fish and other wildlife surveys for re-licensing	
EID	Fish and other wildlife surveys for re-licensing	
PCWA	Fish and other wildlife surveys for re-licensing	
Others	Wildlife and birds	
CDFG	Mountain lion observations and depradation permits (contacted, waiting for response)	

2.0 Updating the Five Elements of the Initial Inventory Map

2.1 Habitats That Support Special-status Species

The existing Initial Inventory Map prepared by the County used the California Natural Diversity Database (CNDDB) point data, USFWS Critical Habitat, and the Pine Hill Preserve area, to show special-status species. For the map update, SEA utilized the most current versions of these same data sources as well as U. S. Forest Service (USFS) and Natural Resource Conservation Service (NRCS) data sources. This includes both the original and the recently proposed changes to the areas of Critical Habitat for the California red-legged frog (*Rana aurora draytoni*) (CRLF) in El Dorado County.

CNDDB: Where appropriate, the latest CNDDB area (polygon) data was used as the information layer rather than the point data (CDFG, November, 2009). The polygon data can be more representative of the actual area surveyed; however it should be noted that there are accuracy levels associated with the polygons so that some of the areas are not very representative of the actual location of the occurrence. These are typically the large circular areas identified on the map. Also, because the CNDDB shows only occurrences based on areas that have been surveyed or locations where someone observed a particular species, it is not a comprehensive

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mapping source for habitat that supports special status species. Based on research of the current data, the map was updated to show the extent of potential habitat for special-status species where quality information is available.

USFS Database: In addition to the CNDDB polygons, data from the USFS on special-status species was included on the map. These areas represent survey data from USFS biologists and are accurate representations of habitat. This data includes sensitive plant species occurrences, northern goshawk and spotted owl protected activity centers and deer emphasis areas. Also included from the USFS database are botanical special interest areas under the management of the USFS. These include areas of unique habitat such as serpentine rock outcrops. The USFS data is limited to areas near the eastern edge of the study area.

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NRCS Data Base: For some of the rare plant species known to occur on unique or rare soils, NRCS soil data for western El Dorado County was used to display potential habitat. Soils with unusual chemistry often support a unique community of plants that are tolerant of the extreme conditions in the soil. Areas of ultramafic (composed of entirely or almost entirely of ferro magnesian minerals) parent rock, including serpentine and gabbroic soils, are included because a variety of rare plants are associated with these soils. The Pine Hill formation within the Pine Hill preserve is a well known example of this habitat type. The update to the map includes other less-well known areas within the study area. Vegetation data representing chaparral communities was intersected with the above soil polygons to show potential locations of the special-status natural communities; Gabbroic Northern Mixed Chaparral and Mixed Serpentine Chaparral.

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INRMP Phase II Mapping Considerations: To better delineate habitats for special-status species, SEA began creating a database that combined CalVeg vegetation data with the California Wildlife Habitat Relationship (CWHR) species data. These datasets were obtained from the California Department of Forestry and Fire Protection (Calfire) and the California Department of Fish and Game (CDFG), respectfully. The CDFG has developed a model for determining habitat suitability for vertebrates based on the CWHR vegetation classifications and species habitat requirements. This system uses a unique scheme to classify all the habitat types in California, including terrestrial, aquatic, natural, and altered habitats. A complete list of the CWHR vegetation types found in the study area is included in Table 2.

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Calfire, in coordination with the USFS has used remotely sensed data with some field verification to produce a spatial dataset called CalVeg. This is a comprehensive classification of vegetation types across the entire state at a 30m pixel resolution. The minimum mapping unit is designated as 2.5 acres. This data uses CWHR habitat types allowing users to evaluate mapped areas for specific species based on the CWHR model.

Table 2. INRMP Study Area: Acreage Mapped using CalVeg Data

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CWHR Code	CWHR HABITAT TYPE	Acreage
AGS	Annual Grassland	78,401
BAR	Barren Land	2,638
BOP	Blue Oak Foothill Pine	12,943
BOW	Blue Oak Woodland	42,434
CPC	Closed Cone Pine/Cypress	315
CRC	Chamise/Redshank Chaparral	3,672
CRP	Agricultural Crops	5,388
DFR	Douglas Fir	62,284
LAC	Lacustrine	7,807
MCH	Mixed Chaparral	32,171
MCP	Montane Chaparral	1,501
MHC	Montane Hardwood Conifer	34,183
MHW	Montane Hardwood	155,891
MRI	Montane Riparian	745
PPN	Ponderosa Pine	67,644
SMC	Sierran Mixed Conifer	25,797
URB	Urban	15,739
VOW	Valley Oak Woodland	3,434
WTM	Wet Meadow	27

The CWHR system uses a large number of variables related to habitat type to define a set of characteristics about the needs of each species in the model. While some of the specific habitat requirements have not been mapped in the CalVeg data, the variables that have been mapped in the CalVeg database can be used to select habitat types based on vegetation requirements for each special-status species. The primary set of variables that were used include: CWHR type (example, blue oak woodland); size class of the dominant overstory (5 classes); and density class (4 classes, S, P, M, D). By combining the species' data from the CWHR and the CalVeg data on habitat types, a database specific for the INRMP study area was created. For each special-status species with data available in the CWHR, the index value defining habitat in the CalVeg database was entered. Habitat is indexed from 0 (least suitable) to 1.0 (most suitable) in CWHR. Only habitat index values greater than 0.5 were selected for the database since lower values indicate a lower probability of suitable habitat. Where available, species range data created by the CWHR was used to further define the potential habitats for each species.

Special-status species in the INRMP Study Area were selected from Tables 5.12-2 and 5.12-3 found in the Draft EIR for the 2004 General Plan and from the latest CNDDB data (Table 3).

Table 3. Special-Status Wildlife Occurring or Potentially Occurring in INRMP Study Area

Species	CDFG[1]	USFWS[2]	CNPS[3]	DEIR[3]	CNDDB[4]
Northwestern pond turtle *Actinemys marmorata marmorata*	CSC	--		Y	Y
California (coast) horned lizard *Phrynosoma coronatum frontale*	CSC	--		Y	N
California red-legged frog *Rana aurora draytonii*	CSC	FT		Y	Y
Foothill yellow-legged frog *Rana boylii*	CSC	--		Y	Y
Hardhead *Mylopharodon conocephalus*	CSC	--		N	N
Cooper's hawk *Accipiter cooperii*	--	--		Y	N
Northern goshawk *Accipiter gentilis*	CSC	--		Y	Y
Sharp-shinned hawk *Accipiter striatus*	--	--		Y	N
Tricolored blackbird *Agelaius tricolor*	CSC	--		Y	Y
Golden eagle *Aquila chrysaetos*	CSC/FP	--		Y	N
Burrowing owl *Athene cunicularia*	CSC	--		Y	N
Northern harrier *Circus cyaneus*	FP	--		Y	N
Great egret *Ardea alba*	--	--		N	Y
White-tailed kite *Elanus leucurus*	FP	--		Y	N
Merlin *Falco columbarius*	--	--		Y	N
Bald eagle *Haliaeetus leucocephalus*	SE/FP	Delisted		Y	Y
Yellow-breasted chat *Icteria virens*	CSC	--		Y	N
Loggerhead shrike *Lanius ludovicianus*	CSC	--		Y	N
California spotted owl *Strix occidentalis occidentalis*	CSC	--		Y	N

Southwestern river otter *Lontra canadensis sonorae*	CSC	--		Y	N
American badger *Taxidea taxus*	CSC	--		N	N
Townsend's big-eared bat *Corynorhinus townsendii*	CSC	--		Y	N
Fringed myotis *Myotis thysanodes*	--	--		Y	Y
Yuma myotis *Myotis yumanensis*	--	--		Y	Y
South Forks ground beetle *Nebria darlingtoni*	--	--		N	Y
Gold rush hanging scorpionfly *Orobittacus obscurus*	--	--		N	Y
Button's Sierra sideband *Monadenia mormonum buttoni*	--	--		Y	Y
Tight coin (Yates'snail) *Ammonitella yatesii*	--	--		N	Y
Blennosperma vernal pool andrenid bee *Andrena blennospermatis*	--	--		N	Y
Vernal pool andrenid bee *Andrena subapasta*	--	--		N	Y
Alabaster Cave harvestman *Banksula californica*	--	--		N	Y
Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	--	FT		Y	Y
Cosumnes spring stonefly *Cosumnoperla hypocrena*	--	--		N	Y
Vernal pool tadpole shrimp *Lepidurus packardi*	--	FE		N	N
Vernal pool fairy shrimp *Branchinecta lynchi*	--	FT		Y	Y
PLANTS					
Jepson's onion *Allium jepsonii*	--	--	1B.2	N	Y
Nissenan manzanita *Arctostaphylos nissenana*	--	--	1B.2	Y	Y

Big-scale balsamroot *Balsamorhiza macrolepis* var. *macrolepis*	--	--	1B.2	Y	Y
Pleasant Valley Mariposa lily *Calochortus clavatus*var. *avius*	--	--	1B.2	Y	Y
Stebbins's morning glory *Calystegia stebbinsii*	SE	FE	1B.1	Y	Y
Pine Hill ceanothus *Ceanothus roderickii*	SR	FE	1B.2	Y	Y
Red Hills soaproot *Chlorogalum grandiflorum*	--	--	1B.2	Y	Y
Brandegee's clarkia *Clarkia biloba brandegeeae*	--	--	1B.2	Y	Y
Pine Hill flannelbush *Fremontodendron decumbens*	SR	FE	1B.2	Y	Y
El Dorado bedstraw *Galium californicum* spp. *sierrae*	SR	FE	1B.2	Y	Y
Parry's horkelia *Horkelia parryi*	--	--	1B.2	Y	Y
Saw toothed lewisia *Lewisia serrata*	--	--	1B.1	Y	Y
Stebbins's phacelia *Phacelia stebbinsii*	--	--	1B.2	Y	Y
Oval leaved viburnum *Viburnum ellipticum*	--	--	2.3	Y	Y
El Dorado mule-ears *Wyethia reticulata*	--	--	1B.2	Y	Y
Mariposa clarkia *Clarkia biloba* ssp. *australis*	--	--	1B.2	N	Y
Butte County fritillary *Fritillaria eastwoodiae*	--	--	3.2	N	Y
Bisbee Peak rush-rose *Helianthemum suffrutescens*	--	--	3.2	N	Y
Layne's ragwort *Packera layneae*	SR	FT	1B.2	Y	Y
Hartweg's golden sunburst *Pseudobahia bahiifolia*	--	--	1B.1	N	Y
Sanford's arrowhead *Sagittaria sanfordii*	--	--	1B.2	N	Y
Oregon fireweed *Epilobium oreganum*	--	--	1B.2	Y	N

Special Habitats Occurring in INRMP Study Area	
Central Valley Drainage Hardhead/Squawfish Stream	
Central Valley Drainage Resident Rainbow Trout Stream	
Sacramento-San Joaquin Foothill/Valley Ephemeral Stream	
Gabbroic northern mixed chaparral	
Serepentic mixed chaparral	

1 California Department of Fish and Game (CDFG)

SE State listed as Endangered; ST State listed and Threatened; SR State listed as Rare; FP Fully Protected; CSC California Species of Concern

2 U.S. Fish and Wildlife Service (USFWS)

FE Federally listed as Endangered; FT Federally listed as Threatened; FC Federal Candidate for listing

3 California Native Plant Society (CNPS)

1B Plants Rare, Threatened , or Endangered in California and elsewhere

2 Plants Rare, Threatened, or Endangered in California, but more common elsewhere

3 Need more information about plant

.1 – Seriously threatened ; .2 Fairly threatened; .3 Not very threatened

3 DEIR

Listed in Draft EIR for 2004 El Dorado County General Plan & likely within study area

4 CNDDB

Listed in California Natural Diversity Database within study area

The CalVeg data does have limitations as to the accuracy of some vegetation types but this is the best available data for the INRMP study area. For example, the data does not map the full extent of riparian habitats, other aquatic habitats, agriculture, or urban areas. In general, the habitat maps represent a large range in which the species could be found. Comparing and combining data from the two sources, CWHR andCalVeg proved to be very laborious requiring extensive manual data entry and using multiple GIS queries to create a database. Completing this process and refining these maps to better understand the implications of planning decisions on these species will require additional modeling beyond the scope of Phase I of the project; however, it is anticipated that this effort would be included as a part of Phase II.

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2.2 Aquatic Environments Including Lakes, Streams, and Rivers

The p data source utilized to produce this map is the National Hydrography Dataset from the USGS. This data includes a thorough inventory of intermittent and perennial streams, bodies of water, and man-made water conveyance structures (e.g., canals). It shows some ephemeral streams but the list of ephemeral water courses is not complete. This data provides a starting point for identifying stream zones and major aquatic habitats, especially for fish and amphibians.

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It should not be considered a comprehensive survey of aquatic habitat and site specific analysis is necessary to document the presence or absence of aquatic environments.

The US Army Corps of Engineers (Corps) has initiated a large scale aquatic resource inventory that includes El Dorado County. The following excerpt is from the Corps' website (USACOE 2010):

> *The purpose of the proposed work is to inventory aquatic resources found in the Six County Area, including ponds, lakes, streams, wetlands and other bodies of water. The study will identify, characterize, and classify aquatic resources through a combination of watershed assessment, remote sensing, spatial analysis, and field work. To the extent possible, the study will incorporate existing data sets and be sensitive to and consistent with on-going initiatives in the Six County Area, including Habitat Conservation Plans (HCPs) and large-scale mitigation strategies, as well as regional planning efforts, like the Sacramento Area Council of Governments' (SACOG) Blueprint and Rural-Urban Connections Strategy (currently in development) and regional transportation plans.*

The product of this work, once completed, can be readily used to update the Aquatic Environments map and also the Wetland and Riparian Habitats map. The Corps has begun work compiling existing information but much more work will be required to collect remotely sensed and field data. A finished product from the Corps is not likely to be ready within the timeline of Phase I of the INRMP.

2.3 Wetland and Riparian Habitats

The wetland and riparian habitat map update is based on data obtained from the USFWS National Wetlands Inventory (NWI) database. The USFWS NWI database is derived from 7.5 minute USGS topographic quadrangle data and aerial photo interpretation. Many seasonal wetlands are not included in this inventory due to the difficulty of mapping these features without extensive ground verification. As mentioned above, the extensive mapping project that has been initiated by the Corps (USACE 2010) is likely to greatly increase the accuracy of mapped wetlands and other aquatic habitats, which in some cases have not been updated since 1977.

Riparian habitat is difficult to map and there are few good sources of data. The CalVeg data is limited in its coverage of riparian habitat, but what exists is shown on the map. A new vegetation dataset is currently being developed by the CDFG (VegCAMP, Vegetation Classification and Mapping Program) using aerial imagery from 2005. This data also uses the CWHR designations to classify habitats. This data appears to much more accurately delineate habitat extents. The region identified as the Northern Sierra Foothills is currently in process and includes a completed portion of northwestern El Dorado County, which has been included on the updated map. When the data collection and editing is finished for VegCAMP (late 2010 – early 2012) the remaining portions of southwestern El Dorado County can be added to the map; however, even the finished dataset will not cover the upper elevations of the study area.

For mapping riparian areas that were not defined in the vegetation mapping, buffer zones along the perennial and intermittent streams were designated. The riparian buffer zones chosen correspond to the General Plan stream setbacks found in Policy 7.3.3.4., which are 100 and 50 feet for perennial and intermittent streams, respectively.

2.4 Important Habitat for Migratory Deer Herds

Spatial information on migratory deer herds is very limited. The only existing source is the CDFG data produced sometime in the 1970's. CDFG staff indicated that there may not have been any recent updates to that data (Craig Stowers, pers. communication). Significant changes have occurred in El Dorado County since those maps were produced. These changes, including increases in population and traffic have likely had some effect on the current distribution of migratory deer herds. Effects could include changes to the ratios of migratory versus resident deer populations, but there have been no studies to verify these changes, and there is no additional population distribution data to update the map.

The CWHR database provides information on suitable habitat types for mule deer but this does not specifically identify habitat for migratory deer. The USFS has mapping data on "Deer Emphasis Areas" that we have included on the map. The only available data on essential areas for migratory deer is the original CDFG map.

2.5 Large Expanses of Native Vegetation

The CalFire CalVeg data from 2000 (described above) represents the most accurate and complete information for the INRMP study area. As mentioned above, CDFG VegCAMP data is more recent and appears to be more accurate in its representations of vegetation communities, but the complete set of data is not available for use in this mapping effort.

The term "large expanses" is subjective and is dependent upon individual species requirements and specific planning goals. A large expanse for a mouse for example, is different than a large expanse for a deer. Wildlife species are also sensitive to road densities and parcel development (disturbance) to varying degrees (e.g., Rubbo and Keisecker, 2005). Species that need large areas to hunt or forage, or require specific habitat elements that are removed by increasing urban, suburban or exurban (areas beyond the suburbs) development, tend to occur less frequently at higher road densities. Some species such as raccoons, skunks, and scrub jays adapt well to urbanization and may not be affected except at the highest levels of disturbance.

If the goal of defining a large expanse of native vegetation is to determine the largest expanses of a specific plant community, then what constitutes large is dependent upon the sizes of the patches of that type of vegetation. Large expanses of vegetation communities with a small total acreage and limited distribution will be much smaller and fewer in number than a very common and extensive plant community. Plant communities with relatively limited distribution are better mapped as special-status plant communities and are shown on the Habitats That Support Special-status Species Map (see Section 2.1).

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Deleted: The definition of "large expanses", recently submitted to the Board of Supervisors for approval, was used to guide the mapping process. The definition, which was approved by PAWTAC, reads as follows:¶
¶
"The amount of less-disturbed, contiguous habitat needed for both narrowly occurring and wide-ranging species or to maintain natural processes, where the extent of land needed depends on the species or natural process."¶
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In order to prepare a map delineating "large expanses", threshold values were chosen from road density and parcel development and combined to create a map of the largest contiguous patches of undisturbed native vegetation. Simply put, areas that had high road densities and/or high parcel development were removed from the map and what was left was identified as large expanses. This process is somewhat artificial and does not necessarily reflect the reality of habitat, ecosystem, or ecological processes, but for the purposes of this study, the process establishes the largest areas of contiguous, less disturbed habitat. The process used to create this map is summarized in Figure 1.

The first step in the process of mapping large expanses of native vegetation was to create a map of relative disturbance within the County. This map was prepared using parcel size and road density as determining factors. The results were displayed as a continuum and were presented to the ISAC and PAWTAC Committees (Administrative Draft, 2/18/10). Road densities were determined by creating a road weighting scheme described in Table 4. Based on committee input, the disturbance map was refined to include the development status of each parcel using parcel development status provided by the County, and assigning a value for each parcel type, with 1 representing ' highly developed' parcels and 2 representing 'undeveloped' parcels. Road density, parcel size and development status were all given values ranging from 1 to 10. These three layers were combined using the GIS and the output was a disturbance gradient map (Figure 2) with values from 3 (least developed) to 30 (most developed). After receiving clarification from the El Dorado County Board of Supervisors on March 16, 2010, SEA determined that the Disturbance Gradient Map was better suited as a planning tool for later Phase I tasks and not a large expanses map per se, so a slightly revised process was developed and is described below.

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Selecting a single cutoff value to define large expanses would be arbitrary and inconsistent with the adopted definition. As the definition indicates, large expanses are species- and natural process-specific, representing a continuum of spatial requirements that are also dependent on the planning, permitting, or mitigation process. These cutoffs will be defined in Phase II of the INRMP.

2.6 Revised Administrative Draft Large Expanses of Native Vegetation Map

To further refine the map of large expanses of native vegetation, existing County GIS databases for roads and parcels were combined using spatial analysis similar to those described above to represent levels of disturbance. To delineate "large expanses", 'thresholds' of disturbance were selected using a combination of road density and parcel size/development. Resulting areas were then displayed by vegetation type and quantified for future Phase I and Phase II tasks.

Switalski (2006) reviews existing literature on the effects of road density. Most of the literature describes road density effects on wide-ranging predators such as wolves or important large game animals like Elk and indicate optimum road density values below 0.6 to 2.5 km/km2. Most of these studies are also from more sparsely populated states. For this map, SEA chose a higher threshold of 3km/km2 to more accurately reflect a wider variety of wildlife (smaller and less wide ranging species) in a more developed region such as El Dorado County.

Deleted: To create a map showing large expanses of native vegetation, existing databases containing road density and parcel size were combined to represent levels of disturbance.

For the revised large expanses map, the first step was to create a layer of road density based on the most recent version of the GPS-captured road data from El Dorado County. Roads were weighted based on their class, number of lanes, and surface (as identified in the County's GIS database). Five classes were used to weight the roads (Table 4). The resulting road density layer, expressed in km/km2, exaggerates density around heavily-used roads such as Highway 50.

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The purpose of the weighting is to differentiate between a roadway such as Highway 50 that represents a considerable barrier to animal movement and a minor country road that would have less impact on species movement.

Table 4. Road Weighting Scheme for Density Analysis

Class	Lanes	Paved	Applied Weighting
Highway	>=3	Y	5
Highway	<=2	Y	4
Major	>=4	Y	4
Major	<=3	Y	3
Minor	All	Y	2
Minor	All	N	1
None	All	all	1

Using spatial analyst tools in ArcGIS, SEA created a density raster using the road line data. A 30m cell size was used to be consistent with the vegetation data displayed on other maps. A search radius of 500m was chosen and the above weighting was used to calculate km of road per square km. Larger and smaller search areas were tested. Larger areas (e.g., 1000 m) tend to give an insupportably high level of disturbance. Smaller search areas did not capture the effect of multiple roads relatively close together (e.g., <500m). 500 m is consistent with other studies and data on negative edge effects due to roads and other barriers (Jongman and Pungetti 2004). The resulting road density data was classified into two classes in order to identify areas of least disturbance due to roads. A value of 3 km/km^2 was used as the threshold; areas with road density above 3km/km2 were considered developed.

Current parcel data (polygons) was obtained from the County's GIS Department. The development status for each parcel was evaluated using the attribute field "USE_CD_LIT". Each development classification in the parcel data was assigned a value of 1 or 2 based on development status. The development status data also contains classifications of parcel size built in. A "1" was assigned to designations that indicated relatively minor development, if any, on the parcel; whereas, a designation of "2" represents parcels with significant development or in some cases a very high probability of development. Table 5 lists the attribute classifications under the field "USE_CD_LIT" in the County's parcel data and SEA's assigned development status (1 or 2).

The road density and parcel development layers were then combined to create a composite layer showing areas with road density under 3km/km^2 and low parcel development (as defined in Table 5). These areas represent large expanses of relatively undisturbed land. Native vegetation communities from the CalVeg data were intersected with the "large expanses" polygons to create the revised Admin Draft Large Expanses of Native Vegetation Map. Non-native vegetation communities and non-vegetation polygons (urban areas, barren, agricultural areas, eucalyptus groves, lacustrine) were eliminated from the CalVeg data. The resulting layer was checked to make sure all vegetation communities within the study area are represented. Table 6 shows the

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Deleted: The road density raster was then reclassified into 15 classes using the Natural Breaks algorithm in the ArcGIS. This algorithm "…identifies break points by picking class breaks that best group similar .alues and maximize the differences between classes."(ArcGIS version 9.3). ¶

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percentage of each vegetation type in the study area represented within the "large expanses" areas.

Table 5. County Parcel Development Status

Parcel Development Status (USE_CD_LIT*)	Assigned class
ENV. SENSITIVE LAND - RESTRICTED USE	1
FARMLAND SECURITY ZONE (CONTRACT)	1
FARMLAND SECURITY ZONE (NON-RENEWAL)	1
MOBILE HOME ON RENTED LAND	1
RESIDENCE ON LEASED LAND	1
RURAL MOBILE HOME 2.51+ AC.	1
RURAL NON-RES. IMPROVEMENT 2.51-20.0 AC.	1
RURAL RES. 2.51-20.0 AC. 1 SF UNIT	1
RURAL RES. 20+ AC. 1 RES. UNIT	1
RURAL RES. LAND 20+ MINOR NON-RES IMPR	1
RURAL RESTRICTIVE ZONING - CLCA (ACTIVE)	1
RURAL RESTRICTIVE ZONING - NON-RENEWAL	1
SUBJ. TO OPEN SPACE CONTRACT (NOT CLCA)	1
TEMPORARY USE CODE FOR PROJECT 184	1
TIMBER PRESERVE ZONING - ACTIVE	1
TIMBER PRESERVE ZONING - NON-RENEWAL	1
UNASSIGNED	1
VAC RURAL RES LAND 2.51-20.0 AC. 1 UNIT	1
VACANT RECREATIONAL LAND	1
VACANT RES. LAND <=2.5 AC. 1-3 UNITS	1
BAR, TAVERN	2
CAMPGROUNDS	2
CEMETERIES	2
COMMUNITY ORIENTED FACILITIES	2
CONDOMINIUMS & TOWNHOUSES	2
FIRE SUPPRESSION FACILITIES	2
HEAVY MANUFACTURING	2
HOSPITALS & CONVALESCENT HOSPITALS	2

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LIGHT MANUFACTURING	2
MANUF. HOMES <=2.5 AC. (MOBILES)	2
MARINAS	2
MEDICAL/DENTAL/VET OFFICES	2
MINERAL RIGHTS	2
MINI-WAREHOUSES (MINI-STORAGE)	2
MISC. IMPROVED COMMERCIAL	2
MISC. IMPROVED INDUSTRIAL PROPERTY	2
MISC. IMPROVED RECREATIONAL	2
MOBILE HOME PARKS	2
MOTEL, HOTEL	2
MULTI-RESIDENTIAL 2-3 UNITS	2
MULTI-RESIDENTIAL 4+ UNITS	2
NON-RES. IMPROVEMENTS <=2.5 AC.	2
OFFICES	2
PARKING LOT	2
PLACE OF WORSHIP	2
PLANNED UNIT DEVELOPMENTS	2
PRIV. HYDROELECTRIC GENERATION PLANT	2
PUBLIC UTILITY (ON STATE ASSESSED ROLL)	2
RESTAURANT	2
RETAIL STORES <=5,000 SQ. FT.	2
RETAIL STORES >15,000 SQ. FT.	2
RETAIL STORES 5,001-15,000 SQ. FT.	2
RETIREMENT HOUSING	2
SCHOOLS - LARGE (101+ STUDENTS)	2
SCHOOLS - MEDIUM (13-100 STUDENTS)	2
SCHOOLS - SMALL (1-12 STUDENTS)	2
SINGLE FAM. RES. <=2.5 AC.(INC. MAN. HMS	2
SUPERMARKETS	2
VACANT COMMERCIAL LAND	2
VACANT INDUSTRIAL LAND	2
VACANT MULTI-RES. LAND 4+ UNITS ALLOWED	2
WAREHOUSES	2
ZERO LOT LINE, HALF-PLEX, TRI-PLEX, ETC.	2

* Field name from County Parcel Database
1 = relatively undeveloped; 2 = developed

Table 6. Acreage of CWHR Habitat Types Within Large Expanses

CWHR Type	Study Area Acreage	Large Expanses Acreage	Percentage in Large Expanses
Annual Grassland	78,401	35,251	45%
Blue Oak Foothill Pine	12,943	4,453	34%
Blue Oak Woodland	42,434	21,563	51%
Closed Cone Pine/Cypress	315	262	83%
Chamise/Redshank Chaparral	3,672	2,891	79%
Douglas Fir	62,284	46,443	75%
Mixed Chaparral	32,171	20,874	65%
Montane Chaparral	1,501	690	46%
Montane Hardwood Conifer	34,183	19,481	57%
Montane Hardwood	155,891	84,761	54%
Montane Riparian	745	283	38%
Perennial Grassland	14	1	7%
Ponderosa Pine	67,644	42,947	63%
Sierran Mixed Conifer	25,797	16,247	63%
Valley Oak Woodland	3,434	819	24%
Wet Meadow	27	11	41%

Deleted: Acreages were calculated to make all parcels (polygons) have a value. The parcel data was converted to a 30m cell size raster using the acreage field to assign values. This raster was reclassified into 10 classes based on parcel size, with larger acreages assigned lower numbers to be consistent with the road density layer (larger values = greater disturbance). One discrepancy that arises in the parcel data is around road right-of-ways. These areas can be large creating abnormally high acreage values along roads.¶
These two layers were added together to create a combined disturbance layer with values ranging from 2 to 25. Adding the parcel data to the road density layer accounts for some of the moderate levels of disturbance associated with exurban development that may not be apparent in areas with relatively few roads. Attachment 1 contains explanations and tables of values for road densities and parcel size found on the Large Expanses of Native Vegetation map.¶

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By defining these areas broadly using threshold values, the resulting map does not take into consideration species-specific habitat requirements or account for habitats with relatively small, dispersed patches. For this reason, the map displaying special-status species and habitats (as well as the other Policy 7.4.2.8 maps of important habitat) must be used in combination with the large expanses map to create habitat linkages, identify conservation areas, or otherwise develop conservation strategies. As the INRMP is developed and indicator species are chosen and specific planning objectives are created, the Large Expanses of Native Vegetation Map (and the

other maps) can be used along with the disturbance gradient map (Figure 2) to find linkages between the large patches of habitat.

Deleted: Large expanses of native vegetation can be determined for a selected species, habitat, or natural process from the above disturbance layer using the vegetation data from CalVeg. By eliminating the non-native vegetation communities from CalVeg (urban areas, agricultural areas, eucalyptus groves) and selecting a specific level of disturbance for a specific planning (e.g., species or natural process) need, a custom map of large expanses can be created by intersecting the two sets of data. ¶
This approach avoids the pitfalls of a one-size-fits-all approach for the idea of large expanses, which would not accurately reflect the reality of habitat, ecosystem, or ecological processes. As the INRMP is developed and focal species are chosen and specific planning objectives are created, the large expanses of native vegetation can individually or collectively be defined based on the selected species and natural process(es).¶

3.0 References

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Attachment 1. Parcel and Road Density Values for Large Expanses of Native Vegetation Map Administrative Draft Version from 2/18/2010

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Parcel Data Values*		Map A	Road Density Values**			Map B
				Density (kM/kM2)		
Value	**Acres**		**Value**	**FROM**	**TO**	
1	500+	Least Disturbed	1	0.0	0.87	Least Disturbed
2	500		2	0.9	2.62	
3	240		3	2.6	4.37	
4	160		4	4.4	6.29	
5	120		5	6.3	8.39	
6	80		6	8.4	10.67	
7	40		7	10.7	13.29	
8	20		8	13.3	16.09	
9	10		9	16.1	18.88	
10	<= 4.5	Most Disturbed	10	18.9	21.68	
			11	21.7	24.65	
			12	24.7	27.97	
			13	28.0	31.82	
			14	31.8	36.19	
			15	36.2	44.76	Most Disturbed

*Parcel data is from the El Dorado County Assessor's Office (GIS).

Polygon vector data was converted to raster format based on calculated acreages of each parcel using a 30m cell size.

The raster was reclassified according to the above table in order to create distinct parcel classes.

**Road Density was calculated from the most recent GIS data obtained from the El Dorado County GIS department in February, 2010.

A line density was calculated using the spatial analyst tools in ArcGIS. Parameters are as follows: Cell size 30m; Search radius of 500m; and roads were weighted 1-5 based on type, lanes , and surface, with higher numbers equating to large, heavy traffic roads.

The main display contains the results of adding the parcel size (Map A) and road density (Map B) layers to create a raster with values ranging from 2 to 25; higher numbers equate to greater disturbance.