

El Dorado County
Integrated Natural Resources Management Plan

Revised Draft
Habitat Inventory and Mapping Report

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Executive Summary

As a required mitigation measure under El Dorado County's (County) 2004 General Plan (Plan), the County is preparing an Integrated Natural Resources Management Plan (INRMP) that will help avoid or compensate for environmental impacts from development under the Plan. The INRMP will be completed in two phases. Under Phase I, the County will prepare the scientific foundation and develop approaches to writing the INRMP, and under Phase II, they will prepare and implement the INRMP. The County's Plant and Wildlife Technical Advisory Committee (PAWTAC) and the INRMP Stakeholders Advisory Committee (ISAC) were formed to provide input throughout both phases of the process and thus facilitate the development of the INRMP.

This Habitat Inventory and Mapping Report is the first of four reports being prepared by the County as a part of Phase I of the INRMP. This report and its accompanying maps update the existing INRMP Initial Inventory Map, which was prepared by the County in March 2008. The subsequent three reports will include developing a list of plant and animal indicator species, evaluating wildlife movement corridors, and developing an INRMP Implementation Report that will identify recommendations for Phase II.

To update the existing Initial Inventory Map, the County gathered additional data, met several times with the PAWTAC and the ISAC, and revised the map to show the best data that is currently available. As required under General Plan Policy 7.4.2.8 (A), the Important Habitat Inventory Map consists of five basic elements:

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.

For graphic clarity, each of these five elements is displayed on a separate map. The five maps are included as figures 1 - 5. Although they are presented as separate maps, all of the information is part of the same Geographic Information System (GIS) database, which will be important for Phase II analysis and implementation of the INRMP. The process used to create each of the five maps is described below. More detailed descriptions of these processes can be found within the main body of the report.

1. Habitats that Support Special-Status Species

The original Initial Inventory Map prepared by the County used the California Natural Diversity Database (CNDDDB) point data, U.S. Fish & Wildlife Service (USFWS) Critical Habitat, and the Pine Hill Preserve area to show special-status species. For the map update, the County utilized the most current versions of these same data sources as well as U. S. Forest Service (USFS) Natural Resource Conservation Service (NRCS), and several other 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.

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2. Aquatic Environments including Lakes, Streams, and Rivers;

The data source utilized to produce this map is the National Hydrography Dataset from the U.S. Geological Survey (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 comprehensive.

3. Wetland and Riparian Habitats

The wetland and riparian habitat map update is based on the USFWS National Wetlands Inventory (NWI) database. The USFWS NWI database is derived from 7.5-minute USGS topographic 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.

4. Important Habitat for Migratory Deer Herds

Information on migratory deer herds is very limited. The only existing source is the California Department of Fish & Game (CDFG) data produced in 1990 from reports prepared in the 1970s and 80s. CDFG staff indicated that there have not been any recent updates, although significant land use changes have occurred since those maps were produced. These changes, including increases in human population and traffic, have likely affected the current distribution of migratory deer herds.

5. Large Expanses of Native Vegetation

A large expanse of native vegetation is dependent upon the vegetation type and the species utilizing the habitat provided by the vegetation type. Therefore, a large expanse of oak woodland is different in size than a large expanse of a vegetation type with relatively limited **distribution** such as serpentine chaparral. Similarly, a large expanse **of native vegetation** for a **population of** mule deer is larger than that required **for a population of** California horned-lizard. Phase I mapping of the large expanses of native vegetation focused on identifying all areas of vegetation that are relatively undisturbed. Phase II will consider species-specific habitat requirements to determine conservation strategies and potential mitigation.

To show **large** expanses of undisturbed areas, the County first mapped areas that have extensive land development and/or road networks. The remaining areas were then shown as large expanses of native vegetation using existing vegetation mapping data.

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1.0 Updates to the Policy 7.4.2.8 Initial Inventory Map

Under Phase 1 of the El Dorado County (County) Integrated Natural Resources Management Plan (INRMP), the County is charged with updating the Policy 7.4.2.8 Initial Inventory Map. Using scientific literature, input received from the Plant and Wildlife Technical Advisory Committee (PAWTAC) and INRMP Stakeholders Advisory Committee (ISAC), and analyzing the use of the map within the context of the General Plan and the EIR, the County identified 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:

6. Habitats that support special-status species;
7. Aquatic environments including lakes, streams, and rivers;
8. Wetland and riparian habitats;
9. Important habitat for migratory deer herds; and,
10. Large expanses of native vegetation.

In updating the map, the County's goal is to delineate the five categories of Policy 7.4.2.8 resources using existing information without field verifying presence, or characterizing relative importance, which may be goals of the Phase II INRMP activities. Similar to a mineral or other resource inventory, the 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.

For graphic clarity, the County'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 interpreting the terms "large expanses" and "native vegetation" and then displaying the information on a map using the best available data sources.

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 the County and the PAWTAC/ISAC. The highlighted data sources were selected to prepare the Administrative Draft of the map updates.

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

Vegetation Data		
<i>Source</i>	<i>Data Description</i>	<i>Notes</i>
CDFG	New CWHR vegetation mapping (Only partial study area available)	Used for riparian map
CalFire	CalVeg - 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
CDFG	Additional CRLF locations from CDFG staff biologist	
USFWS	Proposed new Critical Habitat for California Red-legged Frog	2009
USFWS	Core Recovery Areas for CRLF and Gabbro-endemic Plants	
SMUD	Amphibian species surveys for re-licensing (http://hydrorelicensing.smud.org)	Mostly outside study area
USFS	Goshawk and Spotted Owl Protected Activity Centers	
USFWS	Endangered Species List	
USFS	Bald Eagle Management Areas	
USFS	Sensitive Plant Location Database	
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	Not available
Terrestrial Wildlife Habitats		
EDC	OWMP Priority Conservation areas	

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USFS	Deer Emphasis Areas	
Audubon	Important Bird Areas	None in study area
CDFG	Migratory Deer Boundaries	
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 deprecation permits	Could not locate

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 (CNDDDB) point data, U.S. Fish and Wildlife Service (USFWS) Critical Habitat, and the Pine Hill Preserve area, to show special-status species. For the map update, the County 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. A detailed description of each of these data sources is provided below.

CNDDDB: Where appropriate, the latest CNDDDB 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 CNDDDB shows only occurrences based on areas that have been surveyed or locations where someone observed a particular species, it is not a comprehensive 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 CNDDDB 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 (PACs) 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.

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 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-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.

Other Data Sources: Several other data sources were used to show special-status species habitat information on this map. These are indicated in Table 1 above. One such source is a new verified occurrence of California red-legged frog (CRLF) in the vicinity of Georgetown. This

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location information was provided by a staff biologist at CDFG on a 1:100,000 scale map. The locations shown on the special-status species inventory map are approximate.

A GIS layer of vernal pool complexes prepared by the USFWS in 1990 is also included. Some of the locations shown in this dataset are no longer present due to development and many other vernal pool complexes in the southwest corner of the County are not included in that data.

Several regulatory and administrative boundaries are included as well. The Pine Hill Preserve; El Dorado County Ecological Preserve Boundary and Important Biological Corridors; the USFWS Gabbro-endemic plant core recovery area; the CRLF core recovery areas and critical habitat and public lands (USFS, BLM, State). In addition, the County's Oak Woodland Management Plan (OWMP), Priority Conservation Areas (PCAs) and all CalVeg valley oak woodlands (a County-designated sensitive habitat).

INRMP Phase II Mapping Considerations: To better delineate habitats for special-status species, the County created a database that combined vegetation data with 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 California Wildlife Habitat Relationship (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 and associated acreages found in the study area is included in Table 2.

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. By creating a database that combined the CalVeg vegetation data with the CWHR species data, the County was able to create a database specific to the INRMP study area.

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Table 2. Acreage of CalVeg Vegetation Types in the INRMP Study Area

CWHR Code	CWHR HABITAT TYPE	Acreage
Herbaceous Community		
AGS	Annual Grassland	78,401
WTM	Wet Meadow	27
<i>Sub-total</i>		78,428
Shrub Community		
CRC	Chamise/Redshank Chaparral	3,672
MCH	Mixed Chaparral	32,171
MCP	Montane Chaparral	1,501
<i>Sub-total</i>		37,344
Hardwood Community (Oak)		
VOW	Valley Oak Woodland	3,434
BOP	Blue Oak Foothill Pine	12,943
BOW	Blue Oak Woodland	42,434
MHC	Montane Hardwood Conifer	34,183
MHW	Montane Hardwood	155,891
<i>Sub-total</i>		248,885
Coniferous Community		
CPC	Closed Cone Pine/Cypress	315
DFR	Douglas Fir	62,284
PPN	Ponderosa Pine	67,644
SMC	Sierran Mixed Conifer	25,797
<i>Sub-total</i>		156,040
Riparian Community		
MRI	Montane Riparian	745
<i>Sub-total</i>		745
Non-native Vegetation		
URB	Urban	15,739
BAR	Barren Land	2,638
CRP	Agricultural Crops	5,388
LAC	Lacustrine	7,807
<i>Sub-total</i>		31,572
Grand Total		553,014

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 (e.g., 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 to 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

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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 that are displayed on the map were selected from Tables 5.12-2 and 5.12-3 of the Final EIR for the 2004 General Plan, from the latest CNDDDB data and from locally-experienced biologists. Table 3 represents a complete listing of those species.

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

Species	CDFG ¹	USFWS ²	CNPS ³	FEIR ³	CNDDDB ⁴
Northwestern pond turtle <i>Actinemys marmorata marmorata</i>	CSC	--		Y	Y
California (coast) horned lizard <i>Phrynosoma coronatum frontale</i>	CSC	--		Y	N
California red-legged frog <i>Rana aurora draytonii</i>	CSC	FT		Y	Y
Foothill yellow-legged frog <i>Rana boylei</i>	CSC	--		Y	Y
Hardhead (minnow)* <i>Mylopharodon conocephalus</i>	CSC	--		N	N
Cooper's hawk <i>Accipiter cooperii</i>	WL	--		Y	N
Northern goshawk <i>Accipiter gentilis</i>	CSC	--		Y	Y
Sharp-shinned hawk <i>Accipiter striatus</i>	WL	--		Y	N
Tricolored blackbird <i>Agelaius tricolor</i>	CSC	--		Y	Y
Golden eagle <i>Aquila chrysaetos</i>	CSC/FP	--		Y	N
Burrowing owl <i>Athene cunicularia</i>	CSC	--		Y	N
Northern harrier <i>Circus cyaneus</i>	FP	--		Y	N
Great egret <i>Ardea alba</i>	SA	--		N	Y
White-tailed kite <i>Elanus leucurus</i>	FP	--		Y	N
Merlin <i>Falco columbarius</i>	WL	--		Y	N

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Bald eagle <i>Haliaeetus leucocephalus</i>	SE/FP	Delisted		Y	Y
Yellow-breasted chat <i>Icteria virens</i>	CSC	--		Y	N
Loggerhead shrike <i>Lanius ludovicianus</i>	CSC	--		Y	N
California spotted owl <i>Strix occidentalis occidentalis</i>	CSC	--		Y	N
Southwestern river otter <i>Lontra canadensis sonora</i>	CSC/FP	--		Y	N
American badger* <i>Taxidea taxus</i>	CSC	--		N	N
Ring-tailed cat* <i>Bassariscus astutus</i>	FP	--		N	N
Townsend's big-eared bat <i>Corynorhinus townsendii</i>	CSC	--		Y	N
Fringed myotis <i>Myotis thysanodes</i>	SA	--		Y	Y
Yuma myotis <i>Myotis yumanensis</i>	SA	--		Y	Y
South Forks ground beetle <i>Nebria darlingtoni</i>	SA	--		N	Y
Gold rush hanging scorpionfly <i>Orobittacus obscurus</i>	SA	--		N	Y
Button's Sierra sideband <i>Monadenia mormonum buttoni</i>	SA	--		Y	Y
Tight coin (Yates'snail) <i>Ammonitella yatesii</i>	SA	--		N	Y
Blennosperma vernal pool andrenid bee <i>Andrena blennospermatis</i>	SA	--		N	Y
Vernal pool andrenid bee <i>Andrena subapasta</i>	SA	--		N	Y
Alabaster Cave harvestman <i>Banksula californica</i>	SA	--		N	Y
Valley elderberry longhorn beetle <i>Desmocerus californicus dimorphus</i>	--	FT		Y	Y
Cosumnes spring stonefly <i>Cosumnoperla hypocrena</i>	SA	--		N	Y
Vernal pool tadpole shrimp* <i>Lepidurus packardi</i>	--	FE		N	N

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Vernal pool fairy shrimp <i>Branchinecta lynchi</i>	--	FT		Y	Y
PLANTS					
Jepson's onion <i>Allium jepsonii</i>	--	--	1B.2	N	Y
Nissenan manzanita <i>Arctostaphylos nissenana</i>	--	--	1B.2	Y	Y
Big-scale balsamroot <i>Balsamorhiza macrolepis</i> var. <i>macrolepis</i>	--	--	1B.2	Y	Y
Pleasant Valley Mariposa lily <i>Calochortus clavatus</i> var. <i>avius</i>	--	--	1B.2	Y	Y
Stebbins's morning glory <i>Calystegia stebbinsii</i>	SE	FE	1B.1	Y	Y
Pine Hill ceanothus <i>Ceanothus roderickii</i>	SR	FE	1B.2	Y	Y
Red Hills soaproot <i>Chlorogalum grandiflorum</i>	--	--	1B.2	Y	Y
Brandegee's clarkia <i>Clarkia biloba brandegeae</i>	--	--	1B.2	Y	Y
Pine Hill flannelbush <i>Fremontodendron decumbens</i>	SR	FE	1B.2	Y	Y
El Dorado bedstraw <i>Galium californicum</i> spp. <i>sierrae</i>	SR	FE	1B.2	Y	Y
Parry's horkelia <i>Horkelia parryi</i>	--	--	1B.2	Y	Y
Saw toothed lewisia <i>Lewisia serrata</i>	--	--	1B.1	Y	Y
Stebbins's phacelia <i>Phacelia stebbinsii</i>	--	--	1B.2	Y	Y
Oval leaved viburnum <i>Viburnum ellipticum</i>	--	--	2.3	Y	Y
El Dorado mule-ears <i>Wyethia reticulata</i>	--	--	1B.2	Y	Y
Mariposa clarkia <i>Clarkia biloba</i> ssp. <i>australis</i>	--	--	1B.2	N	Y
Butte County fritillary <i>Fritillaria eastwoodiae</i>	--	--	3.2	N	Y
Bisbee Peak rush-rose <i>Helianthemum suffrutescens</i>	--	--	3.2	N	Y
Layne's ragwort <i>Packera layneae</i>	SR	FT	1B.2	Y	Y

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Hartweg's golden sunburst <i>Pseudobahia bahiifolia</i>	--	--	1B.1	N	Y
Sanford's arrowhead <i>Sagittaria sanfordii</i>	--	--	1B.2	N	Y
Oregon fireweed <i>Epilobium oreganum</i>	--	--	1B.2	Y	N
Special Habitats Occurring in INRMP Study Area					
Central Valley Drainage Hardhead/Squawfish Stream	The special-status habitats here are listed by the CNDDDB and CDFG and are known to occur in the County. The shaded habitats are mapped by CNDDDB and the others were derived from the soil and vegetation databases.				
Central Valley Drainage Resident Rainbow Trout Stream					
Sacramento-San Joaquin Foothill/Valley Ephemeral Stream					
Gabbroic northern mixed chaparral					
Serpentic 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; SA on CDFG's Special Animal List, July 2009; WL – Watch List

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 FEIR

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

4 CNDDDB

Listed in California Natural Diversity Database within study area

* Animals not occurring on the FEIR List or the CNDDDB but known by local biologists to occur in the 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 and CalVeg 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 primary data source utilized to produce this map is the National Hydrography Dataset (NHD) 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. 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 U.S. Army Corps of Engineers (USACE) has initiated a large scale aquatic resource inventory that includes El Dorado County. The following excerpt is from the USACE website (USACE 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 USACE 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 USACE 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 USACE is likely to greatly increase the accuracy of mapped wetlands and other aquatic habitats, which in some cases have not been updated since 1977 (USACE 2010).

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

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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 NHD data described above in Section 2.2 was used to create the buffers. The riparian buffer zones chosen correspond to the General Plan stream setbacks found in Policy 7.3.3.4., which are 100 feet 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 GIS data produced in 1990 from older maps.. The metadata prepared by CDFG for the GIS data describes the data as follows:

*This layer shows critical and non-critical winter and summer ranges, fall holding areas, fawning grounds and migration corridors for deer (*Odocoileus hemionus*) in CDFG Region 2, North Central Region, Ca. In 1990, CDFG Wildlife Biologists compiled these data from the CDFG Migratory Deer Herd Management Plans, biotelemetry studies, personal knowledge, and predicted use of habitats. These data were subsequently digitized onto USGS 15' quadrangle maps to produce this dataset.*

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. Additional information regarding the CDFG GIS data can be found in Appendix A.

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 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,

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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).

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 6.

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 7) with values from 3 (least developed) to 30 (most developed). The County later determined that the Disturbance Gradient Map was better suited as a planning tool for later Phase I tasks and Phase II tasks, and a slightly revised process was developed to produce the final map. That process is presented below.

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

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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, the County 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.

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 exaggerates density around heavily-used roads such as Highway 50. 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.

After reviewing the map with the PAWTAC/ISAC, it was evident that several roads may have been weighted too heavily. For these roads it was noted that several “Major” roads are not paved and/or their classification for paving or lanes was inaccurate. Based on input from the PAWTAC/ISAC and review of the database, these roads are highlighted with a yellow buffer on the map to indicate that the apparent road density and resulting division of large expanses may not be warranted. Rather than removing their effect and changing the classification the divisions caused by these roads have been left to remain consistent with the analysis process.

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, a density raster was created 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., 1,000m) 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). 500m 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 3km/km² 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”.

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Each development classification in the parcel data was then assigned a value of 1 or 2 based on development status. Classifications of parcel size are built into the development status data. 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 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/km² 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.

The CalFire CalVeg data from 2000 (see Section 2.1) 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 was not available for use in this mapping effort.

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

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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
LIGHT MANUFACTURING	2
MANUF. HOMES ≤2.5 AC. (MOBILES)	2
MARINAS	2
MEDICAL/DENTAL/VET OFFICES	2

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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

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Table 6. Acreage of CWHR Habitat Types within Large Expanses

CWHR Code	CWHR HABITAT TYPE	Total Acreage	Large Expanses Acreage	% in Large Expanses
Herbaceous Community				
AGS	Annual Grassland	78,401	35,251	45%
WTM	Wet Meadow	27	11	41%
	<i>Sub-total</i>	78,428	35,262	45%
Shrub Community				
CRC	Chamise/Redshank Chaparral	3,672	2,891	79%
MCH	Mixed Chaparral	32,171	20,874	65%
MCP	Montane Chaparral	1,501	690	46%
	<i>Sub-total</i>	37,344	24,455	65%
Hardwood Community (Oak)				
VOW	Valley Oak Woodland	3,434	819	24%
BOP	Blue Oak Foothill Pine	12,943	4,453	34%
BOW	Blue Oak Woodland	42,434	21,563	51%
MHC	Montane Hardwood Conifer	34,183	19,481	57%
MHW	Montane Hardwood	155,891	87,761	56%
	<i>Sub-total</i>	248,885	134,077	54%
Coniferous Community				
CPC	Closed Cone Pine/Cypress	315	262	83%
DFR	Douglas Fir	62,284	46,443	75%
PPN	Ponderosa Pine	67,644	42,947	63%
SMC	Sierran Mixed Conifer	25,797	16,247	63%
	<i>Sub-total</i>	156,040	105,899	68%
Riparian Community				
MRI	Montane Riparian	745	283	38%
	<i>Sub-total</i>	745	283	38%
Grand Total		521,442	299,976	58%

Large Expanses of Oak Woodlands and the OWMP PCAs

The amount of oak woodlands identified in the Large Expanses Map is approximately 134,000 acres. The PCAs identified in the County's OWMP are mostly located within these large expanses. In the OWMP large expanses of oak woodland were mapped and the total acreage was approximately 219,400 acres (Section D. of Appendix A of the Final OWMP). To create PCAs those large expanses of oak woodland were put through further analysis, considering parcel size, vegetation block size and land use, leaving approximately 40,100 acres of oak woodlands within the PCAs (Table 4-4 in Section H. of Appendix A of the Final OWMP). The PCAs are not large expanses of oak woodlands; they represent a subset of the large expanses to target conservation efforts funded by the in-lieu fee mitigation plan of the OWMP.

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Summary of Large Expanses Map

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 7) to find linkages between the large patches of habitat.

It should also be noted that this map excludes many areas within lightly used or developed parcels that serve as habitat for a variety of species. It also includes many smaller patches of habitat that are relatively undisturbed but may be surrounded by areas of higher disturbance. Both of these types of areas should be considered when developing conservation strategies for the INRMP. The result of this mapping process is a map of the largest contiguous areas of minimally disturbed native vegetation within the study area. The areas shown on the map define “Large Expanses of Native Vegetation” as described in Policy 7.4.2.8.

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

Parcel Data Values*		Map A
Value	Acres	
1	500+	Least Disturbed
2	500	
3	240	
4	160	
5	120	
6	80	
7	40	
8	20	Most Disturbed
9	10	
10	≤4.5	

Road Density Values**			Map B
Value	Density (kM/kM2)		
	FROM	TO	
1	0.0	0.87	Least Disturbed
2	0.9	2.62	
3	2.6	4.37	
4	4.4	6.29	
5	6.3	8.39	
6	8.4	10.67	
7	10.7	13.29	
8	13.3	16.09	Most Disturbed
9	16.1	18.88	
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	

*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.

Attachment 2. Information on Migratory Deer GIS Data

The metadata file attached to the CDFG GIS data on Migratory Deer Herds contains the following description:

Range designations may not be current due to anthropogenic impacts or lack of data regarding the locations of seasonal ranges used by deer. CDFG should be consulted for current site-specific information on the designation or usage of seasonal ranges by deer. These maps have not been updated using current GPS techniques and may not include important corridors, reproductive areas, or other ranges important to deer populations.

Critical deer winter range can include corridors essential for movement, staging areas where deer temporarily congregate, habitats containing high quality winter forage, or other elements important to the survival of deer in winter. Winter ranges are generally at lower elevations and are far less abundant than summer ranges making them vulnerable to human impacts and often a limiting factor in populations. Deer from different summer ranges may share a common winter range where breeding typically occurs. This mixing of genes on winter ranges contributes to genetically diverse and healthy populations.

Critical summer range occurs generally at higher elevations, but can be similar to fall or winter ranges when deer are non-migratory. These ranges are vital to population productivity by providing habitats for parturition and rearing and forage for replenishing nutritional reserves. Summer ranges may be occupied by deer from several distinct winter ranges.

Fall holding areas are used by deer when transitioning to winter ranges. These areas can also be used in mild winters where adequate forage is available and escape from deepening snows is unnecessary.

Fawning areas are critical to population productivity. They are generally located within summer ranges but can occur throughout the home ranges of non-migratory deer. Fawning areas are often linked to meadow complexes or riparian communities where adequate cover can hide newborn fawns and herbaceous forage can replenish the nutritional demands of lactation.

HISTORY

In the 1980's the CDFG created the 'Migratory Deer Herd Management Plans' for most of California. These plans describe the movement and concentrations of migratory deer herds in California using herd information dating back to the 1950's. In 1990 CDFG wildlife managers began mapping and updating the herd areas onto paper USGS 15' quadrangle maps based on these management plans, field information telemetry studies from the 1970's and 1980's, and personal knowledge. As a result of their work, approximately 300 Migratory Deer Herd base maps were created. DFG contracted with the Natural Resources Management Dept. of the California Polytechnic State University (Cal Poly), San Luis Obispo to convert the paper map information into electronic GIS format. This data set is the result, with some error corrections made in 2008 by DFG.

The report from the GIS component titled, "The Creation of a Migratory Deer Herd Data Base using ArcInfo" was submitted to the CDFG in March 1993.