California Quail and Mountain Quail (*Callipepla californica* and *Oreortyx pictus*)

Family: Phasianidae
Order: Galliformes
Class: Aves

WHR #: B140 and B141

Distribution:

California quail are found in southern Oregon, northern Nevada, California, and Baja California, and have been introduced in other states such as Hawaii, Washington, Idaho, Colorado, and Utah (Peterson 1961). In California, they are widespread but absent from the higher elevations of the Sierra Nevada, the Cascades, the White Mountains, and the Warner Mountains, and are replaced by the related Gambel's quail (*C. gambelii*) in some desert regions (Peterson 1961, Small 1994). In southern California, they are found from the Coast Range south to the Mexican border, and occur as far east as the western fringes of the Mojave and Sonoran deserts, such as in the Antelope Valley (Garrett and Dunn 1981, Small 1994). California quail range from sea level to about 5000 ft (1524 meters; Stephenson and Calcarone 1999)

Mountain quail are resident from northern Washington and northern Idaho, south through parts of Oregon, northwestern Nevada, California, and northern Baja California (Peterson 1961). In southern California, mountain quail are found in nearly all of the mountain ranges west of the deserts, including the southern Coast Ranges, from the Santa Lucia Mountains south through Santa Barbara and Ventura counties, and the Peninsular Ranges south to the Mexican border (Garrot and Dunn 1981, Small 1994). In the Transverse Ranges, a small population occurs in the western Santa Monica Mountains, and larger populations occur in the San Gabriel and San Bernardino Mountains (Small 1994). Mountain quail are found at elevations from below 2000 ft (610 meters) to over 9000 ft (2743 meters; Stephenson and Calcarone 1999).

Habitat:

In southern California, these two species overlap broadly in their distribution, but exhibit quite different habitat use patterns, with California quail found in more open habitats and mountain quail occupying more densely vegetated habitats (Stephenson and Calcarone 1999).

California quail are typically found in broken chaparral, woodland edges, riparian woodlands, oak woodlands, coastal scrub, river bottoms, desert oases, and at the edges of parks, farms, and suburban gardens (Peterson 1961, Garrett and Dunn 1981, Small 1994, Unitt 2004). This species is found at the highest densities in habitat mosaics that contain a mix of open feeding areas and protective vegetation cover (Stephenson and Calcarone 1999).

Mountain quail are often found in brushy mountain slopes and brushy forest (Peterson 1961), and in dense montane chaparral and brushy areas within coniferous forests (Garrett and Dunn 1981). Verner et al. (1980) reported that this species prefers habitat with much shrubbery and low percent canopy cover. In southern California, they may be found in the higher reaches of desert scrub, in the arid scrub and pinyon-juniper woodlands in desert-fringe habitat, and in

montane and subalpine forests at higher elevations (Small 1994). They have also been documented in low elevation pinyon-juniper-yucca associations, as in the Little San Bernardino and Eagle Mountains, and in dense, arborescent coastal chaparral dominated by ceanothus, manzanita, and scrub oak (Garrett and Dunn 1981). In the western portions of the Santa Monica Mountains they have been observed to venture into lower-elevation chaparral (Small 1994). This species migrates elevationally on a seasonal basis, moving to lower elevations during the winter months (Verner et al. 1980).

Food:
California quail feed on green vegetation and seeds, especially legumes, and also forage for grains, fruits, and insects, while mountain quail feed mainly on fruit, acorns, seeds, and green vegetation (Verner et al. 1980).

Ecology/Behavior:
These species breed from April to mid-September, and nests are built on the ground, usually under cover of brush, logs, rocks, herbaceous vegetation, or grass clumps (Verner et al. 1980).

The home range of breeding California quail was estimated to be 5 to 10 hectares, while the winter range was estimated to 7-18 hectares (Emlen 1939, cited in Verner et al. 1980). Ormiston (1966, cited in Verner et al. 1980) reported that the maximum breeding home range size of mountain quail in Idaho was 2.6 km^2 (260 hectares), and that breeding territory sizes ranged from 2 to 20 hectares. In general, quail are sedentary, although elevational migrations are observed, particularly in mountain quail (California Interagency Wildlife Task Group 2002). Banding returns have demonstrated that dispersal as far as 17 km, and daily moves of up to 8 km during a year are not unusual (Richardson 1941, Savage 1974).

Quail are preyed upon by a large variety of predators, including raptors, snakes, coyotes (*Canis latrans*), skunks (e.g., *Mephitis* spp.), bobcats (*Lynx rufus*), and domestic dogs and cats (California Interagency Wildlife Task Group 2002).

Rationale for its use as target species:
Both species have been negatively impacted by development of their habitat, especially at low elevations, and California quail have been negatively impacted by fire suppression, which reduces the mosaic characteristic of their preferred habitat (Stephenson and Calcarone 1999). Indirect effects of urbanization, such as increased disturbance, exotic weeds, and domestic predators also threaten these species (Unitt 2004). Although California quail are observed in residential areas that are adjacent to native vegetation, they are apparently sensitive to fragmentation. Crooks et al. (2001) documented the disappearance of California quail from isolated patches over a 10-year period, and suggested that patches of at least 173 hectares may be necessary for sustaining populations long-term.

Habitat modeling approach:
Our habitat model for these species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). Although these two species overlap in some parts of their ranges, WHR ratings differed for many

habitat types and, in these cases, we used the higher of the two ratings. We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	
Urban Green Space	
Vacant Urban	
Orchards and Vineyards (active and abandoned)	
Irrigated Cropland and Improved Pasture Land	
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 5.0 hectares (the smallest documented home range), and those that were both > 34 km (twice the furthest recorded dispersal distance) from a second patch and < 250 hectares (approximately 50 home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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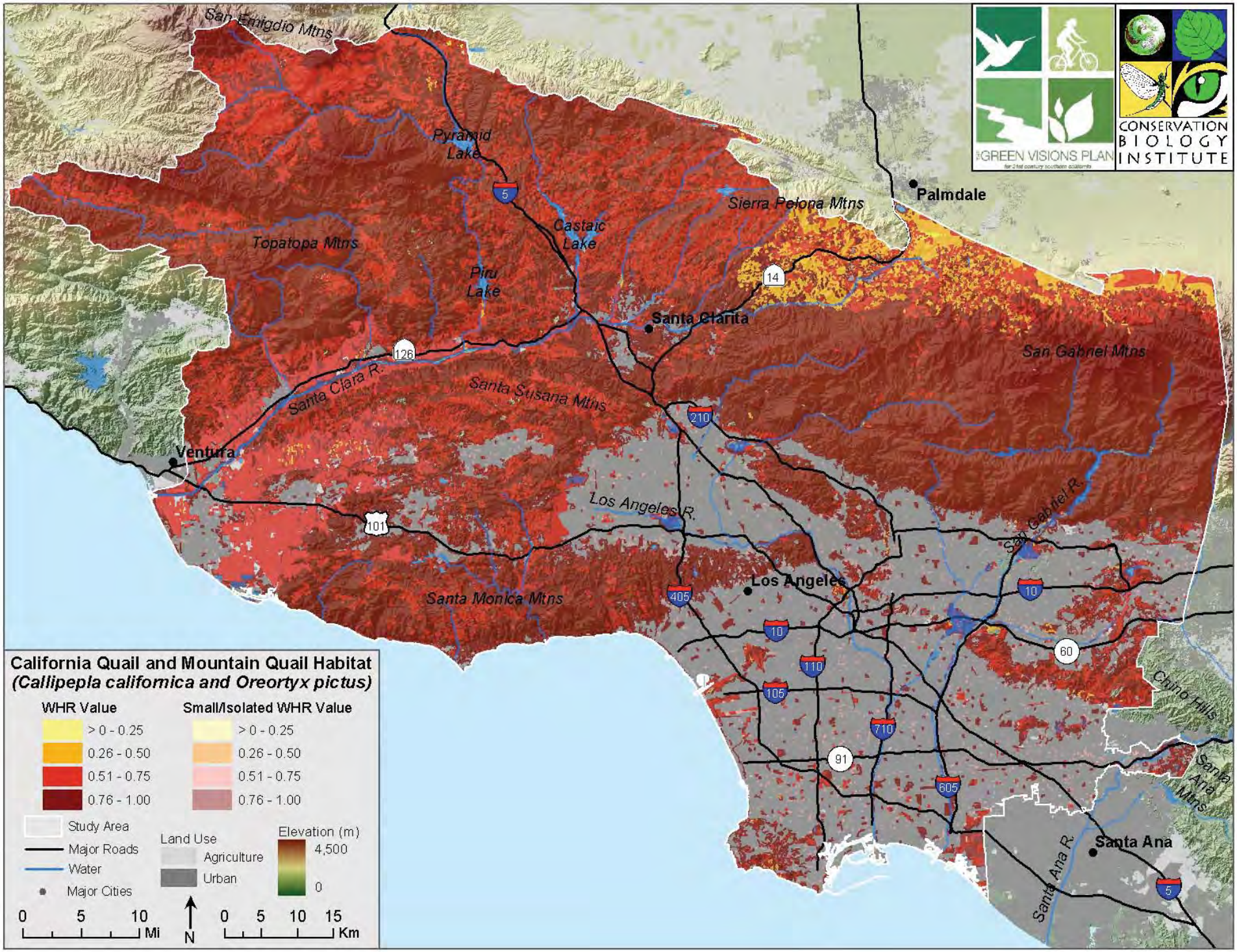
San Emigdio Mtns
Pyramid Lake
Castaic Lake
Piru Lake
Topatopa Mtns
Sierra Pelona Mtns
Palmdale
Santa Clarita
San Gabriel Mtns
Santa Clara R.
Santa Susana Mtns
Ventura
Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
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5
14
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GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
California Quail and Mountain Quail Habitat
(Callipepla californica and Oreortyx pictus)
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Small/Isolated WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Lark Sparrow (*Chondestes grammacus*)
Family: Emberizidae
Order: Passeriformes
Class: Aves

WHR #: B495

Distribution:
Lark sparrows are found from southern Canada, west of the Appalachian Mountains, to northern Mexico, and they winter from southern United States to El Salvador (Peterson 1961). In the west, they breed from southern Canada through the southwestern states, excluding western Washington, and winter from central California, southern Arizona, and western Texas to the south (Peterson 1961).

In southern California, they breed in a variety of habitats, including the Peninsular Ranges, the western edges of the deserts, the foothills of the Cascades, the Sierra Nevada Mountains, Tehachapi Mountains, and the Mt. Pinos area (Small 1994). An increase in lark sparrows is typically observed in southern California during the fall and winter, as migrants from northern parts of the state move south (Small 1994). They are found at elevations between sea level and about 6000 feet (Small 1994).

Habitat:
Lark sparrows are found in a variety of habitats such as open brush, treed areas, and farmland, including valley foothill hardwood, valley foothill hardwood-conifer and open chaparral vegetation communities (Peterson 1961, California Interagency Wildlife Task Group 2002). They tend to prefer younger stages and hardwoods rather than conifers (California Interagency Wildlife Task Group 2002). For breeding habitat, they prefer edges of grasslands bordered by trees or bushes, open grassy woodlands, meadows with low shrubs and trees, and orchards (Small 1994). In the western Sierra Nevada Mountains, lark sparrows breed from blue oak savannahs to ponderosa pine habitat at higher elevations, and tend to prefer areas with scattered trees and/or shrubs (Verner et al. 1980). In the winter lark sparrows may congregate in large groups in arid grasslands, grassy desert scrub, brushy fields or parks, at the edges of agricultural lands or pastures, and rarely in urban gardens (Small 1994).

In San Diego County, lark sparrows are common in inland valleys, especially where there is grassland, pasture, or open ground for foraging, and scattered trees and shrubs for nesting and cover (Unitt 2004). In San Diego County, the distribution of this bird suggests that it adapts to agriculture or low-density rural development but avoids dense urbanization (Unitt 2004). Distribution in San Diego County also suggests that this species does not inhabit coastal areas, typically remaining at least 5 miles from the coast throughout the county (Unitt 2004). In southern California, they are also found in high elevation mountain meadows, broken coniferous forests, and desert habitat, although these birds tend to be rarer at high elevations during the winter (Unitt 2004). In desert, their distribution tends to be associates with orchards and shade

trees near buildings, and observational records suggest that their distribution has spread into desert areas in recent years (Unitt 2004), possibly do to increased irrigation and orchards.

Food:
Lark sparrows eat seeds of annuals and a wide variety of insects, especially grasshoppers (Verner et al. 1980, Unitt 2004). They feed primarily on the ground, preferring areas with plant litter, and may also feed in shrubs and small trees (Verner et al. 1980).

Ecology/Behavior:
Lark sparrows are monogamous, solitary nesters (California Interagency Wildlife Task Group 2002), and lay their eggs from March to early July (Unitt 2004). Their nest may simply be a depression in the ground, typically near clumps of grass or near low shrubs (Verner et al. 1980), and often at the base of a shrub (Unitt 2004). Nests have been documented in a wide variety of shrubs and trees, including laurel sumac (*Rhus* spp.), eucalyptus, tamarisk (*Tamarix* spp.), and lemon trees (Unitt 2004). Lusk et al. (2003) found that nest site locations in prairie habitats tended to be influenced by bare-ground exposure, litter cover, and structural cover.

Lark sparrows defend territories primarily during the courtship period (Bent 1968, cited in Verner et al. 1980). Territory sizes of 1.4 and 3.6 hectares have been reported, while the range of a pair of lark sparrows was 6.1 hectares (Fitch 1958, cited in Verner et al. 1980).

No data was found on dispersal distances. In general, lark sparrows in southern California are not migratory, although seasonal shifts in elevation do occur (California Interagency Wildlife Task Group 2002, Unitt 2004).

Rationale for its use as target species:
Lark sparrows are declining throughout their range (Lusk et al. 2003) and are impacted negatively by urban sprawl, since pavement, lawns, and exotic landscaping are not used as habitat (Unitt 2004). In San Diego County, they have disappeared from areas where cities have replaced farms (e.g., Escondido and El Cajon, Unitt 2004). Bolger et al. (1997) found that lark sparrows are sensitive to fragmentation. In addition, lark sparrow may be negatively influenced by fire suppression, as they responded favorably to habitat restoration using fire (Davis et al. 2000).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). We generated a habitat map which included all pixels with a WHR rating > 0. However, excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X

Vacant Urban	X
Orchards and Vineyards (active and abandoned)	
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	
Horse Ranches	
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 1.4 hectares large (the size of the smallest recorded territory) and those that were both > 90 km (twice the roughly approximated dispersal distance) from a second patch and < 70 hectares (approximately 50 territories) as those less likely to be occupied as compared to larger and less isolated patches.

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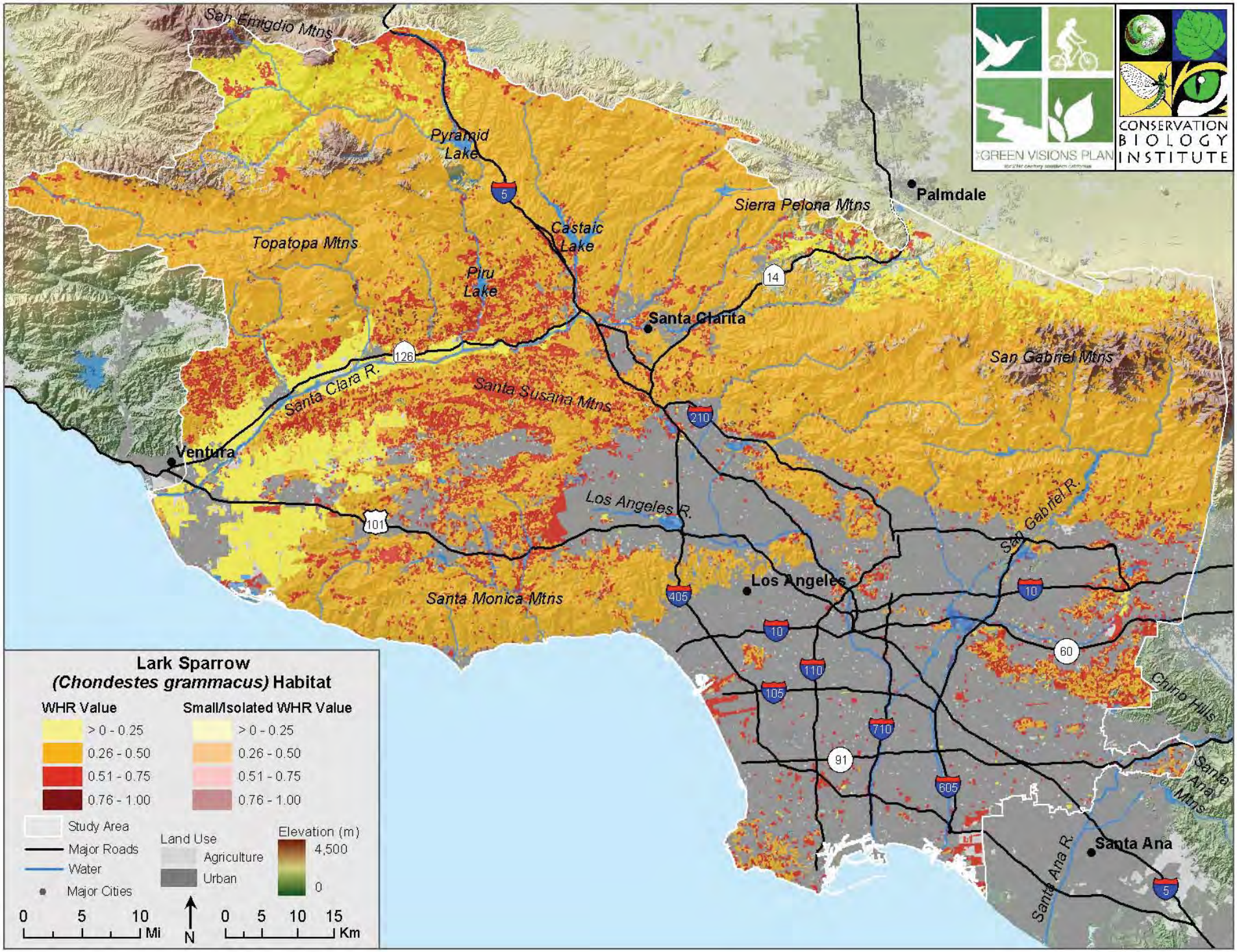
San Emigdio Mtns
Pyramid Lake
Castaic Lake
Piru Lake
Topatopa Mtns
Sierra Pelona Mtns
Palmdale
Santa Clarita
San Gabriel Mtns
Santa Clara R.
Santa Susana Mtns
Ventura
Los Angeles R.
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Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
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605
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Lark Sparrow
(Chondestes grammacus) Habitat
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Small/Isolated WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
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N
0 5 10 15 Km

Northern Harrier (*Circus cyaneus*)
Family: Accipitridae
Order: Falconiformes
Class: Aves

WHR #: B114

Distribution:
Northern harriers are found from Alaska and Canada south through the United States and in northern Eurasia, and winter into northern South America and northern Africa (Peterson 1961). In North America, this species breeds in northern Alaska to northern Baja California, New Mexico, and northern Texas, and winters from southern British Columbia and southern Alberta south (Peterson 1961). In southern California, it is present year-round but becomes more abundant and widespread during winter (Unitt 2004). This species has been documented at elevations as high as 3000 meters and breeds from sea level to 1700 meters in the Central Valley (California Interagency Wildlife Task Group 2002).

Habitat:
The habitat of northern harriers includes marshes, open rangelands, fields, prairies, and both fresh and saltwater emergent wetlands (Peterson 1961, California Interagency Wildlife Task Group 2002). In southern California, this species is less common in foothill, mountainous, and desert areas than in coastal lowlands, especially open grassland, marshes, and valleys (Unitt 2004). An increase in numbers is observed during the winter in desert areas (Unitt 2004). Northern harriers are often found on flat, or hummocky, open areas of tall dense grass or low shrubs (California Interagency Wildlife Task Group 2002). Herkert et al. (1999) found that northern harriers were more likely to nest in grasslands that had not been disturbed, as compared to grasslands that had been disturbed during the previous 12 months.

Food:
Northern harriers feed primarily on voles and other small mammals, birds, frogs, small reptiles, crustaceans, insects, and sometimes fish (California Interagency Wildlife Task Group 2002).

Ecology/Behavior:
The northern harrier nests (and roosts) on the ground among dense grasses or other low vegetation, and eggs are layed in the spring and summer (California Interagency Wildlife Task Group 2002, Unitt 2004). In and near the study area, northern harriers have been documented to nest near Lakeview, near Camp Pendleton, in the Antelope Valley, Saticoy, Alamitos, and near Seal Beach (Garrett and Dunn 1981).

Home range sizes of 5 birds in Utah averaged 429 hectares (range 363-519 hectares, California Interagency Wildlife Task Group 2002), and a breeding pair in Wisconsin had a shared home range of 890 hectares (Hamerstrom and Wilde 1973, cited in California Interagency Wildlife Task Group 2002). Walk and Warner (1999) reported that northern harriers in Illinois were not documented in grasslands patches smaller than 55 hectares in size.

Northern harriers are territorial and will attack other birds of prey and even humans during the breeding season (California Interagency Wildlife Task Group 2002), but communal roosting has been observed in northern harriers in Illinois during winter (Walk 1998).

Rationale for its use as target species:
Northern harriers are threatened in southern California because their preferred habitat (marshes, grasslands, and floodplains) is rapidly being developed. They are also susceptible to disturbance and predation during the breeding season because they nest on the ground (Unitt 2004). Although they can be negatively impacted by agriculture and fires during the early stages of the breeding cycle, some types of agriculture such as grain corps can benefit this species if their nesting and roosting habitat is protected (California Interagency Wildlife Task Group 2002).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	
Urban Green Space	
Vacant Urban	
Orchards and Vineyards (active and abandoned)	
Irrigated Cropland and Improved Pasture Land	
Non-irrigated Cropland and Improved Pasture Land	
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 363 hectares large (the size of the smallest recorded home range) as those less likely to be occupied as compared to larger patches. Because this species is documented to migrate long distances, we assumed to that it could reach all potential habitat patches in the study area.

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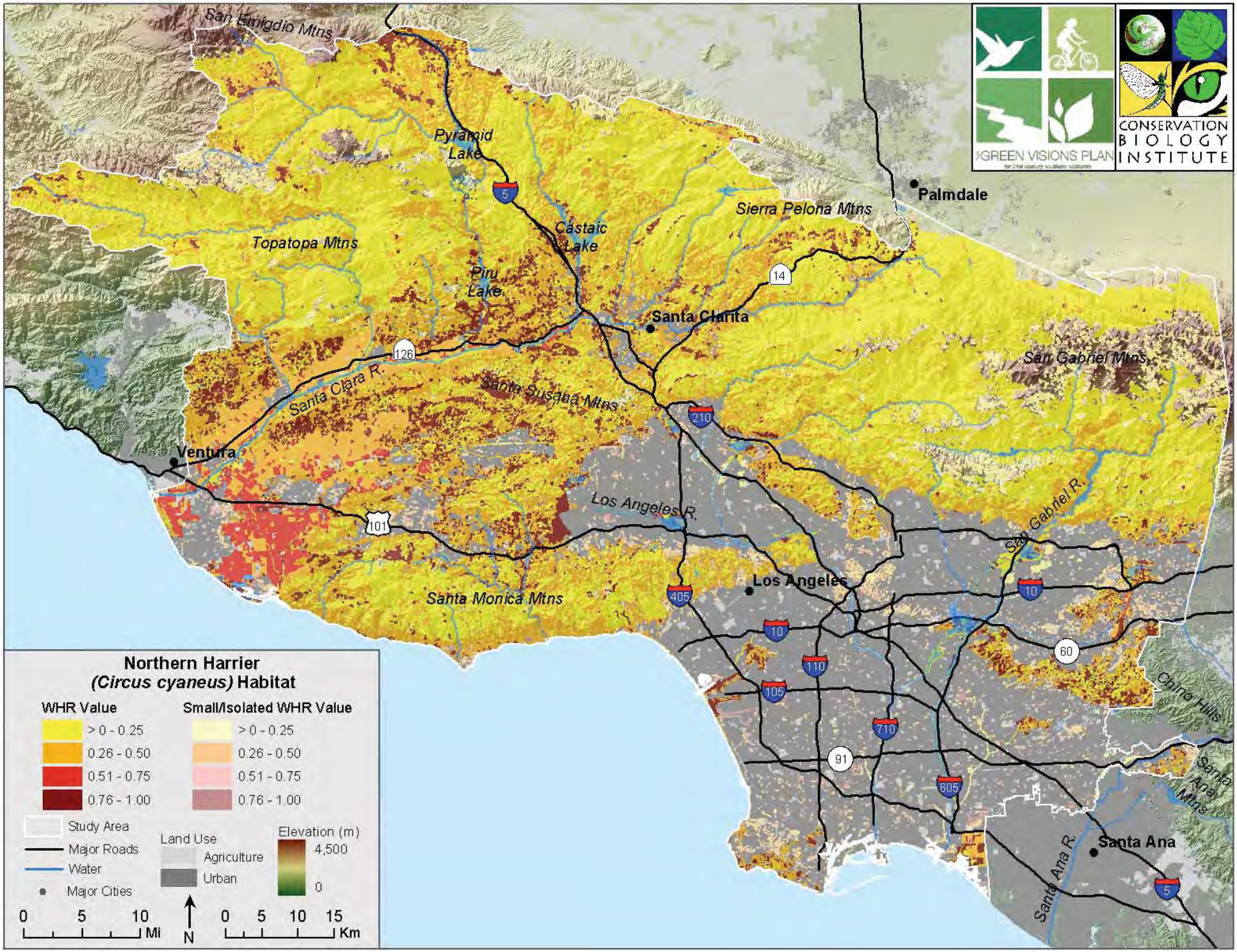
San Emigdio Mtns
Pyramid Lake
Castaic Lake
Piru Lake
Topatopa Mtns
Sierra Pelona Mtns
Palmdale
Santa Clarita
San Gabriel Mtns
Santa Clara R.
Santa Susana Mtns
Ventura
Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Northern Harrier
(Circus cyaneus) Habitat
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Small/Isolated WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Marsh Wren (*Cistothorus palustris*)
Family: Troglodytidae
Order: Passeriformes
Class: Aves

WHR #: B372

Distribution:
Marsh wrens are found from southern Canada to northern Baja California and the Gulf Coast (Peterson 1961). In California, marsh wrens are found in Siskiyou County, Modoc County, in the Basin and Ranges Region to Lake Tahoe, and most marsh wrens in these areas are migratory, moving south in the winter (Small 1994). Further south, marsh wrens are coastal residents from Del Norte County south to San Diego County, but few breeding marsh wrens are found along the coast from Santa Barbara County south, due to habitat loss (Small 1994). In these coastal areas they are common winter visitors but have declined as a nesting species (Garrett and Dunn 1981). However, marsh wrens have been documented to breed in localized coastal areas such as near Oceanside in San Diego County and in western Santa Barbara County from the mouth of the Santa Ynez River to the mouth of the Santa Maria River mouth (Garrett and Dunn 1981). They have been reported to breed in marshes north of Lancaster in Los Angeles County (Garrett and Dunn1981).

Inland, marsh wrens are also found in the Central Valley, in parts of the Coast Ranges, and in desert habitat in the Salton Basin and along the lower Colorado River Valley (Small 1994).

Marsh wrens breed at elevations of 200 feet below sea level to 6400 ft (near Mono Lake) and may be found at 10,000 ft during the non-breeding season (Small 1994).

Habitat:
This species requires freshwater or brackish marshes, typically seeking extensive beds of cattails (*Typha* spp.), rushes (*Juncus* spp.), sedges (*Carex* spp.), or other emergent wetland habitat (Garrett and Dunn 1981, California Interagency Wildlife Task Group 2002), but it will also breed in flooded willow thickets (*Salix* spp.; Small 1994). During migration and in winter, marsh wrens may be found in a variety of habitats, such as coastal tidal salt marshes and dry, brushy thickets, and will typically seek dense cover (Garrett and Dunn 1981, Small 1994). Although they feed primarily in tall, straight-stemmed emergent vegetation, they may also feed in adjacent upland habitats (California Interagency Wildlife Task Group 2002).

Food:
Marsh wrens feed on a variety of insects, spiders, other small invertebrates, and only rarely feed on seeds and grains. They forage among emergent vegetation, on the surface of water, bare ground, among leaf litter, and occasionally catch flying insects (California Interagency Wildlife Task Group 2002).

Ecology/Behavior:

Marsh wrens are polygynous, with males often building multiple nests per season. They lay their eggs from approximately April to June (Unitt 2004). Their nests are typically found on a cattail, tule (*Scirpus acutus*), or other straight-stemmed vegetation, and nests are often over water, which may decrease predation risk.

No information was found on home-range sizes; however, Kale (1965, cited in California Interagency Wildlife Task Group 2002) reported densities of 44-57 pairs per hectare in suitable nesting habitat in Georgia saltmarshes. Verner (1965) reported an average territory size of 0.04 hectares (range 0.02-0.08 hectare) in eastern Washington, while Verner and Engelson (1970) reported territories averaging 0.05-0.07 hectares. No data were found on dispersal or migration distances.

Rationale for its use as target species:
Marsh wrens are an indicator of rare habitat types in southern California, and tend to be more abundant in natural wetlands than in restored wetlands (Delphey and Dinsmore 1993). Marsh wrens were distributed more widely in the past, and their range has declined substantially, most likely due to habitat destruction (Garrett and Dunn 1981). The subspecies *C. p. clarkae* is now recognized as a California species of special concern (Unitt 2004).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 0.02 hectares large (the size of the smallest recorded territory) as less likely to be occupied as compared to larger patches. Because

this species is reported to migrate seasonally in some parts of the state, we assumed that they could reach all habitat patches within the study area.

Bibliography:

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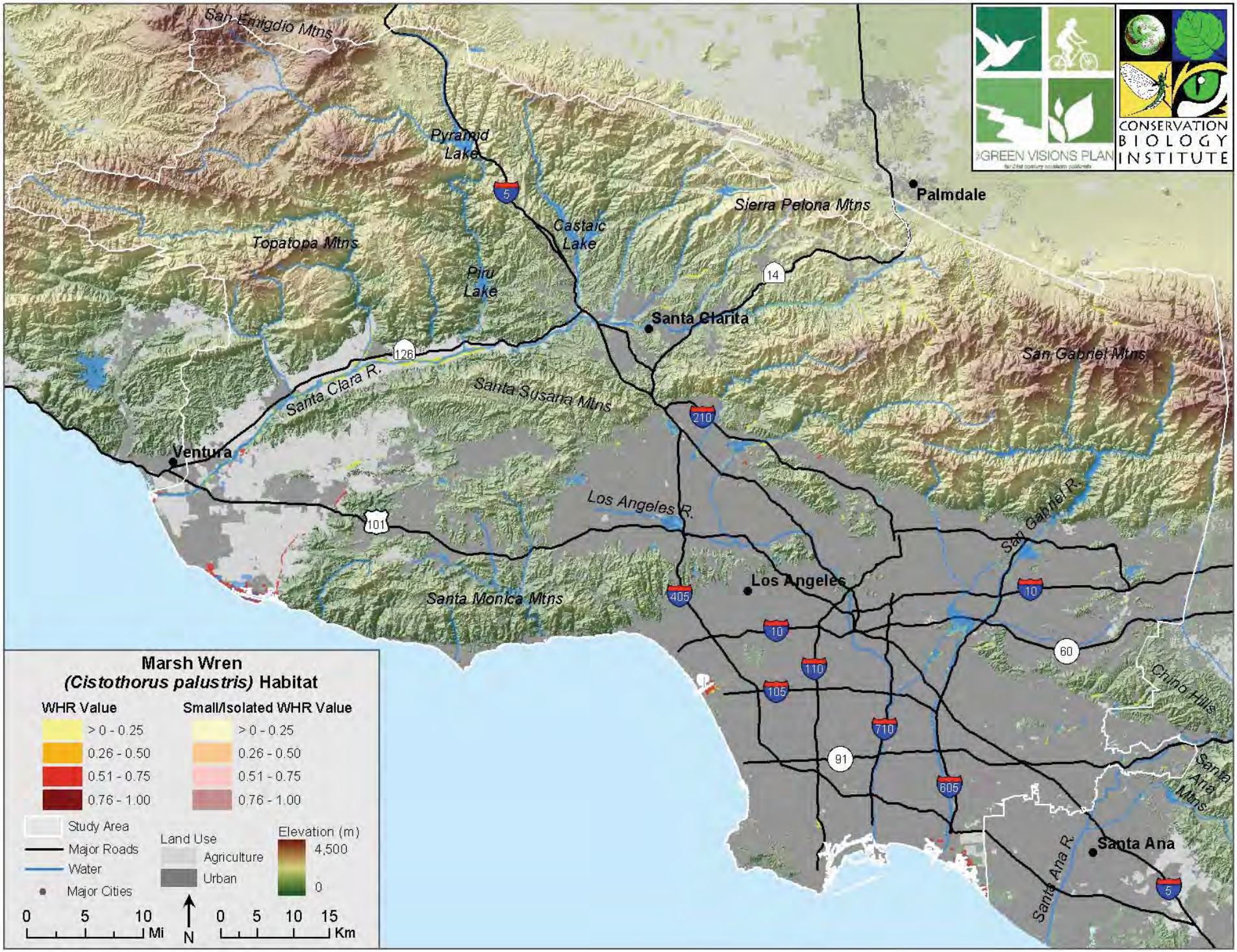
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GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Marsh Wren
(Cistothorus palustris) Habitat
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
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Small/Isolated WHR Value
> 0 - 0.25
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Study Area
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Major Cities
Land Use
Agriculture
Urban
Elevation (m)
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White-tailed Kite (*Elanus leucurus*)
Family: Accipitridae
Order: Falconiformes
Class: Aves

WHR #: B111

Distribution:
White-tailed kites are found from California and Texas, south to Chile and Argentina (Peterson 1961). They are resident in California west of the Sierra Nevada and in the deserts, from Humboldt County and the upper Sacramento Valley south to San Diego County (Peterson 1961). They are typically found at elevations below 1000 feet (Verner et al. 1980), but have been documented at elevations of 4200 feet in San Diego County (Unitt 2004).

Habitat:
The habitat of white-tailed kites includes open foothills, river valleys, and marshes (Peterson 1961). In the western Sierra Nevada Mountains, Verner et al. (1980) report that this species breeds in areas with blue oak savannah, digger pine-oak, and riparian deciduous trees. In southern California, white-tailed kites prefer riparian woodland, oak groves, or sycamore (*Platanus racemosa*) groves adjacent to grassland, and are also found in desert regions year-round (Unitt 2004). Nests are often found in coast live oaks (*Quercus agrifolia*), willow (*Salix* spp.), shrubs such as scrub oaks (*Q. berberidifolia*) and toyon (*Heteromeles arbutifolia*), and even in non-native trees such as orange trees (Unitt 2004). They often feed in open grasslands, meadows, agricultural areas, emergent wetlands, woodlands, and even in citrus orchards, adjacent to open areas (California Interagency Wildlife Task Group 2002, Unitt 2004).

Food:
White-tailed kites feed primarily on diurnal mice species (Verner et al. 1980), focusing almost exclusively on California voles (*Microtus* spp., Unitt 2004). They breed primarily in areas with abundant populations of voles and concentrate in areas with high rodent populations (Verner et al. 1980). They will occasionally also feed on small birds, insects, reptiles, and amphibians (California Interagency Wildlife Task Group 2002).

Ecology/Behavior:
White-tailed kites are monogamous and, in southern California, typically nest between January and May (Unitt 2004). In the western Sierra Nevada Mountains, this species breeds between early February and late October, with a peak during May – August, and selects trees with dense canopies for nesting (Verner et al. 1980).

White-tailed kites were reported to be non-territorial in San Diego and Solano Counties (Verner et al. 1980). During a year of high rodent numbers, the minimum requirement for a breeding pair is 2 acres (0.81 hectares) of habitat (Verner et al. 1980). Warner and Rudd (1975) found that individuals may hunt areas as large as 3 km^2.

This species is non-migratory but tends to be nomadic and disperses easily (Unitt 2004). Dixon et al. (1957) reported dispersal distance of 100 miles (approximately 160 km) in two years for a nestling banded in San Diego County, and this species has dispersed from the mainland to San Clemente Island in 1984 (Scott 1994).

An interesting behavioral trait of white-tailed kites is that this species often roosts communally during the non-breeding season, with one group of 113 individuals, mostly juveniles, observed in San Diego County (Unitt 2004). Their distribution may shift over time due to the location of roost sites as well as the abundance of prey.

Rationale for its use as target species:
Although the habitat of this species has been improved in some areas during the past quarter century due to year-round irrigation of agricultural land (Verner et al. 1980), it is now increasingly threatened by urbanization of foraging habitat and poisoning of its prey (Unitt 2004). In addition, dependence on a small diversity of prey makes this species vulnerable to steep falls and rises in population numbers associated with this prey base (Unitt 2004). The proliferation of crows and ravens may also be detrimental to white-tailed kites, as crows and ravens have been observed to rob them of their prey (Dixon et al. 1957, Unitt 2004). This species preys on rodents that may be harmful to agricultural crops (California Interagency Wildlife Task Group 2002).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	
Urban Green Space	
Vacant Urban	
Orchards and Vineyards (active and abandoned)	
Irrigated Cropland and Improved Pasture Land	
Non-irrigated Cropland and Improved Pasture Land	
Horse Ranches	
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 0.81 hectares large (the size of the smallest recorded home range) and those that were both > 320 km (twice the maximum recorded dispersal distance) from a second patch and < 41hectares (approximately 50 home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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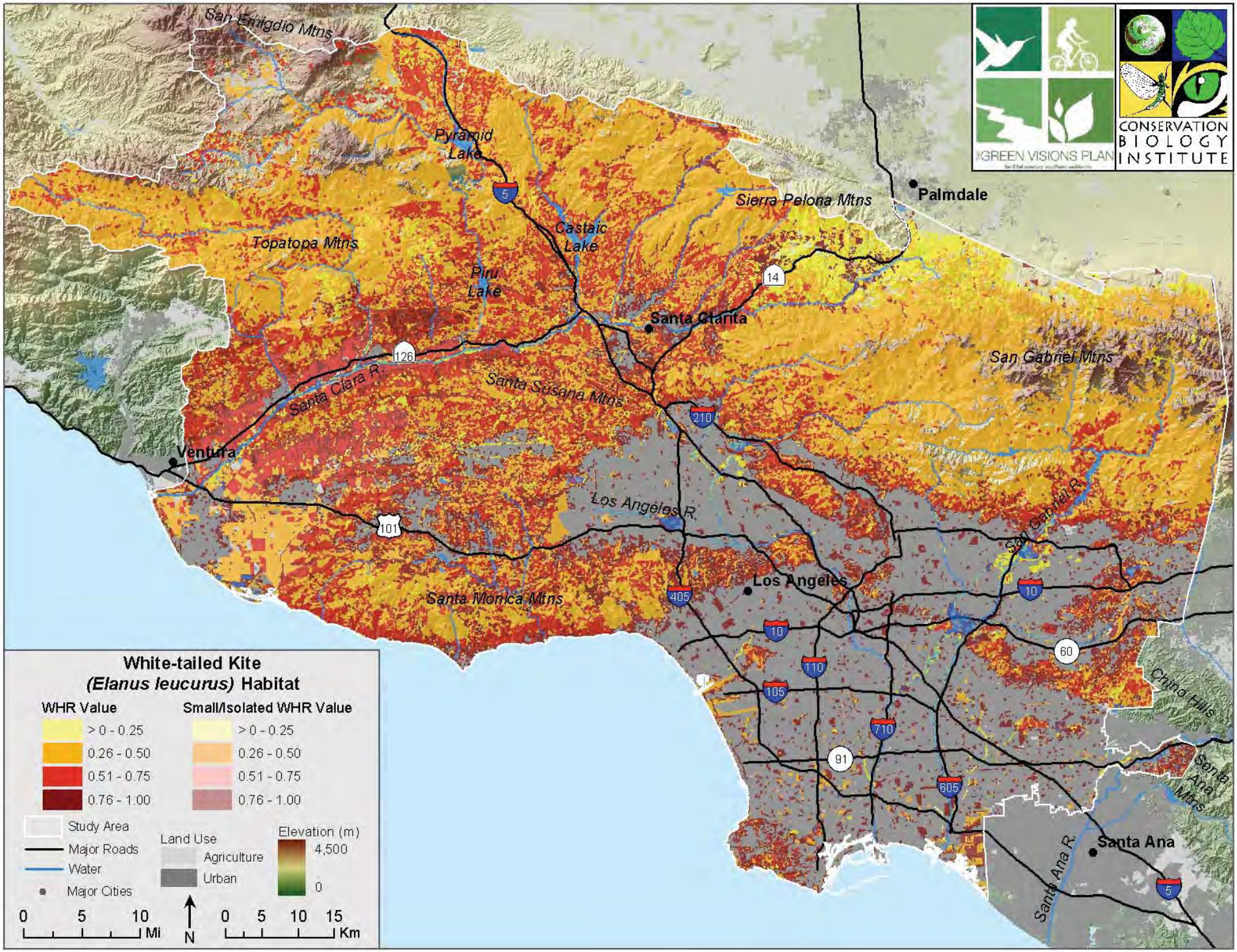
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Santa Monica Mtns
China Hills
Santa Ana Mtns
Santa Ana
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White-tailed Kite
(Elanus leucurus) Habitat
WHR Value
> 0 - 0.25
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Small/Isolated WHR Value
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Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
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Elevation (m)
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Yellow-breasted Chat (*Icteria virens*)
Family: Parulidae
Order: Passeriformes
Class: Aves

WHR #: B467

Distribution:
Yellow-breasted chats are distributed from southern Canada to central Mexico and the Gulf Coast, and breed from southern Canada throughout the western United States (Peterson 1961).

In California, this species once was fairly common, but due to extensive habitat loss and brood parasitism by brown-headed cowbirds (*Molothrus ater*) it is now considered a local and rare-to-common summer visitor throughout the state, and breeding occurs in localized areas only (Small 1994, Unitt 2004). Yellow-breasted chats typically arrive in California in April and depart by late September for wintering grounds in Mexico and Guatemala (California Interagency Wildlife Task Group 2002).

In southern California, the current breeding distribution of yellow-breasted chats is not well known due to rapid distribution changes (Small 1994), but they are considered to be a localized summer visitor in low-elevation foothill canyons and are relatively rare (Garrett and Dunn 1981, Stephenson and Calcarone 1999). Known locations are in Mono Creek, Santa Ynez River, Sespe Creek in the Los Padres National Forest, San Francisquito and Elizabeth Lake canyons in the Angeles National Forest, Bautista Canyon in the San Bernardino National Forest, and the upper San Luis Rey River in Cleveland National Forest (Stephenson and Calcarone 1999). In San Diego County, breeding has been documented in localized coastal, inland, and desert areas (Unitt 2004).

Breeding above 305 meter elevation has not been confirmed, but birds have been documented at elevations of 1220 meters outside of the breeding season (Verner et al. 1980).

Habitat:
Yellow-breasted chats are found primarily in coastal lowlands (Stephenson and Calcarone 1999), especially in stream tangles, briars, willow thickets, and moist canyons (Peterson 1961). They breed in low elevation riparian deciduous habitats (Verner et al. 1980), most commonly in dense riparian thickets and brushy tangles near streams, swampy ground, or ponds (Garrett and Dunn 1981, Small 1994). Outside of the breeding season they may be found in similar vegetation away from water (Small 1994).

Food:
Yellow-breasted chats feed primarily on insects, which are often gleaned from foliage of shrubs and small trees, but fruits are also eaten (Verner et al. 1980). In one Arizona population, ants comprised 82% of their diet (Yard et al. 2004).

Ecology/Behavior:
This species is monogamous but pairs have been found nesting near each other (California Interagency Wildlife Task Group 2002). In the western Sierra Nevada Mountains, this species breeds from May to mid-June (Verner et al. 1980), and in southern California eggs are laid during May to July (Unitt 2004). Nests are typically well-concealed in very dense vegetation (Unitt 2004).

In Illinois marsh and riparian habitats, Brewer (1955) reported a mean home range size of 0.1 hectare (range 0.06 to 0.3 hectare), while Thompson and Nolan (1973) reported a mean territory size of 1.24 hectares (range 1.1 to 1.6 hectares) in upland deciduous scrub habitat in Indiana. Dispersal distances are not well documented, but Skagen et al. (1998) found that continuous bands of riparian vegetation may provide movement corridors for yellow-breasted chats.

Nests of yellow-breasted chats are often parasitized by brown-headed cowbirds (Stephenson and Calcarone 1999).

Rationale for its use as target species:
The yellow-breasted chat is a riparian obligate species, and its use of lowland riparian habitats makes it a good representative of a rare and threatened habitat type in southern California (Stephenson and Calcarone 1999). This species has declined substantially in southern California (Garrett and Dunn 1981), and is considered a California Species of Special Concern (Stephenson and Calcarone 1999). Although habitat loss and brood parasitism are both a concern, this species has shown positive responses to removal of brown-headed cowbirds in areas where removal efforts were focused (Unitt 2004).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X

Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 0.06 hectares large (the size of the smallest recorded home range) as those less likely to be occupied as compared to larger patches. Because this species is reported to migrate large distances (to Mexico and Central America), we assumed it could reach all habitat patches in the study area.

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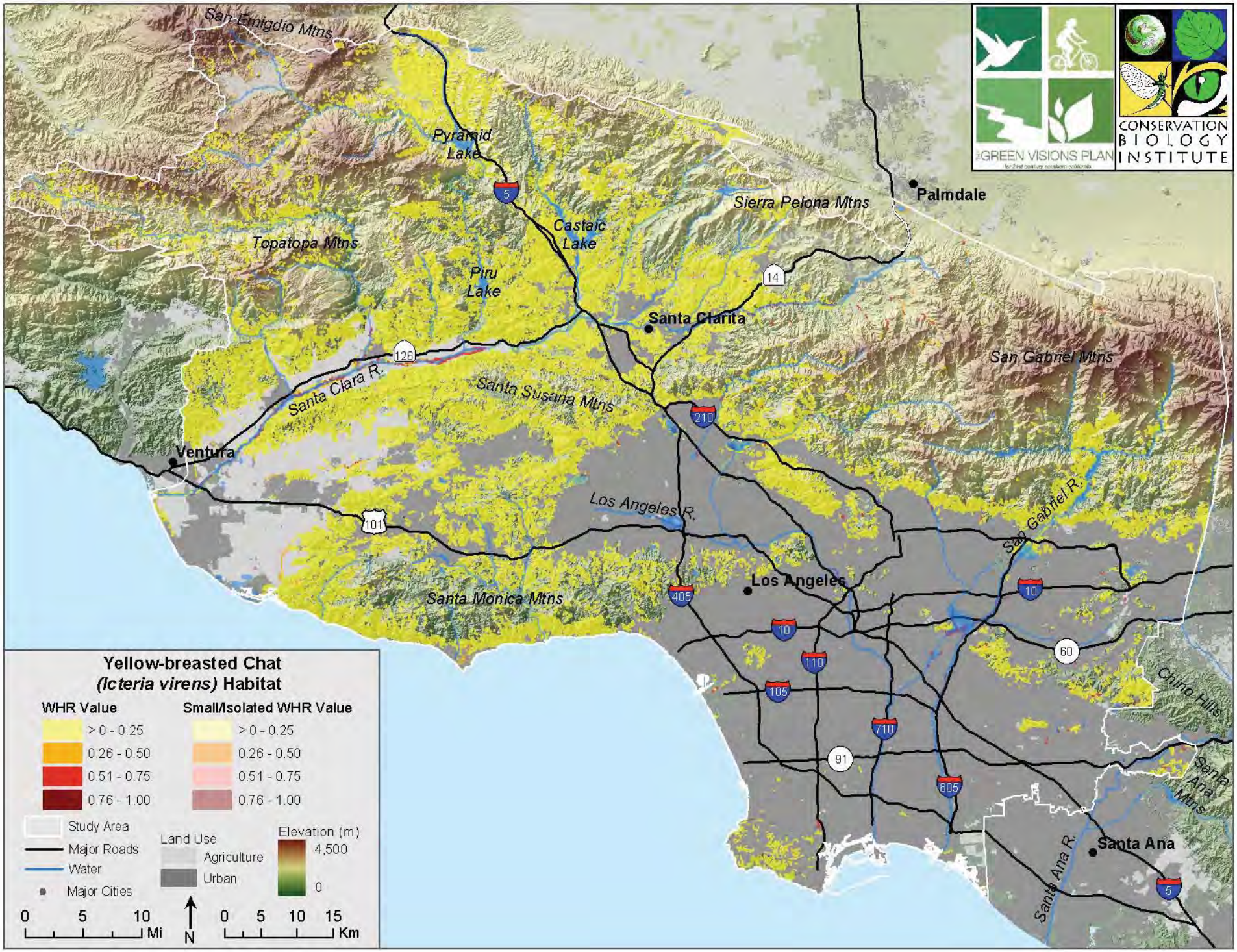
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Santa Susana Mtns
Ventura
Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Yellow-breasted Chat
(Icteria virens) Habitat
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
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Small/Isolated WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
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Loggerhead Shrike (*Lanius ludovicianus*)
Family: Laniidae
Order: Passeriformes
Class: Aves

WHR #: B410

Distribution:
Loggerhead shrikes are found from southern Canada to southern Mexico, and are partially migratory in this range (Peterson 1961). They breed from southern British Columbia, central Alberta, and central Saskatchewan south throughout the western United States, excluding the northwest coast, and winter primarily in the southwest United States (Peterson 1961).

In California, loggerhead shrikes formerly were common residents throughout much of the state, but have declined in abundance (Small 1994). Along the central and southern coasts and near-coastal areas they are less common during April to September (Small 1994). They tend to be absent from heavily forested areas, and are very rare in the northwest coastal strip from Del Norte County south to southern Mendocino County (Small 1994).

Although shrikes are resident throughout much of California, those found north of 39° N and those in the Mono Basin, the Owens Valley, and the northern portions of the Mojave Desert move south in the winter, leading to increased abundance in the south in fall and winter (Garrett and Dunn 1981, Small 1994). A resident subspecies is found on the Channel Islands (Small 1994).

Loggerhead shrikes occur at elevations ranging from -200 to about 7000 feet (-61 to 2133 meters; Small 1994), and tend to breed at elevations lower than 4000 feet (1220 meters; Unitt 2004).

Habitat:
Loggerhead shrikes are found in broken woodlands, savannah, pinyon-juniper woodlands, Joshua tree woodlands, riparian woodlands, desert oases, desert scrub and washes, and low-density suburbs and farms (Small 1994). In these areas they tend to prefer open areas with perches for hunting, and fairly dense bushes for nesting (Small 1994). In the western Sierra Nevada Mountains, loggerhead shrikes breed in blue oak savannahs, digger pine-oak woodlands and chaparral, and tend to prefer stands with low percent canopy cover (Verner et al. 1980). In San Diego County, they are found in grassland, open sage scrub and chaparral, and desert scrub, and are most abundant in the desert and desert-transition areas (Unitt 2004). In San Diego County they tend to be absent from pinyon woodlands at high elevations and from forests and thick chaparral, and seem to prefer washes or valley floors that provide open foraging areas near vegetation that can conceal and protect nests (Unitt 2004). This species occurs only rarely in heavily urbanized areas but is often found in open croplands (California Interagency Wildlife Task Group 2002).

Food:
Loggerhead shrikes prey primarily on a variety of insects and arthropods, but also feed on small reptiles, birds, and mammals, and frequently impale prey on thorns, stiff twigs, or on barbed wire for "butchering" or storage (Verner et al. 1980, Unitt 2004).

Ecology/Behavior:
Loggerhead shrikes are monogamous and solitary nesters. In the western Sierra Nevada Mountains, loggerhead shrikes breed from late February to mid June, which is similar to breeding patterns observed in southern California (Verner et al. 1980, Unitt 2004). Nests are found in a variety of trees and bushes, usually 0.6 to 9.1 meters above the ground (Verner et al. 1980).

Loggerhead shrikes hold territories year-round, and territories and home ranges tend to be of similar size, with a radius of 400 to 595 meters reported for loggerhead shrikes in the San Joaquin Valley (Verner et al. 1980). In open shrubland in Contra Costa and Kern Counties, 10 territories had a mean size of 7.6 hectares (range 4.5 – 16 hectares; Miller 1931, cited in California Interagency Wildlife Task Group 2002). In southern California, loggerhead shrikes do not exhibit long-distance migrations, but they do disperse "considerably" during the nonbreeding season (Unitt 2004). One captive-released bird released on San Clemente Island was later found dead on the mainland, over 65 km away (Unitt 2004).

Rationale for its use as target species:
Loggerhead shrikes numbers have declined throughout most of North America, and they have declined at an alarming rate in coastal San Diego County since the 1990s, with continued declines from the late 1990s to 2001 (Unitt 2004). Their numbers have declined even in undeveloped areas, suggesting that this species is sensitive to indirect impacts of urbanization and habitat fragmentation. Given its rather large prey items, this species occupies a relatively high position in the food chain, and therefore naturally occurs at lower densities than some other birds its size, making it even more vulnerable to extirpation. Loggerhead shrikes are a California Species of Special Concern, and *L. l. mearnsi*, found on San Clemente Island, is Federally listed as Endangered (Stephenson and Calcarone 1999).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	

Urban Green Space	
Vacant Urban	
Orchards and Vineyards (active and abandoned)	
Irrigated Cropland and Improved Pasture Land	
Non-irrigated Cropland and Improved Pasture Land	
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 4.5 hectares large (the size of the smallest recorded territory), and those that were both > 130 km (twice the furthest recorded dispersal distance) from a second patch and < 225 hectares (approximately 50 territories) as those less likely to be occupied as compared to larger and less isolated patches.

Bibliography:

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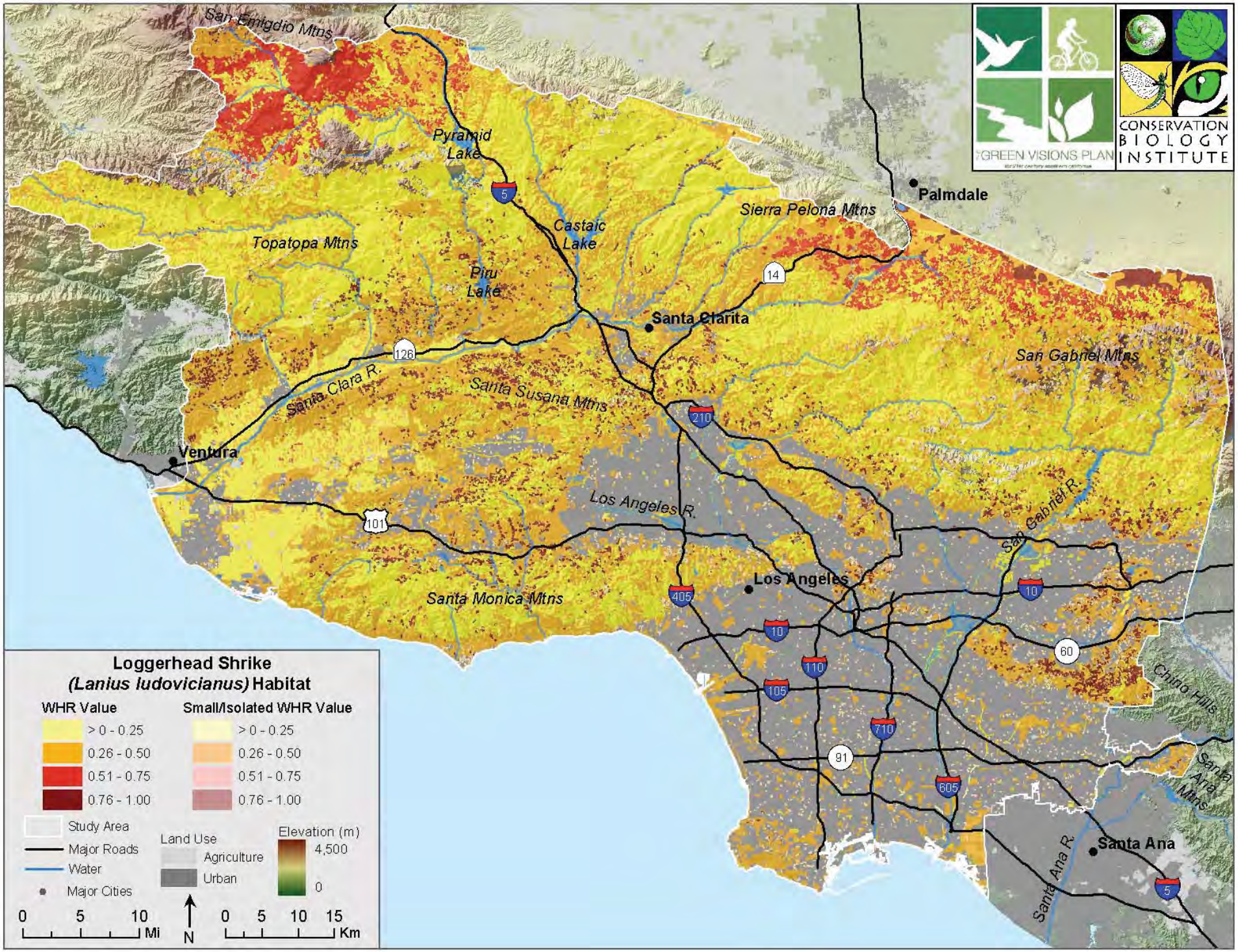
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Loggerhead Shrike
(Lanius ludovicianus) Habitat
WHR Value
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Small/Isolated WHR Value
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Study Area
Major Roads
Water
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Land Use
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Elevation (m)
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Belding's Savannah Sparrow (*Passerculus sandwichensis beldingi*)

Family: Emberizidae
Order: Passeriformes
Class: Aves

WHR #: B499

Distribution:
Savannah sparrows are found from Alaska and Canada, south to Guatemala, and may winter as far south as El Salvador and the West Indies (Peterson 1961). In the United States, they breed from Alaska and the Canadian border south along the western coast to San Diego, in interior California, southern Arizona, New Mexico, and western Nebraska (Peterson 1961).

In California, savannah sparrows are fairly widely distributed but their status is complex due to the presence of up to 7 subspecies in the state, with two of these subspecies only rarely migrating into the state from the north and 5 subspecies occurring as residents in the state (Small 1994).

In southern California, *P. s. nevadensis* is a common and widespread transient and winter visitor, while the endangered Belding's savanna sparrow (*P. s. beldingi*) is non-migratory and has a more restricted distribution (Small 1994, Unitt 2004). The Belding's savannah sparrow is a locally common to uncommon resident of coastal salt marshes in Santa Barbara County south to the Mexican border (Small 1994). This subspecies has been documented in the Santa Clara River estuary, Point Mugu, Playa del Ray, and along several coastal areas in Santa Barbara, Orange, and San Diego Counties (Garrett and Dunn 1981). The "large-billed" savannah sparrow (*P. s. rostratus*) is a rare to uncommon visitor to the Salton Basin and along the coast in Santa Barbara County to the Mexican border (Small 1994). This subspecies used to be a common winter visitor in these areas, withdrawing to the Colorado Delta in Mexico to breed (Garrett and Dunn 1981). Today, however, it is less common along coastal areas (Garrett and Dunn 1981).

Habitat:
Habitat use and preferences vary by region and subspecies. In the western Sierra Nevada Mountains, savannah sparrows are found in grassland habitats and may be found in early successional stages of other habitat types (Verner et al. 1980). In the northwest regions the savannah sparrow breeds in coastal grasslands and wet meadows near river mouths, while in the south, the Belding's savannah sparrow inhabits coastal salt marshes, where the dominant vegetation is pickleweed (*Salicornia* spp.) and cord grass (*Spartina* spp.; Small 1994, Unitt 2004). *P. s. nevadensis* breeds at higher elevations (732 – 2134 meters), where it is found in grassy valleys, along mountain streams, around the edges of alkali lakes, and even in hay meadows and alfalfa fields (Small 1994). The "large-billed" sparrow can be found in salt marshes, on beaches among beach wrack, piers, reefs, and breakwaters, and among tamarisk scrub bordering irrigation ditches, rivers, and the shoreline of the Salton Sea (Small 1994).

Food:
Savanna sparrows eat insect and seeds, and forage primarily on the ground (Verner et al. 1980).

Ecology/Behavior:
Belding's savannah sparrows build their nests in dense marsh vegetation, either on or near the ground (Unitt 2004), and high nesting success has been reported to be associated with tall and dense marsh vegetation (Powell and Collier 1998).

In Georgia, a short-term (1 week) winter home range of 3.2 hectares was reported (Norris 1960, cited in Verner et al. 1980). In San Diego County, Powell and Collier (1998) reported that marshes smaller than 10 hectares were less likely to support breeding Belding's savannah sparrows. Belding's savannah sparrows are sedentary and dispersal is believed to be very limited. Powell and Collier (1998) found no population exchange between two marshes in San Diego County that were only one quarter of a mile (400 meters) apart.

Rationale for its use as target species:
Belding's savannah sparrow relies on one of California's most threatened habitats. This subspecies is State listed as Endangered, primarily due to destruction of its coastal marsh habitat during the past 40-50 years (Small 1994, Unitt 2004). This subspecies is also a very poor disperser so habitat fragmentation is a serious concern.

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). We generated one habitat map which included all pixels with a WHR rating > 0. However, because the WHR system defines habitat for savannah sparrows in general, and not specifically the habitat of Belding's savannah sparrow, we modified the ratings to include only two habitat types: Estuarine and Saline Emergent Wetlands. In addition, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 3.2 hectares (the size of the smallest recorded home range) and those that were both > 0.8 km (twice the roughly approximated maximum dispersal distance) from a second patch and < 160 hectares (approximately 50 home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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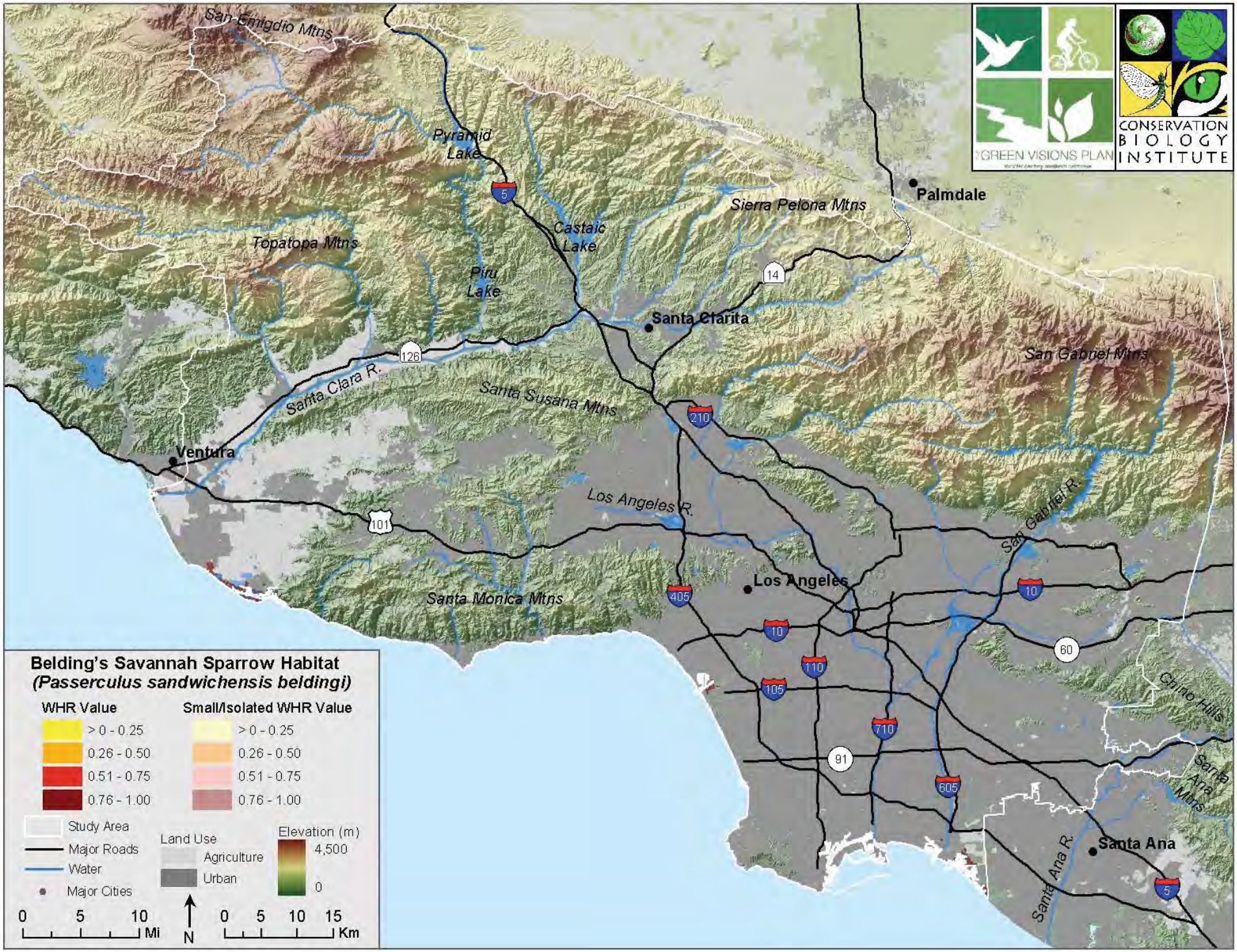
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
San Emigdio Mtns
Pyramid Lake
Castaic Lake
Topatopa Mtns
Piru Lake
Sierra Pelona Mtns
Palmdale
Santa Clarita
San Gabriel Mtns
Santa Clara R.
Santa Susana Mtns
Ventura
Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
5
14
126
210
101
405
10
110
105
710
91
605
60
Belding's Savannah Sparrow Habitat
(Passerculus sandwichensis beldingi)
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Small/Isolated WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Spotted Owl (*Strix occidentalis*)
Family: Strigidae
Order: Strigiformes
Class: Aves

WHR #: B270

Distribution:
Spotted owls are found from southwestern British Columbia south into California, in the southern Rocky Mountains in northern Utah, and from central Colorado to central Mexico (Peterson 1961). They have been reported at elevations from 100 to 8500 feet (Small 1994, Stephenson 1991, cited in Stephenson and Calcarone 1999).

In California, the "northern" spotted owl (*S. o. caurina*) is distributed primarily from the Oregon border through the Klamath Mountains and Northern Coast Range, from Del Norte and Siskiyou counties to Marin County (Small 1994). The "California" spotted owl (*S. o. occidentalis*) is found from Monterey County south to Santa Barbara County, and east to Mount Pinos, southeast through the Transverse Ranges, the San Gabriel mountains, San Bernardino mountains, the Peninsular Ranges, the Santa Ana Mountains, and on Palomar Mountain, the Laguna Mountains, and the Cuyamaca Mountains in San Diego County (Garrett and Dunn 1981, Small 1994). Spotted owls are also found in parts of the Cascade Mountains, Breckenridge Mountain, and the Sierra Nevada Mountains (Small 1994). Some birds have also been found to the northeast, in Shasta and Lassen counties (Small 1994).

Locally, spotted owls have been documented to breed in the Mount Pinos area, Upper Agua Blanca Creek, and Santa Paula Canyon among others, and have been observed in Barnsdall Park in Los Angeles (Garrett and Dunn 1981). In San Diego County, spotted owls typically breed above elevations of 2500 feet, with most frequent observations between 4000 and 6000 feet (Unitt 2004).

Habitat:
In general, spotted owls are found in heavy forest, conifers, and wooded canyons (Peterson 1961). In their northern habitats spotted owls prefer climax forest dominated by coast redwood (*Sequoia* sp.), Douglas fir (*Pseudotsuga* spp.), and hardwoods (Small 1994). In coastal areas they prefer deep, well-shaded canyons dominated by canyon live oak (*Quercus chrysolepis*), while owls in the Cascades, the Sierra Nevada Mountains, and the higher southern California mountains seem to prefer mixed conifer forests, often with an understory of black oaks (*Quercus* spp.) and other deciduous hardwoods (Small 1994).

Typically, spotted owls prefer mature, multilayer forests, with a variety of tree species, and canopy closure ≥ 40% (Small 1994). However, spotted owls have also been documented nesting in second growth forests, typically in deep, shaded canyons, on north-facing slopes, and within 300 meters of water (Small 1994). Spotted owls have also been observed in oak savannah, riparian, suburban, and city park woodlands (Small 1994).

Stephenson and Calcarone (1999) report that nest sites often have a well-developed hardwood understory such as canyon live oak, and a conifer overstory. However, these authors also report that high elevation nests (above 6500 ft) may be found in pure conifer stands, while low elevation nests (below 3000 ft) may be found in pure hardwood stands.

Spotted owls distribution may be tied to water, as roosting sites averaged 51 meters from water (California Interagency Wildlife Task Group 2002).

Food:
Stephenson and Calcarone (1999) reported that wood rats (*Neotoma* spp.) are a primary prey item for spotted owls. Verner et al. (1980) noted that this species also eats other small mammals, large insects, and small birds.

Ecology/Behavior:
Spotted owls breed from early March to late June, with peaks in mid-April to mid-June (Verner et al. 1980). Nests are typically found in tree hollows or sometimes on cliffs or abandoned raptor nests, and have been reported at heights from 9.1 to 15 meters (Verner et al. 1980). Because most nests are found in old large trees, their presence is critical to spotted owl distribution (Unitt 2004).

LaHaye et al. (1997) reported that reproductive success of pairs is higher in low-elevation bigcone Douglas-fir/canyon live oak forests than it is in high-elevation montane conifer forest, possible due to higher densities of woodrats in the surrounding chaparral habitat or because high-elevation owls are more likely to be negatively impacted by late season storms.

Spotted owls are fully nocturnal and are territorial (Verner et al. 1980, Stephenson and Calcarone 1999). Territory size varies widely depending on habitat type, with large territories observed in high-elevation, conifer-dominated sites (Stephenson and Calcarone 1999). Verner et al. (1980) summarize existing data, and report that territories in conifer forest in the Sierra Nevada were 40 to 138 hectares, with a mean of 93 hectares, while home ranges in that habitat were 121-242 hectares, with a mean of 182 hectares. In Oregon, home ranges were reported to be 120-240 hectares, with a mean of 180 hectares (California Interagency Wildlife Task Group 2002).

Adult spotted owls are not believed to be migratory in southern California (Unitt 2004), but young owls have been known to disperse up to 100 km (Thelander and Crabtree 1994). In a study of northern spotted owls, dispersal distances ranged from 0.6 to 111.2 km, but only 8.7% of the individuals dispersed more than 50 km (Forsman et al. 2002). In the San Bernardino Mountains of southern California, young female and male spotted owls dispersed a maximum of 35.7 km and 36.4 km, respectively (LaHaye et al. 2001).

Rationale for its use as target species:
The distribution of spotted owls is closely associated with dense forests with a closed canopy, and they are sensitive to habitat loss and fragmentation. Their presence therefore represents a unique and threatened habitat type in southern California. Spotted owls in southern California

are believed to function as a metapopulation, with separate populations augmented or recolonized by infrequent moves from other populations (Stephenson and Calcarone 1999). The persistence of individual populations is therefore important in maintaining the viability of spotted owls at a larger regional scale. Because low-elevation forests may provide spotted owls with the highest quality habitat, spotted owls may be especially vulnerable to fires that can move in from surrounding chaparral (Stephenson and Calcarone 1999). Spotted owls are also affected negatively by logging, due to a decrease on large old trees which provide the majority of nest sites (Thelander and Crabtree 1994). Populations in southern California have shown a declining trend in past years (Unitt 2004).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 120 hectares large (the size of the smallest recorded home range) and those that were both > 220 km (twice the maximum recorded dispersal distance) from a second patch and < 6000 hectares (approximately 50 home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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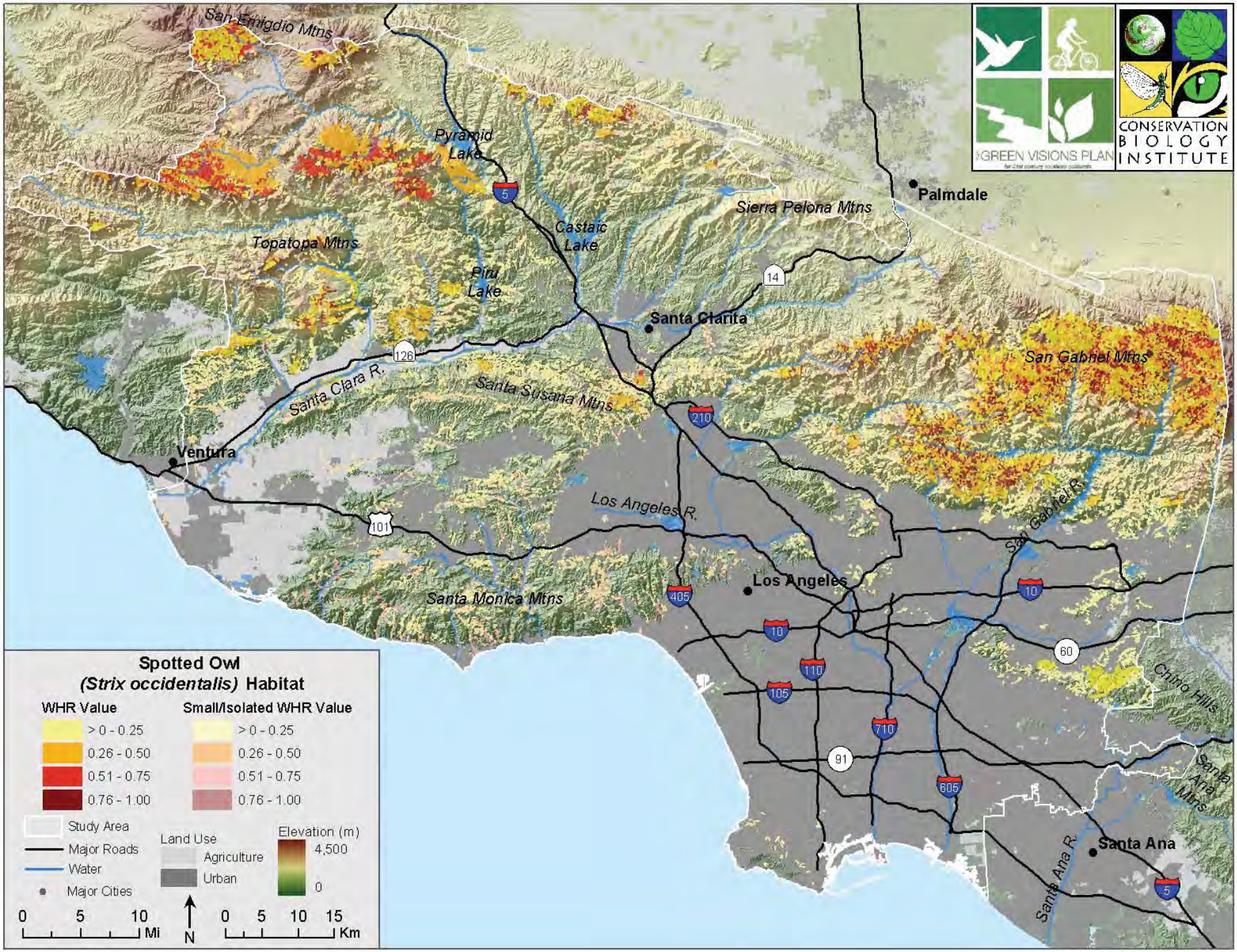
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(Strix occidentalis) Habitat
WHR Value
> 0 - 0.25
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0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Western Meadowlark (*Sturnella neglecta*)
Family: Icteridae
Order: Passeriformes
Class: Aves

WHR #: B521

Distribution:
Western meadowlarks are found from southwestern Canada south in to Central Mexico (Peterson 1961). In California, the western meadowlark occurs as a breeding bird throughout much of the state, including the Channel Islands, with the exception of the dense northwest forests (Small 1994). They are also absent as breeders in the high elevations of the Cascade and Sierra Nevada Mountains, the arid deserts in the southeast, and in areas where urbanization, irrigation and spreading agriculture have altered the environment, although they occur in these areas outside of the breeding season (Small 1994). Within their range, there is some seasonal migration from north and high elevation areas (Small 1994). Western meadowlarks breed at elevations of -200 to 8000 ft (approximately -60 to 2438 meters), but have been observed at elevations of 14,000 ft (4267 meters) outside of the breeding season (Small 1994).

In southern California, the western meadowlark is generally resident, but will withdraw from the coldest montane areas in the winter, so abundance during winter months tends to be greatest in coastal lowlands and in desert agricultural areas (Garrett and Dunn 1981).

Habitat:
For breeding, the western meadowlark requires meadows, pastures, and grasslands with medium height grass, but they may also breed in arid regions among low shrubs if enough grass is present for nesting (Small 1994). In the western Sierra Nevada Mountains, the western meadowlark breeds in grasslands and pastureland with little if any shrub cover, and generally in dry sites, and may move upslope in late summer and fall (Verner et al. 1980). Garrett and Dunn (1981) report that western meadowlarks in southern California may be found in agricultural fields (especially in winter), grasslands, montane pastures, and weedy lots (including those in semi-urban areas in winter), while Unitt (2004) reported that, although grassland is their typical habitat, western meadowlarks can also be found in coastal marshes, open sage scrub, and desert sinks.

Food:
Western meadowlarks eat insects and seeds, which they find among grasses, annuals, or even under clods of dirt which they turn over and dig up (Verner et al. 1980).

Ecology/Behavior:
In the western Sierra Nevada Mountains, the western meadowlark breeds from early February to late July (Verner et al. 1980). Nests are typically a depression on the ground among grasses or other low vegetation (Verner et al. 1980).

Home ranges and territories are believed to be similar in size, and a mean territory size of 3.0 hectares (range 1.2 – 6.1 hectares) has been reported in Wisconsin (Verner et al. 1980). No data on dispersal distances were found.

Rationale for its use as target species:
Western meadowlarks are impacted negatively by urbanization, which occurs frequently in their grassland habitat. Although they appear to tolerate light livestock grazing, especially in winter, heavy grazing, especially in the summer, is detrimental to their habitat (California Interagency Wildlife Task Group 2002). They are also threatened by habitat fragmentation (Bolger et al. 1997) and, because they are a ground-nesting bird, they are very susceptible to human disturbance and predation by domestic pets.

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab). We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	
Vacant Urban	
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	
Non-irrigated Cropland and Improved Pasture Land	
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 1.2 hectares (the size of the smallest recorded home range) as those less likely to be occupied compared to larger patches. We did not find data on dispersal distances or abilities and, therefore, assumed that western meadowlarks could reach any patch in the study area.

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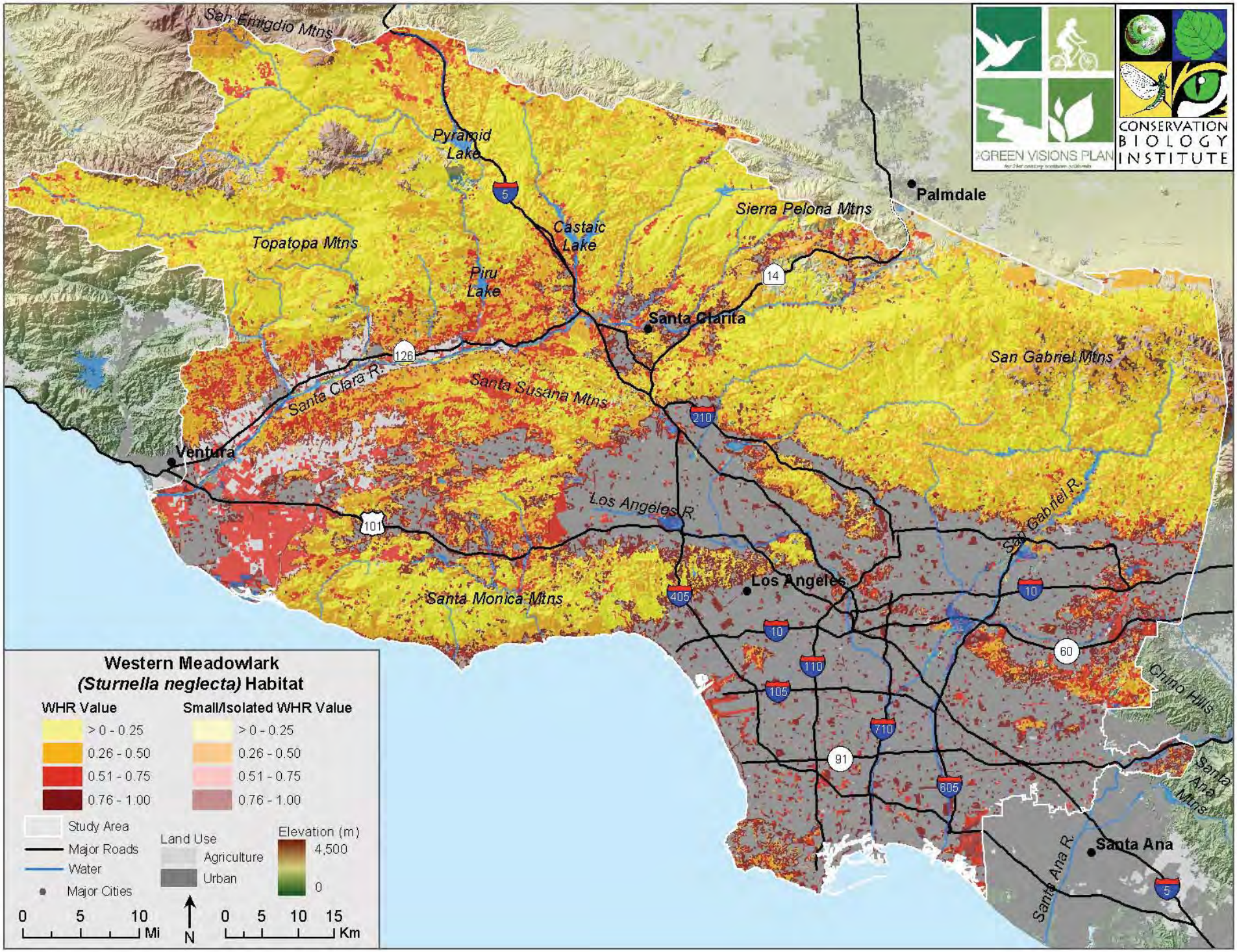
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GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Western Meadowlark
(Sturnella neglecta) Habitat
WHR Value
> 0 - 0.25
0.26 - 0.50
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Small/Isolated WHR Value
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Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Species Accounts: Amphibians and Reptiles

In alphabetical order by Latin name:

Western Pond Turtle	**(*Clemmys marmorata*)**
Coast Horned Lizard	**(*Phrynosoma coronatum*)**
Pacific Chorus Frog	**(*Pseudacris regilla)***
Western Spadefoot Toad	**(*Spea hammondii*)**
Coast Range Newt	**(*Taricha torosa torosa*)**
Two-striped Garter Snake	**(*Thamnophis hammondii*)**

Western Pond Turtle (*Clemmys marmorata*)

Family: Emydidae
Order: Testudines
Class: Reptilia

WHR #: R004

Distribution:
Western pond turtles are distributed from western Washington State south to northwestern Baja California, Mexico, primarily to the west of the Cascade-Sierra Nevada crest (Stebbins 1985). In California, additional populations are found in outlying areas such as the Mojave, Truckee, and Carson rivers (Stebbins 1985). This species is found in association with permanent water sources in a wide variety of habitat types at elevations of 0 to 1830 meters (Stebbins 1985).

Habitat:
Western pond turtles are found in ponds, marshes, rivers, streams, irrigation ditches, and even brackish water, and seem to prefer the quiet water of ponds, small lakes, and slow-moving streams (Stebbins 1954). They are most commonly found in waters that have rocky or muddy bottoms and are well-vegetated with aquatic vegetation such as watercress, cattails, water lilies (Stebbins 1985). These aquatic areas can be found in woodland, grassland, and open forest habitats (Stebbins 1985). Western pond turtles are primarily aquatic but leave the water to bask and to lay their eggs on land (Stebbins 1954), and they may leave water for up to several months during winter (Holland 1996). Eggs may be laid in sandy banks along slow-moving streams, or in hillsides near foothill streams (California Interagency Wildlife Task Group 2002). Eggs can be laid in many soil types, from sandy to very hard, but must be buried at least 10 centimeters (4 inches; California Interagency Wildlife Task Group 2002). Nesting areas often occur on south-facing slopes and have been reported to be up to 402 meters away from water (Holland 1996). Overwintering sites in upland habitats have been recorded up to 480 meters from water (Holland 1996).

Food:
The diet is varied but generally omnivorous (California Interagency Wildlife Task Group 2002). Aquatic plants, insects such as beetles, aquatic invertebrates, and even carrion are eaten (Stebbins 1954).

Ecology/Behavior:
Western pond turtles lay one clutch of eggs, typically during April to August depending on latitude and elevation, although it is possible that they breed year-round in some locations (Behler and King 1979, Holland 1996). Eggs are buried in an earthen cavity, often in a sunny spot near water (Behler and King 1979). Nests have been reported as far as 402 meters from water (Holland 1996). Hatchlings may quickly desiccate if exposed to hot, dry conditions and therefore require habitats with quiet, shallow water and abundant emergent vegetation (Holland 1996, California Interagency Wildlife Task Group 2002).

Western pond turtles bask on logs and rocks, and find cover in dense vegetation. They are not known to be territorial but aggressive behaviors are observed and may indicate competition for basking sites (Bury and Wolfheim 1973). They hibernate during the winter, except at the southern part of the range, often in the mud of stream or pond bottoms (Stebbins 1954). At the northern extent of their range, they are primarily active February to November, but may be active all year at the south end of their range (Stebbins 1954). Western pond turtles are primarily diurnal but some crepuscular and nocturnal activity has been observed (California Interagency Wildlife Task Group 2002). Home ranges sizes averaged 1 hectare and 0.3 hectare of water surface for males and females, respectively, and animals have been documented to move up to 480 meters from water (Holland 1996). However, moves of over 1.5 km along watercourses have been recorded for males (Bury 1972, cited in California Interagency Wildlife Task Group 2002).

A variety of species, including fish, bullfrogs, garter snakes, wading birds, and some mammals, prey on eggs, hatchlings and juveniles. Western pond turtles are especially threatened by introduced predators (Holland 1996). All age groups are susceptible to being killed by automobiles.

Rationale for its use as target species:
Western pond turtles are the only native freshwater turtles remaining in California and may act as indicators of healthy fresh-water ecosystems. They are vulnerable to loss of habitat and to streambed alteration. They are a California Species of Special Concern and are considered Sensitive by the U. S. Forest Service (California Interagency Wildlife Task Group 2002).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab), as modified by species experts for this project. We generated a habitat map which included all pixels with a WHR rating > 0. However, we only included habitat within 1000 meters of the following water sources: perennial streams, rivers, lakes, ponds, reservoirs, and wetlands. This distance represents approximately twice the furthest recorded distance moved on land. In addition, we excluded areas above elevations of 1830 meters, and the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	
Urban Green Space	
Vacant Urban	
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	
Non-irrigated Cropland and Improved Pasture Land	
Horse Ranches	X

Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

Finally, we identified patches of habitat that were < 0.3 hectare (the mean size of female home ranges) and those that were both greater than twice the furthest recorded dispersal distance (1000 meters on land or 3 km along a stream or river) from a second patch and < 15.0 hectares (approximately 50 female home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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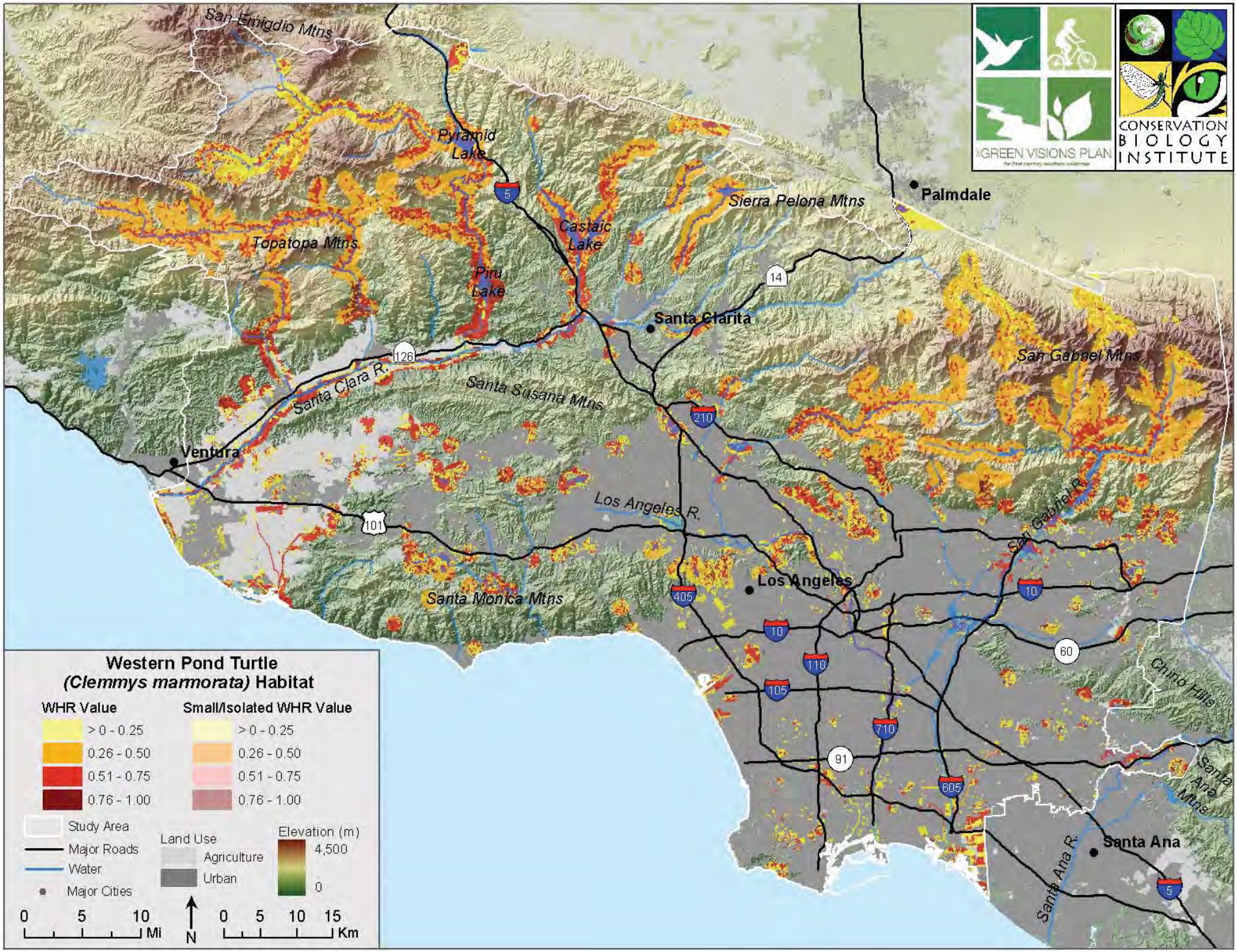
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
San Emigdio Mtns
Pyramid Lake
Castaic Lake
Sierra Pelona Mtns
Palmdale
Topatopa Mtns
Piru Lake
Santa Clarita
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Chino Hills
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Western Pond Turtle
(Clemmys marmorata) Habitat
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
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Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
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Elevation (m)
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Coast Horned Lizard (*Phrynosoma coronatum*)

Family: Phrynosomatidae
Order: Squamata
Class: Reptilia

WHR #: R029

Distribution:
Coast horned lizards are found throughout California, west of the desert and Cascade-Sierran highlands, and throughout Baja California, Mexico, except in the extreme northeastern part (Stebbins 1985). They are found in the Central Valley of California from southern Tehama County south, in the Sierra foothills from Butte County to Tulare County below 1200 meter elevations, below 1800 meter elevations in the mountains of southern California exclusive of the desert, and throughout the Coast Ranges south from Sonoma County (California Interagency Wildlife Task Group 2002). Two subspecies exist in the study area, with *P. c. blainvillii* distributed from the Transverse Ranges south, and *P. c. frontale* found in the northern regions of Ventura and Los Angeles counties (Jennings and Hayes 1994).

Habitat:
Coast horned lizards are found in a variety of habitats including scrubland (including chaparral and coastal sage scrub), grassland, coniferous forests, broadleaf woodlands, and riparian habitats (Stebbins 1985, California Interagency Wildlife Task Group 2002). They are found in valleys, foothills, and semi-arid portions of mountains, and are especially common in lowlands along sandy washes, flood plains, or wind-blown deposits where scattered shrubs provide cover (Stebbins 1954, 1985). Coast horned lizards use open warm areas for sunning and are often found in or near patches of fine loose soils where they can bury themselves (Stebbins 1985), or near colonies of harvester ants (*Pogonmyrmex* spp; Behler and King 1979).

Food:
This species eats primarily harvester ants, as well as other insect prey including wasps, beetles, grasshoppers, flies, and caterpillars (Stebbins 1954, 1985, Suarez and Case 2000). They do not appear to eat Argentine ants (*Linepithema humilis*), which have been introduced into the western United States (Jennings and Hayes 1994).

Ecology/Behavior:
Coast horned lizards typically emerge from hibernation in late March, are active during April – July, and usually aestivate for part of the summer. After reappearing for part of the late summer and early fall, they may move back into overwintering sites (Jennings and Hayes 1994). Six to 21 eggs are laid in April to June (Stebbins 1985) in nests constructed by the female in loose soil (California Interagency Wildlife Task Group 2002). Eggs hatch approximately 2 months later, and the young may temporarily bury themselves in the sand shortly after emerging from the eggs (Stebbins 1954).

Coast horned lizards are primarily active in the daytime and may be found basking in the sun on rocks or in sandy and gravelly places (Stebbins 1954). They are strictly ground-dwelling lizards and may retreat to rodent burrows, openings under rocks, bushes or loose soil for protection and thermoregulation (Stebbins 1954, Jennings and Hayes 1994), or rely on their camouflage when approached (California Interagency Wildlife Task Group 2002).

It is believed that coast horned lizards are not territorial (Stamps 1977), and recent movement data suggest that their home ranges may not be stable over time (T. Brown, California State University San Marcos, personal communication). In the related horned lizard (*P. mcallii*) males tended to move greater distances and have larger home ranges than females, with mean home ranges of 17,773.8 m^2 and 9042.8 m^2 for males and females, respectively (Wone and Beauchamp 2003). The smallest home range reported in that study was 651 m^2 (Wone and Beauchamp 2003). In coast horned lizards, home range size ranged from 541 m^2 to 60,994 m^2, and most (13 of 20) annual home ranges were larger than 5000 m^2 (0.5 hectare; Alberts et al. 2004). In that study, one individual was reported to move 800 meters over 4 days (T. Brown, California State University San Marcos, personal communication).

Coast horned lizards are preyed upon by a variety of species, including other lizards, snakes, loggerhead shrikes (*Lanius ludovicianus*), and hawks (California Interagency Wildlife Task Group 2002).

Rationale for its use as target species:
This species has declined severely in recent years, and is threatened by habitat loss from urban development and agriculture, pesticide use, off-road vehicle use, and invasion of their habitat by exotic vegetation. In addition, the invasion of Argentine ants, which have displaced the lizards' native ant food base, has had serious and negative impacts on coast horned lizards (Fisher et al. 2002, Suarez and Case 2002). The coast horned lizard is a California Species of Special Concern and is listed as Sensitive by the U. S. Forest Service.

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab), as modified by species experts for this project. We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X

Non-irrigated Cropland and Improved Pasture Land	
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we excluded elevations > 1800 meters and, because of the negative influence of Argentine ants often associated with urban development and artificial water sources, we excluded habitat within 200 meters of any urban or agricultural area (excluding non-irrigated cropland and improved pasture land; T. Brown, California State University San Marcos, personal communication).

Finally, we identified patches of habitat that were < 0.5 hectare (5000 m^2; estimated to represent a relatively small home range) and those that were both > 1600 meters (approximately twice the furthest estimated dispersal distance) from a second patch and < 25 hectares (approximately 50 home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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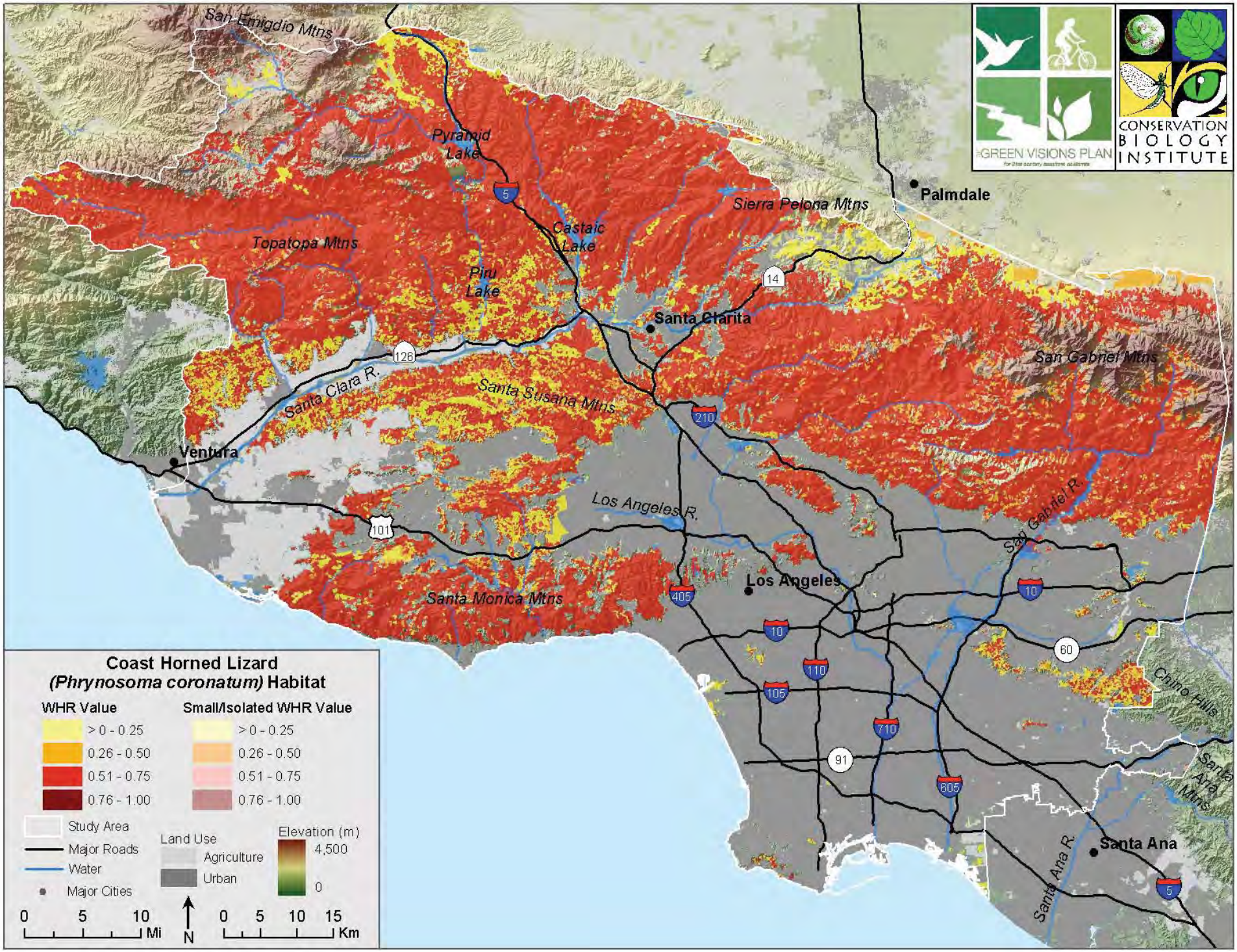
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Elevation (m)
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Pacific Chorus Frog (*Pseudacris regilla*, previously referred to as Pacific treefrog, *Hyla regilla*).

Family: Hylidae
Order: Anura
Class: Amphibia

WHR #: A039

Distribution:
The Pacific chorus frog is distributed from the Mt. Scriven and McBride areas in British Columbia, south to the tip of Baja California, Mexico, at elevations from sea level to about 3500 meters (Stebbins, 1985). The eastern edge of its distribution is western Montana and eastern Nevada (Stebbins 1985). It is the only native frog known to inhabit the Channel Islands, California, and some populations have been found in desert habitats (Stebbins 1985).

Habitat:
The Pacific chorus frog is found in a wide variety of habitats, including grassland, chaparral, woodland, forest, desert oases, and farmland (Stebbins 1985). It is typically found in or near ponds, marshes, springs, slow streams, irrigation canals, and man-made water sources (Stebbins 1954, Stebbins 1985). The Pacific chorus frog breeds in water and is typically found closest to water sources during the breeding season (Stebbins 1985, California Interagency Wildlife Task Group 2002).

Food:
The diet of Pacific chorus frogs includes both adult and larval invertebrates, including leaf-hoppers (e.g., *Erythroneura comes*), midges (e.g., *Tanytarsus* spp.), flies, ants, beetles, and spiders (Stebbins 1962, California Interagency Wildlife Task Group 2002).

Ecology/Behavior:
The Pacific chorus frog typically breeds during November - July, depending on elevation and latitude, in the aquatic habitats described above (Stebbins 1985). Mating and oviposition may occur in any body of water, but water sources with plenty of submerged and emergent vegetation appear to be favored (California Interagency Wildlife Task Group 2002). Mating and oviposition often occur in shallow quiet water (usually less than 4 inches deep) and eggs are found attached to vegetation, small sticks, leaves, or floating freely in masses (Stebbins 1954).

The Pacific chorus frog is primarily a ground dweller, not particularly attracted to trees as its previous name suggested (Stebbins 1954). It is found in low plant growth near water, and seeks shelter in rock fissures, vegetation, burrows of other animals, and various small cover sites in natural or manmade structures (Stebbins 1954, Stebbins 1985). Adults lose water rapidly when exposed to high temperatures and arid conditions, so refuges with moist conditions are an important resource (Jameson 1966). Distant moves by adults usually occur during or after rains. Tadpoles require standing water for up to three months to complete their aquatic life stage (California Interagency Wildlife Task Group 2002).

Pacific chorus frogs have been documented to move up to 910 meters away from their breeding sites (Brattstrom and Warren 1955, cited in California Interagency Wildlife Task Group 2002) and, although most individuals may move less than 10 meters during an entire breeding season, one individual moved 400 meters in four days (Schaub and Larsen 1978). Data on home range sizes were not found.

The Pacific chorus frog is primarily nocturnal although some diurnal activity has been observed (Stebbins 1954), especially at high elevations (California Interagency Wildlife Task Group 2002). Individuals may be active all year, except in very cold or dry areas (Stebbins 1962, California Interagency Wildlife Task Group 2002).

Pacific chorus frogs are preyed upon by a number of species, including garter snakes (*Thamnophis* spp.), bullfrogs (*Rana catesbeiana*), raccoons (*Procyon lotor*), mink (*Mustela vison*), and a variety of birds (California Interagency Wildlife Task Group 2002).

Rationale for its use as target species:
This species may be an indicator of healthy freshwater ecosystems. In addition, it has been negatively impacted by the introduction of trout species in some parts of its range (Knapp 2005). In the Santa Monica Mountains of southern California, tadpoles are preyed upon heavily by mosquitofish (*Gambusia affinis*), which were introduced as part of mosquito control programs (Goodsell and Kats 1999).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab), as modified by species experts for this project. We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded habitat that was > 1000 meters from water sources (intermittent and perennial streams, ponds, lakes, rivers, reservoirs, and wetlands) and we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	
Low Density Residential	
Rural Residential	
Urban Green Space	
Vacant Urban	
Orchards and Vineyards (active and abandoned)	
Irrigated Cropland and Improved Pasture Land	
Non-irrigated Cropland and Improved Pasture Land	
Horse Ranches	
Dairy, Intensive Livestock, and Associated Facilities	
Nurseries	

Other agriculture	
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 0.3 hectares (the estimated size of a home range) and those that were both > 2000 meters (approximately twice the furthest recorded dispersal distance) from a second patch and < 15.0 hectares (approximately 50 home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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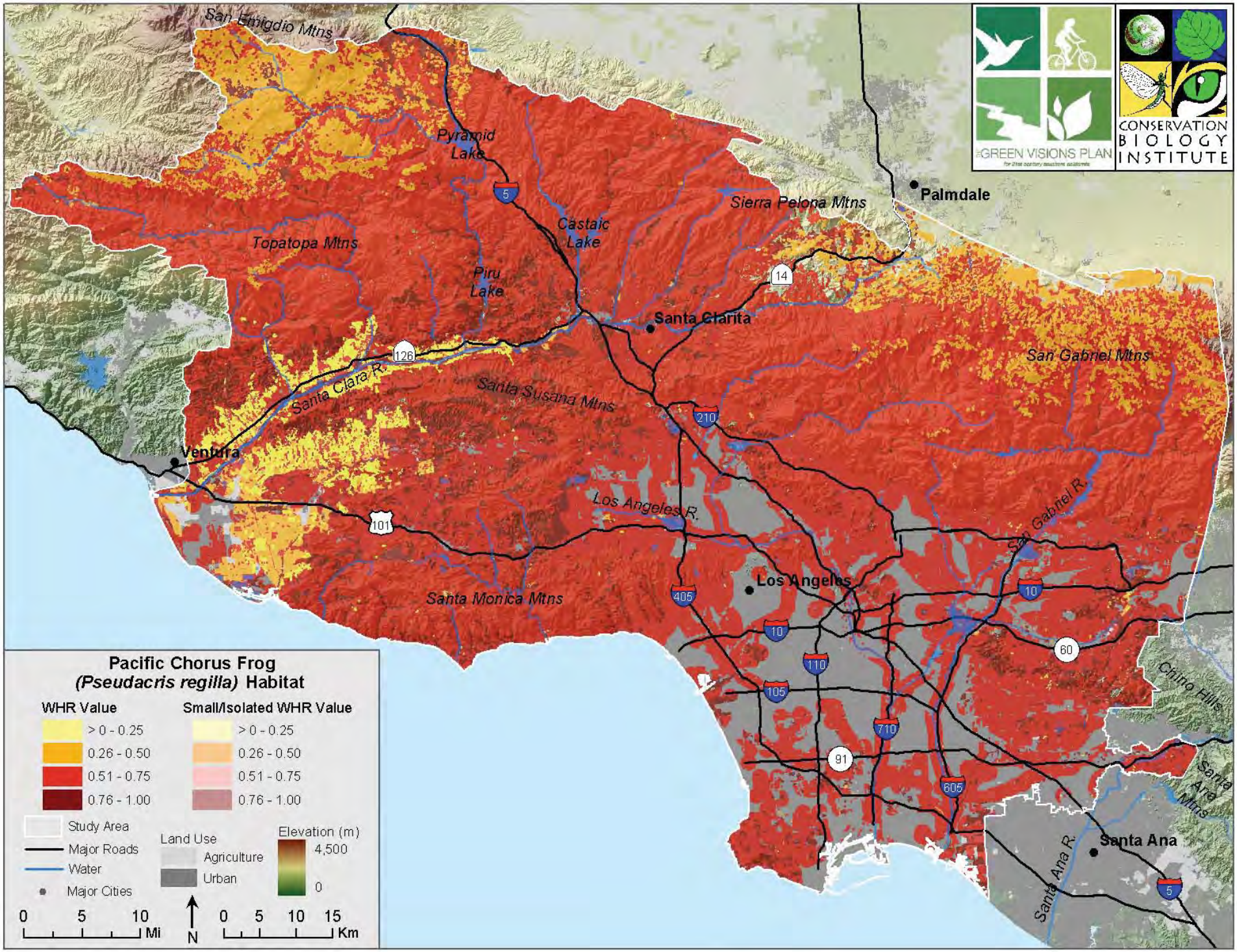
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Santa Ana
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GREEN VISIONS PLAN
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Pacific Chorus Frog
(Pseudacris regilla) Habitat
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Small/Isolated WHR Value
> 0 - 0.25
0.26 - 0.50
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0.76 - 1.00
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Western Spadefoot Toad (*Spea hammondii*)

Family: Pelobatidae
Order: Anura
Class: Amphibia

WHR #: A028

Distribution:
Western spadefoot toads are found in the Central Valley and adjacent foothills, and in the Coast Ranges south of San Francisco Bay to northwestern Baja California, Mexico (Stebbins 1985). In general, they are found between sea level and 1363-meter elevations but are absent form extreme desert areas (Stebbins 1954, California Interagency Wildlife Task Group 2002).

Habitat:
Western spadefoot toads occur primarily in lowlands but also range into the foothills and mountains (Stebbins 1985). In lowland areas they are often found in washes, floodplains of rivers, alluvial fans, playas, and alkali flats, and prefer open vegetation and short grasses with sandy or gravelly soils (Stebbins 1985). They are frequently found in grasslands, but also in open chaparral, and pine-oak woodlands. They require quiet streams or pools for breeding (Stebbins 1985) and, therefore, grasslands with shallow temporary pools are optimal habitats for this species (California Interagency Wildlife Task Group 2002). Some populations were reported to persist for a few years in orchard-vineyard habitats (California Interagency Wildlife Task Group 2002) but the species is now extinct from much of lowland southern California (Stebbins 1985).

Food:
Adults eat insects, worms, and other invertebrates (Stebbins 1972), and a related species (*S. multiplicatus*) was reported to eat butterfly and moth larvae, ants, termites, and beetles (Whitaker et al. 1977, Dimmitt and Ruidal 1980). Tadpoles feed on mosquito larvae (Behler and King 1979), planktonic organisms, and algae (California Interagency Wildlife Task Group 2002).

Ecology/Behavior:
The western spadefoot breeds primarily in winter and spring (Jan – May, Stebbins 1985) but may breed as late as August, depending on rainfall (Stebbins 1954, Behler and King 1979). Breeding occurs primarily in shallow, temporary pools formed by heavy winter rains (California Interagency Wildlife Task Group 2002) but also in quiet streams (Stebbins 1985). Egg masses are found on vegetation or attached to upper surfaces of small submerged rocks (California Interagency Wildlife Task Group 2002).

Western spadefoot toads are nocturnal, generally secretive, and seldom seen except during the breeding season (Stebbins 1954). They seek cover in self-made burrows, or burrows made by other species, sometimes up to 0.9 meters deep, that provide a microhabitat with moderate humidity and temperatures (Stebbins 1954, Stebbins 1972, Behler and King 1979). Recently metamorphosed juveniles will spend several days near breeding ponds, where they seek cover in

drying mud cracks and under surface objects such as boards and even dry cow dung (Weintraub 1980).

During the breeding season, males at breeding sites exhibit aggression towards each other, suggesting at least some level of territoriality (Whitford 1967). Most movement by adults is associated with rain or high humidity at night but postmetamorphic juveniles may disperse even in the absence of rain (California Interagency Wildlife Task Group 2002). Home range of this species is suspected to be up to 0.4 hectare (1 acre, Basey and Sinclear 1980). No data were found on dispersal distances but the literature suggested that movements are limited.

Adults may avoid predation for much of the year due to their secretive nature, but dense aggregations of tadpoles may be preyed upon heavily by wading birds and some mammal species (California Interagency Wildlife Task Group 2002).

Rationale for its use as target species:
Western spadefoot toads may be indicators of vernal pools and other ephemeral wetland habitats. These habitat types are highly threatened by disking, intensive livestock grazing and trampling, off-road vehicle use and contaminant runoff. In addition, western spadefoot toads may be indicators of habitat connectivity, since they are negatively impacted by barriers created by roads and development.

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab), as modified by species experts for this project. We generated a habitat map which included all pixels with a WHR rating > 0. However, we only included habitat within 1000 meters (twice the estimated dispersal distance) of the following water sources: perennial and intermittent streams, rivers, wetlands (both permanently and intermittently flooded), and vernal pools. In addition, we excluded elevations over 1363 meters and the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	
Urban Green Space	
Vacant Urban	
Orchards and Vineyards (active and abandoned)	
Irrigated Cropland and Improved Pasture Land	
Non-irrigated Cropland and Improved Pasture Land	
Horse Ranches	
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X

Packing Houses and Grain Elevators	X
Poultry Operations	X

Finally, we identified patches of habitat that were < 0.4 hectare (the estimated home range size) and those that were both > 1000 meters from a second patch and < 20 hectares (approximately 50 home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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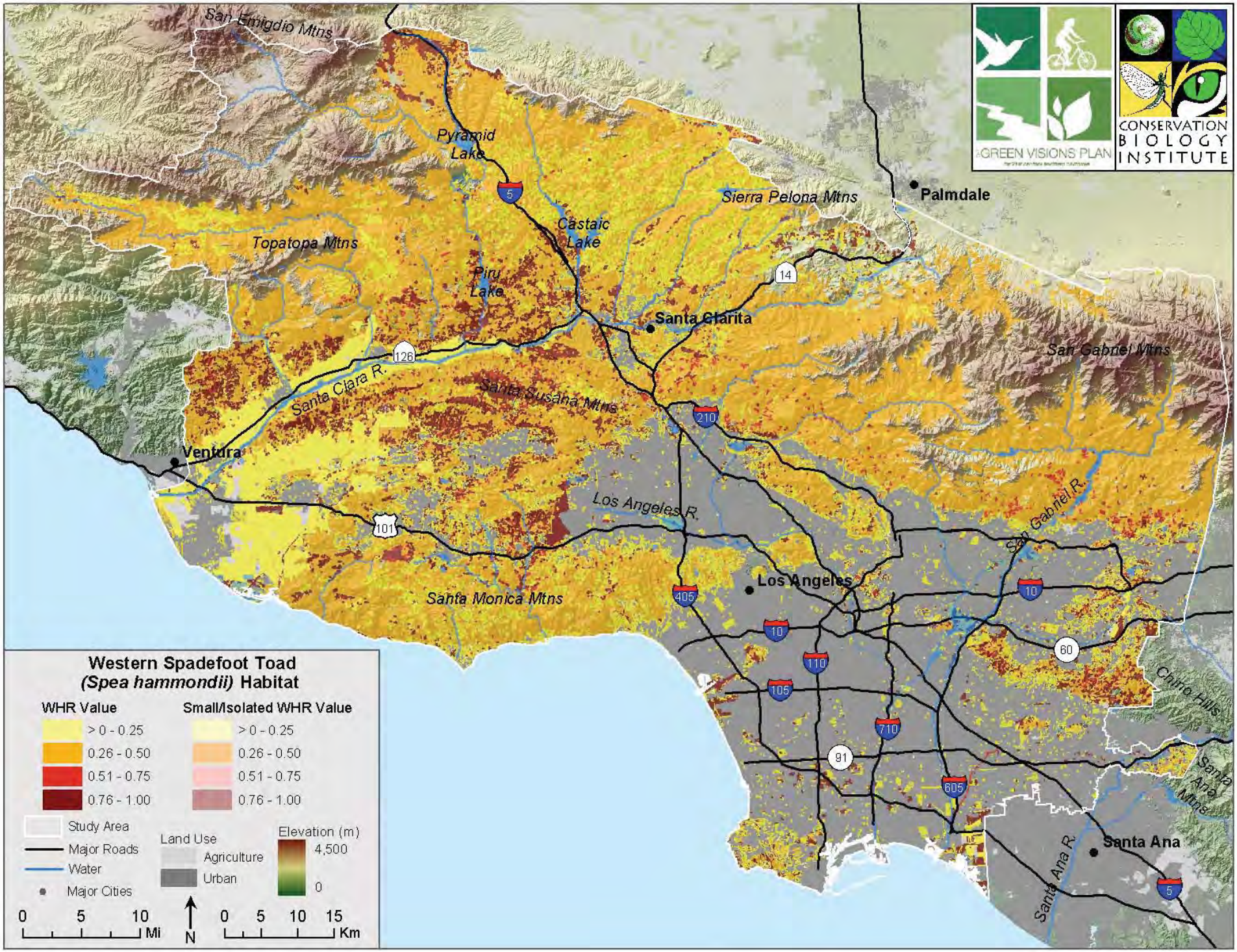
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Coast Range Newt (*Taricha torosa torosa*)
Family: Salamandridae
Order: Caudata
Class: Amphibia

WHR #: A007

Distribution:
Coast range newts are found in the Coast Ranges of California, from Mendocino County to the western slopes of the Peninsular Ranges in San Diego County (Boulder Creek). A few populations have also been found near the floor of the Central Valley. The species is found at elevations of < 2000 meters (Stebbins 1985). The related Sierra newt (*T. t. sierrae*) is found on the western slopes of the Sierra Nevada south to Breckenridge Mountain and Mill Creek, Kern County (Stebbins 1985).

Habitats:
Coast range newts are found in valley-foothill hardwood, valley-foothill hardwood-conifer, coastal scrub and mixed chaparral, and are also known from annual grasslands and mixed conifer habitats (California Interagency Wildlife Task Group 2002). Stebbins (1954) stated that their range "…coincides with the distribution of the coast and interior live oaks and in the Sierra Nevada extends into the Digger and yellow pine zones." Because breeding occurs in ponds, reservoirs, and slowly flowing streams, the optimum habitat is near slow-moving streams, ponds, or lakes (Stebbins 1985). Individuals may also be found in larger rivers and streams with fast water (Stebbins 1985).

Food:
Terrestrial adults and postmetamorphic juveniles eat earthworms, snails, slugs, sowbugs (*Platyarthus* spp.), and insects (Stebbins 1972). In water, breeding adults eat adult and larval aquatic insects, small crustaceans, snails, clams, and even eggs of their own species (Borrell 1935, cited in California Interagency Wildlife Task Group 2002).

Ecology/Behavior:
This species breeds and lays its eggs in water. Individuals go to water during the first rains in the fall and breed during December through May (Stebbins 1985). Eggs are usually laid in shallow water, often attached to emergent vegetation or on the underside of rocks (California Interagency Wildlife Task Group 2002). Egg-laying may extend from fall to late spring, depending on locality (California Interagency Wildlife Task Group 2002).

When out of water, the coast range newt can be found crawling in the open or under rocks, fallen logs, or bark (Stebbins 1985), and may seek cover in mammal burrows and human-made structures such as wells (California Interagency Wildlife Task Group 2002). During terrestrial periods, individuals are active mainly at night, on cloudy days, and following rains (California Interagency Wildlife Task Group 2002). Breeding adults and aquatic larvae are active day and night (California Interagency Wildlife Task Group 2002).

Coast range newts are non-territorial (California Interagency Wildlife Task Group 2002). During the terrestrial periods (typically late spring to the first rains in fall) home ranges are very small, with limited movement (California Interagency Wildlife Task Group 2002). Although migrations exceeding 1000 meters to and from breeding sites have been recorded (California Interagency Wildlife Task Group 2002), this species is typically found within 300 meters of water sources (J. Lovich, personal communication). Home ranges, not including movement to and from breeding sites, are estimated to be 0.4 hectare (Basey and Sinclear 1980).

Coast range newt larvae are preyed upon by two exotic species, crayfish (*Procambarus clarkia*) and mosquito fish (*Gambusia affinis*) as well as other aquatic predatory species. In addition, crayfish may displace newts and reduce breeding success (Gamradt et al. 1997).

Rationale for its use as target species: Coast range newts are a California species of special concern. Survival and recruitment are reduced by two exotic predator species: crayfish and mosquito fish (Goodsell and Kats 1999, California Interagency Wildlife Task Group 2002). Breeding habitat has been eliminated or degraded, and erosion and siltation of streams and pools following fires (and possibly construction and other activities that cause vegetation loss) can cause a reduction in reproduction (Gamradt and Kats 1997).

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab), as modified by species experts. We generated a habitat map which included all pixels with a WHR rating > 0. However, we excluded habitat that was > 600 meters from water sources (intermittent and perennial streams, ponds, lakes, rivers, and reservoirs) and elevations > 2000 meters. We also excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	
Urban Green Space	
Vacant Urban	
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

In addition, we identified patches of habitat that were < 0.4 hectares (the size of the smallest recorded home range) and those that were both > 2000 meters (approximately twice the furthest estimated dispersal distance) from a second patch and < 20.0 hectares (approximately 50 home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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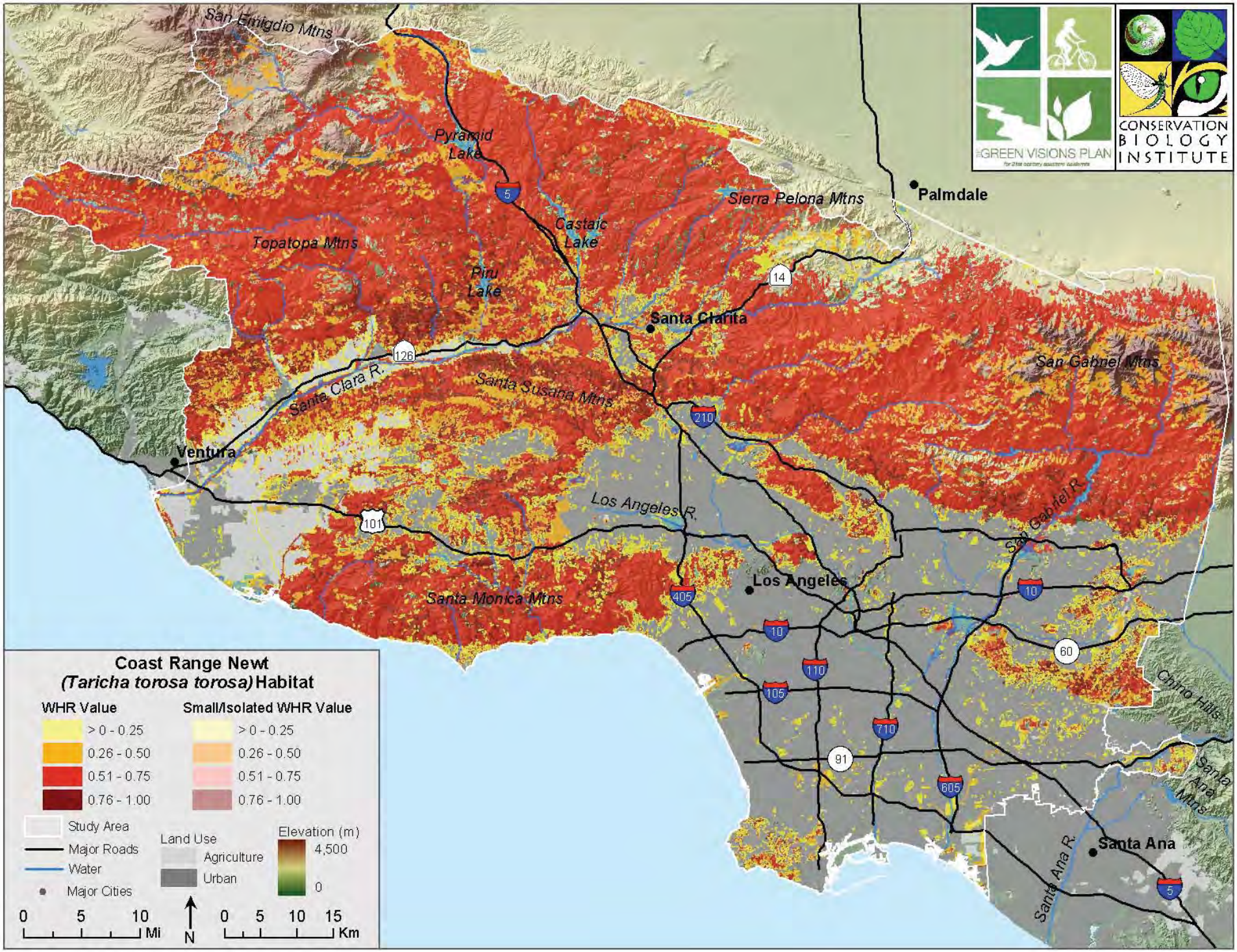
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Sierra Pelona Mtns
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Santa Clara R.
Santa Susana Mtns
Ventura
Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Coast Range Newt
(Taricha torosa torosa) Habitat
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Small/Isolated WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Two-striped Garter Snake (*Thamnophis hammondii*)

Family: Colubridae
Order: Squamata
Class: Reptilia

WHR #: R080

Distribution:
Two-striped garter snakes are found in coastal California, from the vicinity of Salinas, Monterey County, to northwestern Baja California, Mexico, at least as far south as the mouth of the Rio Rosario (Stebbins 1985). It is found in both the South Coast and Transverse Ranges in southern California, and on Santa Catalina Island (California Interagency Wildlife Task Group 2002). Several isolated populations are found in other parts of Baja California (Stebbins 1985). The species is found at elevations from sea level to 2450 meters (Jennings and Hayes 1994).

Habitats:
The two-striped garter snake is highly aquatic and is found in or near permanent fresh water, especially along streams with rocky beds bordered by vegetation such as willows (Stebbins 1985). They may prefer water bodies associated with dense vegetation, and may also be found in chaparral, mixed oak, and oak woodlands (California Interagency Wildlife Task Group 2002). They have been reported to inhabit perennial streams, intermittent streams, stock ponds, and other artificially created aquatic habitats (Jennings and Hayes 1994, Stephenson and Calcarone 1999), and are often found in moving water (R. Lovich, personal communication). They have also been reported to use large sandy riverbeds, such as the Santa Clara River in Ventura County, where dense riparian vegetation exists along the riverbed (Jennings and Hayes 1994). Rathbun et al. (1993) found seasonal habitat differences, with the snakes occupying streamside habitat in the summer and nearby upland habitat in the winter. In the study by Rathbun et al. (1993), radio-tracked individuals remained within about 250 meters of water.

Food:
Adults of this species eat tadpoles, toads, frogs, fish, fish eggs, and earthworms (Stebbins 1985, Dunn 2004). This species forages primarily in and along streams, where it preys on fish and their eggs, and amphibians and their larvae (California Interagency Wildlife Task Group 2002).

Ecology/Behavior:
Courtship and mating usually occur in the spring and young are born in late summer, usually under cover of loose bark on rotting logs or in dense vegetation near water sources (California Interagency Wildlife Task Group 2002). These snakes bear live young, and one captive snake gave birth to 25 young in October (Stebbins 1985).

This species is diurnal, but may also be active at dusk and at night (Stebbins 1985, California Interagency Wildlife Task Group 2002). Diel activity patterns may depend on season and temperature. During the day individuals may be seen basking on rocks or vegetated river banks.

Holes, especially mammal burrows, or crevices provide cover during the night or on cold days (California Interagency Wildlife Task Group 2002).

Two-striped garter snakes are not known to be territorial. Rathbun et al. (1993) reported that the summer home ranges of 7 snakes averaged 1500 m^2 (range 80-5000 m^2) while the winter home range of 3 snakes averaged 3400 m^2 (range 50-9000 m^2), however, the smallest home ranges reported in their study were based on limited numbers of locations and may not accurately represent the minimum area required by an individual. No data on long-distance moves were found for this species.

This species may be preyed upon by mammals, birds, and other snakes.

Rationale for its use as target species:
The two-striped garter snake has been negatively impacted by habitat loss and modification in southern California (Stebbins 1985). In addition, it is threatened by predation by introduced bullfrogs (*Rana catesbeiana*) and fish species, and in many areas its amphibian prey base has been reduced. Although it has no special protection under State or Federal law, Jennings and Hayes (1994) report that it is gone from 40% of its historic range.

Habitat modeling approach:
Our habitat model for this species was based on habitat suitability ratings identified in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab), as modified by species experts for this project. We generated a habitat map which included all pixels with a WHR rating > 0. However, we only included habitat within 500 meters of the following water sources: perennial and intermittent streams, rivers, lakes, ponds, reservoirs, wetlands, and vernal pools. This distance represents approximately twice the distance this species has been observed to move away from water. In addition, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

Finally, we identified patches of habitat that were < 0.15 hectare (1500 m^2; the size of the mean reported summer home range) and those that were both greater than twice the furthest estimated movement distance (500 meters on land or 40 km along a stream or river) from a second patch and < 7.5 hectares (approximately 50 summer home ranges) as those less likely to be occupied as compared to larger and less isolated patches.

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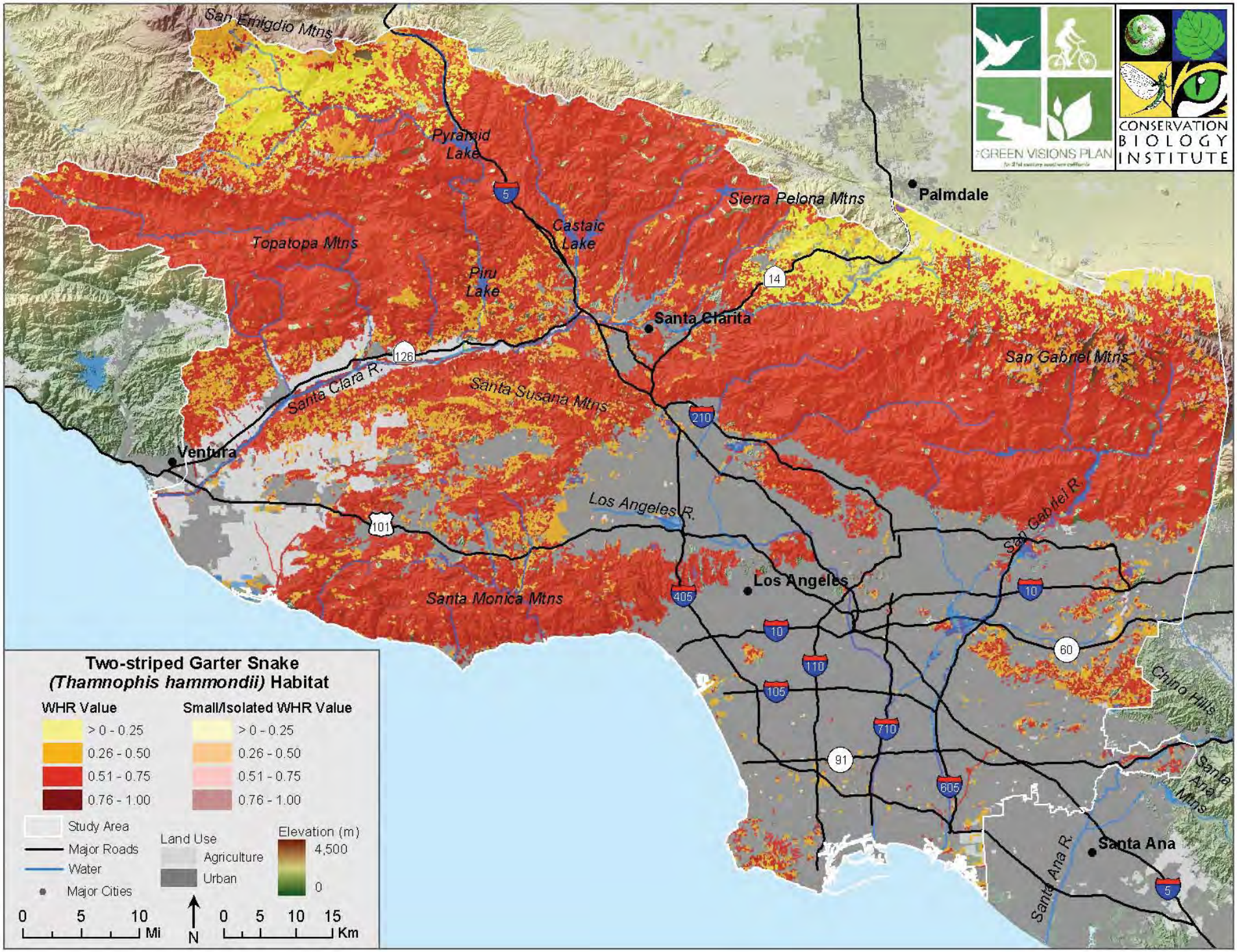
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
San Emigdio Mtns
Pyramid Lake
Castaic Lake
Piru Lake
Topatopa Mtns
Sierra Pelona Mtns
Palmdale
Santa Clarita
San Gabriel Mtns
Santa Clara R.
Santa Susana Mtns
Ventura
Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
5
14
126
210
101
405
10
110
105
710
91
605
60
Two-striped Garter Snake
(Thamnophis hammondii) Habitat
WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Small/Isolated WHR Value
> 0 - 0.25
0.26 - 0.50
0.51 - 0.75
0.76 - 1.00
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Species Accounts: Invertebrates

In alphabetical order by Latin name:

Behr's Metalmark	**(*Apodemia virgulti***
California Dogface	**(*Colias eurydice*)**
Lorquin's Admiral	**(*Limenitis lorquini*)**
Callippe Fritillary	**(*Speyeria callippe*)**
Riverside Fairy Shrimp	**(*Streptocephalus woottoni*)**

Behr's Metalmark (*Apodemia virgulti, previously A. mormo virgulti*)
Family: Riodinidae
Order: Lepidoptera
Class: Insecta

Distribution:
Behr's metalmark belongs to the Family Riodinidae, which is comprised of small tropical butterflies found most commonly in Central and South America (Monroe and Monroe 2004). Behr's metalmarks are found along the west coast from Santa Barbara County south about 150 miles (240 km) into Baja California, and east into the mountains (Howe 1975). They range north through the Tehachapi Mountains and into the southern Sierra Nevada Mountains to about Yosemite (Howe 1975).

Habitat:
Behr's metalmark occurs throughout the chaparral zones of cismontane southern California in association with California buckwheat (*Eriogonum fasciculatum*; Emmela and Emmel 1973, Brown et al. 1992). Behr's metalmark flies at higher elevations than the related desert metalmark (*A. mejicanus deserti*), and is often found in desert transition or chaparral habitat (Monroe and Monroe 2004).

Food:
Adults sip the nectar of narrowleaf goldenbush (*Ericameria linearifolia*), while caterpillars feed on California buckwheat (Monroe and Monroe 2004).

Ecology/Behavior:
This species exhibits several flights during January – December (Monroe and Monroe 2004), with one flight often occurring in March-May and another occurring August – October, depending on elevation (Brown et al. 1992). Males may be found perching on California buckwheat plants when waiting for females, and young caterpillars hibernate inside plant parts such as dried flower heads of California buckwheat (Monroe and Monroe 2004).

Rationale for its use as target species:
This species is vulnerable to habitat destruction and urban development, due to loss of its host plant, California buckwheat.

Habitat modeling approach:
Our habitat model for this species was based on the distribution of its host plant, California buckwheat, which is found in many vegetation associations, including dry slopes, washes, and canyons in scrub and woodland habitats below 2300 meters (Mayer and Laudenslayer 1988, Hickman 1993). We identified vegetation associations in which California buckwheat could be found, using vegetation associations described in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab), and generated a habitat map which included all of these vegetation associations found under 2300 meter elevations (see WHR suitability rating

table). However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

We did not determine a minimum patch size for this species, because minimum patch sizes necessary for persistence of butterfly populations have been difficult to estimate, and many aspects of butterfly ecology (such as emigration and immigration rates) as well as habitat quality can influence the minimum amount of habitat necessary for population persistence (Crone and Schultz 2003). Furthermore, habitat quality and suitability can change dramatically at a local scale, due to grazing, climate change, fire, human activity, vegetation succession, and changes in water flow patterns. Butterfly habitat therefore tends to be patchy (fragmented) and somewhat transitional in quality. Many butterfly populations can persist in this type of habitat, in the form of metapopulations that persist through a balance between colonization and extinction (Hanski 2003). For this reason, we assumed that even very small patches could be important to the persistence of a population

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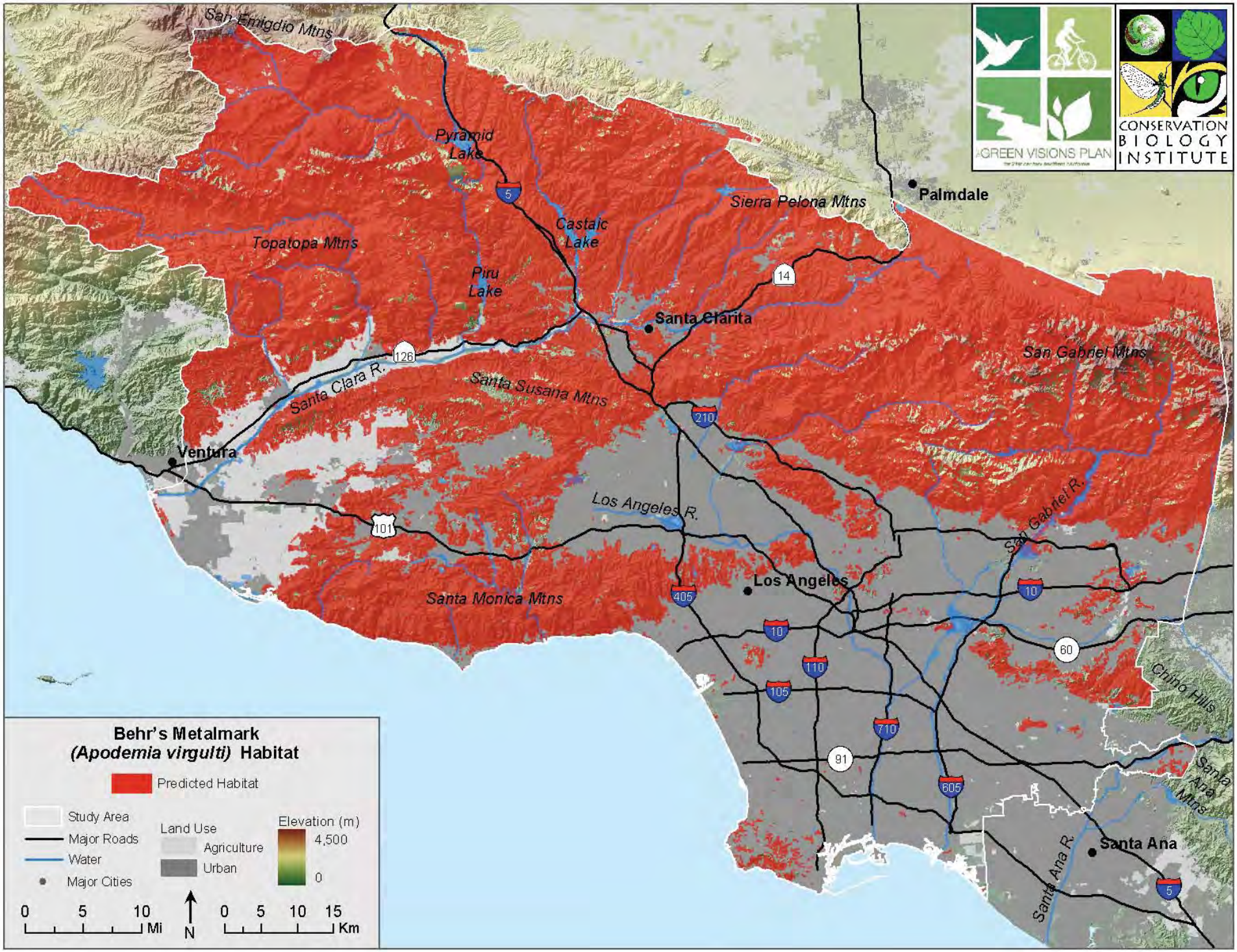
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Chino Hills
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Santa Ana R.
Behr's Metalmark
(Apodemia virgulti) Habitat
Predicted Habitat
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
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0 5 10 Mi
N
0 5 10 15 Km

California Dogface (*Colias eurydice*)

Family: Pieridae
Order: Lepidoptera
Class: Insecta

Distribution:
The California dogface is found primarily in the coastal mountains and foothills of central California to southern San Diego County (Emmel and Emmel 1973, Milne and Milne 1980), but it has also been found in northern Baja California, in the deserts of southeastern California, and in the foothills of the Sierra Nevada Mountains (Howe 1975, Milne and Milne 1980, Brown et al. 1992, Monroe and Monroe 2004).

Habitat:
This species may be found in open woodland habitat (Milne and Milne 1980), often in open oak woodlands and open glades of Douglas fir forests (*Abies* spp.; Howe 1975), and is also found along desert canyon streams (Monroe and Monroe 2004). The California dogface is typically considered a mountain species, but may be found in hilly areas at lower elevations, such as in the north part of the Los Angeles basin (Hogue 1974). In Orange County, it has been found at both low and high elevations in the Santa Ana Mountains, and also in foothills along the coast (Orsak 1977). This species has also been commonly observed in the "resort areas" of San Bernardino Mountains, where it is most common near dry grasses and blooming thistles (*Cirsium* spp.) in open meadows (Emmel and Emmel 1973). It apparently does not exist in the Santa Monica Mountains or on the Palos Verdes Peninsula, based on a lack of sightings during butterfly counts (F. Heath, Camarillo, California, personal communication).

Food:
Caterpillars of this species feed on false indigo plants (primarily *Amorpha californica* and less frequently on *A. fruticosa*; Brown et al. 1992, Monroe and Monroe 2004). In the Santa Ana Mountains, adults have been observed sipping nectar from thistles (Orsark 1977).

Ecology/Behavior:
This species flies during spring to late fall, with adults appearing in two broods, one in April-May and another typically July-September (Emmel and Emmel 1973). Females lay their eggs primarily on false indigo plants (Monroe and Monroe 2004).

Rationale for its use as target species:
In 1972, the California dogface was officially designated as the State butterfly of California (Orsak 1977). Its range is limited almost exclusively to California (Orsak 1977).

Habitat modeling approach:
Our habitat model for this species was based on the distribution of its primary host plant, *Amorpha californica*. This plant is reported to be found on wooded, shrubby, or open slopes, and in chaparral, below elevations of 2300 meters (Isely 1993). We identified vegetation associations in which *A. californica* could be found, using vegetation associations described in

the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab), and generated a habitat map which included all of these vegetation associations found below 2300 meter elevation (see WHR suitability rating table). However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

We did not determine a minimum patch size for this species, because minimum patch sizes necessary for persistence of butterfly populations have been difficult to estimate, and many aspects of butterfly ecology (such as emigration and immigration rates) as well as habitat quality can influence the minimum amount of habitat necessary for population persistence (Crone and Schultz 2003). Furthermore, habitat quality and suitability can change dramatically at a local scale, due to grazing, climate change, fire, human activity, vegetation succession, and changes in water flow patterns. Butterfly habitat therefore tends to be patchy (fragmented) and somewhat transitional in quality. Many butterfly populations can persist in this type of habitat, in the form of metapopulations that persist through a balance between colonization and extinction (Hanski 2003). For this reason, we assumed that even very small patches could be important to the persistence of a population.

Our resulting map apparently overestimates the distribution of this species, due to the difficulty in predicting the distribution of the larval host plant. We therefore indicated two areas (the Santa Monica Mountains and the Palos Verdes Peninsula) that should possibly be excluded from predicted habitat because this species has not been detected in these areas during multiple butterfly counts (F. Heath, Camarillo, California, personal communication).

Bibliography:

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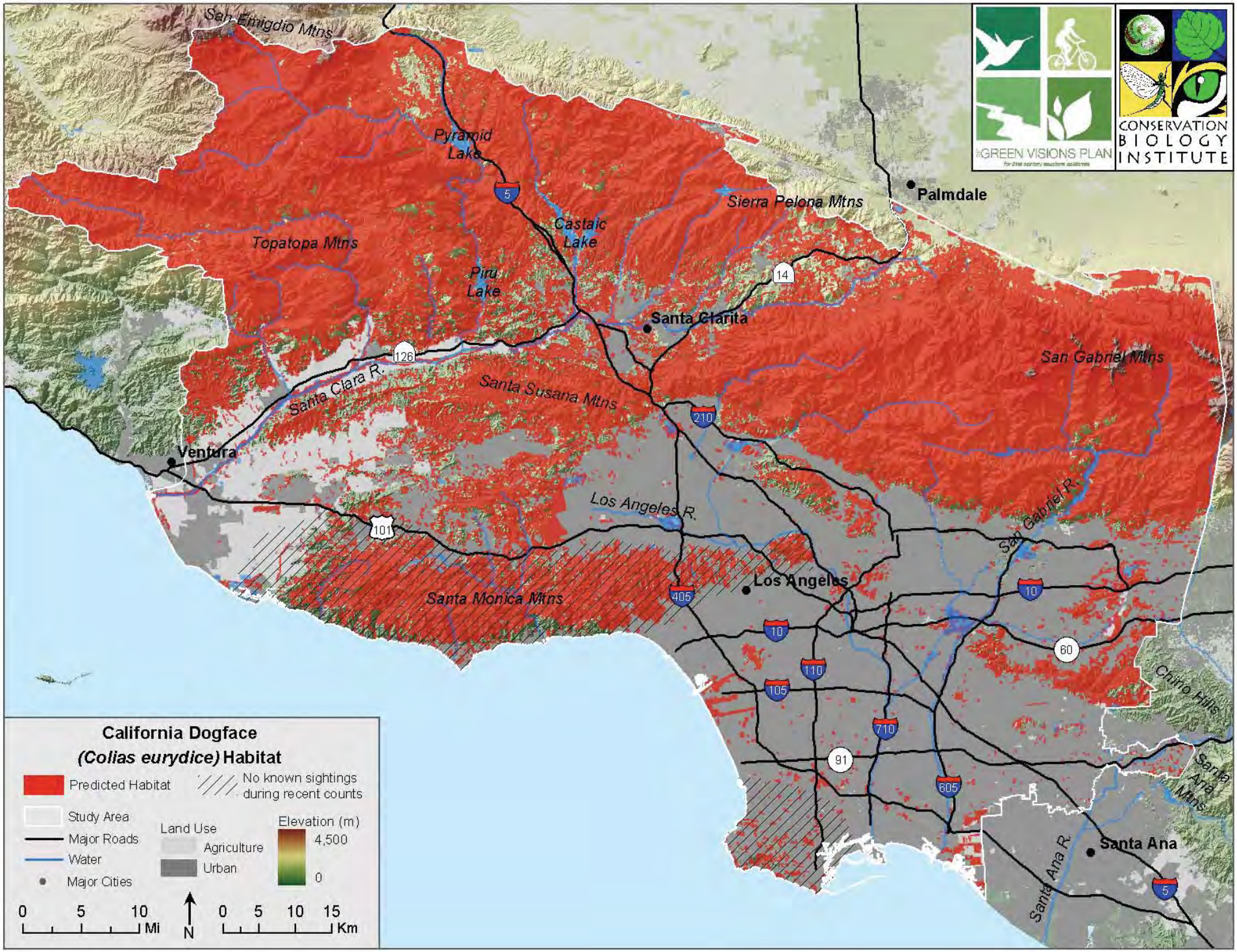
San Emigdio Mtns
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Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
California Dogface
(Colias eurydice) Habitat
Predicted Habitat
No known sightings during recent counts
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Lorquin's Admiral (*Limenitis lorquini*)

Family: Nymphalidae
Order: Lepidoptera
Class: Insecta

Distribution:
Lorquin's admiral is found most commonly along the Pacific coast of North America, from southwestern British Columbia, along coastal Washington, Oregon, California, and northern Baja California, but in the northern part of its range it may occasionally also be found as far east as Idaho (Brock and Kaufman 2003). In Los Angeles County, Lorquin's admiral once occurred in the Baldwin Hills but this species is now probably extinct in this area due to habitat loss (Hogue 1974). In Los Angeles County, this species may now be most abundant in the canyons of the San Gabriel and Santa Monica mountains (Hogue 1974).

Habitat:
This species is typically found along streams, ponds, rivers, lakes, and other water sources, moist wooded areas, canyons, and river bottomlands, especially where willows and other larval plant foods are found (Hogue 1974, Howe 1975, Brock and Kaufman 2003, Monroe and Monroe 2004). Lorquin's admirals may be observed in urban areas, but in arid southern California their distribution may be more closely tied to riparian areas (Brock and Kaufman 2003). Orsak (1977) states that in southern California, the distribution of this species is closely associated with willows and moist riparian woodland vegetation types. Examples of habitat used by this species in the Los Angeles basin are found in Big Tujunga Canyon, Chevy Chase Canyon, Rustic Canyon, and Topanga Canyon (Hogue 1993). In Orange County, this species is found in mountain canyons and moist riparian woodlands along the Santa Ana River (Orsak 1977).

Food:
The caterpillar of this species feeds primarily on willows (Hogue 1993), particularly arroyo willow (*Salix lasiolepis*), slender willow (*S. exigua*), and red willow (*S. laevigata*; Monroe and Monroe 2004). They are also reported to feed on western chokeberry (*Prunus virginiana*), cottonwood and poplars (*Populus* spp.; Howe 1975, Brock and Kaufman 2003, Monroe and Monroe 2004).

Ecology/Behavior:
This species typically flies 2 times during February through November (Monroe and Monroe 2004).

Rationale for its use as target species:
This species relies on riparian habitat which is increasingly threatened by urban development, water use and diversion, and construction of flood control channels (Orsak 1977).

Habitat modeling approach:
Our habitat model for this species was based on the distribution of its host plant (willows in the genus *Salix*). We identified vegetation associations in which the genus *Salix* could be found,

based on Mayer and Laudenslayer (1988), and used vegetation associations described in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab) to generate a habitat map which included all of these vegetation associations (see WHR suitability rating table). However, we excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X
Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

We did not determine a minimum patch size for this species, because minimum patch sizes necessary for persistence of butterfly populations have been difficult to estimate, and many aspects of butterfly ecology (such as emigration and immigration rates) as well as habitat quality can influence the minimum amount of habitat necessary for population persistence (Crone and Schultz 2003). Furthermore, habitat quality and suitability can change dramatically at a local scale, due to grazing, climate change, fire, human activity, vegetation succession, and changes in water flow patterns. Butterfly habitat therefore tends to be patchy (fragmented) and somewhat transitional in quality. Many butterfly populations can persist in this type of habitat, in the form of metapopulations that persist through a balance between colonization and extinction (Hanski 2003). For this reason, we assumed that even very small patches could be important to the persistence of a population

Our map for Lorquin's admiral apparently underestimates the distribution of this species, as indicated by two areas of known presence (Conejo Creek and along the Los Angeles River west of Sepulveda Dam) where our map did not indicate presence. This shortcoming is at least partly due to insufficient resolution and detail in the habitat and water layers available for use in this project. For example, the WHR system includes habitat categories along rivers and lakes that could potentially provide habitat for this species, and that were selected for inclusion in predicted habitat, but the GIS datalayers available for use in this project did not allow this type of resolution. It is therefore likely that this species occurs at additional sites, particularly along rivers and at the edges of lakes, where our map did not predict habitat.

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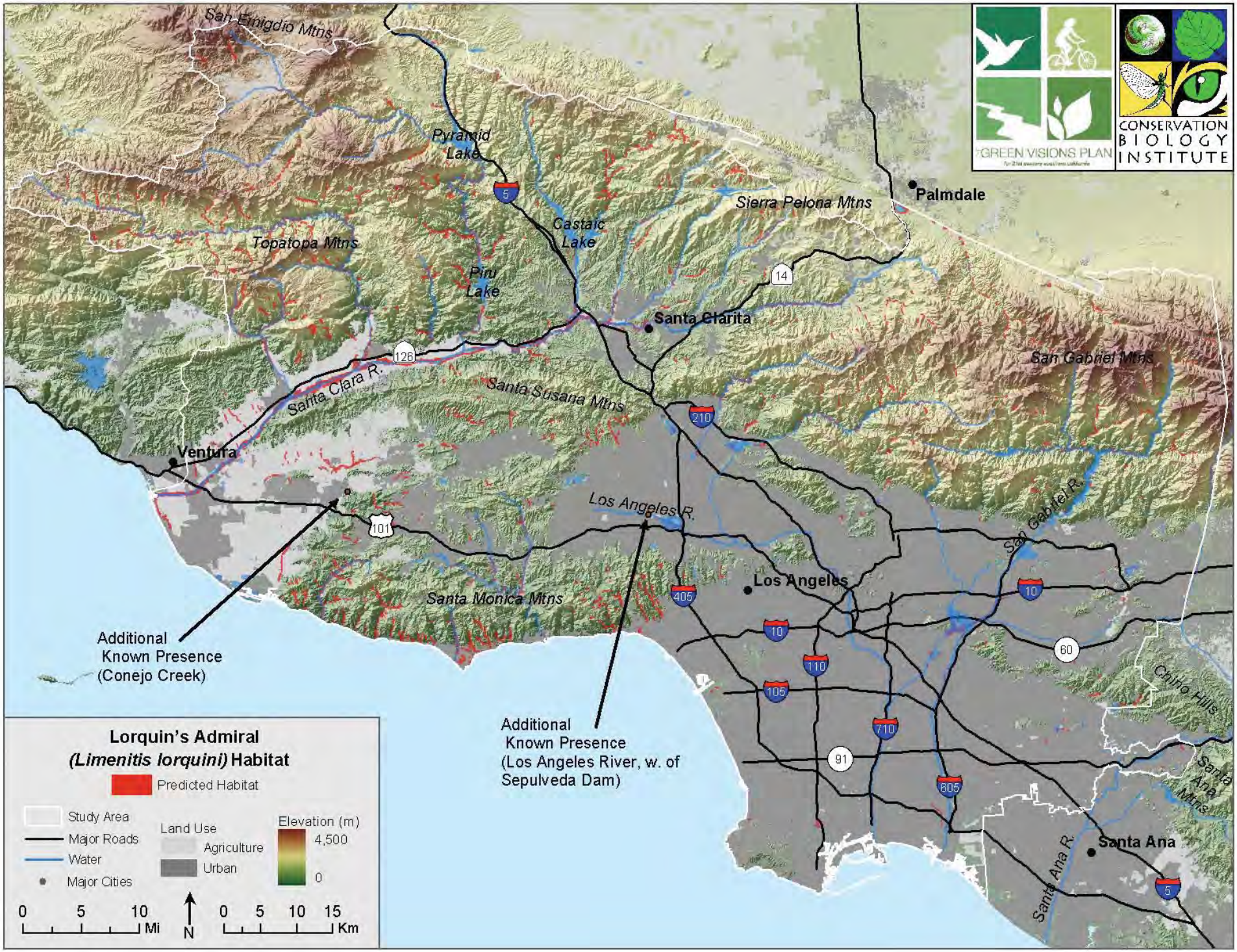
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Santa Susana Mtns
Ventura
Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
Additional Known Presence (Conejo Creek)
Additional Known Presence (Los Angeles River, w. of Sepulveda Dam)
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Lorquin's Admiral (Limenitis lorquini) Habitat
Predicted Habitat
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
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Callippe Fritillary (*Speyeria callippe*)
Family: Nymphalidae
Order: Lepidoptera
Class: Insecta

Distribution:
The species *S. callippe* is widespread and common in southern Canada and the western United States, with a distribution that reaches east to the Great Lakes in the northern part of its range but is restricted to coastal California and the extreme north extent of Baja California in the southwest (Brown et al. 1992, Brock and Kaufman 2003). In California, this species is found in the Coast Ranges and in the western slopes of the Sierras north to Oregon (Howe 1975). Two subspecies, Comstock's fritillary (*S. c. comstocki*) and the Macaria fritillary (*S. c. macaria*), are found regularly in southern California (Heath 2004). Comstock's fritillary is found in the Coastal Ranges, from south of the Pajaro River in the Santa Lucia Ranges of Monterey County to the western foothills of the San Gabriel Mountains, and may be found at elevations up to 4000 feet (1219 meters) in the Santa Lucia Mountains (Howe 1975). Howe (1975) states that this subspecies has a coastal distribution and does not range further than 20 miles (32 km) east of the Pacific coast at any point; however, observations of this species in the Santa Ana Mountains of Orange County (Orsak 1977) suggest that this range description may be too restrictive. The Macaria fritillary is found from the Mount Piños area east to the northwestern reaches of the San Gabriel Mountains (Heath 2004).

Habitat:
Comstock's fritillary is reported to formerly have inhabited both the foothills and higher mountains of southern California (Orsak 1977), and Brown et al. (1992) reported that this subspecies was found to inhabit pinyon-juniper woodland habitat in the Sierra de Juárez Mountains in Baja California. However, by the mid-1970s, the distribution of Comstock's fritillary in Orange County had apparently been greatly reduced, presumably due to a drier climate and habitat loss (Orsak 1977). In Los Angeles County, this subspecies used to be common in Griffith Park until about the 1930s and 1940s (Emmel and Emmel 1973). In the 1970s this subspecies was still common on a 4500 foot (1372 meters) ridge southwest of Santiago Peak in the Santa Ana Mountains of Orange County and throughout the foothills and mountains of San Diego County (Emmel and Emmel 1973, Orsak 1977). At that time, it was reported to occur less commonly on grassy slopes to the south and north of the Los Angeles basin, such as near Malibu Lake in the Santa Monica Mountains and at Barley Flats in the San Gabriel Mountains (Emmel and Emmel 1973).

Although the geographic demarcation between the two subspecies of the Callippe fritillary is not well-known, the Macaria fritillary appears to inhabit habitat at higher elevations than Comstock's fritillary (F. Heath, Camarillo, California, personal communication).

The primary larval food items, violets (*Viola* spp.), are often found on sheltered, rocky outcroppings, and moist places in the foothills and mountains (Orsak 1977). In addition, violets often grow in the shade of young woodlands and around the margins of mature woodlands

(Feltwell 1986). The primary species of violet fed upon by this species, *V. pedunculata*, is often found on grassy or shady areas below 3000 feet (915 meters) elevations (Orsak 1977), while additional violet species fed upon by larvae (*V. quercetorum* and *V. purpurea*) are found at elevations up to 2100 meters (Little 1993).

Food:
The caterpillars of this species feed on mountain violets, primarily *Viola pedunculata, V. quercetorum*, and *V. purpurea* (Orsak 1977, Monroe and Monroe 2004), and adults have been observed to be attracted to thistle (*Cirsium* spp.) blossoms in the Santa Ana Mountains (Orsak 1977).

Ecology/Behavior:
This species flies once per year, in late spring or early summer, depending on locality (Brock and Kaufman 2003), and typically flies at lowland elevations (Orsak 1977). Males are often found on hilltops when seeking females (Orsak 1977, Brock and Kaufman 2003).

Rationale for its use as target species:
Comstock's fritillary is greatly threatened by habitat loss, due to its restricted range along coastal areas. In fact, Orsak (1977) stated that it had already disappeared from much of its historic range at low elevations in Orange County by the mid-1970s. In addition, the reliance of this species on violets, which require moisture and rainfall, makes Comstock's fritillary susceptible to drying climatic conditions, and they often exhibit fluctuating population numbers which are likely tied to patterns of rainfall (Orsak 1977).

Habitat modeling approach:
Our habitat model for this species was based on the likely distribution of its likely host plants, *V. pedunculata, V. quercetorum, and V. purpurea*. These plant species are reported to be found in a range of habitat types, including open, grassy slopes and hillsides, chaparral and other shrubs, oak woodlands, dry forests, montane coniferous forest, sagebrush, desert scrub, and pinyon-juniper (Little 1993, Monroe and Monroe 2004). We identified vegetation associations and seral stage/density classes in which these *Viola* species might be found, using vegetation associations described in the California Wildlife Habitat Relationships system (WHR, http://www.dfg.ca.gov/whdab), and generated a habitat map which included all of these vegetation associations (see WHR suitability rating table). We identified elevations < 1400 meters as likely habitat of Comstock's fritillary and elevations of 1400 - 2100 meters as possible habitat of the Macaria fritillary. We also excluded the following (checked) areas, as identified in our composite SCAG/CALVEG landcover:

Commercial/Industrial	X
High Density Residential	X
Low Density Residential	X
Rural Residential	X
Urban Green Space	X
Vacant Urban	X

Orchards and Vineyards (active and abandoned)	X
Irrigated Cropland and Improved Pasture Land	X
Non-irrigated Cropland and Improved Pasture Land	X
Horse Ranches	X
Dairy, Intensive Livestock, and Associated Facilities	X
Nurseries	X
Other agriculture	X
Packing Houses and Grain Elevators	X
Poultry Operations	X

We did not determine a minimum patch size for this species, because minimum patch sizes necessary for persistence of butterfly populations have been difficult to estimate, and many aspects of butterfly ecology (such as emigration and immigration rates) as well as habitat quality can influence the minimum amount of habitat necessary for population persistence (Crone and Schultz 2003). Furthermore, habitat quality and suitability can change dramatically at a local scale, due to grazing, climate change, fire, human activity, vegetation succession, and changes in water flow patterns. Butterfly habitat therefore tends to be patchy (fragmented) and somewhat transitional in quality. Many butterfly populations can persist in this type of habitat, in the form of metapopulations that persist through a balance between colonization and extinction (Hanski 2003). For this reason, we assumed that even very small patches could be important to the persistence of a population

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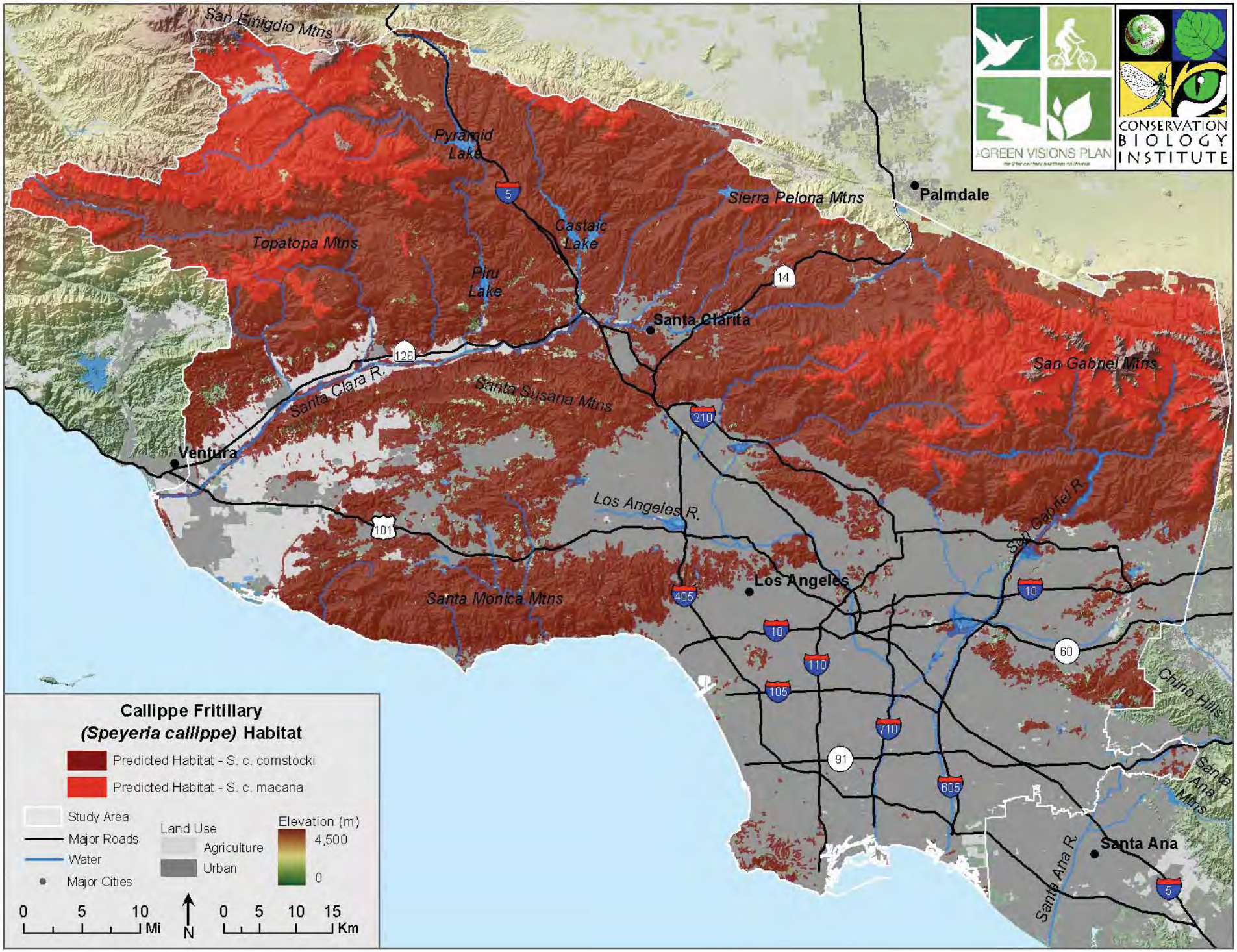
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GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Callippe Fritillary
(Speyeria callippe) Habitat
Predicted Habitat - S. c. comstocki
Predicted Habitat - S. c. macaria
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
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0 5 10 Mi
N
0 5 10 15 Km

Riverside Fairy Shrimp (*Streptocephalus woottoni*)
Family: Streptocephalidae
Order: Anostraca
Class: Branchiopoda

WHR #: (not applicable)

Distribution:
The Riverside fairy shrimp, first described as a new species in 1990, has a very restricted distribution in southern California and northern Baja California (Eng et al. 1990). It was originally believed to only occur in Riverside County; however, additional populations have been found in recent years in Ventura, Los Angeles, Orange, San Diego, and Riverside counties, as well as in Bajamar in Baja California, Mexico (Eng et al. 1990, Simovich and Fugate 1992, Brown et al. 1993, Eriksen and Belk 1999, U. S. Fish and Wildlife Service 2004).

With the exception of the Riverside County populations, and one population (Cruzan Mesa) in Los Angeles County, all populations are within about 24 kilometers of the coast, and all U.S. populations are found within a north to south span of about 200 km (U.S. Fish and Wildlife Service 2004).

Populations are described as belonging to core population areas or isolated populations. Core population areas are comprised of populations in complexes of pools that are within 8 km of each other, while isolated populations are found in single pools that are further than 16 km from other known populations (U.S. Fish and Wildlife Service 2004). Riverside fairy shrimp are found in isolated populations in Ventura and Los Angeles counties (U.S. Fish and Wildlife Service 2004). In Ventura County, one isolated population is found at Carlsberg Ranch near the City of Moorspark, while two isolated populations are found in Los Angeles County; one on Cruzan Mesa near the city of Santa Clarita and one at the Los Angeles International Airport (U.S. Fish and Wildlife Service 2004).

Habitat:
Riverside fairy shrimp require vernal pools or ephemeral pools that fill with water for several months each year but are also dry for part of the year. Vernal pools are relatively shallow seasonal wetlands that form in depressions of soil found on top of impermeable soil or rock layers. The conditions that create vernal pools are not common, so this habitat type is naturally rare (Eriksen et al. 1994). The distribution of Riverside fairy shrimp is also influenced by water temperature, chemistry, and length of time that the pools are inundated with water (Eng et al. 1990). Water supporting Riverside fairy shrimp typically has low dissolved solids and alkalinity, as well as neutral or just-below-neutral pH (Eng et al. 1990). Studies have demonstrated that Riverside fairy shrimp can only survive in a certain range of water chemistry and temperature (Gonzalez et al. 1996, U.S. Fish and Wildlife Service 2004). Pools that support Riverside fairy shrimp may be clear or turbid and typically are filled to a depth of greater than 25 cm and remain filled for 2-7 months (Eriksen and Belk 1999, U.S. Fish and Wildlife Service 2004). Most pools that support Riverside fairy shrimp are found in flat or moderately sloping areas, with most

found in grassland habitats and some found in coastal sage scrub, chaparral, and cultivated fields (Eriksen et al. 1994, Eriksen and Belk 1999, U.S. Fish and Wildlife Service 2004).

Food:
Fairy shrimp are filter feeders, and feed by filtering detritus or microorganisms with their swimming appendages (Eriksen et al. 1994).

Ecology/Behavior:
Riverside fairy shrimp take approximately two months to mature and reproduce depending on temperature, which is a longer time than required by San Diego fairy shrimp (*Branchinecta sandiegonensis*; Hathaway and Simovich 1996). For this reason they require pools that remain inundated with water for a relatively longer time period than those required by San Diego fairy shrimp (Hathaway and Simovich 1996). Riverside fairy shrimp can persist as cysts for multiple years, so adequate water is not absolutely essential in every year (Hathaway and Simovich 1996). This species appears to be adapted to a variable environment, such as that created by varied annual rainfall levels, because only a small percentage of cysts hatch in any given year, with the remainder available to hatch in future years in the event that the pool dries up prematurely that year (Simovich and Hathaway 1997).

Rationale for its use as target species:
Vernal pools represent a unique and rare habitat type that is threatened by urban development and other human activities. In addition, fairy shrimp are threatened by indirect threats such as altered hydrology, pollution, and invasive species, and by long-term threats such as genetic isolation and climate change. For example, the single known population of Riverside fairy shrimp in Ventura County is threatened by nearby urban development, which has already altered the hydrology of its vernal pool (U.S. Fish and Wildlife Service 2004). At Los Angeles International Airport, scraping and draining of pools has threatened the fairy shrimp, but viable cysts persist (U.S. Fish and Wildlife Service 2004). At Cruzan Mesa, removal of upland vegetation has threatened the status of the vernal pools (U.S. Fish and Wildlife Service 2004). Estimates made in the 1990s suggested that 95 percent of vernal pool habitat in southern California had already been lost (Eriksen et al. 1994). Protection of upland habitat around pools is also critical because fairy shrimp cysts are dispersed by vectors such as birds and mammals, and these vector species may be more likely to use vernal pools if nearby habitat is undisturbed (M. Simovich, University of San Diego, personal communication).

Riverside fairy shrimp have been classified as Federally endangered since 1993 (Eriksen et al. 1994). Protection of habitat for Riverside fairy shrimp in Ventura and Los Angeles counties is particularly important because populations in these counties represent the northernmost extent of this species' known range. Populations at the geographic limits of a species' range may be particularly important to a species' long-term persistence because they may represent important sources of genetic variation and the best opportunities for colonization or re-colonization of unoccupied habitat (Gilpin and Soulé 1986, Lesica and Allendorf 1995).

Habitat mapping approach:

Our habitat map for Riverside fairy shrimp shows two types of habitat within the Green Visions study area. We show vernal pools and associated upland habitat proposed as critical habitat for this species (U.S. Fish and Wildlife Service 2004), as well as other potential vernal pools where the species has either not been documented or that may represent future habitat.

As described in U.S. Fish and Wildlife Service (2004), areas designated as critical habitat include those areas currently supporting Riverside fairy shrimp populations and vernal pool vegetation, and associated upland habitat that directly influence conditions in pools supporting these populations. Proposed critical habitat also includes the Southeast Tierra Rejada pool, which has the physical characteristics of pools supporting Riverside fairy shrimp but had not yet been thoroughly surveyed in 2004 (U.S. Fish and Wildlife Service 2004).

Other vernal pools, based on Holland (2003) and California Department of Fish and Game (2005) were also mapped as potential future or currently undocumented sites of Riverside fairy shrimp.

It is likely that these locations under-represent the distribution of this species and that this species may occur in other places, especially in grassland areas were cattle grazing occurs or previously occurred. In these areas, cattle wallows may provide adequate habitat, yet these areas are not typically included in surveys (M. Simovich, University of San Diego, personal communication).

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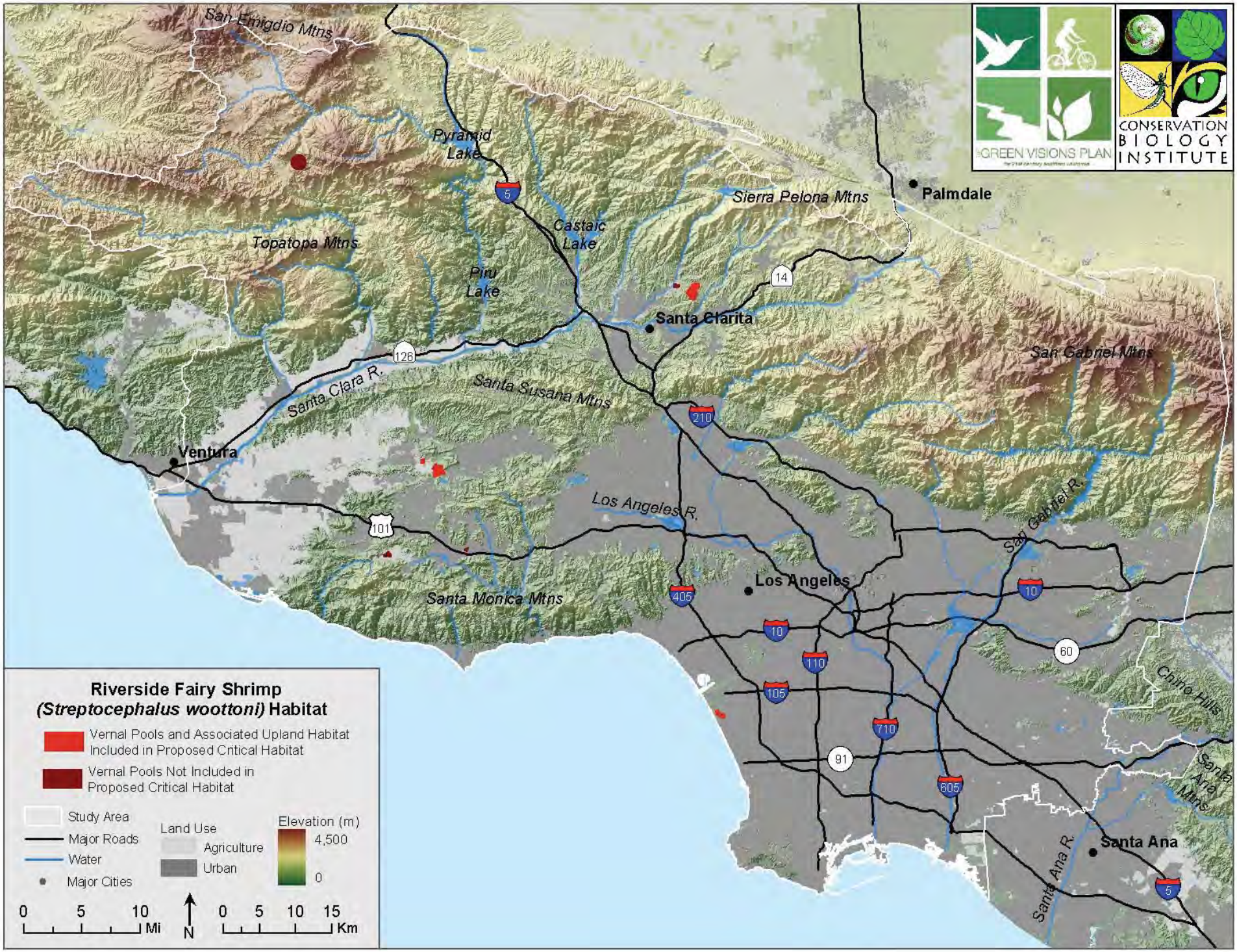
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Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mts
Santa Ana
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GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Riverside Fairy Shrimp
(Streptocephalus woottoni) Habitat
Vernal Pools and Associated Upland Habitat Included in Proposed Critical Habitat
Vernal Pools Not Included in Proposed Critical Habitat
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
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N
0 5 10 15 Km

Species Accounts: Fish

In alphabetical order by Latin name:

Santa Ana Sucker	**(*Catostomus santaanae*)**
California Killifish	**(*Fundulus parvipinnis*)**
Threespine Stickleback	**(*Gasterosteus aculeatus*)**
Arroyo Chub	**(*Gila orcuttii*)**
Rainbow Trout	**(*Oncorhynchus mykiss*)**
Speckled Dace	**(*Rhinichthys osculus*)**

Santa Ana Sucker (*Catostomus santaanae*)

Family: Catostomidae
Order: Cypriniformes
Class: Actinopterygii

WHR #: (not applicable)

Distribution:

Santa Ana suckers are native to the Los Angeles, San Gabriel, Santa Ana, and Santa Clara river systems in southern California; however, the distribution of this species has greatly changed over time (Smith 1966, cited in Moyle 2002). Santa Ana suckers were once found downstream to the mouths of the Los Angles and San Gabriel River drainages, but now are only found in the larger stream sections near the headwaters of these rivers (Swift et al. 1993). In the Los Angeles River basin, they are now only found in lower Big Tujunga Creek, in about 20-30 km of stream below Big Tujunga Dam (Moyle 2002). In the San Gabriel River basin, they are found in about 40 km of the contiguous West, North, and East Forks, with the North Fork represented by very small numbers of individuals (Moyle 2002). In the West Fork San Gabriel River, this species is found primarily below Cogswell Reservoir (Moyle 2002). In the East Fork San Gabriel River, this species was once present in Cattle Canyon, but has apparently been extirpated by mining activities (Moyle et al. 1995).

In the Santa Ana River, they were once found in the upper drainages, including Fish and Santiago Canyons and in Cajon and City Creeks, but by the early 1990s they were only found in the lower stretches of the river, from Mt. Roubidoux downstream to a few kilometers below the Imperial Highway (Swift et al. 1993). In recent years, they have only been found between Prado Dam (a flood control structure) and Weir Canyon Road in Yorba Linda, and upstream of Prado Dam, in a 6 km stretch between Norco and Riverside (U. S. Fish and Wildlife Service 1999, Moyle 2002).

Santa Ana suckers in the Santa Clara River are often considered to be introduced since they were first collected in the 1930s; however, it is possible that they are native to this river (Buth and Crabtree 1982). In this river, they are fairly widespread, ranging from Soledad Canyon, where they are found as pure Santa Ana suckers, downstream to near the mouth of the main river, a few kilometers upstream from Sespe Creek (Moyle 2002). They are also found in Sespe Creek, where they hybridize with the Owens sucker (*C. fumeiventris*; Buth and Crabtree 1982, Swift et al. 1993). Soledad Canyon appears to support the most stable population.

Habitat:

Santa Ana suckers are typically found in small to medium size permanent streams less than 7 meters wide, and ranging in depth from a few centimeters to over 1 meter (Deinstadt et al. 1988). They require relatively cool water with slight to swift flows and, although they are usually found in clear water, they can tolerate seasonal turbidity (Moyle 2002). Their preferred substrate is usually gravel, rubble, or boulder, but they may occasionally be found on sand and mud (Moyle 2002). A good example of preferred habitat is found in the West Fork of the San Gabriel River,

where streamside vegetation, such as alders and sedges, and large holes and riffles provide cover for the fish (Deinstadt et al. 1988). Santa Ana suckers usually do not inhabit reservoirs, and have not been recorded in Piru, Morris, or San Gabriel Resevoirs (Moyle 2002).

Food:
Santa Ana suckers feed primarily on algae (especially diatoms) and detritus, which are scraped off rocks and other surfaces, and some aquatic insects may be eaten as well (Greenfield et al. 1970, Moyle 2002).

Ecology/Behavior:
Santa Ana suckers may live up to 3 – 4 years (Moyle 2002). Spawning occurs during mid-March to early July, and takes place over gravelly riffles (Moyle 2002). This species exhibits a short generation time (early maturation), high fecundity, and a relatively long spawning time (Moyle 2002). These characteristics may allow this species to survive in southern California streams, which are subject to periodic and severe flooding which results in large decreases in abundance of this species (Greenfield et al. 1970). This species is able to recover quickly after such events, by recolonizing streams and producing many young. Because they are a relatively small fish, they are also able to utilize smaller refuges than required by larger species during periods of high water flow (Moyle 2002).

Rationale for its use as target species:
In 1999, the U.S. Fish and Wildlife Service listed this species as threatened due to habitat loss and introduced species (U.S. Fish and Wildlife Service 1999). Because much of its native distribution coincides with the Los Angles metropolitan area, its habitat is greatly threatened due to urban development, pollution, and water diversion. In the upper Santa Ana River, this species seems to have been extirpated by predation from brown trout (*Salmo trutta*; Moyle 2002). In addition, this species hybridizes with introduced Owens sucker in the Santa Clara River (Buth and Crabtree 1982).

Habitat modeling approach:
We did not model habitat for this species. Our habitat map for this species was based on literature review and species expert input regarding known populations documented during the past 35 years.

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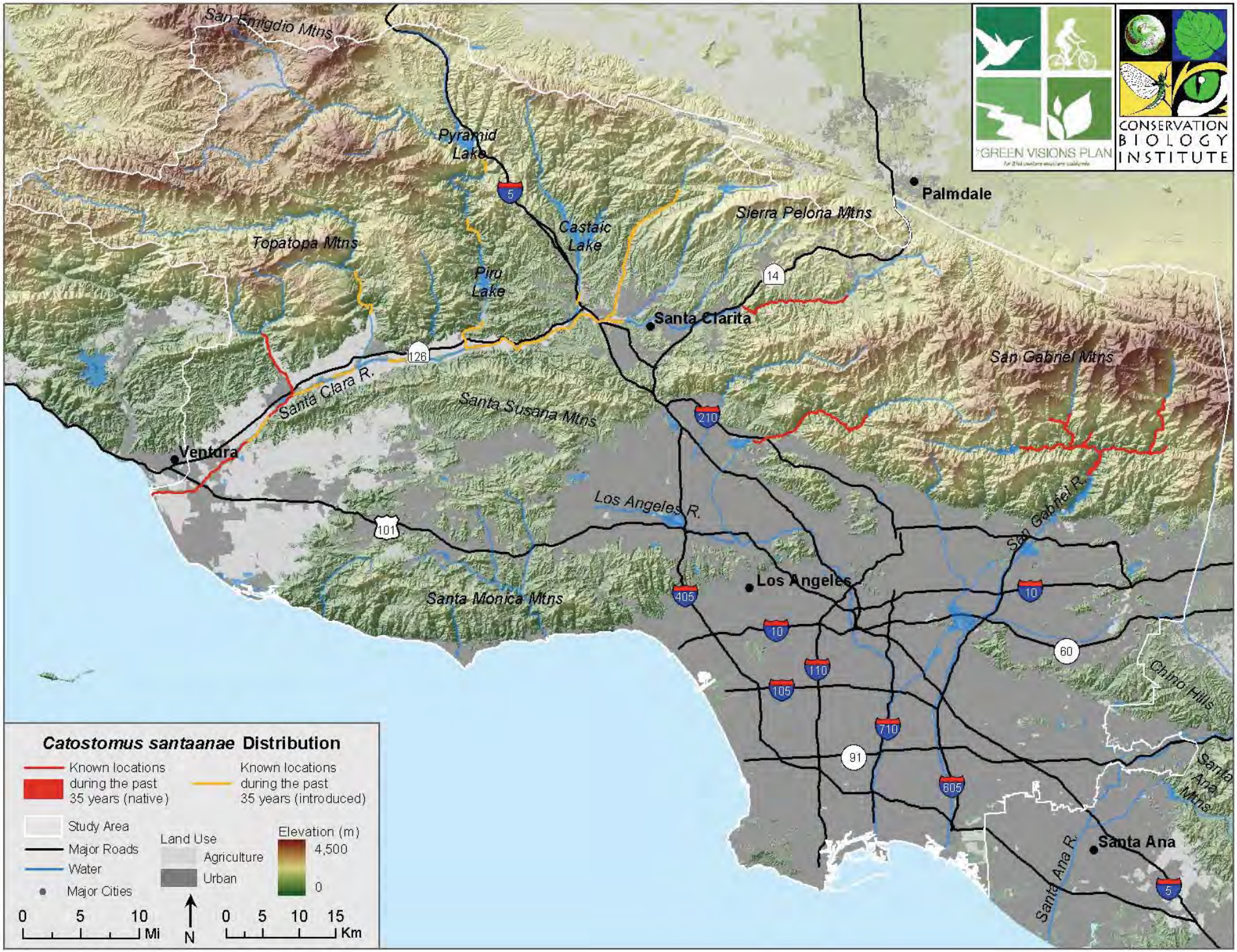
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GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Catostomus santaanae Distribution
Known locations during the past 35 years (native)
Known locations during the past 35 years (introduced)
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
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Elevation (m)
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California Killifish (*Fundulus parvipinnis*)
Family: Fundulidae
Order: Cyprinodontiformes
Class: Actinopterygii

WHR #: (not applicable)

Distribution:
California killifish are found in estuaries, marshes, shallow bays, and the lower reaches of coastal streams, from Morro Bay south to Magdalena Bay in central Baja California, Mexico, (Moyle 2002). The population in Morro Bay appears to be an isolated population, as no California killifish are found between Morro Bay and Goleta Slough in Santa Barbara County (Swift et al. 1993). From that point south to the lower Tijuana River at the Mexican border they are found in most coastal waters (Moyle 2002). They have been found in freshwater in Ventura River, Malibu Creek, Santa Clara River, Ballona Marsh and Ballona Creek (Swift et al. 1993).

Habitat:
This species is often found in estuaries and in saltwater lagoons, but may be found in freshwater streams up to 1-2 km from their mouth (Moyle 2002). Their high tolerance for a wide range of water salinity allows them to live in either fresh or brackish water (McGinnis 1984). California killifish also have a high tolerance for pollutants, such as sulfides, which may kill other species, and this allows them to live and reproduce in areas not suitable for other fish species (Bagarinao and Vetter 1993). California killifish are often found in shallow water near aquatic plants, where they seek cover from predators, but they may temporarily move into deeper waters in bays and estuaries (Moyle 2002).

Food:
This species feeds on a variety of benthic and planktonic invertebrates such as small snails, small crustaceans, siphons of clams, fish eggs, amphipods, copepods, tanaids, ostracods, beetles, and dipteran larvae (Moyle 2002, Hartney and Tumyan 1998).

Ecology/Behavior:
California killifish mature quickly and may only live one year, although some individuals may live 2-3 years (Perez-Espana et al. 1998). Spawning typically takes place in May and June, and embryos are attached to aquatic vegetation (Fritz 1975, cited in Moyle 2002).

This species is strongly euryhaline and can complete its entire lifecycle in either fresh or brackish water. Physiological tests have indicated that its tolerance for a wide range of salt concentrations is nearly has high as that of the pupfish (*Cyprinodon* spp.; McGinnis 1984).

Rationale for its use as target species:
California killifish inhabit one of California's most threatened habitat types, so their long term survival in sustainable populations is dependent on protection of coastal wetlands and upstream watersheds.

Habitat modeling approach:
Our habitat map for this species was based on literature review and input from species experts regarding the location of extant populations during the past 30 years. We also assumed that California killifish could inhabit the lower 500 m of any coastal drainage entering the ocean.

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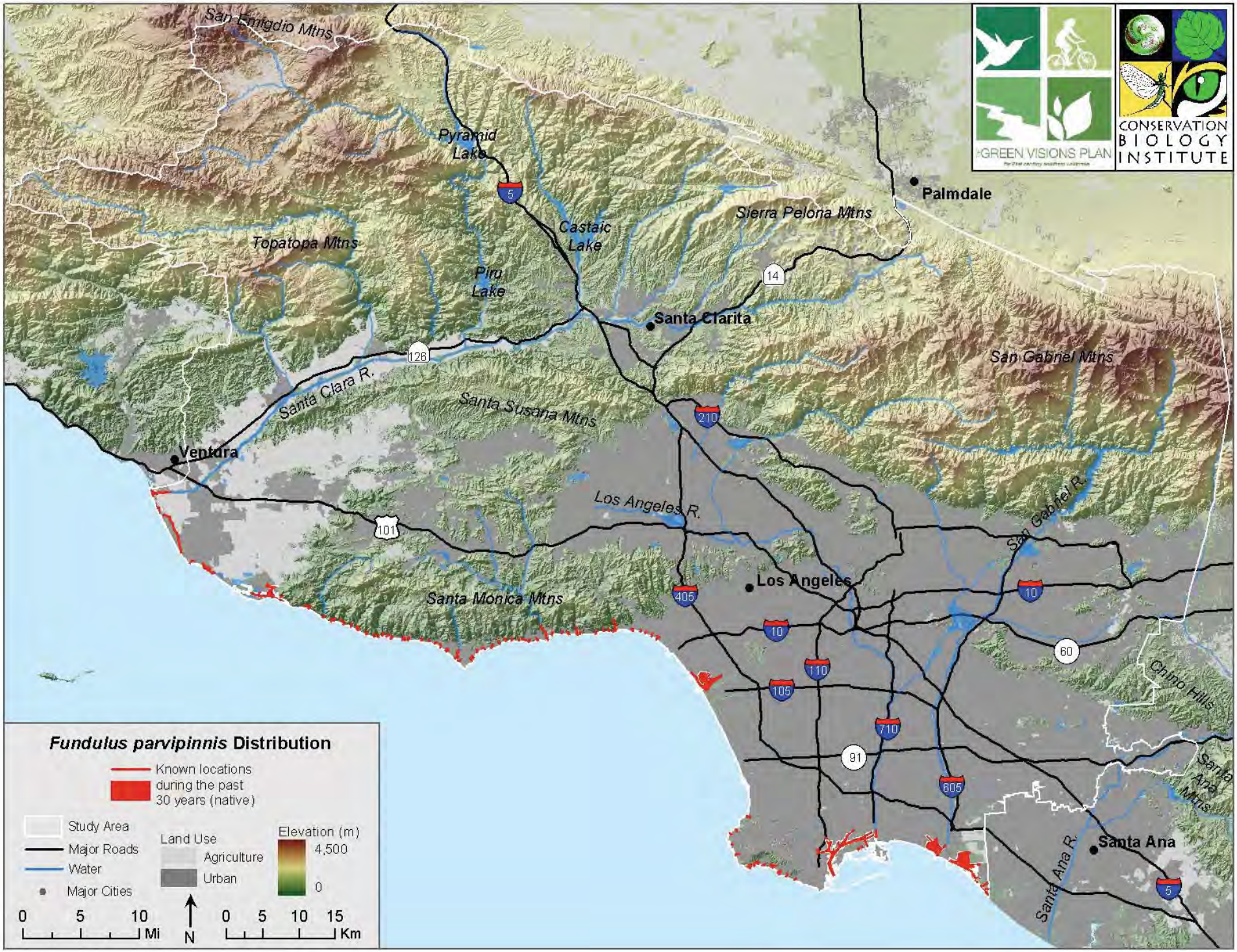
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GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Fundulus parvipinnis Distribution
Known locations during the past 30 years (native)
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
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Threespine Stickleback (*Gasterosteus aculeatus*)
Family: Gasterosteidae
Order: Gasterosteiformes
Class: Actinopterygii

WHR #: (not applicable)

Distribution:
Threespine sticklebacks have a wide distribution, and are found in coastal streams, estuaries, and bays throughout much of the world (Moyle 2002). Within this species, there are anadromous and freshwater forms. In California, the anadromous subspecies, *G. a. aculeatus*, which is found primarily from the Oregon coast south to about Monterey Bay, breeds in the lower reaches of streams and migrates between these streams and estuaries and coastal bays (Moyle 2002). In southern California, at least 3 non-migratory subspecies are also found, and these are present in the study area as both native and introduced populations.

Partially armored threespine sticklebacks (*G. a. microcephalus*) are more common north of Point Conception, but are also found as residents in streams in southern California (Swift et al. 1993). Many of these populations have, however, recently declined or disappeared (Moyle 2002). Since 1991, the only know records south of the Los Angeles basin were from Trabuco Creek, in and below O'Neill Park, upper San Juan Creek near the mouths of Hot Springs and Cold Spring Canyons, the upper reaches of Bell Canyon on Starr Ranch in the San Juan Creek drainage, and a small number of locations in San Diego and Riverside Counties, and in Baja California, Mexico (Swift el al. 1993). Populations are also known from the Ventura River, Santa Clara River, and Calleguas Creek (Swift et al. 1993).

Unarmored threespine sticklebacks (*G. a. williamsoni*) were once common and widespread in the Los Angeles basin and were found in the Santa Clara, Los Angeles, and San Gabriel river systems in Los Angeles County as well as in the Santa Ana River system in Orange County (Malcolm and Swift 1994). By the early 1990s they were restricted to a 14-km stretch of Soledad Canyon in the Santa Clara River and to upper San Francisquito Canyon (Swift et al. 1993). Populations once found in the Santa Maria River drainage and in the Mohave River drainage are extinct, and populations in upper Piru Creek, Elizabeth Lake Canyon, and Castaic Creek have disappeared. Efforts to reintroduce this subspecies to other streams in southern California have not been successful at establishing self-sustaining populations, and this subspecies is listed as endangered by the Federal government and the State of California (Swift et al. 1993).

Threespine sticklebacks (*G. aculeatus*) are also found in Shay Creek in the San Bernardino Mountains, in an isolated population. The taxonomic status of this population, in terms of subspecies status, has not been determined (Swift et al. 1993).

Habitat:

Threespine sticklebacks are typically found in quiet water, in shallow, weedy pools and backwaters, in small pools in clear, trickling streams, and among emergent vegetation along the edges of streams (Moyle 2002). They appear to prefer bottoms of gravel, sand, and mud, and the water must be clear enough so that aquatic plants, which are used for nest building, can grow (Moyle 2002). This species has been found in urbanized waters where water quality is still high (Moyle 2002).

Food:
Freshwater populations of this species feed primarily on organisms such as chironomid midge larvae, ostracods, and fish eggs (including those of other sticklebacks) on the bottom or in aquatic plants (Bell 1979). They form loose schools, and this behavior may make it easier for the fish to find concentrations of food (Moyle 2002). Anadromous populations also feed on pelagic, free-swimming microcrustaceans (Moyle et al. 1995).

Ecology/Behavior:
Threespine sticklebacks usually complete their life cycle in 1 year, and individuals may live up to 2 or even 3 years (Moyle 2002). Breeding usually takes place in April through July, and anadromous forms move into freshwater areas during this time. Males set up territories among aquatic plants and build a nest made of aquatic plants and algae (Moyle 2002). After spawning and fertilization, the male alone tends and guards the nest, and then continues to guard the fry while they are very small (Moyle 2002).

Threespine sticklebacks are prime targets for predators due to their small size, slow movements, and shallow-water habitat; however, the presence of spines and plates deters predators because they make the fish harder to swallow (Moyle 2002). This species is found in various morphological varieties in the streams of southern California, with morphs differing in size and the number of plates. There is evidence that the number of plates is associated with the degree of predatory pressure, with the most armored morphs found in areas where this species co-occurs with predatory trout or garter snakes (Bell and Haglund 1978, Bell and Richkind 1981).

This species is, however, still quite vulnerable to predation, and the presence of predators, especially introduced predatory fishes, has been documented to cause changes in habitat use or complete extirpation of threespine stickleback populations (Leidy 1984).

Rationale for its use as target species:
Although threespine sticklebacks are stable in much of the world, and are still fairly common and widely distributed in California, they are threatened by introduced species, water pollution, erosion, pesticides, and water flow alterations (Malcolm and Swift 1994). In southern California, this species has disappeared from much of its native habitat (Moyle 2002). Unarmored threespine sticklebacks (*G. a. williamsoni*) are Federally and State listed as endangered (Malcolm and Swift 1994).

Habitat modeling approach:

We did not model habitat for this species. Our distribution map focuses on native, freshwater populations of this species, and was based on literature review and input from species experts, regarding extant populations during the past 35 years.

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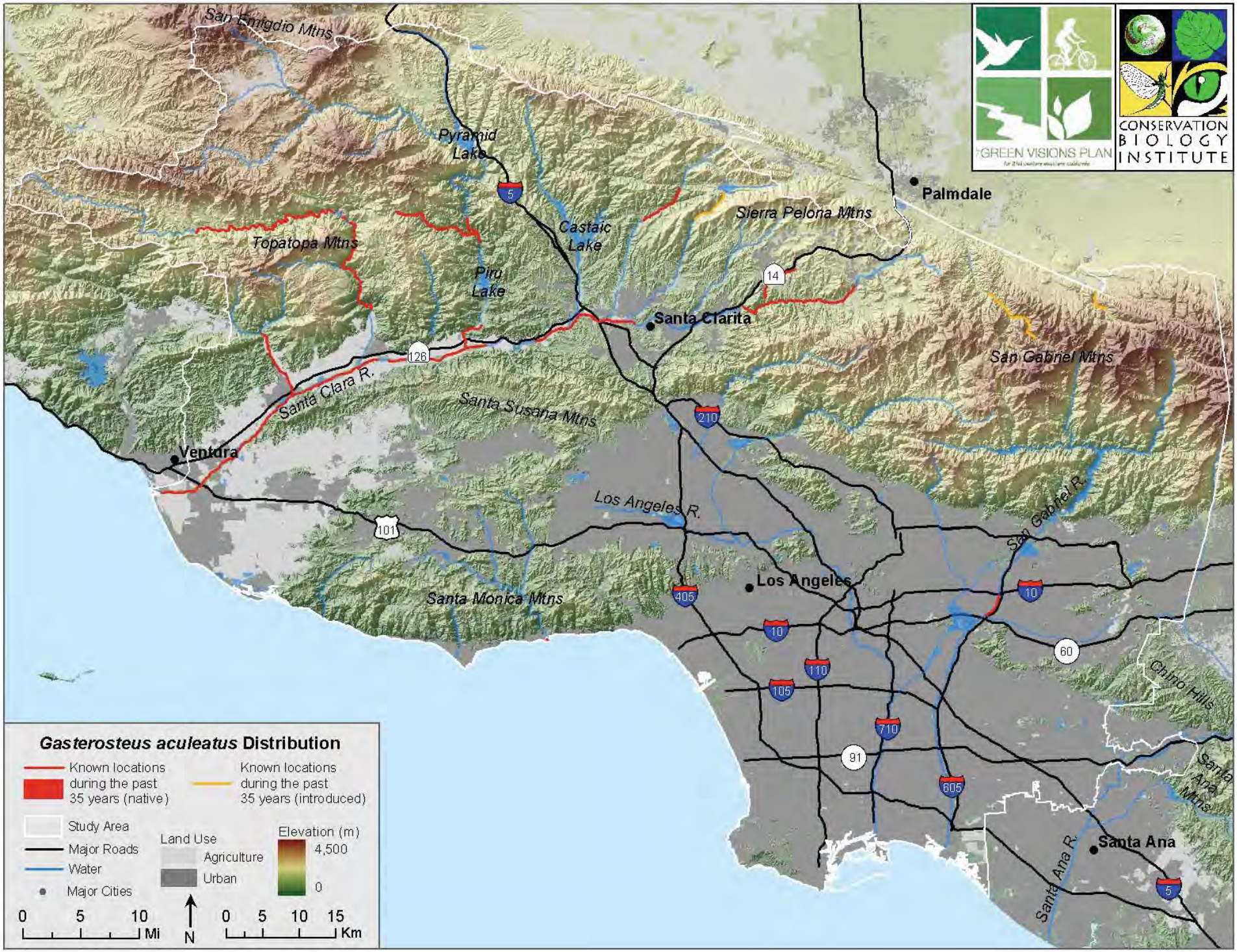
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GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Gasterosteus aculeatus Distribution
Known locations during the past 35 years (native)
Known locations during the past 35 years (introduced)
Study Area
Major Roads
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Arroyo Chub (*Gila orcuttii*)
Family: Cyprinidae
Order: Cypriniformes
Class: Actinopterygii

WHR #: (not applicable)

Distribution:
This species is native to the Los Angeles, San Gabriel, San Luis Rey, Santa Ana, and Santa Margarita Rivers, and to Malibu and San Juan Creeks in southern California (Moyle et al. 1995). Arroyo chubs have also been successfully introduced into other river systems such as the Santa Ynez, Santa Maria, Cuyama, and Mojave rivers (Moyle et al. 1995), including river systems in the study area.

Arroyo chubs have disappeared from much of their native range, and by the early 1990s they were only abundant in the upper Santa Margarita River and its tributary De Luz Creek, Trabuco Creek below O'Neil Park and San Juan Creek (San Juan Creek drainage), Malibu Creek, and the West Fork of the upper San Gabriel River below Cogswell Resevoir (Swift et al. 1993, Moyle et al. 1995). They were also present, but in small numbers, in Big Tujunga Canyon, Pacoima Creek above Pacoima Reservoir, and in the Sepulveda Flood Control Basin (in the Los Angeles River drainage), and in the middle Santa Ana tributaries between Riverside and the Orange County line (Swift et al. 1993, Moyle 2002).

Habitat:
Arroyo chubs are typically found in slow-moving or backwater sections of warm to cool low-gradient streams, usually greater than 40 cm deep, with mud or sand substrates (Moyle et al. 1995), but they are also able to survive in fast moving sections of streams with coarse bottoms and in fast-moving muddy waters typical after seasonal rain storms (Moyle et al. 1995).

Food:
Arroyo chubs are omnivorous, and feed on algae, insects, and small crustaceans. They have also been observed to feed on the roots of a floating water fern infested with nematodes (Moyle 1976).

Ecology/Behavior:
Arroyo chubs rarely live beyond 4 years. The species breeds from February through August, with most spawning taking place in June and July (Tres 1992, cited in Moyle et al. 1995). Spawning typically takes place in pools or in quiet edge waters, and the fry spend their first 3-4 months in quiet water, often among aquatic vegetation (Moyle et al. 1995).

Laboratory studies have shown that this species is physiologically adapted to surviving hypoxic conditions and large temperature fluctuations that often occur in southern California's coastal streams (Castleberry and Cech 1986).

Rationale for its use as target species:
The native range of arroyo chubs is largely coincident with the Los Angeles metropolitan area, so their habitat is threatened by stream degradation, water diversion, and pollution (Moyle et al. 1995). They are also threatened by hybridization with introduced species, as well as competition with non-native species (Moyle et al. 1995).

Habitat modeling approach:
We did not model habitat for this species. Our habitat map was based on literature review and input from species experts regarding the distribution of populations known to be extant during the past 30 years.

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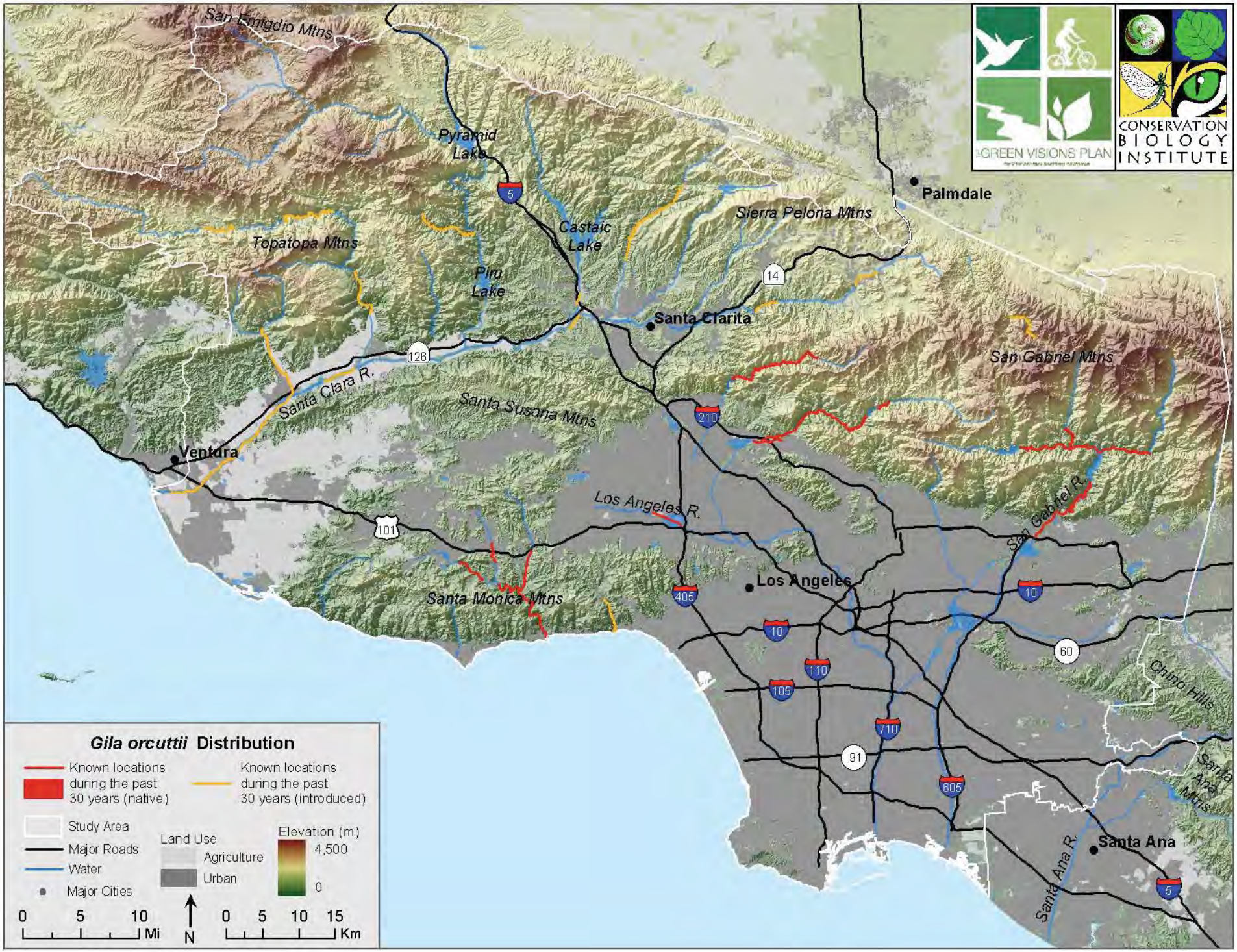
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CONSERVATION BIOLOGY INSTITUTE
Gila orcuttii Distribution
Known locations during the past 30 years (native)
Known locations during the past 30 years (introduced)
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Major Cities
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Rainbow Trout (*Oncorhynchus mykiss*)
Family: Salmonidae
Order: Salmoniformes
Class: Actinopterygii

WHR #: (not applicable)

Distribution:
The family Salmonidae can be found in freshwater and anadromous forms, and can survive in a range of freshwater and marine environments, resulting in a native distribution from the Aleutian Islands south to Baja California (Moyle 2002). As anadromous fish became landlocked, many distinct and isolated populations were created, and the resulting wide range of local forms, races, and runs has made taxonomic classification difficult (Moyle 2002).

Two species of trout, rainbow trout (*O. mykiss*) and cutthroat trout (*O. clarki*), are native to California (Moyle 2002). Within *O. mykiss*, both freshwater and anadromous forms are found, with anadromous forms in southern California referred to as southern steelhead (Moyle 2002). Southern steelhead were once found from south of Point Conception into Baja California, but today the southernmost populations are found in Malibu Creek (Los Angeles County) and San Mateo Creek (San Diego County; Moyle 2002). Of 92 southern Californian streams where these fish were known to historically have spawned, 39 no longer support this species (Moyle 2002). In the Green Visions planning area, southern steelhead were, as of the early 1990s, still reported to occur in the Ventura and Santa Clara rivers in Ventura County, and in Mullholland, Big Sycamore, Malibu, and Topanga canyons in Los Angeles County (Swift et al. 1993).

Populations of resident (non-anadromous) rainbow trout were formed naturally when groups of steelhead were naturally isolated in freshwater streams and rivers, and have also been created via introductions of hatchery-reared individuals. Historically, rainbow trout were found in native populations from Alaska south through Baja California. They now also occur in coldwater streams throughout much of the world due to introductions.

Habitat:
The distribution of trout is likely constrained more by physical characteristics of the waterways than on the abundance of food (Behnke 1992). Trout need habitat for spawning, protection of young, feeding, and, in the case of northern or high elevation populations, overwintering (Behnke 1992). In general, this species is found in cool (<22° C) water that is well oxygenated (Moyle 2002), although southern California populations are tolerant of warmer water conditions that occur during summer months. Spawning habitat must include low-gradient water with a gravel substrate (Behnke 1992). After hatching, young trout require areas of low water velocity and protective cover, which may be found along margins of streams, in spring seeps, side channels, and small tributaries (Benhke 1992). As trout mature, they may seek waterways that provide both quiet deep waters for resting, and faster moving water that carries adequate food resources (Behnke 1992). For anadromous forms, an unobstructed migration path between the ocean and spawing streams is required for both adults and smolts.

Resident rainbow trout can be found in a wide range of habitats, including clear tiny high-mountain streams, alkaline lakes, intermittent streams, and large coastal rivers (Moyle 2002). Anadromous forms use ocean habitats for feeding and freshwater habitats for reproduction. Streams and rivers used by anadromous populations flow through the coastal plains where obstacles to their passage are common, warm and fluctuating water temperatures may make some areas inhospitable, and where passage may only be possible during heavy winter rains, (Moyle et al. 1995). For this reason, the high elevation headwaters of southern California's rivers and streams are the main spawning and rearing habitats (Moyle et al. 1995). All forms of this species spend at least the first 1-2 years of life in cool, clear, fast-flowing freshwater streams and rivers. They prefer areas where riffles are more common than pools, and where there is adequate cover from riparian vegetation and undercut banks and where invertebrates are abundant and diverse (Moyle 2002). Within freshwater streams and rivers, fish of different sizes differ in their use of habitat, and microhabitat selection tends to be based on a balance of water temperature, abundance of invertebrates, and cover from predators (Moyle 2002).

Prior to the 1930s, juvenile southern steelheads could be caught in southern California lagoons (Swift et al. 1993), but today many of these lagoons are more shallow and warmer than they once were, due to reduced inflow of cool fresh water (Moyle et al. 1995). While in the ocean, southern steelhead do not wander far from the coast (Moyle 2002), and may today spend increased amounts of time in the ocean between environmental conditions (adequate rain and resulting freshwater flow) that allow them to move into freshwater rivers and streams (Moyle et al. 1995).

Food:
In freshwater streams, rainbow trout typically feed on drifting aquatic organisms and terrestrial insects, but they will also feed on bottom-dwelling invertebrates and small fish (Moyle 2002). After leaving freshwater streams and rivers, southern steelhead feed on estuarine invertebrates and marine krill, and increasingly feed on small fish and squid as their body size increases (Moyle 2002).

Ecology/Behavior:
Two primary life history patterns are observed among this species. One is the migratory life history exhibited by the southern steelhead, while the other is the resident life history exhibited by the rainbow trout. Steelhead life history can further be broken down into two categories. Winter steelhead typically move from the ocean into freshwater rivers and streams when winter rains produce adequate cold water for migration and spawning in freshwater waterways, with spawning taking place in freshwater tributaries (Moyle 2002). Summer steelhead, also referred to as spring-run steelhead, enter freshwater streams and rivers as immature fish during the spring and migrate to large pools in headwaters, where they mature and then spawn during the following winter or spring (Moyle 2002). Southern steelhead exhibit the winter-run life history (Moyle et al. 1995).

Rainbow trout typically mature between 1 to 5 years depending on water conditions and food resources (Moyle 2002). In southern steelhead, maturity depends on the number of years in

freshwater and marine habitats, with individuals spending 1-3 years in fresh water and then 2-3 in the ocean (Moyle et al. 1995, Moyle 2002). Southern steelhead typically spawn from December to May (Moyle et al. 1995). At spawning, the female digs a nest with her tail, in coarse gravel in a pool or stream riffle, and the eggs are fertilized by the courting male, who drives away competing males (Willers 1991). After spawning, individuals gradually move downstream or to the ocean in the case of anadromous forms. Individuals may spawn up to 4 times in their life (Moyle 2002).

Rainbow trout actively defend feeding territories in streams (Jenkins 1969), with the success of territory defense typically influenced by body size (Moyle 2002). Predators of this species include avian predators such as kingfishers (*Megaceryle alcyon*), mergansers (e.g., *Mergus merganser*), and herons (e.g., *Ardea herodias*), and predatory fish (Moyle 2002).

Rationale for its use as target species:
Most anadromous species in California are in danger of extinction due to movement obstacles (often due to dams) between their marine feeding and freshwater spawning and rearing habitats. Southern steelhead are considered one of the most distinctive Evolutionarily Significant Units (ESU), with respect to their genetic and life history uniqueness, and were listed as endangered by the National Marine Fisheries Service (Moyle 2002). Isolated freshwater populations are often genetically unique and represent unique lineages which may have adaptations to local environments (Moyle 2002). Both forms are susceptible to natural and anthropogenic changes to their habitats, including drought, natural shifts in production regimes in the ocean, water diversion, excessive harvests, pollution, and introduction of hatchery stock (Moyle 2002).

Habitat modeling approach:
We did not model habitat for this species. Our distribution map is based on literature review and input from species experts regarding extant populations during the past 35 years.

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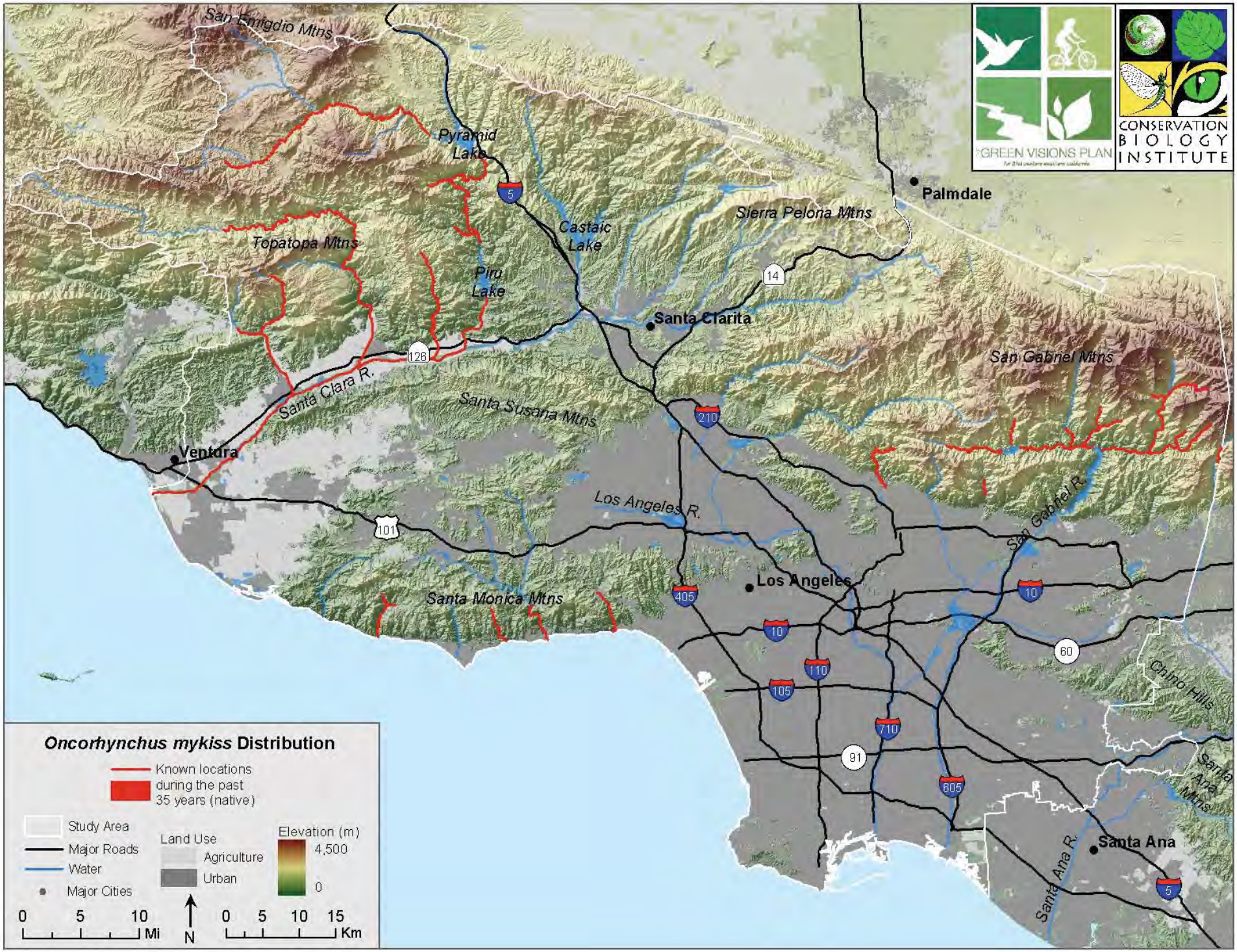
San Emigdio Mtns
Pyramid Lake
Castaic Lake
Palmdale
Sierra Pelona Mtns
Topatopa Mtns
Piru Lake
Santa Clarita
San Gabriel Mtns
Santa Clara R.
Santa Susana Mtns
Ventura
Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Oncorhynchus mykiss Distribution
Known locations during the past 35 years (native)
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km

Speckled Dace (*Rhinichthys osculus*)
Family: Cyprinidae
Order: Cypriniformes
Class: Actinopterygii

WHR #: (not applicable)

Distribution:
Speckled dace are the most widely distributed fish west of the Rocky Mountains, and include numerous subspecies (McGinnis 1984, Moyle 2002). In California, the species *Rhinichthys osculus* is represented by at least 8 groups. Although these groups are not all formally recognized as separate subspecies, they do have discrete distributions. The Amargosa Canyon speckled dace is only found in the Amargosa River near Tecopa, and is a California State taxon of special concern, although additional populations occur in Nevada (Moyle et al. 1989). The Owens speckled dace, also a California State taxon of special concern, is found east of Bishop and in some additional areas in the Owens drainage (Moyle et al. 1989). Other groups found in California include the San Luis Obispo speckled dace, the Lahontan speckled dace, the Klamath speckled dace, the Sacramento speckled dace, and the Long Valley speckled dace (Swift et al. 1993, Moyle 2002).

In addition, in coastal southern California, Santa Ana speckled dace are found in several small populations, and are also considered a California State taxon of special concern. Several studies have suggested that the Santa Ana speckled dace is distinctive and should be listed as a separate subspecies (Moyle et al. 1995). Santa Ana speckled dace were once widely distributed in the upper portions of the Santa Ana, San Gabriel, and Los Angeles river systems in Los Angeles, San Bernardino, and Orange counties, but were less common in the lowlands (Moyle et al. 1995). Santa Ana speckled dace were also reported to occur in the upper portions of the San Jacinto River in Riverside County, and have been introduced into additional rivers in southern California, but the introductions appeared to have failed (Moyle et al. 1995).

In the 1990s the largest populations were found in the East, North, and West forks of the San Gabriel River (Swift et al. 1993). Very few individuals were found in Fish Canyon (a small tributary of the San Gabriel River) and in the following small tributaries of the Santa Ana River system: Lytle, Cajon, City, Strawberry, Mill and Silverado (Swift et al. 1993). During surveys conducted in 1990-1992, no speckled dace could be found in Big Tujunga or Santiago creeks (Swift et al. 1993), and surveys conducted in 2005 also failed to detect the species in these 2 creeks as well as in Mill Creek (G. Abbas, San Bernardino National Forest, personal communication). During the 2005 surveys speckled dace were, however, found in Lytle, Cajon, and Plunge creeks (G. Abbas, San Bernardino National Forest, personal communication). Speckled dace were known to exist in City and Strawberry Creeks in 2003, but not in 2004 or 2005, and may have been extirpated by large fires in late 2003 (G. Abbas, San Bernardino National Forest, personal communication).

Habitat:

As a group, speckled dace occupy a wide variety of habitats, including small springs, rushing brooks, pools in intermittent streams, large rivers, and deep lakes (Moyle 2002). However, all the waters that they occupy are clear, well-oxygenated, and have moving water flows and cover from rocks, boulders, or vegetation (Moyle 2002). Typically, speckled dace are found in small streams in shallow (<60 cm) rocky riffles and runs where they can safely feed among aquatic vegetation and rocks (Moyle 2002).

Santa Ana speckled dace are found in permanent flowing streams with summer water temperatures of 17-20° C, which are often maintained by outflows of cool springs, and inhabit shallow cobble and gravel riffles (Wells et al. 1975, Moyle et al. 1995). They may, however, also be found in warmer waters, as indicated by observations in waters ranging from 24.2 – 24.8° C (G. Abbas, San Bernardino National Forest, personal communication). The West Fork of the San Gabriel River is an example of habitat where this species has been found, and Deinstadt et al. (1990) described it as "…an alder and willow lined pool and run reach broken by short riffles. Boulders and cobble are the primary substrate materials. The lower three-fourths of the section was covered with thick mats of algae. A canopy of willow and alders extends about six feet over the channel on both banks". In the West Fork of the San Gabriel River, speckled dace were typically most abundant in areas where other native fish, such as rainbow trout (*Oncorhynchus mykiss*) and Santa Ana suckers (*Catostomus santaanae*), are also common and, in general, they tend to be most abundant where potential predators, such as brown trout (*Salmo trutta*), are rare or absent (Moyle et al. 1995).

Food:
This species feeds on a large variety of small, bottom-dwelling invertebrates (McGinnis 1984) and may also feed on large flying insects at the water's surface and on zooplankton (Moyle 2002).

Ecology/Behavior:
Speckled dace are at least partially nocturnal, and are often found hidden among bottom rocks during daylight hours. This behavior, along with the habit of feeding singly or in small groups among bottom rocks, is thought to reduce the risk of predation (Mcginnis 1984, Moyle 2002).

The species probably lives for up to 3 years (Deinstadt et al. 1990). Spawning takes place throughout the summer months, with most activity in June and July, and eggs are deposited and fertilized among bottom rocks and gravel (McGinnis 1984, Moyle 2002).

Rationale for its use as target species:
The Santa Ana speckled dace is considered one of the rarest native fishes in coastal southern California (Swift et al. 1993, Moyle et al. 1995). It was petitioned for listing as a federal endangered species in 1994, but the petition was denied because it had not been formally described as a subspecies (Moyle 2002). These fish only occupy a remnant of their former range due to water diversion, urbanization of watersheds, introduction of exotic species, and pollution (Moyle et al. 1995). Their current distribution in small isolated populations makes them especially vulnerable to extinction (Moyle 2002).

Habitat modeling approach:
We did not model habitat for this species. Our habitat map for this species was based on literature review and input from species experts regarding the status of extant populations during the past 35 years.

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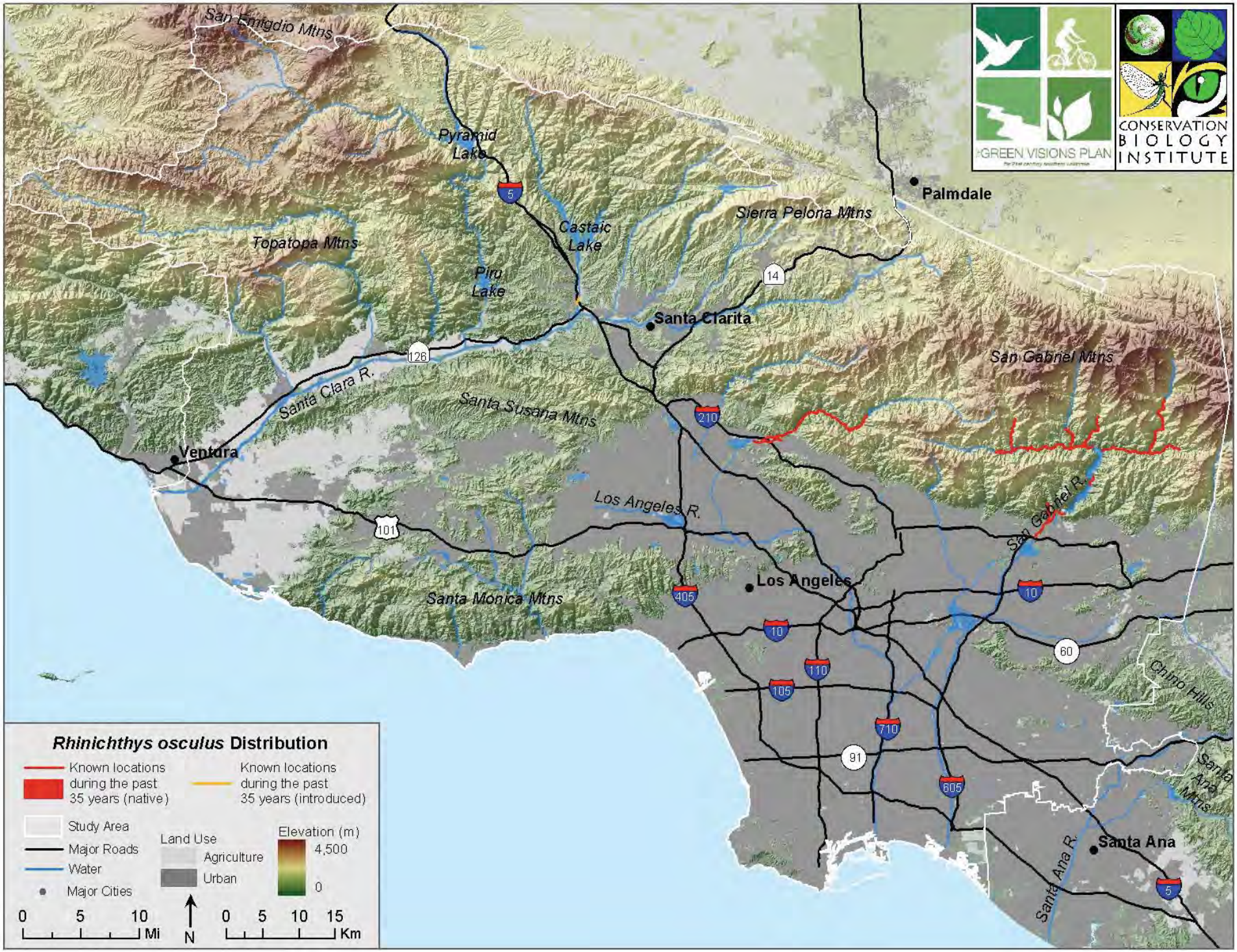
San Emigdio Mtns
Pyramid Lake
Castaic Lake
Topatopa Mtns
Piru Lake
Sierra Pelona Mtns
Palmdale
Santa Clarita
San Gabriel Mtns
Santa Clara R.
Santa Susana Mtns
Ventura
Los Angeles R.
San Gabriel R.
Los Angeles
Santa Monica Mtns
Chino Hills
Santa Ana Mtns
Santa Ana
Santa Ana R.
5
14
126
210
101
405
10
60
110
105
710
91
605
GREEN VISIONS PLAN
CONSERVATION BIOLOGY INSTITUTE
Rhinichthys osculus Distribution
Known locations during the past 35 years (native)
Known locations during the past 35 years (introduced)
Study Area
Major Roads
Water
Major Cities
Land Use
Agriculture
Urban
Elevation (m)
4,500
0
0 5 10 Mi
N
0 5 10 15 Km