

# Conservation Assessment of Orange County



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## EXECUTIVE SUMMARY

Over the past few decades, population growth has mushroomed in Orange County, as in the rest of Southern California, with the development of new communities and the infrastructure to support them. This growth has come at the expense of natural habitats and species in an area recognized as part of a global hotspot of biodiversity. The loss of habitat to development created a growing list of threatened and endangered species in Southern California, presenting challenges to federal, state, and local agencies responsible for natural resource protection, as well as to developers and land use planners trying to maintain a healthy economy. To respond to this dilemma, in 1991 the California legislature passed the Natural Community Conservation Planning (NCCP) Act to encourage a collaborative process for regional planning. As a result of the NCCP, natural open space reserves have been set aside in the coastal and central portions of Orange County which, when combined with National Forest lands, total approximately 163,000 acres of conserved habitat—majestic peaks, chaparral and oak-studded canyons, rolling scrub- and grassland covered hills, and the remnants of formerly extensive coastal lagoons and estuaries—lands that not only contribute to the preservation of biodiversity, but to the quality of life enjoyed by all Southern Californians. The legacy of this regional planning process continues, with the goal of protecting a green network of natural lands for wildlife habitat and open space recreation across jurisdictional boundaries in Southern California.

In 2006, Orange County voters approved the renewal of Measure M, a transportation sales tax designed to raise money to improve Orange County's transportation system. As part of this program, at least \$243 million will be allocated to mitigate the environmental impacts of freeway improvements, under the Orange County Transportation Authority's (OCTA) Mitigation and Resource Protection Program (MRPP). The goals of the MRPP are to engage in comprehensive, rather than piecemeal, mitigation to provide higher-value environmental benefits such as habitat protection, maintenance of wildlife corridors, and species preservation in exchange for streamlined project approvals for the freeway program as a whole.

The opportunity to acquire additional conservation lands via the Renewed Measure M funding requires identifying those lands that would contribute most to conserving the remaining natural resource values of Orange County, while ensuring that existing conservation investments remain intact and functional. In support of this process, the Conservation Biology Institute worked with OCTA and members of the MRPP Environmental Oversight Committee Working Group to conduct a science-based conservation assessment to describe and map selected conservation values across Orange County. This assessment is intended to provide a tool to assist decision-makers in prioritizing lands for acquisition for Measure M mitigation purposes. The objectives of this study were to:

- Develop an objective, science-based process for focusing decision-making on regional conservation priorities.
- Using existing data and applying NCCP tenets of conservation planning, map the distribution of conservation values of undeveloped lands in Orange County, including both protected and unprotected lands.





- Identify components of a regional reserve network, focusing on adding to existing reserve areas to build large core habitat areas with habitat linkages between them to enhance their persistence.
- Develop specific conservation objectives to maximize conservation values for each core and linkage area.
- Based on these objectives, identify areas where conservation of biological resources should be prioritized to improve landscape integrity and connectivity, protect rare species and their habitats, and ensure long-term persistence of natural processes.

As a result of this process, 11 core habitat areas and 4 existing or potentially viable linkages that include both protected and unprotected natural lands were identified. Focusing on the unprotected natural lands, designated as ‘Opportunity Areas,’ individual parcels were assessed relative to their (a) position on the interior or edge of the core area and (b) proximity to protected open space. The positional factor considers ‘edge effects,’ or habitat degradation that occurs at or near the urban-wildland interface (i.e., the habitat ‘edge’), while the proximity factor recognizes the value of adding to existing conservation investments. Using this evaluation process, unprotected lands expected to contribute most to the integrity of the regional reserve were then identified for each core and linkage area.

Establishing specific conservation objectives for each core and linkage area allowed identification of those parcels or groups of parcels for which acquisition would be a ‘no regrets’ decision, based on their contribution to the regional reserve system. These ‘no regrets’ lands, or Priority Conservation Areas (PCAs), represent the final step in the conservation assessment filtering process, and should be the focus of initial conservation efforts.

Thirty-nine PCAs were identified, offering a range of options for acquisition (Figure ES-1). Moreover, the conservation value of each area was characterized. Thus, decision-makers can use these results to prioritize lands for acquisition that consider specific mitigation needs for impacts of transportation projects. As the analyses were conducted at a landscape level, field assessments of individual parcels will be required prior to decisions on acquisition. The hierarchical nature of this study, which includes identification of reserve elements, opportunity areas, and priority conservation areas, also provides a framework for establishing restoration priorities and/or second-tier lands for acquisition, as well as a landscape characterization for beginning OCTA’s NCCP process.

Despite being the smallest county in Southern California, Orange County is also the state’s most populous county, and land values are among the highest in the country. Therefore, land use and conservation planning decisions require a strategic and integrated approach that is systematic, scientifically defensible, and fully transparent for stakeholder and scientific review. Moreover, acquisition decisions must be prioritized to yield the ‘biggest bang for the buck.’ This document establishes the framework for such decisions, and this framework will serve as the foundation for the Renewed Measure M MRPP.



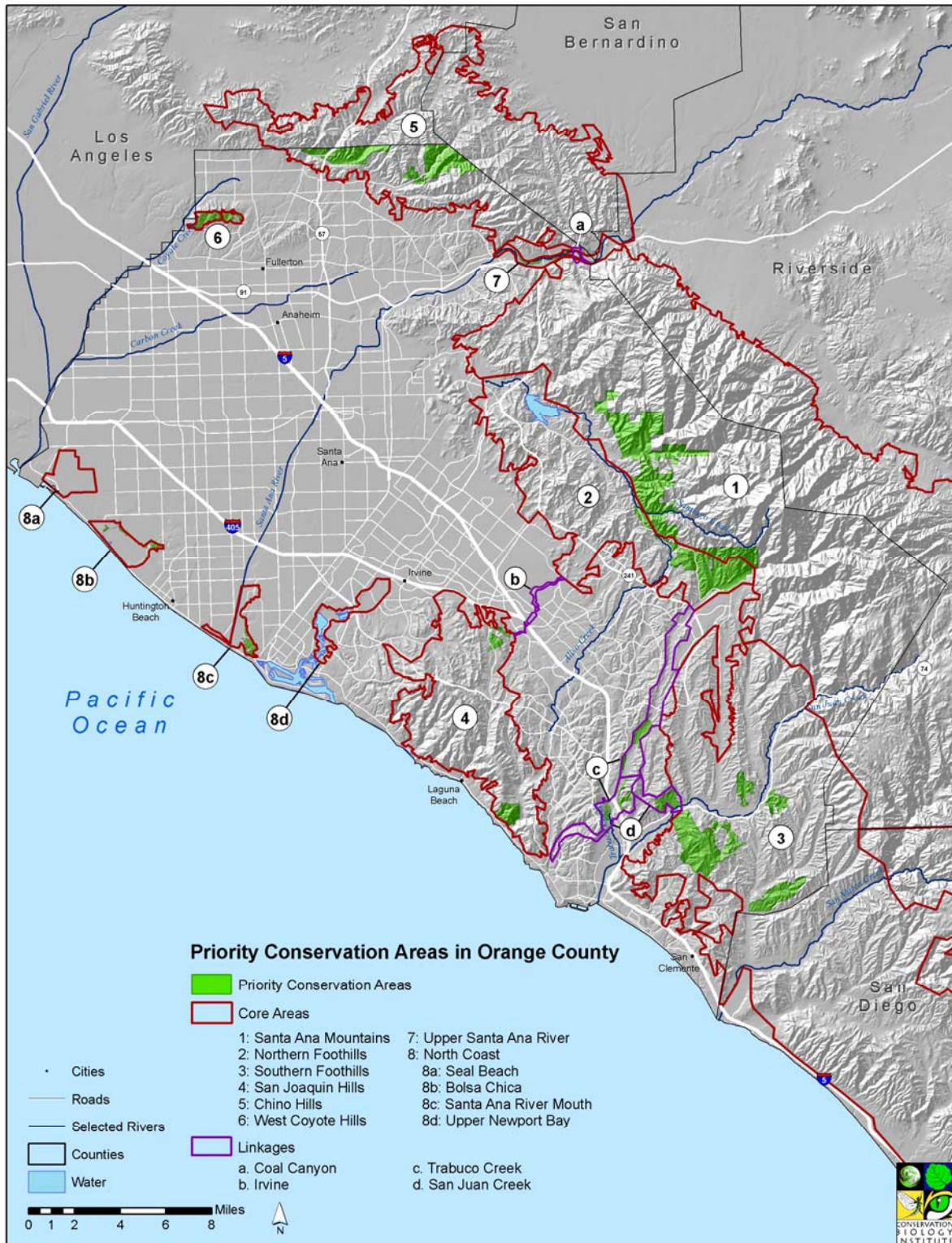


Figure ES-1. Priority Conservation Areas.



## 1 INTRODUCTION

The landscape of Orange County is a study in contrasts—densely populated urban areas fringed by majestic peaks, chaparral and oak-studded canyons, rolling scrub- and grassland covered hills, and the remnants of formerly extensive coastal lagoons and estuaries. Significant planning has gone into preserving what remains of this biological legacy, with an estimated 163,000 acres of natural lands set aside for long-term habitat preservation. Nonetheless, continued development threatens remaining, unprotected habitat, while the juxtaposition of natural lands and urban interface jeopardizes the viability of existing conservation investments both within and beyond the borders of the County.

### Background

In 2006, Orange County voters approved the renewal of Measure M, a transportation sales tax designed to raise money to improve Orange County's transportation system. As part of this program, at least \$243.5 million will be allocated to mitigate the environmental impacts of freeway improvements, under the Orange County Transportation Authority's (OCTA) Mitigation and Resource Protection Program (MRPP). The goals of the MRPP are to engage in comprehensive, rather than piecemeal, mitigation to provide higher-value environmental benefits such as habitat protection, wildlife corridors, and resource preservation in exchange for streamlined project approvals for the freeway program as a whole.

The opportunity to acquire additional conservation lands via the Renewed Measure M funding raises the issue of identifying those lands that would contribute most to conserving the remaining natural resource values of Orange County, while ensuring that existing conservation investments remain intact and functional. In support of this process, the Conservation Biology Institute (CBI) worked with OCTA and members of the Environmental MRPP Oversight Committee Working Group to conduct a conservation assessment using science-based conservation principles to describe and map selected conservation values across Orange County. This assessment is intended as a tool to assist decision-makers in prioritizing lands for acquisition. The objectives of this study were to:

- Map the distribution of conservation values in Orange County;
- Identify areas where biological resources can be maintained over the long-term;
- Identify properties or groups of properties that support key conservation values;
- Provide unbiased science-based tools for decision-making on conservation priorities.

### Approach and Limitations

Conservation planning processes should be systematic, scientifically defensible, and fully transparent for stakeholder and scientific review. This report documents the conservation principles and analytical approaches for assessing selected conservation values in Orange County.



The relative significance of natural lands in Orange County was characterized with respect to various conservation attributes or values. The overall protection of biological resources in the County was then assessed, and gaps in protection—as well as opportunities to fill those gaps—identified. This approach necessitated evaluating both protected and unprotected natural lands, as well as proximity of those lands to developed or urbanized areas. In step-wise fashion, the study identified:

- Existing land uses
- Existing biological resources
- Existing levels of conservation/protection of biological resources
- Gaps in regional conservation of biological resources
- High value, unprotected natural lands that fill gaps in regional conservation and/or enhance existing conservation investments

No new data were collected for this study. The study utilized publicly available data supplemented with information from individuals having specific knowledge of the region's biological resources. The relatively coarse scale of the data did not allow parcel-level assessment of conservation values. Community-level open space areas that may support neighborhood aesthetic and recreational values were not addressed. Nonetheless, the scale and thematic detail of information are adequate to support the conclusions in this report. Appendix A lists data sources; Appendix B provides data documentation for the various analyses.

It is anticipated that results of this assessment will be used initially to assist decision-makers in prioritizing lands for acquisition. The hierarchical nature of this study, which includes identification of reserve elements, opportunity areas, and priority conservation areas, also provides a framework for establishing restoration priorities and/or second tier lands for acquisition. Finally, OCTA has entered into a planning agreement to design and implement both an NCCP and a Habitat Conservation Plan (HCP) that describes measures to conserve biological resources while undertaking public infrastructure projects (CDFG 2009); this assessment provides baseline data that will be useful in the NCCP/HCP process.

## 2 PROJECT SETTING

Orange County holds the distinction of being both the smallest county in southern California and the state's second most populous county. The result of this combination is reflected in the landscape—nearly 60% of the County is developed or otherwise altered. Orange County is bordered by Los Angeles County—the nation's most populous county—to the north, San Bernardino and Riverside counties to the northeast and east, San Diego County to the southeast, and the Pacific Ocean to the west.

Orange County falls within the South Coast Ecoregion of the California Floristic Province. The South Coast Ecoregion is considered a biodiversity “hotspot,” supporting more endemic and imperiled species than any other region in the U.S. (Stein et al 2000), due in large part to its





diversity of geologic substrates, topographic features, climatic regimes, soil types, and other physical factors. The South Coast Ecoregion is, in turn, divided into two major biogeographic units, called ecological sections by the U.S. Forest Service (Miles and Goudey 1997): the Southern California Coast section and the Southern California Mountains and Valleys section. These ecological sections are further divided into subsections. Three Coast and one Mountains and Valley subsections occur in the County: the Los Angeles Plain, the Coastal Hills, the Coastal Terraces, and the Santa Ana Mountains subsections, respectively (Figure 1).

The Los Angeles Plain ecological subsection, or coastal plain of the Los Angeles Basin, dominates the northwestern portion of Orange County. This subsection ranges from sea-level along the coast to about 1,000 feet elevation inland, and is characterized by nearly level floodplains and terraces and gently sloping alluvial fans. Historically, this region supported saltmarsh and dunes along the immediate coast, grassland, scrub, and chaparral on slopes, riparian habitat along drainages, and limited oak and walnut woodlands. Today, this subsection is highly urbanized, with natural habitat existing largely as isolated remnants.

The Coastal Hills subsection includes the foothills west of the Santa Ana Mountains, from the Santa Ana River southward, including the coastal foothills (e.g., San Joaquin Hills). Elevation in this subsection ranges from about 500 to 2,000 feet. Vegetation includes coastal sage scrub, chaparral, oak woodland, riparian associations along drainages, and extensive grasslands in the southern portion of the County. More than 100 threatened or endangered species are associated with coastal sage scrub vegetation (Atwood 1993, California Department of Fish and Game 1996), and the Coastal Foothills—along with the more limited Coastal Terraces—support among the greatest diversity of endemic plant species in North America (Stebbins and Major 1965, Stein et al. 2000). This region is also favored by humans and, as a consequence, is highly developed. The resultant removal and fragmentation of the region's natural communities threatens many species with extinction.

The Coastal Terraces subsection is relatively limited in Orange County, occurring primarily along the coast at Newport Beach and near the mouth of the Santa Ana River. This subsection is characterized by level to gently sloping marine terraces, and may support beaches or dunes along the immediate coast. Elevation ranges from sea level to about 1,500 feet. Vegetation includes dunes, saltmarsh, grassland, coastal sage scrub, chaparral, and riparian associations. Like the Coastal Hills, this subsection has been severely impacted by development, and remaining natural lands are limited and typically support sensitive biological resources.

The Santa Ana Mountains subsection occupies the northern and eastern portions of the County, and includes the low-lying Puente and Chino Hills northwest of the Santa Ana River, and most of the Santa Ana Mountains southeast of the river (Miles and Goudey 1997). The Chino Hills form the northern border of the County and are contiguous with the Puente Hills in Los Angeles County. The Santa Ana Mountains form the eastern boundary of the County, providing a natural barrier from urban development in Riverside County. Elevation in this subsection ranges from about 300 feet near the Santa Ana River to 5,687 feet on Santiago Peak. Key drainages include the Santa Ana River, and Santiago, Aliso, Trabuco, and San Juan creeks. Vegetation includes grasslands, scrub, chaparral, oak woodlands, and coniferous forests.

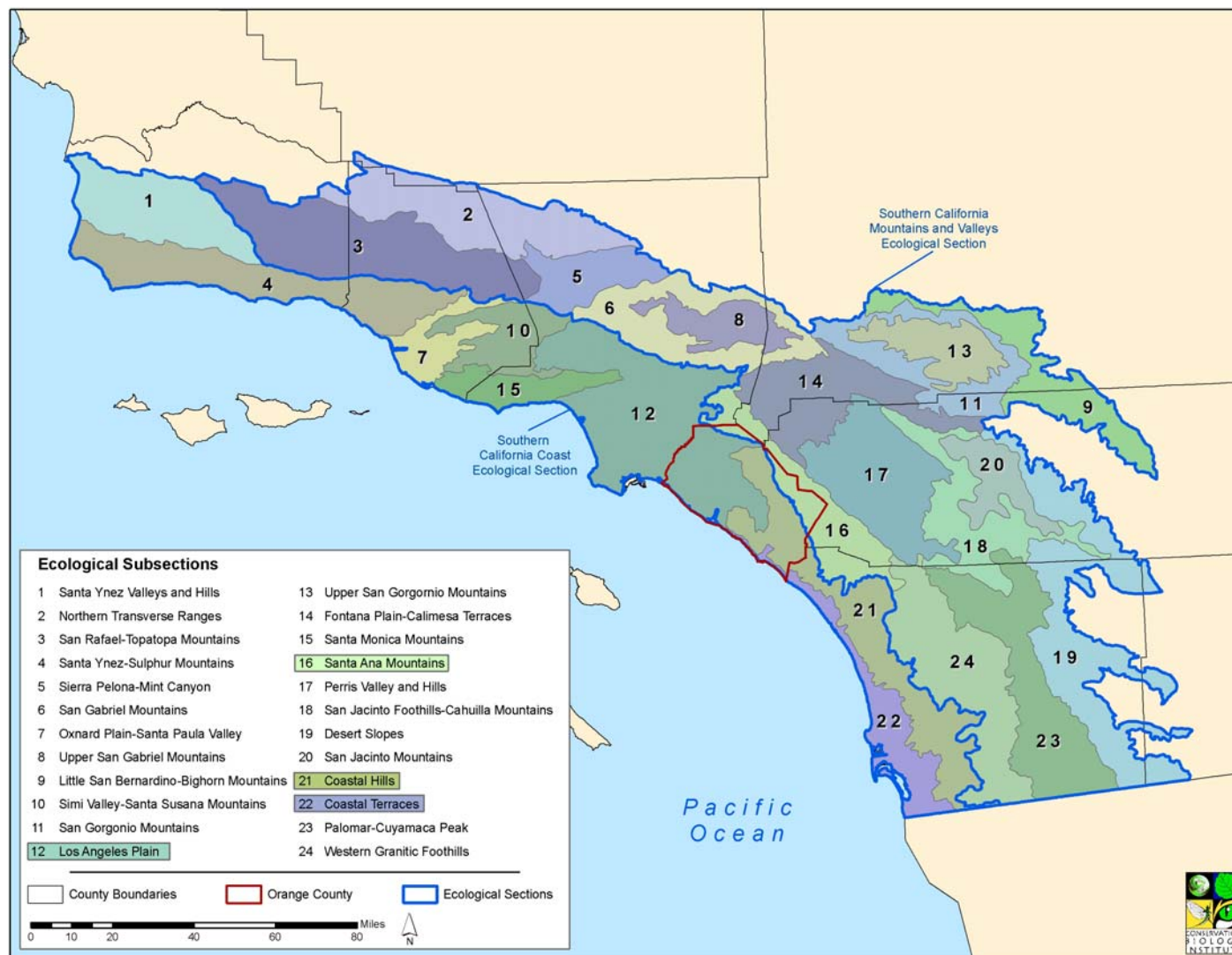


Figure 1. Biogeographic Divisions of the South Coast Ecoregion.



### 3 CONSERVATION VALUES

There are many values recognized in maintaining natural open space areas, ranging from conservation of biodiversity, protection of cultural and historic resources, enhancement of water quality, providing scenic vistas and recreation, to maintaining a sense of wilderness, to name a few. Because this assessment focused on mitigating for transportation impacts to biological resources, and especially sensitive species, in a very urban setting, a set of conservation values was chosen that reflect the biodiversity and long-term persistence of these resources. Additional considerations were the existing data sets available for analysis and generally accepted processes for evaluating relative significance of particular landscapes using Geographic Information Systems (GIS).

The California NCCP guidelines recognize several basic tenets of reserve design that promote biodiversity and provide for high likelihoods for persistence of target species (CDFG 1993). The regional conservation values described in this section are consistent with these objectives:

- Landscape Integrity
- Vegetation Representation
- Special Status Species
- Core Habitat Patches
- Connectivity
- Land Use Buffers

#### Landscape Integrity

Landscape integrity refers to the level of “intactness” of the landscape. High integrity landscapes are characterized by a high proportion of intact habitat, whereas low integrity landscapes are highly fragmented. Intact habitats are an important consideration in conservation planning and reserve design because they maintain ecological processes (e.g., natural hydrological and fire regimes), enhance resilience to disturbance events, accommodate long-term ecosystem adaptations (e.g., climate change), and allow for movement of wide-ranging animals such as mountain lion and mule deer.

Human modifications to the landscape pose the largest threat to landscape integrity, natural resources, and ecosystem functions (Myers 1997, Noss and Csuti 1997, Brooks et al. 2002). The footprint of human land uses, including residential, commercial, and industrial development, road networks, and agriculture, have eliminated and severely fragmented

#### Key Terms and Concepts

**Edge Effects:** Habitat degradation concentrated near the interface between natural and disturbed areas, such as increases in weedy species and pollutants, changes in species composition, interactions, and dispersal, soil erosion and compaction, changes in natural runoff patterns, and predation by house pets.

**Habitat Fragmentation:** The reduction of remnant habitats into smaller and more isolated blocks, each of which may be too small to continue supporting viable populations of species or ecosystem processes that operate over large landscapes, such as fire and hydrological cycles.



landscapes in Orange County, particularly in the coastal plain. Fragmentation increases edge habitat and decreases or eliminates interior habitat. Edge effects from fragmentation may include altered physical conditions (Saunders et al. 1991, Pickett et al. 2001) and fire regimes (Keeley and Fotheringham 2001), increased invasions by exotic plant and animal species (Suarez et al. 1998, Brothers and Spingarn 1992), changes in vegetation structure (Pickett et al. 2001), loss of top predators and changes in interspecific interactions (Bolger et al. 1991, Crooks 2002), and altered population dynamics (Soulé et al. 1992). Roads, in particular, increase erosion, air and water pollution, spread of invasive exotics, and mortality of wildlife species, as well as alter hydrologic and wildlife movement patterns (Beier 1995, Spellerberg 1998, Stritholt et al. 2000, Trombulak and Frissell 2000, Jones et al. 2000, Czech et al. 2001, Paul and Meyer 2001).

## Vegetation Representation

Vegetation representation is a measure of biodiversity, or the range or richness of biological variation across the landscape. Conserving the full range of vegetation community types and species assemblages present in a particular region is important in maintaining the existing biodiversity of that region (Scott et al. 2001). In addition, areas of high vegetation diversity generally support high species diversity (Meffe and Carroll 1997).

### Key Terms and Concepts

**Biodiversity:** The array of life on Earth, including all its different organisms, their genetic codes, and their interconnections within ecosystems and communities.

**Ecosystem:** A dynamic complex of plants, animals, and other organisms that interact with one another and their non-living environment as a unit.

**Endemic Species (Endemism):** Species restricted in distribution, occurring nowhere outside a defined geographic area, such as a particular ecoregion.

## Special Status Species

Another measure of biodiversity is the number of listed and endemic or restricted species in a region. Inclusion of imperiled or endemic species in conservation planning is important in maintaining the existing biodiversity of a region. Orange County supports a large number of sensitive plant and animal species, including 21 threatened and endangered species, as well as critical habitat for 6 species. Several sensitive species found in the County are endemic to the larger South Coast Ecoregion.

## Core Habitat Patches

Core habitat patches are defined as lands that support high or very high landscape integrity and biodiversity in a configuration that promotes the long-term persistence of species and habitats. Larger landscapes tend to allow for natural ecological processes, minimize local extinction probabilities, maintain populations that can re-colonize other areas following disturbance events, and support large area-dependent species, thereby increasing the potential that conservation values will persist over the long term. In Orange County, the degree of urbanization and fragmentation precludes the full range of ecosystem processes in all but the largest remaining blocks of habitat.





## Connectivity

Landscape connectivity is the degree to which the landscape facilitates or impedes movement among resource patches (Taylor et al. 2006). Connectivity of natural open space is widely regarded as essential to maintaining functional landscapes and evolutionary processes (e.g., Noss 1987, 1991, Saunders et al. 1991, Beier and Noss 1998, Crooks 2002). In fact, providing for connectivity of conserved lands is a fundamental principle of conservation planning (Noss et al. 1997, California Department of Fish and Game 1993, California Natural Community Conservation Planning Act 2002). Landscape-scale connectivity is particularly important for large area-dependent species, and is critical to allow species ranges to shift in response to climate change.

Federal, state, and local governments and private institutions have made significant conservation investments in Orange County, with over 163,000 acres of natural areas in public or protected lands. The long-term value of these existing conservation investments relies on maintaining the lands' integrity and natural ecosystem functions by maintaining connections to other intact areas.

## Land Use Buffers

Land use buffers absorb or moderate human impacts on reserve areas. These areas, which are positioned between reserves and the urban interface, do not necessarily consist of high value habitat, but are more often lower value habitat, agricultural areas, or low intensity land uses that are adjacent to conserved lands. In the absence of land use buffers, reserves are subject to edge effects at their margins that erode habitat values and decrease or eliminate interior habitat.

## 4 CONSERVATION ASSESSMENT

Using the aforementioned conservation principles as a foundation, existing data sets and GIS were used to characterize the undeveloped lands in Orange County with respect to the selected conservation values and map the results. Appendix C describes the assessment process and results, which are summarized below.

To characterize undeveloped lands, the assessment process identified elements of a regional (county-wide) reserve system, based on regional design principles. The general consensus among conservation scientists for reserve design includes a core area of protected habitat with little to no human development; surrounded by a buffer zone with protections for important habitat and restrictions on human development; surrounded by areas where human developments and activities are paramount (UNESCO 1974, Gregg and McGean 1985, Batisse 1986, Shafer 1990, Noss 2003). In addition, connectivity between core areas, particularly where core areas are too small to support the full range of conservation values or ecosystem functions, is critical to long-term viability of biological resources (Noss et al. 1997).



## Landscape Integrity

This analysis focused on identifying areas of high landscape integrity that are currently not conserved and areas where the integrity of existing protected areas can be improved through additional conservation actions. Very High and High integrity areas represent about 37% of the County.

## Vegetation Representation

Vegetation representation measures the level of habitat diversity currently protected across the County. The vegetation representation analysis identified the following communities as under-represented in conserved areas within Orange County and therefore priorities for conservation:

- California walnut woodland
- Coastal mixed hardwood
- Fremont cottonwood
- Willow
- Annual grasses and forbs
- Coastal bluff scrub
- Riparian mixed shrub
- Riparian mixed hardwood

## Special Status Species

An estimated 116 special status species occur in Orange County, and these range from federally or state endangered and threatened species to species of special concern or ‘watch list’ species (Appendix D.1). Because regional conservation focuses on those species that are most imperiled or most restricted in distribution, this list of 116 species was ‘filtered’ down to 57 species using the following criteria for inclusion:

- Species listed as threatened or endangered
- Species with a restricted distribution (State ranking of S1)
- Species on OCTA’s NCCP/HCP proposed species list for the Renewed Measure M freeway projects

## Core Habitat Patches

Core habitat areas that fall into three size classes were identified: large, medium, and small. In general, large core habitat areas (>80,000 acres) support the full range of conservation values assessed in this study. Medium core habitat areas (ca. 12,000-45,000 acres) may lack one or more conservation values, but have a reasonable chance for long-term persistence of biological resources, particularly if connectivity is maintained with other core habitat areas and edge effects are minimized. Small blocks of habitat (500-1,200 acres) were designated as core habitat areas only where they support biological resources of regional significance. Smaller cores may have a reduced potential for long-term viability.



Some core habitat areas extend beyond the boundaries of Orange County. For the purpose of this assessment, only that portion of a core that falls within the County was included in the analyses. In addition, many core areas show fragmentation at or near the core boundary. In general, boundary delimitation considered patch size and connectivity, with smaller, non-contiguous patches generally excluded from a core. Excluded patches may support biological resources, but do not contribute significantly to the reserve system nor are their values expected to persist over time or exhibit resilience to disturbance events or climate change.

Previous studies in Orange County (e.g., CBI 2001, Spencer 2005, Central/Coastal and Southern Subregion NCCPs) designated blocks of habitat as key conservation units that correspond, to some degree, with core habitat areas presented in this study. Differences in core boundaries between this assessment and earlier studies can be attributed, in part, to the fact that this study was not constrained by jurisdictional or political boundaries. Despite boundary differences, the biological values and resources of previously designated units have been incorporated into the datasets for this assessment, to the degree feasible.

## Connectivity

The connectivity analysis addressed linkages *between* core habitat areas rather than *within* core habitat areas, focusing on areas critical to maintaining or enhancing connectivity, thus contributing to the long-term persistence of key species and habitats in the region. Using these criteria, four existing or potentially viable linkages were identified within the study area.

## Land Use Buffers

Land use buffers can increase ecosystem functions and resilience of conservation investments to disturbances and edge effects. Potential buffers were identified from the protected areas, land cover, and landscape integrity datasets, and include lands supporting low intensity land uses situated adjacent to existing conservation investments.

The pattern of development in Orange County has produced a landscape that consists largely of high value natural lands in proximity to urbanized areas. For this reason, few areas remain outside of core and linkage areas that could reasonably function as buffers between open space and development. Because conservation priorities will be focused initially in core and linkage areas, buffers were not analyzed further in this assessment.

## 5 REGIONAL RESERVE ELEMENTS

The existing urban and natural landscape of Orange County dictates the limits to which a classic reserve design can be implemented. Nonetheless, the basic tenets of reserve design were applied, to the degree feasible, in identifying three regional reserve elements in this study: core habitat areas, linkages, and buffers. This section focuses on core habitat areas and linkages. As discussed above, potential buffers were identified (see Appendix C) but not analyzed in detail.



## Core Habitat Areas

Designation of core habitat areas was based on conservation values, with a focus on areas of high landscape integrity, high biodiversity, large patch size, and to some degree, shape. Based on these criteria, 11 core habitat areas were identified across the County (Figure 2):

- Santa Ana Mountains
- Northern Foothills
- Southern Foothills
- San Joaquin Hills
- Chino Hills
- West Coyote Hills
- Upper Santa Ana River
- North Coast: Seal Beach, Bolsa Chica, Santa Ana River Mouth, and Upper Newport Bay

Table 1 summarizes conservation values within core habitat areas. Table 2 summarizes vegetation representation within core habitat areas. A brief description of each core habitat area is presented below. Filtered species occurrences within core habitat areas are listed in Appendix D.2. Attributes of core habitat areas are summarized in Appendix E.1; vegetation representation within core habitat areas is detailed in Appendix F.

### *Santa Ana Mountains*

The Santa Ana Mountains constitute the largest block of high integrity habitat in the study area. Based on size, location, and connectivity to other core areas both within and beyond the County, it functions as the ‘backbone’ of the regional reserve system. Maintenance of intact habitat within this core is critical to the continued persistence of wide-ranging species in the region such as mountain lion and mule deer. In addition, this core area is large enough to support intact ecosystem processes and has the ability to function as both refugium and source area for key species in the event of large-scale disturbances or climate change. This core is characterized by both medium- and high elevation vegetation communities and species, and supports the only coniferous forest in Orange County. An estimated 88% of habitat within this core is currently protected, much of that in the Cleveland National Forest.

### *Northern Foothills Core Habitat Area*

The Northern Foothills is a medium-sized core habitat area situated at the western base of the Santa Ana Mountains. Despite its contiguity with the Santa Ana Mountains core, the Northern Foothills are delineated separately because they support primarily low elevation vegetation and sensitive species. The Northern Foothills are bordered by urban development to the west, and



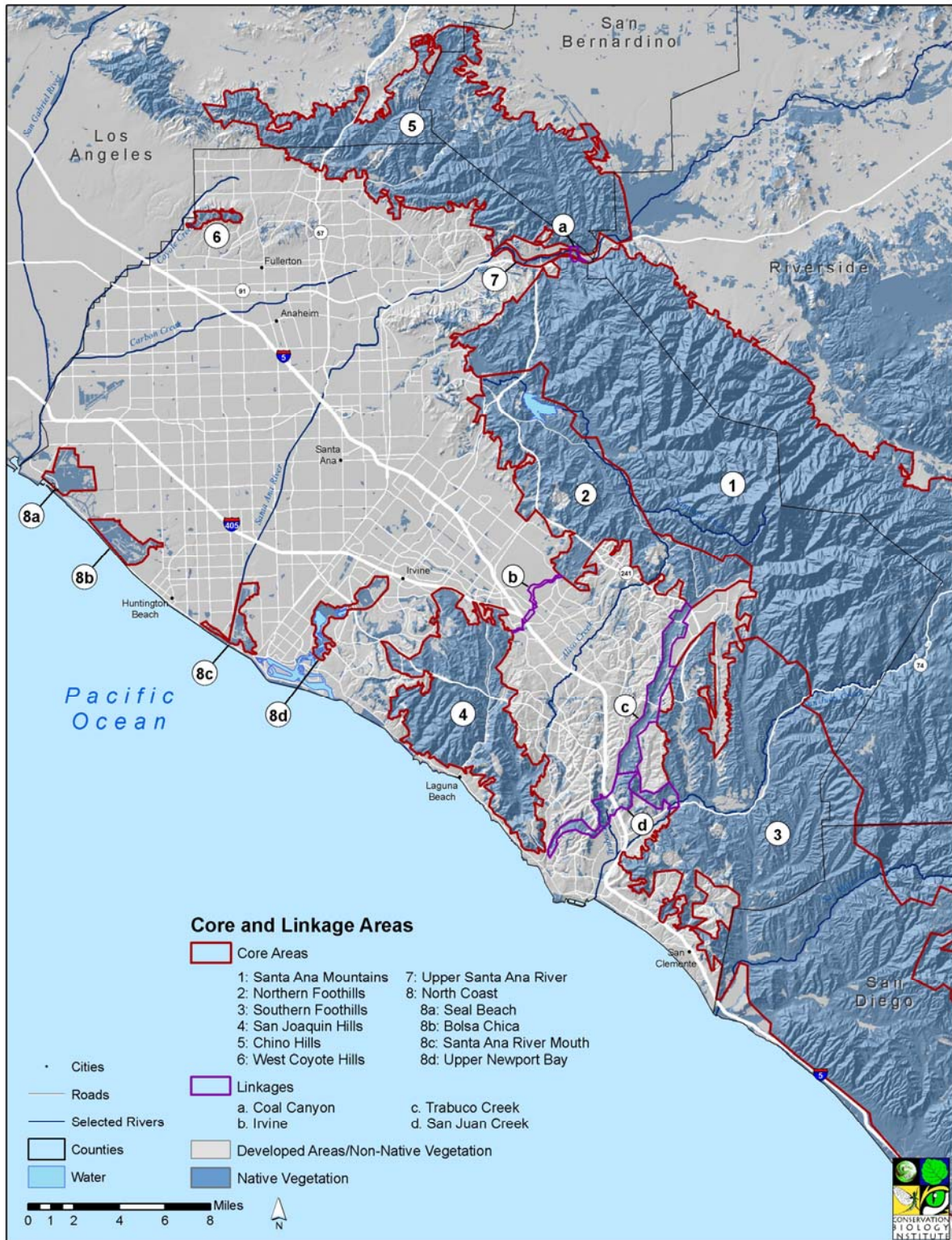


Figure 2. Core Habitat Areas.



Table 1  
Summary of Conservation Values within Core Habitat Areas

Core Area	Size (acres)	Integrity (%) <sup>1</sup>	Vegetation Types(#)	Filtered Species (#)	T & E/M2 Species (#)
Santa Ana Mountains	84,480	98	28	25	6/15
Northern Foothills	23,639	84	21	19	4/16
Southern Foothills	42,562	86	19	26	9/18
San Joaquin Hills	20,673	82	18	15	5/11
Chino Hills	12,601	82	13	13	2/13
West Coyote Hills	537	68	5	5	1/4
Upper Santa Ana River	504	22	6	8	2/7
Seal Beach	1,145	57	3	13	6/3
Bolsa Chica	1,166	31	5	13	7/2
Santa Ana River Mouth	710	29	7	9	5/3
Upper Newport Bay	1,135	48	10	18	8/5

<sup>1</sup> Percentage of lands with High or Very High landscape integrity.

<sup>2</sup> Filtered Species = Federally or state endangered or threatened; restricted in distribution [CNDDDB State Ranking of S1], and/or on OCTA's renewed Measure M (M2) Freeway projects NCCP/HCP proposed species list.

<sup>3</sup> T&E/M2 species = threatened and endangered species and species on OCTA's renewed Measure M (M2) Freeway projects NCCP/HCP proposed species list.

fragmented by two major highways and rural residential development. Nonetheless, this core habitat area supports relatively large blocks of intact habitat and high biodiversity. In combination with habitat to the east, the Northern Foothills also support wide-ranging species. The southern end of this core lies between the Santa Ana Mountains and Trabuco Creek/O'Neill Canyon, and is critical to maintaining wildlife movement between these two areas. An estimated 76% of this core is currently protected, much of that on lands within the Central Subregion of the Central/Coastal NCCP/HCP planning area.

### *Southern Foothills Core Habitat Area*

The Southern Foothills constitutes the second largest core in the study area. This core habitat area is contiguous with the Santa Ana Mountains core to the north and existing conservation investments in San Diego County to the south. The eastern and southern portions of this core are largely undeveloped and intact, while the northern and western edges are adjacent to and fragmented by a number of residential developments (e.g., Rancho Santa Margarita, Ladera Ranch, Cote de Caza, Rancho Mission Viejo) and associated roads. San Juan Creek and Ortega Highway bisect the core.



Table 2  
Summary of Vegetation Representation in Core Habitat Areas<sup>1,2</sup>

Natural Vegetation	Total, County (acres)	Total, Core Habitat Areas (acres) (%) <sup>3</sup>	SA	NF	SF	SJ	CH	WC	USA	NC				
										SB	BC	SA	UNB	
Coniferous Forest	1,981	1,981 100	1,976	4	0	0	0	0	0	0	0	0	0	0
Woodland	13,876	13,042 94	6,582	1,760	2,821	169	1,687	0	5	0	0	7	11	
Chaparral	82,951	82,005 99	62,682	3,653	8,223	4,408	2,990	49	0	0	0	0	0	
Scrub	59,521	55,018 92	11,054	12,903	17,444	10,527	2,479	465	0	14	16	38	76	
Grassland	41,731	31,949 77	1,463	5,067	13,224	5,259	5,253	22	63	414	499	434	252	
Riparian	4,409	2,999 68	708	221	835	310	192	0	436	0	12	102	184	
Wet Meadow/Marsh	2,235	2,158 97	15	32	15	0	0	0	0	717	639	129	612	
<b>Total</b>	206,704	189,155 92	84,480	23,639	42,562	20,673	12,601	537	504	1,145	1,166	710	1,135	

<sup>1</sup> SA = Santa Ana Mountains; NF = Northern Foothills; SF = Southern Foothills; SJ = San Joaquin Hills; CH = Chino Hills; WC = West Coyote Hills; USA = Upper Santa Ana River; North Coast: SB = Seal Beach; BC = Bolsa Chica; SA = Santa Ana River Mouth; NB = Upper Newport Bay.

<sup>2</sup> Numbers may not sum to total due to rounding.

<sup>3</sup> % = Percent of habitat in County that falls within core habitat areas.





The southern portion of this core, in particular, has been identified as a “hotspot” of biological diversity (CBI 2001). It is a core area for several vegetation communities, and supports core populations of filtered species, designated critical habitat, and wide-ranging species such as mountain lion and golden eagle. An estimated 79% of this core is currently protected within the Southern NCCP/HCP planning area and other public or private conservation investments.

### *San Joaquin Hills Core Habitat Area*

The San Joaquin Hills is a medium-sized block of habitat on the immediate coast. This core supports high quality, relatively intact habitat, but is bisected by 2 major roads (SR-73 and SR-133), and is largely isolated from other sizeable core habitat areas, which may have implications for the long-term viability of biological resources. For example, this area is no longer capable of supporting wide-ranging species such as mountain lion or mule deer. The bobcat population in the San Joaquin Hills appears to be genetically distinct from the population in the Santa Ana Mountains, although no evidence of inbreeding has been noted in either the coastal or inland population (Lyren et al. 2008b). The San Joaquin Hills support a number of sensitive vegetation communities and core populations of filtered species, including the endemic Laguna Beach dudleya, the only U.S. population of big-leaved crownbeard, coastal cactus wren, and coastal California gnatcatcher, among others. An estimated 84% of this core is currently protected, primarily within the Coastal Subarea Reserve of the Nature Reserve of Orange County.

### *Chino Hills Core Habitat Area*

The Chino Hills are situated at the northern edge of the Santa Ana Mountains, along the Orange-Los Angeles County line. For the purpose of this assessment, the Chino Hills is delineated separately from the Santa Ana Mountains because it generally supports lower elevation vegetation communities and species. In addition, the two core habitat areas are physically separated by the Santa Ana River. The Chino Hills core habitat area is contiguous with the Puente Hills to the north in Los Angeles County, and is adjacent to the heavily urbanized Los Angeles Basin to the south and west. State Route 57 transects the area and encroaching development has resulted in habitat fragmentation along the southern edge and in the western portion of this core. The eastern portion of this area lies largely within Chino Hills State Park.

The Chino Hills core habitat area is notable for its biodiversity, including the sensitive and regionally under-protected California walnut woodland, as well as core populations of filtered species. Substantial stands of walnut woodland occur in Tonner Canyon. Coastal sage scrub in the Chino Hills is critical habitat for the coastal California gnatcatcher. Although this core currently supports wide-ranging species such as mountain lion and mule deer, persistence of these species in the Chino Hills is contingent upon maintaining a connection with more extensive habitat to the southeast in the Santa Ana Mountains. An estimated 57% of this core is currently protected, much of that in Chino Hills State Park.



### *West Coyote Hills Core Habitat Area*

The West Coyote Hills is a relatively small block of habitat in the northwest portion of the County. This core—the second smallest in the study area—is isolated from other core habitat areas and lies within a matrix of urban lands. These factors lower its resilience to short- and long-term disturbance events, as well as the potential for long-term persistence of biological resources. The effects of habitat loss and fragmentation are reflected in the relatively low biodiversity of this area compared to other core habitat areas in Orange County.

Despite these shortcomings, the West Coyote Hills currently supports several filtered species, including a large population of the federally threatened coastal California gnatcatcher. Coastal sage scrub in this core is designated critical habitat for the gnatcatcher. In addition, this core may function as a temporary refugium for gnatcatchers to the north, in the Chino-Puente Hills. An estimated 18% of this core is currently protected.

### *Upper Santa Ana River Core Habitat Area*

The upper Santa Ana River Core Habitat Area includes that portion of the Santa Ana River that flows through Santa Ana Canyon, just west of the Orange-Riverside County line. This is the smallest core in the study area; however, it lies between the largest core habitat area, the Santa Ana Mountains, and a medium-sized core habitat area, the Chino Hills. The Upper Santa Ana river core was designated primarily for its high quality riparian habitat, which is utilized by at least two federally and state endangered riparian-obligate bird species. In addition, it supports potential habitat for a federally threatened fish species, and lies in proximity to high quality riparian habitat upstream at Prado Dam. This core is utilized by wide-ranging species that travel between the Santa Ana Mountains and Chino Hills.

The landscape integrity of this core habitat area is relatively low due to river alterations and adjacent urban development and roads. Its resilience to disturbance events and climate change may be compromised by its size, shape, edge effects, and future road widening projects. An estimated 56% of this core is currently protected.

### *North Coast Core Habitat Areas*

The North Coast consists of four distinct coastal wetland units; each is considered a distinct core habitat area: Seal Beach, Bolsa Chica, Santa Ana River Mouth, and Upper Newport Bay. Although relatively small and isolated, each of these areas supports valuable wetland habitat and among the largest concentrations of threatened and endangered species in Orange County. The significance of these wetlands extends far beyond their geographic boundaries. Situated along the Pacific Flyway in a section of California that has suffered extensive wetland habitat losses, they provide important wintering and migratory *stepping-stone* habitats for numerous shorebirds and waterfowl. In addition, a number of endemic invertebrate species occur in these systems. Where these wetlands abut upland habitat, sensitive upland species such as coastal California gnatcatcher and coastal cactus wren occur. Extensive grasslands surrounding these wetlands provide significant raptor foraging areas, as well.



Because these wetlands are small, isolated, and situated largely within a matrix of urban lands, they lack the full range of ecosystem functions and are subject to edge effects. These factors may compromise their ability to respond to future climate change or disturbance events. Nonetheless, the high biodiversity of these areas, which includes regionally under-protected and sensitive wetland habitats and a concentration of endangered and threatened species, warrants continued long-term conservation efforts.

The Seal Beach core habitat area, which includes habitat at Anaheim Bay and the Seal Beach National Wildlife Refuge, supports some of the healthiest wetlands in southern California (SCWRP 2001). An estimated 99% of this core is currently protected.

The Bolsa Chica core habitat area includes some of the most important remnant wetlands in southern California. An estimated 76% of this core is currently protected.

The Santa Ana River Mouth core habitat area includes habitat along the Santa Ana River, as well as the Huntington Beach wetlands. Together, these areas represent the remnants of a formerly expansive wetland system that once covered 2,900 acres (SCWRP 2001). An estimated 76% of this core is currently protected.

The Upper Newport Bay core habitat area, which includes Upper Newport Bay and San Joaquin Marsh, supports some of the highest quality tidal marsh habitat in southern California (SCWRP 2001). An estimated 93% of this core is currently protected.

## Linkages between Core Habitat Areas

Designation of linkages between core habitat areas was based on aerial photography, topography, and existing land uses. Based on these criteria, four existing or potentially viable linkages were identified (Figure 3):

- Coal Canyon Linkage (existing)
- Irvine Linkage
- Trabuco Creek Linkage
- San Juan Creek Linkage

A brief description of each linkage is presented below. Attributes of each linkage are summarized in Appendix E.2.

### *Coal Canyon Linkage*

The Santa Ana Mountains are separated from the Chino Hills by Highway 91, a major freeway with heavy traffic and significant physical barriers to wildlife (Spencer 2005). The only viable linkage between these two areas is the Coal Canyon linkage, a wildlife underpass which was



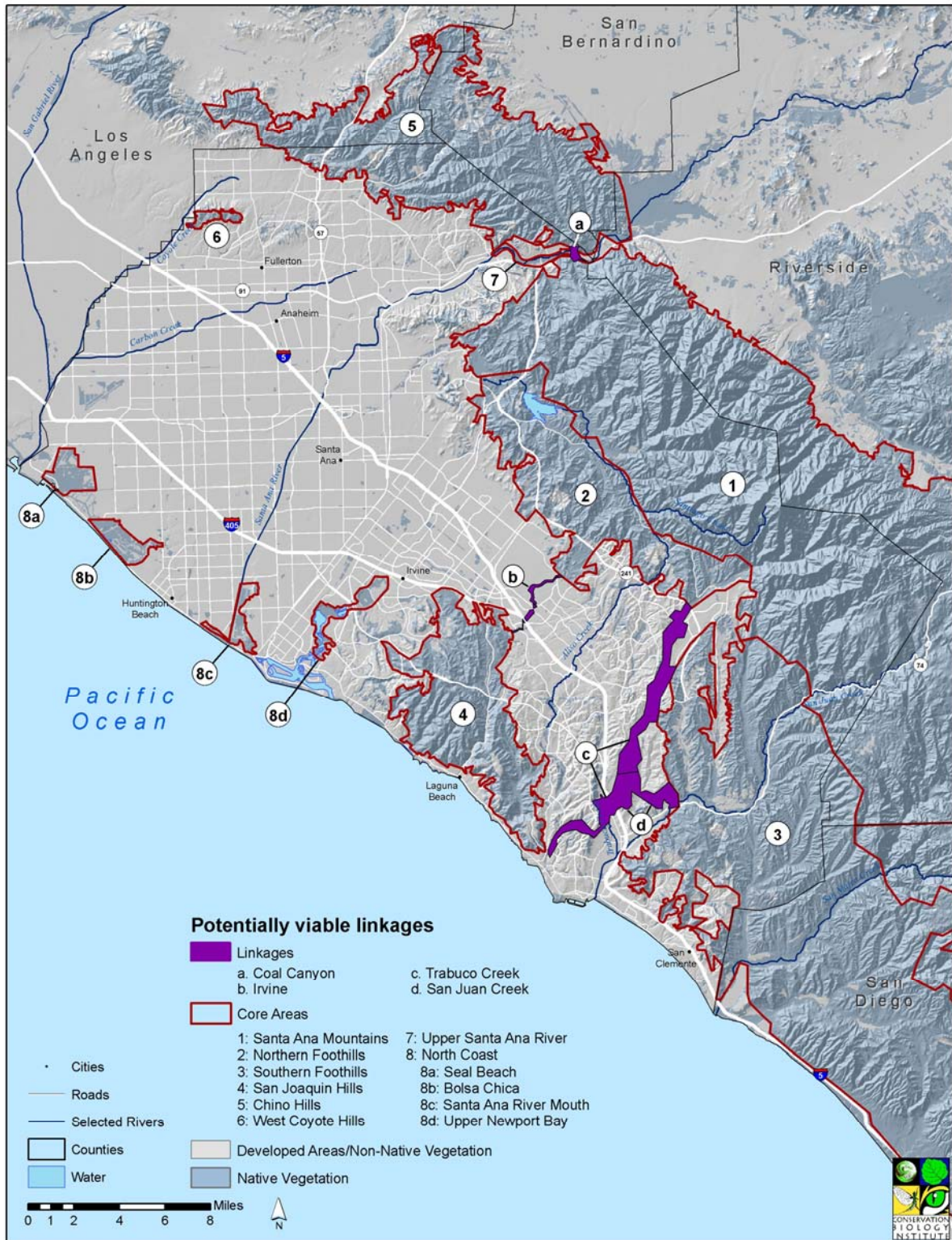


Figure 3. Existing or Potentially Viable Linkages.



restored specifically to maintain this connectivity. This underpass is critical to maintaining movement of wide-ranging species between these two core habitat areas.

The Coal Canyon linkage is an existing, protected linkage; however, this connection is potentially threatened by road widening projects and infrastructure improvements. Further, wildlife use of this linkage may be inhibited by a lack of vegetation, as well as high noise levels from the freeway. This linkage is currently protected and supports about 65% native vegetation.

### *Irvine Linkage*

The San Joaquin Hills core supports regionally important biological resources, but appears to be functionally isolated from other sizeable core habitat areas in the region. Establishing or enhancing connectivity between this area and other cores is critical to the long-term persistence of conservation values in the San Joaquin Hills. The City of Irvine has developed the *Irvine Wildlife Corridor Plan* to establish a linkage through the former MCAS El Toro property. This connection would extend from Limestone-Whiting Wilderness Park in the Northern Foothills through the Orange County Great Park to Laguna Coast Wilderness Park in the San Joaquin Hills (Cotton/Bridges Associates and EcoSystems Restoration Associates 2004).

The Irvine linkage, which includes the proposed Irvine Wildlife Corridor and additional lands to the east and west, is the shortest route between the San Joaquin Hills and Northern Foothills core areas. In addition, much of the linkage is already protected. This linkage would, however, require extensive habitat restoration and road enhancements or modifications to encourage wildlife use. The width of the proposed corridor is constrained by existing development in several areas, including portions of the Great Park and just west of the I-5/405 interchange (El Toro “Y”). Lyren et al. (2008a) identified the 26-lane I-5/I-405 interchange as the major constriction point of this proposed linkage and the biggest obstacle to functional connectivity. It is anticipated that use of the El Toro “Y” undercrossing by wildlife species would require extensive structural modifications. An estimated 88% of this linkage is protected, although only about 7% of the linkage currently supports native vegetation.

### *Trabuco Creek Linkage*

While the Irvine linkage presents the shortest link between the San Joaquin Hills and Northern Foothills, there are potential constraints to its functionality. The Trabuco Creek linkage offers a second, potentially viable linkage between these core areas. This linkage extends from the southern end of the San Joaquin Hills through the Salt Creek corridor, crosses I-5 at Trabuco Creek, and continues along Trabuco Creek through O’Neill Canyon to the Northern Foothills core habitat area. This linkage is longer than the Irvine linkage and key acquisitions would be required at the southern end of the San Joaquin Hills, in the vicinity of the I-5 undercrossing, and in O’Neill Canyon to complete and/or protect the corridor. However, both the landscape integrity and existing native vegetation cover are high in this linkage, and O’Neill Canyon, in particular, supports important biological resources. An estimated 60% of this linkage is currently protected, with a 74% cover of native vegetation.



## San Juan Creek Linkage

The San Juan Creek linkage is a potentially viable connection from the San Joaquin Hills to the Southern Foothills through Trabuco Creek and then southward to San Juan Creek. This connection follows the same course as the Trabuco Creek linkage from the southern San Joaquin Hills across I-5 and into Trabuco Creek/O'Neill Canyon. However, about 0.6 mi north of I-5, this connection diverges to the southeast, with a possible route through undeveloped lands to San Juan Creek. This southeastward portion of the connection includes drainages, slopes, and ridgelines, and movement across portions of the linkage may be constrained by topography. In at least one location, wildlife would have to skirt or cross active agricultural fields. An estimated 53% of this linkage is currently protected, with a 72% cover of native vegetation.

## 6 OPPORTUNITY AREAS

For the purpose of this study, *Opportunity Areas* are defined as unprotected natural lands within the identified cores and linkages described in Section 5. From a biological perspective, the highest priority Opportunity Areas are those that fill regional conservation gaps and/or contribute to the integrity and long-term persistence of biological resources county-wide. In the following sections, the analyses are further refined to (1) prioritize individual parcels within Opportunity Areas and (2) identify *Priority Conservation Areas* that should be the focus of initial acquisition efforts. Figure 4 depicts Opportunity Areas within cores and linkages.

### Parcel Prioritization

Unprotected lands within Opportunity Areas were evaluated according to (1) position (i.e., interior versus edge) of individual parcels within a reserve element and (2) proximity of the parcel to protected open space. This evaluation provides additional attributes for decision-making, and is intended to be used in conjunction with conservation values, rather than independently, in determining the value of a parcel for conservation. The positional factor takes into account 'edge effects,' or habitat degradation that occurs at or near the urban-wildland interface ('edge'). Because most edge effects dissipate with distance from the edge, lands at or near the urban-wildland interface are more 'edge-effected' than lands away from the edge. Conversely, interior parcels generally have a higher conservation value than edge parcels because they maintain landscape integrity and minimize impacts to species, habitats, and ecosystem functions from fragmentation and edge effects. Edge parcels do provide value in buffering interior parcels and may represent areas of high biodiversity or be important in maintaining/enhancing connectivity.

The second factor in this analysis—proximity to protected lands—recognizes the value in adding to existing conservation investments. For this factor, parcels adjacent to existing open space are expected to be less disturbed and therefore have a higher conservation value than parcels adjacent to developed lands. Parcels adjacent to protected open space increase the areal extent of conserved lands and hence, the ability of biological resources on those lands to persist.



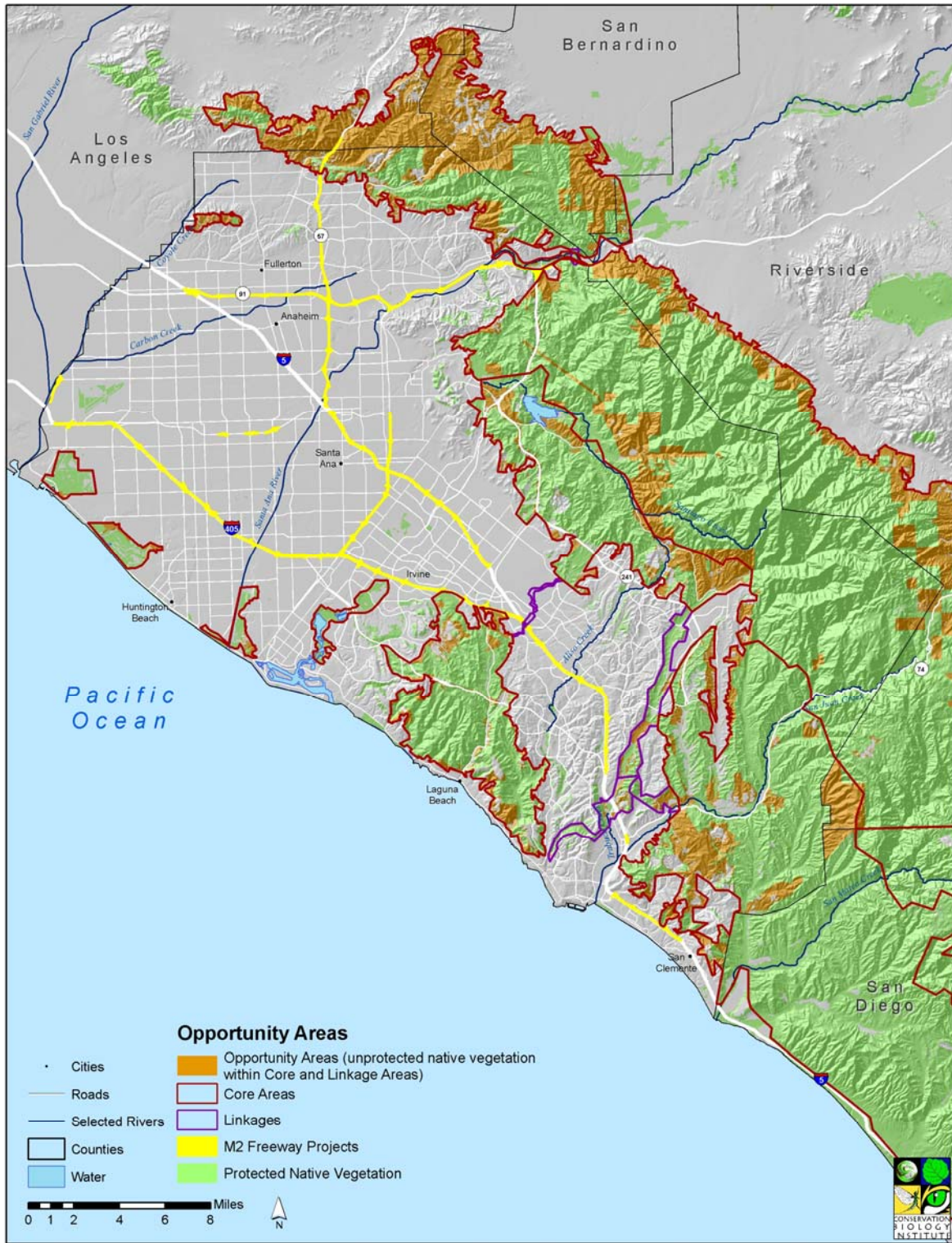


Figure 4. Opportunity Areas within Cores and Linkages.





Thus, the process for evaluating lands at the local scale included the following steps, further illustrated by the boxes below:

- Stratify or group core habitat areas and linkages into two units so that areas with similar conservation values are compared against each other;
- Conduct edge analysis (interior versus edge) for parcels in the first unit only, as parcels within the second unit are assumed to be edge-affected based on small size or relatively linear shape;
- Establish *Positional Priority Levels*, i.e., rank individual parcels within the first unit based on position relative to both edge and existing conserved lands, and within the second unit based on position relative to existing conserved lands;
- Develop *Positional Priority Level* map.

Large/Medium Core Areas (Unit 1)	Small Core Areas/Linkages (Unit 2) <sup>1</sup>
<ul style="list-style-type: none"> <li>○ Santa Ana Mountains</li> <li>○ Northern Foothills</li> <li>○ Southern Foothills</li> <li>○ San Joaquin Hills</li> <li>○ Chino Hills</li> </ul>	<ul style="list-style-type: none"> <li>○ West Coyote Hills</li> <li>○ Upper Santa Ana River</li> <li>○ North Coast (Seal Beach, Bolsa Chica, Santa Ana River Mouth, Upper Newport Bay)</li> <li>○ Irvine/Trabuco Creek/San Juan Creek Linkages</li> </ul>

<sup>1</sup> The Coal Canyon Linkage was excluded from this analysis because it is already protected.

Positional Priority Level	Position/Proximity <sup>1</sup>
<b>Large/Medium Core Habitat Areas (Unit 1)</b>	
High Priority	Interior/Adjacent
Medium Priority	Interior/Not Adjacent <i>or</i> Edge/Adjacent
Low Priority	Edge/Not Adjacent
<b>Small Core Habitat Areas/Linkages (Unit 2)</b>	
Medium Priority	Adjacent
Low Priority	Not Adjacent

<sup>1</sup> Position refers to position relative to urban-wildland interface (e.g., interior versus edge) as determined through a modeling process; proximity refers to position relative to existing conservation investments.

Figure 5 depicts edge versus interior parcels for the large- and medium-sized core habitat areas, and Figure 6 shows the results of the edge and adjacency analyses combined. The distribution of parcels within Opportunity Areas is summarized in Table 3 according to Positional Priority Level. Refer to Appendix C for additional details on the edge analysis process.



## Priority Conservation Areas

The final steps in prioritizing specific lands for conservation involve articulating conservation objectives for each Opportunity Area, i.e., the conservation role that each Opportunity Area should play in the regional reserve system. This allows identification of those currently unprotected lands that contribute most to achieving the conservation objectives. Therefore, based on the characterization of the landscape in previous analyses, both at the regional level and parcel level, Priority Conservation Areas (PCAs) were delineated within opportunity areas (Figure 7). PCAs are defined as those currently unprotected lands for which acquisition would be a ‘no regrets’ decision, based on their contribution to the regional reserve system. Conversely, inadequate conservation within PCAs may affect the overall viability of a specific reserve element by rendering it vulnerable to fragmentation, edge effects, isolation from other core habitat areas, loss of under-represented vegetation and core populations of species, and a decreased capability to respond to climate change.

This section outlines conservation objectives for each reserve element and provides maps depicting PCA locations, as well as Positional Priority Levels of parcels within PCAs. Attributes of PCAs are detailed in Appendix G. Appendix H provides a list of all parcels within each PCA (Appendix H.1), as well as a list of submittal properties (i.e., properties submitted for consideration for acquisition or restoration funding under renewed Measure M) within each PCA (Appendix H.2).

### *Core Habitat Areas*

#### Santa Ana Mountains Core Habitat Area

The Santa Ana Mountains core habitat area is notable for its high landscape integrity, large size, connectivity to other core habitat areas, and suite of mid- to high elevation habitats and species. Key conservation objectives for this core include:

- Minimize interior fragmentation by acquiring or otherwise conserving unprotected parcels in the central portion of the core (north and south of Santiago Creek) and north of O’Neill Canyon (Tabuco area);
- Conserve regionally under-protected vegetation communities (Fremont cottonwood, riparian mixed hardwood);
- Conserve core populations of filtered species, including arroyo toad, northern red-diamond rattlesnake, bobcat, mountain lion, and Malibu baccharis.

Using these objectives as a guideline, two PCAs were identified within this core (Figure 8). Figure 9 depicts the Positional Priority Levels of parcels within these PCAs; these priority levels provide another tool for distinguishing between the relative value of different parcels, assuming biological resources are similar.

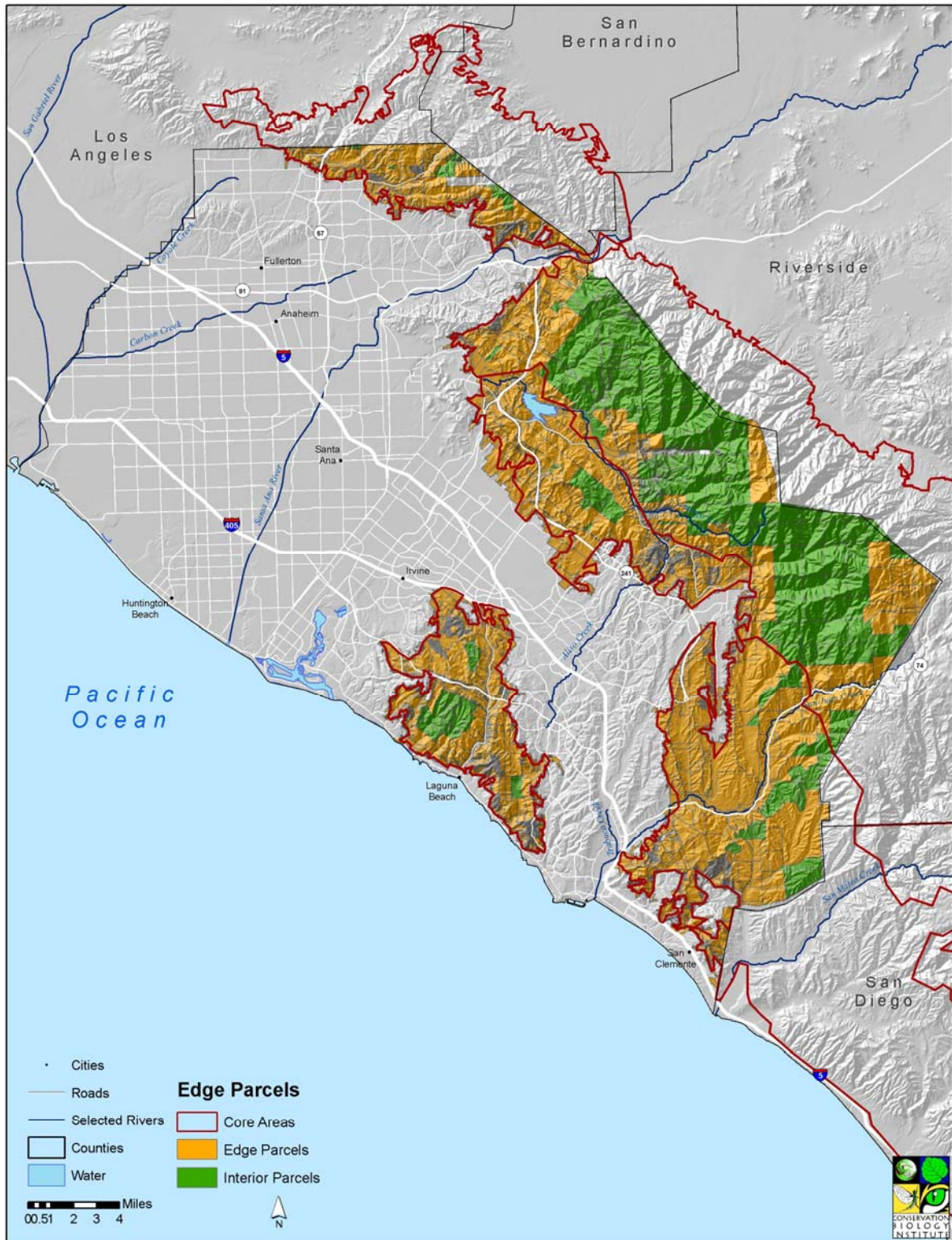


Figure 5. Edge versus Interior Parcels.



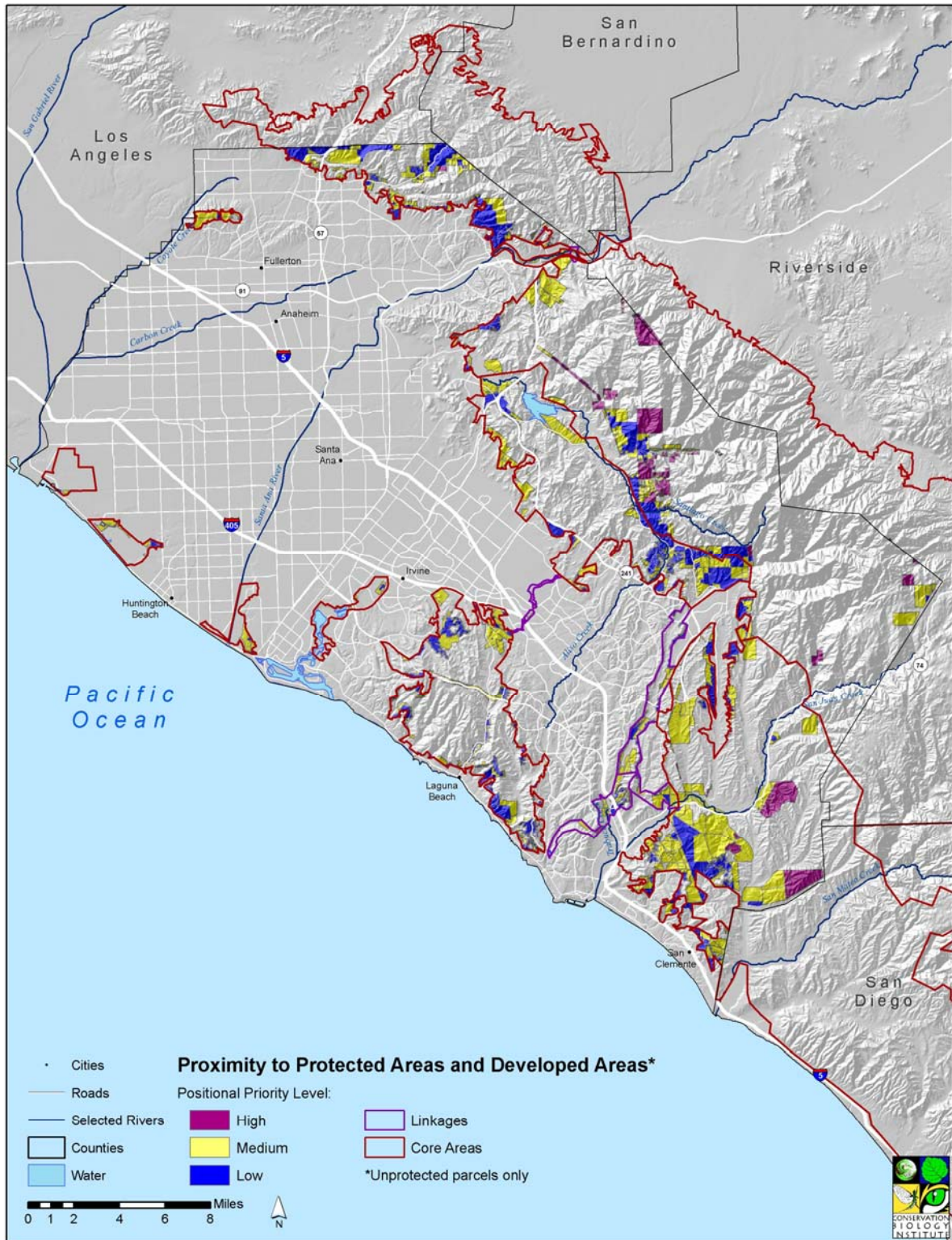


Figure 6. Positional Priority Levels.



Table 3  
Positional Priority Levels<sup>1</sup> of Parcels within Opportunity Areas

Unit	High <sup>2</sup>	Medium <sup>2</sup>	Low <sup>2</sup>	Total # Parcels
Santa Ana Mts. <sup>3</sup>	112	939	2,087	3,138
Northern Foothills <sup>3</sup>	1	744	4,123	4,868
Southern Foothills	11	1,236	7,023	8,270
San Joaquin Hills	0	1,533	8,240	9,773
Chino Hills	4	504	3,184	3,692
W. Coyote Hills	---	99	319	418
Upper Santa Ana River	---	56	175	231
North Coast	---	418	2,426	2,844
Linkages	---	910	3,103	4,013
<b>Total # Parcels</b>	<b>128</b>	<b>6,439</b>	<b>30,680</b>	<b>37,247</b>

<sup>1</sup> Numbers represent number of parcels within each Positional Priority Level.

<sup>2</sup> Unit 1 (Large/Medium-sized Core Habitat Areas): High Priority = Interior/Adjacent; Medium Priority = Interior/Not Adjacent *or* Edge/Adjacent; Low Priority = Edge/Adjacent

Unit 2 (Small Core Habitat Areas/Linkages): Medium Priority = Adjacent; Low Priority = Not Adjacent

<sup>3</sup> Parcels that straddle the Santa Ana Mountains/Northern Foothills Core Habitat Area boundaries are included in the counts for both areas.

#### Northern Foothills Core Habitat Area

The Northern Foothills is a medium-sized core that is contiguous with the larger Santa Ana Mountains core to the east. Because of this contiguity, this area is able to support large-area dependent species such as bobcat and mountain lion. It also supports high biodiversity, including sensitive habitats and core populations of filtered species. Key conservation objectives for this core include:

- Minimize interior fragmentation and maintain connectivity to the Santa Ana Mountains;
- Conserve regionally under-protected vegetation communities (annual grasses and forbs);
- Conserve core populations of filtered species, including arroyo toad, coastal cactus wren, coastal California gnatcatcher, bobcat, mountain lion, intermediate mariposa-lily, many-stemmed dudleya, and peninsular nolina.

Three PCAs were identified within this core (Figure 8). Figure 9 depicts the Positional Priority Levels of parcels within these PCAs.



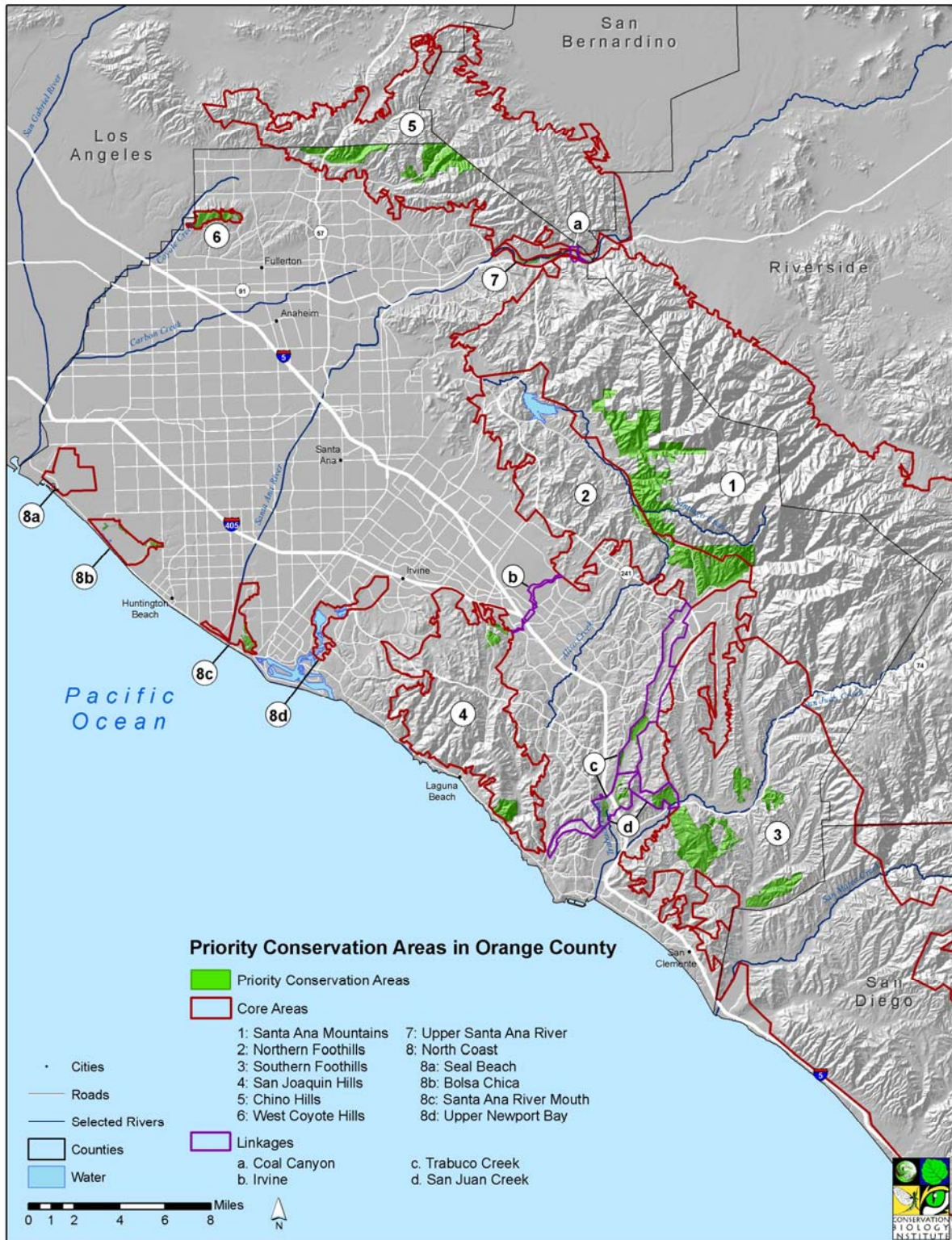


Figure 7. Priority Conservation Areas.



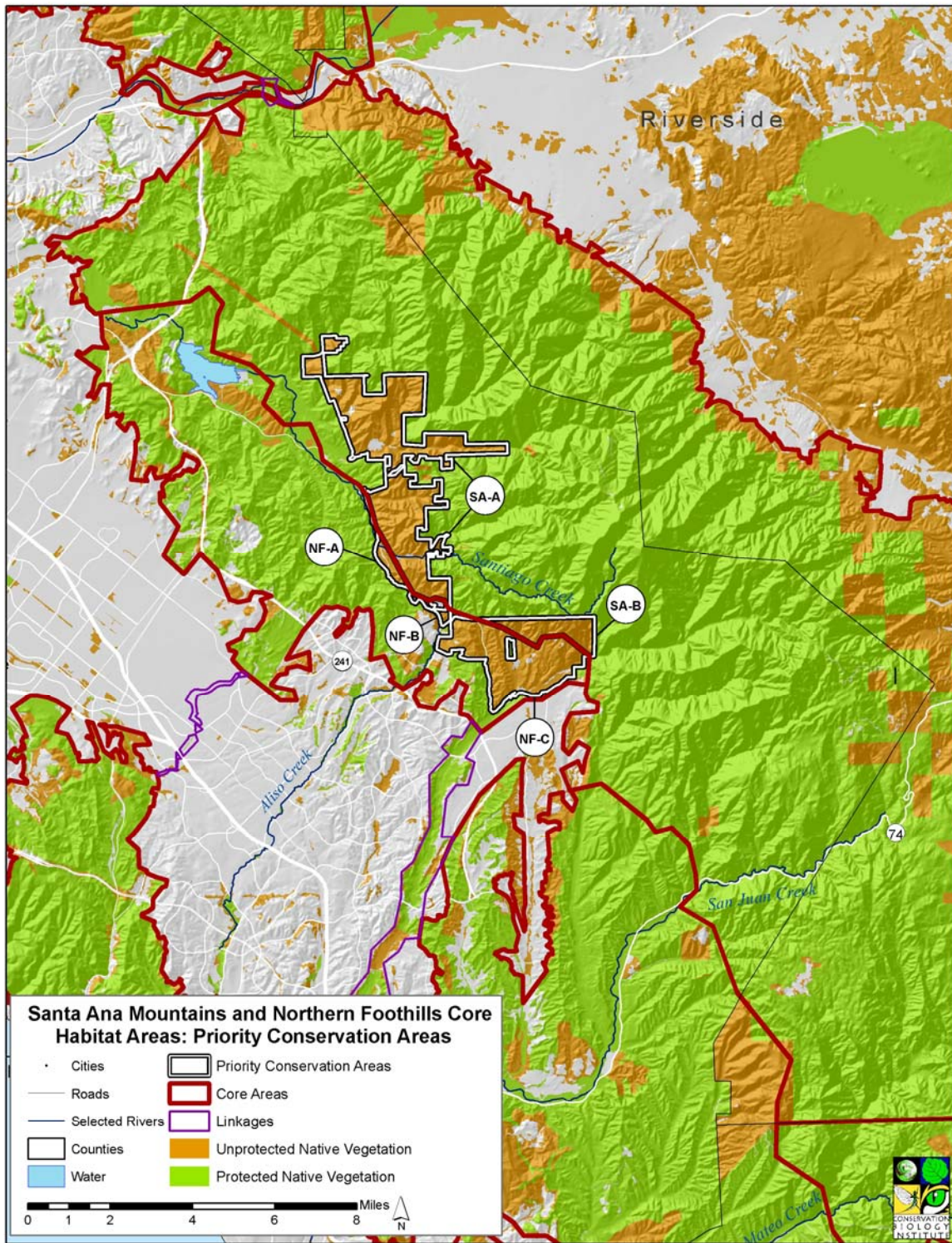


Figure 8. Santa Ana Mountains and Northern Foothills Core Habitat Areas: Priority Conservation Areas (Santa Ana Mountains = SA-A, SA-B; Northern Foothills = NF-A, NF-B, NF-C).



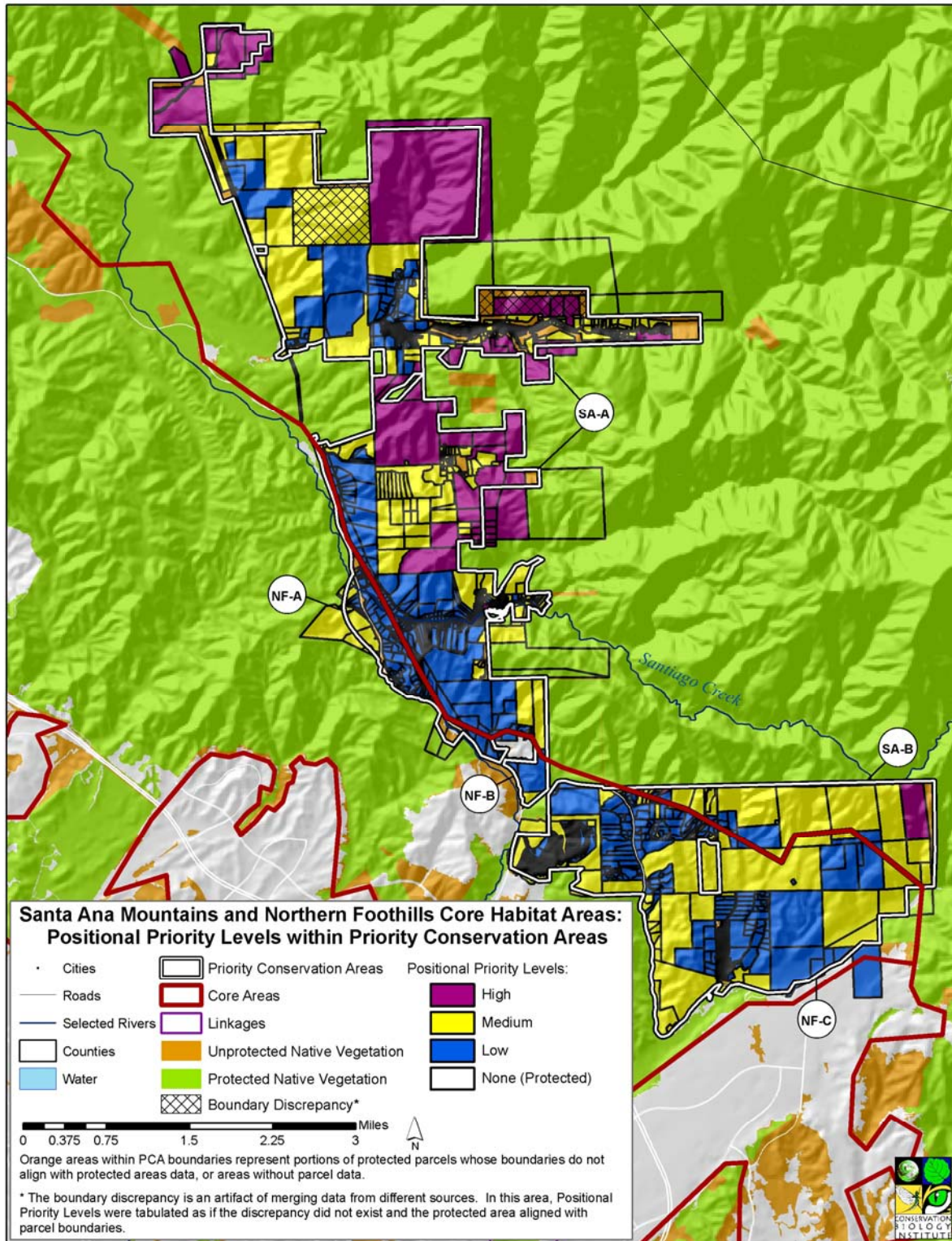


Figure 9. Santa Ana Mountains and Northern Foothills Core Habitat Areas: Positional Priority Levels within Priority Conservation Areas.



### Southern Foothills Core Habitat Area

The Southern Foothills is the second largest core habitat area in Orange County. It is contiguous with the Santa Ana Mountains core to the north and protected lands to the south and east in San Diego and Riverside counties, respectively. This core supports high biodiversity, including many sensitive habitats and core populations of filtered species. Key conservation objectives for this core include:

- Minimize internal fragmentation and maintain connectivity to protected lands in San Diego County;
- Conserve regionally under-protected vegetation communities (riparian mixed shrub, annual grasses and forbs);
- Conserve core populations of filtered species, including arroyo toad, coastal cactus wren, coastal California gnatcatcher, least Bell's vireo, mountain lion, and bobcat.

Four PCAs were identified within this core (Figure 10). Figure 11 depicts the Positional Priority Levels of parcels within these PCAs. No submittal properties occur within the Southern Foothills PCAs.

### San Joaquin Hills Core Habitat Area

This medium-sized core habitat area supports relatively high biodiversity and is largely protected, but it is nearly isolated from other core habitat areas. Key conservation objectives for this core include:

- Ensure connectivity to the Northern Foothills or Southern Foothills cores via the Irvine Linkage (if deemed viable) or the Trabuco Creek/San Juan Creek linkages;
- Conserve regionally under-protected vegetation communities (Fremont cottonwood, willow, annual grasses and forbs);
- Conserve core populations of filtered species, including coastal cactus wren, coastal California gnatcatcher, least Bell's vireo, bobcat, big-leaved crownbeard, Laguna Beach dudleya, and many-stemmed dudleya).

Three PCAs were identified within this core (Figure 12). Figure 13 depicts the Positional Priority Levels of parcels within these PCAs.

### Chino Hills Core Habitat Area

The Chino Hills comprise a medium-sized core habitat area that is particularly important in providing habitat for large-area dependent species such as mountain lion. This core also supports a number of under-represented vegetation communities, including the only California walnut woodland in Orange County, and core populations of filtered species. Key conservation objectives for this core include:



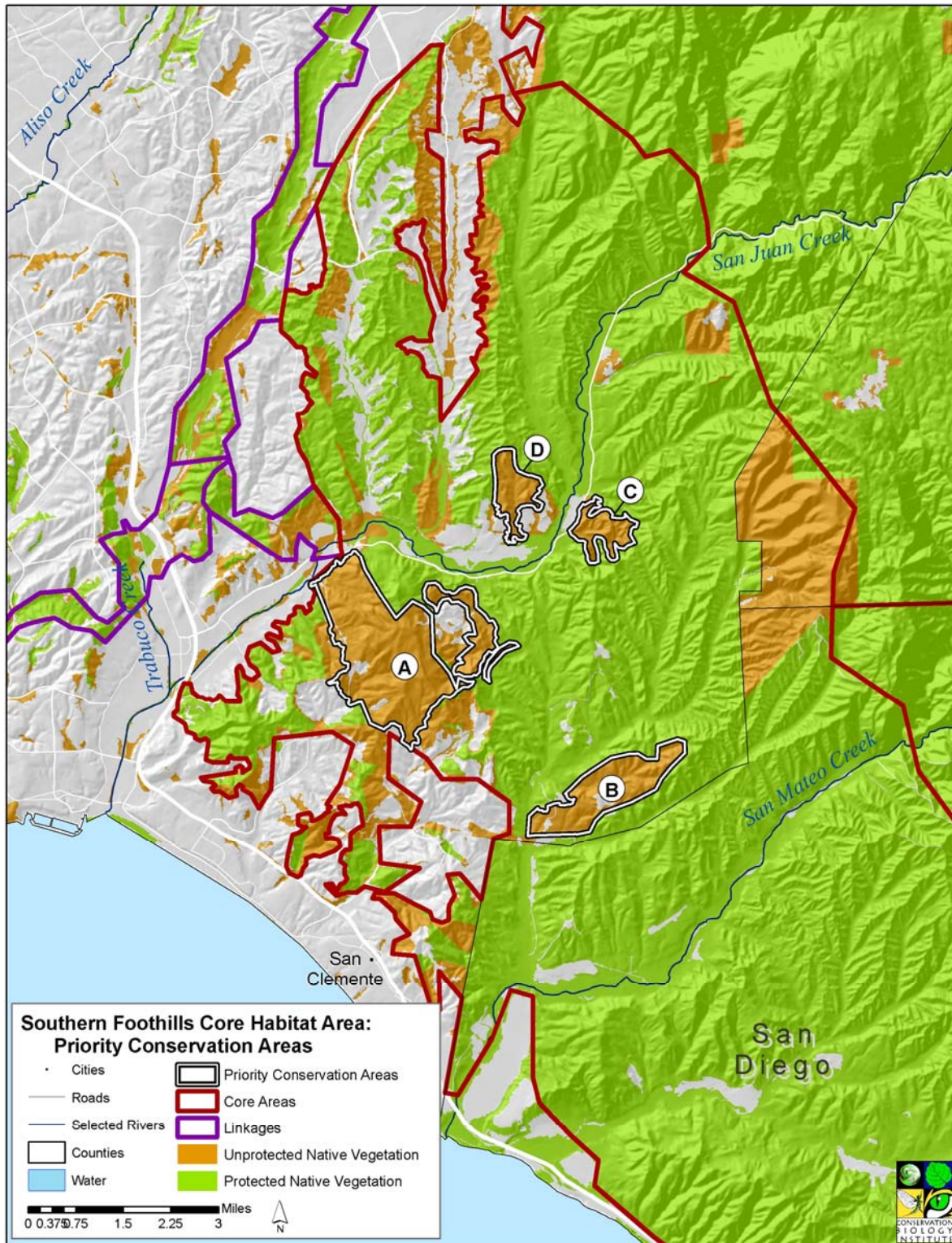


Figure 10. Southern Foothills Core Habitat Area: Priority Conservation Areas (A, B, C, D).



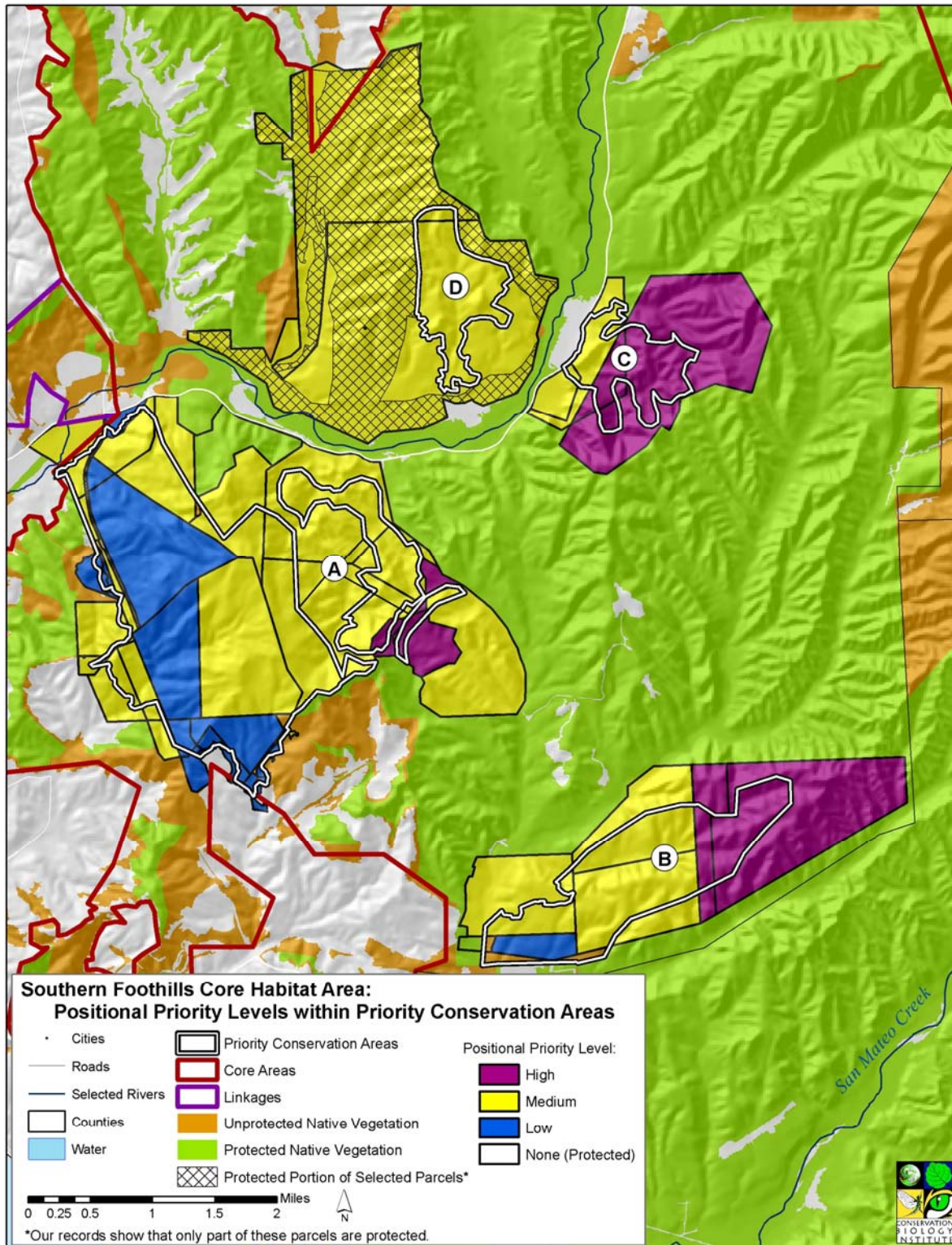


Figure 11. Southern Foothills Core Habitat Area: Positional Priority Levels within Priority Conservation Areas.



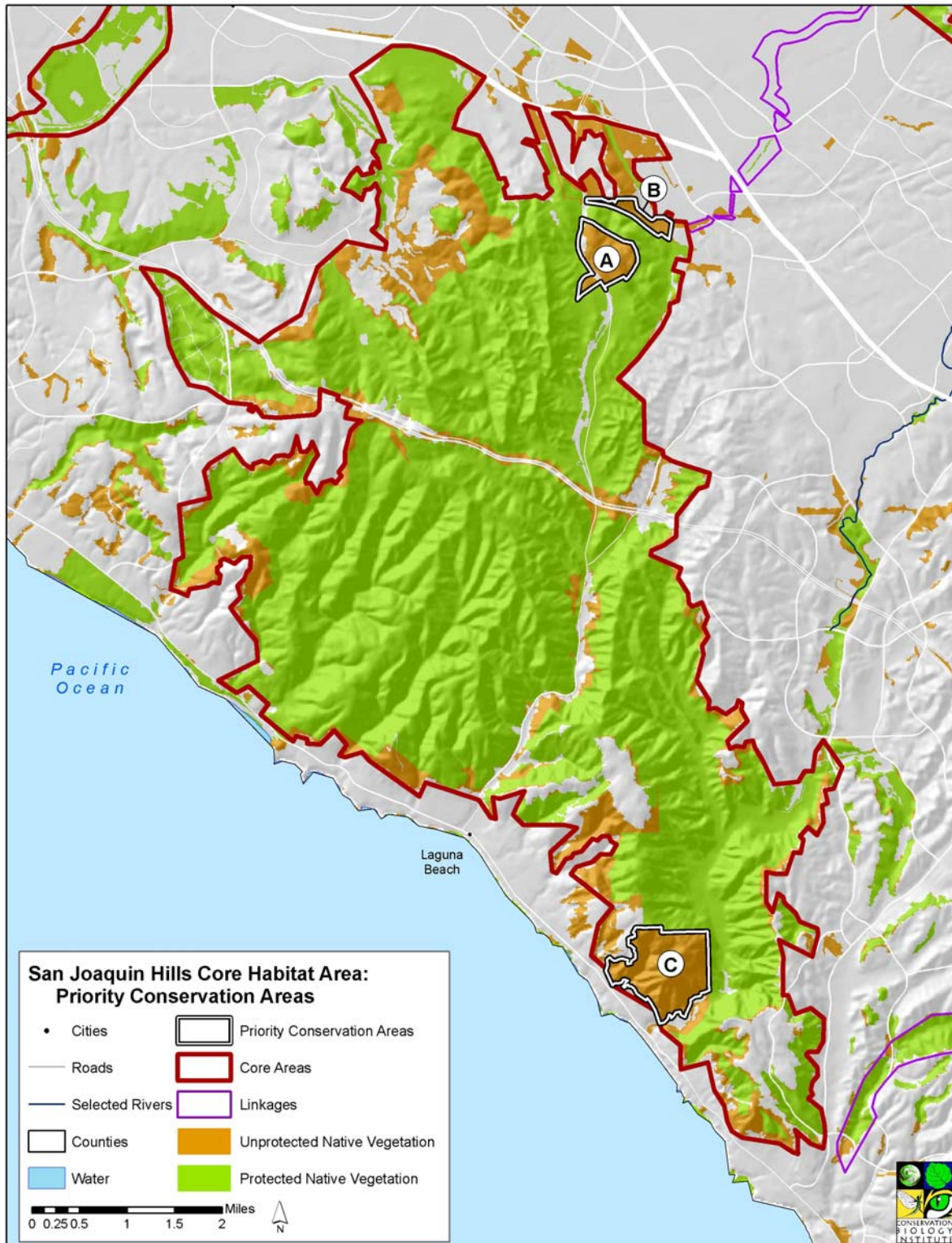


Figure 12. San Joaquin Hills Core Habitat Area: Priority Conservation Areas (A, B, C).

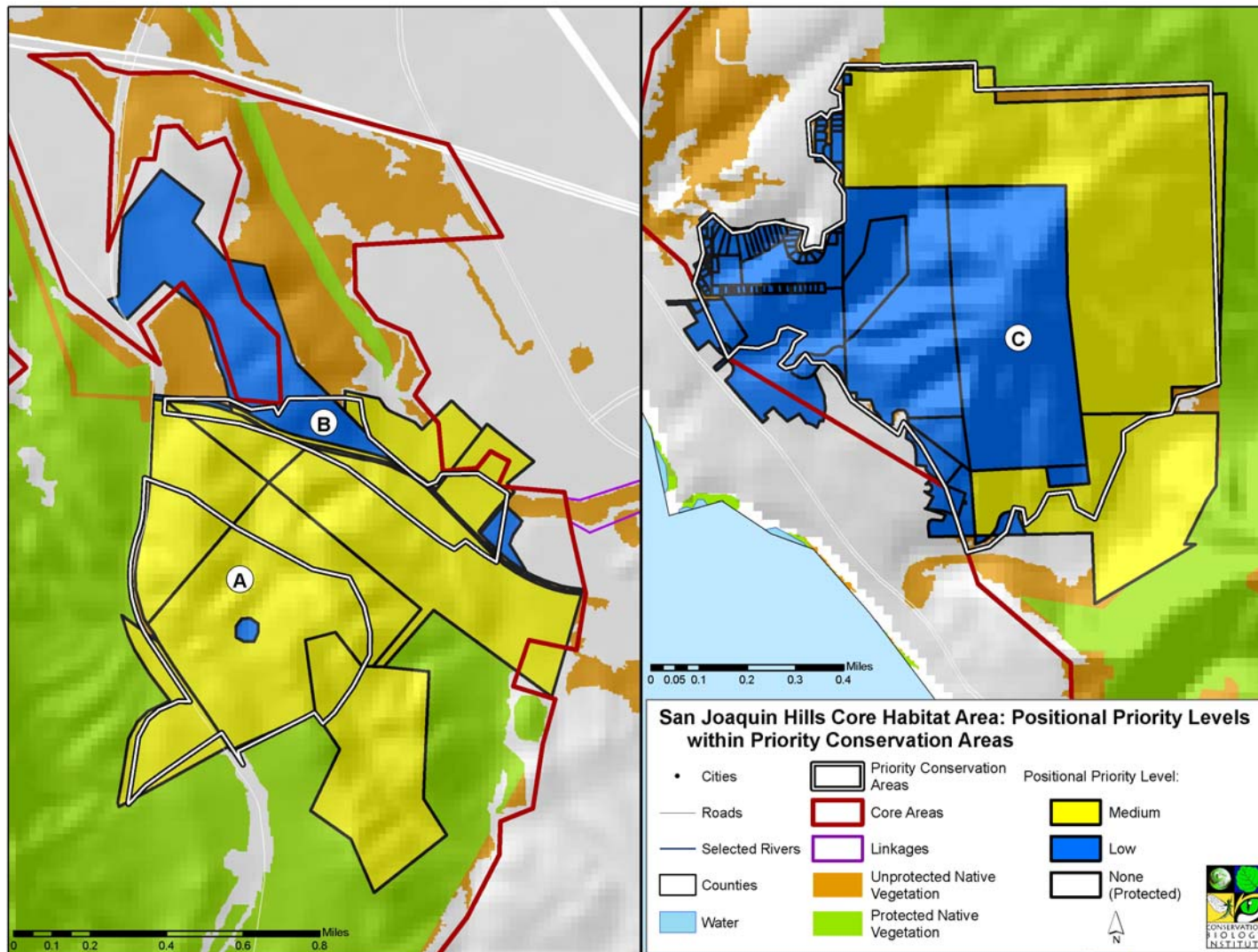


Figure 13. San Joaquin Hills Core Habitat Area: Positional Priority Levels within Priority Conservation Areas.



Minimize internal fragmentation and maintain connectivity to the Puente Hills and Santa Ana Mountains;

- Maintain the integrity of Chino Hills State Park;
- Conserve regionally under-protected vegetation communities (California walnut woodland, coastal mixed hardwood, riparian mixed hardwood, willow, annual grasses and forbs);
- Conserve core populations of filtered species, including coastal cactus wren, coastal California gnatcatcher, mountain lion, and bobcat.

Three PCAs were identified within this core (Figure 14). Figure 15 depicts the Positional Priority Levels of parcels within these PCAs.

#### West Coyote Hills Core Habitat Area

The West Coyote Hills is a small core area that is isolated from other core habitat areas by urban development. Nonetheless, it supports critical habitat for the coastal California gnatcatcher, as well as core populations of gnatcatcher and coastal cactus wren. Key conservation objectives for this core include:

- Maintain habitat for coastal cactus wren and coastal California gnatcatchers;
- Conserve core populations of coastal cactus wren and coastal California gnatcatcher.

Three PCAs were identified within this core (Figure 16). Figure 17 depicts the Positional Priority Levels of parcels within these PCAs.

#### Upper Santa Ana River Core Habitat Area

The Upper Santa Ana River comprises the smallest core habitat area in Orange County, but supports a majority of the unprotected riparian habitat. This core is situated between two larger cores, and supports riparian obligate bird species. Key conservation objectives for this core include:

- Conserve regionally under-protected vegetation communities (Fremont cottonwood, riparian mixed hardwood, willow);
- Conserve core populations of filtered species, including Santa Ana sucker habitat, least Bell's vireo, and southwestern willow flycatcher.

Three PCAs were identified within this core (Figure 18). Figure 19 depicts the Positional Priority Levels of parcels within these PCAs. No submittal properties occur within the Upper Santa Ana River PCAs.



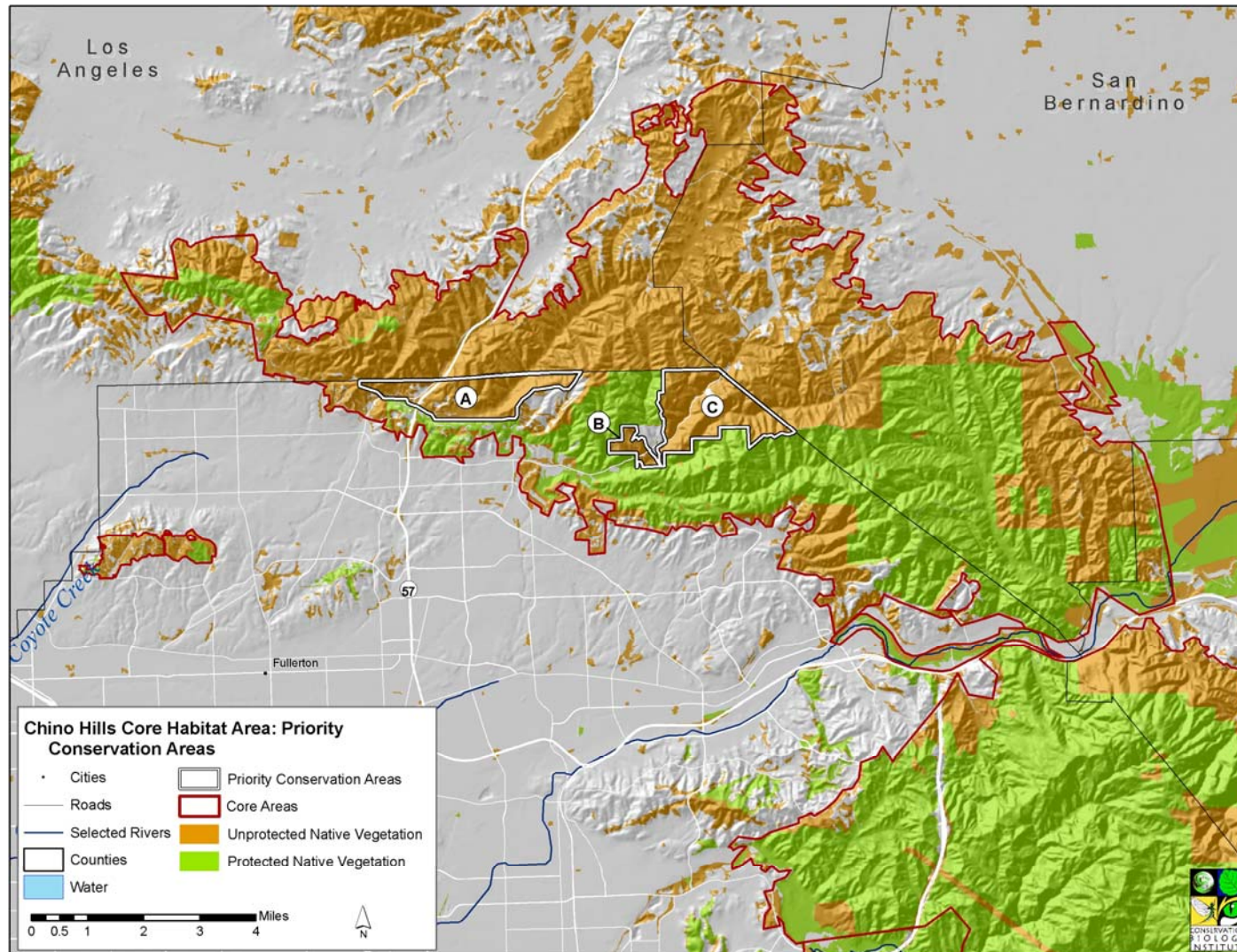


Figure 14. Chino Hills Core Habitat Area: Priority Conservation Areas (A, B, C).



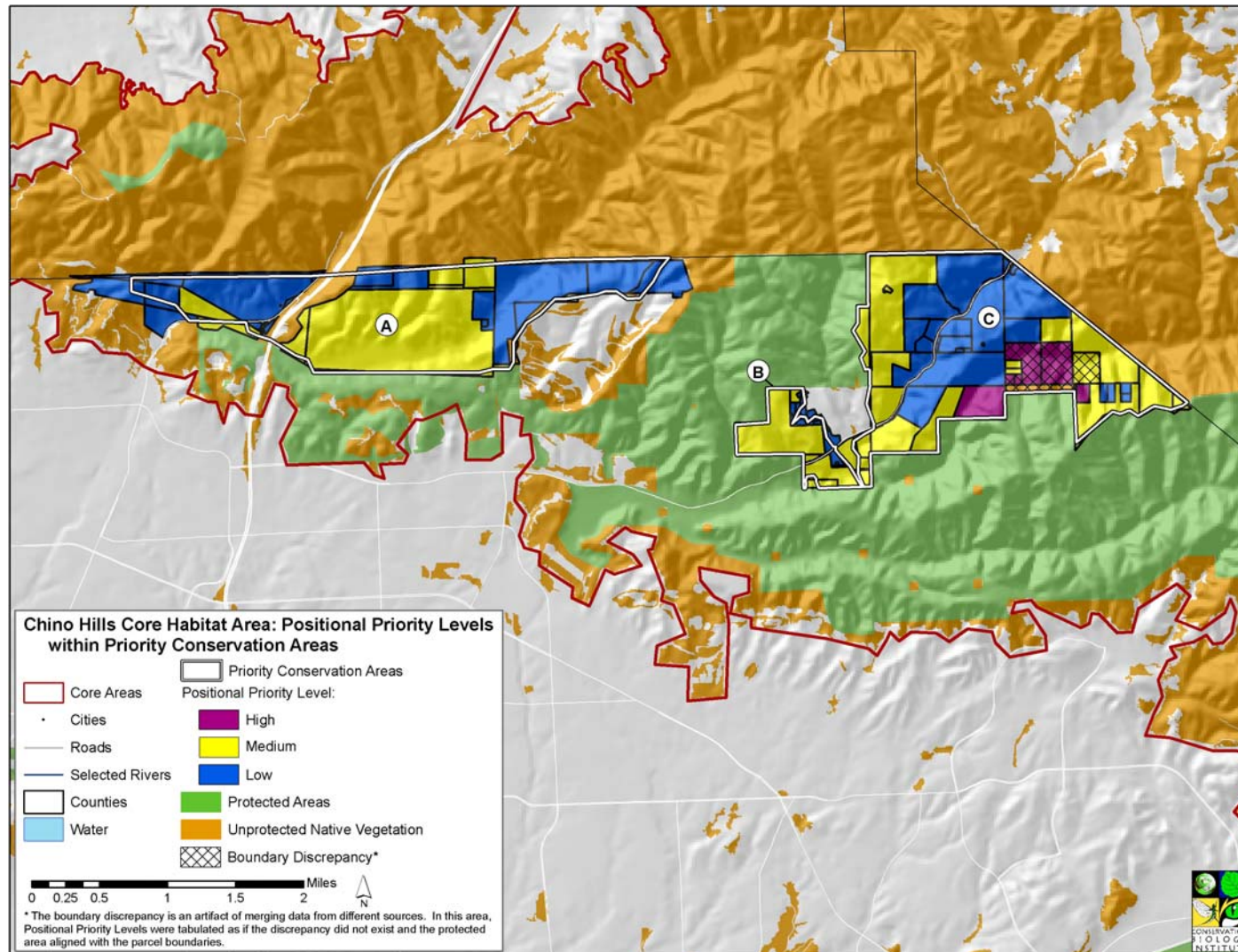


Figure 15. Chino Hills Core Habitat Area: Positional Priority Levels within Priority Conservation Areas.

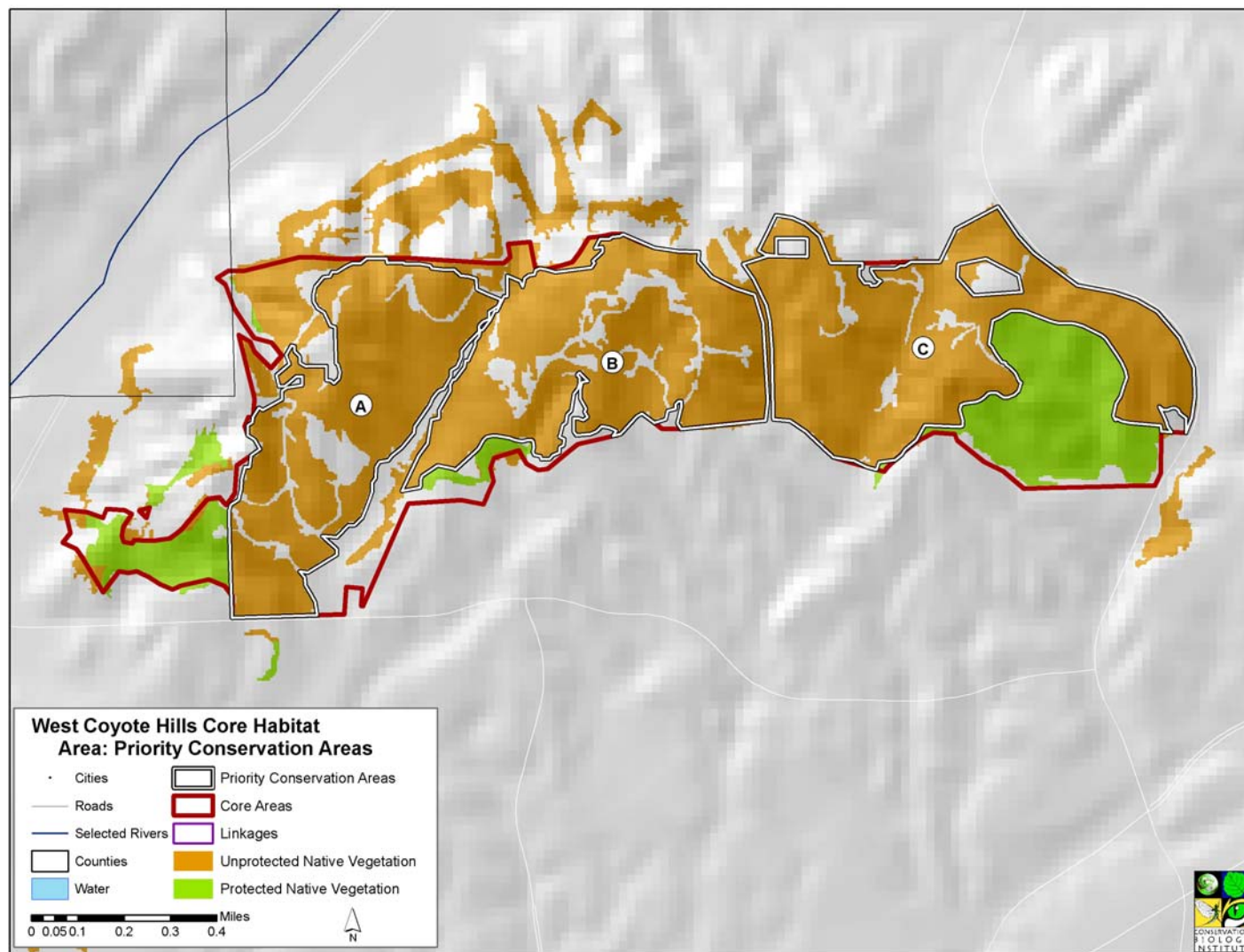


Figure 16. West Coyote Hills Core Habitat Area: Priority Conservation Areas (A, B, C).

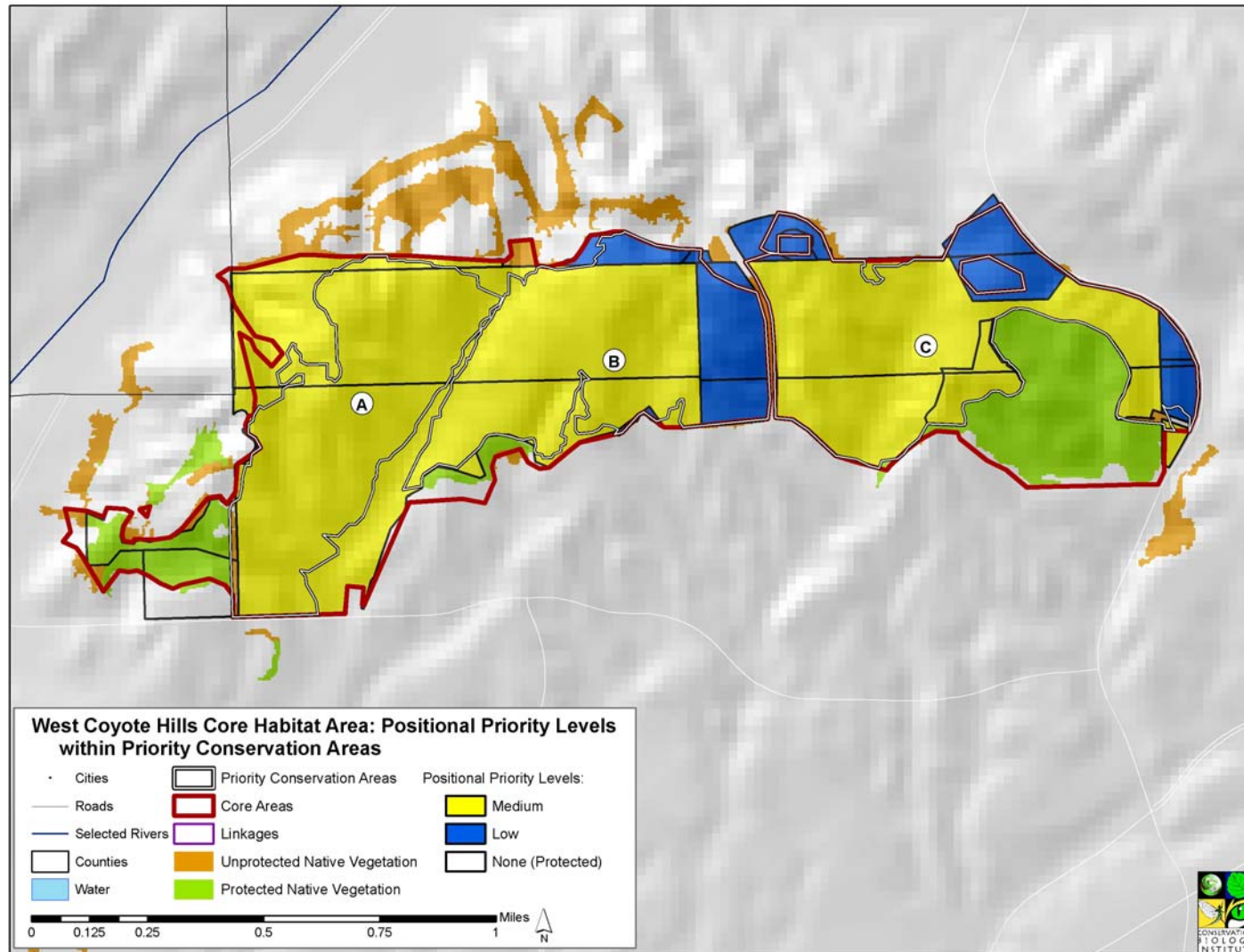


Figure 17. West Coyote Hills Core Habitat Area: Positional Priority Levels within Priority Conservation Areas.



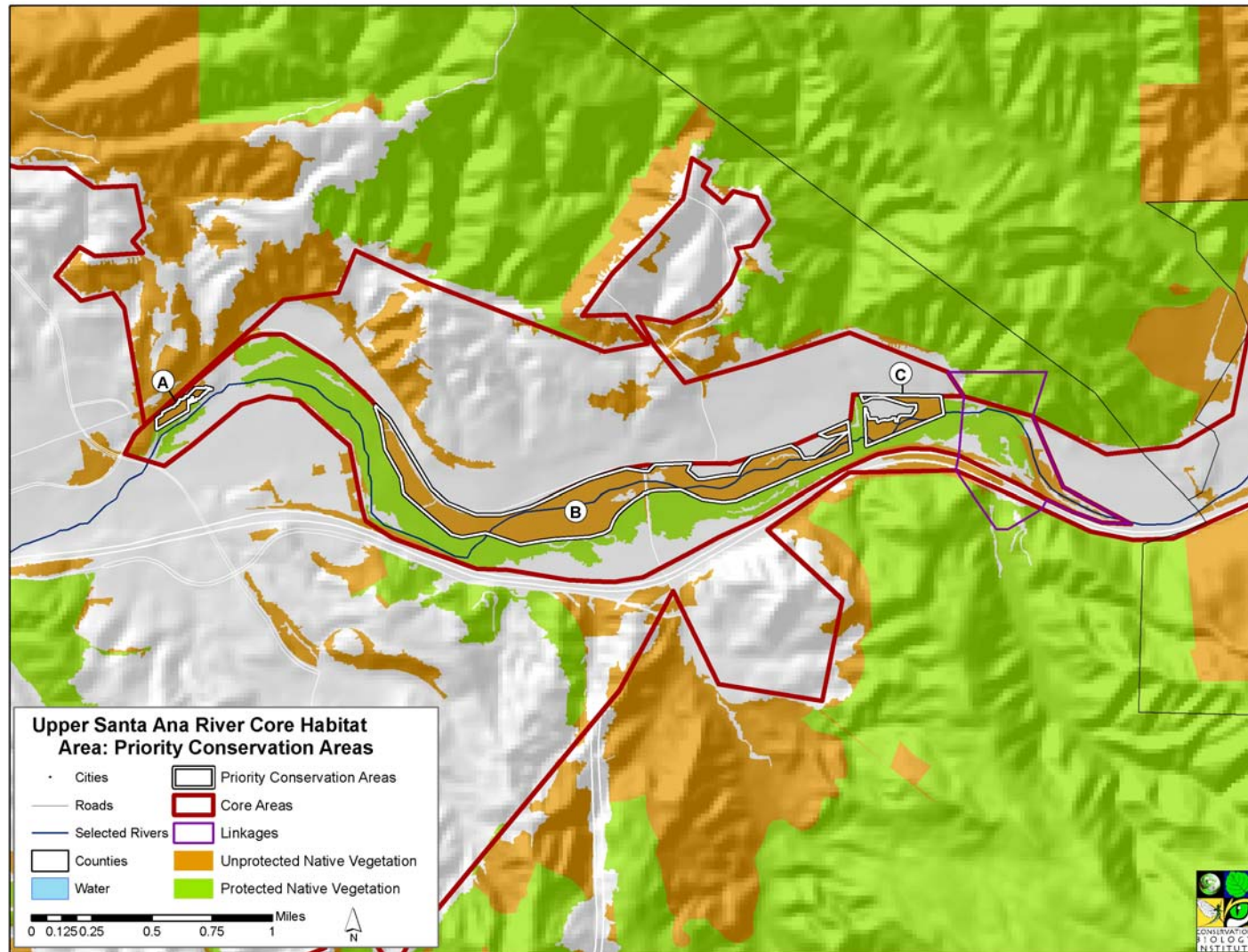


Figure 18. Upper Santa Ana River Core Habitat Area: Priority Conservation Areas (A, B, C).



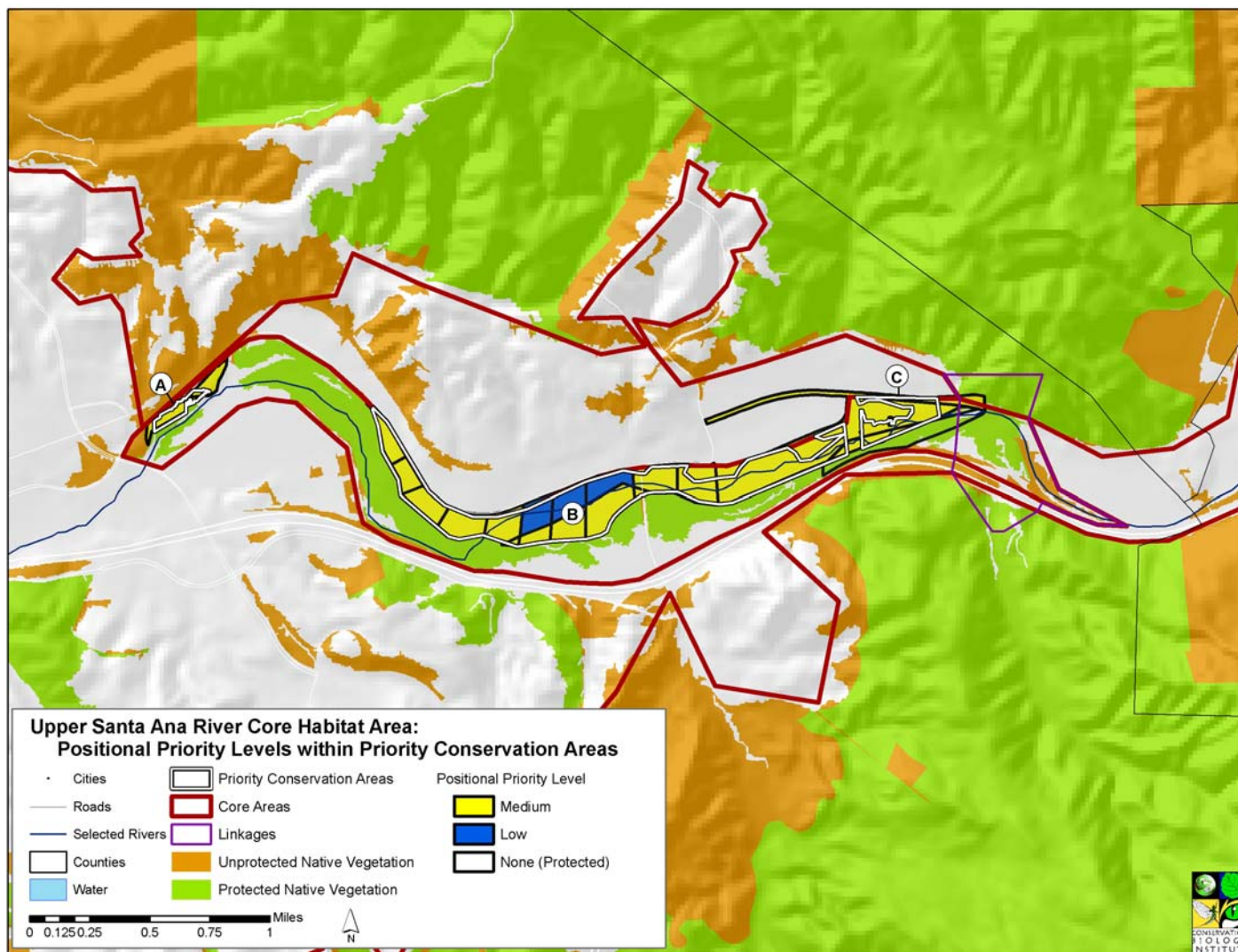


Figure 19. Upper Santa Ana River Core Habitat Area: Positional Priority Levels within Priority Conservation Areas.



### North Coast Core Habitat Areas

The four North Coast lagoons (and adjacent upland habitat) are among the smallest core habitat areas in the County, but support important coastal wetland habitats and high concentrations of threatened and endangered species. Because of their small size and isolation, all of these areas have some loss of ecosystem functions and are subject to edge effects. Conservation objectives for these cores focus on buffering existing habitat and conserving regionally under-protected vegetation communities and/or core populations of filtered species. In most cases, the amount of unprotected lands available for acquisition is relatively small compared to other core habitat areas (Figure 20); the Seal Beach core habitat area contains virtually no lands available for acquisition.

#### *Seal Beach Core Habitat Area*

Key conservation objectives for this core include:

- Buffer existing habitat against development.

No PCAs were identified within this core. Maintenance of lands adjacent to and east of this core as low-intensity land uses will help buffer valuable wetland habitat within the core.

#### *Bolsa Chica Core Habitat Area*

In addition to sensitive wetland habitat, this core contains extensive grasslands that provide valuable foraging areas for raptors. Key conservation objectives for this core include:

- Buffer existing habitat against development;
- Conserve regionally under-protected vegetation (riparian mixed hardwood, annual grasses and forbs).

Five PCAs were identified within this core (Figure 20). Figure 21 depicts the Positional Priority Levels of parcels within these PCAs.

#### *Santa Ana River Mouth Core Habitat Area*

In addition to supporting wetland habitat and core populations of coastal marsh bird species, this core also supports sensitive coastal bluff scrub and grasslands important for foraging raptors. Key conservation objectives for this core include:

- Buffer existing habitat against development;
- Conserve regionally under-protected vegetation communities (willow, coastal bluff scrub, annual grasses and forbs);
- Protect core populations of filtered species, including coastal California gnatcatcher.

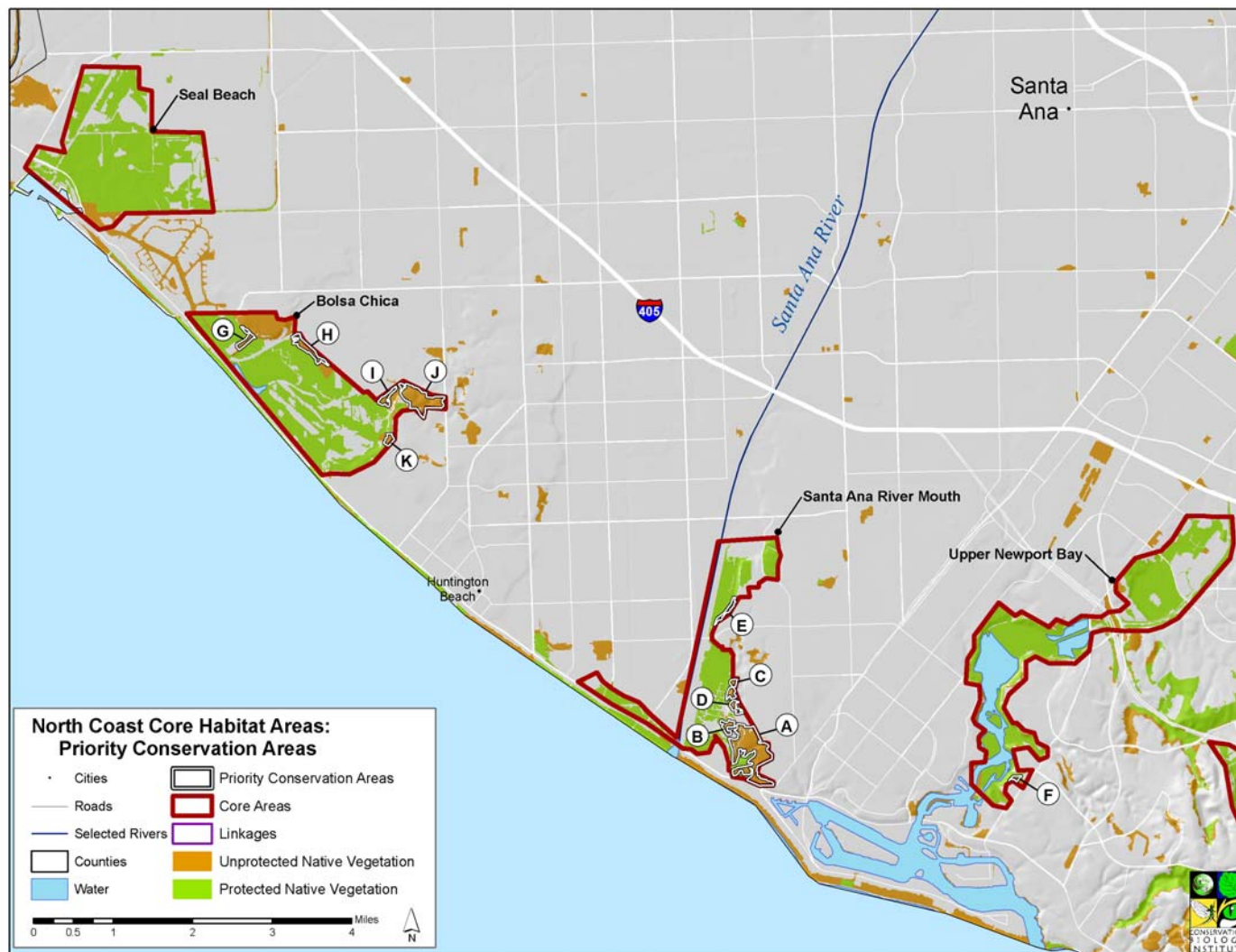


Figure 20. North Coast Core Habitat Areas: Priority Conservation Areas (Santa Ana River Mouth = A, B, C, D, E); Upper Newport Bay = F; Bolsa Chica = G, H, I, J, K).



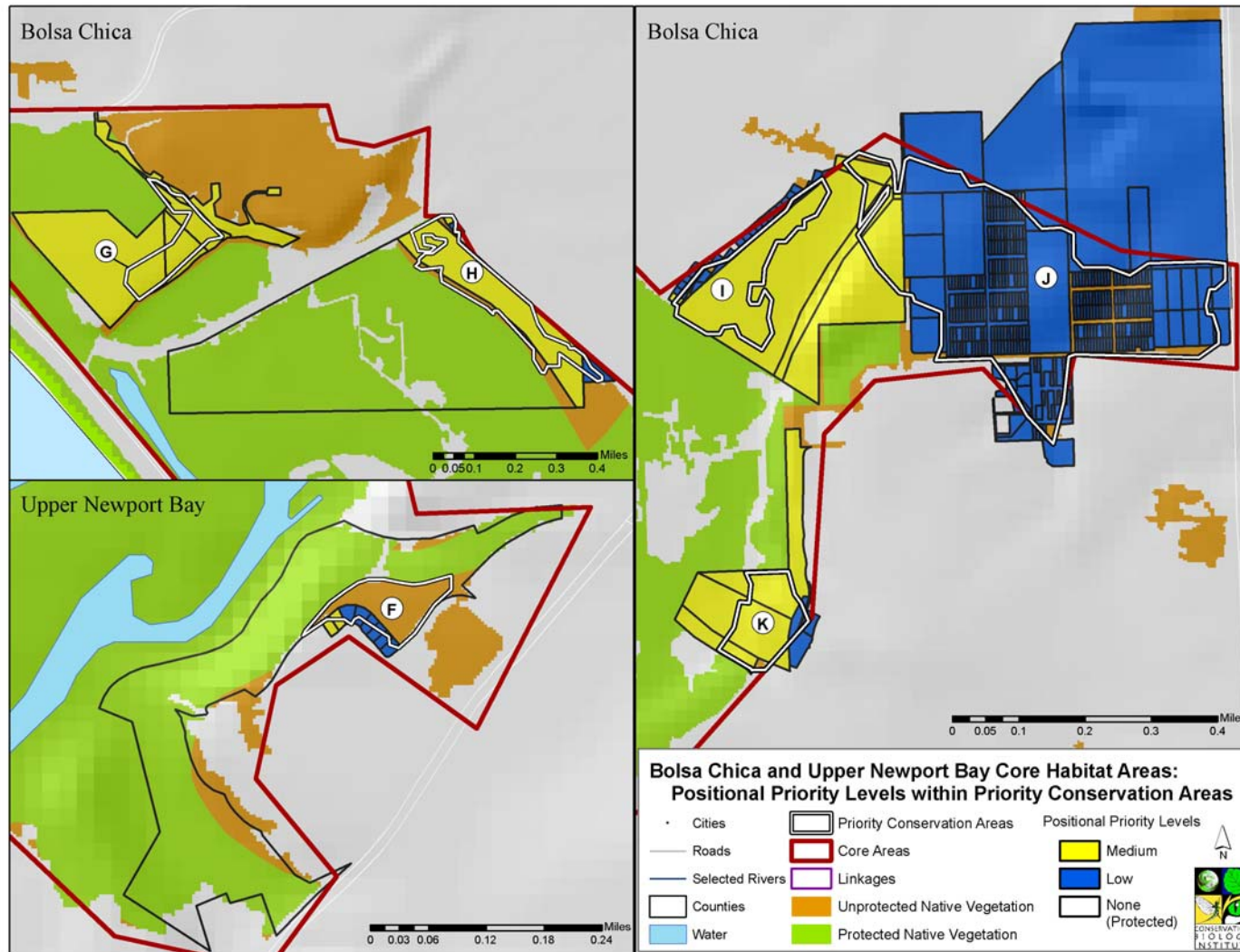


Figure 21. Bolsa Chica and Upper Newport Bay Core Habitat Areas: Positional Priority Levels within Priority Conservation Areas.





Five PCAs were identified within this core (Figure 20). Figure 22 depicts the Positional Priority Levels of parcels within these PCAs.

#### *Upper Newport Bay Core Habitat Area*

In addition to supporting wetland habitat and core populations of coastal marsh bird species, this core also supports sensitive coastal bluff scrub and grasslands important for foraging raptors. Key conservation objectives include:

- Buffer existing habitat against development;
- Conserve regionally under-protected vegetation communities (willow, coastal bluff scrub, annual grasses and forbs);
- Protect core populations of filtered species, including coastal California gnatcatcher.

One PCA was identified within this core (Figure 20). Figure 21 depicts the Positional Priority Levels of parcels within this PCA. No submittal properties occur within the Upper Newport Beach PCA.

#### *Linkages Between Core Habitat Areas*

Conservation objectives for linkages focus primarily on maintaining or enhancing functionality. For the Trabuco and San Juan Creek linkages, continuity is the overriding factor.

#### Coal Canyon Linkage (Existing)

Key conservation objectives to enhance or restore functionality for large-area-dependent species include:

- Restore/enhance riparian vegetation at the undercrossing to promote wildlife use and mitigate noise effects;
- Restrict or limit road-widening projects or infrastructure improvements that would adversely affect wildlife use of this linkage.

Because Coal Canyon is an existing linkage, no PCAs were designated.

#### Irvine Linkage

A large portion of the Irvine linkage is protected, but in need of restoration. The greatest impediment to creating a functional linkage, particularly for large-area dependent species, is the I-5 undercrossing at the El Toro “Y.” In addition, wildlife movement is constrained west of this undercrossing where the corridor narrows due to existing development. Key conservation objectives for this proposed linkage include:

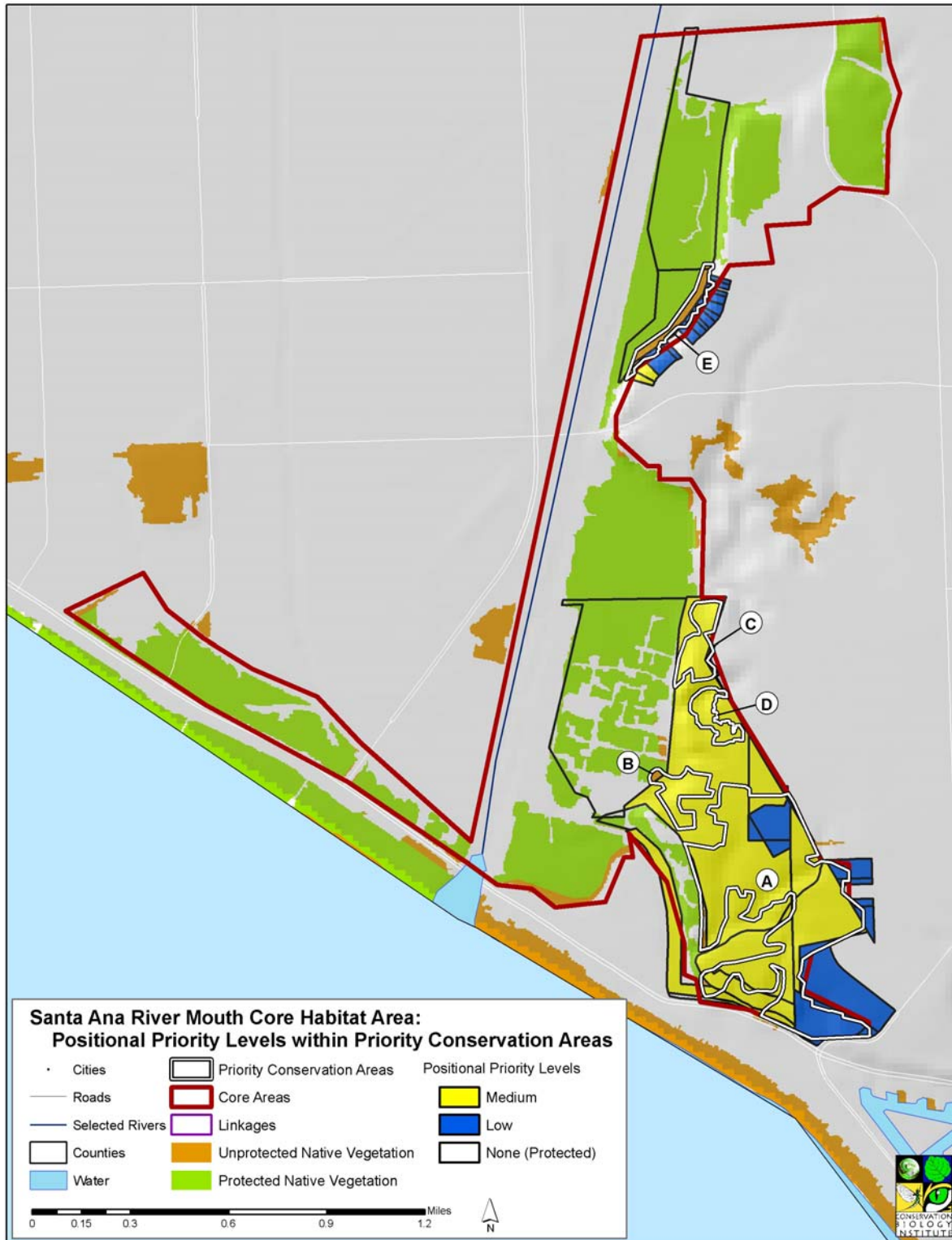


Figure 22. Santa Ana River Mouth Core Habitat Area: Positional Priority Levels within Priority Conservation Areas.



Determine the feasibility of establishing a functional wildlife undercrossing at the El Toro Y;

- Restore native habitat;
- Modify existing road crossings and railroad crossings to facilitate wildlife movement;
- Limit new road crossings;
- Expand the width of the corridor in selected areas.

No PCAs were identified within this linkage; however, PCA B, in the San Joaquin Hills, was identified because of its proximity to this potential linkage. If the Irvine linkage is determined to be viable, then acquisition of PCA B would enhance the linkage as it enters the San Joaquin Hills core habitat area.

#### Trabuco Creek Linkage

The Trabuco Creek linkage appears to be currently functional for wildlife, although acquisition in several key areas would secure this linkage and protect it from future development. Key conservation objectives for this linkage include:

- Ensure continuity between the San Joaquin Hills and Northern Foothills core habitat areas by acquiring or otherwise conserving key parcels at the southern end of the San Joaquin Hills, in the vicinity of the I-5 undercrossing, and in O'Neill Canyon (Trabuco Creek).

Five PCAs were identified (Figure 23). Three of these (A, B, D) also fall within the San Juan Creek linkage. Figure 24 depicts the Positional Priority Levels of parcels within these PCAs.

#### San Juan Creek Linkage

The San Juan Creek linkage would connect the San Joaquin Hills to the Southern Foothills. Much of this linkage follows the Trabuco Creek linkage to the I-5 undercrossing, then heads southeast to San Juan Creek. The functionality of the linkage east of I-5 is unknown; however, it is considered potentially viable based on existing habitat. Key conservation objectives for this linkage include:

- Ensure continuity between the San Joaquin Hills and Southern Foothills core habitat areas by acquiring or otherwise conserving key parcels at the southern end of the San Joaquin Hills, in the vicinity of the I-5 undercrossing, and between Trabuco and San Juan creeks.

Five PCAs were identified (Figure 23). Three of these (A, B, D) also fall within the Trabuco Creek Linkage. Figure 24 depicts the Positional Priority Levels of parcels within these PCAs.



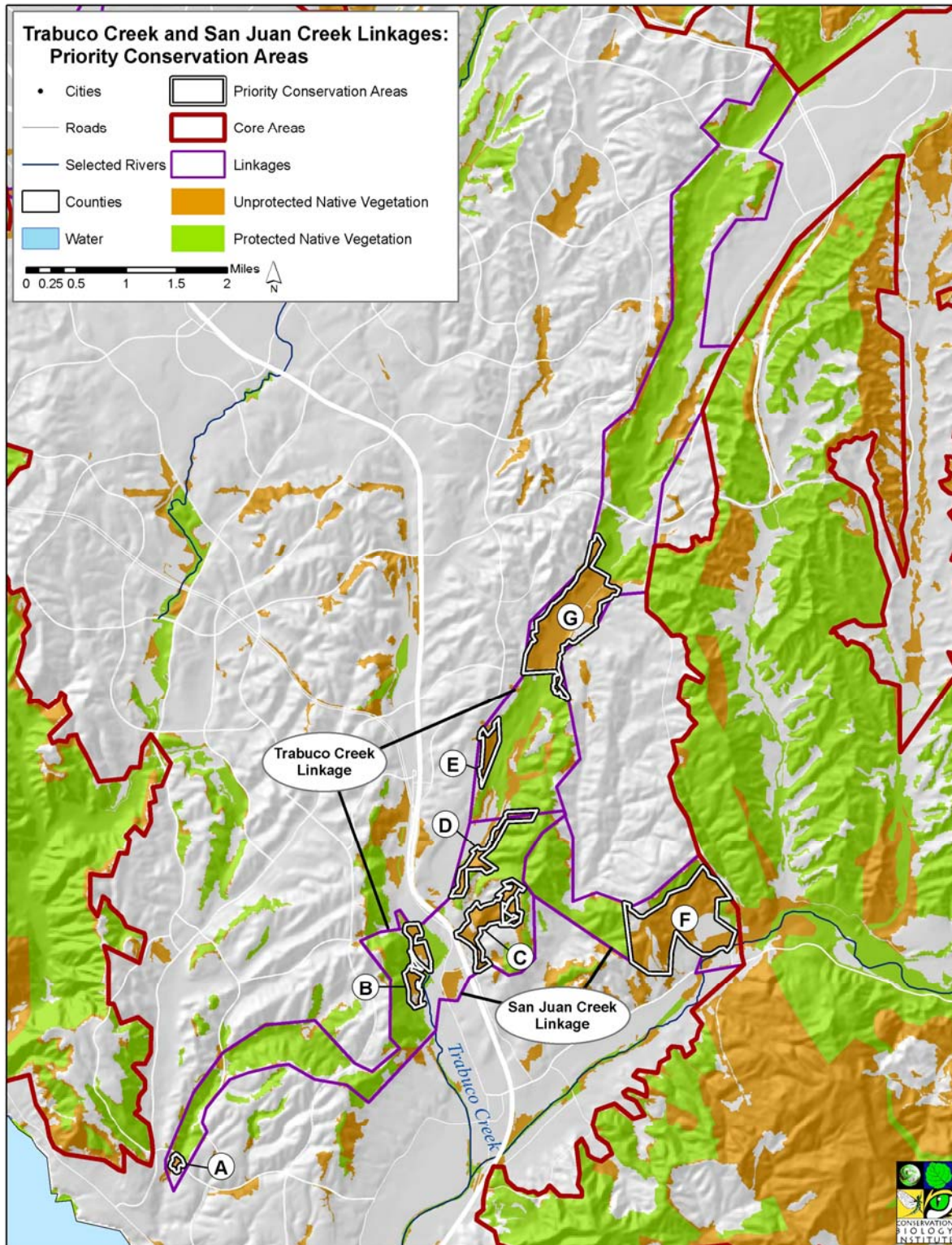


Figure 23. Trabuco Creek and San Juan Creek Linkages: Priority Conservation Areas (Trabuco Creek = A, B, D, E, G; San Juan Creek = A, B, C, D, F).



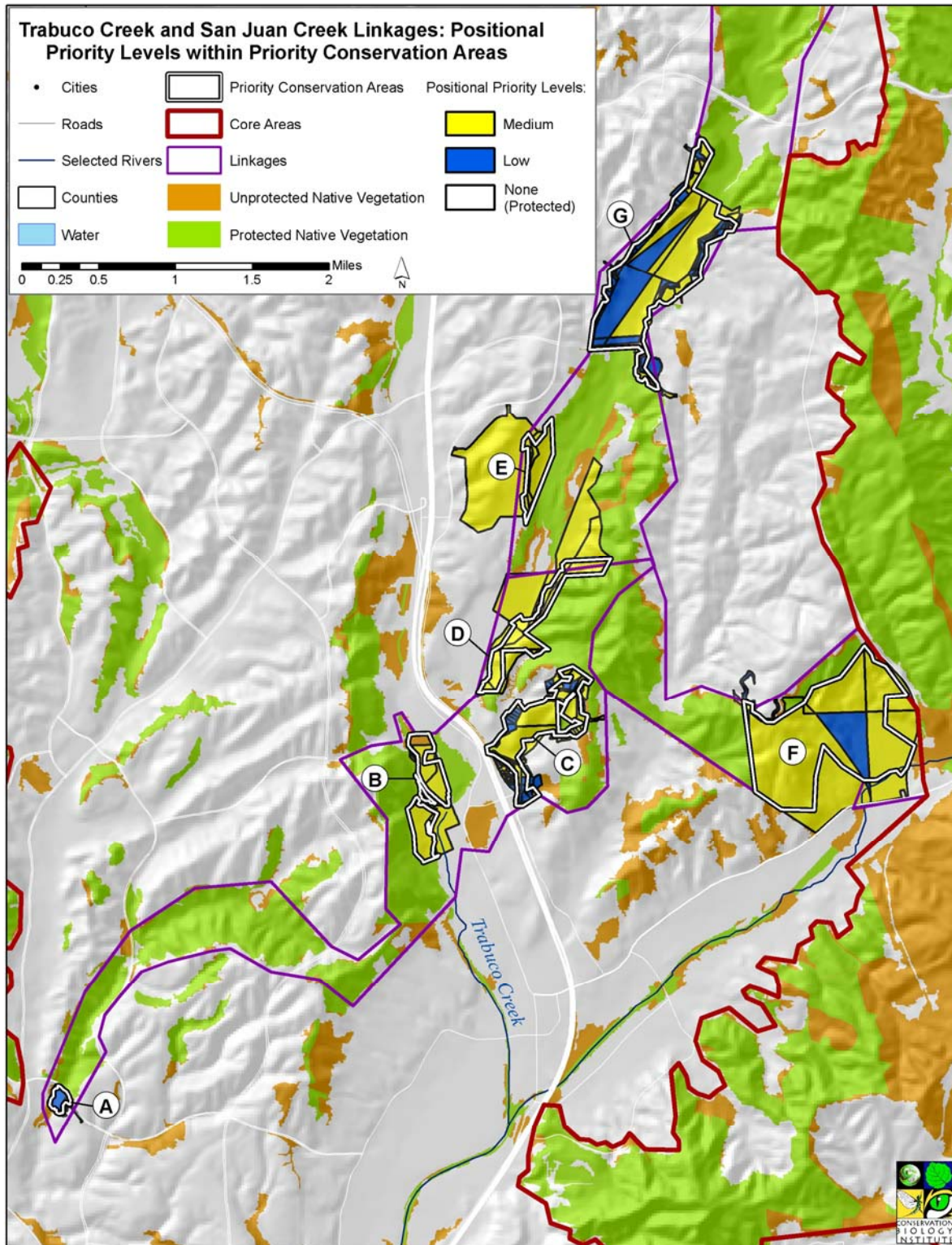


Figure 24. Trabuco Creek and San Juan Creek Linkages: Positional Priority Levels within Priority Conservation Areas.



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